SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO. W56ZTN19R0001	2. TYPE OF SOLICITATION ☐ SEALED BID (IFB) ☒ NEGOTIATED *(RFP)*	3. DATE ISSUED 15-Feb-2019	PAGE OF PAGES 1 OF 445

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

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

7. ISSUED BY CODE W56ZTN	8. ADDRESS OFFER TO *(If Other Than Item 7)* CODE
ACC-APG - GARRISON DIVISION (W56ZTN) ACC-APG GARRISON DIVISION BLDG 6001 6565 SURVEILLANCE LOOP ABERDEEN PROVING GROUND MD 21005-3013 TEL: FAX:	**See Item 7** TEL: FAX:

9. FOR INFORMATION CALL:	A. NAME	B. TELEPHONE NO. *(Include area code)* *(NO COLLECT CALLS)*
	SANDRA A. ANDERSON	443-861-4756

SOLICITATION

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

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

SBA Requirement Number: 0353/19/0184

This Requirements Solicitation is for Maintenance, Repair, Reconstruction, Demolition, Replacement, and/or Installation of a Wide Variety of Roofing Systems at Aberdeen Proving Ground, Maryland.

All work shall be in accordance with the Scope of Work, Terms and Conditions contained herein this Solicitation package.

This acquisition is being issued as a competitive 8(a) set-aside. NAICS Code 238160 and Size Standard of $15M.

The proposed requirement is for a Firm-Fixed Price, Indefinite Delivery, Requirements-Type Construction Contract. A base year and four option year periods are anticipated.

General Wage Decision Number(s): Applicable. Reference the current version(s) included in the solicitation.

Payment Terms: Partial Payments - Net 14 Days; Final Payment - Net 30 Days.

Block No. 11 below is completed to state: The Contractor shall begin performance within ten calendar days and complete each Task Order within the time specified and agreed upon delivery of the order. This performance is mandatory. FAR 52.211-10.

NOTE: A SITE VISIT WILL BE SCHEDULED FOR FEBRUARY 2019. AN AMENDMENT WILL BE ISSUED TO ANNOUNCE THE ACTUAL DATE AND TIME.

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* FAR 52.211-10 *.)*

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

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 _____ *(hour)* local time _____ *(date).* If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

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

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

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

SOLICITATION, OFFER, AND AWARD (Continued)

(Construction, Alteration, or Repair)

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

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

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

AMOUNTS	SEE SCHEDULE OF PRICES

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

19. ACKNOWLEDGMENT OF AMENDMENTS

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

AMENDMENT NO.										
DATE										

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

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

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

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

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

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

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

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

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1000			Job		
	BASE YEAR ROOFING FFP SBA REQUIREMENT NUMBER: 0353/19/0184. BASE YEAR ORDERING PERIOD (05/04/2019 - 05/03/2020) OR PERIOD OF ONE YEAR FROM DATE OF AWARD. CONTRACTOR TO FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, SERVICES AND INCIDENTAL FOR PERFORMING ALL WORK NECESSARY DURING CONSTRUCTION AS ASSOCIATED WITH MAINTENANCE, REPAIR, RECONSTRUCTION, DEMOLITION, REPLACEMENT, AND/OR INSTALLATION OF A WIDE VARIETY OF ROOFING SYSTEMS AT ABERDEEN PROVING GROUND, MARYLAND, AND EDGEWOOD (ABERDEEN PROVING GROUND SOUTH), MARYLAND. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1001			Job		
	BASE YEAR - PERFORMANCE & PAYMENT BONDS FFP Actual amount to be determined based on awarded contract amount and bond quote from surety after award. An estimated/normalized amount of $140,000 for Bond premiums is being estimated for all offerors. Performance and Payment Bonds (See Clause 52.228-15, Performance and Payment Bonds -- Construction (Oct 2010) FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1002			Job		

BASE YEAR - CMRA
FFP
NO COST TO THE GOVERNMENT/NOT SEPARATELY PRICED.
The Contractor shall report ALL Contractor labor hours (including subcontractor labor hours) required for performance of services provided under this purchase order for roofing. The Contractor is required to completely fill in all required data fields using the following web address: http://www.ecmra.mil/, and then click on "Department of the Army CMRA" or the icon of the DoD organization that is receiving or benefitting from the contracted services. Reporting inputs will be for the labor executed during the period of performance during each Government fiscal year (FY), which runs October 1 through September 30. While inputs may be reported any time during the FY, all data shall be reported no later than October 31 of each calendar year, beginning with 2019. Contractors may direct questions to the help desk at help desk at: http://www.ecmra.mil/, by clicking on "Send an email" which is located under the Help Resources ribbon on the right side of the login page of the applicable Service/Components Contractor Manpower Reporting website.
FOB: Destination
PSC CD: Z1JZ

NET AMT

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
2000			Job		
OPTION	OPTION YEAR 1 - ROOFING FFP SBA REQUIREMENT NUMBER: 0353/19/0184. OPTION YEAR 1 - ORDERING PERIOD (05/04/2020 - 05/03/2021) OR PERIOD OF ONE YEAR FROM DATE OF AWARD. CONTRACTOR TO FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, SERVICES AND INCIDENTAL FOR PERFORMING ALL WORK NECESSARY DURING CONSTRUCTION AS ASSOCIATED WITH MAINTENANCE, REPAIR, RECONSTRUCTION, DEMOLITION, REPLACEMENT, AND/OR INSTALLATION OF A WIDE VARIETY OF ROOFING SYSTEMS AT ABERDEEN PROVING GROUND, MARYLAND, AND EDGEWOOD (ABERDEEN PROVING GROUND SOUTH), MARYLAND. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
2001			Job		
OPTION	OPTION YEAR 1 - PERF. & PAYMENT BONDS FFP Actual amount to be determined based on awarded contract amount and bond quote from surety after award. An estimated/normalized amount of $140,000 for Bond premiums is being estimated for all offerors. Performance and Payment Bonds (See Clause 52.228-15, Performance and Payment Bonds -- Construction (Oct 2010) FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
2002			Job		
OPTION	OPTION YEAR 1 - CMRA FFP NO COST TO THE GOVERNMENT/NOT SEPARATELY PRICED. The Contractor shall report ALL Contractor labor hours (including subcontractor labor hours) required for performance of services provided under this purchase order for roofing. The Contractor is required to completely fill in all required data fields using the following web address: http://www.ecmra.mil/, and then click on "Department of the Army CMRA" or the icon of the DoD organization that is receiving or benefitting from the contracted services. Reporting inputs will be for the labor executed during the period of performance during each Government fiscal year (FY), which runs October 1 through September 30. While inputs may be reported any time during the FY, all data shall be reported no later than October 31 of each calendar year, beginning with 2019. Contractors may direct questions to the help desk at help desk at: http://www.ecmra.mil/, by clicking on "Send an email" which is located under the Help Resources ribbon on the right side of the login page of the applicable Service/Components Contractor Manpower Reporting website. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
3000			Job		
OPTION	OPTION YEAR 2 - ROOFING FFP SBA REQUIREMENT NUMBER: 0353/19/0184. OPTION YEAR 2 - ORDERING PERIOD (05/04/2021 - 05/03/2022) OR PERIOD OF ONE YEAR FROM DATE OF AWARD. CONTRACTOR TO FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, SERVICES AND INCIDENTAL FOR PERFORMING ALL WORK NECESSARY DURING CONSTRUCTION AS ASSOCIATED WITH MAINTENANCE, REPAIR, RECONSTRUCTION, DEMOLITION, REPLACEMENT, AND/OR INSTALLATION OF A WIDE VARIETY OF ROOFING SYSTEMS AT ABERDEEN PROVING GROUND, MARYLAND, AND EDGEWOOD (ABERDEEN PROVING GROUND SOUTH), MARYLAND. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
3001			Job		
OPTION	OPTION YEAR 2 - PERF. & PAYMENT BONDS FFP Actual amount to be determined based on awarded contract amount and bond quote from surety after award. An estimated/normalized amount of $140,000 for Bond premiums is being estimated for all offerors. Performance and Payment Bonds (See Clause 52.228-15, Performance and Payment Bonds -- Construction (Oct 2010) FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
3002			Job		
OPTION	OPTION YEAR 2 - CMRA FFP NO COST TO THE GOVERNMENT/NOT SEPARATELY PRICED. The Contractor shall report ALL Contractor labor hours (including subcontractor labor hours) required for performance of services provided under this purchase order for roofing. The Contractor is required to completely fill in all required data fields using the following web address: http://www.ecmra.mil/, and then click on "Department of the Army CMRA" or the icon of the DoD organization that is receiving or benefitting from the contracted services. Reporting inputs will be for the labor executed during the period of performance during each Government fiscal year (FY), which runs October 1 through September 30. While inputs may be reported any time during the FY, all data shall be reported no later than October 31 of each calendar year, beginning with 2019. Contractors may direct questions to the help desk at help desk at: http://www.ecmra.mil/, by clicking on "Send an email" which is located under the Help Resources ribbon on the right side of the login page of the applicable Service/Components Contractor Manpower Reporting website. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
4000			Job		
OPTION	OPTION YEAR 3 - ROOFING FFP SBA REQUIREMENT NUMBER: 0353/19/0184. OPTION YEAR 3 - ORDERING PERIOD (05/04/2022 - 05/03/2023) OR PERIOD OF ONE YEAR FROM DATE OF AWARD. CONTRACTOR TO FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, SERVICES AND INCIDENTAL FOR PERFORMING ALL WORK NECESSARY DURING CONSTRUCTION AS ASSOCIATED WITH MAINTENANCE, REPAIR, RECONSTRUCTION, DEMOLITION, REPLACEMENT, AND/OR INSTALLATION OF A WIDE VARIETY OF ROOFING SYSTEMS AT ABERDEEN PROVING GROUND, MARYLAND, AND EDGEWOOD (ABERDEEN PROVING GROUND SOUTH), MARYLAND. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
4001			Job		
OPTION	OPTION YEAR 3 - PERF. & PAYMENT BONDS FFP Actual amount to be determined based on awarded contract amount and bond quote from surety after award. An estimated/normalized amount of $140,000 for Bond premiums is being estimated for all offerors. Performance and Payment Bonds (See Clause 52.228-15, Performance and Payment Bonds -- Construction (Oct 2010) FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
4002			Job		
OPTION	OPTION YEAR 3 - CMRA FFP NO COST TO THE GOVERNMENT/NOT SEPARATELY PRICED. The Contractor shall report ALL Contractor labor hours (including subcontractor labor hours) required for performance of services provided under this purchase order for roofing. The Contractor is required to completely fill in all required data fields using the following web address: http://www.ecmra.mil/, and then click on "Department of the Army CMRA" or the icon of the DoD organization that is receiving or benefitting from the contracted services. Reporting inputs will be for the labor executed during the period of performance during each Government fiscal year (FY), which runs October 1 through September 30. While inputs may be reported any time during the FY, all data shall be reported no later than October 31 of each calendar year, beginning with 2019. Contractors may direct questions to the help desk at help desk at: http://www.ecmra.mil/, by clicking on "Send an email" which is located under the Help Resources ribbon on the right side of the login page of the applicable Service/Components Contractor Manpower Reporting website. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
5000			Job		
OPTION	OPTION YEAR 4 - ROOFING FFP SBA REQUIREMENT NUMBER: 0353/19/0184. OPTION YEAR 4 - ORDERING PERIOD (05/04/2023 - 05/03/2024) OR PERIOD OF ONE YEAR FROM DATE OF AWARD. CONTRACTOR TO FURNISH ALL PLANT, LABOR, MATERIAL, EQUIPMENT, SERVICES AND INCIDENTAL FOR PERFORMING ALL WORK NECESSARY DURING CONSTRUCTION AS ASSOCIATED WITH MAINTENANCE, REPAIR, RECONSTRUCTION, DEMOLITION, REPLACEMENT, AND/OR INSTALLATION OF A WIDE VARIETY OF ROOFING SYSTEMS AT ABERDEEN PROVING GROUND, MARYLAND, AND EDGEWOOD (ABERDEEN PROVING GROUND SOUTH), MARYLAND. FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
5001			Job		
OPTION	OPTION YEAR 4 - PERF. & PAYMENT BONDS FFP Actual amount to be determined based on awarded contract amount and bond quote from surety after award. An estimated/normalized amount of $140,000 for Bond premiums is being estimated for all offerors. Performance and Payment Bonds (See Clause 52.228-15, Performance and Payment Bonds -- Construction (Oct 2010) FOB: Destination PSC CD: Z1JZ				
				NET AMT	

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
5002 OPTION	OPTION YEAR 4 - CMRA FFP NO COST TO THE GOVERNMENT/NOT SEPARATELY PRICED. The Contractor shall report ALL Contractor labor hours (including subcontractor labor hours) required for performance of services provided under this purchase order for roofing. The Contractor is required to completely fill in all required data fields using the following web address: http://www.ecmra.mil/, and then click on "Department of the Army CMRA" or the icon of the DoD organization that is receiving or benefitting from the contracted services. Reporting inputs will be for the labor executed during the period of performance during each Government fiscal year (FY), which runs October 1 through September 30. While inputs may be reported any time during the FY, all data shall be reported no later than October 31 of each calendar year, beginning with 2019. Contractors may direct questions to the help desk at help desk at: http://www.ecmra.mil/, by clicking on "Send an email" which is located under the Help Resources ribbon on the right side of the login page of the applicable Service/Components Contractor Manpower Reporting website. FOB: Destination PSC CD: Z1JZ		Job		
				NET AMT	

DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	DODAAC / CAGE
1000	N/A	N/A	N/A	N/A
1001	N/A	N/A	N/A	N/A
1002	N/A	N/A	N/A	N/A
2000	N/A	N/A	N/A	N/A
2001	N/A	N/A	N/A	N/A
2002	N/A	N/A	N/A	N/A
3000	N/A	N/A	N/A	N/A
3001	N/A	N/A	N/A	N/A
3002	N/A	N/A	N/A	N/A

4000	N/A	N/A	N/A	N/A
4001	N/A	N/A	N/A	N/A
4002	N/A	N/A	N/A	N/A
5000	N/A	N/A	N/A	N/A
5001	N/A	N/A	N/A	N/A
5002	N/A	N/A	N/A	N/A

BASIS FOR AWARD

Evaluation Factors for Award

A. BASIS FOR AWARD

The award will be made based on the best overall proposal with appropriate consideration given to the following three evaluation factors: Technical (Factor I), Past Performance (Factor II), and Price (Factor III). To receive consideration for an award, an "Acceptable" rating must be achieved for the following two evaluation factors: Technical (Factor I) and Past Performance (Factor II). Factors I and II are of equal importance. All subfactors under Technical (Factor I) are of equal importance. Award will be made to the single responsible offeror, whose proposal has been determined to be technically acceptable (Factor I), acceptable for Past Performance (Factor II), and who has offered the lowest total price (Factor III), inclusive of all CLINs, including options. Offerors must be rated as acceptable for all factors and subfactors to receive the award. Price will be evaluated in accordance with FAR 15.404-1. The Government intends to evaluate proposals and make award without discussions. Offerors should ensure the completeness of their proposals and offer their best terms and conditions with their initial proposals. If negotiations are considered necessary, they will be conducted with those offerors in a competitive range. The determination of the competitive range will be the responsibility of the Contracting Officer and the Source Selection Authority. Factors and sub-factors are not numerically weighted. Price will be the ultimate determining factor for proposals rated as acceptable for Technical and Past Performance.

In order to be considered for award, offerors must be registered in the System for Award Management (SAM) under NAICS 238160 (Size Standard $15.0M) prior to contract award.

B. FACTORS AND SUB-FACTORS TO BE EVALUATED

The following evaluation factors and subfactors will be used to evaluate each proposal. A detailed explanation of the criteria for evaluation is set forth in the "evaluation approach", paragraph "C" of this section. During evaluation of each proposal, the Government will assign each factor/sub-factor an Acceptable/Unacceptable rating. Each sub-factor will be evaluated to determine if the proposed approach associated with each factor meets or does not meet the minimum performance or capability requirements. To receive an overall "Acceptable" factor rating, all sub-factors must receive an "Acceptable" rating.

Factor 1: Technical

The Technical factor is further divided into the following sub-factors:

a) Bonding Capacity
b) Quality Control and Safety
c) Key Personnel
d) Contract Management Plan (CMP)

Factor 2: Past Performance

Each offeror's past performance will be reviewed and evaluated on an acceptable or unacceptable basis.

Factor 3: Price

The resulting award will be an Indefinite Delivery requirement's type contract with task orders issued on a Firm Fixed Price (FFP) basis based on spreadsheet line item pricing incorporated into the award. The Government will evaluate offers for award purposes by adding the total of all CLIN/SubCLIN prices, including spreadsheets included in the solicitation.

NOTE: The Government will establish the contract total ("ceiling") based on the total evaluated price from the successful offeror's proposal, or in an amount up to $69M, whichever is deemed appropriate by the Contracting Officer at time of award.

C. EVALUATION APPROACH

All proposals shall be subject to evaluation by the Source Selection Team (SST). The SST will evaluated the proposals on an "Acceptable" or "Unacceptable" basis.

1. TECHNICAL: The evaluation process will consider the following:

The evaluation criteria provides for technical evaluations based upon criteria established before receipt of the proposals and is intended to ensure that the evaluation will be a structured process employing equitable measures.

Adequacy of Response: The proposal will be evaluated to determine whether the offeror's means and approach have adequately and completely considered, defined and satisfied the requirements specified in this solicitation. The proposal will be evaluated to determine the extent to which each requirement has been addressed in accordance with the proposal submission section of the solicitation.

Feasibility of Approach: The proposal will be evaluated to determine whether the offeror's methods and approach to meeting the solicitation requirements provides the Government with a high level of confidence of successful completion within the established or required timelines.

In order to be "Technically Acceptable" an offeror shall meet the following criteria of "Acceptable" or "Unacceptable" basis for the factors and subfactors listed below. In order to be considered technically acceptable, the offeror must address all elements of the subfactors. Failure to address all elements of the subfactors or failure to provide any required document will render the offeror technically unacceptable for that element. One (1) "Unacceptable" rating will render an offeror technically unacceptable. In such a case, the offeror will no longer be considered for award unless the Source Selection Authority/Contracting Officer determines that Discussions are necessary and the offeror is included in the competitive range.

Table – Technical Acceptable/Unacceptable Ratings

Rating	Description
Acceptable	Proposal clearly meets the minimum requirements of the solicitation.
Unacceptable	Proposal does not clearly meet the minimum requirements of the solicitation.

The technical evaluator will evaluate the offeror's proposal against the technical subfactors below:

a. Subfactor a: Bonding Capacity

The Government will evaluate the offeror's ability to provide evidence from its chosen Surety that it can obtain $10 Million of payment and performance bonds per year of performance specifically for this roofing contract based on the documentation that it submits with its proposal.

b. Subfactor b: Quality Control & Safety

The Government will evaluate the offeror based on the adequacy of its submitted discussion of planned Quality Control (QC) activities to meet the requirements of the contract. See below Proposal Submittal Requirements section for minimum required elements of QC activities and Safety to be included in the proposal submittal.

The Government will evaluate the offeror's (to include major subcontractors) commitment to and record of safe operations based on its Experience Modification Rate (EMR) for the previous five (5) year operating period. NOTE: An EMR of greater than 1.0 during any portion of the previous five (5) year operating period will be deemed unacceptable. A major subcontractor is defined as a subcontractor which is expected to perform 15% or more of the total work on the contract.

The Government will evaluate the offeror's (to include major subcontractors) commitment to and record of safe and regulatory compliant operations based on its OSHA recordable injuries/illnesses reports for the previous five (5) years. NOTE: The offeror's cumulative Lost Work Day Incidence Report (LWDI Report) average shall be at or below the national average LWDI for the SIC code for roofing and sheet metal trades (SIC code 1761) for the previous year.

A major subcontractor is defined as a subcontractor which is expected to perform 15% or more of the total work on the contract.

c. Subfactor c: Key Personnel

(IMPORTANT NOTE: Qualifications, education, and other information as outlined below in "Proposal Submission Requirements" must be clearly demonstrated/listed in the resumes provided. The Government will not make assumptions or fill-in the blanks)

Project Manager (PM):

The Government will evaluate the offeror's ability to provide at least one prime contractor PM that possesses the following experience/qualifications:

- A minimum of seven (7) years' experience in the construction/roofing field with a minimum of five (5) years' experience in roofing management.
- Has managed at a minimum, two roofing projects with a total value in excess of one million U.S. dollars.
- Certified Project Management Professional (PMP) as issued by the Project Management Institute (PMI) with a minimum of two years as a PMP.
- Possesses the 30 hour OSHA safety course or the 40 hour USACE Construction safety course.

Superintendents:

The Government will evaluate the offeror's ability to provide at least two prime contractor site superintendents that possess the following experience/qualifications:

- A minimum of seven (7) years journeyman level experience in the roofing field, with minimum of three (3) years' experience in supervisory positions in the industry.

Quality Control Manager (QCM):

The Government will evaluate the offeror's ability to provide a prime contractor QCM that possesses the following experience/qualifications:

- A minimum of seven (7) years' experience in construction quality control, five (5) of which shall be directly related to quality control of roofing projects.
- Is a Registered Roof Observer (RRO) currently certified by the Roof Consulting Institute (RCI) and in good standing, with a minimum of three years as an RRO.

Corporate Safety Manager:

The Government will evaluate the offeror's ability to provide a prime contractor Corporate

Safety Manager that possesses the following experience/qualifications:

- A minimum of seven years construction related experience, five of which must be solely dedicated to roofing projects.
- Is a certified site safety and health officer.
- Possesses the 30 hour OSHA safety course or the 40 hour USACE Construction safety course.

d. Subfactor d: Contract Management Plan (CMP)

The Government will evaluate the offeror's ability to perform based on its submitted information for the CMP. The evaluation will be based on the adequacy of response for the following items:

- Description of the overall company structure related to the performance and SOW.
- General overview of planned contract execution.
- Organization and ability to manage multiple projects through adequate and qualified on-site staffing to support at least 10 ongoing projects.
- Equipment list (currently owned and planned purchases/lease): Detailed list of equipment to be used in this contract. Age of the vehicles, pictures, and personnel to use this equipment. Identification of current equipment owned and any plans to purchase/lease additional equipment after award during the one (1) month transition-in/phase-in period. NOTE: Contractors should assume that approximately $10M of work will be awarded per year or will be ongoing at any time. Currently owned and planned purchases/lease Equipment list must be adequate for handling this magnitude of workload.
- Scheduling methodology and criteria for selecting and qualifying subcontractors.
- Description of the offeror's plan to ensure Quality control of the contract and projects.
- Method for managing multiple projects simultaneously. (List all reports, programs scheduling software, databases etc. that will be employed for this purpose.)
- Method to meet peak workload demands, identify resources, availability and time frames.
- Plan for providing additional resources, manpower and technical expertise for support of the field office to cover peak workloads, special projects and urgently required projects. Response time shall be not more than one hour from notification of emergency projects.
- Description of how multiple projects in the security areas will be staffed to ensure timely completion
- Documentation and discussion of how the offeror has the ability to or plans to provide a sufficient quantity of qualified personnel, i.e. U.S. Citizens, who can obtain mobility access badges for the security areas of Aberdeen Proving Ground.

2. <u>PAST PERFORMANCE</u>

The Government will evaluate the offeror's record of past and current performance to ascertain the probability of successfully performing the required efforts of the SOW and RFP. Past Performance factor considers each offeror's demonstrated recent and relevant record of

performance in providing services that meet the contract requirements. Recent past performance is considered to be efforts awarded during the past five (5) years, from the issue date of this RFP.

Relevant efforts are defined as services that are the same as or similar services as compared to the North American Industry Classification System (NAICS) Code 238160 (Roofing Contractors). Work may include new work, additions, alterations, maintenance and repairs performed for commercial or Governmental clients. The size and scale of the projects provided will also be considered when determining relevancy.

A relevancy determination of the offeror's (including joint venture partner(s), major and critical subcontractor(s) past performance) will be made by the Government. In determining relevancy for individual contracts, consideration will be given to the effort, or portion of the effort, being proposed by the offeror, teaming partner, or subcontractor whose contract is being reviewed and evaluated.

An assessment of the information will be made to determine if it is recent. Offerors shall supply a complete list of ALL projects/contracts that contain a relevant roofing component with a value of $150,000.00 dollars or greater and the type of work specified in the scope of work must be ongoing or must have been performed during the last five (5) years from the date of issuance of this solicitation. This information must include those contracts used for the Past Performance Questionnaires required below. Numerous Task Orders (TO) added up to meet the minimum construction dollar value identified herein are not acceptable for Indefinite-Delivery, Indefinite Quantity (IDIQ) Contracts.

Evaluation of past performance shall be in accordance with this plan utilizing the forms and questionnaires set forth in Attachment 2. The Government may consider a wide array of information from a variety of sources, but is not compelled to rely on all the information available.

The Government may use data provided by the offeror in its proposal and data obtained from other sources, including data in Government files (i.e., CPARs) or data obtained through interviews with personnel familiar with the contractor and their current and past performance. Data used in conducting past performance assessments shall not extend past five years prior to the issue date of the RFP, but may include performance data as a prime. The Government reserves the right to limit the number of references it decides to contact and to contact references other than those provided by the Offeror including sources outside the Government.

The Government will evaluate the offeror's proposal against the above requirements to determine whether the proposal is acceptable or unacceptable for the Past Performance factor, using the ratings and descriptions outlined in Table 1 below.

Table 1 – Past Performance Ratings

Rating	Description

Acceptable	Based on the offeror's performance record, the Government has a reasonable expectation that the offeror will successfully perform the required effort, or the offeror's performance record is unknown.
Unacceptable	Based on the offeror's performance record, the Government has no reasonable expectation that the offeror will be able to successfully perform the required effort.

NOTE: If an Offeror submits a certification statement that it has no relevant past performance and the Government has no other information available regarding the Offerors past performance, that Offeror will receive a neutral/unknown rating (i.e.), the Offeror is evaluated neither favorably nor unfavorably) for past performance. If the Offeror provides past performance information that is not relevant and current as defined in the RFP, the Offeror will receive a neutral/unknown past performance rating for those contracts. Neutral/unknown is the equivalent of Acceptable for this acquisition.

The Past Performance Evaluation (PPE) will assess the relative risks associated with an offeror's likelihood of success in performing the solicitation requirements as indicated by that offeror's record of past performance. Performance risk is assessed at the factor level after evaluating aspects of the offeror's recent past performance and focusing on performance that is relevant to the services being procured under this solicitation. Offerors are cautioned that in conducting the performance risk assessment, the Government may use data provided by the offeror in its proposal and data obtained from other sources, including data in Government files (i.e., CPARs) or data obtained through interviews with personnel familiar with the contractor and their current and past performance. Data used in conducting past performance assessments shall not extend past five years prior to the issue date of the RFP, but may include performance data as a prime. The Government reserves the right to limit the number of references it decides to contact and to contact references other than those provided by the Offeror including sources outside the Government. Past performance areas of evaluation include:

(i) Quality of Service
(ii) Timeliness of Performance
(iii) Management of Personnel
(iv) Customer Satisfaction

The past performance information provided in the proposal and information obtained from other sources will be used to establish the degree of relevancy of past performance. The Government will evaluate the relative merits of each offeror's past performance. Past performance will not be numerically scored. The evaluation will be a subjective assessment of the offeror's reputation as to whether work performed was similar to work called for in the specifications. It will not be based on absolute standards of performance. The Government reserves the right to consider all aspects of an offeror's performance history, but will attribute more significance to work that was similar in nature, magnitude, and complexity to work under the contract to be awarded from this

solicitation. If an offeror has no relevant performance history, then the Government will give it neither a favorable nor an unfavorable rating.

3. **PRICE**

The Government will evaluate the price proposal for award purposes by adding the total of all CLIN/SubCLIN prices, including spreadsheet totals and including all options by using price analysis techniques describe in FAR 15.404-1. Examples include using historical price information, price competition information, the Independent Government Estimate (IGE), and any other pricing tools necessary. Offers that are unbalanced between years or CLINs may be found unacceptable.

A price is considered reasonable when, in its nature or amount, it does not exceed what an ordinarily prudent person in the conduct of competitive business would incur. A balanced offer is one that contains prices properly distributed over all line items throughout the life of the contract including any base and option period(s).

Reasonableness will be established using historical price information, price competition information, the Independent Government Estimate (IGE), and any other pricing tools necessary. Offers that are unbalanced between years or CLINs may be found unacceptable.

INSTRUCTIONS TO OFFERORS

PROPOSAL SUBMISSION REQUIREMENTS (INSTRUCTIONS TO OFFERORS):

1. INTRODUCTION

a. The offeror's proposal shall be submitted electronically as set forth below to:

US Army Contracting Command
Aberdeen Proving Ground
Attn: Sandra A. Anderson
Contract Specialist

b. The offeror's proposal shall consist of four (4) clearly marked and separated volumes. The Volumes are: Volume I – Technical; Volume II – Past Performance; Volume III – Price; and Volume IV - Solicitation, Offer, Award Documents, and Certification/Representations, Teaming, Joint Venture documentation (if applicable). Proposals shall not contain classified data. The use of hyperlinks in proposals is prohibited. The Government is establishing a 200 page limit on proposals. Volume IV does not count against the page limitation. If potential offerors believe that an expansion of the page limit is warranted, they must submit a request in writing to the Government during the Question and Answer period of the solicitation for Government consideration. *NOTE: Additional pages over the maximum allowed will be removed or not read and will not be evaluated by the Government.*

c. Offerors are responsible for including sufficient details to permit a complete and accurate evaluation of each proposal. Proprietary information shall be clearly marked.

2. PROPOSAL SUBMISSION REQUIREMENTS

Preferred Method: Electronic offers shall be submitted via the AMRDEC SAFE site at https://safe.amrdec.army.mil Proposals shall be sent to Ms. Sandra A. Anderson at sandra.a.anderson12.civ@mail.mil.

Alternate Method: As of the writing of this document, the AMRDEC SAFE site is currently offline. If the site is still not functional at the time proposals are due, the electronic offers shall be submitted via the ARLSAFE site at https://safe.arl.army.mil/ Proposals shall be sent to Ms. Sandra A. Anderson at Sandra.a.anderson12.civ@mail.mil.

3. PROPOSAL FILES:

a. Format. The submission shall be clearly indexed and logically assembled. Each volume shall be clearly identified and shall begin at the top of a page. All pages of each volume shall be appropriately numbered and identified by the complete company name, date and RFP number in the header and/or footer. The submission shall use MS Word 2013 (or previous version) or Adobe PDF as the file type.

b. File Packaging. Zip files are not permitted. Files shall be in Adobe PDF or MS Word 2013 (or previous version). Any price breakdown information submitted to aide in the price evaluation shall be submitted in unlocked Microsoft Office Excel 2013 (or previous version) Read/Write format.

c. Content Requirement. All information shall be confined to the appropriate file. The Offeror shall confine submissions to essential matters and sufficient to define the proposal in a concise manner, to permit a complete and accurate evaluation of each proposal. Offerors are cautioned that "parroting" of the Statement of Work (SOW) with a statement of intent to perform does not reflect an understanding of the requirement or indicate the ability to perform any task in the SOW and will be rated as "Unacceptable". Proprietary information shall be clearly marked. The following shall be included in the Volumes:

(i) VOLUME I – Factor 1 – Technical.

Offerors shall clearly articulate the technical approach (including risks and contingencies) for performing the work, an understanding of the requirement and the capacity to perform the work. The Technical volume shall be organized into the following below sections:

Subfactor a: Bonding Capacity

Offeror shall provide a signed letter from its chosen Surety that it can obtain $10M of performance and payment bonds or evidence that it currently has $10M of spare performance and payment bond capacity for this contract. The Offeror shall also provide contact information for the surety so that the Government can at

its discretion verify the information provided.

Subfactor b: Quality Control and Safety

Offeror shall provide a discussion of planned Quality Control (QC) activities to meet the requirements of the contract. This discussion should be broad enough to address all aspects of QC including as a minimum, responsibility for surveillance of work, acceptance, rejection, documentation and resolution of deficiencies, trends analysis, corrective actions, QC processes and interface with Government inspector and contract closeout procedures.

The offeror shall provide the Experience Modification Rate (EMR) for itself and all major subcontractors for the previous five (5) year operating period. A major subcontractor is defined as a subcontractor which is expected to perform 15% or more of the total work on the contract.

The offeror shall provide OSHA recordable injuries/illnesses reports for itself and all major subcontractors for the previous five (5) years. A major subcontractor is defined as a subcontractor which is expected to perform 15% or more of the total work on the contract.

Subfactor c: Key Personnel

Project Manager (PM):

Offeror shall provide resume(s), including training certificates for at least one prime contractor employee that will perform the Project Manager duties. The documentation submitted shall demonstrate the following for the PM:

- The PM possesses a minimum of seven (7) years' experience in the construction/roofing field with a minimum of five (5) years' experience in roofing management.
- Has managed at a minimum, two roofing projects with a total value in excess of one million U.S. dollars.
- Has completed the OSHA 30 Hour construction safety course or the 40 hour USACE Construction safety course.
- The PM is a certified Project Management Professional (PMP) as issued by the Project Management Institute (PMI) with a minimum of two years as a PMP.

Superintendents:

Offeror shall provide resume(s), including training certificates for at least two prime contractor employees that will perform site Superintendent duties. The submitted documentation shall demonstrate the following:

- The superintendents both possess a minimum of seven (7) years journeyman level experience in the roofing field, with minimum of three (3) years' experience in supervisory positions in the industry.

Quality Control Manager (QCM):

Offeror shall provide resume(s), including training certificates for at least one prime contractor employee that will perform the QCM duties. The submitted documentation shall demonstrate the following:

- Minimum of seven (7) years' experience in construction quality control, five (5) of which shall be directly related to quality control of roofing projects.
- Proposed QCM is a Register Roof Observer (RRO) certified by the Roof Consulting Institute (RCI) with a minimum of three years as an RRO.

Corporate Safety Manager:

Offeror shall provide resume(s), including training certificates for at least one prime contractor employee that will perform the Corporate Safety Manager duties. The submitted documentation shall demonstrate the following:

- A minimum of seven years construction related experience, five of which shall be solely dedicated to roofing projects
- Is a certified site safety and health officer
- Possesses the 30 hour OSHA safety course or the 40 hour USACE Construction safety course.

NOTE: If the offeror is proposing key personnel who are not currently employees of the prime contractor, but are willing to work for the new prime contractor and are being proposed to work for the new contractor, this must be clearly discussed/noted in the proposal. Furthermore, the organizational chart, as required in Subfactor d, must clearly show that key personnel are being proposed as employees of the prime contractor.

Subfactor d: Contract Management Plan (CMP):

Offeror shall provide information that demonstrates/substantiates the following:

- Describe the overall company structure related to the performance and SOW.
- Provide general overview of planned contract execution.
- Organization: Provide an organizational chart by title/position showing how offeror plans to execute this contract. Address the ability to manage multiple projects through adequate and qualified on-site staffing to support at least 10 ongoing projects.
- Equipment: supply a detailed list of existing equipment to be used in this contract. List age of the vehicles, pictures, and personnel to use this equipment. Clearly identify current

equipment owned and any plans to purchase/lease additional equipment after award during the transition-in/phase-in period. For planned purchases/leases, describe the purchasing plans and suppliers. For planned purchases/leases, provide evidence of financial capability such as letter of credit, bank statements, stock holdings, balance sheet info, etc. to demonstrate that the offeror has the financial strength to purchase/lease the equipment.

- Scheduling methodology: describe the scheduling techniques and project planning methodology. Describe the criteria for selecting and qualifying subcontractors.
- Describe the offeror's plan to ensure Quality control of the contract and projects.
- Discuss method for managing multiple projects simultaneously. (List all reports, programs scheduling software, databases etc. that will be employed for this purpose.)
- Discuss method to meet peak workload demands, identify resources, availability and time frames. Describe how multiple projects in the security areas will be staffed to ensure timely completion.
- Provide plan for providing additional resources, manpower and technical expertise for support of the field office to cover peak workloads, special projects and urgently required projects. Response time shall be not more than one hour from notification of emergency projects.
- Describe how multiple projects in the security areas will be staffed to ensure timely completion.
- Provide discussion and documentation/evidence of how the offeror has the ability to provide a sufficient quantity of qualified personnel, i.e. U.S. Citizens, who can obtain mobility access badges for the security areas of Aberdeen Proving Ground.

(ii) VOLUME II – Factor 2 – Past Performance.

This volume shall contain past performance information regarding similar contracts. Offerors shall submit all contracts for the prime offeror and each major subcontractor in performance or awarded during the past five (5) years, from the issue date of this RFP, which are relevant to the efforts required by this solicitation. Relevant efforts are defined as services that are the same as or similar services as compared to the North American Industry Classification System (NAICS) code 238160 Roofing Contractors are considered relevant.

Major subcontractors are defined members of an offeror's overall team who are expected to perform ten (10) percent or more of the proposed effort. This volume shall be organized into the following sections:

1. Section 1 - Contract Descriptions. This section shall include the following information in the following format:

(a) Contractor/Subcontractor place of performance, CAGE Code and DUNS Number. If the work was performed as a subcontractor, also provide the name of the prime contractor and Point of Contact (POC) within the prime contractor organization (name, and current address, e-mail address, and telephone and fax numbers).

(b) Government contracting activity, and current address, Procuring Contracting Officer's name, e-mail address, telephone and fax numbers.

(c) Government's technical representative/COR, and current e-mail address, telephone and fax numbers.

(d) Government contract administration activity and the Administrative Contracting Officer's name, and current e-mail address, and telephone and fax numbers.

(e) Government contract administration activity's Pre-Award Monitor's name, and current e-mail address, telephone and fax numbers.

(f) Contract Number and, in the case of Indefinite Delivery type contracts, GSA contracts, and Blanket Purchase Agreements, include Delivery Order Numbers.

(g) Contract Type (specific type such as Fixed Price (FP), Cost Reimbursement (CR), Time & Material (T&M), etc.). In the case of Indefinite Delivery contracts, indicate specific type (Requirements, Definite Quantity, and Indefinite Quantity) and secondary contract type (FP, CR, T&M, etc.)

(h) Awarded price/cost.

(i) Final or projected final price/cost.

(j) Original delivery schedule, including dates of start and

(k) Completion of work.

(l) Final, or projected final, delivery schedule, including dates of start and completion of work.

(2) Section 2 – Performance

Offerors shall provide a specific narrative explanation of each contract listed in Section 1, Contract Descriptions describing the objectives achieved and detailing how the effort is relevant to the requirements of this RFP.

(a) For any contracts that did not/do not meet original schedule or technical performance requirements, provide a brief explanation of the reason(s) for the shortcomings and any corrective action(s) taken to avoid recurrence. The Offerors shall list each time the delivery schedule was revised and provide an explanation of why the revision was necessary. All Requests for Deviation and Requests for Waiver shall be addressed with respect to causes and corrective actions. The Offerors shall

also provide a copy of any Cure Notices or Show Cause Letters received on each contract listed and a description of any corrective action implemented by the Offeror or proposed subcontractor. The Offerors shall indicate if any of the contracts listed were terminated and the type and reasons for the termination.

(b) Past Performance Questionnaire. For all contracts identified in Section 1, Contract Descriptions, Offerors must make a reasonable attempt to have a Past Performance Questionnaire (Solicitation Attachment 2) completed and submitted by the client. The offeror shall complete Part I of the Past Performance Questionnaire and email the questionnaire to both the Army contracting activity and technical representative responsible for the past/current contract. The POC's shall be instructed to electronically complete Part II of the questionnaire and directly email the entire questionnaire to the Contracting Office no later than the proposal due date, to Sandra Anderson at sandra.a.anderson12.civ@mail.mil. The offeror shall also include a list of all the POC's who were sent a questionnaire in the proposal. The POC List shall be include the following information: Solicitation Number; Company Name; Contract Number; Army Agency; POC Last Name, First Name; POC Title; POC Telephone Number; POC E-Mail Address; Date E-mailed to POC (month/day).

The Government will focus its inquiries on the offeror's (and major subcontractor's) record of performance as it relates to all solicitation requirements, including cost, schedule, performance and management of subcontractors. A significant achievement, problem, or lack of relevant data in any element of the work can become an important consideration in the evaluation process. Therefore, offerors will be reminded they must at a minimum include the most recent and relevant efforts (performance within the past five (5) years) in their proposal. Absent any recent and relevant past performance history or for whom information on past performance is not available, the offeror may not be evaluated favorably or unfavorably on past performance. In some circumstances Past Performance may receive a neutral rating. Therefore, when a neutral rating is assigned, it shall be assumed that the offeror will perform in an acceptable manner.

If a teaming arrangement is contemplated, the offeror shall provide complete information as to the arrangement, including any relevant and recent (up to five (5) years) past/present performance information on previous teaming arrangements with same partner. If this is a first time joint effort, each party to the arrangement must provide a list of past and present relevant contracts.

(iii) VOLUME III – Factor 3 – Price.

Price proposal shall consist of the following:

1. The MS Excel bid schedule is provided in Attachment 1 including Base Year, Option Year 1, Option Year 2, Option Year 3, and Option Year 4.

2. Bid Schedule.

BASE YEAR: Offeror shall subtotal Base Year of Line Items from (e.g. 0001 - 0037) from the spreadsheet (Attachment 1) to achieve a TOTAL for the Base Year. Offeror shall then transfer the TOTAL AMOUNT to Section 00 10 00 of the RFP.

OPTION YEAR 1: Offeror shall subtotal Option Year 1 of Line Items from (e.g. 1001 through 1037) from the spreadsheet (Attachment 1) to achieve a TOTAL for the Option Year 1. Offeror shall then transfer the TOTAL AMOUNT to Section 00 10 00 of the RFP.

OPTION YEAR 2: Offeror shall subtotal Option Year 2 of Line Items from (e.g. 2001 through 2037) from the spreadsheet (Attachment 1) to achieve a TOTAL for the Option Year 2. Offeror shall then transfer the TOTAL AMOUNT to Section 00 10 00 of the RFP.

OPTION YEAR 3: Offeror shall subtotal Option Year 3 of Line Items from (e.g. 3001 through 3037) from the spreadsheet (Attachment 1) to achieve a TOTAL for the Option Year 3. Offeror shall then transfer the TOTAL AMOUNT to Section 00 10 00 of the RFP.

OPTION YEAR 4: Offeror shall subtotal Option Year 4 of Line Items from (e.g. 4001 through 4037) from the spreadsheet (Attachment 1e) to achieve a TOTAL for the Option Year 4. Offeror shall then transfer the TOTAL AMOUNT to Section 00 10 00 of the RFP.

The offeror shall provide Unit Price and Total Price for each ITEM/SUB- ITEM in the Excel Spreadsheets provided (Attachments 1). The offeror shall then transfer the total pricing information to Section 00 10 00 of the RFP.

When submitting a proposal, offerors shall utilize the Excel spreadsheets provided (Attachment 1).

As noted in the CLINs, a normalized/estimated amount of $140,000.00 will be assumed for bonding premiums per year for all offerors.

(iv) VOLUME IV – Solicitations, Offer and Award Documents and Certifications/ Representations/Teaming, Joint Venture documentation (if applicable)

Certifications and Representations - Each offeror shall complete (fill-in and signatures) the solicitation sections indicated below using the file (without modification to the file) provided with the solicitation. An authorized official of the firm shall sign the SF1442 and all certifications requiring original signature. Offerors are required to acknowledge all amendments (SF 30) in accordance with (IAW) FAR 52.215-1. Offerors also must complete Online Representations and Certifications Application (ORCA) registration IAW FAR 52.212-3. An Acrobat PDF file shall be created to capture the signatures for submission.

If a teaming or joint venture arrangement is contemplated, the offeror shall provide complete information about the arrangement, including any relevant and recent (up to five (5) years) of past/present performance information for the team members and/or joint

venture. If this is a first time team/joint effort, each party to the arrangement must provide a list of past and present relevant contracts.

Relevant efforts are defined as services that are the same as or similar services as compared to the North American Industry Classification System (NAICS) code 238160 Roofing Contractors.

Joint Venture Offerors: If the offeror is a joint venture, the offers shall provide all requirement solicitation information for all parties including a copy of the signed joint venture agreement with the proposal. The agreement shall include information, which identifies the responsibilities for each entity under this contract. The agreement shall demonstrate the relationship between firms and identify contractual relationships and authorities to bind each entity of the joint venture. If the joint venture is comprised of 8(a) firms, you shall provide a copy of the Small Business Administration (SBA) approval letter with your solicitation.

Teaming Offerors: If the offer is based on a teaming/partnering relationship, the offeror shall provide all required solicitation information for all parties including a copy of the legally binding teaming/partnership agreement. The agreement shall include information, which identifies the responsibilities for each entity under this contract. The agreement shall demonstrate the relationship between firms and identify contractual relationships and authorities to bind each entity of the teaming/partnering relationship.

PERFORMANCE AND PAYMENT BONDS
PERFORMANCE AND PAYMENT BOND REQUIREMENT AND PAYMENTS:

1. Contract shall furnish performance and payment bonds in accordance with FAR Clause 52.228-15. The contractor shall initially bond the base year for $10,000,000.00. The contractor shall have the ability to secure additional bonding up to at least the Minimum Year Bonding Capacity of $15,000,000.00 per year. And additional bonding need will be requested incrementally as required by award of additional work over and above the initial $10,000,000.00 bond. The contractor shall be responsible for keeping an account the their bonding requirement as the contract progresses.

2. Contractor shall only be paid actual costs up to and not exceeding the contractor's bid price for bond line items. If, after contract award, the contractor actually pays more than the bid price, the contractor shall not be reimbursed for the additional bond cost. Conversely, if the contractor actually pays less than his or her bid costs for bonds, the contractor shall only receive actual cost paid and the excess funds will be deobligated by modification signed by the contracting officer.

STATEMENT OF WORK

Directorate of Public Works Roofing Requirements Contract Specification
SBA Requirement # 0353/19/0184

STATEMENT OF WORK (SOW) and
SPECIAL CONDITIONS (SC)

STATEMENT OF WORK

SW-1 DESCRIPTION OF WORK:

SW-1.1 This work consists of furnishing all plant, labor, materials, equipment, tools, and services, insurance and bonding necessary, and performing all work necessary for the MAINTENANCE, REPAIR, RECONSTRUCTION, DEMOLITION, REPLACEMENT, AND/OR INSTALLATION OF A WIDE VARIETY OF ROOFING SYSTEMS. All coordination with the government shall be through the Contracting Officer (KO) or the Contracting Representative (COR).

SW-1.2 This includes all work related to providing complete and watertight roofing systems on diverse building types.

SW-1.3 This work includes inspections, sampling, and analysis. The job superintendent and the quality control specialist are required to have seven years of roofing construction experience. The safety specialist is required to have five years of roofing construction experience. The Environmental Compliance Officer must have five years' experience in the construction industry. The prime contractor is required to have a full time safety specialist on site. The successful contractor also known as the awardee is required to submit a full version of the Quality Control Plan and the Safety and Health Plan to the Government within one week after contract award. These are post-award submittals:

SW-1.3.1 Quality Control Plan:

a. Quality control procedures.
b. Quality Control Manager's responsibilities
c. Quality control procedures for non-compliance of preventing problems
d. Inspection process for identifying, documenting, and timely correction of punch-lists
e. Plan for managing warranty inspections
f. Quality Mission Statement

SW 1.3.2 Safety and Health Plan

a. Position description & qualifications for safety specialist.
b. Written safety & health plan.
c. Control procedures for non-compliance for Safety & Health procedures.
d. Behavior & attitudes of personnel.
e. Condition of equipment.
f. Experience modification rate for worker's compensation insurance.
g. OSHA incidence rates, for recordable injuries & illness.
h. General Liability completed operations insurance claims history & must be printed on insurance letterhead.
i. Safety Education/tool box meetings.
j. Provide history for the last five years for violations of Federal, State, Local or environmental regulations.
k. Drug & Alcohol policies.

SW 1.3.3 Environmental Plan:

a. Plan for maintaining current MSDS sheets.
b. Control Procedures for compliance with environmental requirements.
c. Environmental Compliance Officer resume and experience.
d. Identification and reporting procedures for non-compliant activities along with corrective actions.

SW 1.4 Location: Aberdeen and Edgewood Areas of Aberdeen Proving Ground, Maryland

SW 1.5 Office: The contractor shall maintain an office which is within 30 miles of Aberdeen Proving Ground – North.

SW-2 PRINCIPAL FEATURES: The work is to be performed under individual task orders, which can include, but are not limited to the maintenance, repair, reconstruction, demolition, replacement, and installation of the following principal features:

a. Existing variety of roofing materials and insulations.
b. Roof decking.
c. Trusses and rafters.
d. Sheet metal, flashings, drip edges, gravel stops, etc.
e. Vents, and ventilators.
f. Cants, nailers, soffit, cornice, rake, and fascia.
g. Gutters & scuppers, downspouts, leaders & conductor heads.
h. Roof drain lines interior to building.
i. Walkways, pitch pockets, expansion joints, caulking and backer rods.
j. Painting various surfaces.
k. Recoating existing roof systems.
l. Raising roof mounted equipment.
m. Electrical conduit.
n. Asbestos and Lead Inspections, Sampling, Analysis, Testing.
o. Roofing related materials containing asbestos and lead as necessary to accomplish the task at hand.
p. Associated tasks and details necessary to complete these projects and provide a watertight roof.
q. Associated tasks and details necessary to address the weather tight integrity of the building envelope.

SW-2.1 Provide all equipment and labor to perform a wide variety of repairs and maintenance on an assortment of roof types. This includes emergency response during other than normal duty hours.

SW-2.2 Prior to the start of work, all roof drains, scuppers, gutters, and downspouts shall be cleaned of all debris and tested to ensure proper operation. Precautions shall be taken to avoid damage to existing items during the cleaning and testing operation. Cleaning and testing of roof drains shall be incidental to the work items under this contract. The government reserves the right to issue delivery orders specifically for cleaning of gutters and downspouts, such as during the late fall period to prepare for the winter months. The Contract Line Items provided are for that purpose.

SW-2.3 All government property damaged by the contractor during the performance of this contract shall be repaired or replaced by the contractor at no additional cost to the Government. This includes but is not limited to damage to lawns and tuft caused by contractor's wheeled/tracked equipment.

SW-3 CONTRACT MANAGEMENT AND EXECUTION (not an all inclusive list)

SW-3.1 PROJECT MANAGER – The project manager shall have the following minimum level of qualification for the execution of work on this contract. This individual shall be a full time employee of the prime contractor with a minimum of seven (7) years' experience in the construction/roofing field with a MINIMUM of five (5) years' experience in management of roofing projects. The project manager shall have managed at minimum, two roofing projects with a total value in excess of one million U.S. dollars. This individual shall be fluent in English and possess good oral and written communication skills. The project manager shall be certified as a Project Management Professional (PMP) as issued by the Project Management Institute (PMI) with a minimum of two years' experience as a PMP. They shall also have completed an OSHA 30 Hour construction safety course or the 40 hour USACE Construction safety course.

SW-3.2 QUALITY CONTROL MANAGER – The Quality Control manager shall be a separate but integral part of the contractor's Quality Assurance/Quality Control Staff. This person shall be a full time employee of the prime contractor with a minimum of seven (7) years' experience in construction quality control, five of which shall be directly related to quality control of roofing projects. The QCM Shall be a Registered Roof Observer (RRO), in good standing, and certified by the Roofing Consulting Institute (RCI). This person shall have been certified as an RRO for a minimum of three consecutive years. In addition the RRO shall be certified in Quality Control for Roofing as issued by RCI. The QCM's

experience and qualifications are outlined in greater detail in Section 01-45-00.10-20 (Quality Control) of the specifications.

SW-3.3 SAFETY MANAGER – The Corporate Safety Manager (CSM) (officer) shall be a separate but integral part of the contractor's management team. This person and the site safety officers assigned to specific projects, shall have no other duties and responsibilities except for the implementation, supervision and safety oversight of the task orders issued under this contract. The CSM(O) shall be fluent in English and possess good oral and written communication skills. The CSM shall be have the following minimum level of training/experience: A minimum of seven years construction related safety experience, five of which shall be solely dedicated to roofing projects, be a Certified Site Safety and Health Officer, 30 Hour OSHA safety course or 40 hour USACE Construction Safety Course.

SPECIAL CONDITIONS:

SC-1 BUY AMERICAN ACT:
Show evidence that all products to be used on this contract comply with the Buy American Act.

SC-2 AVAILABILITY OF THE WORK SITE:
The Contractor shall provide the Contracting Officer's Representative (COR) two weeks advance notice prior to beginning work on each project. The Contractor will not be allowed to begin work without prior approval of the COR.

SC-3 GENERAL SAFETY:
On each job prior to the start of work, the Contractor shall coordinate through the COR with the Safety Office, and verify that all safety related issues are reviewed and addressed. MSD sheets are required for all products to be used on a given task order. The offeror's proposed products shall not contain any chromates, molybdate, chlorine or zinc, or any other heavy metals chemical compounds, which are considered potential pollutants. Products that have no reportable quantity, no Permissible Exposure Limit (PEL) and reduce waste byproducts or render wastes neutral to the environmental are desirable.

SC-3.1 The performance of all work associated with this contract shall include the requirements of 29 Code of Federal Regulations (CFR) Part 1910 General Industry standards, and 29 CFR 1926 Construction standards, with the latest revisions to include the newly revised 1926 Subpart M Fall Protection.

SC-3.2 The performance of all work associated with this contract also includes the provisions of The United States Army Corps of Engineers Safety and Health Requirements Manual, EM-381-1-1, the latest edition and revisions.

SC-3.3 The contractor shall provide a foreman or on site supervisor at each work site. This person shall have current Red Cross Certification in First Aid, and Adult CPR (with AED certification), and a First Aid Kit appropriate for the work and number of people on hand. Current Red Cross certifications shall be in their possession at all times. In the event current certifications are not in their possession, all work will be stopped until someone with current certifications in their possession is present on site. The job superintendent and quality control specialist shall have seven (7) years of roofing construction experience. The safety specialist shall have five (5) years of roofing construction experience. The environmental compliance officer shall have a minimum of five (5) years construction related experience.

Superintendents shall be employees of the prime contractor and each superintendent shall manage no more than two (2) projects valued in excess of $1,000,000.00 and no more than a total of seven (7) projects at any given time. The individual(s) identified will be responsible for timely progress and completion of all assigned work, and be wholly devoted to the supervision of work in progress under this contract only.

SC-4 STRUCTURAL INSPECTION:
The contractor and the government shall inspect the supporting structures of each building's roofing system and verify load capacities, condition, and the roofs ability to support workers, materials and equipment to be used.

SC-5 SECURITY REQUIREMENTS:
In addition to the security requirements listed elsewhere in this specification, additional security requirements may be required by specific tenant commands during the execution of this project. These requirements include but are not limited to the exclusive use of American citizens only, additional escort requirements, additional criminal background checks and badging requirements.

SC-6 ASBESTOS TESTING:

a. Existing materials: Prior to performing work on each task order under this contract the government will sample and test suspect roofing materials for the presence of asbestos. The inspection and sampling will be inclusive of all roofing material that may contain asbestos materials. The Government, at their discretion, may require the roofing contractor to perform the sampling and testing of suspect roofing materials. An accredited Asbestos Building Inspector (BI) who has been trained and certified in accordance with the USEPA's Model Accreditation Plan (MAP) as outlined in 40 CFR Part 763 shall perform this work. This work will be paid for under the contract line item for asbestos samples. When the results of such testing are complete the Contractor shall notify the COR in writing describing the results. The results of the sampling and testing will be provided to the COR who will distribute them to the PM, ISO and Environmental Division Asbestos Coordinator.
b. New Materials: The Government, at their discretion, may require the contractor to provide asbestos analytical results for new materials installed as part of this contract. These materials include but are not limited to gypsum drywall, gypsum roof board, exterior grade gypsum products, roofing felts, asphalt shingles, and roofing cements. Any gypsum product imported from the People's Republic of China SHALL be tested for the presence of asbestos regardless of the material type. The analytical method used shall consist of either Polarized Light Microscopy with Dispersion Staining or Transmission Electron Microscopy for bulk samples utilizing the EPA protocols for analyses.

SC-7 CORE SAMPLES:
Upon request the contractor shall core sample existing roofing materials down to the deck, and repair sample area. Where core samples are directed, the contractor shall patch the core location to ensure it is weather tight and not a source of leakage into the building. In addition, the government may, at their discretion, request a petrographic analyses of the core sample to determine the composition of the various layers within said sample.

SC-8 STORAGE:
Materials stored on the roof shall not exceed one day's supply and shall be distributed so as not to exceed the load limit of the roofing system. Where laydown areas are limited, the contractor may request to store materials on the roof in excess of one day's supply provided the materials are distributed in such a manner so as not to exceed the live load limit of the roof and roof structure. At no time will any flammable/combustible materials be stored on the roof in excess of the amount needed for that day's production. Flammable/combustible materials shall be stored in a segregated storage container or enclosure. The use of Flammable Materials Storage cabinets is recommended but not required unless the jurisdiction having authority requires their use.

SC-9 COMPATIBILITY:
All materials furnished shall be compatible with each other. In the event the use of dissimilar materials is unavoidable they shall be completely insulated from each other by means of gaskets, insulating compounds, etc.

SC-10 SHELF LIFE:
At least half the shelf life, of any time-limited materials, shall remain at the time of application.

SC-11 REFERENCES & STANDARDS:
All publications, standards, and other references incorporated into this specification include the most recent editions, supplements, revisions, and amendments, etc.

SC-12 COMPLETION PACKAGE:
The completion package shall consist of the applicable warranties, submittals, etc. required by the contract documents. The contractor shall also fill out the applicable sections and submit the Real Property Close Out package to the COR as part of the final completion package. This document shall be provided by the government in electronic format and returned electronically to the COR. As-built drawings may be deemed necessary and shall be required on a case-by-case basis. Those projects requiring as built drawings will be identified during the site visit and the scope of the drawings identified and agreed to at that time. The as-built drawings, if required, shall be produced in the format described in the General Conditions.

SC-13 ASBESTOS CONTAINING MATERIALS:
The use of products that contain asbestos is expressly forbidden during the execution of task orders assigned by this contract. Appliances, equipment, components, compounds and coatings as well as other items which utilize gaskets, seals, insulation, filler reinforcement etc., whether factory fabricated of field fabricated shall be accompanied by formal literature or a specific statement from the manufacturer/supplier that no asbestos was incorporated into this product. The requirements for testing suspected products are incorporated in SC-6 above.

END OF SECTION 01010

SECTION 01011
GENERAL CONDITIONS
(10 Mar 06)

PART 1 GENERAL

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GC-1. ACCESS TO JOB-SITES IN SECURITY AREAS:

a. For job-sites at Aberdeen Proving Ground in the security areas, contractors/contractor employees entering these areas must, at minimum, have a photographic security badge or be escorted by a person having such badge. One person with a security badge may escort up to four persons without a photographic

security badge, provided all remain together and within sight of the escort. The contractor shall submit applications for his employees after award of contract. Forms may be obtained from the Administrative Office in Building 4304. Badge applications require approximately six (6) weeks for processing after receipt of applications.

b. Certain areas are more restrictive than outlined above. Access to these areas shall be as detailed in other sections of the specifications. Access to the roof tops of the buildings in the C4ISR complex (6000 block buildings) will require the submission of a Visitor Request (VR) form to the appropriate security officer with the C4 complex. VR's can take up to four weeks to process.

c. All personnel and equipment entering these areas shall be subject to applicable local and federal regulations.

d. Additional restrictions on the possession, carrying and use of Personal Electronic Devices (PED's) may be subject to additional restrictions depending upon the various tenant activities security requirements. Compliance with these additional requirements shall be mandatory and shall not be construed as an additional burden subject to compensation.

GC-2. AS-BUILT DATA:

A. Exterior Work – Specific to Roofing Projects

1. Where available, the government shall provide a copy of the original as-built roof drawings tot eh contractor in both digital and hard copy format. The Contractor shall then mark up the hard copy with the required features and update the digital drawings as required.
2. Specific information required for roof drawing updates shall include the demolition of abandoned roof mounted equipment, the locations of new curbs and other pertinent details relative to roof mounted equipment, the insulation thickness, the membrane type along with methods of attachment to the substrate, the taper profile to include fill (if applicable), the locations of safety rails, walk paths etc., installed on the roof and the locations of the lightening protection system components to include ground loop and down lead locations (for new LPS Installations). The locations of ladders, hatches and safety rails shall be shown on the as-builts as well.

B. Exterior Work - New Buildings, Utilities, Roads, etc.

1. As-built data shall be compiled from field surveys performed by a Registered Professional Land Surveyor. This work shall be tied into the installation monument system on Universal Transverse Mercator (UTM) datum. The as-built survey shall be shown on standard Directorate of Public Works (DPW) drawing sheets and signed by a Registered Professional Land Surveyor. Deliverables of these data shall consist of one set of hard copy drawings and digital files compatible with DPW's Computer Aided Design (CAD) system. This CAD system is the "Microstation" product of Bentley Systems, Inc. Compatible digital file format shall be .DGN. These files are to be delivered on compact disk (CD).

2. Information contained on the as-built drawings shall consist of but not be limited to:
   - Building footprints
   - Paving (roads, parking lots, hardstands, pads, walks, etc.)
   - Fencing
   - Utilities (water, sewer, storm drainage, steam, electric, telephone, fiber optics, gas or fuel, etc., and associated appurtenances)
   - Structures (bridges, testing facilities, etc.)
   - Prominent physical features.

3. The limits of the as-built plans shall be from the point in which new work ties into existing features and infrastructure to and including the building or structure footprint.

4. The information that is depicted on the as-built drawings shall have UTM coordinate values associated with the features respective location. UTM values are required at the following points:
   - Corners of buildings
   - Points of Tangent (PT),
   - Points on Curve (POC),
   - Points of Curve (PC),
   - Points of Reverse Curve (PRC),
   - Points of Compound Curve (PCC) on linear features
   - Poles, transformer, manholes, valves, tees, hydrants, and any other appurtenances associated with utilities.

C. Interior Work:

1. The contractor will be given one hard-copy set of full size prints of the contract drawings (in addition to those mentioned elsewhere) and if available, the drawings in electronic form on floppy disk or CD.
2. During the life of the contract, the on-site job superintendent shall maintain an as-built record of the contract, including any modifications performed, on the hard copy.
3. After contract final inspection, the changes noted on the hard copy shall be incorporated into the digital data. Both the hard copies and floppy discs or CD's shall be turned over to the Contracting Officer's Representative (COR).
4. Equipment Warranty Identification Tag**:** The contractor shall provide and install on each piece of equipment a self-adhesive warranty identification tag. The tag shall contain the following information: Installed by, Installers phone number, Manufacturer, Model Number, Serial Number, Contract Number, Government Project Manager, and the Contracting Officer's Representative (COR) with, phone numbers, Warranty expiration dates for the contractor and manufacturer, and the MAXIMO Identification Number. The contractor shall obtain the MAXIMO Identification Number from the COR. The contractor shall also submit a written report to the COR of the above information.

GC-3. DEPARTMENT OF AGRICULTURE QUARANTINE: See Section 01561, ENVIRONMENTAL PROTECTION.

GC-4. DISPOSAL OF WASTE MATERIAL: See Section 01561, ENVIRONMENTAL PROTECTION.

GC-5. EXCAVATION CLEARANCES:

a. Contractor must obtain an approved Excavation Permit (EP), **SSB Form 1247-R**, from the Directorate of Public Works before starting any excavation work. The Point of Contact at DPW is the Chief, Construction Inspection Branch at 410 306-1161 (phone), 410 306-1187 (FAX), or ECO@usag.apg.army.mil (E-mail). The contractor shall initiate the permit process by filling out the "EXCAVATOR SECTION" of the EP, and submitting through the COR. Processing will normally require ten (10) workdays.

b. All damage to identified utilities shall be the fiscal responsibility of the contractor, to include any peripheral loss imposed on the organizations/tenants of Aberdeen Proving Ground (e.g. damage to facilities, equipment, loss of productivity due to loss of any utility). The authorized representatives for DPW Construction Branch, the DPW Environmental Branch and the Garrison Installation Safety Office have the authority to stop any excavation that is deemed to be either unsafe or unauthorized.

c. Should the contractor encounter unidentified utility lines, all excavation work shall stop, and the COR should be notified immediately. Excavation work shall not be permitted until the utilities are properly identified, and the COR issues a notice to proceed.

d. Permits will be good for 30 calendar days from date of issuance. Contractor shall be responsible for obtaining renewals to maintain permit status.

GC-6. FIRE PREVENTION AND PROTECTION: The contractor shall comply with all fire prevention measures prescribed in the installation fire regulations, a copy of which is on file in the office of the COR. A written fire permit shall be obtained by the contractor for use of open flame devices, such as blow torches, roofer's torches, portable furnaces, tar kettles, or gas and electric welding and cutting equipment from the Fire and Emergency Services Division (F&ESD), of the Directorate of Emergency Services (DES). The contractor shall be liable for any fire damage to Government property attributable to negligence on the part of the contractor, including failure to comply with fire prevention measures prescribed by terms of this contract. Contractors may call the F&ESD at (410) 306-0572/0573 for on-site inspection, or report to Building 2200, 6553 Aberdeen Boulevard, to receive specific fire instructions if in the Aberdeen Area. Edgewood Area contractors should call (410) 436-4451 or 436-4452, or visit Building E-5180, 8218 Hoadley Road.

GC-7. FUEL BURNING EQUIPMENT: Fuel burning equipment under this contract such as boilers, furnaces, water heaters, generators, etc. will be supplied with Reasonably Available Control Technology (RACT), which reduces emission of nitrogen oxides (NO_x). Manufacturers offer low NO_x burners as optional items on their equipment. These low NO_x burners shall be selected and their price included in the contractor's bid.

GC-8. HAZARDOUS AREA WORK PERMITS:

a. Where a work site is included in an area known, or suspected, to contain hazardous materials, a Hazardous Area Work Permit (HAWP) will be included in the specification after the section "Statement of Work". The contractor shall post a copy of the permit in full view at the work site. The contractor shall be responsible to inform all his personnel and assure they conform to the special requirements directed by the permit. This conformance shall be monitored by the Installation Safety Office. Non-conformance shall result in a work stoppage until the situation is corrected, at no expense to the Government. Continued instances of non-conformance may result in contract termination.

b. Hazardous materials include, but are not limited to, National Priority List (Comprehensive Environmental Response Compensation and Liability Act (CERCLA)), chemical surety materials, hazardous chemicals, carcinogens, asbestos, explosives, radioactive materials, etc. These hazardous materials may be encountered at work sites at Aberdeen Proving Ground.

c. When a HAWP is not included with the specification, the work site is in an area not known or suspected to contain hazardous materials. However, during operations such as excavation or demolition, materials may be uncovered which could be hazardous (e.g. asbestos). If contractor personnel should encounter materials, either known hazardous materials or unrecognized materials, they should stop work in that area immediately, and notify the Installation Safety Office at 410 306-1095/1096/1097 for work in the Aberdeen Area, or 410 436-4839 for work in the Edgewood Area, and the COR. Work may be resumed after identification of the material, and notification of work constraints, if any, caused by the materials.

GC-9. LYME DISEASE WARNING: The contractor is responsible for ensuring that his or her personnel take all reasonable precautions to avoid contracting Lyme Disease, to include: using repellents, wearing personal protective clothing and avoiding the wear of abbreviated clothing such as shorts, cutoffs, short sleeve shirts, tee shirts and sandals in areas where tick borne diseases are endemic. Particular attention must be given to ticks and Lyme disease prevention when working in grassy and wooded areas on Aberdeen Proving Ground.

GC-10. MARYLAND DEPARTMENT OF ENVIRONMENT (MDE) PERMITS: Articles or processes requiring MDE permits to construct and/or operate, and that require shop drawings or manufacturer's data to obtain the permit, such as boilers, and incinerators, the following shall apply:

a. The contractor shall initiate the permit application. After completion of those portions pertaining to the equipment to be furnished under contract, the application shall be forwarded, through the COR, to DPW for completion and submission to the MDE. The permit application shall be submitted within ten workdays of approval of the submittal for the equipment.

b. It is the contractor's responsibility to provide equipment or systems capable of construction and operation under MDE permit. The Government will not accept a system that does not meet the state of Maryland law.

c. If required, the Government will make available the following by the time the "Notice to Proceed" is issued:

(1) MDE approved soil erosion and sediment control plans and, if necessary, storm water management plan.

(2) A permit from the State Historic Preservation Office (SHPO).

d. The contractor is responsible to comply with all provisions of the permit(s). Non-compliance shall result in the issuance of a stop-work order from the Contracting Officer, and work shall not be allowed to resume until corrective actions have been taken.

e. For further information, see Section 01561, ENVIRONMENTAL PROTECTION, the applicable portions of paragraphs entitled "POLLUTION PREVENTION" and "ENVIRONMENTAL PERMITS" respectively.

GC-11. RANGE BRIEFINGS: If the work site is designated as one in a range area or in close proximity to a range area, the contractor will be briefed and provided with written instructions on range procedures prior to start of work (see Aberdeen Proving Ground Regulation (APGR) 385-1). This information will include safety requirements such as range clearance/control procedures, emergency procedures, communication requirements, etc. The contractor shall be responsible to disseminate these procedures to all contract and sub-contract personnel. Work shall be scheduled and coordinated with the applicable organization.

GC-12. REFRIGERANT MANAGEMENT: In line with federal environmental laws and regulations regarding the handling of chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) refrigerants, the following shall apply:

a. The contractor shall not intentionally vent any refrigerants to the atmosphere.

b. When performing work requiring the opening of existing air conditioning or refrigeration systems, the refrigerants shall be recovered using EPA-approved recovery or recovery/recycle equipment and storage vessels.

c. On systems to be reused after completion of work, the contractor shall install new or reclaimed refrigerant. All current systems using CFC refrigerants should, unless otherwise specified, be considered for modification to allow use of an alternative HCFC.

d. New or replacement air conditioning/refrigeration equipment shall be installed with specified HCFC refrigerants. No refrigerant shall be used having an Ozone Depletion Potential (ODP) equal to or greater than 0.05 (based on R-11 = 1.0).

e. Refrigerant recovered and not to be reused shall be properly labeled as "Recovered Refrigerant", with the type (R-11, R-12, etc.) indicated, and turned over to the COR.

f. See also Section 01561, ENVIRONMENTAL PROTECTION, applicable portions of paragraphs entitled "POLLUTION PREVENTION" and "SPECIFIC DISPOSAL METHODS" respectively.

GC-13. SAFETY:

a. All operations performed must be in accordance with OSHA 29 CFR 1910 and 1926, and the Code of Maryland (COMAR), including the High Voltage Act. In those instances where Army regulations are more stringent, the Army regulations shall apply. Applicable Army Safety Regulations include, but are not limited to:

(1) AR 385-10, The Army Safety Program;

(2) AMCR 385-100, Safety Manual;

(3) APGR 385-4, The APG Safety and Occupational Health Program; and

(4) EM 385-1-1, U.S. Army Corps of Engineers Safety and Health Requirements Manual.

Regulations are maintained in the Garrison Installation Safety Office (ISO) library, Building 4304 (Aberdeen Area) and Building E-5703 (Edgewood Area) and are available for review upon request.

b. In accordance with contractual requirements, each contractor must appoint a safety representative/competent person to ensure compliance with safety regulations and to act as liaison between the contractor and ISO. ISO personnel will be available for regulatory compliance advice on any particular safety problem that may arise during normal course of operation.

c. Before work under the contract is started, the contractor's safety representative shall report to the ISO located on the First Floor of Building 4304 for familiarization with safety requirements. The safety representative shall maintain an accurate record of and shall report to the ISO exposure data and accidents resulting in death, traumatic injury, occupational disease and/or damage to property, materials, supplies and equipment incident to work performed under the contract.

d. The Contracting Officer shall notify the contractor of any noncompliance with the foregoing provisions and action to be taken. The contractor shall, after receipt of such notices, immediately correct the conditions. Such notice, when delivered to the contractor or his representative at the site of work, shall be deemed to be sufficient for this purpose. 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. The contractor shall make any part of the time lost due to any such stop order subject of claim for excess costs or damages.

e. Confined space work shall not be performed without appropriate monitoring and approval of an entry permit under provisions of 29 CFR 1910.146 and APG Regulation 385-4.

f. Work requiring control of hazardous energy shall be performed IAW 29 CFR 1910.147 and APG Regulation 385-4. Any construction work that takes place above electrical conductors or service lines to a building will require an outage, regardless of the distance from the work area to the conductors.

GC-14. SUBMITTAL REGISTER AND PROGRESS SCHEDULES: The Contractor shall prepare a submittal register of all items required under the contract. The contractor shall prepare a schedule in accordance with Contract Clause entitled "Schedule For Construction Contracts" (FAR 52.236-15) which shows milestones and intervals for contract completion. The register and schedule shall be delivered to the Contracting Officer within ten calendar days after the contractor's receipt of "Notice to Proceed".

GC-15. UNABSORBED OVERHEAD DELAY DAMAGES:

a. Compensation for unabsorbed overhead incurred in a delay during which the contractor is forced to stand by, whether calculated by the Eichleay Formula or any other method, is not automatic. During any such delay, it is the duty of the contractor to seek out new contracts or additional work opportunities to mitigate delay damages. To substantiate entitlement to unabsorbed overhead damages, the contractor must first demonstrate the nature of the delay that made it impractical to mitigate delay damages by undertaking new work.

b. In submitting any claim for delay damages for unabsorbed overhead, regardless of length of delay, the contractor must list all work performed during the delay period. This list shall include date of each contract or agreement, the period of performance and any other information required by the Contracting Officer.

c. In submitting any claim for delay damages for unabsorbed overhead, the contractor must prove all opportunities, prime or sub-contract, bonded or unbonded, it could have undertaken but for the delay. The parties to this contract agree that if no additional work opportunities arise during any delay period in excess of 14 days, under absorption of overhead would be caused by lack of opportunity and not the delay under this contract. In the absence of opportunity to take on additional work, the contractor will be entitled to no additional unabsorbed overhead costs under this contract.

d. In the event new work opportunities do arise during a compensable delay, the contractor will provide notice to the Contracting Officer of such new contracts or other additional work opportunities as they become available during the delay period. The Government will be liable for no unabsorbed overhead costs that arise during the delay period in the absence of an opportunity to adjust the performance schedule to enable avoidance of such costs.

GC-16. UTILITY OUTAGES:

a. General: All utility service outages shall be at the convenience of the Government, and will normally be scheduled during off-duty hours or weekends. Outages shall be requested in writing to the Contracting Officer no less than three weeks (21 days) in advance.

b. Electrical: Work on high voltage primary lines shall be accomplished while lines are de-energized and grounds are in place. If, due to extenuating circumstances, this is not practical, permission must be requested in writing through the COR and Installation Safety Office (ISO) to allow work while energized or hot. The request shall include a specific Activity Hazard Analysis (AHA) which outlines in detail why the work can only be performed while the conductors are energized and shall outline in detail the procedures to be followed to perform the work. In addition to normal procedures, the emergency procedures to be followed shall be outlined as well. If permitted, contractor shall be subject to all OSHA requirements for equipment and worker protection.

GC-17. WARRANTIES: Before final acceptance, the contractor shall provide to the COR a list showing all products and installed equipment that are covered by warranties, and the length of time the warranty is in effect.

GC-18. WATER SUPPLY: A vacuum breaker or appropriate backflow prevention device shall separate any temporary or permanent connection to the potable water supply. The vacuum breaker shall be in accordance with the National Plumbing Code and the American Water Works Association. See Section 01561, ENVIRONMENTAL PROTECTION, Water and/or Sewer Lines, for additional information.

GC-19. WORKING HOURS: Unless otherwise specified, work under the contract shall be performed during the hours from 7:30 a.m. to 5:00 p.m., local time, Mondays through Fridays, except federal holidays. Every other Friday is a scheduled Regular Day Off (RDO). On workday Fridays the hours are from 7:30 a.m. to 4:00 p.m. Prior to performing work during hours other than those specified, the contractor shall obtain the permission of the Contracting Officer or his authorized representative. Normally, requests for

permission to work during hours other than those specified should be submitted no less than 24 hours prior to the time the contractor desires to perform such work.

GC-20. WORKSITE APPEARANCE AND SECURITY: Contractor shall maintain worksite in a reasonably neat appearance. This shall be done by daily cleanups of the worksite. Contractor is responsible to secure all tools and materials at the close of business. The Contractor shall protect all construction materials from exposure to the elements. The Contractor shall ensure that, at the end of the work shift, the building exterior doors/windows are secure to prevent access to the building interior. This requirement applies to all jobsites, including those within restricted areas of APG.

PART 2 PRODUCTS

Compliance with Green Procurement Requirements: Contractor shall follow the Federal EPA Comprehensive Procurement Guidelines (www.epa.gov/cpg) and the Army Contracting Command Quick Guide (https://acc.aep.army.mil/accapps/ACCMAP/Documents/Quick-Guide-for-Sustainable-Procurement.docx) for acquisition of building material, products, and select materials to be utilized on this contract. Materials selected shall have the following characteristics: 1) Long life cycle, 2) Use the least toxic materials, 3) are recyclable, 4) materials that are resource efficient, 5) materials with a maximum recycled content, 6) materials harvested on a sustainable yield basis, 7) and products causing the least pollution during their manufacture, use and reuse.

PART 3 EXECUTION

Not used.

-- END OF SECTION 01011 --

SECTION 01561

ENVIRONMENTAL PROTECTION
12/06

PART 1 GENERAL

1.1 SCOPE

The work covered by this section consists of furnishing all labor, materials, and equipment and performing all work required for the prevention of environmental pollution during, and as the result of, all operations under this contract. For the purpose of this specification, environmental pollution is defined as the introduction of, and/or presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter biological balances of important to human life or affect other species. The control of environmental pollution requires consideration of air, water, and land.

1.2 APPLICABLE REGULATIONS

The contractor and his subcontractors in the performance of this contract shall comply with the following:

a. Clean Air Act (CAA)

b. Clean Water Act (CWA)

c. Code of Maryland Regulations (COMAR) Title 09 and 26

d. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA aka Superfund)

e. Emergency Planning and Community Right-to-Know Act (EPCRA)

f. Endangered Species Act

g. National Environmental Policy Act (NEPA)

h. Federal Insecticide, Fungicide, Rodenticide Act (FIFRA)

i. Occupational Safety and Health Act (OSHA)

j. Oil Pollution Act, Pollution Prevention Act (PPA)

k. Resource Conservation and Recovery Act (RCRA)

l. Safe Drinking Water Act, Toxic Substance Control Act (TSCA)

m. Aberdeen Proving Ground Environmental Regulations (APGR) and Policies. These are accessible at the following internet web site: https://apgrc2gag-intra.apg.army.mil/apg/mrmd

n. and all other applicable Local, State, and Federal laws and regulations concerning environmental and safety requirements, as well as the specific requirements stated elsewhere in the contract specifications.

1.3 NOTIFICATION AND RESPONSE

1.3.1 Imminent Hazard

If state, federal or installation regulators determine that the contractor has or is creating a condition that may present an imminent and substantial endangerment to health or the environment they have the authority to issue project cease-and-desist and/or termination orders without routing such notification through the Contracting Officer (KO) and/or Contracting Officer's Representative (COR). Such authority falls under definition of "imminent hazard" as defined by OSHA, RCRA, and other laws (see "APPLICABLE REGULATIONS" above). If so directed by persons authorized to issue such notifications, the contractor shall comply immediately and notify the KO and/or COR.

1.3.2 Emergency Response

The above statements do not infer that the Contractor will wait for KO, COR and/or regulator notification before initiating corrective action for spills, leaks, fires, explosions, and/or accidents involving injuries. In the event of such incidents the contractor shall immediately notify the Installation "Emergency Operations Center" (dial 911 on post phones or 911 from a commercial phone on or off post) and implement corrective actions to prevent further injuries or damage to the environment. All costs incurred as the result of a contractor caused spill, leak, fire, explosions, or other accidents are the responsibility of the contractor.

1.4 SUBCONTRACTORS

The Contractor is responsible for compliance with the provisions of this section by all subcontractors.

PART 2 PRODUCTS (NOTUSED)

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

The contractor shall practice pollution prevention by means of source reduction. The Pollution Prevention Act (PPA) defines source reduction as practices that reduce or eliminate the creation of pollutants through:

a. increased efficiency in the use of raw materials, energy, water, or other resources; and/or

b. protection of natural resources by conservation; and/or

c. management of personnel and control of hazardous materials to diminish or negate the introduction of pollutants into the environment.

3.2 PROTECTION OF WATER RESOURCES

The contractor shall not pollute any waterways (e.g., streams, lakes, reservoirs) with any harmful organic or inorganic material or waste. All work under this contract shall be performed in such a manner that pollutants are not released into ditches, storm drains, surface or groundwater (i.e. waters of the State, COMAR 26.08), adjacent to or downstream to the site.

3.2.1 Well Installation and Closure (Not Applicable)

3.2.2 Water and/or Sewer Lines (NOT APPLICABLE)

3.2.3 Septic Systems (NOT APPLICABLE)

3.2.4 Groundwater and Dewatering

Discharge of water from an excavation to storm drains is not permitted. Discharges to the sanitary sewers are approved on a case by case basis. Requests must be submitted to the COR.

3.3 PROTECTION OF AIR RESOURCES

The contractor shall protect against the emission of any hazardous substance(s) that cause or contribute to air pollution and may reasonably be anticipated to endanger health, welfare and the environment.

3.3.1 Burning

Burning in most instances is not permitted. The Contractor shall obtain written approval prior to burning of any substance or waste. This section is not applicable to welding, cutting, brazing, soldering, etc.

3.3.2 Dust Control

The contractor shall maintain all work areas free from dust, and air pollutants. Approved temporary methods of stabilization consisting of sprinkling with water, chemical treatment, light bituminous treatment or similar methods will be permitted to control dust. Sprinkling with water, where used, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times. The use of chemical substances to control dust pollution during construction shall be approved by the COR prior to application of such substances. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

3.3.3 New Air Source Permits and Registration (NOT APPLICABLE)

3.3.4 Permits to Construct Boilers (NOT APPLICABLE)

3.3.5 Generator Sets (NOT APPLICABLE)

3.3.6 Materials Containing Semi-Volatile or Volatile Organic Compounds (VOCs)

The Contractor shall minimize use of volatile (i.e., benzene, methylene chloride, toluene, etc.) and semi-volatile (i.e., dichlorobenzene, trichlorobenzene, etc.) organic compounds in order to reduce fugitive air emissions during construction. Volatile and semi-volatile organics are contained in such products as paints, solvents, cleaners, sealers, glues, mastics, etc. Under no circumstance shall the contractor install materials (i.e., paint, glue, sealers, mastics, insulations, etc.) that continue to leach chemicals to the environment after cure.

3.3.7 Ozone Depleting Chemicals (ODC) and Ozone Depleting Substances (ODS)

The contractor's use or installation of ODCs (i.e., Methyl chloroform (MCF) aka 1,1,1-Trichloroethane (TCA), Carbon Tetrachloride (CCI), CFC-113, etc.) and Class 1 ODSs (i.e., R-11 (CFC-11), R-12 (CFC-12), R-13 (CFC-13), R114 CFC-114), R-500, R-502, R503, etc.) are not permitted under this contract.

3.3.8 VOC Limits

COMAR 26.11.33 (Air Quality, Architectural Coatings) sets VOC limits for many types of architectural coatings. The contractor shall ensure materials used at APG meet this requirement.

3.4 PROTECTION OF LAND RESOURCES

The land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction and shall appear to be natural and not detract from the appearance of the project. The Contractor shall confine his construction activities to areas defined by the plans and specifications.

3.4.1 Protection of Trees, Shrubs, and Vegetation

The contractor shall be responsible for the protection of the tops, trunks and roots of all existing trees, shrubs, and vegetation that are to be retained on the site.

3.4.1.1 Heavy equipment, vehicular traffic, or stockpiling materials shall not be permitted within the drip line of trees and/or shrubs to be retained.

3.4.1.2 No toxic materials shall be stored within 100 feet from the drip line of trees to be retained or exposed to the elements.

3.4.1.3 Except for area shown on the plans to be cleared, the Contractor shall not deface, injure, or destroy trees, shrubs or vegetation, nor remove or cut them without specific written authorization. Existing nearby trees or shrubs shall not be used for anchorage.

3.4.1.4 No protective devices, signs, utility boxes or other objects shall be nailed to trees to be retained on the site.

3.4.2 Restoration of Landscape Damage

Any tree, shrub, vegetation or other landscape feature scarred or damaged by the contractor's operations shall be restored as nearly as possible to its original condition at the Contractor's expense or replaced at the direction of the COR. All scars, wounds, cuts or stumps from limbs removed shall be immediately coated with an approved wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes is not permitted. The use of climbing spurs is not permitted for tree climbing. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Contracting Officer, shall be immediately removed or replaced with a nursery-grown tree or healthy tree moved from another location of the same species. Replacement trees and shrubs shall be of the same size as those removed. The Contractor shall remain responsible for the maintenance of replacement trees, shrubs, and vegetation until it is determined that the replacement is viable and can be sustained without other than routine care.

3.4.3 Soil Erosion and Sediment Control

The Contractor shall maintain soil erosion and sediment controls on all excavations. The Contractor shall develop and submit a soil and sediment control plan to the COR if the area (inclusive of temporary road construction, construction of temporary embankments and excavation for plant and/or work or staging areas) to be disturbed is in excess of 5,000 square feet or the excavation exceeds 100 cubic yards of either cut or fill material or a combination of the two. The Contractor shall not commence grading or excavation until the State-approved plan is received. During construction and maintenance of soil erosion and sediment control devices, the Contractor shall ensure the presence of an on-site supervisor who holds State of Maryland "Soil Erosion and Sediment Control" certification.

3.5 POLLUTION PREVENTION ACT (PPA), EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA), AND APPLICABLE EXECUTIVE ORDERS (EO)

The contractor shall comply with the following:

a. Executive Order (EO) #13148 (Greening the Government Through Leadership in Environmental Management),
b. EO #13101 (Greening the Government Through Waste Prevention, Recycling and Federal Acquisition)
c. EO #13123 (Greening the Government Through Efficient Energy Management)
d. RCRA 6002 (Federal Procurement).

The contractor shall accomplish the following.

3.5.1 Green Procurement/Environmentally Preferable Products (EPP)

The government requires the use of recoverable/recovered materials and products identified in the EPA's Comprehensive Procurement Guideline (CPG). All materials and products intended for use within this contract shall meet the recommended minimum content standards identified in the Recovered Materials Advisory Notices (RMAN).

(a) Use products with post-consumer recycled content.
(b) Use products that are recyclable.

(c) Use low toxicity or non-toxic products.
(d) Use and install low-maintenance products.

3.5.1.1 Green procurement and Federal Acquisition requirements emphasize the need to ensure that EPA designated products containing post consumer recycled content are integrated into construction and that the use of products containing virgin materials are minimized to the greatest extent practicable.

3.5.2. Green Building

The contractor shall comply with EO 13101 (Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition), the Federal Acquisition Regulation (FAR), and APG Green Building Initiative Policy and incorporate green building principles and practices into all APG construction projects

3.5.2.1 The contractor shall perform design and undertake construction with knowledge and consideration of potential impacts to both natural and man-made environments. The contractor shall prevent pollution in all project stages, conserve natural resources, minimize adverse impacts to biological and human environments and maintain historical and cultural integrity.

3.5.2.2 During the construction, demolition and/or renovation process the contractor shall minimize adverse acoustical impacts, mitigate adverse air quality impacts to the indoor environment and the atmosphere, employ environmentally sound practices in site layout and landscape, maximize energy efficiency and use of renewable energy sources, protect and conserve water resources and maximize recycling and waste minimization.

3.5.2.3 Low Impact Development (LID)

The contractor shall incorporate LID practices into their site development and storm water management plan in order to mitigate development impacts to land, water, and air. LID emphasizes the integration of site design and planning techniques that conserve natural systems and hydrologic functions on a site.

3.5.3 Energy Conservation

The contractor shall provide Energy Star or other energy efficient products.

3.5.3.1 Lighting

The contractor shall only install energy efficient lighting fixtures, bulbs, fluorescent tubes, switches, and equipment.

3.5.3.1.1 Lighting and Pollution Prevention

Fluorescent lamps and other High Intensity Discharge (HID) lights when tested for disposal typically will exceed the Toxic Characteristic Leaching Procedure (TCLP) limit for mercury, and are a hazardous waste. The contractor shall comply with pollution prevention mandates (Presidential Executive Order #13148 and the Pollution Prevention Act) and install fluorescent lamps, HID lights, and bulbs that are either mercury-free or the mercury content is below the current hazardous waste standard of 0.20 ppm (parts per million). Fluorescent lamps, HID lights, and bulbs that routinely contain mercury shall have permanent manufacturer labeling stating that the lamp, light, or bulb "Contains Mercury" or is "Mercury-Free." Fluorescent lamps and HID lights containing mercury shall be returnable to the manufacturer for recycling to the greatest extent possible.

3.5.4 Paint, Latex (Architectural and Architectural Anti-Corrosive)

The following specifications and restrictions apply to all architectural and anti-corrosive paints used during the course of this contract.

3.5.4.1 Paint Volatile Organic Compound (VOC) Restrictions

Due to the documented health risks associated with high VOC levels. Table 1 lists maximum allowable VOC content (grams/liter and pounds/gallon) for each type of paint.

Table 1. APG VOC Limits for Paints

Type of Paint	VOCs (grams/ liter)	VOCs (pounds/gallon)
Interior architectural		
Flat	50 g/l	0.42 lb/gal
Non-Flat	150 g/l	1.25 lb/gal
Exterior architectural		
Flat	100 g/l	0.83 lb/gal
Non-Flat	200 g/l	1.66 lb/gal
Anticorrosive		
Flat	250 g/l	2.1 lb/gal
Semi-Gloss	250 g/l	2.1 lb/gal
Gloss	250 g/l	2.1 lb/gal

3.5.4.2 Paint Inorganic Component Restrictions

Paints often contain inorganic and organo-metallic components used as preservatives, additives, and pigments. Table 2 lists the base inorganic components prohibited by APG standards.

Table 2. Inorganic Components Prohibited by Standards for Paints

Antimony
Cadmium
Hexavalent chromium
Lead
Mercury

3.5.4.3 Paint Organic Compound Restrictions

Organic chemical compounds in paint affect a number of paint characteristics from how smoothly the paint flows to its freeze resistance. Table 3 lists all compounds prohibited for this contract.

Table 2. Prohibited organic compounds.

Methylene chloride	Di-n-butyl phthalate
1,1,1-Trichloroethane	Di-n-octyl phthalate
Benzene	Diethyl phthalate
Toluene (methylbenzene)	Dimethyl phthalate
Ethylbenzene	Isophorone
Vinyl chloride	Formaldehyde
Naphthalene	Methyl ethyl ketone
1,2-Dichlorobenzene	Methyl isobutyl ketone
Di (2-ethylhexyl) phthalate	Acrolein
Butyl benzyl phthalate	Acrylonitrile

3.5.5 Emergency Planning and Community Right-to-Know

3.5.5.1 EPCRA Requirements

The contractor shall secure all hazardous materials from the elements, leakage, and entry by unauthorized individuals; maintain active current inventories of all hazardous material and hazardous waste that they manage on-site, and maintain a current Material Safety Data Sheet (MSDS) file for each and every hazardous material used on Aberdeen Proving Ground during this contract.

3.5.5.2 EPCRA Reporting

3.5.5.2.1 The contractor shall provide the COR with a list of all hazardous and regulated materials brought onto the installation during execution of the contract. There are no exceptions.

3.5.5.2.2 An initial list shall be provided before any hazardous materials are brought onto the installation. The list shall include chemical/brand name, quantity (in pounds only) with an attached copy of the material safety data sheet (MSDSs) for each item listed. Additions to the quantities previously listed and new items shall be provided over the life of the contract as the contractor determines the necessity to bring more hazardous materials onto the installation.

3.5.5.2.3 At the end of the contract or 31 Dec of each calendar year, whichever comes first, the contractor shall provide the total amount of each chemical used, total amount of waste residues, and total amount of excess hazardous or regulated material removed from the installation or turned over to the government for use.

3.6 LOCATION OF STORAGE AND SERVICE FACILITIES

The location of the Contractor's storage and service facilities shall be limited to the job/construction site. Plans showing storage and service facilities, including storage tanks shall be submitted for written approval to the Contracting Officer.

3.6.1 Hazardous Materials Storage Tanks and Facilities

The contractor shall assure that all hazardous material storage tanks and facilities are physically separated from the immediate work area. Hazardous material storage facility(s) and tank(s) shall be secured from the elements and entry by unauthorized individuals. Tanks shall be afforded secondary containment to protect against leaks and grounded to protect against electrical charges and sparking. All delivery or loading surfaces shall be impervious and curbed where necessary to insure against spills and leaks to land or water. If secondary containment is open to the environment it shall be designed and maintained to prevent migration of hazardous materials into ground water, surface water, or evaporation into the air.

3.7 PESTICIDES

The contractor shall submit an application and procedures for pesticide application and use for government approval prior to bringing any pesticides onto APG.

3.8 DISPOSAL OF WASTES

3.8.1 Hazardous Waste

The contractor shall obtain written government approval before storing any hazardous waste on APG. The transport of hazardous waste onto APG by the contractor is forbidden. Upon determination that a waste is hazardous the contractor shall immediately notify the COR in order to determine pick-up, transportation and waste disposition requirements. The contractor shall containerize, label, stage, and manage the waste while awaiting pick-up. In addition, the containerization, labeling, removal, transportation, and disposal of hazardous materials and waste shall be accomplished in accordance with the requirements outlined in State (COMAR Title 26), Federal EPA (40 CFR),

DOT (49 CFR), and OSHA (29 CFR). All costs incurred for the disposal of contractor-generated hazardous waste are the responsibility of the contractor.

3.8.1.2 Roll-offs

The covered top roll-offs used to store hazardous waste shall be approved for hazardous waste and marked as required by hazardous waste regulations.

3.8.2 Non-RCRA/TSCA and Industrial Wastes

The contractor shall submit information on the method of disposal, transporter, and the disposal site through the COR approval. Copies of the shipping manifests and commercial site receipt copies of manifests and/or bill of lading shall be provided to the COR within 20 days of shipment from the Installation.

3.8.3 Surety/Suspect Surety media and debris

The contractor shall not dispose, handle or remove any surety items.

3.8.4 Mixed Waste (RCRA/TSCA/NRC/etc.)

The contractor shall not transport or dispose any mixed waste.

3.8.5 Radiological Waste

The contractor shall not transport, dispose or remove radiological waste/debris.

3.8.6 Solid Waste

The contractor shall coordinate all demolition/removal/disposal action(s) of construction/demolition (rubble) wastes with the government. The contractor shall fill out and submit form titled "Solid Waste Tracking" of APGR 200-50, Appendix B along with the trip tickets to the COR.

3.9 SPECIFIC DISPOSAL METHODS

3.9.1. Lead Contaminated Debris

Debris with TCLP lead of 5 ppm (mg/1) or greater is a hazardous waste and will be handled as such. Lead contaminated debris (less than 5 ppm) is an industrial waste. Most rubble fills do not have liners and leachate collection systems. The contractor shall dispose of lead contaminated debris (less than 5 ppm TCLP) in a lined landfill (COMAR 26.04.07.19. reference MDE Lead Paint Hazard Fact Sheet #6).

3.9.2 Demolition of Electrical Equipment Containing Polychlorinated Biphenyls (PCB)

Electrical equipment (i.e., transformers, switches, capacitors, ballast, etc.) which contain PCB-contaminated dielectric materials shall be handled as hazardous waste per Toxic Substances Control Act (TSCA) requirements. The contractor shall weigh, containerize, and label all PCB contaminated equipment and debris in accordance with applicable regulations

3.9.3 Demolition of Electrical Equipment Containing Mercury

Electrical items (i.e., switches, thermostats, thermometers, bulbs, fluorescent tubes, and other electrical items) containing toxic characteristic leaching procedure (TCLP) mercury in concentrations of 0.20 ppm (parts-per-million) or greater shall be consolidated, containerized, and labeled by the contractor for final disposition by the Government.

3.9.4 Asbestos Disposal

The contractor shall provide a disposal plan, transporter and disposal site information to the COR for written approval. Completed manifests/bills of lading, and the analytical results of the waste shipped by the approved transporter/disposer shall be returned to the COR within 24 hours of shipment. The signed disposal facility copy shall be returned to the COR within 20 days of shipment.

3.9.4.1 Asbestos/Lead Paint Waste/Debris

Waste/debris containing asbestos, and 5 ppm (mg/1) or greater lead determined by the TCLP test, is a mixed RCRA/TSCA waste. It shall only be disposed of at a licensed government approved disposal facility. The contractor shall containerize, mark, and stage the waste for government removal. All containers of lead contaminated debris (5 ppm or greater) shall be packaged and labeled and managed as a hazardous waste in accordance with State and Federal regulations.

3.9.5 Demolition of Refrigeration Equipment

The contractor shall not release refrigerants/ozone-depleting substances (ODS) or ozone-depleting chemicals (ODC) to the environment during demolition/up-grade of an existing system. All service personnel shall have the necessary training and certifications to accomplish such removal actions. All recovery equipment shall meet EPA (40 CFR 82.158(b) (1)) and/or Air Conditioning and Refrigeration Institute (ARI) 740-1993 standards and certifications. At the discretion of the government the contractor shall either recover all refrigerant for reuse or turn the recovered refrigerant over to the government for shipment to the DOD Reserve Bank for disposal. The contractor is prohibited from releasing refrigerant to the land, water or air.

3.9.6 Contaminated Soil Staging and Disposal

The contractor shall not deposit, spread or dispose of any excavated soils removed from APG contaminated site(s) unless specifically authorized by the government in writing to dispose of such soils at an APG or commercial site. The contractor shall comply with all EPA 40 CFR, RCRA Subtitle C and D requirements while excavating, staging, storing, containerizing, transporting and/or disposing of contaminated soils. If the work is to be performed on or near a CERCLA (Superfund) site the government will advise the contractor of all applicable work requirements and agreements.

3.9.7 Contamination Encountered During Construction

If contamination is encountered during excavation or construction, the site must be remediated before the activity can continue. The contractor shall immediately notify the COR if any contamination or suspect contamination is detected or if remediation is required.

3.9.8 Industrial Waste

Contractor generated industrial waste shall not be stockpiled on-site for more than thirty days.

3.9.9 Liquid Stripper Waste

Liquid wastes from activities such as stripping lead paints shall be containerized in compatible containers, marked as hazardous waste and labeled as to the actual contents in accordance with RCRA hazardous waste regulations.

3.10 SEWER DISCHARGES

The contractor shall perform analyses to determine the composition of each media proposed for discharge to the sewer system. The contractor shall assure that the discharge is within APG permit parameters. The contractor's laboratory shall meet the requirements of paragraph 3.16 of this specification. As a quality assurance measure the government will randomly verify analytical results through government or contract laboratories. The contractor shall obtain approval in writing through the COR prior to any discharge.

3.10.1 Sterilization/Disinfection

Waters with detectable chlorine shall not be discharged to the waters of the State (note the State includes groundwater and surface waters as waters of the State). The contractor shall obtain approval in writing through the COR prior to any discharge.

3.11 QUARANTINED AREA BY DEPARTMENT OF AGRICULTURE

The installation is within an area that has been quarantined by the Department of Agriculture to prevent the spread of certain plant pests that may be present in the soil. The contractor shall thoroughly clean all soil residues from all vehicles, construction equipment at the construction site by high-pressure washer or other methods that will assure complete removal. Water use will be restricted to the minimum to clean a vehicle. Non-chlorinated water from washing must stay on site and not be allowed to run-off to waters of the State. Chlorinated wash waters must be diverted to a sanitary sewer. The contractor shall make arrangements and obtain written authorization through the COR to use wash racks on post. Hand tools shall be thoroughly cleaned by brush or other means to remove all soils. Transporting and disposal of soils and related debris will be in accordance with quarantine requirements.

3.12 HISTORICAL SIGNIFICANCE AND UNEARTHING OF ARTIFACTS

Project areas shall be reviewed for impact to cultural resources prior to any ground disturbance. If artifacts or items of significance are unearthed or discovered during construction the contractor shall cease the action and immediately notify the COR. It is a federal offense for unauthorized person(s) to recover artifacts from federal property.

3.13 PROHIBITED MATERIALS DURING CONSTRUCTION AND RENOVATIONS, POLLUTION PREVENTION

Materials/items/equipment used for construction and renovations shall not be of a nature that they will cause environmental damage, contribute to future environmental concerns or disposal problems.

3.13.1 Electrical Equipment Containing Dielectric Fluid

The contractor shall not install any new electrical equipment (capacitors, lighting, ballasts, etc.) that contains any PCBs. All equipment shall be permanently labeled by the manufacturer as PCB-free.

3.13.2 Lighting

Fluorescent Lamps and HID lights when tested for disposal will typically exceed the TCLP limit for mercury, and are hazardous waste (OSWER, EPA, DC, letter dated 7 Dec 1992; and report dated 14 May 1993). All fluorescent lamps, HID lights, and bulbs shall be permanently labeled by the manufacturer as either "Containing Mercury" or "Mercury-Free." Mercury containing items shall be returnable to the manufacturer for regeneration/recycling to the greatest extent possible.

3.13.3 Paint (Protective Coating)

All architectural and anti-corrosive paints (interior and exterior) shall meet the APG/EPA/Industry/Green Seal GS-03 Standard. See paragraph 3.5.4 for chemical and packaging restrictions and COMAR 26.11.33 (Air Quality, Architectural Coatings). The contractor is responsible to ensure that all paints are environmentally preferable and are of either low-toxic or nontoxic composition. All paints shall be free of persistent bioaccumlative toxins-PBTs (e.g., lead, mercury).

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3.13.4 Asbestos Restrictions

Asbestos containing materials shall not be installed. Where material matching (i.e. roof corrugated sheeting, building siding) is required, equivalent concrete based or other equal substitutes shall be used.

3.13.5 Solder and Flux

Solder and flux shall be heavy metal free (i.e., lead, cadmium, silver, etc.) to the greatest extent possible.

3.14 RADIATION EMITTING EQUIPMENT

Any radiation emitting equipment, sources, materials, and other similar type items must be properly, registered, licensed, etc. The contractor shall submit an application to the COR for written approval prior to bringing any sources on to APG.

3.15 ENVIRONMENTAL PERMITS

The contractor shall not proceed with the construction, renovation, or modifications until all of the required regulatory approval or permits are obtained. Any penalties, fines or costs resulting from stop orders due to actions proceeding without approval/permits shall be assessed against the contractor.

3.15.1 Underground Storage Tanks (UST) and Associated System Components

If any work involves the installation, maintenance, or modification to a UST system or fuel lines to underground piping, a Maryland certified installer is required. The certified installer shall be present on site during all installation actions. The connections shall be made in accordance with COMAR and the complete system shall be precision tested after completion with a State approved method.

3.15.2 Hazardous Area Work Permits or Site Specific Health and Safety Plans

Hazardous materials include, but are not limited to: chemical surety materials, hazardous chemicals, carcinogens, asbestos, explosives, radioactive materials, Unexploded Ordnance (UXO) etc. These hazardous materials may be encountered at work sites at APG. Where work sites are in known or suspected to contain hazardous materials, a Hazardous Area Work Permit (HAWP) will be included in the Statement of Work. The contractor shall also develop a Site Specific Health and Safety Plan prior to initiating work on the site. Similarly, where excavation is required, an excavation permit is required. These permits will indicate the type of hazard and the special requirements to be followed in the work area. Copies of permit(s) shall be posted by the contractor in the full view at the work site. The contractor shall be responsible to inform all his personnel and assure they conform to all special requirements directed by the permit(s). Non-conformance shall result in a work stoppage until the situation is corrected to the satisfaction of the COR, at no expense to the Government. At sites not suspected of containing hazardous materials the possibility still exists of encountering them during the course of work. If during operations hazardous materials, possible contamination or other environmental damage is encountered by contractor personnel they shall immediately discontinue work in that area and notify the COR. Work may resume only after approval is given by the COR.

3.16 CONTRACTOR'S SUPPLIED SAMPLING AND ANALYSIS SERVICES

All sampling and/or analysis laboratories shall be EPA and/or State certified and licensed. In some instances other Federal Agency or national certification may apply. All Army Corps of Engineers (ACOE) managed projects shall require ACOE Certification. The laboratory shall submit a Quality Assurance and Quality Control plan, Health and Safety Plan, Sampling and Analysis Plan/EPA methods/SOPs, certifications and accreditation to the COR. The contractor is responsible for assuring that the analysis laboratory is qualified and has the licensing/certification to perform the sampling and/or analysis required.

--END OF SECTION—

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 01 45 00.10 20
QUALITY CONTROL FOR MINOR CONSTRUCTION
02/10

PART 1 GENERAL

1.1 REFERENCES

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

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1(2008; Errata 2011) Safety and Health Requirements Manual

1.2 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

QC Plan - Submit a QC plan within 15 calendar days after receipt of Notice of Award.

1.3 INFORMATION FOR THE CONTRACTING OFFICER (KO)

NOTE: Weekly CQC Reports and Contractor Production Reports shall be submitted on all task orders issued under this contract

1.3.1. Prior to commencing work on construction, the Contractor shall provide a single copy set of their current report forms to the KO and the COR. The report forms will consist of the Contractor Production Report, Contractor Production Report (Continuation Sheet), Contractor Quality Control (CQC) Report, CQC Report (Continuation Sheet), Preparatory Phase Checklist, Initial Phase Checklist, Rework Items List, and Testing Plan and Log.

1.3.2 The KO and/or the COR shall review the proposed forms submitted by the contractor and within ten (10) working days, either accept the forms as presented or reject the forms and request revisions be made to one or more of the forms. The contractor shall have ten days to revise and re-submit the form or forms in question to the KO and or COR for review and acceptance.

1.3.3 The government reserves the rights to accept or reject any contractor supplied forms or form. Those forms that do not provide sufficient detail in their reporting shall not be acceptable and shall be revised to the satisfaction of the government.

1.3.4 Deliver the following to the KO/COR:

a. CQC Report: Original and one copy, by 10:00 AM the next working Monday after each week that work is performed;

b. Contractor Production Report: Original and one copy by 10:00 AM the next working Monday after each week that work is performed;

c. Preparatory Phase Checklist: Original attached to the original CQC Report and one copy attached to each copy;

d. Initial Phase Checklist: Original attached to the original CQC Report and one copy attached to each copy;

e. Field Test Reports: One copy, within the week after the test is performed, attached to the CQC Report;

f. QC Meeting Minutes: One copy, within the week after the meeting; and

g. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Manager, a QC plan, a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this contract. The QC program shall cover on-site and off-site work and shall be keyed to the work sequence. No work or testing may be performed unless the QC Manager is on the work site.

1.4.1 Preliminary Work Authorized Prior to Acceptance

The only work that is authorized to proceed prior to the acceptance of the QC plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.2 Acceptance

Acceptance of the QC plan is required prior to the start of construction. The KO reserves the right to require changes in the QC plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The KO reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications.

1.4.3 Notification of Changes

Notify the KO, in writing, of any proposed change, including changes in the QC organization personnel, a minimum of seven calendar days prior to a proposed change. Proposed changes shall be subject to the acceptance by the KO.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. The QC Manager shall be assigned no other duties than that of the Quality Control Manager. The QC Manager is required to attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by others.

1.5.1.2 Qualifications

The QC Manager shall be a Register Roof Observer (RRO) with a current certification issued by the Roofing Consulting Institute (RCI) with a minimum of three (3) years experience as an RRO. In addition the QC manager shall have a minimum of 10 years combined experience as a superintendent, inspector, QC Manager, project manager, or construction manager on similar size roofing projects which included the major trades that are part of this contract. The individual must be familiar with the requirements of the EM 385-1-1and have experience in the areas of hazard identification and safety compliance.

1.5.1.3 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager shall have completed the course Construction Quality Management for Contractors and will have a current certificate.

1.5.2 Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager shall be the same as for the QC Manager.

1.6 QC PLAN

1.6.1 Requirements

Provide, for acceptance by the KO, a QC plan submitted in a three-ring binder that covers both on-site and off-site work and includes the following with a table of contents listing the major sections identified with tabs.

I. QC ORGANIZATION: A chart showing the QC organizational structure and its relationship to the production side of the organization.

II. NAMES AND QUALIFICATIONS: In resume format, for each person in the QC organization. Include the CQM for Contractors course certification required by the paragraph entitled "Construction Quality Management Training".

III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONAL: Of each person in the QC organization.

IV. OUTSIDE ORGANIZATIONS: A listing of outside organizations such as architectural and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.

V. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for managing and implementing the QC

program as described in this contract. Include in this letter the QC Manager's authority to direct the removal and replacement of non-conforming work.

VI. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval.

VII. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs “Accredited Laboratories" or "Testing Laboratory Requirements", as applicable.

VIII. TESTING PLAN AND LOG: A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.

IX. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track and complete rework items.

X. DOCUMENTATION PROCEDURES: Use Government formats.

XI. LIST OF DEFINABLE FEATURES: A Definable Feature of Work (DFOW) is a task, which is separate and distinct from other tasks, has the same control requirements and work crews. The list shall be cross-referenced to the Contractor's Construction Schedule and the specification sections. For projects requiring a Progress Chart, the list of definable features of work shall include but not be limited to all items of work on the schedule. For projects requiring a Network Analysis Schedule, the list of definable features of work shall include but not be limited to all critical path activities.

XII. PROCEDURES FOR PERFORMING THREE PHASES OF CONTROL: For each DFOW provide Preparatory and Initial Phase Checklists. Each list shall include a breakdown of quality checks that will be used when performing the quality control functions, inspections, and tests required by the contract documents. The preparatory and initial phases shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems.

XIII. PERSONNEL MATRIX: Not Applicable.

XIV. PROCEDURES FOR COMPLETION INSPECTION: See the paragraph entitled "COMPLETION INSPECTIONS".

XV. TRAINING PROCEDURES AND TRAINING LOG: Not Applicable.

1.7 COORDINATION AND MUTUAL UNDERSTANDING MEETING

During the Pre-Construction conference and prior to the start of construction, discuss the QC program required by this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, and the coordination of the Contractor's management, production and the QC personnel. At the meeting, the Contractor will be required to explain how three phases of control will be implemented for each DFOW. Contractor's personnel required to attend shall include the QC Manager, project manager, and superintendent. Minutes of the meeting will be prepared by the QC Manager and signed by both the Contractor and the KO. The Contractor shall provide a copy of the signed minutes to all attendees. Repeat the coordination and mutual understanding meeting when a new QC Manager is appointed.

1.8 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every one week at the work site with the superintendent and the foreman responsible for the ongoing and upcoming work. The QC Manager

shall prepare the minutes of the meeting and provide a copy to the KO within two working days after the meeting. As a minimum, the following shall be accomplished at each meeting:

a. Review the minutes of the previous meeting;

b. Review the schedule and the status of work and rework;

c. Review the status of submittals;

d. Review the work to be accomplished in the next two weeks and documentation required;

e. Resolve QC and production problems (RFIs, etc.);

f. Address items that may require revising the QC plan; and

g. Review Accident Prevention Plan (APP).

1.9 THREE PHASES OF CONTROL

The three phases of control shall adequately cover both on-site and off-site work and shall include the following for each DFOW.

1.9.1 Preparatory Phase

Notify the KO at least two work days in advance of each preparatory phase. Conduct the preparatory phase with the superintendent and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily CQC Report and in the QC checklist. Perform the following prior to beginning work on each definable feature of work:

a. Review each paragraph of the applicable specification sections;

b. Review the contract drawings;

c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;

d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;

e. Examine the work area to ensure that the required preliminary work has been completed;

f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;

g. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted; and

h. Discuss specific controls used and the construction methods and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW.

1.9.2 Initial Phase

Notify the KO at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the Initial Phase with the foreman responsible for that DFOW. Observe the initial segment of the work to ensure that it complies with contract requirements. Document the results

of the Initial Phase in the daily CQC Report and in the QC checklist. Perform the following for each DFOW:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Ensure that testing is performed by the approved laboratory; and

d. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

1.9.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report and in the QC checklist:

a. Ensure the work is in compliance with contract requirements;

b. Maintain the quality of workmanship required;

c. Ensure that testing is performed by the approved laboratory;

d. Ensure that rework items are being corrected; and

e. Assure manufacturers representatives have performed necessary inspections, if required.

1.9.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

1.9.5 Notification of Three Phases of Control for Off-Site Work

Notify the KO at least two weeks prior to the start of the preparatory and initial phases.

1.10 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review, and approval of submittals are described in the submittal section of the specification.

1.11 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this contract.

1.11.1 Accreditation Requirements

a. Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of

OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

b. Infra-Red Inspection Accreditation Requirements: Company's or firms performing the eight month infrared inspections of low slope roof installations shall have at a minimum, one Certified Level 1 Infrared Thermographer with documented training in infrared roof inspections by the Infrared Training Center or an equivalent training provider that meets or exceeds the requirements outlined by ANSI/ASNT CP-105 and CP-189 of the American Society for Non-Destructive Testing (ASNT).

1.11.2 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO), International Accreditation Services, Inc. (IAS), U. S. Army Corps of Engineers Materials Testing Center (MTC), and the American Association for Laboratory Accreditation (A2LA).

1.11.3 Capability Check

The KO retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this contract.

1.11.4 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the KO immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the KO.

1.12 QC CERTIFICATIONS

1.12.1 Contractor Quality Control Report Certification

Each CQC Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report."

1.12.2. Invoice Certification

Furnish a certificate to the KO with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which payment is requested, including stored material, is in compliance with contract requirements.

1.12.3 Completion Certification

Upon completion of work under this contract, the QC Manager shall furnish a certificate to the KO attesting that "the work has been completed, inspected, tested and is in compliance with the contract."

1.13 COMPLETION INSPECTIONS

1.13.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Contract clause "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC 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. Include in the punch list any remaining items of the "Rework Items List", which were not corrected prior to the Punch-Out inspection. The punch list shall include the estimated date by which the deficiencies will be corrected. A copy of the punch list shall be provided to the KO. The QC Manager or staff shall make follow-on inspections 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".

1.13.2 Pre-Final Inspection

The Government and QC manager 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 QC Manager shall ensure that all items on this list are corrected prior to notifying the Government 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 and shall be accomplished before the contract completion date for the work or any particular increment thereof if the project is divided into increments by separate completion dates.

1.13.3 Final Acceptance Inspection

The QC Manager, the superintendent, or other Contractor management personnel and the KO will be in attendance at this inspection. Additional Government personnel may be in attendance. The final acceptance inspection will be formally scheduled by the KO based upon results of the "Pre-Final Inspection". Notice shall be given to the KO at least 14 days prior to the final inspection. The notice shall state that all specific items previously identified to the Contractor as being unacceptable will be complete 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 KO to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause "Inspection of Construction".

1.14 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER (KO)" shall be used. Reports are required for each day work is performed. Account for each calendar day throughout the life of the contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work shall be identified by terminology consistent with the construction schedule. In the "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site. For each remark given, identify the Schedule Activity No. that is associated with the remark.

1.14.1 Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders shall be divided and tabbed as shown below. These binders shall be readily available to the Government's Quality Assurance Team during all business hours.

a. All completed Preparatory and Initial Phase Checklists, arranged by specification section.

b. All milestone inspections, arranged by Activity/Event Number.

c. A current up-to-date copy of the Testing and Plan Log with supporting field test reports, arranged by specification section.

d. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.

e. A current up-to-date copy of the Rework Items List.

f. Maintain up-to-date copies of all punch lists issued by the Manufacturer's Factory Representative, the QC Staff on the Contractor and Sub-Contractors and all punch lists issued by the Government.

1.14.2 As-Built Drawings

The QC Manager is required to review the as-built drawings, required by Section 01 78 00 CLOSEOUT SUBMITTALS, are kept current on a daily basis and marked to show deviations, which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation, e.g. PC number, modification number, RFI number, etc. The QC Manager shall initial each deviation or revision. Upon completion of work, the QC Manager shall submit a certificate attesting to the accuracy of the as-built drawings prior to submission to the KO.

1.14.3 Roof Information Card

1.15 NOTIFICATION ON NON-COMPLIANCE

The KO will notify the Contractor of any detected non-compliance with the foregoing requirements. The Contractor shall take immediate corrective action. If the contractor fails or refuses to correct the non-compliant work, the KO will issue a non compliance 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 KO may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall make no part of the time lost due to such stop orders the subject of claim for extension of time, for excess costs, or damages.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 02 82 33.13 20
REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD
08/11

This guide specification covers the requirements for limiting occupational and environmental exposure to lead when REMOVING/CONTROLLING lead-based paint or paint with lead (LBP/PWL).

Where LBP/PWL is not specifically being removed/controlled as a hazard abatement action or deleading, use Section 02 83 13.00 20 LEAD IN CONSTRUCTION.

The classification of the lead-based paint or paint with lead as hazardous waste must be performed in accordance with 40 CFR 261, and in the design phase of the project. This classification is prerequisite to the requirement of special handling, storage, and disposal according to Federal, state and local hazardous waste management regulations.

NOTE: When historic preservation work will remove LBP/PWL, refer to the Secretary of the Interior's Standards for the Treatment of Historic Properties and/or Brief 37, "Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing" as appropriate.

Projects that involve cutting, sawing, sanding, scraping, needle gunning, abrasive blasting, high temperature removal, etc., of lead-based paint/paint with lead materials may result in lead exposures in excess of OSHA limits. Therefore, personal protective equipment SHALL be used and controls implemented. Institute worker protection controls as indicated in 29 CFR 1926.62 and herein. Also, some work practices are prohibited for LBP/LBP hazard abatement (e.g., machine sanding, abrasive blasting) unless used with HEPA exhaust controls (see 40 CFR 745.227).

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 INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

AIHA Z88.6	(2006) Respiratory Protection - Respirator Use-Physical Qualifications for Personnel

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780	(1995; Errata Aug 1996; Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists

29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packaging

UNDERWRITERS LABORATORIES (UL)

UL 586 (2009)	Standard for High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Abatement: As applied to target housing and child occupied facilities; "abatement" means any set of measures designed to permanently eliminate lead-based paint hazards in accordance with standards established by appropriate Federal agencies. Such term includes:

a. The removal of lead-based paint and lead-contaminated dust, the permanent containment or encapsulation of lead-based paint, the replacement of lead-painted surfaces or fixtures, and the removal or covering of lead contaminated soil; and

b. All preparation, cleanup, disposal, and post-abatement clearance testing activities associated with such measures.

1.2.2 Action Level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period in a work environment.

1.2.3 Area Sampling: Sampling of lead concentrations within the lead control area and inside the physical boundaries, which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.

1.2.4 Child Occupied Facility: A building or portion of a building constructed prior to 1978 visited regularly by the same child, 6 years of age or under, on a least two different days within any week, provided each days visit last at least 3 hours and the combined weekly visit last at least 6 hours and the combined annual visit last at least 60 hours. Child occupied facilities may include, but are not limited to day-care centers, preschools and kindergarten classrooms.

1.2.5 Competent Person (CP): As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. A Certified Industrial Hygienist (CIH) certified for comprehensive practice by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals is the best choice.

1.2.6 Contaminated Room: Refers to a room for removal of contaminated personal protective equipment (PPE).

1.2.7 Decontamination Shower Facility: That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.8 Deleading: Activities conducted by a person who offers to eliminate lead-based paint or lead-based paint hazards or to plan such activities in commercial buildings, bridges or other structures.

1.2.9 Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

1.2.10 High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

1.2.11 Lead: Metallic lead, inorganic lead compounds, and organic lead soaps.

1.2.12 Lead-Based Paint (LBP): Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

1.2.13 Lead-Based Paint Activities: In the case of target housing or child occupied facilities, lead-based paint activities include; a lead-based paint inspection, a risk assessment, or abatement of lead-based paint hazards.

1.2.14 Lead-Based Paint Hazard (LBP Hazard): Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

1.2.15 Paint with Lead (PWL): Any paint that contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.2.16 Lead Control Area: A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.2.17 Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.18 Personal Sampling: Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.19 Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside the physical boundary."

1.2.20 Target Housing: Housing constructed prior to 1978. It does not include housing for the elderly, or persons with disabilities unless any one or more children age 6 years and younger resides or is expected to reside in such housing.

1.3 DESCRIPTION

1.3.1 Description of Work

The specific information relative to the locations, extent and condition of the LBP/PWL shall be provided in the building specific Scope of Work provided as part of each delivery order. An Activity Hazard Analysis (AHA) shall be performed for each instance of LBP/PWL encountered on a specific project.

1.3.2 Coordination with Other Work

The contractor shall coordinate with work being performed in adjacent areas. Coordination procedures shall be explained in the Removal/Control Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead activities.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data
- Vacuum Filters
- Respirators

SD-06 Test Reports
- Sampling results
- Occupational and Environmental Assessment Data Report

SD-07 Certificates

Qualifications of CP
Testing Laboratory qualifications
Occupant Notification
Training Certification of workers and supervisors
Notification of the Commencement of [LBP] Hazard Abatement
Third Party Consultant Qualifications
Lead-based paint/paint with lead removal/control plan including CP approval (signature, date, and certification number)
Rental equipment notification
Respiratory Protection Program
Hazard Communication Program; G
EPA or State approved hazardous waste treatment, storage, or disposal facility for lead disposal
Lead Waste Management Plan
Vacuum filters
Clearance Certification

SD-11 Closeout Submittals
Completed and signed hazardous waste manifest from treatment or disposal facility
Certification of Medical Examinations
Employee Training Certification
Waste turn-in documents or weight tickets for non-hazardous wastes that are disposed of at sanitary or construction and demolition landfills

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Qualifications of CP

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide previous experience of the CP. Submit proper documentation that the CP is trained and licensed and certified in accordance with Federal, State, and local laws.

1.5.1.2 Training Certification

Submit a certificate for each employee and supervisor, signed and dated by the authorized training provider meeting 40 CFR 745 (Subpart L) requirements, stating that the employee or supervisor has received the required lead training and is certified to perform or supervise deleading or lead removal. Submit proof the work will be performed by a certified firm.

1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air and wipe and soil sampling, testing, and reporting of airborne concentrations of lead. Use a laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLAP) by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis shall be OSHA approved.

1.5.1.4 Third Party Consultant Qualifications

Submit the name, address, and telephone number of the third party consultant selected to perform the wipe sampling for determining concentrations of lead in dust or soil sampling. Submit proper documentation that the consultant is trained and certified as an inspector technician or

inspector/risk assessor by the USEPA authorized State (or local) certification and accreditation program.

1.5.2 Requirements

1.5.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all federal, State, and local requirements.

b. Review and approve lead-based paint/paint with lead removal/control plan for conformance to the applicable standards. Ensure work is performed in strict accordance with specifications at all times.

c. Continuously inspect lead-based paint removal/control work for conformance with the approved plan.

d. Perform air and wipe sampling.

e. Control work to prevent hazardous exposure to human beings and to the environment at all times.

f. Certify the conditions of the work as called for elsewhere in this specification.

1.5.2.2 Lead-Based Paint/Paint with Lead Removal/Control Plan (LBP/PWL R/CP)

Submit a detailed job-specific plan of the work procedures to be used in the removal/control of LBP/PWL. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

The Removal/Control Plan shall be developed by a certified planner/project designer. In occupied buildings, the Removal/Control Plan shall also include an occupant protection program that describes the measures that will be taken during the work to protect the building occupants.

1.5.2.3 Occupational and Environmental Assessment Data Report

NOTE: Sampling results of previous jobs or initial monitoring during the job determine the requirements for further monitoring and the need to fully implement the control and protective requirements. Some LBP or PWL work may not require full implementation of the requirements of 29 CFR 1926.62. Based on the experience of the Contractor with specific process or method for performing the work, the Contractor may be able to provide historic data (previous 12 months) to demonstrate that airborne exposures are controlled below the action level. Such methods or controls shall be fully presented in the Lead Removal/Control Plan.

If initial monitoring is necessary, submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

In order to reduce the full implementation of 29 CFR 1926.62, the Contractor shall provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of 29 CFR 1926.62 and supporting the Lead Removal/Control Plan.

a. The initial monitoring shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead for stated work.

b. Submit worker exposure data gathered during the task based trigger operations of 29 CFR 1926.62 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead containing coatings are present.

c. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

1.5.2.4 Medical Examinations

Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103. Maintain complete and accurate medical records of employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.

1.5.2.5 Training

Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.

b. Establish and implement a respiratory protection program as required by AIHA Z88.6, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.5.2.8 Lead Waste Management

The Lead Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

a. Identification and classification of hazardous wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of proof of EPA, State and local hazardous waste permit applications, permits, manifests and EPA Identification numbers, Transporter Number.

d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers.

h. Unit cost for waste disposal according to this plan.

1.5.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply. The following local and State laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing of lead-contaminated materials apply:

a. COMAR 26.13.01

b. Licensing and certification in the State of Maryland is required.

1.5.3 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the lead waste management plan and the lead-based paint/paint with lead removal/control plan, including work procedures and precautions for the removal plan.

1.6 EQUIPMENT

1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62.

1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper disposable protective whole body clothing, head covering, gloves, and foot coverings as required by 29 CFR 1926.62.

Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during lead-based paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the Contracting Officer.

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the paint removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

PART 2 PRODUCTS

Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

a. Notify the Contracting Officer 20 days prior to the start of any paint removal work.
b. Occupant Notification
Submit occupant written acknowledgment of the delivery of lead hazard information pamphlet (EPA 747-K-99-001 “Protect Your Family From Lead in Your Home") prior to commencing the renovation work for each affected unit per 40 CFR 745 Subpart E.
c. Notification of the Commencement of LBP Hazard Abatement
NOTE: In some states, notification of lead-based paint hazard abatement work by the contractor must be made prior to work. Research if prior notification is required for the locality where work is conducted.
Submit a copy of the notification of the commencement of LBP hazard abatement to the COR according to the procedures established by the contract.

3.1.1.2 Boundary Requirements

a. Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside the lead control area.
b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Furnishings (Not Applicable to this Contract)

~~The Government will remove furniture and equipment from the building before lead-based paint removal work begins.~~

~~Existing furniture and equipment is lead contaminated, decontaminate or dispose of as lead contaminated waste.~~

3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

3.1.1.5 Decontamination Shower Facility (Not Applicable)

~~Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.~~

3.1.1.6 Eye Wash Station

Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62.

b. To the extent feasible, use local exhaust ventilation connected to HEPA filters or other collection systems, approved by the CP. Local exhaust ventilation systems shall be evaluated and maintained in accordance with 29 CFR 1926.62.

c. Vent local exhaust outside the building only and away from building ventilation intakes.

d. Use locally exhausted, power actuated, paint removal tools.

3.1.1.7 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead Control Area Requirements

Establish a lead control area by situating critical barriers and physical boundaries around the area or structure where LBP/PWL removal/control operations will be performed.

3.3 APPLICATION

3.3.1 Work Procedures

Perform removal of lead-based paint in accordance with approved lead-based paint/paint with lead removal/control plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with 29 CFR 1926.62. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), State, and local requirements.

3.3.2 Lead-Based Paint Removal/Control/Deleading

Manual or power sanding of interior and exterior surfaces is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited. Provide methodology for LBP removal/control in work plan. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions necessary to minimize damage to the underlying substrate.

Avoid flash rusting, deterioration of the substrate. Provide surface preparations for painting in accord with Section 09 90 00 PAINTS AND COATINGS.

1. Wood, Drywall, Interior Partitions
    a. Wet Scraping
    b. Heat Stripping
    c. Chemical Stripping
    d. Power Tool cleaning (least acceptable)
    e. Wet Abrasive Blasting

Chemical stripping should be carefully researched as a removal method for soft wood (e.g., pine or redwood) substrates. The wrong chemical strippers can increase the risk of residual lead contamination in the substrate.

2. Steel and Metal Surfaces (Industrial)
    a. Power/Hand Tool Cleaning (least acceptable)
    b. Dry Abrasive Blast with Water Ring (Wet "Halo")
    c. Wet Abrasive Blast
    d. Low Volume High Pressure Water Blast
    e. Chemical Stripping
    f. Vacuum Blast

The following practices are restricted during lead hazard abatement work on housing per 40 CFR 745: Open flame burning or torching is prohibited; machine sanding or grinding or abrasive blasting on LBP is prohibited unless used with High Efficiency Particulate Air (HEPA) exhaust control; dry scraping in conjunction with heat guns, or around electrical outlets, is permitted if limited to no more than 2 square feet in any one room (20 square feet on exterior surfaces); heat guns must operate at a temperature below 1100 degrees Fahrenheit.

Provide methodology for LBP/PWL control and processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this LBP/PWL removal/control process in the LBP/PWL R/CP.

3.3.2.1 Indoor Paint Removal

Perform manual paint removal in lead control areas using enclosures, barriers, or containments and powered locally exhausted paint removal tools. Collect residue debris for disposal in accordance with federal, State, and local requirements.

3.3.2.2 Outdoor Paint Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the LBP/CPR/CP. The worksite preparation (barriers or containments) shall be job dependent and presented in the LBP/PWL R/CP.

3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

a. Vacuum themselves off.
b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.
c. Shower.
d. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing; move to an appropriate facility; shower.
e. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air and Wipe Sampling

Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

a. The CP shall be on the job site directing the air and non-clearance wipe sampling and inspecting the lead-based paint removal/control work to ensure that the requirements of the contract have been satisfied during the entire lead-based paint removal operation.

b. Collect personal air samples on employees who are expected to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, within 72 hours after the air samples are taken.

d. Before any work begins, a third party consultant shall collect and analyze baseline wipe and soil samples in accordance with methods defined in federal, State, and local standards inside and outside of the physical boundary to assess the degree of dust contamination in the facility prior to lead-based paint removal/control.

3.4.1.2 Air Sampling During Paint Removal Work

Conduct area air sampling daily, on each shift in which lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall

resume only after the CP and the Contracting Officer give approval. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.

3.4.1.3 Sampling After Paint Removal/Control

After the visual inspection, conduct soil sampling if bare soil is present during external removal/control operations and collect wipe samples according to the HUD protocol contained in HUD 6780 to determine the lead content of settled dust and dirt in micrograms per square meter foot of surface area and micrograms per gram (ug/g) parts per million (ppm) for soil.

3.4.1.4 Testing of Removed Paint and Used Abrasive

Test removed paint and used abrasive in accordance with 40 CFR 261 for hazardous waste.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the CP. Reclean areas showing dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before restarting work.

3.5.1.1 Clearance Certification

The CP shall certify in writing that air samples collected outside the lead control area during paint removal operations are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62 and 40 CFR 745; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

The third party consultant shall certify surface wipe sample results collected inside and outside the work area are less than 40 micrograms per square foot on floors, less than 250 micrograms per square foot on interior window sills and less than 400 micrograms per square foot on window troughs or not significantly greater than the initial surface loading determined prior to work.

The third party consultant shall certify surface wipe sample results collected inside and outside the work area are less than 200 micrograms per square foot on floors or horizontal surfaces.

Certify surface wipe samples are not significantly greater than the initial surface loading determined prior to work.

For exterior paint removal/control work, soil samples taken at the exterior of the work site shall be used to determine if soil lead levels had increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the work. If soil lead levels do show a statistically significant increase or is above any applicable Federal or State standard for lead in soil, the soil shall be remediated back to the pre-work level.

Clear the lead control area in industrial facilities of all visible dust and debris.

For lead-based paint hazard abatement work, surface wipe and soil sampling shall be conducted and clearance determinations made according to the work practice standards presented in 40 CFR 745.227.

3.5.2 Disposal

a. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 262. Dispose of lead-contaminated waste material at an EPA or State of Maryland approved hazardous waste treatment, storage, or disposal facility off Government property.

b. Place waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. For hazardous waste, the collection drum requires marking/labeling in accordance with 40 CFR 262 during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

c. Handle, transport, and dispose lead or lead-contaminated material classified as hazardous waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

d. All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and Federal, State, or local regulations. Ensure waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

3.5.2.1 Disposal Documentation

Submit written evidence to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Contractor shall provide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for non-hazardous waste disposal.

3.5.3 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials or non-hazardous waste delivered is returned and a copy is furnished to the Government.

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 02 83 13.00 20
LEAD IN CONSTRUCTION
08/11

This guide specification covers the requirements for protection of workers, disposal of lead painted material.

This guide specification also provides guidelines/recommendations for cleanup of lead on construction projects impacting material containing lead and/or lead based paint. This guide specification does not apply to abatement of lead hazards in target housing or child occupied facilities. Section 02 82 33.13 20 REMOVAL/CONTROL AND DISPOSAL OF PAINT WITH LEAD is to be used for abatement or control of lead hazards in 40 CFR 745 defined child occupied facilities or target housing.

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 INDUSTRIAL HYGIENE ASSOCIATION (AIHA)

AIHA Z88.6	(2006) Respiratory Protection - Respirator Use-Physical Qualifications for Personnel

STATE OF VIRGINIA ADMINISTRATIVE CODE (VAC)

16 VAC 25-35Title 16, Agency 25, Chapter 35:	Regulation Concerning Certified Lead Contractor's Notification, Lead Project Permits And Permit Fees
18 VAC 15-30Title 18, Agency 15, Chapter 30:	Virginia Lead-Based Paint Activities Regulations

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780	(1995; Errata Aug 1996; Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response

40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586 (2009)	Standard for High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Action Level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period.

1.2.2 Area Sampling: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

1.2.3 Competent Person (CP): As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead hazard. A Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals is the best choice.

1.2.4 Contaminated Room: Refers to a room for removal of contaminated personal protective equipment (PPE).

1.2.5 Decontamination Shower Facility: That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.6 High Efficiency Particulate Arrestor (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

1.2.7 Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds.

1.2.8 Lead Control Area: A system [of control methods] to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.2.9 Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a work day, the PEL shall be determined by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.10 Material Containing Lead/Paint with Lead (MCL/PWL): Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.2.11 Personal Sampling: Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.12 Physical Boundary: Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

1.3 DESCRIPTION

1.3.1 Description of Work

Construction activities impacting PWL or material containing lead which are covered by this specification include the demolition and/or removal of material containing lead in various conditions, as identified during the project site visit with the Government and contractor. All PWL and/or lead work shall be clearly identified in the SOW and the definable features of work (DFoW0 as appropriate.

1.3.2 Coordination with Other Work

The contractor shall coordinate with work being performed in adjacent areas. Coordination procedures shall be explained in the Plan and shall describe how the Contractor will prevent lead exposure to other contractors and/or Government personnel performing work unrelated to lead activities.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Occupational and Environmental Assessment Data Report (if objective data is used to justify excluding the initial occupational exposure assessment
Lead Compliance Plan including CP approval (signature, date, and certification number
Competent Person qualifications
Training Certification of workers and supervisors
Lead waste management plan
Written evidence that TSD is approved for lead disposal
Certification of Medical Examinations

SD-06 Test Reports
Sampling results
Occupational and Environmental Assessment Data Report

SD-07 Certificates
Testing laboratory qualifications
Occupant Notification
Third party consultant qualifications
Clearance Certification

SD-11 Closeout Submittals
Completed and signed hazardous waste manifest from treatment or disposal facility
Waste turn-in documents or weight tickets for non-hazardous wastes that are disposed of at sanitary or construction and demolition landfills

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Competent Person (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard (29 CFR 1926.62) which shows ability to assess occupational and environmental exposure to lead, experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Submit proper documentation that the CP is trained and certified in accordance with federal, Maryland State and local laws. The competent person shall be a licensed lead-based paint abatement Supervisor/Project Designer in the State of Maryland.

1.5.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, stating that the employee has received the required lead training specified in 29 CFR 1926.62 (l)and is certified to perform or supervise deleading, lead removal or demolition activities in the state of Maryland.

1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air and wipe analysis, testing, and reporting of airborne concentrations of lead. Use a laboratory participating in the EPA

National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency

Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis shall be OSHA approved.

1.5.1.4 Third Party Consultant Qualifications

Submit the name, address and telephone number of the third party consultant selected to perform the wipe sampling for determining concentrations of lead in dust. Submit proper documentation that the consultant is trained and certified as an inspector technician or inspector/risk assessor by the USEPA authorized State (or local) certification and accreditation program.

1.5.2 Requirements

1.5.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all federal, State, and local requirements.

b. Review and approve Lead Compliance Plan for conformance to the applicable referenced standards.

c. Continuously inspect PWL or MCL work for conformance with the approved plan.

d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Control work to prevent hazardous exposure to human beings and to the environment at all times.

g. Supervise final cleaning of the lead control area, take clearance wipe samples if necessary; review clearance sample results and make recommendations for further cleaning.

h. Certify the conditions of the work as called for elsewhere in this specification.

1.5.2.2 Lead Compliance Plan

Submit a detailed job-specific plan of the work procedures to be used in the disturbance of PWL or MCL. The plan shall include a sketch showing the location, size, and details of lead control areas, critical barriers, physical boundaries, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and dust containing lead and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside of the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multi-contractor worksites to inform affected employees and to clarify responsibilities to control exposures.

The plan shall be developed by a certified planner/project designer in the State of Maryland.

In occupied buildings, the plan shall also include an occupant protection program that describes the measures that will be taken during the work to [notify and] protect the building occupants.

1.5.2.3 Occupational and Environmental Assessment Data Report

If initial monitoring is necessary, submit occupational and environmental sampling results to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

In order to reduce the full implementation of 29 CFR 1926.62, the Contractor shall provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of 29 CFR 1926.62 and supporting the Lead Compliance Plan.

a. The initial monitoring shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead for stated work.

b. Submit worker exposure data gathered during the task based trigger operations of 29 CFR 1926.62 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead containing coatings are present.

c. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

1.5.2.4 Medical Examinations

Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

1.5.2.5 Training

Train each employee performing work that disturbs lead, who performs MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State [(18 VAC 15-30)] and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.

b. Establish and implement a respiratory protection program as required by AIHA Z88.6, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.5.2.8 Lead Waste Management

The Lead Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations. And address:

a. Identification and classification of wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of USEPA, State of Maryland and local hazardous waste manifests. If materials are to be turned into the Garrison TSDF for disposal, the contractor shall comply with all requirements for identification, transport and turn in of PWL/MCL wastes to the TSDF.

d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal and disposal. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Wastes shall be cleaned up and containerized daily.

h. Include any process that may alter or treat waste rendering a hazardous waste non hazardous.

i. Unit cost for hazardous waste disposal according to this plan.

1.5.2.9 Environmental, Safety and Health Compliance

Licensing and certification in the state of Maryland is required.

1.5.3 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the Lead Waste Management Plan and the Lead Compliance Plan, including procedures and precautions for the work.

1.6 EQUIPMENT

1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust, fume and mist. Respirators shall comply with the requirements of 29 CFR 1926.62.

1.6.2 Special Protective Clothing

Furnish personnel who will be exposed to lead-contaminated dust with proper disposable protective whole body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, eye, and hand protection. PPE shall remain the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

a. Notify the Contracting Officer 20 days prior to the start of any lead work.

b. Occupant Notification: Submit occupant written acknowledgment of the delivery of lead hazard information pamphlet (EPA 747-K-99-001 "Protect Your Family From Lead in Your Home") prior to commencing the renovation work for each affected unit using language provided in 40 CFR 745 Subpart E.

3.1.1.2 Lead Control Area

a. Physical Boundary - Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside of the lead control area.

b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Furnishings (Not applicable to this Contract)

~~The Government will remove furniture and equipment from the building before lead work begins.~~

~~Furniture [_____] and equipment will remain in the [building] [lead control area]. Protect and cover furnishings or remove furnishings from the work area and store in a location approved by the Contracting Officer.~~

~~Existing [furniture] [and] [equipment] is lead contaminated, [decontaminate] [dispose of as lead contaminated waste].~~

3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area.

3.1.1.5 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

3.1.1.6 Eye Wash Station

Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

3.1.1.7 Mechanical Ventilation System

a. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Local exhaust ventilation systems shall be evaluated and maintained in accordance with 29 CFR 1926.62.

b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.

c. Use locally exhausted, power actuated tools or manual hand tools.

3.1.1.8 Personnel Protection

Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead Control Area Requirements

Establish a lead control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

Full containment - Contain removal operations by the use of critical barriers and HEPA filtered exhaust if required by the CP. For containment areas larger than 1,000 square feet install a minimum of two 18 inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with Plexiglas or clear polycarbonate materials.

3.3 APPLICATION

3.3.1 Lead Work

Perform lead work in accordance with approved Lead Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when the work is performed in accordance with 29 CFR 1926.62 [or 40 CFR 745], and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, State, and local requirements.

3.3.2 Paint with Lead or Material Containing Lead Removal

Manual or power sanding or grinding of lead surfaces or materials is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited.] Provide methodology for removing lead in the Lead Compliance Plan. Select lead removal processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this removal process in the Lead Compliance Plan.

3.3.2.1 Paint with Lead or Material Containing Lead - Indoor Removal

Perform manual or mechanical removal in the lead control areas using enclosures, barriers or containments and powered locally exhausted tools. Collect residue and debris for disposal in accordance with federal, State, and local requirements.

3.3.2.2 Paint with Lead or Material Containing Lead - Outdoor Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the Lead Compliance Plan. The worksite preparation (barriers or containments) shall be job dependent and presented in the Lead Compliance Plan.

3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn in the control area:

a. Vacuum all clothing before entering the contaminated change room.

b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.

c. Shower.

d. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing, move to an appropriate shower facility, shower.

e. Change to clean clothes prior to leaving the clean clothes storage area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air and Wipe Sampling

Conduct sampling for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.

a. The CP shall be on the job site directing the air and wipe sampling and inspecting the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.

b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, signed by the CP, within 72 hours after the air samples are taken.

d. Conduct area air sampling daily, on each shift in which lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after the CP and the Contracting Officer give approval.

e. Before any work begins, [a third party consultant shall] collect and analyze baseline wipe [and soil] samples in accordance with methods defined by federal, State, and local standards inside and outside of the physical boundary to assess the degree of dust contamination in the facility prior to lead disturbance or removal.

f. Surface Wipe Samples - Collect surface wipe samples on floors at a location no greater than 10 feet outside the lead control area at a frequency of once per day while lead removal work is conducted in occupied buildings. Surface wipe results shall meet criteria in paragraph "Clearance Certification.

3.4.1.2 Sampling After Removal

After the visual inspection, collect wipe samples according to the HUD protocol contained in HUD 6780 to determine the lead content of settled dust in micrograms per square meter foot of surface area.

3.4.1.3 Testing of Material Containing Lead Residue

Test residue in accordance with 40 CFR 261for hazardous waste.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead operation has been completed, clean the controlled area of visible contamination by vacuuming with a HEPA filtered

vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before clearance testing.

3.5.1.1 Clearance Certification

The CP shall certify in writing that air samples collected outside the lead control area during paint removal operations are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the Contracting Officer's acknowledgement of receipt of the CP certification.

The third party consultant shall certify surface wipe sample results collected inside and outside the work area are less than 200 micrograms per square foot on floors or horizontal surfaces.

Certify surface wipe samples are not significantly greater than the initial surface loading determined prior to work.

Clear the lead control area in industrial facilities of all visible dust and debris.

For exterior work, soil samples taken at the exterior of the work site may be used to determine if soil lead levels had increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the operation. If soil lead levels either show a statistically significant increase above soil lead levels prior to work or soil lead levels above any applicable federal or state standard for lead in soil, the soil shall be remediated.

3.5.2 Disposal

a. All material, whether hazardous or non-hazardous shall be disposed in accordance with all laws and provisions and all federal, State or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

b. Contractor is responsible for segregation of waste. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261.

c. Dispose of lead-contaminated material classified as hazardous waste at the garrison hazardous waste treatment, storage, or disposal facility at Building A5110 (for Aberdeen projects) and E5830 (for Edgewood projects.).

d. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. For hazardous waste, the collection drum requires marking/labeling in accordance with 40 CFR 262 during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

e. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

3.5.2.1 Disposal Documentation

Submit written evidence to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Contractor shall provide a certificate that the waste was accepted by the disposal facility. [Provide turn-in documents or weight tickets for non-hazardous waste disposal.]

3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials or non-hazardous waste delivered is returned and a copy is furnished to the Government.

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 03 52 00
LIGHTWEIGHT CONCRETE ROOF INSULATION
08/11

PART 1 GENERAL

This specification is for the in kind repairs to existing lightweight concrete roof insulation installations on structural concrete decks.

1.1 REFERENCES

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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE FUN IP	(2009; Errata 2010) Fundamentals Handbook, I-P Edition
ASHRAE FUN SI	(2009; Errata 2010) Fundamentals Handbook, SI Edition

ASTM INTERNATIONAL (ASTM)

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain,
for	Concrete
ASTM C150/C150M	(2011) Standard Specification for Portland cement
ASTM C332	(2009) Lightweight Aggregates for Insulating Concrete
ASTM C495	(2007) Compressive Strength of Lightweight Insulating Concrete
ASTM C578	(2011) Standard Specification for Rigid, Cellular Polystyrene Thermal
Insulation	
ASTM C612	(2010) Mineral Fiber Block and Board Thermal Insulation
ASTM C796	(2004) Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

1.2 QUALIFICATIONS OF APPLICATOR

Perform work by or under the supervision of personnel specializing in insulating concrete application and having not less than 2 years' experience.

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data
Performance requirements
Submit, indicating compressive strength, oven dry density, and coefficient of heat transmission.

SD-06 Test Reports
Performance requirements
Submit certified test reports on laboratory testing of insulating concrete samples taken at time of placement.

SD-07 Certificates
Fabricator's Compatibility Certificates

SD-08 Manufacturer's Instructions
Application

1.4 DELIVERY AND STORAGE

Deliver all materials to the building site in original unopened, undamaged packages or containers, or approved bulk handling equipment, with manufacturer's brand name and contents clearly identified. Protect materials against dampness. Store materials under cover and off the ground, in well-ventilated areas, not exposed to extreme changes of temperature and humidity. Prevent deterioration or intrusion of foreign substances. Keep materials dry until ready for use. Protect metal components from rusting.

1.5 ENVIRONMENTAL CONDITIONS

1.5.1 Normal Conditions

When ambient air temperatures of 40 degrees F or above are predicted for the initial 24 to 72 hours after placement of insulating concrete, the use of hot water and other cold weather protection measures are not required.

1.5.2 Cold Weather Conditions

When ambient air temperature at time of placing insulating concrete is between 40 and 32 degrees F, use hot water in temperature range of 90 to 120 degrees F at the point of placement. When ambient air temperatures of 32 degrees F or below are predicted for the initial 24 to 72 hours after placement of insulating concrete, provide additional protection measures as recommended by the aggregate manufacturer.

1.6 SAFETY AND HEALTH REQUIREMENTS

Comply with manufacturer's protective measures in the safe installation of the insulation board.

1.7 QUALITY ASSURANCE

1.7.1 Fabricator's Compatibility Certificates

Submit a written statement from the insulating concrete fabricator certifying that materials for this project are chemically and physically compatible.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

ASTM C150, Type I, II, or III.

2.2 AGGREGATE

ASTM C332, Group I.

2.3 AIR-ENTRAINMENT

The air-entrainment agent shall be prepackaged or added at the mixer. Provide amount and type of air-entrainment in accordance with the aggregate manufacturer's recommendations. Do not use calcium chloride.

2.4 FOAMING AGENTS

ASTM C796.

2.5 WATER

Water shall be clean and free from injurious amounts of acids, alkali, organic matter, or other deleterious substances.

2.6 EXPANSION JOINT FILLER MATERIAL

ASTM C612, Class 1, semi-rigid, modified for maximum density of 6.0 pounds per cubic foot.

2.7 WELDED WIRE FABRIC

Galvanized steel welded wire fabric shall conform to ASTM A185/A185M.

2.8 INSULATION BOARD

Polystyrene insulation board conforming to ASTM C578 RCPS Type I, II, IV, or V, 24 by 48 inches, and of thickness as indicated in the Scope of work. Boards shall be factory fabricated and slotted or perforated for keying the insulation board into the insulating concrete.

PART 3 EXECUTION

3.1 PERFORMANCE REQUIREMENTS

Provide insulating concrete design mix to shall meet the following performance requirements. Test as specified.

3.1.1 Minimum Compressive Strength
125 pounds per square inch in 28 days as tested with ASTM C495.

3.1.2 Minimum Oven Dry Density
22 pounds per cubic foot as determined by ASTM C495.

3.1.3 Coefficient of Heat Transmission
U value of 0.05 Btu/hr/square foot/degrees F, as determined in accordance with ASHRAE FUN IP. The U value shall incorporate the total roof deck and roofing system design and represent the average U value for the total roof area.

3.2 SURFACE PREPARATION

Clean surfaces to receive insulating concrete of dirt, debris, and other foreign materials that would affect bonding. Deck shall be free of standing water, snow, and ice.

3.3 STEEL ROOF DECKING

As specified in Section 05 30 00 STEEL DECKS.

3.4 REINFORCING MESH OR WELDED WIRE FABRIC

Install reinforcing mesh or welded wire fabric with a minimum end lap of 6 inches and no side lap. Cut mesh or fabric to fit at all walls, curbs, roof drains, and openings. Mesh not required over structural concrete decks.

3.5 APPLICATION OF INSULATING CONCRETE AND INSULATION BOARD

Apply insulating concrete, insulation board and related materials in accordance with respective specifications and manufacturer's instructions, except as modified herein.

3.5.1 Mixing

Mix insulating concrete materials mechanically to produce a uniform distribution.

3.5.2 Conveying

Convey insulating concrete from the mixer to place of final deposit by methods that prevent segregation or loss of materials. Convey the concrete without material separation or loss of air content.

3.5.3 Expansion Joints

Provide expansion joints through the depth of the light-weight insulating concrete at the perimeters of the roof deck, where the roof deck abuts vertical surfaces and where indicated. Perimeter expansion joints are not required with cellular concrete.

3.5.4 Slurry Coat and Insulation Board

Bond the insulation board to the structural deck with a slurry coat of the same insulating concrete mix ratio as used for fill over the insulation board. Screed the slurry of concrete to an even surface, to a minimum of 1/8 inch over the top of the structural deck. Fill corrugations of steel decking with insulating concrete and screed even with the slurry coat.

3.5.5 Insulating Concrete Fill

Place the insulating concrete on the insulation board and screed to an even surface in a continuous operation until placement of a section is completed. Provide slopes as indicated for high points, valleys and positive drainage to roof drains and to eliminate ponding. At no place shall the minimum and maximum thickness of the insulating concrete be less than 2 inches or greater than 8 inches respectively over the top of insulation board.

3.5.5.1 Compacting

Rodding, tamping, or vibrating are not permitted.

3.5.5.2 Curing

Minimize traffic on the surface during the curing period. Under normal conditions, roofing may begin in 3 days. When the insulating concrete is placed during extremely dry conditions, sprinkle additional water on the concrete for hydration of the cement and to minimize shrinkage cracking. After a freezing or heavy rainfall or minor scaling of less than 1/4 inch depth, broom the surface immediately prior to installation of roofing.

3.5.5.3 Patching

Remove portions of the insulating concrete deck with excessive scaling of more than 1/4 inch depth to sound concrete. Patch the surface with Portland cement concrete slurry.

3.6 FIELD TESTS

During progress of work, insulating concrete specimens shall be taken for laboratory testing as specified herein.

3.6.1 Test Specimens

Take test cylinder specimens for compressive strength in the presence of the Contracting Officer. Notify the Contracting Officer one day prior to the date of taking specimens. A minimum of four test specimens shall be made for each day's concreting, with at least one test required for each 75 cubic yards of insulating concrete. Label specimens to indicate the location at which they were taken. Store specimens in an undisturbed place which will not be exposed to rain and extreme changes of temperature and humidity until ready for testing.

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 03 52 16.19
LIGHTWEIGHT INSULATING CONCRETE OVERLAY
08/11

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE FUN IP	(2009; Errata 2010) Fundamentals Handbook, I-P Edition
ASHRAE FUN SI	(2009; Errata 2010) Fundamentals Handbook, SI Edition

ASTM INTERNATIONAL (ASTM)

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain,
for	Concrete
ASTM C150/C150M	(2011) Standard Specification for Portland cement
ASTM C332	(2009) Lightweight Aggregates for Insulating Concrete
ASTM C495	(2007) Compressive Strength of Lightweight Insulating Concrete
ASTM C578	(2011) Standard Specification for Rigid, Cellular Polystyrene Thermal
Insulation	
ASTM C612	(2010) Mineral Fiber Block and Board Thermal Insulation
ASTM C796	(2004) Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam

1.2 QUALIFICATIONS OF APPLICATOR

Perform work by or under the supervision of personnel specializing in insulating concrete application and having not less than 2 years experience.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Performance requirements
Submit, indicating compressive strength, oven dry density, and coefficient of heat transmission.

SD-06 Test Reports
Performance requirements
Submit certified test reports on laboratory testing of insulating concrete samples taken at time of placement.

SD-07 Certificates
Fabricator's Compatibility Certificates

SD-08 Manufacturer's Instructions
Application

1.4 DELIVERY AND STORAGE

Deliver all materials to the building site in original unopened, undamaged packages or containers, or approved bulk handling equipment, with manufacturer's brand name and contents clearly identified. Protect materials against dampness. Store materials under cover and off the ground, in well-ventilated areas, not exposed to extreme changes of temperature and humidity. Prevent deterioration or intrusion of foreign substances. Keep materials dry until ready for use. Protect metal components from rusting.

1.5 ENVIRONMENTAL CONDITIONS

1.5.1 Normal Conditions

When ambient air temperatures of 40 degrees F or above are predicted for the initial 24 to 72 hours after placement of insulating concrete, the use of hot water and other cold weather protection measures are not required.

1.5.2 Cold Weather Conditions

When ambient air temperature at time of placing insulating concrete is between 40 and 32 degrees F , use hot water in temperature range of 90 to 120 degrees F at the point of placement. When ambient air temperatures of 32 degrees F or below are predicted for the initial 24 to 72 hours after placement of insulating concrete, provide additional protection measures as recommended by the aggregate manufacturer.

1.6 SAFETY AND HEALTH REQUIREMENTS

Comply with manufacturer's protective measures in the safe installation of the insulation board.

1.7 QUALITY ASSURANCE

1.7.1 Fabricator's Compatibility Certificates

Submit a written statement from the insulating concrete fabricator certifying that materials for this project are chemically and physically compatible.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

ASTM C150, Type [I] [II] [III].

2.2 AGGREGATE

ASTM C332, Group I.

2.3 AIR-ENTRAINMENT

Prepackage or add the air-entrainment agent at the mixer. Provide amount and type of air-entrainment in accordance with the aggregate manufacturer's recommendations. Do not use calcium chloride.

2.4 FOAMING AGENTS

ASTM C796.

2.5 WATER

Water shall be clean and free from injurious amounts of acids, alkali, organic matter, or other deleterious substances.

2.6 EXPANSION JOINT FILLER MATERIAL

ASTM C612, Class 1, semi-rigid, modified for maximum density of 6.0 pounds per cubic foot.

2.7 WELDED WIRE FABRIC

Galvanized steel welded wire fabric shall conform to ASTM A185/A185M.

2.8 INSULATION BOARD

Polystyrene insulation board conforming to ASTM C578 RCPS Type [I], [II], [III], [IV], or [V], 24 by 48 inches, and of thickness as indicated. Boards shall be factory fabricated and slotted or perforated for keying the insulation board into the insulating concrete.

PART 3 EXECUTION

3.1 PERFORMANCE REQUIREMENTS

Provide insulating concrete design mix to shall meet the following performance requirements. Test as specified.

3.1.1 Minimum Compressive Strength

125 pounds per square inch in 28 days as tested with ASTM C495.

3.1.2 Minimum Oven Dry Density

22 pounds per cubic foot as determined by ASTM C495.

3.1.3 Coefficient of Heat Transmission

U value of 0.05 Btu/hr/sq. ft/degree F, as determined in accordance with ASHRAE FUN IP. The U value shall incorporate the total roof deck and roofing system design and represent the average U value for the total roof area.

3.2 SURFACE PREPARATION

Clean surfaces to receive insulating concrete of dirt, debris, and other foreign materials that would affect bonding. Deck shall be free of standing water, snow, and ice.

3.3 STEEL ROOF DECKING

As specified in Section 05 30 00 STEEL DECKS.

3.4 REINFORCING MESH OR WELDED WIRE FABRIC

Install reinforcing mesh or welded wire fabric with a minimum end lap of 6 inches and no side lap. Cut mesh or fabric to fit at all walls, curbs, roof drains, and openings. Mesh not required over structural concrete decks.

3.5 APPLICATION OF INSULATING CONCRETE AND INSULATION BOARD

Apply insulating concrete, insulation board and related materials in accordance with respective specifications and manufacturer's instructions, except as modified herein.

3.5.1 Mixing

Mix insulating concrete materials mechanically to produce a uniform distribution.

3.5.2 Conveying

Convey insulating concrete from the mixer to place of final deposit by methods that prevent segregation or loss of materials. Convey the concrete without material separation or loss of air content.

3.5.3 Expansion Joints

Provide expansion joints through the depth of the light-weight insulating concrete at the perimeters of the roof deck, where the roof deck abuts vertical surfaces and where indicated. Perimeter expansion joints are not required with cellular concrete.

3.5.4 Slurry Coat and Insulation Board

Bond the insulation board to the structural deck with a slurry coat of the same insulating concrete mix ratio as used for fill over the insulation board. Screed the slurry of concrete to an even surface, to a minimum of 1/8 inch over the top of the structural deck.

3.5.5 Insulating Concrete Fill

Place the insulating concrete on the insulation board and screed to an even surface in a continuous operation until placement of a section is completed. Provide slopes as indicated for high points, valleys and positive drainage [to roof drains] and to eliminate ponding. At no place shall the minimum and maximum thickness of the insulating concrete be less than 2 inches or greater than 8 inches respectively over the top of insulation board.

3.5.5.1 Compacting

Rodding, tamping, or vibrating are not permitted.

3.5.5.2 Curing

Minimize traffic on the surface during the curing period. Under normal conditions, roofing may begin in 3 days. When the insulating concrete is placed during extremely dry conditions, sprinkle additional water on the concrete for hydration of the cement and to minimize shrinkage cracking. After a freezing or heavy rainfall or minor scaling of less than 1/4 inch depth, broom the surface immediately prior to installation of roofing.

3.5.5.3 Patching

Remove portions of the insulating concrete deck with excessive scaling of more than 1/4 inch depth to sound concrete. Patch the surface with Portland cement concrete slurry.

3.6 FIELD TESTS

During progress of work, take insulating concrete specimens for laboratory testing as specified herein.

3.6.1 Test Specimens

Take test cylinder specimens for compressive strength in the presence of the Contracting Officer. Notify the Contracting Officer one day prior to the date of taking specimens. Make a minimum of four test specimens for each day's concreting, with at least one test required for each 75 cubic yards of insulating concrete. Label specimens to indicate the location at which they were taken. Store specimens in an undisturbed place which will not be exposed to rain and extreme changes of temperature and humidity until ready for testing.

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 05 30 00
STEEL DECKS
11/11

PART 1 GENERAL

NOTE: The structural steel design must meet the requirements of OSHA Steel Erection Standard, 29 CFR Part 1926, Subpart R-Steel Erection, Effective Date January 18, 2002.

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)

ANSI/AISC 360	(2010) Specification for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100	(1991; R 2008) Cold-Formed Steel Design Manual
AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2010) Structural Welding Code - Steel
AWS D1.3	(2008; Errata 2008) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1008	(2011) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A1011	(2010) Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability and Ultra-High Strength
ASTM A108	(2007) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A123	(2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A36 (2008) Standard Specification for Carbon Structural Steel

ASTM A653 (2010) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A780 (2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM A792 (2010) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

ASTM C423 (2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM D 1056 (2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

ASTM D 1149 (2007) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber

ASTM D 746 (2007) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

ASTM E 84 (2011a) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide http://www.approvalguide.com/

FM DS 1-28 (2002) Design Wind Loads

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2011; TIA 11-1; Errata 2011) National Electrical Code

STEEL DECK INSTITUTE (SDI)

SDI 31 (2007) Design Manual for Composite Decks, Form Decks, and Roof Decks

SDI DDMO3	(2004; Errata 2006; Add 2006) Diaphragm Design Manual; 3rd Edition
SDI DDP	(1987; R 2000) Deck Damage and Penetrations
SDI MOC2	(2006) Manual of Construction with Steel Deck

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20	(2002; E 2004) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2010) Structural Engineering

UNDERWRITERS LABORATORIES (UL)

UL 209	(2005; Reprint May 2007) Cellular Metal Floor Raceways and Fittings
UL 580	(2006; Reprint Jul 2009) Tests for Uplift Resistance of Roof Assemblies
UL Bld Mat Dir	(2011) Building Materials Directory

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
- Fabrication Drawings
- Metal Floor Deck Units
- Cant Strips
- Ridge and Valley Plates
- Metal Closure Strips

SD-03 Product Data
- Accessories
- Deck Units
- Galvanizing Repair Paint
- Joint Sealant Material
- Mechanical Fasteners
- Metal Floor Deck Units
- Powder-Actuated Tool Operator
- Repair Paint
- Sound Absorbing Material
- Welder Qualifications
- Welding Equipment
- Welding Rods and Accessories

SD-04 Samples
- Metal Roof Deck Units

Flexible Closure Strips
Accessories

SD-05 Design Data

Deck Units: Submit manufacturer's design calculations, or applicable published literature for the structural properties of the proposed deck units.

SD-07 Certificates

Welding Procedures
Fire Safety
Wind Storm Resistance

1.3 QUALITY ASSURANCE

1.3.1 Deck Units

Furnish deck units and accessory products from a manufacturer regularly engaged in manufacture of steel decking. Provide manufacturer's certificates attesting that the decking material meets the specified requirements.

1.3.2 Certification of Powder-Actuated Tool Operator

Manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.

1.3.3 Qualifications for Welding Work

Follows Welding Procedures in accordance with AWS D1.1. Test specimens shall be made in the presence of Contracting Officer and shall be tested by an approved testing laboratory at the Contractor's expense.

Submit qualified Welder Qualifications in accordance with AWS D1.1 or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, perform an immediate retest of two test welds until each test weld passes. Failure in the immediate retest will require the welder be retested after further practice or training, performing a complete set of test welds.

Submit manufacturer's catalog data for Welding Equipment and Welding Rods and Accessories.

1.3.4 Regulatory Requirements

1.3.4.1 Fire Safety

Test roof deck as a part of a roof deck construction assembly of the type used for this project, listing as fire classified in the UL Bld Mat Dir, or listing as Class I construction in the FM APP GUIDE, and so labeled.

1.3.4.2 Wind Storm Resistance

Provide roof construction assembly capable of withstanding an uplift pressure of 90 pounds per square foot when tested in accordance with the uplift pressure test described in the FM DS 1-28 or as described in UL 580 and in general compliance with UFC 3-301-01.

1.3.5 Fabrication Drawings

Show type and location of units, location and sequence of connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, size and location of holes to be cut and reinforcement to be provided, the manufacturer's erection instructions and other pertinent details.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver deck units to the site in a dry and undamaged condition. Store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage. Do not use decking for storage or as working platform until units have been fastened into position. Exercise care not to damage material or overload decking during construction. The maximum uniform distributed storage load must not exceed the design live load. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide drainage. Maintain deck finish at all times to prevent formation of rust. Repair deck finish using touch-up paint. Replace damaged material.

1.5 DESIGN REQUIREMENTS FOR ROOF DECKS

1.5.1 Properties of Sections

Properties of metal roof deck sections must comply with engineering design width as limited by the provisions of AISI D100.

1.5.2 Allowable Loads

Indicate total uniform dead and live load for detailing purposes.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Steel Sheet

Flat rolled carbon steel sheets of structural quality, thickness not less than 0.028inch before coating, meeting the requirements of AISI SG03-3, except as modified herein. For acoustical steel deck units, provide perforated sheets with 5/32 inch diameter holes staggered 3/8 inch on-centers.

2.1.2 Steel Coating

ASTM A653 designation G90 galvanized, or ASTM A792 designation AZ55, aluminum-zinc alloy. Apply coating to both sides of sheet. Conform to UL 209 for coating on decking provided as wire raceways.

2.1.3 Mixes

2.1.3.1 Galvanizing Repair Paint for Floor Decks

Provide a high-zinc-dust content paint for re-galvanizing welds in galvanized steel conforming to ASTM A780.

2.1.4 Galvanized Steel Angles for Roof Decks

Provide hot-rolled carbon steel angles conforming to ASTM A36, merchant quality, Grade Designation SAE/AISI 1023 or SAE/AISI 1025, and hot-dip galvanized in accordance with ASTM A123.

2.1.5 Joint Sealant Material for Roof Decks

Provide a non-skinning, gun-grade, bulk compound material as recommended by the manufacturer.

2.1.6 Galvanizing Repair Paint for Roof Decks

Provide a high zinc-dust content paint for re-galvanizing welds in galvanized steel and shall conform to ASTM A780.

2.1.7 Flexible Closure Strips for Roof Decks

Provide strips made of elastomeric material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Provide a vulcanized, closed-cell, expanded chloroprene elastomer having approximately 3.5 psi compressive-deflection at 25 percent deflection (limits), conforming to ASTM D 1056, Grade No. SCE 41, with the following additional properties:

Brittleness temperature of minus 40 degrees F when tested in accordance with ASTM D 746.

Flammability resistance with a flame spread rating of less than 25 when tested in accordance with ASTM E 84.

Resistance to ozone must be "no cracks" after exposure of a sample kept under a surface tensile strain of 25 percent to an ozone concentration of 100 parts per million of air by volume in air for 100 hours at 104 degrees F and tested in accordance with ASTM D 1149.

Provide an elastomeric type adhesive with a chloroprene base as recommended by the manufacturer of the flexible closure strips.

2.1.8 Sound Absorbing Material

Provide glass fiber in roll or premolded form for acoustical noncellular steel roof deck and glass fiber rigid strip for acoustical cellular steel deck in accordance with the manufacturer's standards.

2.2 ACCESSORIES

Provide accessories of same material as deck, unless specified otherwise. Provide manufacturer's standard type accessories, as specified.

2.2.1 Adjusting Plates

Provide adjusting plates, or segments of deck units, of same thickness and configuration as deck units in locations too narrow to accommodate full size units. Provide factory cut plates of predetermined size where possible.

2.2.2 End Closures

Fabricated of sheet metal by the deck manufacturer. Provide end closures minimum 0.028 inch thick to close open ends at exposed edges of floors, parapets, end walls, eaves, and openings through deck.

2.2.3 Partition Closures

Provide closures for closing voids above interior walls and partitions that are perpendicular to the direction of the configurations.

2.2.4 Closure Plates for Composite Deck

Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in composite steel deck 1/4 inch and over.

2.2.5 Sheet Metal Collar

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

2.2.6 Cover Plates

Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominal 18 gage thick before galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

2.2.7 Roof Sump Pans

Sump pans must be provided for roof drains and must be minimum 0.075 inch thick steel, recessed type. Shape sump pans to meet roof slope by the supplier or by a sheet metal specialist. Provide bearing flanges of sump pans to overlap steel deck a minimum of 3 inch. Shape, size, and reinforce the opening in bottom of the sump pan to receive roof drain.

2.2.8 Column Closures

Sheet metal, minimum 0.0358 inch thick or metal rib lath.

2.2.9 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

2.2.10 Hanger

Provide clips or loops for [utility systems] [and] [suspended ceilings] of one or more of the following types:

a. Lip tabs or integral tabs where noncellular decking or flat plate of cellular section is 0.0474 inch thick or more, and a structural concrete fill is used over deck.

b. Slots or holes punched in decking for installation of pigtails.

c. Tabs driven from top side of decking and arranged so as not to pierce electrical cells.

d. Decking manufacturer's standard as approved by the Contracting Officer.

2.2.11 Shear Connectors

Provide shear connectors as headed stud type, ASTM A108, Grade 1015 or 1020, cold finished carbon steel with dimensions complying with ANSI/AISC 360 and or strap type, ASTM 1011, Grade D, hot-rolled carbon steel.

2.2.12 Mechanical Fasteners

Provide mechanical fasteners, such as powder actuated or pneumatically driven fasteners, for anchoring the deck to structural supports and adjoining units that are designed to meet the loads indicated. Provide positive locking-type fasteners listed by the Steel Deck Institute and ICC-ES, as approved by the Contracting Officer.

2.2.13 Miscellaneous Accessories

Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch welding washers, 0.0598 inch cant strip, 0.0295 inch other metal accessories, 0.0358 inch unless otherwise indicated. Accessories must include but not be limited to saddles, welding washers, fasteners, cant strips, butt cover plates, underlapping sleeves, and ridge and valley plates.

2.3 FABRICATION

Furnish one sample of each type of Metal Floor Deck Units used to illustrate the actual cross section dimensions and configuration.

Furnish sample of Metal Roof Deck Units used to illustrate actual cross section dimensions and configurations.

Furnish one sample of each type Flexible Closure Strips, 12 inch long.

2.3.1 Deck Units

2.3.1.1 Cellular Metal Floor Deck Units

Provide decking as wire raceways conforming to NFPA 70. Fabricate units from the specified structural-quality steel sheets. Provide nominal thickness of the steel sheets, before galvanizing, a minimum 18-gage for the upper element of the floor deck unit, and a minimum 16-gage for the lower element of the floor deck unit.

Provide sufficient welds, forming the steel sheets into the cellular floor deck unit, to develop the full horizontal shear at the plane where the steel sheets are joined.

Cellular metal floor deck units must be fluted section cells combined on a flat plate having interlocking type sidelaps. Provide depth, width of unit, number of cells per unit, and width of cells as follows:

DEPTH MINIMUM (inch)	WIDTH OF UNIT NOMINAL (inch)	NUMBER OF CELLS PER UNIT	WIDTH OF CELLS NOMINAL (inch)
1-1/2	24	4	3-5/8
1-1/2	24	2	9-5/8
1-1/2	12	1	9-5/8
3	24	3	5-5/8
3	24	2	9-5/8
3	12	1	9-5/8
4-1/2	24	4	2-5/8
4-1/2	24	2	9-5/8
4-1/2	12	1	9-5/8
6	24	2	9-5/8
6	12	1	9-5/8

7-1/2	24	2	9-5/8
7-1/2	12	1	9-5/8

Cellular metal floor deck units must be fluted section cells combined with a matching fluted bottom section having interlocking type sidelaps. Provide depth, width of unit, number of cells per unit, and width of cells as follows:

Conform to SDI 31for deck units. Conform to ASTM A653, SS, Grade 230, Grade 33; ASTM A1008 Coated Carbon Steel Sheets, Grade C, 33,000 psi minimum yield strength; or ASTM A792 Coated Steel Sheets, Grade 33 for formed cellular and non-cellular decking and accessories. Use panels of maximum possible lengths to minimize end laps. Fabricate deck units in lengths to span 3 or more supports with flush, telescoped, or nested 2 inch laps at ends, and interlocking, or nested side laps, unless otherwise indicated. Deck with cross-sectional configuration differing from the units indicated may be used, provided that the properties of the proposed units, determined in accordance with AISI SG03-3, are equal to or greater than the properties of the units indicated and that the material will fit the space provided without requiring revisions to adjacent materials or systems. Factory apply a standard, phosphatized and painted, baked-on enamel finish to underside of steel decking.

2.3.2 Open Beam, Metal Floor Deck Units

Fabricate open beam metal floor deck units of the specified structural-quality steel sheets. Provide nominal thickness of the steel sheets before galvanizing of minimum 18-gage.

Provide open beam metal floor deck units with a fluted section having interlocking type sidelaps. Provide depth, width of unit, number of flutes per unit, and width of flutes as follows:

DEPTH MINIMUM (inch)	WIDTH OF UNIT NOMINAL (inch)	NUMBER OF CELLS PER UNIT	WIDTH OF CELLS NOMINAL (inch)
1-1/2	24	4	3-5/8
1-1/2	24	2	9-5/8
1-1/2	12	1	9-5/8
3	24	3	5-5/8
3	24	2	9-5/8
3	12	1	9-5/8
4-1/2	24	2	9-5/8
4-1/2	12	2	2-5/8
4-1/2	12	1	9-5/8
6	24	2	9-5/8
6	12	1	9-5/8
7-1/2	24	2	9-5/8
7-1/2	12	1	9-5/8

2.3.3 Length of Floor Deck Units

Provide floor deck units of sufficient length to span three or more spacings where possible.

2.3.4 Roof Deck

Conform to ASTM A792 or ASTM A1008 for deck used in conjunction with insulation and built-up roofing. Fabricate roof deck units of 0.0295 inch design thickness or thicker steel and galvanized or painted with an epoxy coating or equivalent applied to prime-coating in accordance with manufacturer's standard.

2.3.4.1 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0359 inch thick before galvanizing. Bend strips to form a 45-degree cant not less than 5 inch wide, with top and bottom flanges a minimum 3 inch wide. Length of strips 10 feet.

2.3.4.2 Ridge and Valley Plates for Roof Decks

Fabricate plates from the specified structural-quality steel sheets, not less than nominal 0.0359 inch thick before galvanizing. Provide plates of minimum 4-1/2 inch wide and bent to provide tight fitting closures at ridges and valleys. Provide a minimum length of ridge and valley plates of 10 feet.

2.3.4.3 Metal Closure Strips for Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not less than nominal 0.0359 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

2.3.5 Form Deck

Conform to ASTM A653 or ASTM A1008 for deck used as formwork for concrete. Fabricate form deck of 0.015 inch design thickness or thicker steel. Zinc-coat in conformance with ASTM A653, G90 coating class.

2.3.6 Composite Deck

Conform to ASTM A653 or ASTM A1008 for composite deck assembly. Fabricate deck used as the tension reinforcing in composite deck if 0.0295inch design thickness or thicker steel. Zinc-coat in conformance with ASTM A653, G90 coating class.

In addition to resisting shear, provide devices to resist vertical separation between the steel deck and the concrete. Provide one of the following types of shear devices:

a. Mechanically fixed shear devices such as embossments, holes, or welded buttons.
b. Mechanically or powder-actuated devices such as inverted, triangular or L-shaped ribs

2.3.7 Acoustical Steel Deck

Provide a Noise Reduction Coefficient (NRC) rating of not less than 0.70, when tested in accordance with ASTM C423, Standard Mounting No. 6. Provide sound absorbing materials with either glass fiber in roll or premolded form for acoustical steel deck (noncellular) and or glass fiber rigid strip for acoustical steel deck (cellular)] in accordance with manufacturer's standards.

2.3.8 Venting

To ensure positive venting from the underside, provide slotted or perforated steel deck to receive concrete fill, overlay, or a poured concrete deck.

2.3.9 Shop Priming

Shop prime accessories and [underside of] deck at the factory after coating. Clean surfaces in accordance with the manufacturer's standard procedure followed by a spray, dip or roller coat of rust-inhibitive primer, oven cured.

2.3.10 Touch-Up Paint

Provide touch-up paint for shop-painted units of the same type used for the shop painting. Touch-up welds with paint conforming to SSPC Paint 20 in accordance with ASTM A780. Maintain finish of deck units and accessories by using touch-up paint whenever necessary to prevent the formation of rust.

For floor decking installation, wire brush, clean, and touchup paint the scarred areas on the top and bottom surfaces of the metal floor decking and on the surface of supporting steel members. Include welds, weld scars, bruises, and rust spots for scarred areas. Touched up the galvanized surfaces with galvanizing repair paint. Touch up the painted surfaces with paint for the repair of painted surfaces.

After roof decking installation, wire brush, clean, and touchup paint the scarred areas on top and bottom surfaces of metal roof decking. The scarred areas include welds, weld scars, bruises, and rust spots. Touchup galvanized surfaces with galvanizing repair paint. Touchup painted surfaces with repair paint of painted surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

Prior to installation of decking units and accessories, examine worksite to verify that as-built structure will permit installation of decking system without modification.

3.2 INSTALLATION

Install steel deck units in accordance with SDI 31 approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports before permanently securing in place. Damaged deck and accessories including material which is permanently stained or contaminated, deformed, or with burned holes shall not be installed. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Contracting Officer and make necessary corrections before permanently anchoring deck units. Locate deck ends over supports only. Ends of floor deck may be lapped or butted. Do not use unanchored deck units as a work or storage platform. Do not fill unanchored deck with concrete. Permanently anchor units placed by the end of each working day. Do not support suspended ceilings, light fixtures, ducts, utilities, or other loads by steel deck unless indicated. Distribute loads by appropriate means to prevent damage. Prepare shoring in position before concrete placement begins in composite or form deck. Size cellular decking provided as electrical raceways to accommodate indicated wiring systems. Chip off burrs and eliminate sharp edges which may damage wiring. Mesh decking panels accurately and place in accordance with UL 209. Neatly fit acoustical material into the rib voids.

3.2.1 Attachment

Immediately after placement and alignment, and after correcting inaccuracies, permanently fasten steel deck units to structural supports and to adjacent deck units by welding with normal 5/8 inch diameter puddle welds or fastened with screws, powder-actuated fasteners, or pneumatically driven fasteners as indicated on the design drawings and in accordance with manufacturer's recommended procedure and SDI 31. Clamp or weight deck units to provide firm contact between deck units and structural supports while performing welding or fastening. Anchoring the deck to structural supports with powder-actuated fasteners or pneumatically driven fasteners is prohibited. Attachment of adjacent deck units by button-punching is prohibited.

The fasteners shall provide minimum required pull-out, pull-over and shear resistance based upon test results of the specific steel deck and fastener as listed in the current edition of the Factory Mutual Approval Guide and Factory Mutual Data Sheet 1-28 or manufacturer's data sheets. If studs are being welded to the top flanges of beams, the deck ends should be butted. If not, deck ends should be lapped. Welding washers shall be used at welded connections when deck thickness is less than 0.028

inch. Fasteners for roof insulations are specified in Section 07 22 00 ROOF AND DECK INSULATION.

3.2.1.1 Welding

Perform welding in accordance with AWS D1.3 using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Ensure only operators previously qualified by tests prescribed in AWS D1.1and AWS D1.3 make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Conform to the recommendations of the Steel Deck Institute and the steel deck manufacturer for location, size, and spacing of fastening. Do not use welding washers at the connections of the deck to supports. Do not use welding washers at sidelaps. Holes and similar defects will not be acceptable. Lap 2 inch deck ends. Attach all partial or segments of deck units to structural supports in accordance with Section 2.5 of SDI DDMO3. Attach shear connectors as shown and welded as per AWS D1.1 through the steel deck to the steel member. Immediately clean welds by chipping and wire brushing. Heavily coat welds, cut edges and damaged portions of shop primed and painted finish with the manufacturer's standard touch-up paint.

3.2.1.2 Fastening

Anchor deck to structural supports and adjoining units with mechanical fasteners as listed by the Steel Deck Institute, ICC-ES, the fastener and steel deck manufacturers, and approved by the Contracting Officer. Drive the powder-actuated fasteners with a low-velocity piston tool by an operator authorized by the manufacturer of the powder-actuated tool. Drive pneumatically fasteners with a low-velocity fastening tool and comply with the manufacturer's recommendations.

3.2.1.3 Fastening Floor Deck Units

Fasten floor deck units to the steel supporting members at ends and at all intermediate supports, both parallel and perpendicular to deck span, by welds. Do not exceed spacing of welds of 12 inch on center, with a minimum of two welds per floor deck unit at each support. Provide 3/4 inch minimum diameter fusion welds. Coordinate welding sequence and procedure with the placing of the floor deck units. Blow holes shall be cause for rejection.

Lock sidelaps between adjacent floor deck units together at intervals not exceeding 48 inch on center by welding or button punching for all spans.

3.2.2 Openings

Cut or drill all holes and openings required and be coordinated with the drawings, specifications, and other trades. Frame and reinforce openings through the deck in conformance with SDI DDP. Reinforce holes and openings 6 to 12 inch across by 0.0474 inch thick steel sheet at least 12 inch wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inch on center. Reinforce holes and openings larger than 12 inch by steel channels or angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Install steel channels or angles perpendicular to the deck ribs and fasten to the channels or angles perpendicular to the steel joists.

3.2.3 Deck Damage

SDI MOC2, for repair of deck damage.

3.2.4 Accessory Installation

3.2.4.1 Adjusting Plates

Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.

3.2.4.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.

3.2.4.3 Closures Above Partitions

Provide for closing voids between cells over partitions that are perpendicular to direction of cells. Provide a one-piece closure strip for partitions 4 inch nominal or less in thickness and two-piece closure strips for wider partitions. Provide sheet metal closures above fire-rated partitions at both sides of partition with space between filled with fiberglass insulation. Provide flexible rubber closures above acoustic-rated partitions at both sides of partition with space between filled with blanket insulation.

3.2.4.4 Cover Plates

Provide metal cover plates, or joint tape, at joints between cellular decking sheets to be used as electrical raceways. Where concrete leakage would be a problem, provide metal cover plates, or joint tape, at joints between decking sheets, cellular or noncellular, to be covered with concrete fill.

3.2.4.5 Column Closures

Provide for spaces between floor decking and columns which penetrate the deck. Field cut closure plate to fit column in the field and tack weld to decking and columns.

3.2.4.6 Access Hole Covers

Provide to seal holes cut in decking to facilitate welding of decking to structural supports.

3.2.4.7 Hangers

Provide as indicated to support utility system and suspended ceilings. Space devices as indicated.

3.2.5 Sound Absorbing Material

Install sound absorbing glass fiber roll or premolded form, neatly in voids between perforated webs of acoustical noncellular steel deck and glass fiber rigid strip, in cells of acoustical cellular steel deck. Keep sound absorbing material dry before, during and after installation.

3.2.6 Concrete Work

Prior to placement of concrete, inspect installed decking to ensure that there has been no permanent deflection or other damage to decking. Replace decking which has been damaged or permanently deflected as approved by the Contracting Officer. Place concrete on metal deck in accordance with Construction Practice of SDI 31.

3.2.7 Preparation of Fire-Proofed Surfaces

Provide deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, galvanized and free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Complete any required cleaning prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

3.3 JOINT SEALING FOR ROOF DECKS

Seal sidelaps and endlaps with manufacturer's recommended joint sealing material. Shop or field apply the material. Before applying the sealing material, completely remove dust, dirt, moisture, and other foreign material from the surfaces to which the sealing material is to be applied. Apply sealing material in strict accordance with the sealing material manufacturer's printed instructions.

3.4 ROOF SUMP PANS

Place sump pans over openings in roof decking and fusion welded to top surface of roof decking. Do not exceed spacing of welds of 12 inch with not less than one weld at each corner. Field cut opening in the bottom of each roof sump pan to receive the roof drain as part of the work of this section.

3.5 CANT STRIPS FOR ROOF DECKS

Provide strips to be fusion welded to surface of roof decking, secured to wood nailers by galvanized screws or to steel framing by galvanized self-tapping screws or welds. Do not exceed spacing of welds and fasteners of 12 inch. Lap end joints a minimum 3 inch and secure with galvanized sheet metal screws spaced a maximum 4 inch on center.

3.6 RIDGE AND VALLEY PLATES FOR ROOF DECKS

Provide plates to be fusion welded to top surface of roof decking. Lap end joints a minimum 3 inch. For valley plates, provide endlaps to be in the direction of water flow.

3.7 CLOSURE STRIPS FOR ROOF DECKS

Provide closure strips at open, uncovered ends and edges of the roof decking and in voids between roof decking and top of walls and partitions where indicated. Install closure strips in position in a manner to provide a weathertight installation.

3.8 ROOF INSULATION SUPPORT FOR ROOF DECKS

Provide metal closure strips for support of roof insulation where rib openings in top surface of metal roof decking occur adjacent to edges and openings. Weld metal closure strips in position.

3.9 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

3.10 FIELD QUALITY CONTROL

3.10.1 Decks Not Receiving Concrete

Inspect the decking top surface for distortion after installation. For roof decks not receiving concrete, verify distortion by placing a straight edge across three adjacent top flanges. The maximum allowable gap between the straight edge and the top flanges is 1/16 inch; when gap is more than 1/16 inch, provide corrective measures or replacement. Reinspect decking after performing corrective measures or replacement.

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 05 52 00
METAL RAILINGS
08/15

This guide specification covers the requirements for metal railing systems which are not a part of any other metals system of the specification. Specifically addressed in this specification are the requirements for both penetrating and non-penetrating (weighted base and offset counterweight style) perimeter safety rail systems for installation on roof surfaces and parapet walls to provide fall prevention and protection.

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2015) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.3.8M	(1981; R 2005) Metric Hex Lag Screws
ASME B18.21.1	(2009) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.22M	(1981; R 2010) Metric Plain Washers
ASME B18.6.1	(1981; R 2008) Wood Screws (Inch Series)
ASME B18.6.3	(2013) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)
ASME B18.6.5M	(2000; R 2010) Standard Specification for Metric Thread-Forming and Thread-Cutting Tapping Screws
ASME B18.6.7M	(1999; R 2010) Metric Machine Screws

ASTM INTERNATIONAL (ASTM)

ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A27/A27M (2013) Standard Specification for Steel Castings, Carbon, for General Application

ASTM A283/A283M (2013) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

ASTM A307 (2014) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM A325 (2014) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

ASTM A325M (2014) Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric)

ASTM A36/A36M (2014) Standard Specification for Carbon Structural Steel

ASTM A449 (2014) Standard Specification for Hex Cap Screws, Bolts, and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use

ASTM A467/A467M (2007; R 2012) Standard Specification for Machine Coil Chain

ASTM A47/A47M (1999; R 2014) Standard Specification for Ferritic Malleable Iron Castings

ASTM A500/A500M (2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A512 (2006) Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing

ASTM A53/A53M (2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A575 (1996; E 2013; R 2013) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades

ASTM B221 (2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM B221M (2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B429/B429M	(2010; E 2012) Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM C514	(2004; R 2014) Standard Specification for Nails for the Application of Gypsum Board
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM E488/E488M	(2015) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 898-1	(2013) Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel — Part 1: Bolts, Screws and Studs with Specified Property Classes — Coarse Thread and Fine Pitch Thread

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 521	(2001) Pipe Railing Manual

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1. Comply with the administrative requirements of the general conditions and statement of work sections of the contract

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
Fabrication Drawings and layout of product on roof top to include profiles, sizes, connections, size and type of fasteners and accessories.
SD-03 Product Data
Submit sufficient product data to government that clearly shows what product is being proposed and that the product's technical specifications meets or exceeds the requirement of this specification.
Color chips charts representing the manufacturer's full range of available colors and patterns
SD-07 Certificates
Welding Procedures for field fabrication only
Welder Qualification for field fabrication only
SD-08 Manufacturer's Instructions
Installation Instructions

1.4 QUALITY CONTROL

1.4.1 Welding Procedures (Field fabrication only)

Submit welding procedures testing in accordance with AWS D1.1/D1.1M made in the presence of the Contracting Officer and by an approved testing laboratory at the Contractor's expense.

1.4.2 Welder Qualification (field fabrication only)

Submit certified welder qualification by tests in accordance with AWS D1.1/D1.1M, or under an equivalent approved qualification test.

In addition perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, make an immediate retest of two test welds and ensure each test weld passes. Failure in the immediate retest will require that the welder be retested after further practice or training and make a complete set of test welds.

1.4.3 Railing structural requirements

Handrails wall rails and guard rail assemblies and attachment points shall be designed and installed such that they can withstand a minimum concentrated load of two-hundred (200) pounds applied horizontally or vertically down ward at any point on the top rail of the system.

The infill area of the system shall be capable of withstanding a horizontal concentrated load of two hundred (200) pounds applied to one square foot at any point in the system. This loading is not act concurrently with loads on the top rail of system in determining the stress on the guardrail.

Handrail assemblies and guards shall be designed to withstand a load of fifty (50) pounds per linear foot applied in the direction at the top and transfer this load through the supports to the structure.

1.4.4 Field measurements

The contractor shall verify the existing site conditions prior to installation of handrail assemblies. Where the new handrails are to be fitted to existing construction, the contractor shall obtain accurate field measurements prior to fabrication of the rail system components.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1. Materials shall be delivered to the job site in the original packaging materials provided by the manufacturer. Materials shall be inspected by the COR prior to acceptance of eth delivery. Materials shall be in good condition and adequately protected against damge as rails and uprights are a finished product. Damaged or rejected materials shall be replaced by the contractor at no additional expense to the government.

1.5.2 Store materials in a dry secure area protected from construction traffic, and damage due to weather (i.e. freezing temperatures and moisture) until ready for installation.

PART 2 PRODUCTS

NOTE: Use products supplied by an Acceptable Manufacturer of roof safety rail systems who has been in operation for a minimum of five consecutive years who can provide a full range of “off of the shelf” rail systems and products designed to meet the intent of 29 CFR 1910.23, 29 CFR1926.500. .501, .502 and .503 as well as the EM 385-1-1 requirements and these specifications

2.1 FABRICATION

To the greatest extent possible, the contractor shall utilize premanufactured components for the roof safety rail systems. The units shall be disassembled only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

If field fabrication is required, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes, including zinc coatings.

Provide railings and handrails detail plans and elevations at not less than 1 to 12 scale 1-inch to 1-foot. Provide details of sections and connections at not less than 1 to 4 scale 3-inches to 1-foot. Also detail setting drawings, diagrams, templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchors.

Use materials of size and thicknesses indicated or, if not indicated, of required size and thickness to produce adequate strength and durability in finished product for intended use. Work materials to dimensions indicated on approved detail drawings, using proven details of fabrication and support. Use type of materials indicated or specified for the various components of work.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ensure all exposed edges are eased to a radius of approximately 1/32-inch. Bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

Weld corners and seams continuously and in accordance with the recommendations of AWS D1.1/D1.1M. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk) screws or bolts.

Provide anchorage of the type indicated and coordinated with the supporting structure. Fabricate anchoring devices and space as indicated and as required to provide adequate support for the intended use of the work.

Use hot-rolled steel bars for work fabricated from bar stock unless work is indicated or specified to be fabricated from cold-finished or cold-rolled stock.

2.1.1 Aluminum Railings

Fabrication: Provide fabrication jointing by one of the following methods:

a. Flush-type rail fittings, welded and ground smooth with splice locks secured with 3/8-inch recessed head set screws.

b. Ensure all mitered and welded joints made by fitting post to top rail, intermediate rail to post, and corners, are groove welded and ground smooth. Provide butted splices, where allowed by the Contracting Officer, reinforced by a tight fitting dowel or sleeve not less than 6 inches in length. Tack weld or epoxy cement dowel or sleeve to one side of the splice.

c. Assemble railings using slip-on aluminum-magnesium alloy fittings for joints. Fasten fittings to pipe or tube with 1/4 or 3/8-inch stainless steel recessed head setscrews. Provide assembled railings with fittings only at vertical supports or at rail terminations attached to walls. Provide expansion joints at the midpoint of panels. Provide a setscrew in only one side of the slip-on sleeve. Provide alloy fittings to conform to ASTM B26/B26M.

Provide removable railing sections as indicated. Provide toe-boards and brackets where indicated, using flange castings as appropriate.

2.1.2 Steel Handrails

Fabricate joint posts, rail, and corners by one of the following methods:

a. Flush-type rail fittings of commercial standard, welded and ground smooth, with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews. Rails shall be 1 ½ inch to 1.90 inch O.D. diameter

b. Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight fitting interior sleeve not less than 6 inches long.

c. Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

Provide removable sections as indicated.

2.1.3 Protective Coating

Shop prime the steelwork as indicated in accordance with Section 09 90 00 PAINTS AND COATINGS except surfaces of steel that are:

a. encased in concrete
b. surfaces for welding
c. high-strength bolt connected contact surfaces
d. crane rails surfaces

Provide hot dipped galvanized steelwork as indicated in accordance with ASTM A123/A123M. Touch up abraded surfaces and cut ends of galvanized members with zinc-dust, zinc-oxide primer, or an approved galvanizing repair compound.

2.2 COMPONENTS

2.2.1 Structural Steel Plates, Shapes and Bars

Provide structural-size shapes and plates, except plates to be bent or cold-formed, conforming to ASTM A36/A36M, unless otherwise noted.

Provide steel plates, to be bent or cold-formed, conforming to ASTM A283/A283M, Grade C.

Provide steel bars and bar-size shapes conforming to ASTM A36/A36M, unless otherwise noted.

2.2.2 Structural Steel Tubing

NOTE: Includes square, rectangular, round, and specially shaped structural steel tubing.

Provide structural steel tubing, hot-formed, welded or seamless, conforming to ASTM A500/A500M, Grade B, unless otherwise noted.

2.2.3 Hot-Rolled Carbon Steel Bars

Provide bars and bar-size shapes conforming to ASTM A575, grade as selected by the fabricator.

2.2.4 Cold-Finished Steel Bars

Provide cold-finished steel bars conforming to ASTM A108, grade as selected by the fabricator.

2.2.5 Cold-Drawn Steel Tubing

Provide tubing conforming to ASTM A512, sunk drawn, butt-welded, cold-finished, and stress-relieved.

2.2.6 Steel Pipe

Provide pipe conforming to ASTM A53/A53M, type as selected, Grade B; primed finish, unless galvanizing is required; standard weight (Schedule 40).

2.2.7 Concrete Inserts

NOTE: Use inserts for fastening steel stair items to cast-in-place concrete construction subjected to direct pullout loadings such as shelf angles and supports attached to concrete slab ceilings. Indicate all locations of inserts.

Provide threaded-type concrete inserts consisting of galvanized ferrous castings, internally threaded to receive 3/4-inch diameter machine bolts; either malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M, hot-dip galvanized in accordance with ASTM A153/A153M.

Provide wedge-type concrete inserts consisting of galvanized box-type ferrous castings designed to accept 3/4-inch diameter bolts having special wedge-shaped heads, made of either malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M and hot-dip galvanized in accordance with ASTM A153/A153M.

Provide carbon steel bolts having special wedge-shaped heads, nuts, washers, and shims, galvanized in accordance with ASTM A153/A153M. Provide slotted-type concrete inserts consisting of galvanized 1/8-inch thick pressed steel plate conforming to ASTM A283/A283M, made of box-type welded construction with slot designed to receive 3/4-inch diameter square-head bolt with knockout cover; and hot-dip galvanized in accordance with ASTM A123/A123M.

2.2.8 Masonry Anchorage Devices

NOTE: Use masonry anchorage devices only for fastening steel stair items to solid masonry and concrete when the anchor is not subjected to pullout loads or vibration in shear loads.

Provide masonry anchorage devices consisting of expansion shields complying with AASHTO M 314, ASTM E488/E488M and ASTM C514 as follows:

Provide lead expansion shields for machine screws and bolts 1/4-inch and smaller; head-out embedded nut type, single unit class, Group I, Type 1, Class 1.

Provide lead expansion shields for machine screws and bolts larger than 1/4 inch in size; head-out embedded nut type, multiple unit class, Group I, Type 1, Class 2.

Provide bolt anchor expansion shields for lag bolts; zinc-alloy, long shield anchors class, Group II, Type 1, Class 1.

Provide bolt anchor expansion shields for bolts; closed-end bottom bearing class, Group II, Type 2, Class 1.

NOTE: Use toggle bolts for anchoring steel stair items to hollow masonry and stud partitions.

Provide tumble-wing type toggle bolts conforming to ASTM A325 ASTM A449 and ASTM C636/C636M, type, class, and style as required.

2.2.9 Fasteners

Provide type 304 or 305 stainless steel fasteners as specified by the systems manufacturer for exterior applications or where built into exterior walls or floor systems.

Provide standard hexagon-head bolts, conforming to ISO 898-1 ASTM A307, Grade A.

Provide square-head lag bolts conforming to ASME B18.2.3.8M /ASME B18.2.1.

Provide cadmium-plated steel machine screws conforming to ASME B18.6.7M, ASME B18.6.3.

Provide flat-head carbon steel wood screws conforming to ASME B18.6.5M, ASME B18.6.1.

Provide plain round, general-assembly-grade, carbon steel washers conforming to ASME B18.22M, ASME B18.21.1.

Provide helical spring, carbon steel lock washers conforming to ASME B18.2.3.8M, ASME B18.2.1.

2.2.10 Steel Railings and Handrails

Design handrails to resist a concentrated load of 200 lbs. in any direction at any point of the top of the rail or 50 lbs. per foot applied horizontally to top of the rail, whichever is more severe. Provide pipe collars of the same material and finish as the handrail and posts.

2.2.10.1 Steel Handrails

NOTE: Standard A 53 pipe at nominal diameter 1 1/4 inches meets the minimum requirements since the outside diameter is 1.66 inches.

Provide steel handrails, including inserts in concrete, steel pipe conforming to ASTM A53/A53M or structural tubing conforming to ASTM A500/A500M, Grade A or B of equivalent strength. Provide steel railings of 1-1/2 inches nominal size, hot-dip galvanized and powder coated.

Provide kick plates between railing posts where indicated, and consist of 1/8-inch steel flat bars not less than 6-inches high. Secure kick plates as indicated.

Galvanize and/or powder coat all exterior railings, including pipe, fittings, brackets, fasteners, and other ferrous metal components.

2.2.11 Aluminum Railings and Handrails

NOTE: Do not use slip-on type fittings and set screws for locations subject to abusive use by building occupants. The less expensive Alloy 6061-T6 meets the strength requirements, but is not suitable for bending, and discolors when anodized. Handrail fastenings should be of Series 300 stainless steel. Specify No. 316 for marine environments.

Provide railings and handrails consisting of 1 1/2-inch nominal schedule 40 pipe ASTM B429/B429M, 1-3/4-inch square aluminum semi-hollow tube with rounded corners ASTM B221M/ASTM B221. Provide anodized aluminum with powder coated color railings. Ensure all fasteners are Series 300 stainless steel.

2.2.12 Safety Chains

Provide safety chains of galvanized steel, straight link type, 3/16-inch diameter, with at least twelve links per foot, and with snap hooks on each end.

Test safety chain in accordance with ASTM A467/A467M, Class CS.

Provide snap hooks of boat type. Provide galvanized 3/8-inch bolt with 3/4-inch eye diameter for attachment of chain, anchored as indicated. Supply two chains, 4-inches longer than the anchorage spacing, for each guarded area. Provide bolts and nuts as indicated, conforming to the requirements of ASTM A307. Locate guard rails and safety chain where indicated. Mount the top chain rail 3 feet 6 inches above the floor or roof and mount the lower chain rail 2 feet above the floor or roof surface.

PART 3 EXECUTION

3.1 PREPARATION

Adjust stair railings and handrails prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts according to the length of the rail systems used but generally not more than 8-feet on center. Plumb posts in each direction unless an angled or offset post is called for. Secure posts and rail ends to building construction according to the requirements outlined by the rail system manufacturer for the type of application being utilized:

Secure handrails to walls by means of wall brackets provided by the rail system manufacturer.

3.2 INSTALLATION

Submit manufacturer's installation instructions for the following products to be used in the installation of the roof safety rail systems:

a. safety rails and fastening system

b. Mounting posts to include spacing and attachment method to parapet wall or roof deck

c. Installation instructions for Non-penetrating safety rail systems

Provide complete, detailed fabrication and installation drawings for all hardware, and for all steel shapes, plates, bars and strips used in accordance with the design specifications referenced in this section.

3.2.1 Steel Handrail

Install in accordance with the rail systems manufacturer’s installation instructions.

3.2.2 Aluminum Handrail

Where aluminum handrails are installed as a component of an existing lightening protection system, ensure the handrails are bonded to the existing conductors and down wires in accordance with the manufacturer’s installation instructions.

3.2.3 Touchup Painting

Immediately after installation, clean field welds, bolted connections, abraded areas of the shop paint, and exposed areas painted with the paint used for shop painting. Apply paint by brush or spray to provide a minimum dry-film thickness of 2-mils.

3.3 FIELD QUALITY CONTROL

3.3.1 Field Welding

Ensure procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work comply with AWS D1.1/D1.1M.

SECTION 06 10
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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 FOREST FOUNDATION (AFF)

ATFS STANDARDS	(2015) American Tree Farm System Standards of Sustainability 2015-2020

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC 111	(2005) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection
AITC TCM	(2012) Timber Construction Manual, 5th Edition
ANSI/AITC A190.1	(2007) American National Standard, Structural Glued Laminated Timber

AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)

ALSC PS 20	(2015) American Softwood Lumber Standard

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

AREMA Eng Man	(2017) Manual for Railway Engineering

AMERICAN WOOD COUNCIL (AWC)

AWC NDS	(2015) National Design Specification (NDS) for Wood Construction
AWC WFCM	(2012) Wood Frame Construction Manual for One- and Two-Family Dwellings

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA BOOK	(2015) AWPA Book of Standards
AWPA M2	(2016) Standard for the Inspection of Preservative Treated Wood Products for Industrial Use

AWPA M6	(2013) Brands Used on Preservative Treated Materials
AWPA P18	(2014) Nonpressure Preservatives
AWPA P49	(2015) Standard for Fire Retardant FR-1
AWPA P5	(2015) Standard for Waterborne Preservatives
AWPA T1	(2017) Use Category System: Processing and Treatment Standard
AWPA U1	(2017) Use Category System: User Specification for Treated Wood

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA E30	(2016) Engineered Wood Construction Guide
APA E445	(2002) Performance Standards and Qualification Policy for Structural-Use Panels (APA PRP-108)
APA EWS R540	(2013) Builder Tips: Proper Storage and Handling of Glulam Beams
APA EWS T300	(2007) Technical Note: Glulam Connection Details
APA F405	(19) Product Guide: Performance Rated Panels
APA L870	(2010) Voluntary Product Standard, PS 1-09, Structural Plywood
APA S350	(2014) PS 2-10, Performance Standard for Wood-Based Structural-Use Panels

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2015) Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.5.2.1M	(2006; R 2011) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2010) Metric Round Head Square Neck Bolts
ASME B18.6.1	(2016) Wood Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2016) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A653/A653M	(2017) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C1136	(2017a) Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C1396/C1396M	(2017) Standard Specification for Gypsum Board
ASTM C208	(2012; R 2017; E 2017) Standard Specification for Cellulosic Fiber Insulating Board
ASTM D1435	(2013) Standard Practice for Outdoor Weathering of Plastics
ASTM D1972	(1997; R 2005) Standard Practice for Generic Marking of Plastic Products
ASTM D198	(2015) Standard Test Methods of Static Tests of Lumber in Structural Sizes
ASTM D2344/D2344M	(2016) Standard Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates
ASTM D2898	(2010; R 2017) Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
ASTM D3498	(2003; R 2011) Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
ASTM D6108	(2013) Standard Test Method for Compressive Properties of Plastic Lumber and Shapes
ASTM D6109	(2013) Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products
ASTM D6111	(2013a) Standard Test Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by Displacement
ASTM D6112	(2013) Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes
ASTM D6117	(2016) Standard Test Methods for Mechanical Fasteners in Plastic Lumber and Shapes
ASTM D696	(2016) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer

ASTM E96/E96M	(2016) Standard Test Methods for Water Vapor Transmission of Materials
ASTM F1667	(2017) Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
ASTM F547	(2017) Standard Terminology of Nails for Use with Wood and Wood-Base Materials

CALIFORNIA AIR RESOURCES BOARD (CARB)

CARB 93120	(2007) Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

COMPOSITE PANEL ASSOCIATION (CPA)

CPA A208.1	(2016) Particleboard

CSA GROUP (CSA)

CSA Z809-08	(R2013) Sustainable Forest Management

FM GLOBAL (FM)

FM 4435	(2013) Roof Perimeter Flashing

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001	(1993; Am 1996; Am 1999; Am 2002) Principles and Criteria for Forest Stewardship

GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)

NHLA Rules	(2015) Rules for the Measurement & Inspection of Hardwood & Cypress

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules	(2013) Standard Grading Rules for Northeastern Lumber

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2013	(2015) PEFC International Standard Chain of Custody of Forest Based Products Requirements

REDWOOD INSPECTION SERVICE (RIS) OF THE CALIFORNIA REDWOOD ASSOCIATION (CRA)

RIS Grade Use	(1998) Redwood Lumber Grades and Uses

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications

SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)

SCMA Spec	(1986; Supple. No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB 1003	(2014) Standard Grading Rules for Southern Pine Lumber

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019	(2015) Standards, Rules for Label Use, Procedures and Guidance

TRUSS PLATE INSTITUTE (TPI)

TPI 1	(2014) National Design Standard for Metal Plate Connected Wood Truss Construction, Including Commentary and Appendices
TPI HIB	(1991) Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses

U.S. DEPARTMENT OF COMMERCE (DOC)

DOC/NIST PS56	(1973) Structural Glued Laminated Timber
DOC/NIST PS58	(1973) Basic Hardboard (ANSI A135.4)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-1923	(Rev A; Notice 3) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)
CID A-A-1924	(Rev A; Notice 2) Shield, Expansion (Self Drilling Tubular Expansion Shell Bolt Anchors
CID A-A-1925	(Rev A; Notice 3) Shield Expansion (Nail Anchors)
FS UU-B-790	(Rev A; Notice 2) Building Paper Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)

UNDERWRITERS LABORATORIES (UL)

UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB 17 (2015) Standard Grading Rules

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA G-5 (2017) Western Lumber Grading Rules

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Structural Glued Laminated Members;
Trussed Rafters;
Trussed Joists;
Fabricated Structural Members;
Modifications of Structural Members;
Drawings of structural laminated members, fabricated wood trusses, engineered wood joists and rafters, and other fabricated structural members indicating materials, shop fabrication, and field erection details; including methods of fastening.
Nailers and Nailing Strips;
Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

SD-03 Product Data

Salvaged Lumber
Recovered Lumber
Underlayment

SD-05 Design Data

Modifications of Structural Members;
Design analysis and calculations showing design criteria used to accomplish the applicable analysis.

SD-06 Test Reports

Preservative-treated Lumber and Plywood

SD-07 Certificates

Certificates of Grade
Certified Sustainably Harvested Wood;
Preservative Treatment
Indoor Air Quality

SD-11 Closeout Submittals

Certified Sustainably Harvested Framing Lumber;
Certified Sustainably Harvested Structural Glued Laminated Timber;
Certified Sustainably Harvested Plywood Roof Sheathing;
Certified Sustainably Harvested Plywood for Other Uses;
VOC Content for Structural Glued Laminated Timber;

1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Store wood I-beams and glue-laminated beams and joists on edge. Adhere to requirements for stacking, lifting, bracing, cutting, notching, and special fastening requirements. Handle and store laminated timber in accordance with AITC 111 or APA EWS R540. Do not use materials that have visible moisture or biological growth. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

1.4 GRADING AND MARKING

1.4.1 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 must be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view must not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

1.4.2 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 must indicate compliance with ANSI/AITC A190.1 and must include all identification information required by ANSI/AITC A190.1. Structurally end-jointed lumber must also be certified and grade marked in accordance with ANSI/AITC A190.1.

1.4.3 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 must identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with APA L870. Surfaces that are to be exposed to view must not bear grademarks or other types of identifying marks.

1.4.4 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 must indicate end use, span rating, and exposure durability classification. Oriented Strand Board (OSB), APA F405.

1.4.5 Preservative-Treated Lumber and Plywood

The Contractor is responsible for the quality of treated wood products. Each treated piece must be inspected in accordance with AWPA M2 and permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor must 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.

1.4.6 Fire-Retardant Treated Lumber

Mark each piece in accordance with AWPA M6, except pieces that are to be natural or transparent finished. In addition, exterior fire-retardant lumber must be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of AWPA M6.

1.4.7 Hardboard, Gypsum Board, and Fiberboard

Mark each sheet or bundle to identify the standard under which the material is produced and the producer.

1.4.8 Plastic Lumber

Plastic lumber products are NOT Authorized for use on the roofing requirements contract.

1.5 SIZES AND SURFACING

ALSC PS 20 for dressed sizes of yard and structural lumber. Lumber must be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes must be within manufacturing tolerances allowed by the standard under which the product is produced. Other measurements are IP or SI standard.

1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products must be as follows at the time of delivery to the job site:

a. Framing lumber and board, 19 percent maximum
b. Timbers 5 inches and thicker, 25 percent maximum
c. Roof planking, 15 percent maximum
d. Materials other than lumber; moisture content must be in accordance with standard under which the product is produced

1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to AWPA P5. Pressure treatment of wood products must conform to the requirements of AWPA BOOK Use Category System Standards U1 and T1. Pressure-treated wood products must not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products must not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and must not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards. In accordance with AWPA U1 provide non-copper preservative treatment such as EL2, PTI or SBX, DOT for products in direct contact with sheet metal.

a. 0.25 pcf intended for above ground use.
b. 0.40 pcf intended for ground contact and fresh water use. 0.60 pcf intended for Ammoniacal Copper Quaternary Compound (ACQ)-treated foundations. 0.80 to 1.00 pcf intended for ACQ-treated pilings. All wood must be air or kiln dried after treatment. Specific treatments must be verified by the report of an approved independent inspection agency, or the AWPA Quality Mark on each piece. Do not incise surfaces of lumber that will be exposed.

Minimize cutting and avoid breathing sawdust. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution. All lumber and woodwork must be preservative treated. Plastic lumber must not be

preservative treated. The following items must be preservative treated:

(1) Wood framing, woodwork, and plywood up to and including the subflooring at the first-floor level of structures having crawl spaces when the bottoms of such items are 24 inches or less from the earth underneath.
(2) Wood members that are in contact with water.
(3) Exterior wood steps, platforms, and railings; and all wood framing of open, roofed structures.
(4) Wood sills, soles, plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.
(5) Nailers, edge strips, crickets, curbs, and cants for roof decks.

1.7.1 Existing Structures

Use borate, permathrin, or a sodium silicate wood mineralization process to treat wood. Use borate for interior applications only.

1.7.2 New Construction

Use a boron-based preservative conforming to AWPA P18, sodium silicate wood mineralization process, or Ammoniacal Copper Quaternary Compound to treat wood. Use boron-based preservatives for above-ground applications only.

1.8 FIRE-RETARDANT TREATMENT

Fire-retardant treated wood must be pressure treated with fire retardants conforming to AWPA P49. Fire retardant treatment of wood products must conform to the requirements of AWPA U1, Commodity Specification H and AWPA T1, Section H.

Treatment and performance inspection must be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material must bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting must be subjected to an accelerated weathering technique in accordance with ASTM D2898 prior to being tested. Such items which will not be inside a building, and such items which will be exposed to heat or high humidity, must receive exterior fire-retardant treatment. Fire-retardant-treated wood products must be free of halogens, sulfates, ammonium phosphate, and formaldehyde.

1.9 QUALITY ASSURANCE

1.9.1 Drawing Requirements

For fabricated structural members, trusses, qlu-lam members, indicate materials, details of construction, methods of fastening, and erection details. Include reference to design criteria used and manufacturers design calculations. Submit drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.

1.9.2 Data Required

Submit calculations and drawings for all proposed modifications of structural members. Do not proceed with modifications until the submittal has been approved.

1.9.3 Humidity Requirements

Sequence work to minimize use of temporary HVAC to dry out building and control humidity.

1.9.4 Plastic Lumber Performance

1.10 ENVIRONMENTAL REQUIREMENTS

During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.

1.11 CERTIFICATIONS

1.11.1 Certified Wood Grades

Provide certificates of grade from the grading agency on graded but unmarked lumber or plywood attesting that materials meet the grade requirements specified herein.

1.11.2 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by FSC STD 01 001. Provide a letter of Certification of Sustainably Harvested Wood signed by the wood supplier. Identify certifying organization and their third party program name and indicate compliance with chain-of-custody program requirements. Submit sustainable wood certification data; identify each certified product on a line item basis. Submit copies of invoices bearing certification numbers.

1.11.3 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

1.11.3.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide validation by other third-party program that products meet the requirements of this paragraph.

1.11.3.2 Composite Wood, Wood Structural Panel and Agrifiber Products

For purposes of this specification, composite wood and agrifiber products include particleboard, medium density fiberboard (MDF), wheatboard, strawboard, panel substrates, and door cores. Products must contain no added urea-formaldehyde resins.

PART 2 PRODUCTS

2.1 PRODUCT SUSTAINABILITY CRITERIA

For products in this section, where applicable and to extent allowed by performance criteria, provide and document the following:

2.1.1 Certified Sustainably Harvested Wood

Certified sustainably harvested wood is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph BIOBASED PRODUCTS.

2.1.2 Biobased Content for Wood Products

Biobased content is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph BIOBASED PRODUCTS.

2.1.3 Recycled Content for Wood Products

Recycled content is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph RECYCLED CONTENT.

2.1.4 Reduce Volatile Organic Compounds (VOC) (Low-Emitting Materials) for Products

Reduced VOC content is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph REDUCE VOLATILE ORGANIC COMPOUNDS (VOC) (LOW-EMITTING MATERIALS).

2.2 MATERIALS

2.2.1 Virgin Lumber

Lumber fabricated from old growth timber is not permitted. Avoid companies who buy, sell, or use old growth timber in their operations, when possible. Provide certified sustainably harvested virgin lumber.

2.2.2 Salvaged Lumber

Provide salvaged lumber where specified. Unless otherwise noted, salvaged lumber must be delivered clean, denailed, and free of paint, finish materials, and other contamination. Lumber must meet the other criteria within this section. Provide documentation certifying products are from salvaged lumber sources.

2.2.3 Recovered Lumber

Use recovered lumber where practical. Unless otherwise noted, recovered lumber must be delivered clean and free of contamination. Provide grading certificates for any recovered wood materials used in structural applications. Lumber must meet the other criteria within this section. Provide documentation certifying products are from recovered lumber sources.

2.2.4 Natural Decay- and Insect-Resistant Wood

Naturally durable wood must be certified sustainably harvested natural-decay and insect-resistant wood. An occasional piece with corner sapwood is permitted if 90 percent or more of the width of each side on which the sapwood occurs is heartwood.

2.2.5 Plastic Lumber – NOT APPLICABLE TO ROOFING CONTRACT

2.3 LUMBER

2.3.1 Structural Lumber

Except where a specific grade is indicated or specified, Any of the species and grades listed in AWC NDS that have allowable unit stresses in pounds per square inch (psi) not less than 1050 Fb, 700 Ft, 780 Fc, with 1,200,000 E for engineered uses; 1,200 Fb with 1,200,000E for repetition member uses. Use for joists, rafters, headers, trusses, beams (except collar beams), columns, posts, stair stringers, girders, and all other members indicated to be stress rated. Design of members and fastenings must conform to AITC TCM. Other stress graded or dimensioned items such as blocking, carriages, and studs must be standard or No. 2 grade except that studs may be Stud grade.

2.3.2 Framing Lumber

Framing lumber such as studs, plates, caps, collar beams, cant strips, bucks, sleepers, nailing strips, and nailers and board lumber such as subflooring and wall and roof sheathing must be one of the species listed in the table below. Minimum grade of species must be as listed. Provide certified sustainably harvested framing lumber.

Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber
WWPA G-5 standard grading rules	Aspen, Douglas Fir-Larch, Douglas Fir South, Engelmann Spruce-Lodgepole Pine, Engelmann Spruce, Hem-Fir, Idaho White Pine, Lodgepole Pine, Mountain Hemlock, Mountain Hemlock-Hem-Fir, Ponderosa Pine-Sugar Pine, Ponderosa Pine-Lodgepole Pine, Subalpine Fir, White Woods, Western Woods, Western Cedars, Western Hemlock	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 3 m 10 feet and shorter)	All Species: No. 3 Common
Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber

WCLIB 17 standard grading rules	Douglas Fir-Larch, Hem-Fir, Mountain Hemlock, Sitka Spruce, Western Cedars, Western Hemlock	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 3 m 10 feet and shorter)	All Species: Standard
SPIB 1003 standard grading rules	Southern Pine	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 3 m 10 feet and shorter)	No. 2 Boards
SCMA Spec standard specifications	Cypress	No. 2 Common	No. 2 Common
NELMA Grading Rules standard grading rules	Balsam Fir, Eastern Hemlock-Tamarack, Eastern Spruce, Eastern White Pine, Northern Pine, Northern Pine-Cedar	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 3 m 10 feet and shorter)	All Species: No. 3 Common except Standard for Eastern White and Northern Pine
Table of Grades for Framing and Board Lumber			
Grading Rules	Species	Framing	Board Lumber

RIS Grade Use standard specifications	Redwood	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2x4 nominal size, 3 m 10 feet and shorter)	Construction Heart
NHLA Rules rules for the measurement and inspection of hardwood and cypress lumber	Cypress	No. 2 Dimension	No. 2 Common

2.3.3 Structural Glued Laminated Timber

Not Applicable

2.4 PLYWOOD, STRUCTURAL-USE, AND ORIENTED STRAND BOARD (OSB) PANELS

APA L870, APA S350, APA E445, and APA F405 respectively.

2.4.1 Subflooring – Not Applicable

2.4.2 Combination Subfloor-Underlayment – Not Applicable

2.4.3 Wall Sheathing

2.4.3.1 Plywood

C-D Grade, Exposure 1, and a minimum thickness of 1/2 inch, except where indicated to have greater thickness. Provide certified sustainably harvested plywood wall sheathing.

2.4.3.2 Structural-Use and OSB Panels

Sheathing grade with durability equivalent to Exposure 1, Span Rating of 16/0 or greater. OSB, APA Rated Sheathing. OSB must be a phenolic-glued board. Provide certified sustainably harvested structural-use and OSB panel wall sheathing.

2.4.4 Roof Sheathing

2.4.4.1 Plywood

C-D Grade, Exposure 1, with an Identification Index of not less than 24/0. Provide certified sustainably harvested plywood roof sheathing. Provide exterior grade material with phenol resin for all applications.

2.4.4.2 Structural-Use Panel

Sheathing grade with durability equivalent to Exposure 1, Span Rating of 24/0 or greater.

2.4.5 Diaphragms

2.4.5.1 Plywood

Structural I, C-D grade, Exposure 1, and a minimum thickness of 1/2 inch. Provide certified sustainably harvested plywood diaphragm.

2.4.5.2 Structural-Use and OSB Panels

Sheathing grade with durability equivalent to Exposure 1 and a minimum thickness of ½ inch. Provide certified sustainably harvested structural-use and OSB panel diaphragm.

2.4.6 Shear Walls – Not Applicable

2.5 UNDERLAYMENT – Not Applicable

2.6 OTHER MATERIALS

2.6.1 Hardboard Underlayment

DOC/NIST PS58, service class, sanded on one side, 1/4 inch thick 4 feet wide.

2.6.2 Fiberboard Wall Sheathing – Not Approved for this contract

2.6.3 Gypsum Wall Sheathing

ASTM C1396, 1/2 inch thick or fire retardant (Type X) 5/8 inch thick; 4 feet wide with square edge for supports 16 inches o.c. with or without corner bracing of framing or for supports 24 inches o.c. with corner bracing of framing; 2 feet wide with V-tongue and groove (T&G) edge for supports 16 inches o.c. with corner bracing of framing.

2.6.4 Foil-Faced Insulative Sheathing

Wood fiber core, chemically treated for water resistance, with aluminum foil laminated under pressure to both sides with water-resistant adhesive; 48 inches or 48 3/4 inches wide; 0.078 inch thick when used with corner bracing, 0.115 inch thick with studs up to 16 inches o.c. without corner bracing, or 0.137 inch thick with studs up to 24 inches o.c. without corner bracing. The sheathing and installation must have been accepted by ICC as conforming to ICC IBC. The sheathing alone must have a thermal resistance value (R value) of not less than 0.20.

2.6.5 Cellulose Honeycomb Panels – Not Approved for this contract

2.6.6 Building Paper

FS UU-B-790, Type I, Grade D, Style 1.

2.6.7 Trussed Rafters

Metal plate connected trusses designed in accordance with TPI 1 and TPI HIB and fabricated in accordance with TPI 1.

2.6.8 Trussed Joists

Metal plate connected parallel chord wood trusses designed and fabricated in accordance with TPI 1.

2.6.9 Roof Decking

Roof decking must be commercial grade with minimum design value of 1100 psi in bending. Decking must be 2 inches thick with single tongue and groove, 4 inches thick with double tongue and groove; V-jointed, matched and dressed. As an option, fabricated laminated lumber decking with interlocking tongue and groove joints may be provided.

2.6.10 Miscellaneous Wood Members

2.6.10.1 Nonstress Graded Members

Members must include bridging, corner bracing, furring, grounds, and nailing strips. Members must be in accordance with TABLE I for the species used. Sizes must be as follows unless otherwise shown:

Member	Size inch
Bridging	1 x 3 or 1x4 for use between members 2 x 12 and smaller 2x4 for use in members larger than 2x12
Corner bracing	1 x 4.
Furring	1 x [2] [3]
Grounds	Plaster thickness by 1-1/2.
Nailing strips	1 x 3 or 1 x 4 when used as shingle base or interior finish, otherwise 2 inch stock.

2.6.10.2 Wood Bumpers

AREMA Eng. Man, Industrial grade cross ties

2.6.10.3 Sill Plates

Sill plates must be standard or number 2 grade.

2.6.10.4 Blocking

Blocking must be standard or number 2 grade.

2.6.10.5 Rough Bucks and Frames

Rough bucks and frames must be straight standard or number 2 grade.

2.6.11 Adhesives

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Provide certification of indoor air quality for non-aerosol adhesives applied on the interior of the building (inside of the weatherproofing system). Provide certification of indoor air quality for aerosol adhesives used on the interior of the building (inside of the weatherproofing system).

2.7 ROUGH HARDWARE

Unless otherwise indicated or specified, rough hardware must be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials UST be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry, or concrete walls or slabs must be hot-dip zinc-coated in accordance with ASTM A153/A153M. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather must be copper alloy or hot-dipped galvanized fasteners as recommended by the treated wood manufacturer.

2.7.1 Bolts, Nuts, Studs, and Rivets

ASME B18.2.1, ASME B18.5.2.1M, ASME B18.5.2.2M and ASME B18.2.2.

2.7.2 Anchor Bolts

ASTM A307, size as indicated, complete with nuts and washers.

2.7.3 Expansion Shields

CID A-A-1923, CID A-A-1924, and CID A-A-1925. Except as shown otherwise, maximum size of devices must be 3/8 inch.

2.7.4 Lag Screws and Lag Bolts
ASME B18.2.1.
2.7.5 Wood
Screws ASME
B18.6.1.
2.7.6 Nails and Staples

ASTM F547, size and type best suited for purpose; staples must be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails must be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails must be used for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber; 16-penny or larger nails must be used for nailing through 2 inch thick lumber. Nails used with treated lumber and sheathing must be hot-dipped galvanized in accordance with ASTM A153/A153M. Nailing must be in accordance with the recommended nailing schedule contained in AWC WFCM. Where detailed nailing requirements are not specified, nail size and spacing must be sufficient to develop an adequate strength for the connection. The connection's strength must be verified against the nail capacity tables in AWC NDS. Reasonable judgment backed by experience must ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector must be used.

2.7.7 Wire
Nails ASTM
F1667.

2.7.8 Timber Connectors

Unless otherwise specified, timber connectors must be in accordance with TPI 1, APA EWS T300 or AITC TCM.

2.7.9 Clip Angles

Steel, 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

2.7.10 Joist Hangers

Steel or iron, zinc coated, sized to fit the supported member, of sufficient strength to develop the full strength of the supported member in accordance with ICC IBC, and furnished complete with any special nails required.

2.7.11 Tie Straps

For joists supported by the lower flange of steel beams, provide 1/8 by 1-1/2 inch steel strap, 2 feet long, except as indicated otherwise.

2.7.12 Joist Anchors

For joists supported by masonry walls, provide anchors 3/16 by 1 1/2 inch steel tee or strap, bent and of length to provide 4 inches embedment into wall and 12 inches along joist except as indicated otherwise. For joists parallel to masonry or concrete walls, provide anchors 1/4 by 1-1/4 inch minimum cross-sectional area, steel strap, length as necessary to extend over top of first three joists and into wall 4 inches, and with wall end of bend or pin type , except as indicated otherwise.

2.7.13 Door Buck Anchors

Metal anchors, 1/8 by 1-1/4 inch steel, 12 inches long, with ends bent 2 inches, except as indicated otherwise. Anchors must be screwed to the backs of bucks and built into masonry or concrete. Locate 8 inches above sills and below heads and not more than 24 inches intermediately between. Anchorage of bucks to steel framing must be as indicated or as necessary to suit the conditions.

2.7.14 Metal Bridging

Where not indicated or specified otherwise, No. 16 U.S. Standard gage, cadmium-plated or zinc-coated.

2.7.15 Toothed Rings and Shear Plates AWC
NDS.

2.7.16 Beam Anchors

Steel U-shaped strap anchors 1/4 inch thick by 1-1/2 inches wide, except as indicated otherwise.

2.7.17 Metal Framing Anchors

Construct anchors to the configuration shown using hot dip zinc-coated steel conforming to ASTM A653/A653M, Z275 G90. Except where otherwise shown, Steel must be not lighter than 18 gage. Special nails supplied by the manufacturer must be used for all nailing.

2.7.18 Panel Edge Clips

Extruded aluminum or galvanized steel, H-shaped clips to prevent differential deflection of roof sheathing.

2.8 AIR INFILTRATION BARRIER

Air infiltration barrier must be building paper meeting the requirements of ASTM C1136, Type IV, style optional or a tear and puncture resistant olefin building wrap (polyethylene or polypropylene) with a moisture vapor transmission rate of 125g per square meter per 24 hours in accordance with ASTM E96, Desiccant Method at 23 degrees C or with a moisture vapor transmission rate of 670 g per square meter per 24 hours in accordance with ASTM E96, Water Method at 23 degrees C.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Conform to AWC WFCM and install in accordance with the National Association of Home Builders (NAHB) Advanced Framing Techniques: Optimum Value Engineering, unless otherwise indicated or specified. Select lumber sizes to minimize waste. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner. Space plastic lumber boards as necessary to allow for lengthwise expansion and contraction. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Frame members for the passage of pipes, conduits, and ducts. Provide adequate support as appropriate to the application, climate, and modulus of elasticity of the product. Do not cut or bore structural members for the passage of ducts or pipes without approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spiking and nailing not indicated or specified otherwise must be in accordance with the Nailing Schedule contained in ICC IBC; perform bolting in an approved manner. Spikes, nails, and bolts must be drawn up tight. Timber connections and fastenings must conform to AWC NDS. Provide 2 inch minimum clearance between chimneys and wood framing; provide 4 inch minimum clearance at fireplaces. Fill the spaces with strips of approved noncombustible material. Use slate or steel shims when leveling joists, beams, and girders on masonry or concrete. Do not use shimming on wood or metal bearings. When joists, beams, and girders are placed on masonry or concrete, a wood base plate must be positioned and leveled with grout. The joist, beam, or girder must then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket must be formed into the wall. The joist, beam, or girder must then be placed into the pocket and leveled with a steel shim.

3.1.1 Sills

Set sills level and square and wedge with steel or slate shims; point or grout with non-shrinking cement mortar to provide continuous and solid bearing. Anchor sills to the foundations as indicated. Where sizes and spacing of anchor bolts are not indicated, provide not less than 5/8 inch diameter bolts at all corners and splices and space at a maximum of 6 feet o.c. between corner bolts. Provide at least two bolts for each sill member. Lap and splice sills at corners and bolt through the laps or butt the ends and through-bolt not more than 6 inches from the ends. Provide bolts with plate washers and nuts. Bolts in exterior walls must be zinc-coated.

3.1.1.1 Anchors in Masonry

Except where indicated otherwise, Embed anchor bolts not less than 15 inches in masonry unit walls and provide each with a nut and a 2 inch diameter washer at bottom end. Fully grout bolts with mortar.

3.1.1.2 Anchors in Concrete

Except where indicated otherwise, Embed anchor bolts not less than 8 inches in poured concrete walls and provide each with a nut and a 2 inch diameter washer at bottom end. A bent end may be substituted for the nut and washer; bend must be not less than 90 degrees. Powder-actuated fasteners spaced 3 feet o.c. may be provided in lieu of bolts for single thickness plates on concrete.

3.1.2 Beams and Girders

Set beams and girders level and in alignment and anchor to bearing walls, piers, or supports with U-shaped steel strap anchors. Embed anchors in concrete or masonry at each bearing and through-bolt to the beams or girders with not less than two bolts. Provide bolts not less than 1/2 inch in diameter and with plate washers under heads and nuts. Install beams and girders not indicated otherwise with 8 inch minimum end bearing on walls or supports. Install beams and girders into walls with 1/2 inch clearance at the top, end, and sides or standard steel wall-bearing boxes. Provide joints and splices over bearings only and bolt or spike together.

3.1.3 Roof Framing or Rafters

Tops of supports or rafters must form a true plane. Valley, ridge, and hip members must be of depth equal to cut on rafters where practicable, but in no case less than depth of rafters and nominally 2 inches thick. Rafters must be notched and have full and solid bearing on plates. Valleys, hips, and ridges must be straight and true intersections of roof planes. Necessary crickets and watersheds must be formed. Rafters, except hip and valley rafters, must be spiked to wall plate and to ceiling joists with no less than three 8-penny nails or bolted by angles. Rafters must be toe-nailed to ridge, valley, or hip members with at least three 8-penny nails. Rafters must be braced to prevent movement until permanent bracing, decking or sheathing is installed. Hip and valley rafters must be secured to wall plates by clip angles. Openings in roof must be framed with headers and trimmers. Unless otherwise indicated, headers carrying more than two rafters and trimmers supporting headers carrying more than one rafter must be double. Hip rafters longer than the available lumber must be butt jointed and scabbed. Valley rafters longer than the available lumber must be double, with pieces lapped not less than 4 feet and well spiked together. Install trussed rafters in accordance with TPI HIB. Install engineered wood joists in accordance with distributor's instructions.

3.1.4 Joists

Provide joists of the sizes and spacing indicated, accurately and in alignment, and of uniform width. Joists must have full bearing on sills, [plates,] [beams,] [girders,] [and] [trusses]; provide laps over bearing only and spike. Where joists are of insufficient length to produce a 12 inch lap, butt joists over bearing and provide wood scabs 2 nominal inches thick by depth of joists by 24 inches long or metal straps 1/4 by 1 1/2 inch by not less than 18 inches long nailed to each joist with not less than four 10-penny nails, or approved sheet metal connectors installed in accordance with the manufacturer's recommendations. Provide joists built into masonry with a beveled fire cut so that the top of the joist does not enter the wall more than one inch or standard steel wall bearing boxes. Provide metal hangers for joists framing into the side of headers, beams, or girders. When a portion of the joist extends above the top flange of a steel beam or girder, provide a 3/8 inch space between the top flange and the extended portion of the joists to allow for shrinkage of joists. The minimum joist end bearing must be 4 inches, and joists built into concrete or masonry must have a 1/2 inch minimum clearance at the top, end, and sides. For joists approved to be bored for the passage of pipes

or conduits, bore through the neutral axis of the joist. Provide steel joist hangers of proper size and type to receive the ends of all framed joists.

3.1.4.1 Floor (Ceiling) Framing

Except where otherwise indicated joists must have bearings not less than 4 inches on concrete or masonry and 1-1/2 inches on wood or metal. Joists, trimmers, headers, and beams framing into carrying members at the same relative levels must be carried on joist hangers. Joists must be lapped and spiked together at bearings or butted end-to-end with scab ties at joint and spiked to plates. Openings in floors must be framed with headers and trimmers. Headers carrying more than two tail joists and trimmers supporting headers carrying more than one tail joist must be doubled, unless otherwise indicated. Joists built into masonry must be provided with a beveled fire cut so that the top of the joist does not enter the wall more than 1 inch or standard steel wall bearing boxes. Install engineered wood joists in accordance with distributor's instructions.

3.1.4.2 Doubled Joists

Provide under bearing walls and partitions running parallel with the floor joists, around stairways, chimneys, fireplaces, and at other openings where joists are cut and framed. Double, space for clearance, block apart 4 feet on center, rigidly frame, and spike together joists under partitions that are to receive ducts, pipes, and conduits.

3.1.4.3 Tie Straps

For joists supported by the lower flange of steel beams, provide straps at every fourth joist and the corresponding fourth joist on the opposite side. Tie joists across the top of the steel beam with a steel strap. Form straps to lie flat across the top of the beam and twist at the ends to provide flat contact with the side of each joist. Nail each strap at each end with three 10-penny nails spaced 2 inches o.c.

3.1.4.4 Joist Anchors

Provide anchors for each fourth joist supported by a masonry wall. Build wall end of anchors into the wall. Nail anchor to the joist with three 10-penny nails spaced 2 inches o.c. Anchor the first three joists parallel to concrete or masonry walls at bridging points, but not less than 8 feet o.c. from end walls. Let anchors into the tops of each joist and spike to the top of joist with one 10-penny nail. Extend anchors at least 4 to 8 inches into the wall.

3.1.5 Bridging

Provide bridging for floor and ceiling joists and for roof rafters having slopes of less than 1/3. Locate bridging as indicated and as specified herein. Provide bridging for spans greater than 6 feet, but do not exceed 8 feet maximum spacing between rows of bridging. Install rows of bridging uniformly. Provide metal or wood cross-bridging, except where solid bridging is indicated. Do not nail the bottom end of cross-bridging until the subfloor has been laid.

3.1.5.1 Wood Cross-Bridging

Provide wood cross-bridging not less than 2 by 4 nominal size. Nail wood cross-bridging at each end with three 8-penny nails for 2 by thick material.

3.1.5.2 Metal Cross-Bridging

Must be the manufacturer's standard product, not less than 16 gage before forming and coating. Metal bridging must be the compression type, lodged into or nailed to the wide faces of opposite joists at points diagonally across from each other near the bottoms and tops of joists.

3.1.6 Subflooring

3.1.6.1 Plywood, Structural-Use, and OSB Panels

Apply best side up with the grain of outer plies or the long dimension at right angles to joists. Stagger end joints and locate over the centerline of joists. Support panel edges by nominal 2 by 4 members framed between joists so the edge joints of subfloor occur over the centerline of blocking. Allow 1/8 inch spacing at panel ends and 1/4 inch at panel edges. Panels must be continuous over two or more spans. Nail panels 6 inches o.c.at supported edges and 10 inches o.c. over intermediate bearing. Nails must be 8-penny common or 6-penny threaded. Provide at least 1/2 inch clearance between subflooring and masonry or concrete walls. Subflooring may be installed with adhesive conforming to ASTM D3498 and nails spaced at 12 inches on center unless otherwise shown.

3.1.6.2 Combination Subfloor-Underlayment

Apply with the grain of the face plies or the long dimension at right angles to joists. Panels must be continuous over two or more spans. Stagger end joints of adjacent panels. Panel edges must be T&G or supported by 2 by 4 members framed between joists so the edge joints of subfloor-underlayment occur over the centerline of blocking. Provide end joints of panels over the centerline of joists. Allow 1/8 inch spacing between panel edge and end joints. Nail panels 6 inches o.c. at ends and edges and 10 inches o.c. along intermediate bearings unless they are glue-nailed in accordance with APA E30. Nails must be 8-penny coated common or 6-penny threaded. Provide at least 1/2 inch clearance between subfloor-underlayment and masonry or concrete walls. Lightly sand all joints to receive resilient flooring.

3.1.6.3 Wood

Subflooring must be applied diagonally with end joints made over supports. Each board must bear on at least three supports and must be nailed at each support using two nails for boards 6 inches and less in width and three nails for boards more than 6 inches in width.

3.1.6.4 Depressed Subfloors

Provide depressed subfloors to receive ceramic and quarry tile floors. Nail cleats or ledgers of one by four material to the sides of joists to support the flooring material. Place the cleats at a depth below the top of the joists sufficient to allow the installation of the subflooring below the tops of joists. Snugly fit subflooring as specified herein between joists.

3.1.7 Underlayment

Install underlayment over subfloor just prior to laying of resilient flooring and protect from water and physical damage. Stagger end joints of underlayment with respect to each other, and stagger all joints with respect to paralleling panel joints in subfloor. Space panels 1/16 inch apart at ends and 1/8 inch apart at edges and at least 1/2 inch from concrete or masonry walls. Nail panels 6 inches o.c. along edges and 6 inches o.c. each way throughout panel, but not closer than 3/8 inch to panel edges. Nails must be 4-penny annular ring or screw type and must be countersunk 1/16 inch. Lightly sand all joints to receive resilient flooring.

3.1.8 Columns and Posts

Set columns and posts, plumb, in alignment, and with full and uniform bearing. Do not embed the bottom and bearing surfaces of posts, columns in concrete or set in direct contact with concrete slabs on grade. Provide post and beam construction with wood bolsters, steel post caps in such a manner that the post above will tier directly over the one below; fabricate the assembly in a rigid and substantial manner using bolts or lag screws.

3.1.9 Wall Framing

3.1.9.1 Studs

Select studs for straightness and set plumb, true, and in alignment. In walls and partitions more than 8 feet tall, provide horizontal bridging at not more than 8 feet o.c. using nominal 2 inch material of the same width as the studs; install the bridging flat. Sizes and spacing of studs must be as indicated. Double studs at jambs and heads of openings and triple at corners to form corner posts. Frame corner posts to receive sheathing, lath, and interior finish. Truss over openings exceeding 4 feet in width or use a header of sufficient depth. Toe-nail studs to sills or sole plates with four 8-penny nails or fasten with metal nailing clips or connectors. Anchor studs abutting concrete or masonry walls thereto near the top and bottom and at midheight of each story using expansion bolts or powder-actuated drive studs.

3.1.9.2 Plates

Use plates for walls and partitions of the same width as the studs to form continuous horizontal ties. Splice single plates; stagger the ends of double plates. Double top plates in walls and bearing partitions, built up of two nominal 2 inch thick members. Top plates for nonbearing partitions must be single or double plates of the same size as the studs.

Nail lower members of double top plates and single top plates to each stud and corner post with two 16-penny nails. Nail the upper members of double plates to the lower members with 10-penny nails, two near each end, and stagger 16 inches o.c. intermediately between. Nail sole plates on wood construction through the subfloor to each joist and header; stagger nails. Anchor sole plates on concrete with expansion bolts, one near each end and at not more than 6 feet o.c., or with powder-actuated fasteners, one near each end and at not more than 3 feet o.c. Provide plates cut for the passage of pipes or ducts with a steel angle as a tie for the plate and bearing for joist.

3.1.9.3 Firestops

Provide firestops for wood framed walls and partitions and for furred spaces of concrete or masonry walls at each floor level and at the ceiling line in the top story. Where firestops are not automatically provided by the framing system used, they must be formed of closely fitted wood blocks of nominal 2 inch thick material of the same width as the studs and joists. Lightweight concrete units may be used at the first-floor level to serve jointly as firestopping and ratproofing.

3.1.9.4 Diagonal Bracing

Provide diagonal bracing at all external corners and internal angles and at maximum 40 foot centers in stud walls, except that bracing may be omitted where diagonally applied wood sheathing, plywood or structural-use panel sheathing, 4 by 8 foot fiberboard sheathing, or gypsum board sheathing is used. Bracing must be of 1 by 6 material, let into the exterior face of studs. Extend bracing from top plates to sill at an angle of approximately 45 degrees and double nail at each stud. When openings occur near corners, provide diagonal knee braces extending from the corner post above headers to top plates and from below window sills to the main sill. Nail bracing at each bearing with two 8-penny nails.

3.1.10 Wall Sheathing

3.1.10.1 Plywood, Structural-Use, and OSB Panel Wall Sheathing

Apply horizontally or vertically. Extend sheathing over and nail to sill and top plate. Abut sheathing edges over centerlines of supports. Allow 1/8 inch spacing between panels and 1/8 inch at windows and doors. If

sheathing is applied horizontally, stagger vertical end joints. Nail panels with 6-penny nails spaced 6 inches o.c. along edges of the panel and 12 inches o.c. over intermediate supports. Keep nails 3/8 inches away from panel ledges. Provide 2 by 4 blocking for horizontal edges not otherwise supported.

3.1.10.2 Fiberboard Wall Sheathing – Not Applicable to this contract

3.1.10.3 Gypsum Sheathing Board

Apply gypsum sheathing board either horizontally or vertically. Butt joints and locate over the centerlines of supports. Horizontally applied sheathing must be T&G, applied with tongued edge up. Stagger vertical joints and abut sheet closely to frames of openings. Nail sheathing with 11 gage, 3/8 inch head, zinc-coated nails 1-1/2 inches long for 1/2 inch sheathing and 1-3/4 inches long for 5/8 inch sheathing, spaced 3/8 inch minimum from edges. Provide 2 by 4 blocking for horizontal edges of 4 foot wide panels not otherwise supported.

a. Gypsum Sheathing Board Used with Diagonal-Braced Framing: Sheathing must be either 2 or 4 feet wide. Apply sheathing 2 feet wide horizontally. Nail 4 inches maximum o.c. at edges and over intermediate bearings. Apply sheathing 4 feet wide either horizontally or vertically. Nail 4 inches maximum o.c. at edges and 8 inches maximum o.c. at intermediate bearings.

b. Gypsum Sheathing Board Used with Unbraced Frames: Sheathing must be 4 feet wide and applied vertically. Extend sheathing over and nail to both sill and top plates. Nail 4 inches maximum o.c. at edges and 8 inches maximum o.c. at intermediate bearings.

3.1.10.4 Foil-Faced Insulating Sheathing

Apply sheathing vertically. Butt or overlap joints and locate over centerline of supports. Attach sheathing to framing with 1-1/4 inch, large, flat-head, 11 gage, galvanized roofing nails or 16 gage, 7/16 inch minimum crown, galvanized staples with 1-1/4 inch legs. For nonstructural application (with corner bracing), space fasteners 6 inches o.c. on all panel edges and 12 inches o.c. on intermediate supports, regardless of sheathing thickness, for studs not more than 24 inches o.c. For structural application (without corner bracing), for studs not more than 16 inches o.c., space fasteners 3 inches o.c. on all edges and 6 inches o.c. on intermediate members using minimum 0.115 inch thickness; for studs up to 24 inches o.c., space fasteners 3 inches o.c. on all edges and 3 inches o.c. on intermediate supports using minimum 0.137 inch thickness.

3.1.10.5 Particleboard

Install according to manufacturer's instructions and accepted industry standards.

3.1.10.6 Cellulose Honeycomb Panels

Install according to manufacturer's instructions and accepted industry standards.

3.1.11 Wood Sheathing

Sheathing end joints must be made over framing members and so alternated that there will be at least two boards between joints on the same support. Each board must bear on at least three supports. Boards must be nailed at each support using two nails for boards 6 inches and less in width and three nails for boards more than 6 inches in width. Roof sheathing must not be installed where roof decking is installed.

3.1.12 Building Paper

Provide building paper where indicated or on wood board sheathing for all types of exterior siding. Apply paper shingle fashion, horizontally, beginning at the bottom of the wall. Lap edges 4 inches, and nail with one inch, zinc-coated roofing nails, spaced 12 inches o.c. and driven through tin discs.

3.1.13 Ceiling Joists

Size as indicated and set accurately and in alignment. Toe-nail joists to all plates with not less than three 10-penny nails. Frame openings in ceilings with headers and trimmers.

3.1.14 Metal Framing Anchors

Provide framing anchors at every rafter or trussed rafter to fasten rafter or trussed rafter to plates and studs against uplift movement and forces as indicated. Anchors must be punched and formed for nailing so that nails will be stressed in shear only. Nails must be zinc-coated; drive a nail in each nail hole provided in the anchor.

3.1.15 Trusses

Metal plate connected wood trusses must be handled, erected, and braced in accordance with TPI HIB and as indicated.

3.1.16 Structural Glued Laminated Timber 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.

3.1.17 Plywood and Structural-Use Panel Roof Sheathing

Install with the grain of the outer plies or long dimension at right angles to supports. Stagger end joints and locate over the centerlines of supports. Allow 1/8 inch spacing at panel ends and 1/4 inch at panel edges. Nail panels with 8-penny common nails or 6-penny annular rings or screw-type nails spaced 6 inches o.c. at supported edges and 12 inches o.c. at intermediate bearings. Do not use staples in roof sheathing. Where the support spacing exceeds the maximum span for an unsupported edge, provide adequate blocking, tongue-and-groove edges, or panel edge clips, in accordance with APA E30.

3.1.18 Stair Framing

Cut carriages to exact shape required to receive treads and risers, with risers of uniform height and treads of uniform width. Provide trimmers, nailers, and blocking as required to support finish materials.

3.1.19 Plastic Lumber – Not Applicable to this contract

3.2 MISCELLANEOUS

3.2.1 Wood Roof Nailers, Edge Strips, Crickets, Curbs, and Cants

Provide sizes and configurations indicated or specified and anchored securely to continuous construction.

3.2.1.1 Roof Nailing Strips

Provide roof nailing strips for roof decks as indicated and specified herein. Apply nailing strips in straight parallel rows in the direction and spacing indicated specified in Scope of work. Strips must be surface applied embedded in concrete.

a. Surface-Applied Nailers: Must be 6 to 8 inches wide and of thickness to finish flush with the top of the insulation. Anchor strips securely to the roof deck with powder actuated fastening devices or expansion shields and bolts, spaced not more than 24 inches o.c. On decks with slopes of one inch or more, provide surface applied wood nailers for securing insulation and for nailing of roofing felts.

b. Embedded Nailers: Must be nominal 2 by 3 with 2 inch sides beveled. Set and anchor nailers to finish flush with the roof deck surface.

3.2.1.2 Roof Edge Strips and Nailers

Provide at perimeter of roof, around openings through roof, and where roofs abut walls, curbs, and other vertical surfaces. Except where indicated otherwise, nailers must be 6 inches wide and the same thickness as the insulation. Anchor nailers securely to underlying construction. Anchor perimeter nailers in accordance with FM 4435. Strips must be grooved as indicated for edge venting; install at walls, curbs, and other vertical surfaces with a 1/4 to 1/2 inch air space.

3.2.1.3 Crickets, Cants, and Curbs

Provide wood saddles or crickets, cant strips, curbs for scuttles and ventilators, and wood nailers bolted to tops of concrete or masonry curbs and at expansion joints, as indicated, specified, or necessary and of lumber or 1/2 inch thick exterior plywood.

3.2.2 Rough Wood Bucks

Size as indicated. Set wood bucks true and plumb. Anchor bucks to concrete or masonry with steel straps extending into the wall 8 inches minimum. Place anchors near the top and bottom of the buck and space uniformly at 2 foot maximum intervals.

3.2.3 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

3.2.4 Wood Grounds

Provide for fastening wood trim, finish materials, and other items to plastered walls and ceilings.Install grounds in proper alignment and true with an 8 foot straightedge.

3.2.5 Wood Furring

Provide where shown and as necessary for facing materials specified. Except as shown otherwise, furring strips must be nominal one by 3, continuous, and spaced 16 inches o.c. Erect furring vertically or horizontally as necessary. Nail furring strips to masonry. Do not use wood plugs. Provide furring strips around openings, behind bases, and at angles and corners. Furring must be plumb, rigid, and level and must be shimmed as necessary to provide a true, even plane with surfaces suitable to receive the finish required. Form furring for [cornices,] offsets and breaks in walls or ceilings on 1 by 4 wood strips spaced 16 inches o.c.

3.2.6 Wood Bumpers

Dress to the sizes indicated, and bevel edges. Bore, countersink, and bolt bumpers in place.

3.2.7 Temporary Closures

Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed. Cover windows and other unprotected openings with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas as directed.

3.2.8 Temporary Centering, Bracing, and Shoring

3.2.9 Wood Sleepers

Run wood sleepers in lengths as long as practicable and stagger end joints in adjacent rows. Sleepers for gymnasium floors are specified in Section 09 64 66 WOOD ATHLETIC FLOORING.

3.2.10 Diaphragms

Install plywood, structural-use, or OSB panels with the long dimension perpendicular to supports. End joints must be staggered and located over the centerline of supports. Longitudinal joints must be continuous and provided with blocking. Nail panels with 8-penny nails spaced not more than 12 inches on centers around the diaphragm boundaries and 4 inches on centers at all other supported edges and 12 inches o.c. over intermediate bearings.

3.2.11 Shear Walls

Install plywood or structural-use panels with long dimension parallel or perpendicular to supports. Provide blocking behind edges not located over supports. Nail panels with 8-penny nails spaced not more than 12 inches on centers along panel edges and 6 inches o.c. over intermediate bearings.

3.2.12 Bridging

Wood bridging must have ends accurately bevel-cut to afford firm contact and must be nailed at each end with two nails. Install metal bridging as recommended by the manufacturer. The lower ends of bridging must be driven up tight and secured after subflooring or roof sheathing has been laid and partition framing installed.

3.2.13 Corner Bracing

Install corner bracing when required by type of sheathing used or when siding, other than panel siding, is applied directly to studs. Corner bracing must be let into the exterior surfaces of the studs at an angle of approximately 45 degrees, must extend completely over wall plates, and must be secured at each bearing with two nails.

3.2.14 Sill Plates

Sill plates must be set level and square and anchor bolted at not more than 6 feet on centers and not more than 12 inches from end of each piece. A minimum of two anchors must be used for each piece.

3.3 INSTALLATION OF TIMBER CONNECTORS

Install timber connectors in conformance with requirements of AWC NDS.

3.4 ERECTION TOLERANCES

a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, must be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/4 inch in 8 feet from a straight line;

(3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/4 inch in 8 feet from a true plane.

b. Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive must be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/8 inch in 8 feet from a straight line;

(3) Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/8 in 8 feet from a true plane.

3.5 SPECIAL INSPECTION AND TESTING FOR SEISMIC-RESISTING SYSTEMS

Special inspections and testing for seismic-resisting systems and components must be done in accordance with Section 01 45 35 SPECIAL INSPECTIONS.

3.6 WASTE MANAGEMENT OF WOOD PRODUCTS

In accordance with the Waste Management Plan and as specified. Separate and reuse scrap sheet materials larger than 2 square feet, framing members larger than 16 inches, and multiple offcuts of any size larger than 12 inches. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.

Separate composite wood from other wood types and recycle or reuse. Coordinate with manufacturer for take-back program and submit manufacturer's policy statement on program. Set aside scrap and return to manufacturer for recycling into new product. When such a service is not available, local recyclers must be sought after to reclaim the materials. Fold up metal banding, flatten, and recycle.

Separate treated, stained, painted, and contaminated wood and place in designated area for hazardous materials. Dispose of according to local regulations. Do not leave any wood, shavings, sawdust, or other wood waste buried in fill or on the ground, unless for planned future use. Prevent sawdust and wood shavings from entering the storm drainage system

SECTION 07 22 00
ROOF AND DECK INSULATION
02/16

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 C1177/C1177M	(2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1289	(2017) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C208	(2012; R 2017; E 2017) Standard Specification for Cellulosic Fiber Insulating Board
ASTM C552	(2017) Standard Specification for Cellular Glass Thermal Insulation
ASTM C578	(2017a) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C726	(2017) Standard Specification for Mineral Wool Roof Insulation Board
ASTM C728	(2017a) Standard Specification for Perlite Thermal Insulation Board
ASTM D2178/D2178M	(2015a) Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D312	(2000; R 2006) Standard Specification for Asphalt Used in Roofing
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free
ASTM D4601/D4601M	(2004; R 2012) Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D4897/D4897M	(2016) Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing

ASTM E84	(2018) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM 4450	(1989) Approval Standard for Class 1 Insulated Steel Deck Roofs
FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 1	(2018) Fire Code

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS)Indoor Advantage

UNDERWRITERS LABORATORIES (UL)

UL 1256	(2002; Reprint Jul 2013) Fire Test of Roof Deck Constructions
UL 2818	(2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Insulation Board Layout and Attachment;
Verification of Existing Conditions;

SD-03 Product Data Insulation;
Cover Board;
Fasteners;
Sheathing Paper;
Moisture Control;
Asphalt Products;

SD-06 Test Reports

Flame Spread Rating;
SD-07 Certificates
Volatile Organic Compounds (VOC) Content;
Installer Qualifications;

Certificates Of Compliance For Felt Materials; SD-08 Manufacturer's Instructions
Nails and Fasteners;
Roof Insulation;

SD-11 Closeout Submittals

Volatile Organic Compounds (VOC) Content; S

1.3 SHOP DRAWINGS

Submit insulation board layout and attachment indicating methods of attachment and spacing, transitions, tapered components, thicknesses of materials, and closure and termination conditions. Show locations of ridges, valleys, crickets, interface with, and slope to, roof drains. Base shop drawings on verified field measurements and include verification of existing conditions. Show wood nailers. Show location and spacing of wood nailers required for securing of insulation and back-nailing of roofing felts.

1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for cover board or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

1.5 MANUFACTURER'S INSTRUCTIONS

Include field of roof and perimeter attachment requirements.

Provide a complete description of installation sequencing for each phase of the roofing system. Include weatherproofing procedures.

1.6 QUALITY CONTROL

Provide certification of installer qualifications from the insulation manufacturer confirming the specific installer has the required qualifications for installing the specific roof insulation system(s) indicated.

Provide certificates of compliance for felt materials.

1.7 FM APPROVAL REQUIREMENTS

Provide fastening patterns in accordance with FM 1-90 for insulation on steel decks.

1.8 FIRE PERFORMANCE REQUIREMENTS

1.8.1 Insulation in Roof Systems

Comply with the requirements of ICC IBC or UL 1256 or FM 4450 or FM 4470. Roof insulation to have a flame spread rating of 75 or less when tested in accordance with ASTM E84. Additional documentation of compliance with flame spread rating is not required when insulation of the type used for this project as part of the specific roof assembly is listed and labeled as FM Class 1 approved.

1.8.2 Thermal Barrier Requirements

Separate polyurethane or polystyrene insulation from a combustible or steel deck with a thermal barrier of glass mat gypsum roof board or other approved barrier material in accordance with the requirements of the ICC IBC or FM 4450 or FM 4470 or UL 1256.

1.8.3 Fire Resistance Ratings for Roofs

Provide in accordance with ICC IBC Chapter 7 and Table 721.1(3) Min [Fire and Smoke] Protection For Floor and Roof Systems.

1.9 CERTIFICATIONS

Provide products that are third party certified for low Volatile Organic Compounds (VOC) Content in accordance with UL 2818 Greenguard [Gold], SCS Scientific Certification Systems Indoor Advantage Gold or approved equal. http://www.scsglobalservices.com/indoor-air-quality-certification

1.10 DELIVERY, STORAGE, AND HANDLING

1.10.1 Delivery

Deliver materials to the project site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

a. Name of manufacturer

b. Brand designation

c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification

d. Asphalt flashpoint (FP), equiviscous temperature (EVT), and finished blowing temperature (FBT).

Deliver materials in sufficient quantity to allow continuity of the work.

1.10.2 Storage and Handling

Store and handle materials in accordance with manufacturer's printed instructions. Protect from damage, exposure to open flame or other ignition sources, wetting, condensation, and moisture absorption. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Store felt rolls on ends. For the 24 hours immediately before application of felts, store felts in an area maintained at a temperature no lower than 50 degrees F above grade and having ventilation on all sides. Replace damaged material with new material.

1.11 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

PART 2 PRODUCTS

2.1 PRODUCT SUSTAINABILITY CRITERIA Where allowed by performance criteria:

2.1.1 Reduce Volatile Organic Compounds (VOC) Contents

Provide products with reduced VOC content and provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph REDUCE VOLATILE ORGANIC COMPOUNDS.

2.1.2 Recycled Content

Provide products with recycled content and provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph RECYCLED CONTENT.

2.2 INSULATION

2.2.1 Insulation Types

The primary insulation type to be installed on roofing projects at APG shall be polyisocyanurate insulation board with a minimum compressive strength of 25 PSI dependent upon the project. However APG reserves the right to utilize one or more of the following materials for insulation of roof assemblies. Provide roof insulation that is compatible with attachment methods for the specified insulation and roof membrane.

a. ~~Expanded Perlite Board: Provide in accordance with ASTM C728. Minimum 3/4 inch thick when both top and bottom surfaces must be in contact with asphalt.~~
b. Polyisocyanurate Board: Provide in accordance with ASTM C1289 REV A Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength of 25 pounds per square inch (psi).
c. Composite Boards: Provide in accordance with ASTM C1289 REV A, Type V, oriented strand board or waferboard on one side and fibrous felt or glass fiber mat membrane or aluminum foil on opposite side (Polyisocyanurate composite board and or SBS modified bitumen – rock wool insulation panels).
d. Cellular Glass Boards: ASTM C552, Type IV.
e. Polystyrene Board: In accordance with ASTM C578 REV A, Type II, IV, or X.
f. ~~Wood Fiberboard: In accordance with ASTM C208 , high density, except 4 by 4 feet maximum board size.~~

2.2.2 Mineral Fiber Insulation Board

Provide in accordance with ASTM C726.

2.2.3 Recycled Materials

Provide thermal insulation materials containing recycled content in accordance with paragraph PRODUCT SUSTAINABILITY CRITERIA. Unless specified otherwise, the minimum required recycled content for listed materials are:

Perlite Composition Board:	75 percent postconsumer paper
Polyisocyanurate/polyurethane:	9 percent recovered material
Wood Fiberboard:	100 percent recovered material
Cellular Glass Insulation:	75 percent recovered content
Structural Fiberboard:	100 percent recovered content
Fiberglass Insulation:	25 percent recovered content
Fiber (felt) or Fiber composite:	75 percent recovered content
Rubber:	90 percent recovered content
Plastic or Plastic/Rubber composite:	90 percent recovered content
Wood/Plastic Composite:	90 percent total recovered content

2.2.4 Insulation Thickness

As necessary to provide the thermal resistance (R-value) indicated for average thickness of tapered system. Base calculation on the R-value for aged insulation. For insulation over steel decks, satisfy both specified R-value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature. Insulation thickness shall provide a minimum R-Value of R-30.

2.2.5 Tapered Roof Insulation

One layer of the tapered roof insulation assembly must be factory tapered to a slope of not less than one in 1/2 inch per foot. Factory fabricate mitered joints from two diagonally cut boards or one board shaped to provide required slopes.

2.2.6 Cants and Tapered Edge Strips

Provide preformed cants and tapered edge strips of the same material as the roof insulation. When unavailable, provide pressure-preservative treated wood, wood fiberboard, rock wool or rigid perlite board cants and edge strips as recommended by the roofing manufacturer for the specific application, unless otherwise indicated. Face of cant strips to incline at 45 degrees with a minimum vertical height of 4 inches. Taper edge strips at a rate of one to 1 1/2 inch per foot down to approximately 1/8 inch thick.

2.3 COVER BOARD

For use as a thermal barrier (underlayment), fire barrier (overlayment), or cover board for hot-mopped, torched-down, or adhesive-applied roofing membrane over roof insulation.

2.3.1 Glass Mat Gypsum Roof Board – DENS-DECK Prime™ or approved equivalent

ASTM C1177/C1177M, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E84, 500 psi, Class A, non-combustible, 1/2 inch thick, 4 by 8 feet board size.

2.3.2 High Density Wood Fiber

Provide high density fiber board, Grade 2 in accordance with ASTM C208 with a transverse load of 53.4 N 12 lbf.

2.4 BITUMENS

2.4.1 Asphalt Primer

Provide in accordance with ASTM D41/D41M.

2.4.2 Asphalt

Provide in accordance with ASTM D312, Type III or IV. Asphalt flash point, finished blowing temperature, and equiviscous temperature (EVT) for mop and mechanical spreader application must be indicated on each container.

2.4.3 Asphalt Roof Cement

Provide in accordance with ASTM D4586/D4586M, Type I, for horizontal surfaces and surfaces sloped from 0 to 3 inches per foot. Type II for vertical and surfaces sloped more than 3 inches per foot.

2.5 SHEATHING PAPER FOR WOOD DECKS

Rosin-sized building paper or unsaturated felt weighing not less than 5 pounds per 100 square feet.

2.6 MOISTURE CONTROL

2.6.1 Vapor Retarder

2.6.1.1 Asphalt Saturated Felt Base Sheet for Single Layer Application

Provide in accordance with ASTM D4601/D4601M, weighing not less than 35 pounds per 100 square feet.

2.6.1.2 Asphalt-Coated Glass Felt

Provide in accordance with ASTM D2178/D2178M, Type [IV] [VI].

2.6.2 Ventilating Felt for [Poured] [Precast] Concrete Decks

Provide in accordance with ASTM D4897/D4897M, Type II, non-perforated, with spot mopping holes where specified.

2.6.3 Organic Roofing

Provide in accordance with ASTM D226/D226M, Type I.

2.7 FASTENERS

Provide flush-driven fasteners through flat round or hexagonal steel or plastic plates. Provide zinc-coated steel plates, flat round not less than 1 3/8 inch diameter, hexagonal not less than 28 gage. Provide high-density plastic plates, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fully recess fastener head into plastic plate after it is driven. Form plates to prevent dishing. Do not use bell or cup shaped plates. Provide fasteners in accordance with insulation manufacturer's recommendations for holding power when driven, or a minimum of 120 pounds each in steel deck, whichever is the higher minimum. Provide fasteners for steel or concrete decks in accordance with FM APP GUIDE (http://www.approvalguide.com/) for Class I roof deck construction, and spaced to withstand uplift pressure of 90 pounds per square foot.

2.7.1 Roofing Nails for Wood Decks

Barbed 11 gage, zinc-coated nails with 7/16 to 5/8 inch diameter heads or annular ring shank, square head, one piece composite nails. Provide nails long enough to penetrate wood deck at least 5/8 inch without protruding through underside of decking.

2.7.2 Fasteners for Plywood Decks

Annular ring shank, square head, one piece composite nails long enough to penetrate into plywood decks approximately 1/2 inch without protruding through underside of decking.

2.7.3 Fasteners for Steel Decks

Approved hardened penetrating fasteners or screws in accordance with FM 4450 and listed in FM APP GUIDE for Class I roof deck construction. Quantity and placement to withstand a minimum uplift pressure of 90 psf in accordance with FM APP GUIDE.

2.7.4 Fasteners for Poured Concrete Decks

Approved hardened fasteners or screws to penetrate deck at least 1 inch but not more than 1 1/2 inches, in accordance with FM 4470, and listed in FM APP GUIDE for Class I roof deck construction. Quantity and placement to withstand an uplift pressure of 90 psf in accordance with FM APP GUIDE.

2.8 WOOD NAILERS

Pressure-preservative treated as specified in Section 06 10 00 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

3.1.1 Surface Inspection

Ensure surfaces are clean, smooth, and dry prior to application. Ensure surfaces receiving vapor retarder are free of projections that might puncture the vapor retarder. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work.

The Contractor and Contracting Officer Representative will inspect and approve the surfaces immediately before starting installation. Prior to installing vapor retarder, ventilating felt, insulation, perform the following:

a. Examine wood decks to ascertain that deck boards have been properly nailed and that exposed nail heads have been set.

b. Examine steel decks to ensure that panels are properly secured to structural members and to each other and that surfaces of top flanges are flat or slightly convex.

c. Examine precast concrete decks to ensure that joints between precast units are properly grouted and leveled to provide suitable surfaces for installation of ventilating felt, vapor retarder and/or insulation.

d. In the presence of the Contracting Officer perform the following surface dryness test on concrete substrates:

   (1) Foaming: When poured on the deck, one pint of asphalt when heated in the range of 350 to 400 degrees F, does not foam upon contact. Strippability: After asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from surface, do not consider surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been re-tested by method above and found dry.

e. Prior to installing any roof system on a concrete deck, moisture test the deck in accordance with ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage from hollow or low spots, perform the following:

a. Provide wood nailers of the same thickness as the insulation at eaves, edges, curbs, walls, and roof openings for securing of cant strips, gravel stops, [gutters,] and flashing flanges. On decks with slopes of one in 12 (1 inch per foot) or more, install wood nailers perpendicular to slope for securing insulation and for backnailing of roofing felts.

b. Fill or cover cracks or knot holes larger than 1/2 inch in diameter in wood decks as necessary to form an unyielding surface.

c. Cover wood decks with a layer of rosin-sized building paper or unsaturated felt. Lap sides and ends not less than 3 inches. Nail sufficiently to prevent tearing or buckling during installation.

d. Cover steel decks with a layer of insulation board of sufficient width to span the width of a deck rib opening, and in accordance with fire safety requirements. Secure with piercing or self-drilling, self-tapping fasteners of quantity and placement in accordance with FM APP GUIDE. Locate insulation joints parallel to ribs of deck on solid bearing surfaces only, not over open ribs.

e. Solidly apply asphalt primer to poured or precast concrete decks at the rate of 1 gallon per 100 square feet of roof surface, stopping approximately 4 inches from joints between precast concrete units. Allow primer to dry thoroughly. Place felt strips, 4 inches or more in width, over joints, 2 inches on each side, between precast concrete units in a heavy coating of cold-applied asphalt roof cement.

3.2 INSTALLATION OF VAPOR RETARDER

Install vapor retarder in direct contact with roof deck surface, ventilating felt, or insulation. Unless otherwise specified, vapor retarder to consist of either two plies of No. 15 asphalt-saturated felt, two plies of asphalt-coated glass felt , or one layer of asphalt-saturated felt base sheet. Lay vapor retarder at right angles to direction of slope. Install first ply of felt or base sheet as specified herein for the specific deck. Apply second ply of 2-ply vapor retarder system using asphalt at rate of 20 to 35 lbs. per 100 square feet, applied within plus or minus 25 degrees F of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less. Use thermometers to check temperatures during heating and application. Completely seal side and end laps. Asphalt must be visible beyond all edges of each ply as it is being installed. Lay plies free of wrinkles, buckles, creases or fishmouths. Do not walk on mopped surfaces while asphalt is sticky. Press out air bubbles to obtain complete adhesion between surfaces. At walls, eaves, rakes, and other vertical surfaces, extend vapor retarder organic felts or separate plies 9 inches, with not less than 9 inches on the substrate, and the extended portion turned back and mopped in over the top of the insulation. At roof penetrations other than walls, eaves and rakes, and vertical surfaces, extend vapor retarder or separate plies 9 inches to form a lap folded back over the edge of the insulation. Provide asphalt roof cement under the vapor retarder for at least 9 inches from walls, eaves, rakes and other penetrations.

3.2.1 Vapor Retarder on Poured Concrete Decks

Evenly mop primed substrate with asphalt at a rate of 20 to 35 lbs per 100 square feet before installing vapor retarder. Lay first ply of two-ply system with each sheet lapping 19 inches over the preceding sheet. Lap ends not less than 4 inches. Stagger laps a minimum of one layer of asphalt base sheet, provide side and end laps not less than 4 inches. Stagger laps a minimum of 12 inches. Cement base sheets together with a solid mopping of asphalt.

3.2.2 Vapor Retarder on Precast Concrete Decks

Evenly mop primed substrate with asphalt at a rate of 20 to 35 lbs per 100 square feet before installing vapor retarder. Lay first ply of two-ply system with each sheet lapping 19 inches over preceding sheet. Lap ends not less than 4 inches. Stagger laps a minimum of 12 inches. For vapor retarder consisting of one layer of asphalt base sheet, provide side and end laps not less than 4 inches and stagger laps a minimum of 12 inches. Cement base sheets together with a solid mopping of asphalt.

3.2.3 Vapor Retarder on Wood Decks

Lay first ply of two-ply system dry with each sheet lapping 2 inches over the preceding sheet. Lap ends not less than 4 inches. Stagger laps a minimum of 12 inches. Nail felt at 6 inch intervals along the side laps and install two rows of nails approximately 11 inches apart down longitudinal center of each sheet, with nails

staggered at 18 inches on center. For vapor retarder consisting of one layer of asphalt base sheet, lap each sheet 4 inches over the preceding sheet. Provide end laps not less than 4 inches and stagger laps a minimum of 12 inches. Cement side and end laps together with solid mopping of asphalt or heavy coat of asphalt roof cement. Nail side laps at 6 inch intervals. Apply asphalt mopping at a rate of 20 to 35 lbs per 100 square feet. Install two rows of nails approximately 11 inches apart down longitudinal center of each sheet, with nails staggered at 18 inches on center.

3.2.4 Vapor Retarder on Steel Decks

Even mop the mechanically secured insulation surface with asphalt before installing vapor retarder. For a two-ply vapor retarder, install each sheet lapping 19 inches over the preceding sheet. Lap ends not less than 4 inches. Stagger the laps a minimum of 12 inches. Cement felts together with solid mopping of asphalt. Apply asphalt moppings at rate of 20 to 35 lbs per 100 square feet. For a vapor retarder consisting of one layer of asphalt base sheet, lap each sheet 4 inches over preceding sheet. Lap ends not less than 4 inches, and stagger laps a minimum of 12 inches. Cement base sheets together with solid mopping of asphalt.

3.2.5 Over Gypsum Insulating Concrete or Lightweight Insulating Concrete

Lay one ply of venting inorganic base sheet, without mopping, at a right angle to the slope with 4 inch side laps and 6 inch end laps. Bond laps with hot asphalt. Stagger end laps. Nail base sheet 9 inches on center at side laps and in 2 rows 11 inches apart down the center of the sheet with nails 18 inches on centers and staggered attach to the concrete deck in accordance with uplift requirements. Apply 2-ply vapor retarder over the base sheet as specified above.

3.2.6 Over Concrete Decks and First Layer of Insulation on Steel Decks

Apply 2-ply vapor retarder as specified above except delete the venting inorganic base sheet.

3.2.7 Over Structural Concrete on Non-Venting Support

Lay one ply of venting inorganic base sheet with mopping holes at a right angle to the slope with 4 inch side laps and 6 inch end laps then apply the vapor retarder as specified.

3.3 INSTALLATION OF VENTILATING FELT

Apply ventilating felt in accordance with manufacturer's printed instructions, spot mopped with asphalt to concrete deck. Extend over roof cants, up vertical surfaces and terminate under cap flashing. At roof edges terminate under outside edge of perimeter edge nailers or under gravel stop fascia.

3.4 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds 1/2 inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of felts for the built-up roofing, as specified in Section 07-51-13, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, provide joints of each succeeding layer that are parallel and offset in both directions with respect to the layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface. Verify required slopes to each roof drain.

3.4.1 Installation Using Asphalt

Firmly embed each layer in solid asphalt mopping; mop only sufficient area to provide complete embedment of one board at a time. Provide 20 to 35 lbs of asphalt per 100 square feet of roof deck for each layer of insulation. Apply asphalt when temperature is within plus or minus 25 degrees F of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less, for longer than 4 consecutive hours. Use thermometers to check temperatures during heating and application.

3.4.2 Installation Using Asphalt on Steel Decks

Secure first layer of insulation and thermal barrier to deck with piercing or self-drilling, self-tapping fasteners. Engage fasteners by driving them through insulation into top flange of steel deck. Use driving method prescribed by fastener manufacturer. Locate insulation joints parallel to ribs of deck on solid bearing surfaces only, not over open ribs. Secure succeeding layers with solid asphalt mopping. Where insulation is applied over steel deck, locate long edge joints so that they bear continuously on the steel deck. Insulation that can be readily lifted after installation is not considered adequately secured. Apply insulation only in quantities that can be entirely waterproofed the same day. Phased construction is not permitted. Apply impermeable faced insulation without damage to the facing.

3.4.3 Installation of Protection for Asphalt Work

Before starting asphalt work, protect surrounding areas and surfaces from spillage and migration of asphalt onto other work. Provide non-combustible protective coverings at surfaces adjacent to hoists and kettles. Lap protective coverings at least 6 inches, secure against wind, and vent to prevent collection of moisture on covered surfaces. Keep protective coverings in place for the duration of asphalt work.

3.4.4 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.

3.4.5 Special Precautions for Installation of Foam Insulation

3.4.5.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, install 1/2 inch thick wood fiberboard, glass mat gypsum roof board, or 3/4 inch thick expanded perlite board insulation over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

3.4.5.2 Polystyrene Insulation

a. Over the top surface of non-composite polystyrene board, install 1/2 inch thick high density wood fiberboard, 3/4 inch thick expanded perlite board, glass mat gypsum roof board, or other overlayment approved by roofing sheet manufacturer. Tightly butt and stagger joints of field applied overlayment board at least 6 inches with respect to the polystyrene board below. Apply 6 inch wide glass fiber roofing tape centered over joints and edges of overlayment board.

b. Where composite boards consisting of polystyrene insulation are provided, apply 6 inch wide glass fiber roofing tape centered over joints and edges of composite board. Apply joint strips as recommended by roofing sheet manufacturer.

3.4.6 Cant Strips

Where indicated, provide cant strips at intersections of roof with walls, parapets, and curbs extending above roof. Wood cant strips must bear on and be anchored to wood blocking. Fit cant strips flush to vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install in heavy mopping of asphalt or set in a heavy coating of asphalt roof cement or an approved adhesive.

3.4.7 Tapered Edge Strips

Where indicated, provide edge strips in the right angle formed by the juncture of roof and wood nailing strips that extend above the level of the roof. Install edge strips flush to vertical surfaces of wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, install in a heavy mopping of asphalt or set in a heavy coating of asphalt roof cement or an approved adhesive.

3.5 PROTECTION

3.5.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with finished roofing as specified in the scope of work on same day. Phased construction is not permitted. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces is not permitted. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight in accordance with indicated live load limits of roof construction. Protect exposed edges of insulation with cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs must be two layers of bituminous-saturated felt set in plastic bituminous cement or single ply or EPDM membrane set in roof cement. Fill all profile voids in cutoffs to prevent trapping moisture below the membrane. Remove cutoffs when work resumes.

3.5.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

3.6 INSPECTION

Establish and maintain inspection procedures to assure compliance of the installed roof insulation with contract requirements. Remove, replace, correct in an approved manner, any work found not in compliance. Quality control must include, but is not limited to, the following:

Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.

a. Verification of certification, listing or label compliance with FM Data Sheets. (https://www.fmglobal.com/fmglobalregistration/Downloads.aspx)

b. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.

c. Inspection of vapor retarder application, including edge envelopes and mechanical fastening.

d. Inspection of mechanical fasteners; type, number, length, and spacing.

e. Coordination with other materials, cants, sleepers, and nailing strips.

f. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.

g. Installation of cutoffs and proper joining of work on subsequent days.

h. Continuation of complete roofing system installation to cover insulation installed same day.

i. Verification of required slope to each roof drain.

-- End of Section --

SECTION 07 31 13
ASPHALT SHINGLES
08/16

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 D1970/D1970M	(2017) Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D3018/D3018M	(2011; R 2017) Standard Specification for Class A Asphalt Shingles Surfaced With Mineral Granules
ASTM D3161/D3161M	(2016a) Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method)
ASTM D3462/D3462M	(2016) Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free
ASTM D4869/D4869M	(2016a) Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing
ASTM D6380/D6380M	(2003; E 2013; R 2013) Standard Specification for Asphalt Roll Roofing (Organic Felt)
ASTM D7158/D7158M	(2016) Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0437	(2017) The NRCA Roofing Manual: Steep-slope Roof Systems

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

UNDERWRITERS LABORATORIES (UL)

UL 2218	(2010; Reprint Jan 2018) UL Standard for Safety Impact Resistance of Prepared Roof Covering Materials
UL 790	(2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings

1.2 DEFINITIONS

1.2.1 Top Lap

That portion of shingle overlapping shingle in course below.

1.2.2 Head Lap

The triple coverage portion of top lap which is the shortest distance from the butt edge of an overlapping shingle to the upper edge of a shingle in the second course below.

1.2.3 Exposure

That portion of a shingle exposed to the weather after installation.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data Shingles: Submit data including type, weight, class, UL labels, and special types of underlayment and eave flashing.

SD-04 Samples

Shingles; Full shingle sample and manufacturer's standard size samples of materials and products requiring color or finish selection.
Color Charts;

SD-08 Manufacturer's Instructions Application

SD-11 Closeout Submittals

Energy Star Label for Asphalt Shingle;

Heat Island Reduction;
Manufacturer's
Warranty
Contractor's
Warranty

1.4 DELIVERY AND STORAGE

Deliver materials in the manufacturer's unopened bundles and containers bearing the manufacturer's brand name. Keep materials dry, completely covered, and protected from the weather. Store according to manufacturer's written instructions. Store roll goods on end in an upright position or in accordance with manufacturer's recommendations. Immediately before laying, store roofing felt for 24 hours in an area maintained at a temperature not lower than 50 degrees F.

1.5 WARRANTIES

Warranties must begin on the date of Government acceptance of the work.

1.5.1 Manufacturer's Warranty

Furnish the asphalt shingle manufacturer's standard 30 year warranty for the asphalt shingles. The warranty must run directly to the Government.

1.5.2 Contractor's Warranty

Provide warranty for 5 years that the asphalt shingle roofing system, as installed, is free from defects in workmanship. When repairs due to defective workmanship are required during the Contractor's warranty period, the Contractor must make such repairs within 72 hours of notification. When repairs are not performed within the specified time, emergency repairs performed by others will not void the warranty.

PART 2 PRODUCTS

2.1 PRODUCT SUSTAINABILITY CRITERIA

For products in this section, where applicable and to extent allowed by performance criteria, provide and document the following:

2.1.1 Energy Efficient Asphalt Roofing Products

Energy Star Label requirement is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph ENERGY EFFICIENT EQUIPMENT.

2.2 MATERIALS

2.2.1 Shingles

Mineral granule-surfaced asphalt shingles, self-sealing, square tab, strip, and fungus-resistant, impact resistant shingles conforming to UL 2218, Class 4. ASTM D3018, Type I, and ASTM D3462, weighing not less than 210 pounds per 100 square feet, architectural shingles weighing not less than 290 pounds per 100 square feet. Shingles must meet the fire resistance requirements of UL 790 for Class A and the wind resistance requirements of ASTM D3161,

Class F, ASTM D7158, Class H. Color must be as selected from the manufacturer's standard color charts. Shingle color must be in accordance with Installation Design Guide. Provide asphalt shingle that is Energy Star labeled. Provide data identifying Energy Star label for asphalt shingle product. Provide solar reflectance product with an initial solar reflectance greater than or equal to 0.25 and a solar reflectance greater than or equal to 0.15 three years after installation under normal conditions.

2.2.2 Mineral-Surfaced Asphalt Roll Roofing ASTM D6380

2.2.3 Smooth-Surfaced Asphalt Roll Roofing ASTM D6380, Type II.

2.2.4 Underlayment

Asphalt-saturated felt conforming to ASTM D4869 or ASTM D226, Type II, number 30, without perforations or other material specified by the shingle manufacturer for use as underlayment.

2.2.4.1 Leak Barrier Underlayment

Self-adhering leak barrier or ice dam underlayment must comply with ASTM D1970 for sealability around nails.

2.2.5 Self-Adhering Membrane

Self-adhering rubberized asphaltic membrane, a minimum of 40 mils thick, and recommended by the shingle manufacturer for use as eaves flashing.

2.2.6 Nails for Applying Shingles and Asphalt-Saturated Felt

Aluminum or hot-dipped galvanized steel or equivalent corrosion resistant with sharp points and flat heads 10 to 3/8 to 7/16 inch in diameter. Shank diameter of nails must be a minimum of 0.105 inch and a maximum of 0.135 inch with garb or otherwise deformed for added pull-out resistance. Nails must be long enough to penetrate completely through or extend a minimum of 3/4 inch into roof deck, whichever is less, when driven through materials to be fastened.

2.2.7 Asphalt Roof Cement ASTM D4586, Type II.

2.2.8 Asphalt Primer ASTM D41

2.2.9 Ventilators

2.2.9.1 Nailable Plastic Shingle Over Type Ridge Vents

Ridge vents must be constructed of UV stabilized nailable rigid polypropylene material, approximately 1 foot wide and 1 inch thick, and must be in 4 foot long interlocking sections with self-aligning ends or corrugated polyethylene rigid roll or rigid strip ridge vent with aluminum wind deflectors on each side. Vents must be designed to prevent infiltration of insects, rain, and snow.

2.2.9.2 Nailable Mesh Shingle Over Type Ridge Vents

Ridge vents must be constructed of UV stabilized nailable polyester mesh material, approximately 1 foot wide. Vents must be designed to prevent infiltration of insects, rain, and snow.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

Do not install building construction materials that show visual evidence of biological growth. Ensure that roof deck is smooth, clean, dry, and without loose knots. Roof surfaces must be firm and free from loose boards, large cracks, and projecting ends that might damage the roofing. Vents and other projections through roofs must be properly flashed and secured in position, and projecting nails must be driven flush with the deck.

3.2 SURFACE PREPARATION

Cover knotholes and cracks with sheet metal nailed securely to sheathing. Flash and secure vents and other roof projections, and drive projecting nails firmly home.

3.3 APPLICATION

Apply roofing materials as specified herein unless specified or recommended otherwise by shingle manufacturer's written instructions or by NRCA 0437.

3.3.1 Underlayment

Provide for roof slopes 1 in 3 4 inches per footand greater. Apply one layer of shingle underlayment to roof deck. Lay underlayment parallel to roof eaves, starting at eaves. Provide minimum 2 inch head laps, 4 inch end laps, and 6 inch laps from both sides over hips and ridges. Nail sufficiently to hold until shingles are applied. Turn up vertical surfaces a minimum of 4 inches.

Provide for roof slopes between 4 inches per foot and greater. Apply two layers to roof deck. Provide a 19 inch wide strip as starter sheet to maintain specified number of layers throughout roof. Lay parallel to eaves, starting at eaves. Provide minimum 19 inch head laps, 6 inch laps from both sides over hips and ridges, and 12 inch end laps in the field of the roof. Nail sufficiently to hold until shingles are applied. Turn up vertical surfaces a minimum of 4 inches. When a self-adhering membrane is used for eave flashing, start underlayment from upper edge of eave flashing.

3.3.2 Drip Edges

Provide metal drip edges as specified in Section 07 60 00 FLASHING AND SHEET METAL applied directly on the wood deck at eaves and over the underlayment at rakes. Extend back from edge of deck a minimum of 3 inches, and secure with nails spaced a maximum of 10 inches o.c. along inner edge.

3.3.3 Starter Strip

Apply starter strip at eaves, using 9 inch wide strip of mineral-surfaced roll roofing of a color to match shingles. Optionally, use a row of shingles with tabs removed and trimmed to ensure that joints are not exposed at shingle cutouts. Apply starter strip along eaves, overlaying and finishing even with lower edge of eave flashing strip, overhanging the metal drip edge at eaves and rake edges 1/4 inch to 3/8 inch; fasten in a line parallel to and 3 to 4 inches above eave edge. Place nails so top of nail is not exposed in cutouts of first course of shingles. When roll roofing is provided, seal tabs of first course of shingles with asphalt roof cement. Fasten with 6 nails per strip of shingles or space nails at 6 inches o.c. for roll roofing. Seal tabs of first course of shingles with asphalt roof cement as specified below.

3.3.4 Shingle Courses

Start first course with full shingle, and apply succeeding courses with joints staggered at thirds or halves. Butt-end joints of shingles must not align vertically more often than every fourth course. Apply shingle courses as follows:

a. Fastening: Do not drive fasteners into or above the factory-applied adhesive unless adhesive is located 5/8 inch or closer to top of cutouts. Place fasteners so they are concealed by shingle top lap and penetrate the head lap.

b. Shingles applied with nails: Nominal 5 inch exposure. Apply each shingle with minimum of four nails. Place one nail 1 inch from each end, and evenly space nails on a horizontal line a minimum of 5/8 inch above top of cutouts. Cement each tab with one spot of asphalt roof cement placed 1 to 2 inches from bottom edge of shingle.

c. Nailing: Apply shingles with nominal 5 inch exposure. Apply each shingle with minimum of six nails. Place one nail 1 inch from each end and one nail on each side of each cutout, on a horizontal line 5/8 inch above cutouts.

d. Sealing: Seal each tab with continuous, 9 inch long, 1/4 inch diameter bead of asphalt roof cement, applied to the surface of course below. Place bead on horizontal line 5/8 inch above cutouts so bead will be 1 inch from bottom edge of tab to be sealed and so bead will not show through cutouts. After nailing each shingle, press tabs down to ensure spreading and bonding of asphalt roof cement.

3.3.5 Hips and Ridges

Form with 9 by 12 inch individual shingles or with 12 by 12 inch shingles cut from 12 by 36 inch strip shingles. Bend shingles lengthwise down center with equal exposure on each side of hip or ridge. Lap shingles to provide a maximum 5 inch exposure, and nail each side in unexposed area 5-1/2 inches from butt and 1 inch in from edge.

3.3.6 Valleys

Provide either closed cut, woven, open roll roofing, or open sheet metal valleys.

3.3.6.1 Closed Cut Valleys

Provide 36 inch wide valley lining of single layer of smooth-surfaced or mineral-surfaced roll roofing, with mineral-surface facing down, for full length of valley as follows:

a. Center lining in valley over underlayment. Provide minimum 12 inch end laps in the lining and seal laps with asphalt roof cement. Fasten lining to hold it in place until shingles are applied.

b. Apply first regular course of shingles along eaves of one of the intersecting roof planes and across valley. Extend course at least 12 inches onto adjoining roof.

c. Apply succeeding courses in same manner as first course, extending across valley and onto adjoining roof.

d. Press shingles tightly into valley and nail in normal manner, except apply nails not closer than 6 inches to valley centerline, and apply additional nail in top corner of each shingle crossing valley.

e. Apply shingles on the adjoining roof plane, starting along eaves and across valley onto previously applied shingles. Trim overlapping courses back to a line parallel to and a

minimum of 2 inches back from valley centerline.

f. Trim 1 inch on a 45 degree angle from upper corner of each end shingle. Embed end shingles in a 3 inch wide band of asphalt roof cement.

3.3.6.2 Woven Valleys

Provide valley lining as specified for closed cut valley. Lay valley shingles over lining by either of the following methods:

a. Method I: Apply regular shingles on both roofs simultaneously. Weave each course in turn over the valley. Lay the first regular course of shingles along eaves of roof up to and over valley. Extend course along adjoining roof deck at least 12 inches. Carry first regular course of shingles of adjoining roof over valley on top of previously applied shingles. Lay succeeding courses alternately, weaving valley shingles over each other for full length of valley.

b. Method II: Apply regular shingles on each roof surface separately to a line about 3 feet from center of valley, and weave valley shingles in place later, as specified for Method I.

In following either method, press shingles tightly into valley, and fasten in normal manner; except apply nails not closer than 6 inches to valley centerline, and apply additional nail in top corner of terminal shingle on both sides of valley.

3.3.6.3 Open Roll Roofing Valleys

Provide 18 inch wide strip of mineral-surfaced asphalt roll roofing, of a color to blend with asphalt shingles, and with granular surface facing down, for the full length of valley as follows:

a. Center roll roofing strip in valley over underlayment. Lay centered in valley over felt underlayment and with granular face down. Nail strip only enough to hold in place. Apply nails in rows 1 inch from each edge. As fastening along second side proceeds, press strip firmly into valley.

b. Center second strip 36 inches wide in valley and lay it over first strip with granular face exposed and nail as specified for 18 inch strip.

c. Before applying roofing shingles, snap two chalk lines for full length of valley. Locate each line 3 inches from centerline of valley at top, and increase width between lines by 1 inch for each 8 feet of valley length, continuing to eaves.

d. Apply a 2 inch band of asphalt roof cement along each edge of 36 inch strip from edge to chalk line. Cut regular shingle courses true along valley chalk lines, and nail in normal manner.

3.3.6.4 Open Sheet Metal Valleys

Sheet metal flashing for valleys is specified in Section 07 60 00 FLASHING AND SHEET METAL. Before installing and fastening flashing in place with metal cleats:

a. Install single layer of 36 inch wide, asphalt-saturated felt, centered on valley and extending entire length of valley over felt underlayment.

b. Cut regular shingle courses on each roof on true line 2 inches from valley centerline at top of valley, and increase width between lines by 1 inch for each 8 feet of valley length, continuing to eaves.

c. Apply 2 inch band of asphalt roof cement over flashing, along and underside of shingles adjoining valley.

d. Press shingles tightly into cement, and nail in normal manner, except apply nails not closer than 5 inches to valley centerline. Do not drive nails through valley flashing.

e. Provide a 4 inch band of asphalt roof cement for fastening shingle tabs down along open metal gutters.

3.3.7 Flashing

3.3.7.1 Eave Flashing

Provide for roof slopes 1 in 3 4 inches per footand greater. Provide eave flashing strips consisting of smooth-surfaced roll roofing. Flashing strips must overhang metal drip edge 1/4 inch to 3/8 inch and extend up the slope far enough to cover a point 12 inches inside interior face of exterior wall. Where overhangs require flashings wider than 36 inches, locate laps outside exterior wall face. Laps must be at least 2 inches wide and cemented with asphalt roof cement over entire length of lap. Lap end 12 inches and cement.

Provide for roof slopes 4 inches per foot and greater. Provide either of the following types of eave flashing:

a. From the eaves to a point 24 inches inside interior wall line, apply solid coating of asphalt roof cement between overlapping layers of underlayment. Spread cement to a uniform thickness at rate of 2 gallons per 100 square feet of cemented roof area.

b. From the eaves to a point 24 inches inside interior wall line, apply one layer of self-adhering membrane. Follow membrane manufacturers printed installation instructions.

3.3.7.2 Stepped Flashing

For sloping roofs which abut vertical surfaces, provide stepped metal flashing as specified in Section 07 60 00 FLASHING AND SHEET METAL.

3.3.7.3 Vent and Stack Flashing

Apply shingles up to point where vent or stack pipe projects through roof, and cut nearest shingle to fit around pipe. Before applying shingles beyond pipe, prepare flange of metal pipe vent flashing as specified in Section 07 60 00 FLASHING AND SHEET METAL, by applying a 1/8 inch thick coating of asphalt roof cement on bottom side of flashing flange. Slip flashing collar and flange over pipe, and set coated flange in 1/16 inch coating of asphalt roof cement. After applying flashing flange, continue shingling up roof. Lap lower part of flange over shingles. Overlap flange with side and upper shingles. Fit shingles around pipe, and embed in 1/16 inch thick coating of asphalt roof cement where shingles overlay flange.

3.3.7.4 Chimney Flashing

Provide treated wood crickets as specified in Section 06 10 00 ROUGH CARPENTRY. Provide metal base and counterflashing as specified in Section 07 60 00 FLASHING AND SHEET METAL. Uniformly coat masonry surfaces which are to receive flashing with asphalt primer applied at rate of 1 gallon per 100 square feet. Apply shingles over underlayment up to front face of chimney. Apply metal front base flashing with lower section extending at least 4 inches over shingles. Set base flashing in a 1/16 inch coating of asphalt roof cement on shingles and chimney face. Apply metal step flashing at sides in a coating of asphalt roof cement. Embed

end shingles in each course that overlaps step flashing with asphalt roof cement. Apply metal rear base flashing over cricket and back of chimney in coating of asphalt roof cement. Apply end shingles in each course up to cricket, and cement in place. Lap base flashing minimum of 3 inches with metal counterflashing.

-- End of Section --

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 07 31 26
SLATE ROOFING
08/09

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 B370	(2011) Standard Specification for Copper Sheet and Strip for Building Construction
ASTM C406/C406M	(2010) Roofing Slate
ASTM D 146	(2004) Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing
ASTM D 226/D 226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 412	(2006ae2) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0405	(2001; 5th Ed) Roofing and Waterproofing Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2003) Architectural Sheet Metal Manual, 6th Edition

1.2 SYSTEM DESCRIPTION

Salvage and reuse intact and serviceable existing slate materials whenever possible. New slate being incorporated into existing slate roofs shall match existing as closely as possible. Use slate from the same quarry or manufacturer as the original, if possible. Establish units of work, including removal of existing materials, preparation of existing surfaces and application of underlayment, nailers, and related temporary and/or permanent flashing. The progression of work shall be laid out and presented to the Contracting Officer to prevent other trades from working on or above completed roofing. Do no store materials on roof decks in such a manner as to overstress and/or damage the deck and supporting structure. Avoid placing of loads at midspans of framing so that superimposed loads are well distributed. Vertical surfaces which project through the roof surface at a right angle to the slope of the roof shall have a cricket (sometimes referred to as a saddle) built into the roof to divert water away from the back of the vertical member, as shown.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
Drawings

SD-03 Product Data
Qualifications

SD-04 Samples
Slate
Accessories for Slate Roofs
Sealants
Underlayment Membrane
Fasteners

SD-07 Certificates
Materials

1.4 QUALITY ASSURANCE

Provide qualified workers, trained and experienced in installing slate roofing systems of this configuration, and submit documentation of 5 consecutive years of work of this type. Show familiarity with and perform work in accordance with SMACNA 1793 and NRCA 0405. As proof of Qualifications, submit documentation showing qualifications of personnel proposed to perform the roofing work, and a list of installations made identifying when, where, and for whom the installations were made. Submit drawings showing slate installation and appearance details, flashing details, and nailing patterns for the slates.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in manufacturer's unopened bundles and containers with the manufacturer's brand and name marked clearly thereon. Store shingles in accordance with manufacturer's printed instructions and roll goods on-end in an upright position. Immediately before laying, store roofing felt for 24 hours in an area maintained at a temperature not lower than 50 degrees F.

1.6 PROJECT/SITE CONDITIONS

Perform slate roofing operations when existing and forecasted weather conditions permit work in accordance with manufacturer’s recommendations and warranty requirements. Apply elastomeric membrane underlayment only in fair weather when air and surface temperatures are above 40 degrees F. Provide temporary protection materials maintained on the site at all times for temporary roofing, flashing, and other protection when delays and/or changed weather conditions do not permit completion of each unit of work prior to the end of each working day. Remove and discard materials which have been used for temporary roofing, flashing and other protection.

1.7 WARRANTY

Furnish a warranty against defects in material and workmanship of slate roof assembly, including related metal flashing for a period of 10 years from date of final acceptance of the work. Contractor shall inspect the completed project every 12 months for the first 3 years of the warranty period, at year 5 and a final inspection at year 10. Inspections shall be from a remote access device such as a bucket lift or cherry picker and shall not include any foot traffic on the slates.

PART 2 PRODUCTS

2.1 MATERIALS

Submit certificates of compliance attesting that the materials meet specification requirements.

2.1.1 Slate

Provide slate conforming to ASTM C406. Slate shall be Grade A, (ASTM S1), hard, dense rock, punched or drilled for two nails each. Cracked slate shall not be used. Exposed corners shall be full. Broken corners on covered ends which sacrifice nailing strength or the laying of a watertight roof will not be allowed. Submit three representative shingles to show color range.

2.1.1.1 Standard Thickness Roofing Slate

Slate shall be smooth texture 3/16 to 1/4 inch thickness.

2.1.1.2 Graduated Roof Slate

Not applicable to this contract

2.1.1.3 Slate Colors

Slate colors to be selected by the Government.

2.1.2 Underlayment Membrane

Furnish an underlayment membrane on all surfaces to be covered with slate. Membrane shall consist of asphalt-saturated felt or high strength composite self-adhering membrane. Submit a 1 by 1 foot section.

2.1.2.1 Roofing Felt

Roofing felt shall be asphalt-saturated rag felt, Type II, No. 30 asphalt felt in accordance with ASTM D 226.

2.1.2.2 Elastomeric Membrane Underlayment

Membrane shall be a cold applied composite self-adhering membrane of not less than 0.004 inch high strength polyethylene film with slip resistant embossing, coated on one side with a thick layer of adhesive-consistency rubberized asphalt, inter-wound with a disposable silicone coated release sheet. The tensile strength and elongation values shall be not less than 250 psi when tested in accordance with ASTM D 412 and pliability shall be unaffected when tested in accordance with ASTM D 146.

2.1.2.3 Elastomeric Membrane Accessories

Two component urethane, mastic and primer shall be as approved by the membrane manufacturer. Flashing, expansion joint covers, temporary UV protection and corner fillets shall be as recommended by the membrane manufacturer.

2.1.3 Nails

Nails shall be large-headed slater's solid copper nails of Number 10 or 11 gauge metals. Nails shall be 3d for slates 18 inches or less in length; 4d nails shall be used for slates 20 inch or longer, and 6d nails shall be used for slates on hips and ridges. Thicker slates require longer and heavier gauge nails. The proper size shall be determined by adding 1 inch to twice the thickness of the slate. Nails shall be of sufficient length to adequately penetrate the roof sheathing. Nails used to retain copper flashing and slate at rake edges, hips, ridges, and eaves prone to wind damage shall be of the ring shank design.

2.1.4 Flashing

Flashing shall be 20 ounce, light cold-rolled temper (H00) copper conforming to ASTM B370. Flashing shall be in accordance with the requirements as specified in Section 07 57 13 FLASHING AND SHEET METAL.

2.1.5 Elastic Cement

Elastic cement shall be an approved brand of waterproof elastic slater's cement colored to match as nearly as possible the general color of the slate.

2.1.6 Acid Neutralizing Wash

Acid neutralizing wash shall be non-destructive wash formulated to neutralize the effects of acid deposits resulting from the past burning of fossil fuels (particularly coal). The wash shall not change the color, appearance, or life of the slate roof, copper flashing and accessories, underlayment, adhesives or the wall surfaces of the building.

2.1.7 Sealants

Sealants, where required, shall be in accordance with the slate manufacturer's recommendations. Submit 8 ounces of each type.

2.2 ACCESSORIES FOR SLATE ROOFS

2.2.1 Crickets or Saddles

Provide crickets of light rafter construction covered with sheathing, underlayment, and copper sheet metal specified in Section 07 57 13 FLASHING AND SHEET METAL. If the cricket area is large and exposed to view, it shall be slated the same as other roof areas.

2.2.2 Snow Guards

Provide nonferrous metal snow guards, as indicated.

Copper Snow Guard, NO. 100BB, with brass cleat .080 thick, ½ hard copper cleat (shoe) .050 thick or approved equivalent. Shoe may be a half fan style or present a decorative face as required for historical/cultural requirements or for aesthetics.

PART 3 EXECUTION

3.1 PROTECTION OF ROOF SURFACES

Use equipment (such as padded ridge ladders) and techniques to prevent damage to roof as a result of foot or material traffic. Contractor is responsible for controlling breakage of new or existing slate beyond what is indicated. Personnel who are working on the roof shall wear proper shoes which will not further damage slates; shoe soles shall be made of a material which will aid in preventing falls.

3.1.1 Installation Plan

Submit a detailed installation plan for approval prior to beginning the work indicating the methods to be used to apply the slates to the roof and protect the installed slates from damage. The plan shall contain a narrative description and a drawing clearly depicting the layout for work access devices such as padded roof jacks for walkways, padded chicken walk placements between walkways, and other means of protecting newly installed slates and any existing slates to remain. Details shall be provided that clearly indicate how work access devices shall be installed/incorporated and the sequence of Work

to include these devices. Under no circumstances shall any foot traffic be allowed on newly installed slates or existing slates to remain. The Plan shall indicate how the work access devices will keep foot traffic off the slates at all times.

3.1.2 Inspection

Contractor's quality control inspections and inspections by the Government shall take place as the Work progresses to coordinate with the installation and removal of the work access devices. Notify the Contracting Officer a minimum of 48 hours in advance of requested inspections and maintain work access devices in place to provide access to uninspected areas until final acceptance by the Government.

3.2 SLATE REMOVAL

Where work involves partial replacement or repair of roof, verify each slate for tightness and continued use. Perform testing with broad, flat-nosed, slater's pliers. Slates which have been identified for replacement or re-installation shall be marked with a non-destructive color mark removable by solvent, rather than water, and for approval within 30 days after Notice to Proceed. Slates fastened with non-copper fasteners shall be re-fastened with proper copper fasteners. Submit representative samples of each fastener with identifying tags.

3.3 PREPARATION OF SURFACES

Roof deck surfaces shall be smooth, clean, firm, dry, and free from loose boards, large cracks, and projecting ends that might damage the roofing. Foreign particles shall be cleaned from interlocking areas to ensure proper seating and to prevent water damming. Prior to installation of slate, vents and other projections through roofs shall be properly flashed and secured in position, and projecting nails shall be driven firmly home.

3.4 ROOFING FELT

Lay felt in horizontal layers with joints lapped toward eaves and at ends at least 2 inches, and secured along laps and at ends as necessary to hold the felt in place and protect the structure until covered with the slate. Felt shall be preserved unbroken, tight and whole. Felt shall lap hips and ridges at least 12 inches to form a double thickness and shall be lapped 2 inches over the metal of valleys or built-in gutters.

3.5 ELASTOMERIC MEMBRANE UNDERLAYMENT

3.5.1 Surface Preparation

Remove dust, dirt, loose nails or other protrusions. Priming is not required for wood or metal surfaces but is necessary on concrete or masonry surfaces.

3.5.2 Primer

Primer shall be applied at a coverage rate of 250-350 sq. ft./gal. Primer shall be applied by spray or paint roller. Pine wood decks shall be covered with minimum 1/4 inch plywood prior to receiving membrane coverage.

3.5.3 Membrane Application

Apply membrane according to manufacturer's instructions and adhere it directly to roof deck. Cut the membrane into 10 to 15 foot lengths and re-roll it. The release paper shall be peeled back 1 to 2 feet; align the membrane on the lower edge of the roof when the first 1 to 2 feet are placed. The release paper under the membrane shall be peeled from the membrane and the membrane pressed in place. Lower edges shall be rolled firmly with a wallpaper or hand roller. For ice dam protection, apply the

membrane to reach a point above the highest expected level of ice dams; refer to drawings for extent. Ends and edges shall be overlapped a minimum of 6 inches. Membrane shall not be folded onto an exposed face of the roof edge.

3.5.4 Valley and Ridge Application

Cut the membrane into 4 to 6 foot lengths. The release paper sheet shall be peeled and centered over the valley or ridge, then draped and pressed in place, working from the center of the valley or ridge outward in each direction. For valleys, membrane shall be applied starting at the low point and working upwards. Overlap all sheets a minimum of 6 inches.

3.5.5 Vertical Membrane Flashings

Vertical wall installations shall receive primer prior to the application of membrane. Primer shall be applied at a coverage rate of 250-350 sq. ft. /gal. Membrane shall be turned up walls and dormers as indicated on the drawings. Vertical membrane terminations shall be mechanically fastened and shall receive a troweling of mastic as approved by the membrane manufacturer. Membrane may be folded onto the fascia, provided it will be covered by a gutter metal edge or other material.

3.5.6 Protection

Elastomeric membrane underlayment shall not be left permanently exposed to sunlight. Membrane shall be covered with exposed roofing materials as soon as possible. Membrane damaged due to exposure to sunlight shall be patched prior to the application of final roof covering.

3.6 METAL FLASHING AND SNOW GUARDS

Metal flashing shall be as shown at intersections of vertical or projecting surfaces through the roof or against which the roof abuts, such as walls, parapets, dormers, and sides of chimneys. Flashing installation shall be in accordance with Section 07 57 13 FLASHING AND SHEET METAL.

3.6.1 Snow and Ice Guards

Install manufactured snow and ice guards in accordance with the manufacturer's installation guidance documents for snow guards on slate roofing. Guards shall be a cooper snow guard, No. 100BB, brass cleat .080 thick ½ hard, copper cleat (shoe) .050 thick.

3.7 SLATING

3.7.1 Repair and Replacement

Existing reusable slates removed from the repair area shall be intermingled with new slates to provide a smooth visual transition between new and existing areas. Slating shall be applied as shown.

3.7.2 Slate Coursing

The slate shall project 2 inches at the eaves and 1 inch at gable ends, and shall be laid in horizontal courses with 3 inch headlap (unless otherwise indicated), and each course shall break joints with the preceding one by at least 3 inches. Slates at the eaves or cornice line shall be doubled and canted 1/4 inch by a wooden cant strip, using same thickness slate for under-eaves at first exposed course. Under-eave slate shall be approximately 3 inches longer than exposure of first course. There shall be no through joints from the roof surface to the underlayment.

3.7.3 Nailing

Fasten each slate with a minimum of two copper nails of sufficient length to penetrate the roof decking at least 3/4 inch or through the decking thickness, whichever is less. Where the underside of roof decking is exposed to view, such as in overhanging eaves, the nails shall be long enough to penetrate the roof decking but not so long that they may be driven through the decking. The heads of slating nails shall just touch the slate and shall not be driven "home" or draw the slate, but left with the heads just clearing the slate so that the slate hangs on the nail. Nails in slates overlapping sheet metalwork shall not puncture the sheet metal. Exposed nails are permissible only in top courses where unavoidable, but covered with elastic cement. Hip slates and ridge slates shall be laid in elastic cement spread thickly over unexposed surface of under courses of slate, nailed securely in place and pointed with elastic cement.

3.7.4 Vertical Surfaces

Slate shall be fitted neatly around pipes, ventilators, chimneys and other vertical surfaces.

3.7.5 Hips

Hips shall be laid to form a fantail, saddle, mitered, or Boston hip as specified.

3.7.6 Ridges

Ridges shall be laid to form comb, saddle, or strip saddle ridges as specified. The nails of the combing slate shall pass through the joints of the slate below. The combing slate shall be laid with the same exposure as the next course down. Combing slates sloping away from the direction of the prevailing storms shall project 1 inch above the combing slate on the opposite side of ridge.

3.7.7 Valleys

Valleys shall be laid to form closed, open, or round valleys as specified. Open-type valleys shall be formed with the main roof at cricket areas. The size of the cricket is largely determined by the roof condition. Unless noted otherwise, the slope of the cricket shall be the same as the slope of the roof.

UNIFIED FACILITIES GUIDE SPECIFICATIONS
SECTION 07 41 13
METAL ROOF PANELS
05/11

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.

ALUMINUM ASSOCIATION (AA)

AA ADM-105 (2005; Errata 2005) Aluminum Design Manual

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

ANSI/AISC 341 (2005; Suppl No. 1 2005) Seismic Provisions for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100 (2007; Supp 1: 2009; Supp 2: 2010) North American Specification for the Design of Cold-Formed Steel Structural Members

AISI SG03-3 (2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-10 (2010; Change 2010; Change 2011) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M (2004) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

AWS D1.1/D1.1M (2010) Structural Welding Code - Steel

AWS D1.2/D1.2M (2008) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M (2011) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened

ASTM A123/A123M (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A36/A36M (2008) Standard Specification for Carbon Structural Steel

ASTM A424/A424M (2009a) Standard Specification for Steel Sheet for Porcelain Enameling

ASTM A463/A463M (2010) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

ASTM A653/A653M (2010) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A755/A755M (2003; R 2008) Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products

ASTM A792/A792M (2010) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

ASTM A924/A924M (2010a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

ASTM B117 (2009) Standing Practice for Operating Salt Spray (Fog) Apparatus

ASTM B209 (2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B209M (2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

ASTM C286 (1999; R 2009) Standard Terminology Relating to Porcelain Enamel and Ceramic-Metal Systems

ASTM C552 (2007) Standard Specification for Cellular Glass Thermal Insulation

ASTM C553 (2011) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

ASTM C792 (2004; R 2008) Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants

ASTM C920 (2011) Standard Specification for Elastomeric Joint Sealants

ASTM D 1056	(2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1308	(2002; R 2007) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(2008) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 1667	(2005; R 2011) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D 2244	(2011) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Coordinates
Color	
ASTM D 2247	(2011) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 226/D 226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and
Waterproofing	
ASTM D 2794	(1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(2009e2) Measuring Adhesion by Tape Test
ASTM D 3363	(2005e1; R 2011) Film Hardness by Pencil Test
ASTM D 4214	(2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 4587	(2011) Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Coatings
Related	
ASTM D 522	(1993a; R 2008) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(2008) Standard Test Method for Specular Gloss
ASTM D 5894	(2010) Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry and a UV/Condensation Cabinet)
Cabinet	
ASTM D 610	(2008) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(2002; R 2009) Evaluating Degree of Blistering of Paints
ASTM D 822	(2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings

ASTM D 968	(2005; R 2010) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1970/D1970M	(2011) Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D4637/D4637M	(2010) EPDM Sheet Used in Single-Ply Roof Membrane
ASTM D4869/D4869M	(2005e1; R 2011) Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing
ASTM E 1592	(2005) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E 2140	(2001; R 2009) Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
ASTM E 84	(2011a) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G 152	(2006) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G 153	(2004; R 2010) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

FM GLOBAL (FM)

FM 4471	(2010) Class I Panel Roofs

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA RSDM	(2000) Metal Roofing Systems Design Manual

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0405	(2001; 5th Ed) Roofing and Waterproofing Manual
NRCA 0409	(2006) Architectural Sheet Metal and Metal Roofing Manual

PORCELAIN ENAMEL INSTITUTE (PEI)

PEI 1001	(1996) Specification for Architectural Porcelain Enamel (ALS-100)

PEI CG-3	(2005) Color Guide for Architectural Porcelain Enamel

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2003) Architectural Sheet Metal Manual, 6th Edition

UNDERWRITERS LABORATORIES (UL)

UL 580	(2006; Reprint Jul 2009) Tests for Uplift Resistance of Roof Assemblies
UL Bld Mat Dir	(2011) Building Materials Directory

1.2 DESCRIPTION OF METAL ROOF SYSTEM

1.2.1 Performance Requirements

Steel panels and accessory components must conform to the following standards:

ASTM A1008/A1008M
ASTM A123/A123M
ASTM A36/A36M
ASTM A424/A424M, ASTM C286, PEI 1001, PEI CG-3 for Porcelain and Ceramic Enameling
ASTM A463/A463M for aluminum coated steel sheet
ASTM A755/A755M for metallic coated steel sheet for exterior coil prepainted applications.
ASTM A924/A924M for metallic coated steel sheet
ASTM D 522 for applied coatings
UL Bld Mat Dir

1.2.1.1 Hydrostatic Head Resistance

No water penetration when tested according to ASTM E 2140. Submit leakage test report upon completion of installation.

1.2.1.2 Wind Uplift Resistance

Provide metal roof panel system that conforms to the requirements of ASTM E 1592 and UL 580. Uplift force due to wind action governs the design for panels. Submit wind uplift test report prior to commencing installation.

Roof system and attachments must resist the wind loads as determined by ASCE 7-10, in pounds per square foot. Metal roof panels and component materials must also comply with the requirements in FM 4471 as part of a panel roofing system as listed in Factory Mutual Guide (FMG) "Approval Guide" for class 1 or noncombustible construction, as applicable. Identify all materials with FMG markings.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
Roofing Panels
Flashing and Accessories

Gutter/Downspout Assembly

SD-03 Product Data
Submit manufacturer's catalog data for the following items:
Roof panels
Factory-Applied Color Finish
Accessories
Fasteners
Pressure Sensitive Tape
Underlayments
Gaskets and Sealing/Insulating Compounds
Coil Stock
Aluminized Steel Repair Paint
Enamel Repair Paint
Galvanizing Repair Paint

SD-04 Samples
Roof Panels
Factory-applied Color Finish, samples, 9 inch lengths, full width
Accessories
Fasteners
Gaskets and Sealant/Insulating Compounds

SD-05 Design Data
Wind Uplift Resistance

SD-06 Test Reports
Leakage Test Report
Wind Uplift Test Report
Fire Rating Test Report
Factory Finish and Color Performance Requirements

SD-07 Certificates
Roof Panels
Coil stock compatibility
Self-Adhering Modified Bitumen Underlayment
Qualification of Manufacturer
Qualification of Applicator

SD-08 Manufacturer's Instructions
INSULATION
INSTALLATION MANUAL

SD-09 Manufacturer's Field Reports
Manufacturer's Field Inspection Reports

SD-11 Closeout Submittals
Warranties
Information Card
Date Of Installation Wall-Mounted Placard

1.4 QUALITY ASSURANCE

1.4.1 Qualification of Manufacturer

Submit documentation verifying metal roof panel manufacturer has been in the business of manufacturing metal roof panels for a period of not less than 5 years.

Manufacturer must also provide engineering services by an authorized engineer, currently licensed in the geographic area of the project, with a minimum of five (5) years' experience as an engineer knowledgeable in roof wind design analysis, protocols and procedures for MBMA RSDM, ASCE 7-10, UL 580, and FM 4471. Engineer must provide certified engineering calculations for the project conforming to the stated references.

1.4.1.1 Manufacturer's Technical Representative

The manufacturer's technical representative must be thoroughly familiar with the products to be installed, installation requirements and practices, and with any special considerations in the geographical area of the project. The representative must perform field inspections and attend meetings as specified.

1.4.1.2 Single Source

Roofing panels, clips, closures, and other accessories must be standard products of the same manufacturer, and the most recent design of the manufacturer to operate as a complete system for the intended use.

1.4.2 Qualification of Applicator

Metal roof system applicator must be approved, authorized, or licensed in writing by the roof panel manufacturer and have a minimum of three years' experience as an approved, authorized, or licensed applicator with that manufacturer, approved at a level capable of providing the specified warranty. Supply the names, locations and client contact information of 5 projects of similar size and scope constructed by applicator using the manufacturer's roofing products submitted for this project within the previous three years.

1.4.3 Field Verification

Prior to the preparation of drawings and fabrication, verify location of roof framing, roof openings and penetrations, and any other special conditions. Indicate all special conditions and measurements on final shop drawings.

1.4.4 Qualifications for Welding Work

Welding procedures must conform to AWS D1.1 for steel or AWS D1.2 for aluminum.

Operators are permitted to make only those types of weldments for which each is specifically qualified.

1.4.5 Pre-Construction Conference

After approval of submittals and before performing roofing system installation work, the contractor shall request a pre-construction conference to review the following definable features of the delivery order requires:

a. Drawings, specifications, and submittals related to the roof work. Submit, as a minimum; sample profiles of roofing panels, with factory-applied color finish samples, flashing and accessories, gutter/downspout assembly samples, typical fasteners and pressure sensitive tape, sample gaskets and sealant/insulating compounds. Also include data and 1/2 pint sample of aluminized steel repair paint, enamel repair paint, galvanizing repair paint, and technical data on coil stock and coil stock compatibility, and manufacturer's installation manual.

b. Roof system components installation to include a tentative schedule of key events with milestones and completion dates;

c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representative;

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing; and

e. Quality control plan for the roof system installation;

f. Safety requirements in particular the means and methods to be utilized to comply with the requirements of EM-385-1-1.

Coordinate pre-construction conference scheduling with the Contracting Officer's Representative (COR). Attendance is mandatory for the Contractor, the Contracting Officer's designated personnel, personnel directly responsible for the installation of metal roof system, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, and representative of the metal roofing manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DELIVERY, HANDLING, AND STORAGE

Deliver, store, and handle panel materials, bulk roofing products, accessories, and other manufactured items in a manner to prevent damage and deformation, as recommended by the manufacturer, and as specified.

1.5.1 Delivery

Package and deliver materials to the site in undamaged condition. Provide adequate packaging to protect materials during shipment. Do not uncrate materials until ready for use, except for inspection. Immediately upon arrival of materials at jobsite, inspect materials for damage, deformation, dampness, and staining. Remove affected materials from the site and immediately replace. Remove moisture from wet materials not otherwise affected, restack and protect from further moisture exposure.

1.5.2 Handling

Handle materials in a manner to avoid damage. Select and operate material handling equipment so as not to damage materials or applied roofing.

1.5.3 Storage

Stack materials stored on site on platforms or pallets, and cover with tarpaulins or other weathertight covering which prevents trapping of water or condensation under the covering. Store roof panels so that water which may have accumulated during transit or storage will drain off. Do not store panels in contact with materials that might cause staining. Secure coverings and stored items to protect from wind displacement.

1.6 PROJECT CONDITIONS

Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements, and specified safety requirements.

1.7 FABRICATION

Fabricate and finish metal roof panels and accessories on a factory stationary industrial type, leased or installer owned portable rolling mill to the greatest extent possible, per manufacturer's standard procedures and processes, and as necessary to fulfill indicated performance requirements. Comply with indicated profiles, dimensional and structural requirements.

Provide panel profile, as indicated on drawings including major ribs and intermediate stiffening ribs for full length of panel. Fabricate panel side laps with factory installed captive gaskets, separator strips providing a weather tight seal and preventing metal-to metal contact, and minimizing noise from movements within the panel assembly.

1.7.1 Finishes

Finish quality and application processes must conform to the related standards specified within this section. Noticeable variations within the same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize any contrasting variations.

1.7.2 Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 as applicable to the design, dimensions, metal, and other characteristics of the item indicated.

a. Form exposed sheet metal accessories which are free from excessive oil canning, buckling, and tool marks, and are true to line and levels indicated, with exposed edges folded back to form hems.

b. End Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

c. Sealed Joints: Form non-expansion, but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA 1793.

d. Conceal fasteners and expansion provisions where possible.[Exposed fasteners are not allowed on faces of accessories exposed to view.]

e. Fabricate cleats and attachments devices of size and metal thickness recommended by SMACNA or by metal roof panel manufacturer for application, but not less than the thickness of the metal being secured.

1.8 WARRANTIES

Provide metal roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to manufacturer's standard warranty as required to comply with the specified requirements.

1.8.1 Metal Roof Panel Manufacturer Warranty

Furnish the metal roof panel manufacturer's 20-year no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation, components, trim, and accessories necessary for a watertight roof system construction. Make warranty directly to the Government, commencing at time of Government’s acceptance of the roof work. The warranty must state that:

a. If within the warranty period, the metal roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, displaces, corrodes, perforates, separates at the seams, or

shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the metal roof system and correction of defective workmanship is the responsibility of the metal roof panel manufacturer. All costs associated with the repair or replacement work are the responsibility of the metal roof panel manufacturer.

b. If the manufacturer or his approved applicator fail to perform the repairs within 24 hours of notification, emergency temporary repairs performed by others does not void the warranty.

1.8.2 Manufacturer's Finish Warranty

Provide a manufacturer's no-dollar-limit 20 year warranty for the roofing system. Issue the warranty directly to the Government at the date of Government acceptance. Warranting that the factory color finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of 8 when measured in accordance with ASTM D 4214; or fade or change colors in excess of 5 NBS units as measured in accordance with ASTM D 2244.

1.8.3 Metal Roof System Installer Warranty

Provide the "Contractors Five (5) Year No Penal Sum Warranty for Non-Structural Metal Roof System" attached at the end of this section. Provide a separate bond in an amount equal to the installed total material and installation roofing system cost in favor of the Government covering the installer's warranty responsibilities effective throughout the five (5) year warranty period.

Provide roof system installer warranty for a period of not less than two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof panel installation, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Issue warranty directly to the Government. Correction of defective workmanship and replacement of damaged or affected materials is the responsibility of the metal roof system installer. All costs associated with the repair or replacement work are the responsibility of the installer.

1.8.4 Continuance of Warranty

Repair or replacement work that becomes necessary within the warranty period must be approved, as required, and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the metal roof system manufacturer warranty for the remainder of the manufacturer warranty period.

1.9 CONFORMANCE AND COMPATIBILITY

The entire metal roofing and flashing system must be in accordance with specified and indicated requirements, including wind resistance and seismic per ANSI/AISC 341 requirements. Work not specifically addressed and any deviation from specified requirements must be in general accordance with recommendations of the MBMA RSDM, NRCA 0405, the metal panel manufacturer's published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

1.10 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of English unit measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The English and metric units for the measurements shown are as follows:

PRODUCTS	ENGLISH UNITS	METRIC UNITS

a. Sheet Aluminum	0.040 inch	1.0 mm
b. Panels	12 inches	300 mm
- Vertical legs	2 inches	50 mm
- Stiffening ribs	4 inches	100 mm
c. Screws	No. 14	0.242 mm
	No. 12	0.216 mm
d. Bolts	1/4 inch	6 mm
e. Studs	3/16 inch	5 mm
f. Fasteners	1/2 inch	13 mm
	One inch	25 mm
g. Rivets	1/16 inch	5 mm
	1/8 inch	3 mm

PART 2 PRODUCTS

2.1 ROOF PANELS

2.1.1 Aluminum Sheet Panels

Roll-form aluminum roof panels to the specified profile, with .032 inch thickness and depth as indicated.

Material must be plumb and true, and within the tolerances listed:

a. Aluminum sheet conforming to ASTM B209, and AA ADM-105

b. Individual panels to have continuous length sufficient to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not a part of the panel profile and free from damage to the finish coating system.

c. Provide panels with thermal expansion and contraction consistent with the type of system specified, and the following profile:

1. profile and coverage to be a minimum height and width from the manufacturer's standard for the indicated roof slope.

2. profile to be a 1-1/2 inch high rib at 12 inches o.c. with small stiffening ribs, 38 inch overall panel width with 36 inch exposed panel and exposed fasteners.

3. profile to be a 1-1/2 inch high rib at 7.2 inches o.c.; 38-7/8 inch overall width with 36 inch exposed panel and exposed fasteners.

4. profile to be a 1 inch high rib at 4 inches o.c.; 49-5/8 inch overall width with 44-48 inch exposed panel and exposed fasteners.

5. profile to be a 1 inch high rib at 8 inches o.c.; 41-5/8 inch overall width with 40 inch exposed panel and exposed fasteners.

6. profile to be a 1-3/4 inch high V-beam rib at 5 inches o.c.; 44-7/8 inch overall width with 42 inch exposed panel and exposed fasteners.

7. profile to be a 7/8 inch high corrugated rib at 2 inches o.c., 38-7/8 inch overall width with 36 inch exposed panel and exposed fasteners.

8. profile to be a 3 inch high standing seam, 24 inch coverage, factory-caulked and mechanical crimping or snap-together seams with concealed clips and fasteners.

9. profile to be a 2 inch high standing seam, 12 or 18 inch coverage with mechanical crimping or snap-together seams with concealed clips and fasteners.

10. profile to be [smooth, flat][embossed pattern][textured]surface.

11. profile to be custom, as shown on drawings.

2.1.2 Steel Sheet Panels

Roll-form steel sheet roof panels to the specified profile, with 22 gauge and depth as indicated.

Material must be plumb and true, and within the tolerances listed:

a. Galvanized steel sheet conforming to ASTM A653 and AISI SG03-3.

b. Aluminum-Zinc alloy coated steel sheet conforming to ASTM A792 and AISI SG03-3.

c. Individual panels to have continuous length sufficient to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not a part of the panel profile and free from damage to the finish coating system.

d. Provide panels with thermal expansion and contraction consistent with the type of system specified, and the following profile:

1. profile and coverage to be a minimum height and width from the manufacturer's standard for the indicated roof slope.

2. profile to be a 1-1/2 inch high rib at 12 inches o.c. with small stiffening ribs, 38 inch overall panel width with 36 inch exposed panel and exposed fasteners.

3. profile to be a 1-1/2 inch high rib at 7.2 inches o.c.; 38-7/8 inch overall width with 36 inch exposed panel and exposed fasteners.

4. profile to be a 1 inch high rib at 4 inches o.c.; 49-5/8 inch overall width with 44-48 inch exposed panel and exposed fasteners.

5. profile to be a 1 inch high rib at 8 inches o.c.; 41-5/8 inch overall width with 40 inch exposed panel and exposed fasteners.

6. profile to be a 1-3/4 inch high V-beam rib at 5 inches o.c.; 44-7/8 inch overall width with 42 inch exposed panel and exposed fasteners.

7. profile to be a 7/8 inch high corrugated rib at 2 inches o.c., 38-7/8 inch overall width with 36 inch exposed panel and exposed fasteners.

8. profile to be a 2 inch high standing seam, 12 -24 inch coverage with mechanical crimping or snap-together seams with concealed clips and fasteners.

9. profile to be [smooth, flat][embossed pattern][textured]surface.

10. profile to be custom, as shown on drawings.

2.2 FACTORY FINISH AND COLOR PERFORMANCE REQUIREMENTS

The US metal building industry offers a variety of color finishes to protect the metal panels against chemical corrosion and ultraviolet radiation; to provide long life with minimum maintenance plus acceptable weathering and color retention; and to assure chalk, fade, and mar resistance. Some of the most widely used coatings include, but are not limited to, the following:

a. Polyvinylidene fluoride (PVDF2); a nominal 0.025 mm (1 mil) thick coating modified with a proprietary resin for toughness; it may be used in most environments.

b. Silicone-modified polyester (SMP); a thermoset coating system composed of polyester resin modified by copolymerization with a functional silicone resin intermediate designed for added protection against chemical corrosion and ultraviolet radiation.

c. Plastisol (PVC); a two-coat system consisting of a polyvinyl-chloride resin dispersed in a plasticizer top-coat over a corrosion-resistant primer; it is a high-performance, thick coating designed for highly aggressive and corrosive environments with excellent resistance to common acids, alkalis, and inorganic compounds.

Most coatings may be ordered extra-thick for buildings in direct contact with salt or chemical laden air or where a premium finish would be justified. The thicker coating provides additional primer and increases the coating's corrosion and abrasion resistance, but it requires a special run by the coil coater and additional delivery time. Appropriate specification requirements must be added if thick film coatings are to be used. Clear coats may also be added to the finish color coated coil to enhance the coatings performance.

The baseline values included in this specification are for a standard 1 mil PVDF2 (i.e., Kynar 500, Hylar 5000) coating system. If a different coating type or thickness is required, research the coating type and modify indicated values accordingly. Coordinate with the coating type specified elsewhere in this section.

Corrosion of galvanized steel panels, together with the fact that cut edges, scratches and penetrations of the panels expose the steel substrate, warrants consideration for the use of aluminum panels in salt spray and other corrosive environments; however, the greater expansion of aluminum must be considered in the design. Where steel panels are used in coastal environments, specify enhanced PVDF2 or other premium coatings. Increased PVDF2 coating thicknesses and or addition of a factory-applied clear coat over the color finish enhance coating system performance.

Roof panels are available in several standard colors. Specify custom color options only with Government approval. Where accent colors are required, specify accordingly.

Energy considerations may be a consideration in the color choice for the roof panels. White or light-colored roofing surfaces are much better at reflecting sunlight (radiant gain and UV) than darker surfaces. Coordinate color specification and selection with the user.

All panels are to receive a factory applied polyvinylidene fluoride, Kynar 500/Hylar 5000 finish consisting of a baked topcoat with a manufacturer's recommended prime coat conforming to the following:

a. Metal Preparation: All metal is to have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with an acid rinse, and thorough drying.

b. Prime Coating: A base coat of epoxy paint, specifically formulated to interact with the top-coat, is to be applied to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. The prime coat must be oven cured prior to application of the finish coat.

c. Exterior Finish Coating: Apply the exterior finish coating over the primer by roll coating to a dry film thickness of 0.80 plus 0.05 mils (3.80 plus 0.05 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 plus 0.10 mils (4.00 plus 0.10 mils for Vinyl Plastisol). This exterior finish coat must be oven-cured.

d. Interior finish coating: Apply a wash coat on the reverse side over primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry fill thickness of 0.50 plus 0.10 mils. The wash coat must be oven cured.

e. Color: The exterior finish chosen from the manufacturer's standard color chart.

f. Physical Properties: Coating must conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

General: ASTM D 5894 and ASTM D 4587.
Abrasion: ASTM D 968
Adhesion: ASTM D 3359
Chalking: ASTM D 4214
Chemical Pollution: ASTM D 1308
Color Change and Conformity: ASTM D 2244
Creepage: ASTM D 1654
Cyclic Corrosion Test: ASTM D 5894
Flame Spread: ASTM E 84
Flexibility: ASTM D 522
Formability: ASTM D 522
Gloss at 60 and 85 degrees: ASTM D 523
Humidity: ASTM D 2247 and ASTM D 714
Oxidation: ASTM D 610
Pencil Hardness: ASTM D 3363
Reverse Impact: ASTM D 2794
Salt Spray: ASTM B117
Weatherometer: ASTM G 152, ASTM G 153 and ASTM D 822

2.2.1 Specular Gloss

For roofs of structures along airfields where glare would be objectionable and may be an operational hazard, the specular gloss value should be limited to 10 or less at an angle of 85 degrees. Limited paint systems can meet this reflectance value. Panel embossing also reduces the gloss, or reflectance value, and may be specified in combination with the paint system specification to meet the necessary requirement

Finished roof surfaces to have a specular gloss value of 30 plus or minus 5 at an angle of 60 degrees or 10 or less at an angle of 85 degrees when measured in accordance with ASTM D 523.

2.3 MISCELLANEOUS METAL FRAMING

2.3.1 General

Provide cold formed metallic-coated steel sheet conforming to ASTM A653/A653M, AISI S100, and as specified in 05 40 00 COLD-FORMED METAL FRAMING unless otherwise indicated.

2.3.2 Fasteners and Miscellaneous Metal Framing

Provide compatible type, corrosion resistant, of sufficient size and length to penetrate the supporting element a minimum of one inch with other required properties to fasten miscellaneous metal framing members to substrates in accordance with the roof panel manufacturer's and ASCE 7-10 requirements.

2.3.2.1 Exposed Fasteners

Fasteners for roof panels must be stainless steel, compatible with the sheet panel or flashing material and of the type and size recommended by the manufacturer to meet the performance requirements and design loads. Fasteners for accessories must be the manufacturer's standard. Provide an integral metal washer, matching the color of attached material with compressible sealing EPDM gasket approximately 3/32 inch thick for exposed fasteners.

2.3.2.2 Screws

Provide corrosion resistant screws, stainless steel of the type and size recommended by the manufacturer to meet the performance requirements.

2.3.2.3 Rivets

Provide closed-end type rivets, corrosion resistant stainless steel where watertight connections are required.

2.3.2.4 Attachment Clips

Provide hot-dip galvanized, conforming to ASTM A653/A653M, stainless steel, series 300 clips. Size, shape, thickness and capacity must meet the thickness and design load criteria specified.

2.3.3 Electrodes for Manual, Shielded Metal Arc Welding

Electrodes for manual, shielded metal arc welding must meet the requirements of AWS D1.1/D1.1M, and be covered, mild-steel electrodes conforming to AWS A5.1/A5.1M.

2.4 ACCESSORIES

Accessories must be compatible with the metal roof panels. Sheet metal flashing, trim, metal closure strips, caps, and similar metal accessories must be not less than the minimum thicknesses specified for roof panels. Provide exposed metal accessories to match the panels furnished, except as otherwise indicated. Molded foam rib, ridge and other closure strips must be closed-cell or solid-cell synthetic rubber or neoprene premolded to match configuration of the panels and not absorb or retain water.

2.4.1 Pre-manufactured Accessories

Pre-manufactured accessories must be manufacturer's standard for intended purpose, comply with applicable specification section, compatible with the metal roof system and approved for use by the metal roof panel manufacturer. Construct curbs to match roof slope.

2.4.2 Metal Closure Strips

Provide factory fabricated steel closure strips of the same gauge, thickness, color, finish and profile as the specified roof panel.

2.4.3 Rubber Closure Strips

Provide closed-cell, expanded cellular rubber closure strips conforming to ASTM D 1056 and ASTM D 1667, extruded or molded to the configuration of the specified roof panel profile and in lengths supplied by roof panel manufacturer.

2.4.4 Sub girts for Retrofits

Provide bar sub girts 1-1/2 by 1/8 inch galvanized steel with slotted holes for welding to end of impaling clip spikes.

2.5 JOINT SEALANTS

2.5.1 Sealants

Sealants are to be an approved gun type for use in hand or air pressure caulking guns at temperatures above 40 degrees F (or frost-free application at temperatures above 10 degrees F) with a minimum solid content of 85 percent of the total volume. Sealant must dry with a tough, durable surface skin which permits it to remain soft and pliable underneath, providing a weather tight joint. No migratory staining, in conformance with to ASTM C792, is permitted on painted or unpainted metal, stone, glass, vinyl or wood.

Prime all joints to receive sealants with a compatible one-component or two-component primer as recommended by the roof panel manufacturer.

2.5.1.1 Shop Applied Sealants

Sealant for shop-applied caulking must be an approved gun grade, non-sag one-component polysulfide or silicone conforming to ASTM C792 and ASTM C920, Type II, with a curing time which ensures the sealants plasticity at the time of field erection. Color to match panel color.

2.5.1.2 Field Applied Sealants

Sealants for field-applied caulking must be an approved gun grade, non-sag on-component polysulfide or two component polyurethane with an initial maximum Shore A durometer hardness of 25, conforming to ASTM C920, Type II. Color to match panel color.

2.5.1.3 Tape Sealants

Provide pressure sensitive, 100 percent solid tape sealant with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the roof panel manufacturer.

2.5.2 Sheet Metal Flashing and Trim

2.5.2.1 Fabrication, General

Custom fabricate sheet metal flashing and trim to comply with recommendations within the SMACNA 1793 that apply to design, dimensions, metal type, and other characteristics of design indicated. Shop fabricate items to the greatest extent possible. Obtain and verify field measurements for accurate fit prior to shop fabrication. Fabricate flashing and trim without excessive oil canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

2.5.2.2 Roof Drainage Sheet Metal Fabrications

Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96 inch long sections. Fabricate expansion joints and accessories from the same metal as gutters, unless otherwise indicated.

Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangars of same material as downspouts and anchors.

2.6 INSULATION

Insulation, facer material and attachment must be compatible with metal roof system specified, as approved by the roof panel manufacturer, and conform to ASTM C552 (cellular glass) or ASTM C553 (fiber blankets).

2.6.1 Fire Rated Assembly System

Provide semi-rigid glass-fiber insulation board conforming to ASTM C553, Form A, Class 1, Class A fire-hazard classification with a minimum density of 1.55 pounds per cubic foot (pcf) and 1-1/2 inches thick. Thermal conductivity (K) must not exceed 0.24.

2.6.2 Fire Rated Roof Panel Assembly

Provide materials for fire-rated roof panel construction as follows:

Impaling clips, accessories, and fasteners must be UL listed 40 U18.24 UL Bld Mat Dir galvanized steel sheet or impaling bolts welded to each wall unit joint and spaced not more than 48 inches on center.

Provide bar sub girts 1-1/2 by 1/8 inch galvanized steel with slotted holes for welding to end of impaling clip spikes.

Provide galvanized steel structural angles and flashing angles, gage or thickness as indicated, or material as specified. Flashing angles must be not less than No. 18 U.S. standard gage.

Provide hot-dip galvanized steel metal facing conforming to ASTM A653, Grade A. Coating must conform to, ASTM A653 and ASTM A924.

Metal facing must be as indicated and fabricated of enamel-coated hot-dip galvanized steel conforming to ASTM A653, Grade A. Coating must conform to ASTM A653 and ASTM A924. Provide Class A fire hazard classification finish. Flame spread, fuel contributed, or smoke developed cannot exceed a value of 25.

Submit fire rating test report to contracting officer for review and approval. Secure written approval prior to commencement of installation.

2.7 UNDERLAYMENTS

Consider self-adhering modified bitumen underlayment for ice dam protection and ridge, hip, valley, and sidewall areas. Additionally, severe weather locations, complex roofs, or high value contents must consider the higher protection capacity of a self-adhering modified bitumen underlayment, where it will not create a condensation concern.

When low perm underlayment is used throughout the roof area, ensure its vapor retarding effects are considered such that its use does not create condensation issues. Consideration for predominant vapor drive action in hot and cold climates in combination with building use and location, insulation location, under deck or attic space venting, and vapor retarder needs and positioning should be considered in

underlayment selection. Underlayment in conjunction with an underlying and properly positioned vapor retarder/barrier may be required in some circumstances.

For shed roofs, underlayment may be omitted.

2.7.1 Felt Underlayment

Provide No. 30 asphalt-saturated organic, non-perforated felt underlayment in compliance with ASTM D 226 Type II, or ASTM D4869.

2.7.2 Self-Adhering Modified Bitumen Underlayment

Provide self-adhering modified bitumen membrane underlayment material in compliance with ASTM D1970, suitable for use as underlayment for metal roofing. Use membrane resistant to cyclical elevated temperatures for extended period of time in high heat service conditions. Provide membrane with integral non-tacking top surface of polyethylene film or other surface material to serve as separator between bituminous material and metal products to be applied above.

2.7.3 EPDM Membrane

Ethylene Propylene Diene Terpolymer (EPDM), ASTM D4637, Type I, non-reinforced, minimum 1.1 mm (0.045 inch) thick.

2.7.4 Slip Sheet

Provide 5 pounds per 100 sf rosin sized unsaturated building paper for slip sheet.

2.8 GASKETS AND SEALING/INSULATING COMPOUNDS

Gaskets and sealing/insulating compounds must be nonabsorptive and suitable for insulating contact points of incompatible materials. Sealing/insulating compounds must be non-running after drying.

2.9 FINISH REPAIR MATERIAL

Repair paint for color finish enameled roofing must be compatible paint of the same formula and color as the specified finish furnished by the manufacturer.

Only use repair and touch-up paint supplied by the roof panel manufacturer and is compatible with the specified system.

PART 3 EXECUTION

3.1 EXAMINATION

Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the work. Ensure surfaces are suitable, dry and free of defects and projections which might affect the installation.

Examine primary and secondary roof framing to verify that rafters, purlins, angels, channels, and other structural support members for panels and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer, UL, ASTM, and ASCE 7-10 [and applicable seismic] requirements.

Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking; and that installation is within flatness tolerances required by metal roof panel manufacturer.

Examine rough-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of panels prior to installation.

Submit a written report to the Contracting Officer, endorsed by the installer, listing conditions detrimental to the performance of the work. Proceed with installation only after defects have been corrected.

3.2 INSTALLATION

Installation must meet specified requirements and be in accordance with the manufacturer's installation instructions and approved shop drawings. Do not install damaged materials. Dissimilar materials which are not compatible when contacting each other must be insulated by means of gaskets or sealing/insulating compounds. Keep all exposed surfaces and edges clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Remove stained, discolored, or damaged materials from the site.

3.2.1 Preparation

Clean all substrate substances which may be harmful to insulation, and roof panels including removing projections capable of interfering with insulation, and roof panel attachment.

Install sub-purlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.2.2 Underlayment

Install underlayment according to roof panel manufacturer's written recommendations and recommendation in NRCA “The NRCA Roofing and Waterproofing Manual".

3.2.2.1 Single Layer Felt Underlayment for a Standard Slope Roof Deck

Install single layer of felt underlayment on roof deck perpendicular to roof slope in parallel courses. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses a minimum of 72 inches. Fasten with felt underlayment roofing nails.

Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in a direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.

3.2.2.2 Self-Adhering Sheet Underlayment

Install self-adhering sheet underlayment; wrinkle free on roof deck. Comply with low-temperature installation restrictions of manufacturer where applicable. Install at locations indicated on project drawings, lapped in a 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.

3.2.2.3 Slip Sheet

Apply specified slip sheet at time of roof panel installation when felt or other underlayment is used that may be in direct contact with and adhere to or adversely impact the underside of roof panels, and as otherwise recommended by the roof panel manufacturer. Install slip sheet over deck substrates prior to roof panel installation.

3.3 INSULATION INSTALLATION

Install insulation concurrently with metal roof panel installation, in thickness indicated, to cover entire roof, according to manufacturer's written instructions.

3.4 PROTECTION OF APPLIED MATERIALS

Do not permit storing, walking, wheeling, and trucking directly on applied roofing/insulation materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to applied roofing/insulation materials, and to distribute weight to conform to indicated live load limits of roof construction.

3.5 FASTENER INSTALLATION

Anchor metal roof panels and other components of the Work securely in place, using approved fasteners according to manufacturer's written instructions.

3.5.1 Welding

Procedures for manual, shielded metal-arc welding, the appearance and quality of welds made, and the methods used in correcting welding work must be in accordance with AWS D1.1/D1.1M.

3.6 FLASHING, TRIM, AND CLOSURE INSTALLATION

3.6.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. 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 water tight and weather resistant. Work is to be accomplished to form weather tight construction without waves, warps, buckles, fastening stresses or distortion, and to allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accomplish the work must conform to the manufacturers written instructions.

3.6.2 Metal Flashing

Install exposed metal flashing at building corners, rakes, eaves, junctions between metal siding and roofing, valleys and changes off slope or direction in metal roofing, building expansion joints and gutters.

Exposed metal flashing must be the same material, color, and finish as the specified metal roofing panels. Furnish flashing in minimum 8 foot lengths. Exposed flashing must have 1 inch locked and blind soldered end joints, with expansion joints at intervals of no greater than 16 feet.

Fasten flashing at not more than 8 inches on center for roofs, except where flashing is held in place by the same screws used to secure panels. Exposed flashing and flashing subject to rain penetration must be bedded in specified joint sealant. Flashing which is contact with dissimilar metals must be isolated by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Form drips to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

3.7 ROOF PANEL INSTALLATION

Provide metal roof panels of full length from eave to ridge or eave to wall as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels or other components of the Work securely in place, with provisions for thermal and structural movement in accordance with NRCA 0409.

Steel Roof Panels: Use stainless steel fasteners for exterior surfaces and galvanized fasteners for unexposed surfaces.

Aluminum Roof Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for unexposed surfaces.

Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using approved fasteners according to manufacturer's written instructions. Provide all blocking and nailers as required.

Metal Protection: Where dissimilar metals contact each other or possibly corrosive substrates, protect against galvanic action by permanent separation as recommended by the metal roof panel manufacturer.

Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and required for weatherproof performance of metal roof panel system. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

3.7.1 Handling and Erection

Erect roofing system in accordance with the approved erection drawings, printed instructions and safety precautions of the manufacturer.

Do not subject panels to overloading, abuse, or undue impact. Do not apply bent, chipped, or defective panels. Damaged panels must be replaced and removed from the site at the contractor's expense. Erect panels true, plumb, and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with indicated rake, eave, and curb overhang. Allow for thermal movement of the roofing, movement of the building structure, and provide permanent freedom from noise due to wind pressure.

Do not permit storage, walking, wheeling or trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to the installed roofing materials, and to distribute weight to conform to the indicated live load limits of the roof construction.

Roof panels must be laid with corrugations in the direction of the roof slope. End laps of exterior roofing must not be less than 8 inches; side laps of standard exterior corrugated panels must not be less than 2-1/2 corrugations.

Field cutting of metal roof panels by torch is not permitted. Field cut only as recommended by manufacturer's written instructions.

3.7.2 Closure Strips

Install metal closure strips at open ends of metal ridge rolls; open ends of corrugated or ribbed pattern roofs, and at intersection of wall and roof, unless open ends are concealed with formed eave flashing; rake of metal roof unless open end has a formed flashing member; and in other required areas.

Install closure strips at intersection of the wall with metal roofing; top and bottom of metal siding; heads of wall openings; and in other required locations.

3.7.3 Workmanship

Make lines, arises, and angles sharp and true. Free exposed surfaces from any visible wave, warp, buckle and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and as necessary to make the work watertight.

3.8 ACCEPTANCE PROVISIONS

3.8.1 Erection Tolerances

Erect metal roofing straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions. Horizontal lines must not vary more than 1/8 inch in 40 feet.

3.8.2 Leakage Tests

Finished application of metal roofing is to be subject to inspection and test for leakage by the Contracting Officer or his designated representative, and Architect/Engineer. Inspection and tests will be conducted without cost to the Government.

Inspection and testing is to be made promptly after erection to permit correction of defects and removal/replacement of defective materials.

3.8.3 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials and as recommended by the metal roof panel manufacturer. Finished repaired surfaces must be uniform and free from variations of color and surface texture. Repaired metal surfaces that are not acceptable to the project requirements are to be immediately removed and replaced with new material.

3.8.4 Paint Finished Metal Roofing

Paint finished metal roofing will be tested for color stability by the Contracting Officer during the manufacturer’s specified guarantee period. Panels that indicate color changes, fading, or surface degradation, determined by visual examination, must be removed and replaced with new panels at no expense to the Government. New panels will be subject to the specified tests for an additional year from the date of their installation.

3.9 CLEAN UP AND DISPOSAL

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces must be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating. Touch up scratches in panel finish with manufacturer supplied touch-up paint system to match panel finish. Treat exposed cut edges with manufacturer supplied clear coat.

Collect all scrap/waste materials and place in containers. Promptly dispose of demolished and scrap materials. Do not allow scrap/waste materials to accumulate on-site; transport immediately from the government property and legally dispose of them.

3.10 FIELD QUALITY CONTROL

3.10.1 Manufacturer's Inspection

Manufacturer's technical representative must visit the site a minimum of three times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Make inspections during the first 20 squares of roof panel installation, at mid-point of the installation, and at substantial completion, at a minimum. Additional inspections are required for each 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors must be performed as requested by the Contracting Officer. After each inspection, submit a report, signed by the manufacturer's technical representative to the Contracting Officer within 3 working days. Note in the report overall quality of work, deficiencies and any other concerns, and recommended corrective action.

Submit three signed copies of the manufacturer's field inspection reports to the Contracting Officer within one week of substantial completion.

3.11 INFORMATION CARD

For each roof, furnish a typewritten information card for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved (0.032) inch thick aluminum card for exterior display.

Format as directed in paragraph titled "Form One".

Make card 8 1/2 by 11 inches minimum. Information card must identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, roof panel manufacturer and product name, type underlayment(s), date of completion; installing contractor identification and contact information; manufacturer warranty expiration, warranty reference number, and contact information. Install card at location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

3.11.1 Form One

FORM 1 - PREFORMED [STEEL] [ALUMINUM] PANEL ROOFING SYSTEM AND COMPONENTS

1. Contract Number:
2. Building Number & Location:
3. COE Specification Number:
4. Deck/Substrate Type:
5. Slopes of Deck/Roof Structure:
6. Insulation Type & Thickness:
7. Insulation Manufacturer:
8. Vapor Retarder: ( )Yes ( )No
9. Vapor Retarder Type:
10. Preformed Steel Standing Seam Roofing Description:

a. Manufacturer (Name, Address, & Phone No.):
b. Product Name:
c. Width:
d. Gage:
e. Base Metal:
f. Method of Attachment:

11. Repair of Color Coating:

a. Coating Manufacturer (Name, Address & Phone No.):
b. Product Name:
c. Surface Preparation:
d. Recoating Formula:
e. Application Method:

12. Statement of Compliance or Exception:_____

_____

13. Date Roof Completed:
14. Warranty Period: From_____ To_____
15. Roofing Contractor (Name & Address):
16. Prime Contractor (Name & Address):
Contractor's Signature _____ Date:

Inspector's Signature _____ Date:
Text

3.12 DATE OF INSTALLATION WALL-MOUNTED PLACARD

For each metal roof panel installation, furnish an exterior "Date of Installation Placard", 0.032 inch thick aluminum, 8-1/2 inches high by 11 inches wide, with mounting accessories, photoengraved to include the following information:

Facility Name and Number
Approximate Roof Area Newly Installed and Date of Completion
Manufacturer, Type of Roof Panel and Name
Underlayment and Insulation System, R value
Installing Contractor and Contact Information
Warranty Expiration Date
Warranty Reference Number and Contact Information
Install placard as directed by the Contracting Officer.

UNIFIED FACILITIES GUIDE SPECIFICATION
SECTION 07 41 63
FABRICATED ROOF PANEL ASSEMBLIES
05/09

NOTE: This guide specification covers the requirements for both factory color and mill finish aluminum or steel fabricated roof panel assemblies.

This section includes structural standing seam panels, insulated sandwich panels and special fabricated roof panel systems.

For Army projects also refer to TI 809-29, "Structural Considerations for Metal Roofing".

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.

ALUMINUM ASSOCIATION (AA)

AA ADM (2010) Aluminum Design Manual

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

ANSI/AISC 341 (2005; Suppl No. 1 2005) Seismic Provisions for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3 (2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-10 (2010; Change 2010; Change 2011) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M (2004) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

AWS D1.1/D1.1M (2010) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M (2011) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened

ASTM A123/A123M (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A36/A36M (2008) Standard Specification for Carbon Structural Steel

ASTM A424/A424M (2009a) Standard Specification for Steel Sheet for Porcelain Enameling

ASTM A463/A463M (2010) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

ASTM A606/A606M (2009a) Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance

ASTM A653/A653M (2010) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A780/A780M (2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM A792/A792M (2010) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

ASTM A924/A924M (2010a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

ASTM B117 (2009) Standing Practice for Operating Salt Spray (Fog) Apparatus

ASTM B209 (2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B659 (1990; R 2008e1) Standard Guide for Measuring Thickness of Metallic and Inorganic Coatings

ASTM C273 (2007a) Shear Properties of Sandwich Core Materials

ASTM C286 (1999; R 2009) Standard Terminology Relating to Porcelain Enamel and Ceramic-Metal Systems

ASTM C553 (2011) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

ASTM C612	(2010) Mineral Fiber Block and Board Thermal Insulation
ASTM C920	(2011) Standard Specification for Elastomeric Joint Sealants
ASTM D 1056	(2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1308	(2002; R 2007) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1621	(2010) Compressive Properties of Rigid Cellular Plastics
ASTM D 1622	(2008) Apparent Density of Rigid Cellular Plastics
ASTM D 1667	(2005; R 2011) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D 2244	(2011) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Coordinates
Color	
ASTM D 2247	(2011) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 2794	(1993; R 2010) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 2856	(1994; R 1998) Open-Cell Content of Rigid Cellular Plastics by the Air Psychronometer
ASTM D 333	(2001; R 2007) Standard Guide for Clear and Pigmented Lacquers
ASTM D 3363	(2005e1; R 2011) Film Hardness by Pencil Test
ASTM D 4214	(2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 522	(1993a; R 2008) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(2008) Standard Test Method for Specular Gloss
ASTM D 714	(2002; R 2009) Evaluating Degree of Blistering of Paints
ASTM D 822	(2001; R 2006) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D 968	(2005; R 2010) Abrasion Resistance of Organic Coatings by Falling Abrasive

ASTM E 119	(2011) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E 136	(2011) Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
ASTM E 1592	(2005) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E 2140	(2001; R 2009) Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head
ASTM E 84	(2011a) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G 152	(2006) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G 153	(2004; R 2010) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

FM GLOBAL (FM)

FM 4471	(2010) Class I Panel Roofs

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA RSDM	(2000) Metal Roofing Systems Design Manual

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500	(2006) Metal Finishes Manual

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0405	(2001; 5th Ed) Roofing and Waterproofing Manual
NRCA 0409	(2006) Architectural Sheet Metal and Metal Roofing Manual

PORCELAIN ENAMEL INSTITUTE (PEI)

PEI 1001	(1996) Specification for Architectural Porcelain Enamel (ALS-100)

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2003) Architectural Sheet Metal Manual, 6th Edition

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC PS 9.01	(1982; E 2004) Cold-Applied Asphalt Mastic Painting System with Extra-Thick Film

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS SS-L-30	(Rev D; Int Am 3) Lath and Board Products, Gypsum

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

NAVFAC A-A-50570	(1997) Paint, Water-Borne, Acrylic Or Modified Acrylic, Semigloss, For Metal Surfaces

UNDERWRITERS LABORATORIES (UL)

UL 580 of Roof	(2006; Reprint Jul 2009) Tests for Uplift Resistance Assemblies
UL Bld Mat Dir	(2011) Building Materials Directory

1.2 PERFORMANCE REQUIREMENTS

a. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

b. Wind-Uplift Resistance: Provide roof panel assemblies that comply with the requirements of the roof systems and attachments in accordance with ASTM E 1592 and UL 580. Uplifting force due to wind action governs the design for panels.

(1) Roof systems and attachments are to resist the wind loads as determined by ASCE 7-10 in pounds per square foot.

c. FMG Listing: Provide FRP roof panels and component materials that comply with requirements in FM 4471as part of a panel roofing system and that are listed in FMG "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

d. Structural Performance: Provide roof panel assemblies capable of withstanding the effects of gravity loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592.

e. Seismic Performance: Provide fabricated roof panel assemblies conforming to and ANSI/AISC 341 with test data.

1.3 DEFINITIONS

Fabricated Roof Panel Assembly: Metal roof and liner panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories shop fabricated or field assembled for a complete weather-tight roofing system.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals
Qualification of Manufacturer
Qualification of Installer

Qualifications for Welding

SD-02 Shop Drawings
Roofing Panels
Flashing and Accessories
Gutter/Downspout Assembly

SD-03 Product Data
Coil Stock
Factory Color Finish
Sub-girts and Formed Shapes
Closure Materials
Insulation
Pressure Sensitive Tape
Sealants and Caulking
Rated Wall Assembly
Galvanizing Repair Paint
Enamel Repair Paint
Aluminized Steel Repair Paint
Accessories

SD-04 Samples
Coil Stock Sample 12 inches long by the actual panel width
Roofing Panel sample 12 inches long by actual panel width
Fasteners
Metal Closure Strips 10 inches long of each type
Insulation, approximately 8 by 11 inches
Manufacturer s color charts and chips

SD-05 Design Data
Wind design analysis
Seismic design analysis

SD-06 Test Reports
Leakage Tests
Fire Rating Test Report
Coatings and base metals of metal roofing
Factory Finish and Color Performance Requirements
Wind Uplift Test Report
Seismic Test Report

SD-07 Certificates
Coil Stock
Fasteners
Galvanizing Repair Paint
Enamel Repair Paint

SD-08 Manufacturer's Instructions
Installation of Roof panel assemblies

SD-11 Closeout Submittals
Warranty Information Form and Placard
Manufacturer's field inspection reports
Instructions to Government and/or Contractor Personnel;
Date Of Installation Wall-Mounted Placard
Submit 20 year "No-Dollar-Limit" warranty for labor and materials

1.5 QUALITY ASSURANCE

1.5.1 Pre-Construction Meeting

After submittals are received and approved but before roofing and insulation work, including associated work, is performed, the Contracting Officer's Representative, at the request of the Contractor shall hold a pre-construction meeting to review the following:

a. The drawings and specifications:

(1) Fabrication and Installation drawings for the following items are to indicate completely dimensioned structural frame and erection layouts, openings in roof, special framing details and construction details at corners, ridges, eaves, building intersections, curbs and flashing, location and type of mastic and metal filler strips, location and erection of flashing and gutter/downspout assembly:

(2) Installation of Roof panel assemblies

(3) Roofing Panels

(4) Flashing and Accessories

(5) Gutter/Downspout Assembly

Submit certification from coil stock manufacturer or supplier that the machinery used will form the provided coil stock without warping, waviness, or rippling that is not a part of the panel profile, and without damage, abrasion or marring of the finish coating.

Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures and patterns available for roof panels with Factory Color Finish.

Submit Factory Finish and Color Performance Requirements verified by an independent testing agency.

Submit a wind design analysis from the manufacturer including, but not limited to, wind speed, exposure category, co-efficient, importance factor, designate type of facility, negative pressures for each zone, methods and requirements of attachment. Include a roof plan delineating dimensions and attachment patterns for each zone. Prepare signed and sealed wind design analysis with a Licensed Project Engineer, in the geographic area where the construction will take place.

(6)Wind Uplift Test Report

(7) Seismic design analysis

(8) Seismic Test Report

(9) Fire Rating Test Report

b. Qualifications including:

(1) Qualification of Manufacturer

Certify that the manufacturer of the metal roofing system meets requirements specified.

(2) Qualification of Installer

Certify that the applicator meets requirements specified, and provide evidence that products used within this specification are manufactured in the United States.

(3) Qualifications for Welding

Provide certification of welding procedures conforming to AWS A5.1 and AWS D1.1

c. Submit procedure for onsite inspection and acceptance of the roofing substrate and pertinent structural details relating to the roofing system, including; but not limited to:

(1) Material Safety Data Sheets

(2) Sub-girts and Formed Shapes

(3) Closure Materials
(4) Insulation
(5) Pressure Sensitive Tape
(6) Sealants and Caulking
(7) Rated Wall Assembly
(8) Galvanizing Repair Paint
(9) Enamel Repair Paint
(10) Aluminized Steel Repair Paint
(11) Accessories

d. Submit plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing. Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

e. Safety requirements to include means and methods for compliance to the safety requirements outline in EM385-1-1.

f. Submit Manufacturer's data indicating percentage of recycle material in roofing panels to verify sustainable acquisition compliance.

1.5.2 Manufacturer's Technical Representative

Ensure the representative has authorization from manufacturer to approve field changes and is thoroughly familiar with the products and installations in the geographical area where construction will take place.

1.5.3 Qualification of Manufacturer

Guarantee the metal roof panel system manufacturer possesses the following:

a. A minimum of five years' experience in manufacturing metal roof system and accessory products.

b. Engineering services of an authorized engineer; currently licensed in the geographical area where construction will take place, having a minimum of four years' experience as an engineer knowledgeable in roof wind design analysis, protocols and procedures for the MBMA Metal Roofing System Design Manual; ASCE 7-10, UL 580 and FM wind design guide for metal roof systems.

c. Certified engineering calculations using the products submitted for:

Wind uplift requirements in accordance with FM Wind Design Guide and ASCE 7-10.

1.5.4 Qualification of Installation Contractor

Confirm that the installation contractor is approved and certified by the roofing panel manufacturer prior to beginning the installation of the metal roofing system.

1.5.5 Single Source

Obtain each type of metal roof and liner panels, clips, closures and other accessories from the standard products of the single source from a single manufacturer to operate as a complete system for the intended use.

1.5.6 Surface-Burning Characteristics

Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Flame-Spread Index: 25or less.

Smoke-Developed Index: 450 or less.

1.5.7 Fire-Resistance Ratings

Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Combustion Characteristics: ASTM E 136.

1.5.8 Fabrication

Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles, dimensional and structural requirements conforming to AISI SG03-3.

Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weather-tight and minimize noise from movements within panel assembly.

Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA 1793 that apply to the design, dimensions, metal, and other characteristics of item indicated.

Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

End Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA 1793.

Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA 1793 or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

1.5.9 Finishes

Comply with NAAMM AMP 500 for recommendations for applying and designating finishes.

Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.6 DELIVERY, HANDLING, AND STORAGE

Deliver components, sheets, metal roof panels, and other manufactured items to prevent damage or deformation; package metal roof panels for protection during transportation and handling.

Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.

Stack metal roof panels on platforms or pallets, covered with suitable weather-tight and ventilated covering; store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.

Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

Protect foam-plastic insulation as follows:

a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.

Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed according to manufacturer's written instructions and warranty requirements.

Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.8 WARRANTY

Furnish the metal roof panel manufacturer's 20-year no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation, components, trim, and accessories necessary for a watertight roof system construction. Make warranty directly to the Government, commencing at time of Government’s acceptance of the roof work. Provide a warranty with the following conditions:

a. If within the warranty period, the metal roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, displaces, corrodes, perforates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the metal roof system and correction of defective workmanship is the responsibility of the metal roof panel manufacturer. All costs associated with the repair or replacement work are the responsibility of the metal roof panel manufacturer. Conform galvanized repairs to ASTM A780/A780M.

b. If the manufacturer or his approved applicator fail to perform the repairs within 24 hours of notification, emergency temporary repairs performed by others does not void the warranty.

1.8.1 Manufacturer's Finish Warranty

Provide a manufacturer's 20 year "No-Dollar-Limit" warranty for labor and materials for the roofing system. Issue the warranty directly to the Government at the date of Government acceptance. warranting that the factory color finish, under normal atmospheric conditions at the site, will not crack, peel, or delaminate; chalk in excess of a numerical rating of 8 when measured in accordance with ASTM D 4214; or fade or change colors in excess of 5 NBS units as measured in accordance with ASTM D 2244.

1.8.2 Metal Roof System Installer Warranty

Provide the "Contractors Five (5) Year No Penal Sum Warranty for Non-Structural Metal Roof System" attached at the end of this section.

Provide roof system installer warranty for a period of not less than two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof panel installation, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Issue warranty directly to the Government. Correction of defective workmanship and replacement of damaged or affected materials is the responsibility of the metal roof system installer. All costs associated with the repair or replacement work are the responsibility of the installer.

1.8.3 Continuance of Warranty

Approve and accomplish required repair or replacement work that becomes necessary within the warranty period in a manner so as to restore the integrity of the roof system assembly and maintain the validity of the metal roof system manufacturer warranty for the remainder of the manufacturer warranty period.

1.9 CONFORMANCE AND COMPATIBILITY

Provide an entire roofing and flashing system in accordance with specified and indicated requirements, including wind resistance and seismic per ANSI/AISC 341 requirements. Perform any work not specifically addressed, or any deviation from specified requirements in general accordance with recommendations of the MBMA RSDM, NRCA 0405, the metal panel manufacturer's published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

1.10 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of English unit measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The English and metric units for the measurements shown are as follows:

PRODUCTS	ENGLISH UNITS
a. Sheet Aluminum	0.040 inch
b. Panels	12 inches
- Vertical legs	2 inches
- Stiffening ribs	4 inches
c. Screws	No. 14
	No. 12
d. Bolts	1/4 inch

e. Studs	3/16 inch
f. Fasteners	1/2 inch One inch
g. Rivets	1/16 inch 1/8 inch

PART 2 PRODUCTS

2.1 PANEL MATERIALS

2.1.1 Aluminum Sheet

Roll-form aluminum roof and liner panels to the specified profile, with fy equals 40ksi, .040 inch thickness and depth as indicated. Ensure the material is plumb and true, and within the tolerances listed:

a. Aluminum Sheet conforming to ASTM B209, ASTM B209M, and AA ADM.

b. Individual panels to have continuous length to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not part of the panel profile and free of damage to the finish coating system.

c. Provide panels with thermal expansion and contraction consistent with the type of system specified.

(1) Provide profile and coverage of minimum height and width from manufacturer s standard for the indicated roof slope.

(2) Provide a profile of 1-1/2 inch high rib at 12 inches o.c. with small stiffening ribs, 38 inch overall width with 36 inch coverage and exposed fasteners.

(3) Provide a profile of 1-1/2 inch high rib at 7.2 inches o.c., 38-7/8 inch overall width with 36 inch coverage and exposed fasteners.

(4) Provide a profile of 1 inch high rib at 4 inches o.c., 49-5/8 inch overall width with 44-48 inch coverage and exposed fasteners.

(5) Provide a profile of 1 inch high rib at 8 inches o.c., 41-5/8 inch overall width with 40 inch coverage and exposed fasteners.

(6) Provide a profile of 1-3/4 inch high V-beam rib at 5 inches o.c., 44-7/8 inch overall width with 42 inch coverage and exposed fasteners.

(7) Provide a profile of 7/8 inch high corrugated rib at 2 inches o.c., 38-7/8 inch overall width with 36 inch coverage and exposed fasteners.

(8) Provide a profile of 3 inch high standing seam, 24 inch coverage, factory-caulked and mechanical crimping or snap-together seams with concealed clips and fasteners.

(9) Provide a profile of 2 inch high standing seam, 12 -18 inch coverage, with mechanical crimping or snap-together seams with concealed clips and fasteners.

(10) Provide [smooth, flat] [embossed] Surface Texture.

2.1.2 Steel Sheet

Provide roll-form steel roof and liner panels to the specified profile, with fy equals 40ksi, 22 gauge and depth as indicated, conforming to ASTM A1008, ASTM A36. Ensure the material is plumb and true, and within the tolerances listed:

a. Galvanized/Galvannealed Steel Sheet conforming to ASTM A123, ASTM A653, ASTM A653, ASTM A792, and AISI SG03-3.

b. Metallic coated steel sheet conforming to ASTM A924.

c. Aluminum-Zinc Alloy-coated Steel Sheet conforming to ASTM A463, ASTM A792 and AISI SG03-3.

d. Steel sheet with porcelain coating conforming to ASTM A424, ASTM C286, and PEI 1001, or ASTM A606 for improved atmospheric corrosion resistance.

e. Individual panels to have continuous length to cover the entire length of any unbroken roof slope with no joints or seams and formed without warping, waviness, or ripples that are not part of the panel profile and free of damage to the finish coating system.

f. Provide panels with thermal expansion and contraction consistent with the type of system specified.

(1) Profile and coverage: a minimum height and width from manufacturer's standard for the indicated roof slope.

(2) Profile: a 1-1/2 inch high rib at 12 inches o.c. with small stiffening ribs, 38 inch overall width with 36 inch coverage and exposed fasteners.

(3) Profile: a 1-1/2 inch high rib at 7.2 inches o.c., 38-7/8 inch overall width with 36 inch coverage and exposed fasteners.

(4) Profile: a 1 inch high rib at 4 inches o.c., 49-5/8 inch overall width with 48, 44 inch coverage and exposed fasteners.

(5) Profile: a 1 inch high rib at 8 inches o.c., 41-5/8 inch overall width with 40 inch coverage and exposed fasteners.

(6) Profile: a 7/8 inch high corrugated rib at 2 inches o.c., 38-7/8 inch overall width with 36 inch coverage and exposed fasteners.

(7) Profile: a 3 inch high standing seam, 24 inch coverage, factory-caulked and mechanical crimping or snap-together seams with concealed clips and fasteners.

(8) Profile: a 1,1-3/4, 2, 2-1/2 inch high standing seam, 12, 16, 18 inch coverage, with mechanical crimping or snap-together seams with concealed clips and fasteners.

(9) Provide smooth, flat, embossed surface texture.

2.1.3 Foam-Insulation Core Roof Panel

Provide factory-formed aluminum or steel roof panel assembly fabricated from two sheets of metal with modified polyisocyanurate or polyurethane foam insulation core board during fabrication with joints between panels designed to form weather-tight seals. Include accessories required for weather-tight installation.

a. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.

b. Density: 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D 1622.

c. Compressive Strength: Minimum 20 psi when tested according to ASTM D 1621.

d. Shear Strength: 26 psi when tested according to ASTM C273.

2.1.4 Insulated Panel Construction

Shop fabricates or field assembles insulated panel construction with specified exterior and interior aluminum or steel sheet in accordance with manufacturer's printed instructions.

Provide pre-finished interior lath or board finished interior surface for panel assemblies conforming to FS SS-L-30 and UL Bld Mat Dir.

Provide glass-fiber insulation conforming to ASTM C553 and ASTM C612 of thickness and density as required for the geographical area where construction will take place. Glass-Fiber and Mineral-Wool-Fiber are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (http://www.epa.gov/cpg/)

Provide insulation fasteners of adhesively attached type, plate welded to projecting spindle anchors; capable of holding insulation of thickness indicated, secured in position with self-locking washer and complying with the following requirements:

a. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

b. 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.

d. Provide anchor adhesive with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

2.1.5 Finish

All panels are to receive a factory-applied polyvinylidene fluoride, Kynar 500/Hylar 5000 finish consisting of a baked-on top-coat with a manufacturer s recommended prime coat conforming to the following:

a. Metal Preparation: All metal is to have the surfaces carefully prepared for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with acid rinse, and thorough drying.

b. Prime Coating: Apply a base coat of epoxy paint, specifically formulated to interact with the top-coat, to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. Ensure the prime coat is oven cured prior to application of finish coat.

c. Exterior Finish Coating: Apply the finish coating over the primer by roll coating to dry film thickness of 0.80 plus 5 mils (3.80 plus 0.50 mils for Vinyl Plastisol) for a total dry film thickness of 1.00 plus 0.10 mils (4.00 plus 0.10 mils for Vinyl Plastisol). Ensure the finish coat is oven-cured.

d. Interior Finish Coating: Apply a wash-coat on the reverse side over the primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry film thickness of 0.50 plus 0.10 mils. Ensure the wash-coat is oven-cured.

e. Color: The exterior finish chosen from the manufacturer's standard color chart.

f. Physical Properties: Provide coating conforming to the industry and manufacturer s standard performance criteria as listed by the following certified test reports:

(1) Chalking: ASTM D 333
(2) Coating Thickness: ASTM B659
(3) Color Change and Conformity: ASTM D 2244
(4) Weatherometer: ASTM G 152, ASTM G 153 and ASTM D 822
(5) Humidity: ASTM D 2247 and ASTM D 714
(6) Salt Spray: ASTM B117
(7) Chemical Pollution: ASTM D 1308
(8) Gloss at 60: ASTM D 523
(9) Pencil Hardness: ASTM D 3363
(10) Reverse Impact: ASTM D 2794
(11) Flexibility: ASTM D 522
(12) Abrasion: ASTM D 968
(13) Flame Spread: ASTM E 84

2.2 MISCELLANEOUS METAL FRAMING

2.2.1 General

Cold-formed metallic-coated steel sheet conforming to AISI SG03-3 and ASTM A653 and specified in Section 05 40 00 COLD-FORMED METAL FRAMING unless otherwise indicated.

2.2.2 Fasteners for Miscellaneous Metal Framing

Type, material, corrosion resistance, size and sufficient length to penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to substrates in accordance with the roof panel manufacturer's and ASCE 7-10 requirements.

2.3 FASTENERS

2.3.1 General

Type, material, corrosion resistance, size and sufficient length to penetrate the supporting member a minimum of 1 inch with other properties required to fasten miscellaneous metal framing members to substrates in accordance with the roof panel manufacturer's and ASCE 7-10 requirements.

2.3.2 Exposed Fasteners

Provide corrosion resistant coated steel, aluminum, stainless steel, or nylon capped, steel compatible, exposed fasteners with the sheet panel or flashing and of a type and size recommended by the manufacturer to meet the performance requirements and design loads. Provide manufacturer's standard fasteners for accessories. Provide an integral metal washer matching the color of attached material with compressible sealing EPDM gasket approximately 3/32 inch thick.

2.3.3 Screws

Provide corrosion resistant coated steel, aluminum and/or stainless steel screws of the type and size recommended by the manufacturer to meet the performance requirements.

2.3.4 Rivets

Provide closed-end type rivets, made of corrosion resistant coated steel, aluminum or stainless steel where watertight connections are required.

2.3.5 Attachment Clips

Fabricate clips from steel hot-dipped galvanized in accordance with ASTM A653 Z275 G 90 or Series 300 stainless steel. Size, shape, thickness and capacity as required meeting the insulation thickness and design load criteria specified.

2.4 ACCESSORIES

2.4.1 General

Provide only accessories which are compatible with the metal roof panels. Sheet metal flashing, trim, metal closure strips, caps and similar metal accessories cannot be less than the minimum thickness specified for the roof panels. Exposed metal accessories/finishes to match the panels furnished, except as otherwise indicated. Provide molded foam rib, ridge and other closure strips which are non-absorbent closed-cell or solid-cell synthetic rubber or pre-molded neoprene to match configuration of the panels.

2.4.2 Rubber Closure Strips

Closed-cell, expanded cellular rubber conforming to ASTM D 1056 And ASTM D 1667; extruded or molded to the configuration of the specified roof panel and in lengths supplied by the roof panel manufacturer.

2.4.3 Metal Closure Strips

Factory fabricated aluminum or steel closure strips to be the same gauge, thickness, color, finish and profile of the specified roof panel.

2.4.4 Joint Sealants

2.4.4.1 Sealants

Provide an approved gun type sealant for use in hand- or air-pressure calking guns at temperatures above 40 degrees F or frost-free application at temperatures above 10 degrees F with minimum solid content of 85 percent of the total volume. Provide sealant that has a tough, durable dry surface skin which permits it to remain soft and pliable underneath, providing a weather-tight joint. No migratory staining is permitted on painted or unpainted metal, stone, glass, vinyl, or wood.

Prime all joints to receive sealants with a compatible one-component or two-component primer as recommended by the roof panel manufacturer.

a. Shop Applied Caulking: An approved gun grade, non-sag one component polysulfide or silicone conforming to ASTM C920, Type II, with a curing time to ensure the sealant s plasticity at the time of field erection.

b. Field Applied Caulking: An approved gun grade, non-sag one component polysulfide or two-component polyurethane with an initial maximum Shore A durometer hardness of 25, conforming to ASTM C920, Type II. Match color to panel colors.

c. Tape Sealant: Pressure sensitive, 100% solid with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the roof panel manufacturer.

2.5 SHEET METAL FLASHING AND TRIM

2.5.1 Fabrication, General

Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA 1793 that apply to the design, dimensions, metal and other characteristics of the items indicated. Shop fabricated items where practicable. Obtain field measurements for accurate fit before shop fabrication.

2.5.2 Roof Drainage Sheet Metal Fabrications

a. Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96-inch long sections. Fabricate expansion joints and accessories from same metal as gutters, unless otherwise indicated.

b. Downspouts: Fabricate [circular] [rectangular] downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts and anchors.

2.6 REPAIR OF FINISH PROTECTION

Provide repair paint for color finish enameled roofing that is compatible with the paint of the same formula and color as the specified finish furnished by the roofing manufacturer. Conform acrylic or modified acrylic to NAVFAC A-A-50570.

PART 3 EXECUTION

3.1 EXAMINATION

Contracting Officer may request verification and certification testing of coatings and base metals of metal roofing prior to installation.

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of the work.

b. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer, UL, ASTM, ASCE 7-10 and as required for the geographical area where construction will take place.

c. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

d. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

e. Submit to the Contracting Officer a written report, endorsed by Installer, listing conditions detrimental to performance of the work.

f. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

a. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

b. Miscellaneous Framing: Install sub-purlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.

3.3 ROOF PANEL INSTALLATION

Provide metal roof panels of full length from eave to ridge or eave to wall as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement in accordance with NRCA 0409.

Steel Roof Panels: Use stainless-steel fasteners for exterior surfaces and galvanized steel fasteners for interior surfaces.

Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for exterior surfaces and aluminum or galvanized steel fasteners for interior surfaces.

Anchor Clips: Anchor metal roof panels and other components of the work securely in place, using manufacturer’s approved fasteners according to manufacturers' written instructions.

Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating conforming to SSPC PS 9.01 by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.

Erect roofing system in accordance with the approved erection drawings, the printed instructions and safety precautions of the manufacturer.

Do not subject sheets to overloading, abuse, or undue impact. Do not apply bent, chipped, or defective sheets.

Erect sheets true and plumb and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with the indicated rake, eave, and curb overhang.

Allow for thermal movement of the roofing, movement of the building structure, and provide permanent freedom from noise due to wind pressure.

Field cutting metal roof panels by torch is not permitted.

Lay roofing sheets with corrugations in the direction of the roof slope. End laps of exterior roofing cannot be less than 8 inches; the side laps of standard exterior corrugated sheets cannot be not less than 2-1/2 corrugations.

Do not permit storage, walking, wheeling, and trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to the installed roofing materials, and to distribute weight to conform to the indicated live load limits of roof construction.

3.4 FASTENER INSTALLATION

Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

3.5 FLASHING, TRIM AND CLOSURE INSTALLATION

3.5.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

Install sheet metalwork to form weather-tight construction without waves, warps, buckles, fastening stresses or distortion, and allow for expansion and contraction. Perform cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades by sheet metal mechanics.

3.5.2 Metal Flashing

Install metal flashing at building corners, rakes and eaves, junctions between metal siding and roofing, valleys and changes of slope or direction in metal roofing, and building expansion joints and gutters.

Provide exposed metal flashing that is the same material, color, and finish as the specified metal roofing.

Fasten flashing at not more than 8 inches on center for roofs, except where flashing are held in place by the same screws that secure covering sheets.

Furnish flashing in at least 8-foot lengths. Provide exposed flashing that has one inch locked and blind-soldered end joints, and expansion joints at intervals of not more than 16 feet.

Bed exposed flashing and flashing subject to rain penetration in the specified joint sealant.

Isolate flashing which is in contact with dissimilar metals by means of the specified asphalt mastic material to prevent electrolytic deterioration.

Form drips to the profile indicated, with the edge folded back 1/2 inch to form a reinforced drip edge.

3.5.3 Closures

Install metal closure strips at open ends of metal ridge rolls; open ends of corrugated or ribbed pattern roofs, and at intersection of wall and roof unless open ends are concealed with formed eave flashing; rake of metal roof unless open end has a formed flashing member; and in other required areas.

Install mastic closure strips at intersection of the wall with metal roofing; top and bottom of metal siding; heads of wall openings; and in other required locations.

3.6 WORKMANSHIP

Ensure lines, arises, and angles are sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Ensure that sheet metal that is exposed to the weather is watertight with provisions for expansion and contraction.

Ensure surfaces that are to receive sheet metal are plumb and true, clean, even, smooth, dry, and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight.

3.7 ACCEPTANCE PROVISIONS

3.7.1 Erection Tolerances

Erect metal roofing straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions. Do not vary horizontal lines more than 1/8 inch in 40 feet.

3.7.2 Leakage Tests

Finished application of metal roofing is subject to inspection and test for leakage by the Contracting Officer, Architect/Engineer. Conduct inspections and tests without cost to the Government.

Perform inspections and tests promptly after erection to permit correction of defects and the removal and replacement of defective materials.

3.7.3 Repairs to Finish

Repair scratches, abrasions, and minor surface defects of finish with the specified repair materials. Ensure finished repaired surfaces are uniform and free from variations of color and surface texture.

Immediately remove and replace repaired metal surfaces that are not acceptable to the project requirements with new material.

3.7.4 Paint-Finish Metal Roofing

Test paint-finish metal roofing for color stability by the Contracting Officer during the manufacturer's specified guarantee period.

Remove and replace panels that indicate color changes, fading, or surface degradation, determined by visual examination, with new panels at no expense to the Government.

New panels are subject to the specified tests for an additional year from the date of their installation.

3.8 CLEAN-UP AND DISPOSAL

Clean all exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Ensure exposed metal surfaces are free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating.

Collect and place scrap/waste materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site; transport demolished materials from government property and legally dispose of them.

3.9 FIELD QUALITY CONTROL

3.9.1 Manufacturer's Inspection

Ensure manufacturer's technical representative visits the site a minimum of three times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Make inspections during the first 20 squares of roof panel installation, at mid-point of the installation, and at substantial completion, at a minimum. Additional inspections are required for each 100 squares of total roof area, with the exception those follow-up inspections of previously noted deficiencies or application errors are performed as requested by the Contracting Officer. After each inspection, submit a report, signed by the manufacturer’s technical representative to the Contracting Officer within 3 working days. Note in the report overall quality of work, deficiencies and any other concerns, and recommended corrective action.

Submit electronically, three signed copies of the manufacturer's field inspection reports to the Contracting Officer within one week of substantial completion.

3.10 INFORMATION FORM AND PLACARD

For each roof, furnish a typewritten information card for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 0.032 inch thick aluminum card for exterior display. Format as directed in paragraph titled "Form One".

Provide an information card 8 1/2 by 11 inches minimum, identifying the facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, roof panel manufacturer and product name, type underlayment(s), date of completion; installing contractor identification and contact information; manufacturer warranty expiration, warranty reference number, and contact information. Install card at interior roof top access point and at location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

3.11 FORM ONE

FORM 1 - PREFORMED [STEEL][ALUMINUM] PANEL ROOFING SYSTEM AND COMPONENTS

1. Contract Number:

2. Building Number & Location:

3. Delivery Order number:

4. Deck/Substrate Type:

5. Slopes of Deck/Roof Structure:

6. Insulation Type & Thickness:

7. Insulation Manufacturer:

8. Vapor Retarder: ( )Yes ( )No

9. Vapor Retarder Type:

10. Preformed Steel Standing Seam Roofing Description:

a. Manufacturer (Name, Address, & Phone No.):

b. Product Name: c. Width: d. Gage:

e. Base Metal: f. Method of Attachment:

11. Repair of Color Coating:

a. Coating Manufacturer (Name, Address & Phone No.):

b. Product Name:

c. Surface Preparation:

d. Recoating Formula:

e. Application Method:

12. Statement of Compliance or Exception:_____
_____
_____

13. Date Roof Completed:

14. Warranty Period: From_____ To_____

15. Roofing Contractor (Name & Address):

16. Prime Contractor (Name & Address):

Contractor's Signature _____ Date:

Inspector's Signature _____ Date:

3.12 DATE OF INSTALLATION WALL-MOUNTED PLACARD

For each metal roof panel installation, furnish an exterior "Date of Installation Placard", 0.032 inch thick aluminum, 8-1/2 inches high by 11 inches wide, with mounting accessories, photoengraved to include the following information:

Facility Name and Number
Approximate Roof Area Newly Installed and Date of Completion
Manufacturer, Type of Roof Panel and Name
Underlayment and Insulation System, R value
Installing Contractor and Contact Information
Warranty Expiration Date
Warranty Reference Number and Contact Information
Install placard as directed by the Contracting Officer.

********** USACE / NAVFAC / AFCEC / NASA
UFGS-07 51 13 (May 2012)

Preparing Activity: NAVFAC **Superseding**
UFGS-07 51 13 (February 2012)

UNIFIED FACILITIES GUIDE SPECIFICATIONS
References are in agreement with UMRL dated April 2018

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BUILT-UP ASPHALT ROOFING

05/12

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********** USACE / NAVFAC / AFCEC / NASA
UFGS-07 51 13 (May 2012)
Preparing Activity: NAVFAC Superseding
UFGS-07 51 13 (February 2012) UNIFIED
FACILITIES GUIDE SPECIFICATIONS
References are in agreement with UMRL dated April 2018

SECTION 07 51 13 BUILT-UP ASPHALT ROOFING 05/12

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM C1153	(2010) Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging
ASTM C208	(2012; R 2017; E 2017) Standard Specification for Cellulosic Fiber Insulating Board
ASTM C728	(2017a) Standard Specification for Perlite Thermal Insulation Board
ASTM D1863/D1863M	(2005; R 2011; E 2012) Mineral Aggregate Used on Built-Up Roofs
ASTM D1864/D1864M	(1989; E 2009; R 2009) Moisture in Mineral Aggregate Used on Built-Up Roofs
ASTM D1970/D1970M	(2017) Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D2170/D2170M	(2010) Kinematic Viscosity of Asphalts (Bitumens)
ASTM D2178/D2178M	(2015a) Asphalt Glass Felt Used in Roofing and Waterproofing
ASTM D312/D312M	(2016a) Standard Specification for Asphalt Used in Roofing
ASTM D3617	(2007; R 2015; E 2015) Sampling and Analysis of New Built-Up Roof Membranes

ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4402/D4402M	(2015) Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer
ASTM D448	(2012; R 2017) Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free
ASTM D4601/D4601M	(2004; R 2012) Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D4637/D4637M	(2015) EPDM Sheet Used in Single-Ply Roof Membrane
ASTM D4869/D4869M	(2016a) Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing
ASTM D4897/D4897M	(2016) Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing
ASTM D517	(1998; R 2008) Asphalt Plank
ASTM D6162/D6162M	(2016) Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
ASTM D6163/D6163M	(2016) Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
ASTM D6164/D6164M	(2016) Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
ASTM D6757/D6757M	(2016a) Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing
ASTM E108	(2011) Fire Tests of Roof Coverings

FM GLOBAL (FM)

FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA RoofMan	(2017) The NRCA Roofing Manual **SINGLE**

PLY ROOFING INDUSTRY (SPRI)

ANSI/SPRI RD-1	(2014) Performance Standard for Retrofit Drains

UNDERWRITERS LABORATORIES (UL)

UL 790	(2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings
UL RMSD	(2012) Roofing Materials and Systems Directory

1.2 DESCRIPTION OF ROOF MEMBRANE SYSTEM[S]

Asphalt applied, four-ply felt, aggregate surfaced or three-ply felt with granule-surfaced modified bitumen cap sheet built-up roof membrane system.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wind Uplift Calculations;
Asphalt
Felts, including ply felt, base sheet and ventilating felt as applicable;
Granule Surface Modified Bitumen Cap Sheet;
FLASHING MEMBRANE;
Fasteners Primer
Asphalt Roof Cement
Walkpad Materials
Cant Strips
Certificate attesting that the fiberboard furnished for the project contains recovered material, and showing an estimated percent of such recovered material.
Pre-Manufactured Accessories to be incorporated in the system installation;
Roof Walkways
Sample Warranties certificates;
Submit all data required with requirements of this section. Include in Data written acceptance by the roof membrane manufacturer of the products and accessories provided.

List products in the applicable wind uplift and fire rating classification listings, unless approved otherwise by the Contracting Officer.

SD-06 Test Reports

Samples of Built-Up Roofing
Submit test results on roofing field samples as required, verifying composition of sample. Submit six copies of laboratory analysis within 30 calendar days after samples are taken. Submit reports in accordance with ASTM D3617.

SD-07 Certificates
Bill of Lading
Submit when labels of asphalt containers do not indicate the finished blowing temperature, flash point and equiviscous temperature.
Qualifications of Applicator
Submit evidence of the roofing system manufacturer's approval.

SD-08 Manufacturer's Instructions

Felts;
Flashings;
Modified Bitumen Cap Sheet;
Base Sheet attachment, including pattern and frequency of mechanical attachments required in field of roof, corners, and perimeters to provide for the specified wind resistance.
Asphalt Primer
Roof Cement
Fasteners
Cold Weather Conditions installation;
Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Include membrane manufacturer requirements for nailers and backnailing of roof membrane on steep slopes. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

SD-11 Closeout Submittals WARRANTY
INFORMATION CARD

1.4 QUALITY ASSURANCE

1.4.1 Qualifications of Applicator

The roofing system applicator must be approved, authorized, or licensed in writing by the roofing system manufacturer and must have a minimum of 3 years experience as an approved, authorized, or licensed applicator with the manufacturer and be approved at a level capable of providing the specified warranty.

1.4.2 Qualifications of Photovoltaics (PV) Rooftop Applicator- Not Applicable to this contract

1.4.3 Fire Resistance

Complete roof covering assembly must:

a. Be Class A rated in accordance with ASTM E108 , FM 4470, or UL 790; and

b. Be listed as part of Fire-Classified roof deck construction in UL RMSD, or Class I roof deck construction in FM APP GUIDE.

1.4.4 Wind Uplift Resistance

The complete roof system assembly shall be rated and installed to resist wind loads calculated in accordance with ASCE 7-10 and validated by uplift resistance testing in accordance with Factory Mutual (FM) test procedures. Do not install non-rated systems except as approved by the Contracting Officer. Submit licensed engineer's wind uplift calculations and substantiating data to validate any non-rated roof system. Base wind uplift measurements on a design wind speed of 120 mph in accordance with ASCE 7-10 and/or other applicable building code requirements.

1.4.5 Preroofing Conference

After approval of submittals and before performing roofing [and insulation] system installation work, hold a preroofing conference to review the following:

a. Drawings and specifications and submittals related to the roof work;

b. Roof system components installation;

c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the

roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representatives to roof manufacturer;

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing; and

e. Quality control plan for the roof system installation;

f. Safety requirements.

Coordinate preroofing conference scheduling with the Contracting Officer. The conference must be attended by the Contractor, the Contracting Officer's designated personnel, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, Fire Marshall, and representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials in manufacturers' original unopened containers and rolls with manufacturer's labels intact and legible. Mark and remove wet or damaged materials from site. Where materials are covered by a referenced specification, container must bear specification number, type, and class, as applicable. Indicate on labels or bill of lading for roofing asphalt the asphalt type, finished blowing temperature (FBT), flash point (FP), and equiviscous temperature (EVT), that is, the temperature at which the viscosity is either 125 centistokes when tested in accordance with ASTM D2170 or 75 centipoise when tested in accordance with ASTM D4402. Deliver materials in sufficient quantity to allow work to proceed without interruption.

1.5.2 Storage

Protect materials against moisture absorption, contamination, or other damage. Avoid crushing or crinkling of roll materials. Store roll materials on end on clean raised platforms in dry locations in enclosed buildings or trailers with adequate ventilation. Do not store roll materials in buildings under construction until concrete, mortar, and plaster work are finished and dry. Do not store materials outdoors unless approved by the Contracting Officer. Completely cover felts stored outdoors, on and off roof, with waterproof canvas protective covering. Do not use polyethylene sheet as a covering. Tie covering securely to pallets to make completely weatherproof and yet provide sufficient ventilation to prevent condensation. Maintain roll materials at temperature above 50 degrees F for a 24-hour period immediately prior to application. Keep aggregate dry as defined by ASTM D1863. Place only those materials to be used during one day's work on the roof at one time. Remove unused materials from the roof at the end of each day's work. Immediately remove wet, contaminated or otherwise damaged or unsuitable materials from the site. Damaged materials may be marked by the Contracting Officer.

1.5.3 Handling

Prevent damage to edges and ends of roll materials. Do not install damaged materials in the work. Select and operate material handling equipment so as not to damage materials or applied roofing.

1.6 ENVIRONMENTAL CONDITIONS

Do not install roofing during precipitation, or fog, or when air temperature is below 40 degrees F, or when there is ice, frost, moisture or visible dampness on roof deck.[Restriction on application of roofing materials below 40 degrees F may be waived if Contractor devises a means, satisfactory to Contracting Officer, of: (1) maintaining surrounding temperature above 40 degrees F; (2) maintaining application temperature of heated materials without

exceeding maximum specified heating temperature; and follows other recommendations of the membrane manufacturer for application in cold weather conditions.

1.7 SEQUENCING

Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counterflashing are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials. Application of roofing must immediately follow application of insulation as a continuous operation. Coordinate roofing operations with insulation work so that all roof insulation applied each day is covered with complete felt ply installation the same day.

1.8 WARRANTY

Provide roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to standard membrane manufacturer warranty to comply with the specified requirements. Minimum manufacturer warranty shall have no dollar limit, cover full system water-tightness, and shall have a minimum duration of 20 years.

1.8.1 Roof Membrane Manufacturer Warranty

Furnish the roof membrane manufacturer's 20-year no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation, and accessories necessary for a watertight roof system construction. Write the warranty directly to the Government commencing at the time of Government's acceptance of the roof work. Provide the following statement for such warranty:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, blisters, splits, tears, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work are the responsibility of the roof membrane manufacturer.

b. The warranty must remain in full force and effect, including emergency temporary repairs performed by others, when the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification.

1.8.2 Roofing System Installer Warranty

The roof system installer must warrant for a minimum period of two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The roof system installer is responsible for correction of defective workmanship and replacement of damaged or affected materials. The roof system installer is responsible for all costs associated with the repair or replacement work.

1.8.3 Continuance of Warranty

Approve repair or replacement work that becomes necessary within the warranty period and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

1.9 CONFORMANCE AND COMPATIBILITY

The entire roofing and flashing system must be in accordance with specified and indicated requirements, including fire and wind resistance requirements. Work not specifically addressed and any deviation from specified

requirements must be in general accordance with recommendations of the NRCA RoofMan, membrane manufacturer published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

PART 2 PRODUCTS

2.1 GENERAL

Furnish a combination of specified materials that comprise the membrane manufacturer's standard system of the number and type of plies specified. Materials provided must be approved by the roof membrane manufacturer and suitable for the service and climatic conditions of the installation.

2.2 FIBERGLASS FELT MATERIALS

a. Venting Base Sheet: ASTM D4897/D4897M, Type II, [without][with] perforations and as approved by the roof membrane manufacturer.

b. Fiberglass Felt Base Sheet: ASTM D4601/D4601M, Type II, [without][with] perforations and as approved by the roof membrane manufacturer.

c. Ply Felt: ASTM D2178/D2178M, Type [IV] [or] [VI].

2.3 BASE FLASHING MEMBRANE

ASTM D6163. Membrane manufacturer's standard, minimum two-ply modified bitumen membrane flashing system compatible with the built-up roof membrane and as recommended in membrane manufacturer's published literature. Provide a minimum base ply of flashing membrane of 70 mils thick. Provide a minimum granule surface modified bitumen flashing cap sheet of 120 mils thick on the selvage edge.

2.4 ASPHALT

Adhere to the following general requirements:

Roof Slope, in./ft	**Type Asphalt**
Less than 1/2	**Type II, Type III in hot climate**
1/2 to 1	**Type III**
1 to 1-1/2	**Type III, Type IV in hot climate**

In locations where ambient temperature frequently exceeds 100 degrees F and roof slope is 1/2 inch per foot or greater, specify Type IV asphalt.

****

ASTM D312/D312M, Type [II] [or] [III] [or] [IV], in accordance with membrane manufacturer requirements and compatible with the slope conditions of the installation.

2.5 SURFACING MATERIAL

2.5.1 Aggregate for Surfacing Built-up Roofing

Water-worn gravel, crushed stone, or crushed slag, conforming to ASTM D1863, or marble, expanded slag, or expanded shale, conforming to ASTM D1863 except density not less than 55 pcf. Aggregate conforming to gradation sizes No. 6, No. 7, and No. 67 in conformance with ASTM D448 is acceptable provided other requirements of ASTM D1863 are met. Provide 2 percent maximum moisture content as determined by ASTM D1864. Provide light colored and opaque aggregate. Limestone, volcanic rock, crushed shells, and cinders are prohibited.

2.5.2 Granule Surface Modified Bitumen Cap Sheet

ASTM D6163, ASTM D6162, ASTM D6164; Type II, Grade G, minimum (120 mils) thick at selvage edge, and as required to provide specified fire safety rating.

2.6 PRIMER

ASTM D41 for asphalt roofing systems and as approved by the membrane manufacturer.

2.7 ASPHALT ROOF CEMENT

ASTM D4586 for use with asphalt roofing systems, Type II for vertical surfaces and built-up bituminous flashings; Type I for horizontal surfaces and as recommended by the membrane manufacturer.

2.8 CANT STRIPS

Standard cant strips must be of perlite conforming to ASTM C728 [or wood fiber conforming to ASTM C208] treated with bituminous impregnation, sizing, or waxing and fabricated to provide maximum 45 degree change in direction of membrane. Provide minimum 1-1/2 inch thick cant strips and provide for minimum 5 inch face and 3-1/2 inch vertical height when installed at 45 degree face angle, except where clearance restricts height to lesser dimension.

2.9 UNSATURATED FELT OR ROSIN-SIZED BUILDING PAPER

Provide rosin-sized sheathing paper weighing minimum 5 pounds per 100 square feet or unsaturated felt weighing approximately 7-1/2 pounds per 100 square feet.

2.10 FASTENERS AND PLATES

Coated, corrosion resistant fasteners compatible with components being attached and contact surfaces. Conform to FM 4470 for fasteners for attachment to deck substrate of Class I roof deck construction and FM APP GUIDE for the wind resistance specified. Use hard copper fasteners in contact with copper; aluminum or stainless steel fasteners in contact with aluminum; and stainless steel fasteners in contact with stainless steel. For fastening only roofing felts, use fasteners driven through metal discs, or one-piece composite fasteners with heads not less than 1 inch in diameter or 1 inch square with rounded or 45-degree tapered corners.

2.10.1 Wood Substrates and Nailers

Provide 11 gage annular threaded shank nails with 7/16 to 5/8 inch diameter heads; or one-piece composite nails with annular threaded shanks not less than 11 gage for securing felts and metal items. Provide fasteners long enough to penetrate minimum 1 inch into or minimum 1/4 inch through wood substrate materials. Do not penetrate wood decking exposed to view on the underside.

2.10.2 Masonry or Concrete Walls and Vertical Surfaces

Provide hardened steel nails or screws with flat heads, diamond shaped points, and mechanically deformed shanks not less than 1 inch long for securing felts, metal items, and accessories. Use power-driven fasteners only when approved in writing by Contracting Officer.

2.10.3 Metal Plates

Flat corrosion-resistant round stress plates as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470; minimum 2 inch in diameter. Form discs to prevent dishing or cupping.

2.11 PRE-MANUFACTURED ACCESSORIES

Pre-manufactured accessories must be manufacturer's standard for intended purpose,[comply with applicable specification section,] compatible with the membrane roof system and approved for use by the roof membrane manufacturer.

2.11.1 Pre-fabricated Curbs

Provide [_____] gauge [G90 galvanized][AZ55 galvalume][_____] curbs with minimum 4 inch flange for attachment to roof nailers. Provide minimum height of 10 inch above the finished roof membrane surface.

2.11.2 Photovoltaic (PV) Systems - Rack Mounted Systems - Not Applicable

2.12 WALKPADS

Provide polyester reinforced roof walkpads, granule-surfaced modified bitumen membrane material, ASTM D6162 or ASTM D6164, minimum 200 mils thick, compatible with the roof membrane and as recommended by the roof membrane manufacturer. Do not exceed 4 feet in length for each panel. Other walkpad materials require approval of the Contracting Officer prior to installation.

2.12.1 ROOF WALKWAYS

Provide 36 by 72 inch by 1/2 inch thick asphalt planks, consisting of a homogeneous core of asphalt, plasticizers, and fillers bonded between two saturated and coated facing sheets. Top side must be surfaced with ceramic granules. Conform to ASTM D517, mineral-surfaced asphalt.

2.13 PAVER BLOCKS

Precast concrete, minimum 1-1/2 inch thick, minimum 18 inch square for walkways and minimum 6-inch by 12-inch for use in supporting surface bearing components but extending not less than 2 inch beyond all sides of surface bearing bases. Install walkpad material under all paver blocks.

2.14 ROOF INSULATION BELOW MEMBRANE SYSTEM

Insulation must be compatible with the roof membrane, approved by the membrane manufacturer.

2.15 MEMBRANE LINER

Self-adhering modified bitumen underlayment conforming to ASTM D1970, EPDM membrane liner conforming to ASTM D4637, or other waterproof membrane liner material conforming to ASTM D4869, or ASTM D6757, and as approved by the Contracting Officer.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

Before applying roofing materials, ensure that the following exist:

a. Drains, curbs, cants, control joints, expansion joints, perimeter walls, roof penetrating components, and

equipment supports are in place.

b. Surfaces are rigid, clean, dry, smooth, and free of cracks, holes, and sharp changes in elevation. Joints in substrate are sealed to prevent drippage of bitumen into building or down exterior walls. Inspect surfaces and approve immediately before application of roofing and flashings. Apply the roofing and flashings to a smooth and firm surface free from ice, frost, visible moisture, dirt, projections, and foreign materials.

c. The plane of the substrate does not vary more than 1/4 inch within an area 10 by 10 feet when checked with a 10 foot straight edge placed anywhere on the substrate.

d. Substrate is sloped as indicated to provide drainage.

e. Walls and vertical surfaces are constructed to receive counterflashing and will permit mechanical fastening of the base flashing materials.

f. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing at minimum height of 8 inch above finished roofing surface.

g. Treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of felts, edging strips, attachment flanges of sheet metal, and roof fixtures. Embedded nailers are flush with deck surfaces. Surface-applied nailers are same thickness as roof insulation.

h. Cants are securely fastened in place in the angles formed by walls and other vertical surfaces. The angle of the cant is approximately 45 degrees and the height of the vertical leg is not less than nominal 3-1/2 inch. Lay cants in a solid asphalt mopping or coat of asphalt cement just prior to laying the roofing plies.

i. Venting is provided in accordance with the following:

(1) Edge Venting: Perimeter nailers are kerfed across width of the nailers to permit escape of gaseous pressure at roof edges.

(2) Underside Venting: Vent openings are provided in steel form decking for cast-in-place concrete substrate.

j. Exposed nail heads in wood substrates are properly set. Warped and split boards, sheets have been replaced. There are no cracks or end joints 1/4 inch in width or greater. Knot holes are covered with sheet metal and nailed in place. Wood Plywood decks are covered with rosin paper or unsaturated felt prior to base sheet or roof membrane application. Joints in plywood substrates are taped with 2 inch wide masking tape to prevent air leakage from the underside.

k. Insulation boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is being roofed over on the same day the insulation is installed.

l. Cast-in-place concrete substrates have been allowed to cure and the surface dryness requirements specified under paragraph entitled "Field Quality Control" have been met. No viable moisture present when conducting ASTM D4263

m. Joints between precast concrete deck units, including weld plates, are grouted, leveled, and covered with 4 inch wide ply felt or other bituminous stripping membrane set in bituminous cement prior to applying other roofing materials over the area. Prior to application of primer on precast concrete decks, cover joints with a minimum 4 inch strip of felt or bituminous stripping membrane set in bituminous cement.

3.2 PREPARATION

Verify that work of other trades that penetrates the roof deck or requires men and equipment to traverse the roof deck is complete. Examine deck surfaces for inadequate anchorage, foreign material, moisture, and unevenness which would prevent the execution and quality of application. Proceed with the roofing application only after defects have been corrected. Starting work designates acceptance of the surfaces by the Contractor.

3.2.1 Protection of Property

3.2.1.1 Protective Coverings

Install protective coverings at paving and building walls adjacent to hoists and kettles prior to starting the work. Lap protective coverings not less than six inch, secure against wind, and vent to prevent collection of moisture on covered surfaces. Keep protective coverings in place for the duration of the roofing work.

3.2.1.2 Bitumen Stops

Provide felt bitumen stops or other means to prevent bitumen drippage at roof edges, openings, and vertical projections before hot mopped application of the roofing membrane. Form felt bitumen stops with two 12 inch wide strips of organic ply felt. Laminate with and set strips into a coating of asphalt roof cement with one-half of the width overhanging the edge of the roof or opening. Where nailers are provided, nail the strips with roofing nails spaced 12 inch on center in addition to embedding in asphalt roof cement. Protect the free portion of each strip from damage throughout the roofing period. After the plies of felt are in place, fold free portion of the strips back over the roofing membrane and embed in a continuous coating of asphalt roof cement. Secure with roofing nails spaced 3 inch on center.

3.2.2 Equipment

3.2.2.1 Mechanical Application Devices

Provide and maintain mechanical application devices with pneumatic tires that operate without damaging the insulation, roofing membrane, or structural components.

3.2.2.2 Flame-Heated Equipment

Do not place flame-heated equipment on roof. Provide and maintain a fire extinguisher adjacent to flame-heated equipment and on the roof.

3.2.2.3 Open Flame Application Equipment

Use only open flame equipment recommended by the roofing materials manufacturer. Do not ignite open flame equipment when left unattended. Provide and maintain a fire extinguisher adjacent to open flame equipment on the roof.

3.2.3 Priming of Surfaces

Prime all surfaces to be in contact with adhered membrane materials. Apply primer at the rate of 0.75 gallon per 100 sq. ft. or as recommended by roof membrane manufacturer's printed instructions to promote adhesion of membrane materials. Allow primer to dry prior to application of membrane materials to primed surface. Avoid flammable primer material conditions in torch applied membrane base flashing applications.

3.2.3.1 Priming of Concrete and Masonry Surfaces

After surface dryness requirements have been met, coat concrete and masonry surfaces which are to receive roofing and base flashing uniformly with primer. Allow primer to dry before application of roofing and flashing materials.

3.2.3.2 Priming of Metal Surfaces

Prime flanges of metal components to be embedded into the roofing system prior to setting in bituminous materials or stripping into roofing system.

3.2.4 Covering of Wood Substrate

Cover wood substrate with a layer of unsaturated felt or rosin-sized building paper lapped 2 inch at sides and 4 inch at ends. Nail to hold in place prior to application of roofing system.

3.2.5 Heating of Asphalt

Break up solid asphalt on a surface free of dirt and debris. Heat asphalt in kettle designed to prevent contact of flame with surfaces in contact with the asphalt. Provide visible working thermometer and thermostatic controls set to the temperature limits. Keep controls in working order and calibrated. Use immersion thermometer, accurate within a tolerance of plus or minus one degree C 2 degrees F, to check temperatures of the asphalt frequently. When temperatures exceed maximum specified, remove asphalt from the site. Do no permit cutting back, adulterating, or fluxing of asphalt.

3.2.5.1 Temperature Limitations for Asphalt

Heat and apply asphalt at the temperatures specified below unless specified otherwise by manufacturer's printed application instructions. Use thermometer to check temperature during heating and application. Have kettle attended constantly during heating process to ensure specified temperatures are maintained. Do not heat asphalt above its finished blowing temperature (FBT). Do not heat asphalt between 500 and 525 degrees F for longer than four consecutive hours. Do not heat asphalt to the flash point (FP). Apply asphalt and embed membrane sheets when temperature of asphalt is within plus or minus 25 degrees F of the equiviscous temperature (EVT). Before heating and application of asphalt refer to the asphalt manufacturer's label or bill of lading for FP, FBT, and EVT of the asphalt used.

3.3 APPLICATION

Apply roofing materials as specified unless approved otherwise by the Contracting Officer. Keep roofing materials dry before and during application. Except for aggregate surfacing, complete application of roofing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day. Maintain specified temperature for asphalt. [Provide temporary roofing and flashing as specified herein prior to application of permanent roofing system.] Do not apply aggregate surfacing until the other roofing application procedures specified herein are completed.

3.3.1 Phased Membrane Construction

Phased application of membrane plies is prohibited.

3.3.2 Temporary Roofing and Flashing

Provide watertight temporary roofing and flashing where considerable work by other trades, such as installing [cooling towers,] [antennas,] [pipes,] [ducts,] [_____,] is to be performed on the roof or where construction scheduling or weather conditions require protection of building interior before permanent roofing system can be installed. Do not install temporary roofing over permanently installed insulation. Provide rigid pads for traffic over temporary roofing.

3.3.2.1 Removal

Completely remove temporary roofing and flashing before continuing with application of permanent roofing system.

3.3.3 Base Sheet Application - General

Fully adhere base sheets in accordance with membrane manufacturer's printed instructions. Roll and broom in the base sheet to ensure full contract with the hot asphalt application. On nailable substrates, mechanically fasten base sheet in conformance with specified wind resistance requirements and membrane manufacturer's printed instructions, and to include increased fastening frequency in corner and perimeter areas. Drive fasteners flush with no dishing or cupping of fastener plate. Where applicable, base sheet may be mechanically fastened in conjunction with insulation to the substrate, in accordance with membrane manufacturers printed instructions. Apply sheets in a continuous operation. Apply sheets with side laps at a minimum of 2 inch unless greater side lap is recommended by the manufacturer's standard written application instructions. Provide end laps of not less than 6 inch and staggered a minimum of 36 inch. Apply sheets parallel to the roof slope. Apply sheets on the other side in the same manner,

resulting in twice the normal amount of roofing sheets and asphalt at the crown. Extend base sheets approximately 2 inch above the top of cant strips at vertical surfaces and to the top of cant strips elsewhere. Trim base sheet to a neat fit around vent pipes, roof drains, and other projections through the roof. Retrofit roof drains must conform to ANSI/SPRI RD-1. Application must be free of ridges, wrinkles, and buckles.

3.3.3.1 Ventilating Base Sheets

Apply ventilating base sheet material recommended by the roof membrane manufacturer. Extend sheets over roof cants, up vertical surfaces, and terminate under cap flashing; at roof edges terminate sheets under outside edge of perimeter edge nailers or under gravel stop.

3.3.4 Ply Felts

Ensure proper alignment of felts prior to installation. Apply ply felts parallel to slope of roof. Apply felts on other side in same manner, resulting in twice normal amount of roofing felts and asphalt at crown. Bucking or backwater laps are prohibited. Apply felts in a continuous operation. Provide starter sheets of felt to maintain the specified number of plies throughout the roofing. Apply felts with side laps in accordance with the material manufacturer's printed instructions for the number of plies to be installed and in uniform alignment. Lap ends not less than 6 inch and stagger 36 inch minimum. Place the full width of each ply in hot bitumen immediately behind the bitumen applicator. Plies must be laid free of wrinkles, creases, ridges, or fishmouths. Extend felts approximately 2 inch above top of cant strips at vertical surfaces and to top of cant strips elsewhere. Trim felts to a neat fit around vent pipes, roof drains, and other projections. Avoid traffic on mopped surfaces when the bitumen is fluid and for a minimum of one hour after ply application.

3.3.4.1 Hot-Mopping of Ply Felts

Bond plies to each other and to the base sheets or substrate with hot asphalt. Apply felts immediately following application of asphalt. Do not work ahead with asphalt. At the instant felts come into contact with asphalt, asphalt must be completely fluid, with asphalt temperatures within specified EVT range. Apply asphalt uniformly in a full, continuous mopping and firmly bonding film. Apply asphalt at the rate of approximately 25 pounds per 100 sq. feet plus or minus 25 percent. Require application rate on the high end of the application range when mopping directly to absorptive insulation substrates of perlite and wood fiber. As felts are rolled into the hot asphalt, immediately squeegee, roll or broom down to eliminate trapped air and to provide tight, smooth laminations without wrinkles, buckles, kinks, or fish mouths. Bitumen must be visible beyond all edges of each ply as it is being installed. Individual ply installation and the completed roof membrane system must be free of air pockets, felt delaminations, ridges, creases, fishmouths, dry laps, or blisters. Do not lay felts dry or turn back laps for mopping between plies.

3.3.4.2 Backnailing of Ply Felts

Unless otherwise recommended by the roof membrane manufacturer and approved by the Contracting Officer, provide minimum 3-1/2 inch wide nailing strips matching insulation thickness and applied perpendicular to roof slope for Backnailing of roof membrane. Space nailing strips as recommended by the membrane manufacturer, but not exceeding 16 feet on center unless approved otherwise by the Contracting Officer. Coordinate the nailer installation with insulation requirements. As the felt plies are installed, nail each ply 1 inch from the leading edge at each nailer line. Provide fasteners with a 1 inch diameter metal cap or fasten through 1 inch diameter caps. Set fasteners firm and flush without puncturing felt ply. Conceal fasteners with succeeding plies of felt.

3.3.4.3 Valleys and Ridges

Valleys: Apply roofing at valleys and waterways in the following manner:

Continue base sheets across valleys and terminate 18 inch from the valley.

Continue felt plies across valleys and terminate 12 inch from the valley. Terminate exposed laps on a line 12 inch from, and parallel to, the gutter valley. Provide two plies of felt 9 and 12 inch wide, successively mop in over each felt line of the termination.

If the application can be completed without wrinkles, buckles, or fishmouths and if side laps do not face the direction of drainage, roofing felts and base sheets may be laid continuously across or parallel to shallow valleys such as those formed by reverse-slope roofs. For this application, reinforce valleys with one ply of felt, 36 inch wide, center on the valley gutter and lay in a solid mopping of asphalt over the top ply of roofing.

3.3.5 Membrane Flashing

Provide two plies of modified bitumen membrane strip flashing and sheet flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes, and other vertical surfaces, and where necessary to make the work watertight. Top ply of flashing must be granule-surfaced modified bitumen membrane. Install flashing after plies of roof membrane felt have been applied but before aggregate surfacing is applied. Cut at a 45 degree angle across terminating end lap area of cap membrane prior to applying adjacent overlapping cap membrane. Press flashing into place to ensure full adhesion and avoid bridging. Ensure full lap seal in all lap areas. Mechanically fasten top edge of base flashing 6 inch on center through minimum 1 inch diameter tin caps with fasteners of sufficient length to embed minimum 1 inch into attachment substrate. [Apply matching granules in any areas of asphalt bleed out while the asphalt is still hot.] Apply membrane liner over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs, parapet walls, expansion joints and as otherwise indicated to serve as waterproof lining under sheet metal flashing components.

3.3.5.1 Strip Flashing

Set primed flanges of sheet metal flashings to be incorporated into roofing system in a uniform coating of asphalt roof cement not less than 1/16 inch thick applied over the ply felts. Strip-in with one layer of smooth surface modified bitumen membrane and cap with granule-surfaced modified bitumen membrane. Set strip flashing in hot asphalt or cement to the tops of the flanges, roofing membrane, and to each other. Use coatings of asphalt roof cement not less than 1/16 inch thick for ply felt. Use hot asphalt or modified bitumen cement for modified bitumen sheets. Extend first stripping ply not less than 4 inch beyond outer edge of flange onto roof membrane. Extend each additional ply 4 inch beyond the edge of the previous ply.

3.3.5.2 Membrane Flashing at Roof Drain

Extend roofing plies to edge of drain bowl opening at roof drain deck flange. Neatly fit and press primed roof drain flashing into heavy coat of asphalt roof cement applied to top of roofing plies. Strip in and completely cover flashing with two layers of modified bitumen sheet, extending the first sheet 6 inch on the roofing beyond the edge of flashing. Extend the cap sheet 6 inch beyond the previous flashing ply. Bond the two layers to the metal flashing and to each other with hot asphalt. Securely clamp membrane, metal flashing, and strip flashing in the flashing clamping ring. Secure clamps so that strip flashing and metal flashing are free from wrinkles and folds. Trim membrane, flashing, and stripping flush with inside of clamping ring.

3.3.5.3 Pre-fabricated Curbs

Anchor prefabricated curbs securely to nailer or other base substrate as indicated and flash with modified bitumen flashing membrane.

3.3.5.4 Set-On Accessories

Where pipe or conduit blocking, supports and similar roof accessories are set on the membrane, adhere walkpad material to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.

3.3.5.5 Lightning Protection

Flash or attach lightning protection system components to the roof membrane in a manner acceptable to the roof membrane manufacturer.

3.3.6 Roof Walkpads

Install walkpads at roof access points and where otherwise indicated for traffic areas and for access to mechanical equipment, in accordance with the modified bitumen sheet roofing manufacturer's printed instructions. Provide minimum 6 inch separation between adjacent walkpads to accommodate drainage. Provide walkpad [or an additional layer of cap sheet] under precast concrete paver blocks to protect the roofing.

3.3.7 Elevated Metal [Walkways] [and] [Platforms]

Provide protection mat of walkpad material, or other material approved by the Contracting Officer, at all surface bearing support locations.

3.3.8 Paver Blocks

Install paver blocks where indicated and as necessary to support surface bearing items traversing the roof area. Set paver block on a layer of walkpad [or modified bitumen cap sheet] applying over the completed roof membrane.

3.3.9 Aggregate Surfacing

After completion of roof membrane ply and flashing installation, and correction of tears, gouges or other deficiencies in the installed work, apply aggregate surfacing. Uniformly flood coat the surface with hot asphalt at a rate of approximate 60 pounds per square. While asphalt is still hot, apply gravel aggregate surfacing material at a rate of 400 pounds per square. Provide for full and uniform coverage of the roof surface. Approximately 50 percent of the aggregate must be solidly adhered in the asphalt.

3.3.10 Granule-Surfaced Modified Bitumen Cap Sheet

Inspect underlying applied membrane and repair free of damage, holes, puncture, gouges, abrasions, and any other defects, and free of moisture, loose materials, debris, sediments, dust, and any other conditions required by the membrane manufacturer prior to cap sheet installation. Provide cleaning and artificial drying with heated blowers or torches to ensure clean, dry surface prior to cap sheet application. When delays in cap sheet installation may have occurred, do not apply cap sheet if underlying materials have been exposed to rain or frozen precipitation within the previous 24 hours. Unroll cap sheet membrane and allow to relax a minimum of 1 hour prior to installation and as otherwise recommended by the membrane manufacturer. Apply cap sheet in same direction as the underlying felt plies. Align cap membrane and apply with minimum 3 inch side laps and minimum 6 inch end laps and as otherwise required by membrane manufacturer. Set cap sheet in hot asphalt. Cap sheet may be torch applied with approval of the Contracting Officer and written approval of the felt membrane manufacturer, and as recommended by the modified bitumen membrane manufacturer. Cut at a 45 degree angle across selvage edge of cap membrane to be overlapped in end lap areas prior to applying overlapping cap membrane. [Apply matching granules in any areas of bitumen bleed out while the bitumen is still hot]. Minimize traffic on newly installed cap sheet membrane.

3.3.10.1 Backnailing of Cap Sheet Membrane

Unless otherwise recommended by the roof membrane manufacturer and approved by the Contracting Officer, install the modified bitumen cap sheet to provide for end laps at nailer locations. Nail the modified bitumen cap sheet at the end lap area across the width of the sheet. Nail within 1 inch of each edge of the sheet and at 8 to 8-1/2 inch on center across the width of the sheet in a staggered fashion. Provide nails with a 1 inch diameter metal cap or nail through 1 inch diameter caps. Cover nails by overlapping adjacent upslope sheet at the end lap area.

3.3.11 Correction of Deficiencies

Where any form of deficiency is found, take additional measures to determine the extent of the deficiency and corrective actions must be as directed by the Contracting Officer. [Where interply moppings are too light, apply additional two plies of felt in full moppings of asphalt. Apply with 4 inch side and end laps. Where free water, skips, excessive voids, dry laps, desponding or any form of delamination are discovered between the plies, remove and rebuild affected area. Correction of inadequate number of plies, improper lap widths, or non-uniform or excessive asphalt mopping must be as directed by the Contracting Officer.] Where insulation is found to be wet, remove insulation and provide new built-up roofing and insulation.

3.3.12 Clean Up

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

3.4 PROTECTION OF APPLIED ROOFING

3.4.1 Protection Against Moisture Absorption

When precipitation is imminent and at the end of each day's work, protect applied roofing as follows:

3.4.2 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of modified bitumen roofing system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cutoffs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

3.4.3 Temporary Flashing for Permanent Roofing

Provide temporary flashing at drains, curbs, walls and other penetrations and terminations of roofing sheets until permanent flashings can be applied. Remove temporary flashing before applying permanent flashing.

3.4.4 Temporary Walkways, Runways, and Platforms

Do not permit storing, walking, wheeling, and trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

3.4.5 Glaze Coat

Use light glaze coating of bitumen to waterproof roof areas requiring extended time to complete. Glaze coating must be at the discretion of the Contracting Officer. Apply bitumen glaze coat on exposed felts at a rate of 5 to 10 pounds per square. Lower application rates, in accordance with membrane manufacturer's recommendations, may be required when modified bitumen cap sheet surfacing is specified. Provide valleys and low areas that may pond water with glaze coating.

3.5 FIELD QUALITY CONTROL

Perform field tests in the presence of the Contracting Officer. Notify the Contracting Officer one day before performing tests.

3.5.1 Test for Surface Dryness

Before application of insulation or membrane materials and starting work on the area to be roofed, perform test for surface dryness in accordance with the following:

a. Foaming: When poured on the surface to which materials are to be applied, one pint of asphalt when

heated in the range of 350 to 400 degrees F, must not foam upon contact.

b. Strippability: After asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from the surface, do not consider the surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been tested by the method above and found dry.

c. Prior to installing any roof system on a concrete deck, conduct a test per ASTM D4263.The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.5.2 Construction Monitoring

During progress of the roof work, Contractor is responsible for making visual inspections to ensure compliance with specified parameters.
Additionally, verify the following:

a. Equipment is in working order. Metering devices are accurate.

b. Materials are not installed in adverse weather conditions.

c. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials. Nailers and blocking are provided where and as needed.

Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.

The proper number, type, and spacing of fasteners are installed. Materials comply with the specified requirements.
All materials are properly stored, handled and protected from moisture or other damages.

Asphalt is heated and applied within the specified temperature parameters.

Hot asphalt application is provided uniformly for voidless coverage and as necessary to ensure full adhesion of materials. Materials are set in place while asphalt is within the specified temperature range.

The proper number and types of plies are installed, with the specified overlaps.

Applied membrane surface is inspected, cleaned, dry, and repaired as necessary prior to cap sheet installation.

Membrane is without ridges, wrinkles, kinks, fishmouths, or other voids or delaminations.

Installer adheres to specified and detailed application parameters.

Associated flashings and sheet metal are installed in a timely manner in accord with the specified requirements.

Temporary protection measures are in place at the end of each work shift.

3.5.2.1 Manufacturer's Inspection

Manufacturer's technical representative must visit the site a minimum of three times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Inspect during the first 20 squares of membrane installation, at mid-point of the installation, and at substantial completion prior to surfacing

application, at a minimum. Additional inspections must not exceed one for each 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors must be performed as requested by the Contracting Officer. After each inspection, submit a report, signed by the manufacturer's technical representative to the Contracting Officer within 3 working days. The report must note overall quality of work, deficiencies and any other concerns, and recommended corrective action.

3.5.3 Samples of Built-Up Roofing

After application of specified roofing felts and prior to applying surfacing, take field samples of built-up roofing as directed by the Contracting Officer. Take and test samples in accordance with ASTM D3617 and at locations selected by the Contracting Officer immediately prior to cutting. 4 inch by 40 inch samples across felt laps in a manner to expose the specified number of plies. The 4 inch edge must coincide with an edge lap of felt and not be positioned over an end lap. Use 4 inch by 40 inch samples for visual inspection. The Contracting Officer will inspect the samples for the specified number of plies, bond between plies, skips in interply moppings, uniform asphalt mopping, presence of excessive voids or large voids in the ply construction, presence of harmful foreign materials, visible presence of moisture in the sandwich and wet insulation. Use 12 inch by 12 inch cut samples to calculate bitumen quantities in accordance with ASTM D3617 and directed by the Contracting Officer. Do not proceed with surfacing until all deficiencies disclosed as a result of cut tests have been corrected and approved by the Contracting Officer. Where cuts are not retained by the Contracting Officer or disposed, set cut strip back in cut area and patch as specified.

3.5.3.1 Number of Cut Tests

Take cut samples as directed by the Contracting Officer for quality assurance validation or as necessary to determine the extent of deficiencies discovered in the construction. .

3.5.3.2 Sample Cutting Device

Provide a rectangular, 4 inch by 40 inch template and 12 inch by 12 inch template, of a type that will permit accurate cutting of samples with standard roofing knives. Keep cutting edge of knife clean by washing in solvent after each cut.

3.5.3.3 Patching Cut-Out Area

Immediately after inspection, replace cut-out sample. When sample is needed for laboratory analysis or other circumstance makes it unavailable, substitute a new section of equivalent size and structure. For non-nailable decks, replace sample in hot asphalt. For nailable decks, insert one ply of ply felt into opening from which sample was taken and sprinkle nail to hold in place; coat felt heavily with asphalt roof cement and press cutout sample firmly into asphalt roof cement. Repair area of cut with new patch of the same number of plies as the primary roof membrane. Extend the first ply minimum 6 inch all around the cut area. Extend each additional ply minimum 4 inch beyond the previous ply.

3.5.4 Roof Drain Test

After roofing system is complete except for surfacing, perform the following test of roof drains and adjacent roofing for watertightness. Plug roof drains and fill with water to edge of drain sump for 8 hours. Do not plug secondary overflow drains at same time as adjacent primary drain. To ensure some drainage from roof, do not test all drains at same time. Measure water at beginning and end of the test period. When precipitation occurs during test period, repeat test. When water level falls, remove water, thoroughly dry, and inspect the installation. Repair or replace roofing at drain to provide for a properly installed watertight flashing seal. Repeat test until there is no water leakage.

3.6 INFRARED INSPECTION

Eight months after completion of the roofing system, the Contractor must inspect the roof surface using infrared (IR) scanning as specified in ASTM C1153. Where the IR inspection indicates moisture intrusion, replace wet

insulation and damaged or deficient materials or construction in a manner to provide watertight construction and maintain the specified roof system warranties.

3.7 INFORMATION CARD

For each roof, furnish a typewritten information card for facility records and a photoengraved 0.032 inch thick aluminum card for exterior display. Card must be 8-1/2 by 11 inch minimum. Information card must identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Provide minimum size information card of 8-1/2 by 11 inch. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

-- End of Section --

Change 3 - 08/17
Preparing Activity: NAVFAC
Superseding
UFGS-07 52 00 (November 2008) UNIFIED
FACILITIES GUIDE SPECIFICATIONS
References are in agreement with UMRL dated April 2018
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SECTION 07 52 00
MODIFIED BITUMINOUS MEMBRANE ROOFING
05/12

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP	(2013) Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE 90.1 - SI	(2013) Energy Standard for Buildings Except Low-Rise Residential Buildings

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.24	(2014) Roofing - Safety Requirements of Low-Sloped Roofs

ASPHALT ROOFING MANUFACTURER'S ASSOCIATION (ARMA)

ARMA 410BUR88	(2001) Manual of Roof Maintenance and Repair
ARMA PMBRG98	(1998) Quality Control Guideline for the Application of Polymer Modified Bitumen Roofing

ASTM INTERNATIONAL (ASTM)

ASTM C1153	(2010) Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging
ASTM C1289	(2017) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C208	(2012; R 2017; E 2017) Standard Specification for Cellulosic Fiber Insulating Board
ASTM C552	(2017) Standard Specification for Cellular Glass Thermal Insulation
ASTM C578	(2017a) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

ASTM C726	(2017) Standard Specification for Mineral Wool Roof Insulation Board
ASTM C728	(2017a) Standard Specification for Perlite Thermal Insulation Board
ASTM D1668/D1668M	(1997a; R 2014; E 2014) Glass Fabrics (Woven and Treated) for Roofing and Waterproofing
ASTM D1863/D1863M	(2005; R 2011; E 2012) Mineral Aggregate Used on Built-Up Roofs
ASTM D1970/D1970M	(2017) Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D2170/D2170M	(2010) Kinematic Viscosity of Asphalts (Bitumens)
ASTM D2824/D2824M	(2013) Aluminum-Pigmented Asphalt Roof Coatings, Non-Fibered, Asbestos Fibered, and Fibered without Asbestos
ASTM D312/D312M	(2016a) Standard Specification for Asphalt Used in Roofing
ASTM D4073	(2006; R 2013) Standard Test Method for Tensile-Tear Strength of Bituminous Roofing Membranes
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4402/D4402M	(2015) Viscosity Determination of Asphalt at Elevated Temperatures Using a Rotational Viscometer
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free
ASTM D4601/D4601M	(2004; R 2012) Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM D4637/D4637M	(2015) EPDM Sheet Used in Single-Ply Roof Membrane
ASTM D4897/D4897M	(2016) Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing
ASTM D5147/D5147M	(2014) Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material
ASTM D6162/D6162M	(2016) Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements

ASTM D6163/D6163M	(2016) Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
ASTM D6164/D6164M	(2016) Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
ASTM D6222/D6222M	(2016) Standard Specification for Atactic Polypropylene (ARP) Modified Bituminous Sheet Materials Using Polyester Reinforcements
ASTM D6223/D6223M	(2016) Standard Specification for Atactic Polypropylene (ARP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
ASTM D6298	(2016) Standard Specification for Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Bituminous Sheet with a Factory Applied Metal Surface
ASTM E108	(2011) Fire Tests of Roof Coverings

FM GLOBAL (FM)

FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1	(2015) Occupational and Educational Personal Eye and Face Protection Devices

MIDWEST ROOFING CONTRACTORS ASSOCIATION (MRCA)

CERTA	(2007) NRCA/MRCA Certified Roofing Torch Applicator Program

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241	(2013; Errata 2015) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 58	(2017; ERTA 17-1) Liquefied Petroleum Gas Code

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA C3701	(1997) Repair Manual for Low Slope Membrane Roof Systems

NRCA CONDET	(2014) Construction Details Manual
NRCA RoofMan	(2017) The NRCA Roofing Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

SINGLE PLY ROOFING INDUSTRY (SPRI)

ANSI/SPRI/FM 4435/ES-1	(2017) Test Standard for Edge Systems Used with Low Slope Roofing Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.12	Construction Work
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.16	Rules of Construction

UNDERWRITERS LABORATORIES (UL)

UL 790	(2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings
UL RMSD	(2012) Roofing Materials and Systems Directory

1.2 DESCRIPTION OF ROOF MEMBRANE SYSTEMS

The Modified Bitumen (MB) roofing system shall consist of, at a minimum, a two ply SBS or APP modified Bitumen roof membrane consisting of a modified bitumen base sheet and cap sheet. Materials such as flat and taper stock insulation, venting base sheet and non-venting base sheets are considered to be incidental to the modified bitumen system and will be specified using separate line items.

Unless being installed as part of PMMA, IRMA, or protected membrane roof systems, the use of single ply or one membrane modified bitumen roof system shall not be approved for use on Aberdeen Proving Ground.

The approved modified bitumen system to be installed at Aberdeen Proving Ground consists of an APP 180 MB roofing system (base ply and white granular coated cap sheet) that is fully adhered and torched down to the underlying substrate. The approved substrates for torch application of MB Systems includes metal and structural concrete decks.

Under no circumstances shall torch application of MB systems over wood decks be permitted. The approved MB Application over a wood deck shall be either a self-adhering base sheet and cap sheet SBS modified system or a cold applied modified bitumen system. The government reserves the right to utilize either self-adhering or cold applied MB system on wooden decks on a case by case basis.

The system shall consist of a non-venting or venting base sheet (Dependent upon the substrate), curb and base flashing, base ply and granular coated cap sheet or finish ply of compatible materials installed in accordance with the manufacturers technical instructions and approved for a fifteen year No Dollar Limit (NDL) warranty.

Aberdeen Proving Ground reserves the right to specify a three ply SBS or APP MB System that consists of a MB base sheet, interplay sheet and granular coated cap sheet. This system shall be a fully adhered systems which is either torch applied, cold applied or self-adhering.

Torch applied and cold applied application may include ether of both SBS and APP, selected based on the specific application and service conditions intended.

The contractor shall be approved and trained by the manufacturer for the installation of their particular products and shall have a minimum of five years verifiable experience in the installation of this system.

All torch operators shall be have completed a NRCA torch operators training course and shall have up to date certifications on file. Contractor shall provide the torch operators certifications to the government as part of the submittal package for MB roof systems.

All work must follow the NRCA RoofMan guidelines and standards stated within this Section.

1.3 SUBMITTALS

Government approval is required for all submittals required by this section. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roof plan; drawing depicting wind loads and boundaries of enhanced perimeter and corner attachments of roof system components, as applicable

SD-03 Product Data

Modified Bitumen Sheets;
Asphalt
Cold-Applied Membrane Adhesive;
Fiberglass Felt;
Primer;
Modified Bitumen Roof Cement;
Pre-Manufactured Accessories
Fasteners And Plates;

Sample Warranty certificate;

Submit all data required by Section 07 22 00 ROOF AND DECK INSULATION, together with requirements of this section. Include in data written acceptance by the roof membrane manufacturer of the products and accessories provided. Products must be as listed in the applicable wind uplift and fire rating classification listings, unless approved otherwise by the Contracting Officer.

SD-05 Design Data

Wind Uplift Calculations; Provide Engineering calculations, signed, sealed, and dated by a qualified Engineer validating the wind resistance per ASCE 7, ASTM D4073, and ANSI/SPRI/FM 4435/ES-1 of non-rated roof system.

SD-07 Certificates

Provide evidence that products used within this specification are manufactured in the United States.

Qualification of Manufacturer: Certify that the manufacturer of the modified bitumen membrane meets requirements specified under paragraph entitled "Qualification of Manufacturer."

Qualification of Applicator: Certify that the applicator meets requirements specified under paragraph entitled "Qualification of Applicator."

Qualification of Engineer of Record: Certify that the Engineer of Record is fully qualified, competent, and currently licensed to practice in the project jurisdiction.

Bill of Lading: Submit bill of lading when labels of asphalt containers do not bear the flash point (FP), finished blowing temperature (FBT), and equiviscous temperature (EVT).

Wind Uplift Resistance; classification, as applicable
Fire Resistance classification;
Submit the roof system assembly wind uplift and fire rating classification listings.

SD-08 Manufacturer's Instructions

Modified Bitumen Membrane Application;
Flashing;
Temperature Limitations for Asphalt
Torches
Cold Adhesive Applied Modified Bitumen Membrane;
Base Sheet attachment, including pattern and frequency of mechanical attachments required in field of roof, corners, and perimeters to provide for the specified wind resistance.
Primer
Fasteners
Ventilating Base Sheets
Coating Application;
Cold Weather Installation;

Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Include membrane manufacturer requirements for nailers and back nailing of roof membrane on steep slopes. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

SD-11 Closeout Submittals Warranty
Information Card
Instructions To Government Personnel
Include copies of Safety Data Sheets for maintenance/repair materials.
Submit 15 year "No-Dollar-Limit" warranty for labor and materials.

1.4 QUALITY ASSURANCE

1.4.1 Qualification of Manufacturer

Modified bitumen sheet roofing system manufacturer must have a minimum of seven (7) years' experience in manufacturing modified bitumen roofing products.

1.4.2 Qualification of Applicator

Roofing system applicator must be approved, authorized, and/or licensed in writing by the modified bitumen sheet roofing system manufacturer and have a minimum of five (5) years' experience as an approved, authorized, or licensed applicator with that manufacturer and be approved at a level capable of providing the specified warranty. The applicator must supply the names, locations contract number, Contracting Officer name and client contact

information of five projects of similar size and scope that the applicator has constructed using the manufacturer's roofing products submitted for this project within the previous three years.

1.4.3 Qualifications of Photovoltaics (PV) Rooftop Applicator

The PV rooftop applicator must be approved, authorized, or certified by a Roof Integrated Solar Energy (RISE) Certified Solar Roofing Professional (CSRP), and comply with applicable codes, standards, and regulatory requirements to maintain the weatherproofing abilities of both the integrated roof system and photovoltaic system.

1.4.4 Qualification of Engineer of Record

Engineer of Record must be currently licensed within the jurisdiction of the project.

Engineer of Record must be approved, authorized, and currently licensed by the state of Maryland, and have a minimum of five years' experience as an approved Engineer for manufacturers of similar roof systems.
Engineer of Record must supply the names and locations of five projects of similar size and scope for which he has provided engineering calculations using the manufacturer's products submitted for this project within the previous three years.

Engineer of Record must provide certified engineering calculations for:

Wind uplift requirements in accordance with Local and State codes, ASCE 7, in accordance with International Building Code.
Seismic requirements per local and state building codes.

Seismic requirements per ICC IBC Chapter 16, Section 1608.3

Snow load requirements per ICC IBC Chapter 16 Section 1608.3 and Section 7 of ASCE 7

1.4.5 Fire Resistance

Complete roof covering assembly must:

a. Be Class A or B rated in accordance with ASTM E108, FM 4470, or UL 790; and

b. Be listed as part of Fire-Classified roof deck construction in UL RMSD, or Class I roof deck construction in FM APP GUIDE.

FM or UL approved components of the roof covering assembly must bear the appropriate FM or UL label.

1.4.6 Wind Uplift Resistance

The complete roof system assembly, including insulation, must be rated Class 1-90 in accordance with FM P7825 and ASTM D 4073 capable of withstanding an uplift pressure of 45 psf. Non-rated systems must not be installed, except as approved by the Contracting Officer. Submit licensed engineer's Wind uplift calculations and substantiating data to validate any non-rated roof system. Base wind uplift measurements on a design wind speed of 120 mph in accordance with ASCE 7-10, ASTM D 4073, and/or other applicable building code requirements.

1.4.7 Pre-Construction Conference

Within ten calendar days of the task order award, the contractor shall request that the COR schedule a pre-construction meeting. This meeting shall be scheduled by the COR and attended by the contractor, their applicable sub-contractors, the COR, PM and end user stake holders. The following items will be discussed and or reviewed:

a. The project schedule to include date of mobilization and set up, key events dates and completion dates.

b. Drawings, including Roof Plan, specifications and submittals related to the roof work, Field inspection and verification of all existing conditions, including all fire safety issues, existing structure, and existing materials, including concealed combustibles, which may require additional protection during installation.

c. Roof System components installation

d. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roof structure, and roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representatives to roof manufacturer.

e. Contractor's plan for coordination of work of the various trades involved in providing the roofing system and other components secures to the roof.

f. Quality control, (ARMA PMBRG98) plan for the roof system installation.

g. Safety requirements to include building specific fall prevention and protection plans, electrical safety plan, as well as the Activity Hazard Analysis (AHA) for the specific activities to be undertaken with the applicable task order. The conference shall discuss the means and methods to be utilized to show compliance with the applicable OSHA, MOSH and Army safety regulations.

Coordinate preroofing conference scheduling with the Contracting Officer. The conference must be attended by the Contractor, the Contracting Officer's designated personnel, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, designated safety personnel trained to enforce and comply with ASSE/SAFE A10.24, Fire Marshall (or designated representative), and representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver materials in manufacturers' original unopened containers and rolls with labels intact and legible.

Mark and remove wet or damaged materials from the site at no additional expense to the Government.
Where materials are covered by a referenced specification, the container must bear the specification number, type, and class, as applicable.

Labels or bill of lading for roofing asphalt must indicate asphalt type, FP, FBT, and EVT, that is, the temperature at which the viscosity is either 125 centistokes when tested in accordance with ASTM D2170 or 75 centipoise when tested in accordance with ASTM D4402.

Deliver materials in sufficient quantity to allow work to proceed without interruption.

1.5.2 Storage

Protect materials against moisture absorption and contamination or other damage. Avoid crushing or crinkling of roll materials. Store roll materials on end on clean raised platforms or pallets one level high in dry locations with adequate ventilation, such as an enclosed building or closed trailer. Do not store roll materials in buildings under construction until concrete, mortar, and plaster work is finished and dry. Maintain roll materials at temperatures above 10 degrees C 50 degrees F for 24 hours immediately before application. Do not store materials outdoors unless approved by the Contracting Officer. Completely cover felts stored outdoors, on and off roof, with waterproof canvas protective covering. Do not use polyethylene sheet as a covering. Tie covering securely to pallets to make completely weatherproof. Provide sufficient ventilation to prevent condensation. Do not store more

materials on roof than can be installed the same day and remove unused materials at end of each day's work. Distribute materials temporarily stored on roof to stay within live load limits of the roof construction.

Maintain a minimum distance of 35 feet for all stored flammable materials, including materials covered with shrink wraps, craft paper and/or tarps from all torch/welding applications.

Immediately remove wet, contaminated or otherwise damaged or unsuitable materials from the site. Damaged materials may be marked by the Contracting Officer.

1.5.3 Handling

Prevent damage to edges and ends of roll materials. Do not install damaged materials in the work. Select and operate material handling equipment to prevent damage to materials or applied roofing.

1.6 ENVIRONMENTAL REQUIREMENTS

Do not install roofing system when air temperature is below 40 degrees F, during any form of precipitation, including fog, or when there is ice, frost, moisture, or any other visible dampness on the roof deck. Follow manufacturer's printed instructions for Cold Weather Installation.

1.7 TORCH, HOT-MOPPED ASPHALT APPLIED or HEAT WELDED MODIFIED BITUMEN MEMBRANE SAFETY

1.7.1 Property Protection

Take all precautions necessary to prevent ignition of combustible materials during torch application or hot-mopped asphalt application of roofing.

Immediately call the fire department if a fire commences or there are indications of something burning in or around the area of the torch operations. Review all fire safety procedures as outlined at the pre-roofing conference.

Install materials using the techniques recommended by CERTA NRCA/MRCA Certified Roofing Torch Applicator Program available from the National Roofing Contractors Association (NRCA) and the Midwest Roofing Contractors Association (MRCA) as endorsed by the Asphalt Roofing Manufacturers Association (ARMA) and the United Union of Roofers, Waterproofers and Allied Workers. Application procedures must comply with NFPA 241, OSHA 29 CFR 1910 and 29 CFR 1910.12, 29 CFR 1926.16, 29 CFR 1926 Subpart F., UL Fire Resistance Directory Volume No. 1, NRCA R&W Manual, and Florida Building Code Volume 2004.

Do not store flammable liquids on the roof.

NOTE: Torch Applied - Provide a minimum of two 2.65 gallon containers of water and two fully charged minimum 20 pound CO_2 or 20 pound ABC (dry chemical) fire extinguishers in separate, easily accessible locations on the roof and within 30 feet (10 feet on smaller roofs) of each torch work area at all times.

NOTE: Hot Mopped Applied - No Asphalt Kettles are allowed on roofs. Locate kettles and supply LP-Gas Cylinders safely and secured per NFPA 241 outside of the building's perimeter a minimum of 20 feet from the structure and any combustible materials.

Maintain a minimum separation of 20 feet between LP-Gas Cylinders and kettle. Provide protective fire retardant blanket barrier or shield between any building structure to a minimum height of 8 foot and a clear surround distance of 4 foot if operations force placement of kettle within a distance of 20 feet. Do not obstruct or place kettles or Cylinder storage within 10 feet of exits, means of egress, gates, roadways, entrances. Locate kettles downwind and away from any building air intakes.

Provide a minimum of two portable fully charged 20 pound CO2 or 20 pound ABC (dry chemical)] fire extinguishers no closer than 5 feet and no further than 25 feet of horizontal travel distance from each kettle at all times while kettle is in operation, in easily accessible and identifiable locations. Also provide a minimum of two multipurpose 2-A:20-B:C portable fire extinguisher on the roof being covered or repaired.

Comply with the following safety procedures:

a. Fuel containers, burners, and related appurtenances of roofing equipment in which liquefied petroleum gas is used for heating must comply with the requirements of NFPA 58.

b. Fuel containers having capacities greater than one pound must be located a minimum of 10 foot clear distance from the burner flame.

c. All LP-Gas Cylinders must be clearly labeled "Flammable Gas", and secured to prevent accidental tip-over.

d. Check all pressure regulators and hoses prior to use for proper functioning and integrity.

e. Turn off fuel supply at LP Gas Cylinder when kettle is not in use.

f. Equip all kettles with a functioning temperature measuring device to ensure no heating in excess of 50 degrees F below the flash point.

g. Provide covers, lid, or top which are close fitting, constructed of minimum No.14 manufacturer's gauge steel, and can be gravity closed on all kettles.

h. Clean all roofing mops and rags free of excess asphalt and store safely away from all combustible materials. Store discarded roofing mops and rags in a non-combustible container and remove from site each day.

i. Position all pump lines handling hot asphalt securely and equip all pump lines with a shut-off valve on each with a coupler which may be opened when lines are full. Do not subject pump lines to pressures in excess of safe and recommended NRCA and ARMA working pressures. Station an operator near the equipment to cut off flow and care for other emergencies while conducting heating, pumping and application operations.

j. Asphalt bucket used by roofers or workers in similar trades must be constructed of minimum No. 24 gauge or heavier sheet steel and have a metal bail of no less than 1/4 inch diameter material. The bail is to be fastened to offset ears or equivalent which have been riveted, welded, or otherwise safely and securely attached to the bucket. Soldered bail sockets are prohibited. Position workers and other employees to avoid being struck by bucket or other roofing materials, which may accidentally fall while being hoisted, lowered, or used in the roofing operation. Provide safety barriers and caution signs at all skylights or other roof holes.

k. Do not use flammable liquids with a flash point below 100 degrees F (gasoline and similar products) for cleaning purposes.

Do not use solid fuel or Class I liquids as fuel for roofing asphalt kettles. Provide a minimum of one employee fully knowledgeable of kettle operations and hazards to maintain constant surveillance during kettle operation within a minimum distance of 25 foot of the kettle.

NOTE: Torch Applied and Hot Mopped Applied

Check all fire extinguishers prior to commencement of work, and upon completion of the day's work, to ensure fullness and operability.

Project supervisor must make daily inspections with the facility manager of all conditions and operations which could present hazards during torching, hot-mopped applications and issue directives to address all such concerns and items of the work and existing conditions.

Identify and protect all combustible roof components, possible fire traps, and hidden hazards. Seal off voids or openings in the substrate with non-combustible materials prior to installing torch-applied, hot-mopped applied materials in the area. Install protective fire retardant blankets and shields at building walls, eaves, parapets and equipment curbs constructed of combustible materials within 3 foot radius of the area of torch work, hot-mopped kettle prior to commencement of the work.

When working around intakes and openings, temporarily disconnect and block to prevent flame of torch, fumes from kettle from being drawn into the opening. Provide non-combustible shielding or flame guard protection where gaps or voids occur in the construction in area of torch work.

1.7.2 Fire Watch

All personnel on the roof during torch application, hot-mopped application must be properly trained to use a fire extinguisher.

Provide a fire watch for a minimum of two hours after completion of all torch work, 30 minutes after completion of hot-mopped kettle operations at the end of each work shift. Maintain the fire watch for additional time required to ensure no potential ignition conditions exist. Utilize heat sensing meters to scan for hot spots in the work. For torch applications, provide and utilize a minimum of one certified heat detection gun per torch for use during the fire watch to verify cool, safe and non-combustible conditions exist. Provide a minimum duration fire watch of two hours conducted by personnel properly trained to survey the underside of the roof deck (where possible) and the topside of possible smoldering elements.

Do not torch in areas of poor and/or no visibility (curbs, corners, eaves, expansions joints, flashing, other voids and small penetrations) which could allow a torch flame to ignite combustible material(s) hidden from view or within the underside of the roof deck or building interior. Use cold finish applications in these areas whenever possible and per manufacturer's printed instructions, NRCA 4002, MRCA R&NW manual for "cold adhered" materials.

Do not leave the rooftop unattended during breaks in work during a work shift. Walk and scan all areas of application checking for hot spots, fumes, or smoldering, especially at wall and curb areas, prior to departure at the end of each work shift. Ensure any and all suspect conditions are eliminated prior to leaving the site each work shift.

1.7.3 Open Flame Application (Torch) Equipment and Personnel Safety

Only NRCA/MRCA CERTA certified roofing applicators are allowed to operate any torching equipment. Verify that all such applicators maintain and are currently carrying a valid Certified Roofing Torch Applicator (CERTA) card.

All crew members must be trained in preventive measures for indirect and direct dangers and hazards associated with roofing work, which include, but are not limited to the following:

a. Heat Stress: Wear light colored clothing, a hat for ultra-violet protection, and other eye protective devices. Drink sufficient quantities of non-alcoholic, non-caffeine liquids. Stage shifts for crew members to allow for breaks from heat and sun exposure without interfering with work progress.

b. First Aid for Burns: Immediately call for an ambulance. Contact local Occupational Health Services (OHS).

All crew members must wear correct personal protective equipment (PPE), including, but not limited to the following items:

a. Long-sleeved shirts buttoned at the collar and cuffs, and must be made of non-flammable materials. Polyester materials are not allowed.

b. Work boots covering ankles with rubber or composite soles.

c. Long pants without cuffs to extend over the top of the work boots, and must be made of non-flammable materials. No polyester allowed.

d. Heavy leather gloves and/or flame retardant gauntlets which must be worn during all handling of a torch, whether operating or not.

e. OSHA and ANSI/ISEA Z87.1 approved face shields, goggles and/or safety glasses to be worn during torching and any other applicable roofing functions.

f. OSHA and ANSI approved hard hats.

1.7.4 Wind Conditions

Use side shields with all torching operations when winds are occurring to prevent flame distortion of end burners. Use torch machine equipment with bottom shield plate to prevent flame spread on to roof deck and substrate. When high wind gusts are present, notify the safety officer and cease all use of torching equipment until wind conditions lower and authorization from the safety officer to proceed is received.

1.8 SEQUENCING

Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counter flashing, per NRCA CONDET, and are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials. Application of roofing must immediately follow application of insulation as a continuous operation. Coordinate roofing operations with insulation work so that all roof insulation applied each day is covered with roof membrane installation the same day.

1.9 WARRANTY

Provide roof system material and workmanship warranties meeting specified requirements. Provide revision or amendment to standard membrane manufacturer warranty as required to comply with the specified requirements. Minimum manufacturer warranty shall have no dollar limit, cover full system water-tightness, and shall have a minimum duration of 20 years.

1.9.1 Roof Membrane Manufacturer Warranty

Furnish the roof membrane manufacturer's 15-year no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation in compliance with ASTM C1289, and accessories necessary for a watertight roof system construction. Provide warranty directly to the Government and commence warranty effective date at time of Government's acceptance of the roof work. The warranty must state that:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, blisters, splits, tears, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work are the responsibility of the roof membrane manufacturer.

b. When the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others does not void the warranty.

c. Upon completion of installation, and acceptance by the Contracting Officer COR and Roofing System Engineer of Record, the manufacturer must supply the appropriate warranty to the Owner.

d. Installer must submit a minimum two year warranty to the membrane manufacturer from the date of acceptance, with a copy to the Contracting Officer's Representative.

1.9.2 Roofing System Installer Warranty

The roof system installer must warrant for a period of two (2) years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The roof system installer is responsible for correction of defective workmanship and replacement of damaged or affected materials. The roof system installer is responsible for all costs associated with the repair or replacement work.

1.9.3 Continuance of Warranty

Repair or replacement work, ARMA 410BUR88, NRCA C3701 that becomes necessary within the warranty period and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

1.10 CONFORMANCE AND COMPATIBILITY

The entire roofing and flashing system must be in accordance with specified and indicated requirements, including fire and wind resistance ANSI/SPRI/FM 4435/ES-1) requirements. Work not specifically addressed and any deviation from specified requirements must be in general accordance with recommendations of the NRCA Roofing and Waterproofing Manual, membrane manufacturer published recommendations and details, and compatible with surrounding components and construction. Submit any deviation from specified or indicated requirements to the Contracting Officer for approval prior to installation.

1.11 ELIMINATION, PREVENTION OF FALL HAZARDS

1.11.1 Fall Protection

Installation of fall protection devices and equipment will be addressed under a separate line item and specification. Rail systems, both fixed and non-penetrating shall be designed to withstand a lateral force of 250 pounds without displacement in accordance with the OSHA fall protection standards.

The installation of a safety rail system around all new and existing roof hatches shall be required in the execution of task order issued under this contract.

1.12 COOL ROOFS

Meet the ASHRAE 90.1 - SI ASHRAE 90.1 - IP Chapter 5 values for cool roofing. If a cool roof is not selected in zones 1-3, meet one of the exception requirements listed in ASHRAE 90.1 - SI ASHRAE 90.1 - IP Chapter 5 or provide thermal insulation above the deck with an R value of 33 or greater.

1.13 SUSTAINABILITY REPORTING

Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION.

1.13.1 Recycled Materials

Contractor shall select materials so that the sum of post-consumer recycled content value plus one-half of post-industrial recycled content value constitutes at least 10 percent of the total materials cost for the project. EPA Comprehensive Procurement Guidelines has a supplier database: http://www.epa.gov/cpg/products/

1.13.2 Local/Regional Materials

Contractor shall select materials so that a minimum of 10 percent (by dollar value) of materials and products for the project are extracted, harvested, or recovered, as well as manufactured, regionally within a 500 mile radius of the project site.

PART 2 PRODUCTS

2.1 MODIFIED BITUMEN SHEETS AND FIBERGLASS FELT MATERIALS

Furnish a combination of specified materials that comprise the modified bitumen manufacturer's standard system of the number and type of plies specified. Materials provided must be suitable for the service and climatic conditions of the installation. Modified bitumen sheets must be watertight and visually free of pinholes, particles of foreign matter, non-dispersed raw material, factory splices, or other conditions that might affect serviceability. Polymer modifier must comply with ARMA PMBRG98 and be uniformly dispersed throughout the sheet. Edges of sheet must be straight and flat.

a. Venting Base Sheet: ASTM D4897, Type II, with perforations and as approved by the modified bitumen roof membrane manufacturer.

b. Fiberglass Felt Base Sheet: ASTM D4601, ASTM D1668 Type II, with perforations and as approved by the modified bitumen roof membrane manufacturer.

c. SBS Base Sheet: ASTM D6162 or ASTM D6164 or ASTM D6163, Type I or II, Grade S, minimum 80 mils thick.

d. SBS Interply Sheet: ASTM D6162 or ASTM D6164 or ASTM D6163, Type I or II, Grade S, minimum 80 mils thick.

e. SBS Cap Sheet: ASTM D6162 or ASTM D6164 or ASTM D6163; Type II, Grade S, minimum 145 mils thick, and as required to provide specified fire safety rating.

f. APP Base Sheet: ASTM D6222, Type I or II; or ASTM D6223; Grade S, minimum 140 mils thick.

g. APP Cap Sheet: ASTM D6222, Type II; or ASTM D6223; Grade S, minimum 180 mils thick.

2.2 BASE FLASHING MEMBRANE

Membrane manufacturer's standard, minimum two-ply modified bitumen membrane flashing system compatible with the roof membrane specified and as recommended in membrane manufacturer's published literature. Flashing membranes must meet or exceed the properties of the material standards specified for the modified bitumen base, interply and cap sheet, except that flashing membrane thickness must be as recommended by the membrane manufacturer. Metal clad flashing membrane must comply with ASTM D6298.

2.3 ASPHALT

ASTM D312, Type III or IV, in accordance with modified bitumen membrane manufacturer requirements and compatible with the slope conditions of the installation.

2.4 COLD-APPLIED MEMBRANE ADHESIVE

Membrane manufacturer's recommended [low volatile organic compound (VOC)] cold process adhesive for application of the membrane plies.

2.5 MEMBRANE SURFACING

Provide modified bitumen roof membrane cap sheet with factory-applied granule surfacing of light color or as selected from membrane manufacturer's standard colors. Provide modified bitumen membrane manufacturer's recommended field-applied protective coating of [white][light gray][_____] color. Aluminized coating must comply with ASTM D2824, Type I or III, as recommended by the modified bitumen roof membrane

manufacturer.]Light colored, opaque water-worn gravel aggregate surfacing material conforming to ASTM D1863, or other aggregate as recommended by the membrane manufacturer and approved by the Contracting Officer[, and applied in flood coat of hot asphalt].]

]2.6 PRIMER

ASTM D41/D41M, or other primer compatible with the application and as approved in writing by the modified bitumen membrane manufacturer.

2.7 MODIFIED BITUMEN ROOF CEMENT

ASTM D4586/D4586M, Type II for vertical surfaces, Type I for horizontal surfaces, compatible with the modified bitumen roof membrane and as recommended by the modified bitumen membrane manufacturer.

2.8 CANT AND TAPERED EDGE STRIPS

Provide standard cants and tapered edge strips of the same material as the roof insulation or when roof insulation material is not available, provide pressure preservative treated wood, wood fiberboard, rock wool or rigid perlite board cants and edge strips as recommended by the manufacturer. [or wood fiber conforming to ASTM C208] treated with bituminous impregnation, sizing, or waxing and fabricated to provide maximum 45 degree change in direction of membrane. Cant strips must be minimum 1-1/2 inch thick and provide for minimum 5 inch face and 3-1/2 inch vertical height when installed at 45 degree face angle 4 inch vertical height with 45 degree cant angle], except where clearance restricts height to lesser dimension. Taper edge strips at a rate of one to 1-1/2 inch per foot to a minimum of 1/8 inch of thickness. Provide kiln-dried preservative-treated wood cants, in compliance with requirements of Section 06 10 00 ROUGH CARPENTRY at base of wood nailers set on edge and wood curbing and where otherwise indicated.

2.9 FASTENERS AND PLATES

Provide coated, corrosion-resistant fasteners as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470 and FM APP GUIDE for Class I roof deck construction and the wind uplift resistance specified. For fastening of membrane or felts to wood materials, provide fasteners driven through 1 inch diameter metal discs, or one piece composite fasteners with heads not less than 1 inch in diameter or 1 inch square with rounded or 45 degree tapered corners.

2.9.1 Masonry or Concrete Walls and Vertical Surfaces

Use hardened steel nails or screws with flat heads, diamond shaped points, and mechanically deformed shanks not less than 1 inch long for securing felts, modified bitumen sheets, metal items, and accessories to masonry or concrete walls and vertical surfaces. Use power-driven fasteners only when approved in writing by the Contracting Officer.

2.9.2 Metal Plates

Provide flat corrosion-resistant round stress plates as recommended by the modified bitumen sheet manufacturer's printed instructions and meeting the requirements of FM 4470; not less than 2 inch in diameter. Form discs to prevent dishing or cupping.

2.10 PRE-MANUFACTURED ACCESSORIES

Pre-manufactured accessories must be manufacturer's standard for intended purpose, comply with applicable specification section, compatible with the membrane roof system and approved for use by the modified bitumen membrane manufacturer.

2.10.1 Pre-fabricated Curbs

Provide 16 gauge steel curbs with minimum 4 inch flange for attachment to roof nailers. Curbs must be minimum height of 10 inch above the finished roof membrane surface.

2.10.2 Elevated Metal [Walkways] [and] [Platforms]

As specified in Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS 05 51 33 METAL LADDERS, 05 52 00 METAL RAILINGS, or 05 51 00 METAL STAIRS.

2.11 WALKPADS

Roof walkpads must be polyester reinforced, granule-surfaced modified bitumen membrane material, minimum 197 mils thick, compatible with the modified bitumen sheet roofing and as recommended by the modified bitumen sheet roofing manufacturer. Panels must not exceed 4 foot in length. Other walkpad materials require approval of the Contracting Officer prior to installation.

2.12 PAVER BLOCKS

Precast concrete, minimum 1-1/2 inch thick, minimum 18 inch square for walkways and minimum 6 inch by 12 inch for use in supporting surface bearing components but extending not less than 2 inch beyond all sides of surface bearing bases. Install walkpad material under all paver blocks.

2.13 ROOF INSULATION BELOW MODIFIED BITUMEN MEMBRANE SYSTEM

Insulation must be compatible with the roof membrane, approved by the membrane manufacturer and meeting all the requirements of ASTM C552, ASTM C578, or ASTM C726 as specified in Section 07 22 00 ROOF AND DECK INSULATION.

2.14 MEMBRANE LINER

Provide self-adhering modified bitumen underlayment conforming to ASTM D1970, EPDM membrane liner conforming to ASTM D4637 or other waterproof membrane liner material as approved by the Contracting Officer.

2.15 Photovoltaic (PV) Systems - Rack Mounted Systems

The Contractor shall adhere to the following guidelines:

a. Building Owners Guide to Roof-mounted PV Systems, published by NRCA.

b. Guidelines for Roof-Mounted PV Systems, published by NRCA.

PART 3 EXECUTION

3.1 EXAMINATION

Ensure that the following conditions exist prior to application of the roofing materials:

a. Drains, curbs, cants, control joints, expansion joints, perimeter walls, roof penetrating components, and equipment supports are in place.

b. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation. Joints in the substrate are sealed to prevent dripping of bitumen into building or down exterior walls.

c. The plane of the substrate does not vary more than 1/4 inch within an area 10 by 10 foot when checked with a 10 foot straight edge placed anywhere on the substrate.

d. Substrate is sloped as indicated to provide positive drainage.

e. Walls and vertical surfaces are constructed to receive counter flashing, and will permit mechanical fastening of the base flashing materials.

f. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing at minimum height of 8 inch above finished roofing surface.

g. Protect all combustible materials and surfaces which may contain concealed combustible or flammable materials. All fire extinguishing equipment has been placed as specified.

h. Verify all Fire Watch personnel assignments.

i. Treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures. Embedded nailers are flush with deck surfaces. Surface-applied nailers are the same thickness as the roof insulation.

j. Cants are securely fastened in place in the angles formed by walls and other vertical surfaces. The angle of the cant is 45 degrees and the height of the vertical leg is not less than 3-1/2 inch.

k. Venting is provided in accordance with the following:

(1) Edge Venting: Perimeter nailers are kerfed across the width of the nailers to permit escape of gaseous pressure at roof edges.

(2) Underside Venting: Vent openings are provided in steel form decking for cast-in-place concrete substrate.

l. Exposed nail heads in wood substrates are properly set. Warped and split boards, sheets have been replaced. There are no cracks or end joints 1/4 inch in width or greater. Knot holes are covered with sheet metal and nailed in place. Wood, Plywood decks are covered with rosin paper or unsaturated felt prior to base sheet or roof membrane application. Joints in plywood substrates are taped or otherwise sealed to prevent air leakage from the underside.

m. Insulation boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is being roofed over on the same day the insulation is installed.

n. Cast-in-place substrates have been allowed to cure and the surface dryness requirements specified under paragraph entitled "Field Quality Control" have been met.

o. Joints between precast concrete deck units are grouted, leveled, and stripped in with felt or bituminous stripping membrane set in bituminous cement prior to applying other roofing materials over the area.

p. Roof deck and framing are sloped as indicated to provide positive drainage.

3.2 PREPARATION

3.2.1 Protection of Property

3.2.1.1 Protective Coverings

Install protective coverings at paving and building walls adjacent to hoists, tankers, and kettles prior to starting the work. Lap protective coverings not less than 6 inch, secure against wind, and vent to prevent collection of moisture on covered surfaces. Keep protective coverings in place for the duration of the roofing work.

3.2.1.2 Bitumen Stops

Provide felt bitumen stops or other means to prevent bitumen drippage at roof edges, openings, and vertical projections before hot mopped application of the roofing membrane.

3.2.2 Equipment

3.2.2.1 Mechanical Application Devices

Mount mechanical application devices on pneumatic-tired wheels. Use devices designed and maintained to operate without damaging the insulation, roofing membrane, or structural components.

3.2.2.2 Flame-Heated Equipment

Do not place flame-heated equipment on roof. Provide and maintain a fire extinguisher adjacent to flame-heated equipment and on the roof.

3.2.2.3 Open Flame Application Equipment

Torches and other open flame equipment must be specifically designated for use in application of modified bitumen materials and approved by the modified bitumen sheet manufacturer. Open flame equipment must not be ignited (burning) when left unattended. Provide and maintain a fire extinguisher adjacent to open flame equipment on the roof. Specific requirements for fire watches and burn permits exist. These requirements will be reviewed at the preroofing conference.

3.2.2.4 Electric-Heated Equipment

Provide adequate electrical service as required by manufacturer of electrical equipment to ensure against damage to equipment and property and to ensure proper application of roofing materials.

3.2.3 Heating of Asphalt

Break up solid asphalt on a surface free of dirt and debris. Heat asphalt in kettle designed to prevent contact of flame with surfaces in contact with the asphalt. Kettles must have visible working thermometer and thermostatic controls set to the temperature limits specified herein. Keep controls in working order and calibrated. Use immersion thermometer, accurate within a tolerance of plus or minus 2 degrees F, to check temperatures of the asphalt frequently. When temperatures exceed maximums specified, remove asphalt from the site. Do no permit cutting back, adulterating, or fluxing of asphalt.

3.2.3.1 Temperature Limitations for Asphalt

Heat and apply asphalt at the temperatures specified below unless specified otherwise by manufacturer's printed application instructions. Use thermometer to check temperature during heating and application. Have kettle attended constantly during heating process to ensure specified temperatures are maintained. Do not heat asphalt above its finished blowing temperature (FBT). Do not heat asphalt between 500 and 525 degrees F for longer than four consecutive hours. Do not heat asphalt to the flash point (FP). Apply asphalt and embed membrane sheets when temperature of asphalt is within plus or minus 25 degrees F of the equiviscous temperature (EVT) but not less than 400 degrees F. Before heating and application of asphalt refer to the asphalt manufacturer's label or bill of lading for FP, FBT, and EVT of the asphalt used.

3.2.4 Priming of Surfaces

Prime all surfaces to be in contact with adhered membrane materials. Apply primer at the rate of 0.75 gallon per 100 sq. ft. or as recommended by modified bitumen sheet manufacturer's printed instructions to promote adhesion of membrane materials. Allow primer to dry prior to application of membrane materials to primed surface. Avoid flammable primer material conditions in torch applied membrane applications.

3.2.4.1 Priming of Concrete and Masonry Surfaces

After surface dryness requirements have been met, coat concrete and masonry surfaces which are to receive membrane materials uniformly with primer.

3.2.4.2 Priming of Metal Surfaces

Prime flanges of metal components to be embedded into the roof system prior to setting in bituminous materials or stripping into roofing system.

3.2.5 Membrane Preparation

Unroll modified bitumen membrane materials and allow to relax a minimum of 30 minutes prior to installation. In cold weather, adhere to membrane manufacturer's additional recommendations for pre-installation membrane handling and preparation. Inspect for damage, pinholes, and particles of foreign matter, non-dispersed raw material, factory splices, or other conditions that might affect serviceability. Edges of seams must be straight and flat so that they may be seamed to one another without forming fish mouths or wrinkles. Discard damaged or defective materials.

3.2.6 Substrate Preparation

Apply membrane to clean, dry surfaces only. Do not apply membrane to surfaces that have been wet by rain or frozen precipitation within the previous 12 hours. Provide cleaning and artificial drying with heated blowers or torches as necessary to ensure clean, dry surface prior to membrane application.

3.3 APPLICATION

Apply roofing materials as specified herein unless approved otherwise by the Contracting Officer. Keep roofing materials dry before and during application. Complete application of roofing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day. Maintain specified temperatures for asphalt. Provide temporary roofing and flashing as specified herein prior to application of permanent roofing system.

3.3.1 Phased Membrane Construction

Phased application of membrane plies is prohibited unless otherwise approved by the Contracting Officer and supported by the membrane manufacturer's written application instructions. If cap sheet installation is delayed, thoroughly clean the applied membrane material surface and dry immediately prior to cap sheet installation. Priming of the applied membrane surface may be required at the discretion of the Contracting Officer prior to cap sheet installation.

3.3.2 Temporary Roofing and Flashing

Provide watertight temporary roofing and flashing where considerable work by other trades, such as installing cooling towers, antennas, pipes, ducts, etc., is to be performed on the roof or where construction scheduling or weather conditions require protection of the building's interior before permanent roofing system can be installed. Do not install temporary roofing over permanently installed insulation. Provide rigid pads for traffic over temporary roofing.

3.3.2.1 Removal

Completely remove temporary roofing and flashing before continuing with application of the permanent roofing system.

3.3.3 Application Method

3.3.3.1 Hot Asphalt Application of Modified Bitumen Membrane

Apply membrane immediately following application of hot asphalt. Apply hot asphalt within 6 foot of roll. Do not work ahead with asphalt. Asphalt must be completely fluid, with mop temperatures within the asphalt's EVT range, but not less than 400 degrees F, at the instant membrane comes into contact with asphalt. Application of bitumen between layers must be such as to provide full, continuous, uniform coverage and complete contact of hot asphalt with the sheet above and below. Embed sheets in asphalt. As sheets are being rolled into hot asphalt, immediately and thoroughly apply uniform positive pressure by squeegee, roll, or broom to ensure full adhesion and lap seal, eliminate trapped air and to provide tight, smooth laminations. Avoid excessive extrusion of asphalt at lap areas. Control asphalt bleed out to approximately 1 inch maximum.

3.3.3.2 Torch Applied Heat Welded Modified Bitumen Membrane Flashing

Base flashing membrane may be torch applied. Ensure substrate membrane surfaces are warmed either naturally or by torch during the installation. Apply heat evenly to underside of roll membrane being installed and exposed side lap area of previously installed sheet. Provide for slight, uniform flow of bitumen in front of roll and full width of roll as the material is being rolled or set into place. Apply uniform positive pressure to ensure membrane is fully adhered and all laps are sealed. Prior to forming lap over granulated surfaces, embed granules of the receiving sheet by heating and troweling-in the granules to form a uniform black compound surface. Roll all lap areas with a weighted roller immediately after forming lap. Provide for visual bleed out of compound in lap areas. Avoid overheating the membrane or burning through to membrane reinforcement. Inspect and ensure all lap areas are fully sealed.

3.3.3.3 Cold Adhesive Applied Modified Bitumen Membrane

Apply cold adhesive with airless sprayer or 1/4 inch saw-toothed rubber squeegee to prepared surfaces in accordance with membrane manufacturer's application instructions. Fully cover substrate with adhesive. Roll or lay membrane in adhesive in accordance with manufacturer's recommendations and within the time limitations of adhesive application. Broom the membrane to ensure full contact with adhesive. Seal laps with adhesive or by heat fusing with torch or hot air welder as required by membrane manufacturer. Minimize traffic on installed membrane during the adhesive cure and set time.

3.3.4 Ventilating Base Sheets

Apply ventilating base sheets with 3 inch side laps and 6 inch end laps in accordance with manufacturer's printed application instructions for substrate and wind uplift conditions specified. Mechanical attachments must be as required for wind resistance specified and to include increased frequency of attachment at corner and perimeter areas. Drive fasteners flush with no dishing or cupping of fastener plate. Top mop perforated sheet with a full, continuous mopping of hot asphalt.

3.3.5 Modified Bitumen Base Sheet

Fully adhere base sheets in accordance with membrane manufacturer's printed instructions. Apply cold adhesive with airless sprayer or a 1/4 inch saw-toothed rubber squeegee and at application rate recommended by the membrane manufacturer. Fully cover substrate with cold adhesive. Ensure laps areas of base sheet are fully sealed. Roll and broom in the base sheet to ensure full contact with the hot asphalt or adhesive application. On nailable substrates, mechanically fasten base sheet in conformance with specified wind resistance requirements and membrane manufacturer's printed instructions, and to include increased fastening frequency in corner and perimeter areas. Drive fasteners flush with no dishing or cupping of fastener plate. Where applicable, mechanically fasten base sheet in conjunction with insulation to the substrate, in accordance with membrane manufacturers printed instructions. Apply sheets in a continuous operation. Apply sheets with side laps at a minimum of 2 inch unless greater side lap is recommended by the manufacturer's standard written application instructions. Provide end laps of not less than 6 inch and staggered a minimum of 36 inch. Apply sheets at right angles to the roof slope so that the direction of water flow is over and not against the laps, parallel to the roof slope, so that plies of sheets extend from eave line on one side of the barrel-type roof and 18 inch over the center line of the crown of the roof. Apply sheets on the other side in the same manner, resulting in twice the normal

amount of roofing sheets and asphalt at the crown. Extend base sheets approximately 2 inch above the top of cant strips at vertical surfaces and to the top of cant strips elsewhere. Trim base sheet to a neat fit around vent pipes, roof drains, and other projections through the roof. Application must be free of ridges, wrinkles, and buckles.

3.3.6 Modified Bitumen Membrane Application

Ensure proper sheet alignment prior to installation. Apply membrane layers perpendicular to slope of roof in shingle fashion to shed water, including application on areas of tapered insulation that change slope direction. Apply membrane layers parallel to slope of roof. Bucking or backwater laps are prohibited. Fully adhere membrane sheets to underlying substrate materials. Provide minimum 3 inch side laps and minimum 6 inch end laps and as otherwise required by membrane manufacturer. Stagger end laps minimum 36 inch. Offset side laps between membrane layers a minimum of 12 inch. Offset end laps between membrane layers a minimum of 36 inch. Install all membrane layers the same workday, unless supported otherwise by roof membrane manufacturer application instructions and approved by the Contracting Officer. Provide tight smooth laminations of each membrane layer without wrinkles, ridges, buckles, kinks, fishmouths, or voids. Ensure full membrane adhesion and full lap seals. Rework to seal any open laps prior to application of subsequent membrane layers. The completed membrane application must be free of surface abrasions, air pockets, blisters, ridges, wrinkles, buckles, kinks, fishmouths, voids, or open seams.

3.3.6.1 Cap Sheet Installation

Underlying applied membrane must be inspected and repaired free of damage, holes, puncture, gouges, abrasions, and any other defects, and free of moisture, loose materials, debris, sediments, dust, and any other conditions required by the membrane manufacturer prior to cap sheet installation. Do not apply cap sheet if rain or frozen precipitation has occurred within the previous 24 hours. Align cap membrane and apply by the specified method with the proper side and end lap widths. Set cap sheet in hot asphalt or torch apply as recommended by the modified bitumen membrane manufacturer. Cut at a 45 degree angle across selvage edge of cap membrane to be overlapped in end lap areas prior to applying overlapping cap membrane. Apply matching granules in any areas of bitumen, adhesive bleed out while the asphalt is still hot or adhesive is still tacky. Minimize traffic on newly installed cap sheet membrane.

3.3.6.2 Backnailing of Cap Sheet

Unless otherwise recommended by the modified bitumen membrane manufacturer and approved by the Contracting Officer, provide minimum 3-1/2 inch wide nailing strips matching insulation thickness and applied perpendicular to roof slope for Backnailing of roof membrane. Space nailing strips as recommended by the membrane manufacturer, but not exceeding 16 foot on center unless approved otherwise by the Contracting Officer. Coordinate the nailer installation with insulation requirements. Install the modified bitumen cap sheet to provide for end laps at nailer locations. Nail the modified bitumen cap sheet at the end lap area across the width of the sheet. Nail within 1 inch of each edge of the sheet and at 8 inch to 8-1/2 inch on center across the width of the sheet in a staggered fashion. Nails must have 1 inch diameter metal cap or be nailed through 1 inch diameter caps. Cover nails by overlapping adjacent upslope sheet at the end lap area.

3.3.7 Membrane Flashing

Apply two-ply modified bitumen strip flashing and sheet flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes, and other vertical surfaces, and where necessary to make the work watertight. Apply membrane flashing in accordance with the roof membrane manufacturers printed instructions and as specified. Cut at a 45 degree angle across terminating end lap area of cap membrane prior to applying adjacent overlapping cap membrane. Press flashing into place to ensure full adhesion and avoid bridging. Ensure full lap seal in all lap areas. Mechanically fasten top edge of modified bituminous base flashing 6 inches on center through minimum 1 inch diameter tin caps with fasteners of sufficient length to embed minimum one inch into attachment substrate. Apply matching granules in any areas of asphalt or adhesive bleed out while the asphalt is still hot or adhesive is still tacky. Apply membrane liner over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs, parapet walls, expansion joints and as otherwise indicated to serve as waterproof lining under sheet metal

flashing components. Metal flashing per SMACNA 1793 guidelines and standards is specified under Section 07 60 00 FLASHING AND SHEET METAL. Do not set metal flashing in hot asphalt.

3.3.7.1 Membrane Strip Flashing

Set primed flanges of metal flashing in full bed of modified bituminous cement material and securely fasten through to attachment substrate. Strip-in with membrane flashing so that strip extends not less than 4 inch beyond outer edge of flange. Where multiple membrane stripping plies are installed, extend each additional stripping ply minimum 4 inch beyond edge of previous ply.

3.3.7.2 Membrane Flashing at Roof Drain

Roof drains are specified in Section 22 00 00 PLUMBING, GENERAL PURPOSE. Flashing for roof drains, is specified in Section 07 60 00 FLASHING AND SHEET METAL. Extend membrane sheets to edge of drain bowl opening at the roof drain deck flange in accordance with membrane manufacturer's printed application instructions. Securely clamp membrane sheets and metal roof drain flashing and strip flashing in the flashing clamping ring. Secure clamps so that sheets and metal flashing are free from wrinkles and folds. Trim stripping must be flush with inside of clamping ring.

3.3.7.3 Pre-fabricated Curbs

Securely anchor prefabricated curbs to nailer or other base substrate and flash with modified bitumen membrane.

3.3.7.4 Set-On Accessories

Where pipe or conduit blocking, supports and similar roof accessories are set on the membrane, adhere walkpad material to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.

3.3.7.5 Lightning Protection

Flash and attach lightning protection system components to the roof membrane in a manner acceptable to the roof membrane manufacturer.

3.3.8 Roof Walkpads

Install walkpads at roof access points and where otherwise indicated for traffic areas and for access to mechanical equipment, in accordance with the modified bitumen sheet roofing manufacturer's printed instructions. Provide minimum 6 inch separation between adjacent walkpads to accommodate drainage. Provide walkpad or an additional layer of cap sheet under precast concrete paver blocks to protect the roofing.

3.3.9 Elevated Metal Walkways and Platforms

Install over completed roof system in accordance with Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS, Section 05 51 33 METAL LADDERS, Section 05 52 00 METAL RAILINGS, and Section 05 51 00 METAL STAIRS. Provide for protection of roof membrane by placing walkpad material, or other material approved by the Contracting Officer, at all surface bearing support locations.

3.3.10 Paver Blocks

Install paver blocks where indicated and as necessary to support surface bearing items traversing the roof area. Set paver block on a layer of walkpad [or cap sheet] applied over the completed roof membrane.

3.3.11 Field Applied Surfacing

After completion of roof membrane and flashing installation, and correction of tears, gouges, and other deficiencies in the installed work, apply specified surfacing.

3.3.11.1 Aggregate

Uniformly flood coat the surface with hot asphalt at a rate of approximate 60 pounds per square. While asphalt is still hot, apply gravel aggregate surfacing material at a rate of 400 pounds per square or 300 pounds per square for slag or other approved aggregate surfacing. Provide for full and uniform coverage of the roof surface. Solidly adhere approximately 50 percent of the aggregate in the asphalt.

3.3.11.2 Coating Application

Apply surface coating materials to membrane and flashing in accordance with coating material manufacturer's recommendations.

3.3.12 Correction of Deficiencies

Where any form of deficiency is found, additional measures will be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions must be performed as directed by the Contracting Officer.

3.3.13 Clean Up

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

3.4 CORRECTION OF DEFICIENCIES

Where any form of deficiency is found, additional measures must be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions must be as directed by the Contracting Officer.

3.5 PROTECTION OF APPLIED ROOFING

At the end of the day's work and when precipitation is imminent, protect applied modified bitumen roofing system from water intrusion.

3.5.1 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of modified bitumen roofing system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

3.5.2 Temporary Flashing for Permanent Roofing

Provide temporary flashing at drains, curbs, walls and other penetrations and terminations of roofing sheets until permanent flashing can be applied. Remove temporary flashing before applying permanent flashing.

3.5.3 Temporary Walkways, Runways, and Platforms

Do not permit storing, walking, wheeling, and trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

3.6 FIELD QUALITY CONTROL

Perform field tests in the presence of the Contracting Officer. Notify the Contracting Officer one day before performing tests.

3.6.1 Test for Surface Dryness

Before application of membrane sheets and starting work on the area to be roofed, perform test for surface dryness in accordance with the following:

a. Foaming: When poured on the surface to which membrane materials are to be applied, one pint of asphalt when heated in the range of 350 to 400 degrees F, must not foam upon contact.

b. Strippability: On cementitious substrate surfaces, after asphalt used in the foaming test application has cooled to ambient temperatures, test coating for adherence. Should a portion of the sample be readily stripped clean from the surface, do not consider the surface to be dry and do not start application. Should rain occur during application, stop work and do not resume until surface has been tested by the method above and found dry.

c. Prior to installing any roof system on a concrete deck, conduct a test per ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.6.2 Construction Monitoring

During progress of the roof work, Contractor must make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

a. Materials comply with the specified requirements.

b. Materials are not installed in adverse weather conditions.

All materials are properly stored, handled and protected from moisture or other damages.

c. Equipment is in working order. Metering devices are accurate.

d. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials.

(1) Nailers and blocking are provided where and as needed.

Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.

(2) The proper number, type, and spacing of fasteners are installed.

Membrane heating, hot mopping, or adhesive application is provided uniformly and as necessary to ensure full adhesion of roll materials. Asphalt is heated and applied within the specified temperature range.

The proper number and types of plies are installed, with the specified overlaps.

Applied membrane surface is inspected, cleaned, dry, and repaired as necessary prior to cap sheet installation.

(3) Lap areas of all plies are completely sealed.

Membrane is fully adhered without ridges, wrinkles, kinks, fishmouths, or other voids or delaminations.

Installer adheres to specified and detailed application parameters.

Associated flashing and sheet metal are installed in a timely manner in accord with the specified requirements.

Temporary protection measures are in place at the end of each work shift.

3.6.2.1 Manufacturer's Inspection

Manufacturer's technical representative must visit the site a minimum of three times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Inspections must occur during the first 20 squares of membrane installation, at mid-point of the installation, and at substantial completion, at a minimum. Additional inspections must not exceed one for each 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors must be performed as requested by the Contracting Officer. After each inspection, submit a report, signed by the manufacturer's technical representative to the Contracting Officer within 3 working days. Note in the report overall quality of work, deficiencies and any other concerns, and recommended corrective action.

3.6.3 Samples of Roofing

Take samples per ASTM D5147, sized 4-inch by 40-inch cut across width of modified bitumen sheets as directed by the Contracting Officer. Cut samples will be examined by the Contracting Officer for specified number of plies, proper lap width, complete lap seal, full uniform adhesive compound application and adhesion, full bond between plies, harmful foreign materials, presence of moisture, and wet insulation. Where cuts are not retained by the Contracting Officer or disposed, set cut strip back in cut area in bed of modified bitumen cement. Repair area of cut with new minimum two-ply modified bitumen membrane patch.

3.6.4 Roof Drain Test

After completing roofing, but prior to Government acceptance, perform the following test for watertight integrity. Plug roof drains and fill with water to edge of drain sump for 8 hours. Do not plug secondary overflow drains at the same time as adjacent primary drain. To ensure some drainage from roof, do not test all drains at same time. Measure water at beginning and end of the test period. When precipitation occurs during test period, repeat test. When water level falls, remove water, thoroughly dry, and inspect installation; repair or replace roofing at drain to provide for a properly installed watertight flashing seal. Repeat test until there is no water leakage.

3.7 INFRARED INSPECTION

Eight months after completion of the roofing system, the Contractor must inspect the roof surface using infrared (IR) scanning as specified in ASTM C1153. Where the IR inspection indicates moisture intrusion, wet insulation and damaged or deficient materials or construction must be replaced in a manner to provide watertight construction and maintain the specified roof system warranties.

3.8 INSTRUCTIONS TO GOVERNMENT CONTRACTOR PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the modified bitumen membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair, and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations.

3.9 INFORMATION CARD

For each roof, furnish a typewritten information card for facility Records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 0.039 inch thick aluminum card for exterior display. Card must be 8 1/2 by 11 inch minimum. Information card must identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. The card must be a minimum size of 8 1/2 by 11 inch. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

-- End of Section --

SECTION 07 54 50
THERMOPLASTIC OLEFIN (POLYOLEFIN) TPO ROOF SYSTEM

NOTE: This guide specification covers the requirements for reinforced polyvinyl chloride roofing membrane; loose laid and ballasted, fully adhered, or mechanically fastened.

PART 1 GENERAL

Roofs must be constructed to drain with a minimum slope of ½ inch per foot however a ¼ inch per foot slope may be acceptable if required to meet the minimum flashing heights required by the system manufacturer for warranty purposes

Roof expansion joints must be provided at each expansion joint in the structure, at each change in deck material, and at each intersection where a roof deck changes direction. Expansion joints and curb dividers in the membrane should be located at high points where practicable.

Top of nailers for curbs, area dividers and expansion joints should be at least 8 inches above surface of finished roof and should not interfere with drainage. Do not use flush type joints.

Designer should require materials, products, and innovative construction methods and techniques which are environmentally sensitive, take advantage of recycling and conserve natural resources.

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 29/C 29M	(1997; R 2003) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 208	Standard Specification for Cellulosic Fiber Insulating Board
ASTM C 578	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 728	Standard Specification for Perlite Thermal Insulation Board
ASTM C 1289	Standard Specification for Faced, Rigid Polyisocyanurate Thermal Insulation Board
ASTM D 41	Standard Specification for Asphalt Primer Used in Roofing, Damp proofing and Water Proofing
ASTM D 312	Standard Specification for Asphalt used in Roofing
ASTM D 412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension

ASTM D 1079	Standard Terminology Relating to Roofing, Water proofing, and Bituminous Materials
ASTM D 4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D 4434	(2006) Poly (Vinyl Chloride) Sheet Roofing
ASTM G 21	(1996; R 2002) Determining Resistance of Synthetic Polymeric Materials to Fungi
ASTM D 6878	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing

FM GLOBAL (FM)

FM Standard 4470	Approval Standard for Class 1 Roof Covers
FM P7825a	(2005) Approval Guide Fire Protection
FM P9513	(2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001), 1-28 (2002), 1-29 (2002), 1-28R/1-29R (1998), 1-30 (2000), 1-31 (2000), 1-32 (2000), 1-33 (2000), 1-34 (2001), 1-49 (2000), 1-52 (2000), 1-54 (2001)

SINGLE PLY ROOFING INDUSTRY (SPRI)

SPRI RP-4	(2002) Wind Design Standard for Ballasted Single-Ply Roofing Systems

UNDERWRITERS LABORATORIES (UL)

TGFU R1306	"Roofing Systems and Materials Guide"
UL 580	(2006) Tests for Uplift Resistance of Roof Assemblies
UL 790	(2004) Test Methods for Fire Tests of Roof Coverings

1.2 SUBMITTALS

Government approval is required for all submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roofing System - Drawings showing arrangement of sheets, seam locations, and flashing details including waterproofing of joints where sheet metal flashings change direction. Shop drawings drawn by the manufacturer and certified by the Contractor for the specified system are the preferred drawings.

SD-03 Product Data

Installation - Manufacturer's instructions for preparing and installing the membrane, flashing, seams, insulation, nailers, and other accessories.

Protection of Finished Roofing - A protection plan showing areas to be protected, type of material used a procedure to protect the membrane from damage until completion of work by other trades, and a description of the method of repairing the roofing.

Inspection - The inspection procedure for substrate suitability including decks, curbs and insulation installation, prior to start of the work. Also include inspection procedures during and after placement of the membrane, and after completion of work by other trades.

SD-07 Certificates

Materials - Certificates of compliance attesting that the materials meet specification requirements. The certificates shall list the components required for the specified rating.

Qualifications - Contractor's qualifications as specified.

1.3 GENERAL REQUIREMENTS

NOTE: For guidance on flashings and drainage details, the designer should consult the SMACNA "Architectural Sheet Metal Manual."

Thermoplastic Polyolefin (TPO) roofing system shall be a fully adhered system consisting of a 115 mil thick fleece backed TPO membrane. The adhesive spacing shall either full contact adhesives approved by the manufacturer or low rise foam adhesives set down in ribbons spaced four to six inches apart. Roofing membrane sheet widths shall be consistent with membrane attachment methods and wind uplift requirements, and shall be as large as practical to minimize joints. Membrane shall be free of defects and foreign material. Flashing work shall be coordinated to permit continuous roof-surfacing operations. Insulation shall be applied and weatherproofed on the same day. Roof must be maintained in a water tight condition throughout all phases of construction.

1.3.1 Delivery and Storage

Materials shall be delivered to the jobsite in the manufacturer's original unopened packages, clearly marked with the manufacturer's name, brand name, description of contents, and label for compliance with UL requirements. Time limited materials shall be used before shelf life expires. Materials other than ballast shall be stored in clean, dry areas. Storage temperatures shall be as specified by the manufacturer. A maximum of one day’s supply of materials other than ballast may be stored on the roof when distributed so as not to exceed the roof live load limit. These materials shall be kept dry and clean until application. For rolled material, each roll shall be clearly labeled to identify the manufacturer, the product brand name, and other pertinent information necessary to allow for field inspection and identification of the products. Each roll on a pallet must be clearly identified by the manufacturer. Materials not meeting this requirement shall be rejected by the government as non-conforming materials.

Materials shall be stored above 55 degrees F a minimum of 24 hours prior to application.

All flammable solvent based products shall be stored in flame safety cabinets except for those materials in direct use. Flammable materials shall not be stored on the roof top at any time except for that quantity which will be consumed during the daily production activities.

1.3.2 Fire Resistance

The roofing system fire resistance shall be rated Class A as determined by UL 790 or Class 1 as determined by FM P7825a. Compliance of each component of the roofing system shall be evidenced by label or by written certification from the manufacturer.

1.3.3 Wind Uplift Requirements

FM I-90 ratings apply to the fully adhered roof systems specified in this section installed over a steel deck. Placement of fasteners required for an I-90 rating shall be shown on the drawings.

Fully adhered protected membranes have performed well in hurricane areas, when ballasted as specified in SPRI RP-4. Roof deck must be adequate to support the weight of the ballast as a dead load.

Wind uplift resistance of the complete roof assembly shall be rated Class I-90 in accordance with FM P9513 or Class 90 in accordance with UL 580. Wind resistance of loose-laid ballasted system shall be in accordance with FM P9513 or SPRI RP-4.

1.3.4 Warranty

Provide a manufacturer's No Dollar Limit (NDL) warranty for twenty (20) years shall be furnished. Warranty shall provide for repair or replacement of the complete roofing system, including insulation and flashings, if leaking is caused by defects in materials or workmanship.

The installer shall provide a one year warranty on their workmanship

1.3.5 Qualifications

The Contractor shall submit documentation verifying that the Contractor has a minimum of 5 years experience with TPO roofing systems and has been certified by the TPO roofing manufacturer as an approved Installer for the specified roofing system.

1.3.6 Quality Control

The components used for this system shall be provided by a single manufacturer or approved by the primary roofing manufacturer.

PART 2 PRODUCTS

2.1 SOLVENTS AND SEALANTS

Adhesives, welding solvents, and sealants shall be as recommended by the membrane manufacturer. All solvents, adhesives and sealants must be compatible with the roofing system being installed and the surrounding finishes. Products used must meet the criteria to be labeled "Low VOC" products.

2.2 BALLAST

NOTE: Ballast is not applicable as this system specified is to be a fully adhered TPO system.

2.3 FASTENERS

Fasteners for sheet-metal flashing shall be corrosion-resistant steel annular-ring type nails, or screws. Fasteners for anchoring the roofing membrane shall be as approved by the membrane manufacturer and identical to those used to obtain the wind uplift rating.

2.4 FLASHINGS

Flashings shall be ultra-violet resistant materials furnished by the membrane manufacturer, except as otherwise specified. Shaped flashing components shall be prefabricated. Sheared edges of metal flashings that will contact the membrane shall be turned into a tight hem.

A Fleece backed, polyester scrim reinforced TPO membrane with a nominal thickness of 0.060 inches that is suitable and approved for fully adhered applications shall be utilized. Where ever practical, manufacturer's pre-fabricated flashings should be utilized

2.5 MEMBRANE

NOTE: Only membranes containing reinforcing materials will be used, as some unreinforced membranes can shrink to the point where flashings are torn loose from their fastenings.

Membrane shall consist of a fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch TPO thickness meeting or exceeding the requirements of ASTM D-6878. Membrane shall be fungi resistant as demonstrated by "non sustained growth" or discoloration after 21 days exposure as specified in ASTM G 21. Membrane shall be white in color.

Examples of acceptable products include but are not limited to EverGuard FB 600 Ultra TPO roofing membrane by GAFMC, Sure-Weld FleeceBACK Membrane (115 mil nominal thickness/60 mil over fleece) by Carlisle SynTec or an approved alternate.

In some instances, the government may specify an adhesive-less fully adhered TPO system that utilizes pile and hook type of fastening system (i.e. VELCRO™ fasteners) with an FM 1-90 rating. Examples of this product include but are not limited to Carlisle RapidLock Membrane and RapidLock Insulation or an approved equivalent product

2.6 PREFABRICATED ACCESSORIES

Pipe seals and expansion joint covers shall be types and sizes recommended by the membrane manufacturer.

2.7 SLIP SHEET/SEPARATION SHEET

Slip sheets between insulation and membrane shall be as recommended by the membrane manufacturer.

2.8 WALKWAYS

Walkways shall be fully adhered walkway rolls consisting of a diamond plate type pattern of a contrasting color than the main field of the roof. Walkway rolls shall be adhered using an approved solvent based adhesive applied in accordance with the manufacturer's installation requirements. Walkways shall proceed from the point of roof access and provide the most direct access to the roof mounted equipment present on the roof.

PART 3 EXECUTION

3.1 ENVIRONMENTAL CONDITIONS

Membrane shall not be installed in high wind, inclement weather or when there is visible ice, frost or moisture on the deck or membrane. Unless otherwise specified by the manufacturer, membrane shall not be installed when air temperature is below 40 degrees F or within 5 degrees F of the dew point.

3.2 PREPARATION

The substrate of any bay or section of the building shall be complete and suitable for insulation and membrane installation before roofing is begun. Roofing on lightweight insulating concrete shall not begin until the concrete passes the air-dry density test specified in Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE. Insulation under roofing shall comply with Section 07 22 00 ROOF AND DECK INSULATION. Surfaces on or against which membrane is applied shall be smooth, clean, and free from oil, grease, sharp edges, standing water,

and construction debris. Joints over 1/4 inch wide shall be filled with insulation material. Wood nailers shall comply with Section 06 10 00 ROUGH CARPENTRY.

3.3 INSTALLATION

NOTE: Coordinate installation requirements with Section 07 22 00 ROOF AND DECK INSULATION and Section 06 10 00 ROUGH CARPENTRY. Asphalt and the asphalt-coated side of any insulation should not be used in contact with TPO membrane.

Any treatment for lumber listed in AWPA U1 and AWPA T1, except acid copper chromate, may be allowed. Surfaces of wood cut in the field should be treated with copper napthenate solution.

Nailers shall be anchored to resist a minimum of 200 pounds per foot in any direction for the anticipated life of the roof; except that nailers for mechanically fastened systems shall withstand 300 pounds per foot in any direction. Nailing pattern shall be shown on the drawings, and may then be deleted from these paragraphs. In no case should the fastening rate be less than that specified by the manufacturer. Both layers of insulation shall be mechanically fastened or installed using a compatible adhesive material approved by the roofing system manufacturer.

Installation shall comply with the manufacturer's approved instructions except as otherwise specified.

3.3.1 Membrane

Membrane shall not be placed directly on concrete deck or other hard surface which may damage the membrane. Unless otherwise specified by the manufacturer, the membrane shall be rolled out on the surface and allowed to relax for at least 1/2 hour when ambient temperature is 60 degrees F or higher or 2 hours when ambient temperature is below 60 degrees F prior to other installation activities. Membrane shall be overlapped a minimum of 3 inches at side laps and minimum 3 inches at end laps. Direction of laps shall allow water to flow over and not into the lap. Membrane joints shall be free of wrinkles and fishmouths. The entire length of joints shall be probe-tested and corrected during the day of installation. Defective areas shall be re-sealed. Wrinkles, fishmouths, or damaged areas shall be cut out and the area covered with membrane using a 3 inch seam on all sides. Repairs shall be probe-tested for continuity. Bonded areas of seams shall be a minimum 3 inches wide for bonded seams and 2 inches wide for heat-welded seams.

3.3.2 Nailing

Membrane shall be fastened to nailers in accordance with the membrane manufacturer's approved instructions. Unless otherwise specified, nails shall be staggered on 4 inch centers maximum; screws for sheet metal shall be staggered on 8 inch centers maximum; and a row of fasteners shall be at least 1/2 inch from edges of sheet metal.

3.3.3 Flashing

Roof edges, projections through the roof and changes in roof planes shall be flashed. The seam between the flashing and the membrane shall be completed before the flashing is bonded to vertical surfaces. The seam shall be sealed a minimum of 3 inches beyond the fasteners which attach the membrane to nailers. The installed flashings shall be secured at the top of the flashing a maximum of 12 inches on centers under the counterflashing or cap. Where it is possible, prefabricated components shall be used for pipe seals and flashing accessories.

3.3.4 Expansion Joints

Expansion joints shall be covered using prefabricated covers or elastomeric flashing in accordance with the recommendations of the manufacturer.

3.3.5 Cutoffs

If work is terminated prior to weatherproofing the entire roof, the membrane shall be sealed to the roof deck. Flutes in metal decking shall be sealed off along the cutoff edge. Membrane shall be pulled free or cut to expose the insulation when resuming work and cut insulation sheets used for fill-in shall be removed. Asphalt or coal-tar products shall not be used for sealing.

3.3.6 Walkways

Walkways shall be a fully adhered roll of walkway materials of a contrasting color to the roof field. Pavers and pads shall not be approved for use task orders issued under this contract

3.4 BALLAST APPLICATION

NOTE: Not Applicable to this specification.

3.5 PROTECTION OF FINISHED ROOFING

The roofing membrane shall be protected from damage by other trades. After completion of work by other trades, the protection shall be removed and the roof shall be inspected. Any damage shall be repaired in accordance with the recommendation of the roofing manufacturer.

3.6 INSPECTION

Inspection requirements shall be in accordance with those requirements outlined in the contract and specifications as well as the requirements levied by the roofing systems manufacturer.

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SECTION 07 54 19
POLYVINYL-CHLORIDE
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PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/SPRI ES-1	(2003) Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7	(2017) Minimum Design Loads for Buildings and Other Structures

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.24	(2014) Roofing - Safety Requirements of Low-Sloped Roofs

ASTM INTERNATIONAL (ASTM)

ASTM D4263	(1983; R 2012) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4434/D4434M	(2015) Standard Specification for Poly(Vinyl Chloride) Sheet Roofing
ASTM D6754/D6754M	(2010) Standard Specification for Ketone Ethylene Ester Based Sheet Roofing
ASTM E108	(2011) Fire Tests of Roof Coverings

FM GLOBAL (FM)

FM 4470	(2010) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction
FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 3619	(2004) Quality Control Guidelines for Application of Polymer-Modified Bitumen Roofing

NRCA 3740	(2005) The NRCA Waterproofing Manual
NRCA 3758	(2009) Guidelines for Roof-mounted Photovoltaic System Installation
NRCA 3760	(2010) Building Owners Guide to Roof-mounted Photovoltaic Systems

SINGLE PLY ROOFING INDUSTRY (SPRI)

ANSI/SPRI RD-1	(2014) Performance Standard for Retrofit Drains

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED BD+C	(2009; R 2010) Leadership in Energy and Environmental Design(tm) Building Design and Construction (LEED-NC)

UNDERWRITERS LABORATORIES (UL)

UL 790	(2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings

1.2 SUMMARY

The system shall be a fully adhered polyvinyl-chloride (PVC) roof membrane system applied over either insulation, cover board, concrete roof deck, or PVC membrane roofing manufacturer-accepted substrate.

1.3 ASSEMBLY REQUIREMENTS

Roofing membrane sheet widths shall be consistent with membrane attachment methods and wind uplift requirements, and shall be as large as practical. In order to minimize joints and 3-way overlaps, prefabricated sheets are not accepted. Provide membrane which is free of defects and foreign material. Coordinate flashing work to permit continuous roof-surfacing operations. Insulation shall be applied and weatherproofed on the same day.

1.3.1 Fire Resistance Complete roof system assembly:

a. Class A or B rated in accordance with ASTM E108, FM 4470, or UL 790; and

b. Be listed as Class I roof deck construction in FM APP GUIDE.

FM or UL approved components of the roof covering assembly shall bear the appropriate FM or UL label.

1.3.2 Wind Uplift Resistance

The complete roof system assembly shall be rated and installed to resist wind loads calculated in accordance with ASCE 7 and validated by uplift resistance testing in accordance with Factory Mutual (FM) test procedures. Do not install non-rated systems, except as approved by the Contracting Officer. Submit Engineering calculations, signed, sealed, and dated by a Registered Engineer, validating the wind resistance per ASCE 7, and ANSI/SPRI ES-1 if it is a non-rated roof system. Base wind uplift measurements on a design wind speed of 124 mph in accordance with ASCE 7 and other applicable building code requirements.

1.3.3 Solar Reflectance Index (SRI)

SRI measures the roof's ability to reject solar heat, defined such that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. Use roofing materials having minimum appropriate SRI for more than 75 percent of roof surface (low slope (less than 2:12) SRI greater than 78; high slope (greater than 2:12) SRI greater than 29).

1.4 SUSTAINABILITY REPORTING

Materials in this technical specification may contribute towards contract compliance with sustainability requirements.

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G
Roof Plan;

SD-03 Product Data

PVC Roofing Membrane;
Bonding Adhesive
Flashing
Membrane Fasteners and Plates Roof
Insulation
Protection Mat
Pre-Manufactured Accessories

Water Cutoffs
Information Card

SD-05 Design Data

Wind Uplift Resistance;

SD-07 Certificates

Qualification of Manufacturer Qualifications of
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Wind Uplift Resistance
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Polymer Thickness Sample Warranty;

SD-08 Manufacturer's Instructions

Application Method;
Membrane Flashing;
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SD-11 Closeout Submittals

LEED Documentation
Warranty;
Information Card;
Instructions to Government Personnel;

QUALITY ASSURANCE

1.4.1 Qualification of Manufacturer

Polyvinyl-Chloride sheet roofing system manufacturer must have a minimum of 10 years' experience in manufacturing PVC roofing products.

1.4.2 Qualifications of Applicator

Roofing system applicator must be approved, authorized, or licensed in writing by the PVC sheet roofing system manufacturer and have a minimum of five years' experience as an approved, authorized, or licensed applicator with that manufacturer and be approved at a level capable of providing the specified warranty. Supply the names, locations and client contact information of five projects, within the previous three years, of similar size and scope that the applicator has constructed using the manufacturer's roofing products submitted for this project.

1.4.3 Qualifications of Photovoltaics (PV) Rooftop Applicator

The PV rooftop applicator must be approved, authorized, or certified by a Roof Integrated Solar Energy (RISE) Certified Solar Roofing Professional (CSRP), and comply with applicable codes, standards, and regulatory requirements to maintain the weatherproofing abilities of both the integrated roof system and photovoltaic system.

1.4.4 Qualification of Engineer of Record

Engineer of Record must be currently licensed within the jurisdiction of the project.
Engineer of Record must be approved, authorized, and currently licensed by the state of Maryland, and have a minimum of five years' experience as an approved Engineer for manufacturers of similar roof systems.
Engineer of Record must supply the names and locations of five projects of similar size and scope for which he has provided engineering calculations using the manufacturer's products submitted for this project within the previous three years. Engineer of Record must provide certified engineering calculations for:

Wind uplift requirements in accordance with Local and State codes ASCE 7, in accordance with ICC IBC.
Seismic requirements per state building codes Seismic requirements per ICC IBC Chapter 16, Section 1613
Snow load requirements per ICC IBC Chapter 16 Section 1608 and Section 7 of ASCE 7

1.4.5 Conformance and Compatibility

The entire roofing and flashing system shall be in accordance with specified and indicated requirements, including fire and wind resistance.

1.4.6 Preroofing Conference

After approval of submittals and before performing roofing and insulation system installation work, hold a preroofing conference to review the following:

a. Drawings, including roof plan, specifications and submittals related to the roof work. Field inspection and verification of all existing conditions, including all fire safety issues, existing structure, and existing materials, including concealed combustibles, which may require additional protection during installation.

b. Roof system components installation;

c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roofing substrate, and roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representative to roof manufacturer;

d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing; and

e. Quality control(NRCA 3619) plan for the roof system installation;

f. Safety requirements.

Coordinate preroofing conference scheduling with the Contracting Officer. The conference shall be attended by the Contractor, the Contracting Officer's designated personnel, personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, designated safety personnel trained to enforce and copy with ASSE/SAFE A10.24, Fire Marshall, and a representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.5 DETAIL DRAWINGS

Submit roof plan depicting wind loads and boundaries of enhanced perimeter and corner attachments of roof system components, location of perimeter half-sheets, spacing of perimeter, corner, and infield fasteners, as applicable. The drawing shall reflect the project roof plan of each roof level and conditions indicated. Submit bids with approved detail drawings and specifications approved and furnished by the PVC membrane manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Delivery

Deliver materials in the manufacturer's original, unopened containers and rolls with labels intact and legible. Mark and remove wet or damaged materials from the site. Where materials are covered by a referenced specification number, the container shall bear the specification number, type, class, and shelf life expiration date where applicable. Deliver materials in sufficient quantity to allow work to proceed without interruption.

1.6.2 Storage

Protect materials against moisture absorption and contamination or other damage. Avoid crushing or crinkling of roll materials. Store roll materials on end on clean raised platforms or pallets one level high in dry locations with adequate ventilation, such as an enclosed building or closed trailer. Do not store roll materials in buildings under construction until concrete, mortar, and plaster work is finished and dry. Maintain roll materials at temperatures above 50 degrees F for 24 hours immediately before application. Do not store materials outdoors unless approved by the Contracting Officer. Completely cover felts stored outdoors, on and off roof, with waterproof canvas protective covering. Do not use polyethylene sheet as a covering. Tie covering securely to pallets to make completely weatherproof. Provide sufficient ventilation to prevent condensation. Do not store more materials on roof than can be installed the same day and remove unused materials at end of each day’s work. Distribute materials temporarily stored on roof to stay within live load limits of the roof construction.

a. Maintain a minimum distance of 35 foot for all stored flammable materials, including materials covered with shrink wraps, craft paper and/or tarps from all torch/welding applications.

b. Immediately remove wet, contaminated or otherwise damaged or unsuitable materials from the site. Damaged materials may be marked by the Contracting Officer.

1.6.3 Handling

Prevent damage to edges and ends of roll materials. Do not install damaged materials in the work. Select and operate material handling equipment to prevent damage to materials or applied roofing.

1.9 ENVIRONMENTAL REQUIREMENTS

Do not install roofing system when air temperature is below 40 degrees F, during any form of precipitation, including fog, or when there is ice, frost, moisture, or any other visible dampness on the roof deck. Follow manufacturer's printed instructions for Cold Weather Installation.

1.10 SEQUENCING

Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counterflashing in accordance with NRCA 3740, are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials. Application of roofing shall immediately follow application of insulation as a continuous operation. Coordinate roofing operations with insulation work so that all roof insulation applied each day is covered with roof membrane installation the same day.

1.11 WARRANTY

Provide roof system material and workmanship warranties. Provide revision or amendment to standard membrane manufacturer warranty as required to comply with the specified requirements. Minimum manufacturer warranty shall have no dollar limit, cover full system water-tightness, and shall have a minimum duration of 20 years. Submit sample certificate.

1.11.1 Roof Membrane Manufacturer Warranty

Furnish the roof membrane manufacturer's 20-year, no dollar limit roof system materials and installation workmanship warranty, including flashing, insulation, and accessories necessary for a watertight roof system construction. Provide warranty directly to the Government and commence warranty effective date at time of Government's acceptance of the roof work. The warranty must state that:

a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, splits, tears, cracks, delaminates, separates at the seams, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship are the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work are the responsibility of the roof membrane manufacturer.

b. When the manufacturer or his approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others does not void the warranty.

1.11.2 Roofing System Installer Warranty

The roof system installer shall warrant for a minimum period of two years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Government. The roof system installer is responsible for correction of defective workmanship and replacement of damaged or affected materials. The roof system installer is responsible for all costs associated with the repair or replacement work.

1.11.3 Continuance of Warranty

Approve repair or replacement work that becomes necessary within the warranty period and accomplished in a manner so as to restore the integrity of the roof system assembly and validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 PVC Roof Membrane

Provide a minimum polymer thickness 0.072 inch reinforced PVC as specified herein. Provide PVC system capable of obtaining 20 year warranties and as listed in the applicable wind uplift and fire rating classification listings.

Submit Data as required by Section 07 22 00 ROOF AND DECK INSULATION together with requirements of this section. Data shall include written acceptance by the roof membrane manufacturer of the insulation and other products and accessories to be provided by and warranted under the full system guarantee of the roof membrane manufacturer.

a. Coordinate with other specification sections related to the roof work. Furnish a combination of specified materials that comprise a roof system acceptable to the roof membrane manufacturer and meeting specified requirements. Provide materials free of defects and suitable for the service and climatic conditions of the installation. All warranted roof system components shall be sourced from the PVC roof membrane manufacturer, including but not limited to all insulation, cover boards, accessories, adhesives and edge metal.

b. For each roof, furnish a typewritten information card for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved 0.032 inch thick aluminum card for exterior display. Card shall be 8 1/2 by 11 inches minimum. Information card shall identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing Contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

2.1.2 Bonding Adhesive

Provide PVC membrane manufacturer's low volatile organic compound (VOC) membrane adhesive, as supplied by roof membrane manufacturer, and recommended by the manufacturer's printed data for bonding of PVC membrane materials to acceptable insulation, wood, metal, concrete or other acceptable substrate materials. Bonding adhesive shall not be used to bond membrane materials to each other.

2.1.3 Water Cutoff Mastic/Water Block

As supplied by the roof membrane manufacturer and recommended by the manufacturer's printed data.

2.1.4 Membrane Flashing

Membrane flashing, including self-adhering membrane flashing, perimeter flashing, flashing around roof penetrations and prefabricated pipe seals, shall be minimum polymer thickness 0.072 inch reinforced PVC for 20year warranties, and shall be utilized as recommended and supplied by the roof membrane manufacturer or

minimum 0.072 inch thick reinforced PVC roof membrane and flashing's for 20 year warranties. Submit certification from PVC membrane manufacturer that the proposed PVC membrane roofing product meets the minimum polymer thickness specified.

2.1.5 Membrane Fasteners and Plates

Coated, corrosion-resistant fasteners as recommended and supplied by the PVC roof membrane manufacturer and meeting the requirements of FM 4470 and FM RoofNav (www. roofnav.com) or FM APP GUIDE for Class I roof deck construction and the wind uplift resistance specified. Fasteners and Plates to be supplied and warranted for the substrate type(s) by PVC membrane manufacturer and recommended by PVC membrane manufacturer's printed data.

2.1.5.1 Stress Plates, Bar or Rail for Fasteners

Corrosion-resistant stress plates as recommended by the roof membrane manufacturer's printed instructions and meeting the requirements of FM 4470 must be utilized and must be supplied by PVC roof membrane manufacturer. Stress plates shall be formed to prevent dishing or cupping. Manufacturer-supplied anchoring bar or rails may be utilized for high wind conditions.

2.1.5.2 Auxiliary Fasteners

Corrosion resistance screws, nails, or anchors must be suitable for intended attachment purpose and be recommended and supplied for use by the PVC roof membrane manufacturer.

2.1.6 Protection Mat

Minimum 6 ounce/square yard ultraviolet resistant polypropylene, non-woven, needle punched fabric for use as protection mat under ballast system or as recommended and supplied by the roof membrane manufacturer.

2.1.7 Pre-manufactured Accessories

Pre-manufactured accessories shall be manufacturer's standard for intended purpose, must comply with applicable specification section, be compatible with the membrane roof system and approved for use and supplied by the PVC roof membrane manufacturer. Pre-fabricated Curbs shall be [_____] gauge [G90 galvanized] [AZ55 galvalume] with minimum 4 inch flange for attachment to roof nailers. Curbs shall provide minimum height of 10 inches above the finished roof membrane surface.

2.1.8 PVC Walk Tread

Scrim reinforced 0.096 inch thickness PVC membrane with a textured surface, compatible with and supplied by manufacturer of the PVC roof membrane.

2.1.9 Elevated Metal Walkways and Platforms

As specified in Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS, and as approved by the roof membrane manufacturer.

2.1.10 Roof Insulation

Insulation system and facer material shall be compatible with membrane application specified and be approved and supplied by the PVC membrane roof manufacturer and as specified in Section 07 22 00 ROOF AND DECK INSULATION.

2.1.11 Wood Products

As specified in Section 06 10 00 ROUGH CARPENTRY, except that fire retardant treated materials shall not be in contact with PVC membrane or PVC accessory products, unless approved by the membrane manufacturer and the Contracting Officer.

2.2 Reinforced, PVC Membrane

Reinforced polyvinyl chloride (PVC) membrane shall contain fibers or scrim, and shall comply with ASTM D4434/, Type II, Grade I or Type III or Type IV, fleece backed, or ASTM D6754, and in all cases shall provide 0.072 inch minimum thickness for adhered application. Notwithstanding the ASTM standards referenced, reinforced PVC roof membranes provided under this section shall have the minimum, labeled thickness specified. PVC membrane thickness specified herein is exclusive of backing material on the bottom of fleece-backed membrane. Principal polymer used in manufacture of the membrane sheet shall be PVC. Width and length of PVC membrane roofing sheet shall be consistent with membrane attachment methods and wind uplift requirements, and shall be as large as practical. In order to minimize joints and 3-way overlaps, prefabricated sheets are not accepted. Maximum reinforced PVC membrane roofing sheet dimensions to be the maximum width obtainable from PVC membrane roof manufacturer in order to minimize seams in the field of the roof.

2.3 PHOTOVOLTAIC (PV) SYSTEMS - RACK MOUNTED SYSTEMS

Adhere to NRCA 3758 and NRCA 3760

2.4 COOL ROOFS

Roof surface layer of the built up roofing system must meet current Energy Star qualifications for Cool Roof products. The minimum tested Solar Reflectance values is limited to the following: Low Slope: Initial Value >0.65; Three Years after Installation Value >0.50, Steep Slope: Initial Value >0.25; Three Years after Installation Value >0.15

PART 3 EXECUTION

3.1 CONCRETE SURFACE DRYNESS

Prior to installing any roof system on a concrete deck, including application of insulation or membrane materials, conduct a test for surface dryness in accordance with ASTM D4263. The deck is acceptable for roof system application when there is no visible moisture on underside of plastic sheet after 24 hours.

3.2 EXAMINATION

Ensure that the following conditions exist prior to application of the roofing materials:

a. [Drains,] [curbs,] [control joints,] [expansion joints,] [perimeter walls,] [roof penetrating components,] [and] [equipment supports] are in place.

b. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation.

c. Substrate is sloped to provide positive drainage.

d. Walls and vertical surfaces are constructed to receive counterflashing, and will permit mechanical fastening of the base flashing materials.

e. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing at minimum height of 8 inches above finished roofing surface.

f. Pressure-preservative treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures. Embedded nailers are flush with deck surfaces. Surface-applied nailers are the same thickness as the roof insulation.

g. PVC materials are not in contact with fire retardant treated wood, except as approved by the PVC membrane roof manufacturer and Contracting Officer.

h. Venting shall be provided if required by, and in accordance with the cellular lightweight concrete manufacturer's requirements and recommendations.

i. Exposed nail heads in wood substrates are properly set. Warped and split boards, sheets have been replaced. There are no cracks or end joints 1/4 inch in width or greater. Joints in plywood substrates are taped or otherwise sealed to prevent air leakage from the underside.

j. Insulation boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is attached as specified in Section 07 22 00 ROOF AND DECK INSULATION. Insulation is being roofed over on the same day the insulation is installed.

3.3 APPLICATION METHOD

Apply entire PVC membrane roofing utilizing a fully adhered application methods. Apply roofing materials as specified herein unless approved otherwise by the Contracting Officer. Submit instructions including pattern and frequency of mechanical attachments required in the field for roof, corners, and perimeters to provide for the specified wind resistance

3.3.1 Special Precautions

a. Do not dilute coatings or sealants unless specifically recommended by the material manufacturer's printed application instructions. Do not thin liquid materials or cleaners used for cleaning PVC sheet.

b. Keep liquids in airtight containers, and keep containers closed except when removing materials.

c. Use liquid components, including adhesives, within their shelf life period. Store adhesives at 60 to 80 degrees F prior to use. Avoid excessive adhesive application and adhesive spills, as they can be destructive to some thermoplastic sheets and insulations; follow adhesive manufacturer's printed application instructions. Mix and use liquid components in accordance with label directions and manufacturer's printed instructions.

d. Provide clean, dry cloths or pads for applying membrane cleaners and cleaning of membrane.

e. Do not use heat guns or open flame to expedite drying of adhesives or primers.

f. Require workmen and others who walk on the membrane to wear clean, soft-soled shoes to avoid damage to roofing materials.

g. Do not use equipment with sharp edges which could puncture the PVC membrane roofing sheet.

h. Shut down air intakes and any related mechanical systems and seal open vents and air intakes when applying solvent-based materials in the area of the opening or intake. Coordinate shutdowns with the Contracting Officer.

3.3.2 PVC Roofing Membrane

Provide a watertight roof membrane sheet free of contaminants and defects that might affect serviceability. Provide a uniform, straight, and flat edge. Only felt-backed membrane shall be placed directly on concrete deck or other hard surface which may otherwise damage the membrane, absent the felt backing. Non-felt-backed PVC membrane roofing sheet shall not be placed directly on concrete deck or other hard surface which may damage the membrane. Membrane shall be overlapped a minimum of 3 inches at sides for adhered applications and minimum 4 inches at ends. Direction of laps shall allow water to flow over and not against the lap.

Membrane joints shall be free of wrinkles and fishmouths. The entire length of hot-air-welded seams shall be probe-tested and corrected during the day of installation. Defective areas shall be re-welded. Wrinkles, fishmouths, or damaged areas shall be cut out and the area covered with membrane using a continuous hot-air-welded seam on all sides. Repairs shall be probe-tested for continuity. Hot-air-welded seams are to be accomplished in accordance with the PVC membrane roofing manufacturer's published requirements.

3.3.2.1 Nailing

Membrane shall be fastened to nailers in accordance with the membrane manufacturer's approved instructions. Unless otherwise specified, nails shall be staggered on 4 inch centers maximum; screws for sheet metal shall be staggered on 8 inch centers maximum; and a row of fasteners shall be at least 1/2 inch from edges of sheet metal.

3.3.2.2 Flashing

Roof edges, projections through the roof and changes in roof planes shall be flashed. The seam shall be sealed a minimum of 3 inches beyond the fasteners which attach the membrane to nailers. The installed flashing's shall be secured at the top of the flashing a maximum of 12 inches on centers under the counterflashing or cap. Where possible, prefabricated components shall be used for pipe seals and flashing accessories.

3.3.2.3 Expansion Joints

Expansion joints shall be covered using Prefabricated covers or elastomeric flashing in accordance with the recommendations of the manufacturer.

3.3.2.4 Cutoffs

If work is terminated prior to weatherproofing the entire roof, the membrane shall be sealed to the roof deck. Flutes in metal decking shall be sealed off along the cutoff edge. Membrane shall be pulled free or cut to expose the insulation when resuming work and cut insulation sheets used for fill-in shall be removed. Asphalt or coal-tar products shall not be used for sealing.

3.3.2.5 Walkways

Walkways shall be installed on a loose-laid pad of the membrane material extending at least.25 mm 1 inch beyond the walkway material, and as specified by the manufacturer. Stone ballast shall not be placed below or above walkways.

3.3.3 Adhered Membrane Application

Layout membrane and side lap adjoining sheets in accordance with membrane manufacturer's printed installation instructions. Allow for sufficient membrane to form proper membrane terminations. Remove dusting agents and dirt from membrane and substrate areas where bonding adhesives are to be applied. Apply specified adhesive evenly and continuously to substrate [and underside of sheets] at rates recommended by the roof membrane manufacturer's printed application instructions. When adhesive is spray applied, roll with a paint roller to ensure proper contact and coverage. Do not apply bonding adhesive to surfaces of membrane in seam or lap areas. Allow adhesive to flash off or dry to consistency prescribed by manufacturer before adhering sheets to the substrate. When adhesive is peel & stick release paper-activated, follow manufacturer's printed instructions. Roll each sheet into adhesive slowly and evenly to avoid wrinkles; broom or roll the membrane to remove air pockets and fishmouths and to ensure adequately uniform bonding of sheet to substrate. Form field hot-air-welded laps or seams as specified and ensure that hot-air welded dimension is at width required by the membrane manufacturer's installation instructions. Check all seams and continuous hot-air-weld of all seams and lap seals.

3.3.4 Mechanically Fastened Membrane Application – NOT APPLICABLE

3.3.5 Perimeter Attachment

Adhesive bond or mechanically secure roof membrane sheet at roof perimeter in a manner to comply with wind resistance requirements and in accordance with membrane manufacturer's printed application instructions. When adhesively bonding a mechanically fastened system in perimeter areas, the perimeter boundary of the adhesive bond shall be the same as the boundary required for additional perimeter mechanical fastening to meet wind resistance requirements.

3.3.6 Securement at Base Tie-In Conditions

Mechanically fasten the roof membrane at penetrations, at base of curbs and walls, and at all locations where the membrane turns and angles greater than 4 degrees (1:12). Space fasteners a maximum of 12 inches on center, except where more frequent attachment is required to meet specified wind resistance or where recommended by the roof membrane manufacturer. Cover over fasteners with a layer of flashing material. Hot-air-weld all seams of flashing material as recommended by the roof membrane manufacturer's printed data.

3.3.7 Pre-fabricated Curbs

Securely anchor prefabricated curbs to nailer or other base substrate and flashed with PVC membrane flashing materials.

3.3.7.1 Set-On Accessories

Where pipe or conduit blocking, supports and similar roof accessories, or isolated paver block, are set on the membrane, adhere reinforced membrane or walkpad material, as recommended by the roof membrane manufacturer, to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.

3.3.8 Roof Walkways

Install walkways at roof access points and where otherwise indicated for traffic areas and for access to mechanical equipment, in accordance with the PVC membrane roof manufacturer's printed instructions. Provide minimum 6 inch separation between adjacent walkways to accommodate drainage.

3.3.9 Elevated Metal [Walkways] [and] [Platforms]

Install over completed roof system in accordance with Section 05 50 13 MISCELLANEOUS METAL FABRICATIONS. Provide for protection of roof membrane by placing reinforced membrane or walkpad material, or other material approved by the PVC membrane roof manufacturer and Contracting Officer, at all surface bearing support locations.

3.3.10 Isolated Paver Blocks

Install paver blocks where indicated and as necessary to support surface bearing items traversing the roof area. Set paver block on a layer of reinforced PVC membrane or walkway applied over the completed PVC roof membrane.

3.4 FLASHINGS

Provide flashings in the angles formed at walls and other vertical surfaces and where required to make the work watertight, except where metal flashings are indicated.

3.4.1 General

Provide a one-ply flashing membrane, as specified for the system used, and install immediately after the roofing membrane is placed and prior to finish coating where a finish coating is required. Flashings must be stepped where vertical surfaces abut sloped roof surfaces. Provide sheet metal reglet in which sheet metal cap flashings are installed of not more than 16 inch nor less than 8 inch above the roofing surfaces. Exposed joints and end laps of flashing membrane must be made and sealed in the manner required for roofing membrane.

3.4.2 Membrane Flashing

3.4.2.1 Installation

Install flashing and flashing accessories as the roof membrane is installed. Apply flashing to cleaned surfaces and as recommended by the roof membrane manufacturer and as specified. Utilize cured PVC membrane flashing and prefabricated accessory flashings to the maximum extent recommended by the roof membrane manufacturer. Limit uncured flashing material to reinforcing inside and outside corners and angle changes in plane of membrane, and to flashing scuppers, pourable sealer pockets, and other formed penetrations or unusually shaped conditions as recommended by the roof membrane manufacturer where the use of cured material is impractical. Extend base flashing not less than 8 inch above roofing surface and as necessary to provide for seaming overlap on roof membrane as recommended by the roof membrane manufacturer.

3.4.2.2 Sealing

Seal flashing membrane for a minimum of 3 inch on each side of fastening device used to anchor roof membrane to nailers. Completely adhere flashing sheets in place. Seam flashing membrane in the same manner as roof membrane, except as otherwise recommended by the membrane manufacturer's printed instructions and approved by the Contracting Officer. Reinforce all corners and angle transitions by applying uncured membrane to the area in accordance with roof membrane manufacturer recommendations. Mechanically fasten top edge of base flashing with manufacturer recommended termination bar fastened at maximum 12 inch on center. Install sheet metal flashing over the termination bar in the completed work. Mechanically fasten top edge of base flashing for all other terminations in a manner recommended by the roof membrane manufacturer. Apply membrane liner over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs, parapet walls, and expansion joints and as otherwise indicated to serve as waterproof lining under sheet metal flashing components.

3.4.3 Flashing at Roof Drain

Provide a tapered insulation sump into the drain bowl area. Do not exceed tapered slope of (4:12) 18 degrees for unreinforced membrane and (1:12) 5 degrees for reinforced membrane. Provide tapered insulation with surface suitable for adhering membrane in the drain sump area. Avoid field seams running through or within 24 inch of roof drain, or as otherwise recommended by the roof membrane manufacturer. Adhere the membrane to the tapered in the drain sump area. Apply water block mastic and extend membrane sheets over edge of drain bowl opening at the roof drain deck flange in accordance with membrane manufacturer's printed application instructions. Insure membrane free of wrinkles and folds in the drain area. Securely clamp membrane in the flashing clamping ring. Ensure membrane is cut to within 3/4 inch of inside rim of clamping ring to maintain drainage capacity. Do not cut back to bolt holes. Retrofit roof drains shall conform to ANSI/SPRI RD-1.

3.5 ROOF WALKPADS

Install walkpads at roof access points and where otherwise indicated for traffic areas and for access to mechanical equipment, in accordance with the roof membrane manufacturer's printed instructions. Provide minimum 6 inch separation between adjacent walkpads to accommodate drainage.

3.5.1 Elevated Metal [Walkways][and][Platforms]

Provide for protection of roof membrane by placing reinforced membrane or walkpad material, or other material approved by the Contracting Officer, at all surface bearing support locations.

3.6 CORRECTION OF DEFICIENCES

Where any form of deficiency is found, additional measures must be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and provide corrective action recommendations. Perform corrective action as directed by the Contracting Officer.

3.7 PROTECTION OF APPLIED ROOFING

At the end of the day's work and when precipitation is imminent, protect applied membrane roofing system from water intrusion.

3.7.1 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of the roof membrane system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

3.7.2 Temporary Flashing for Permanent Roofing

Provide temporary flashing at drains, curbs, walls and other penetrations and terminations of roofing sheets until permanent flashings can be applied. Remove temporary flashing before applying permanent flashing.

3.7.3 Temporary Walkways, Runways, and Platforms

Do not permit storing, walking, wheeling, and trucking directly on applied roofing system. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

3.8 FIELD QUALITY CONTROL

3.8.1 Construction Monitoring

During progress of the roof work, make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

a. Equipment is in working order. Metering devices are accurate.

b. Materials are not installed in adverse weather conditions.

c. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials.

   (1) Nailers and blocking are provided where and as needed.

   (2) Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.

   (3) The proper number, type, and spacing of fasteners are installed.

   (4) Materials comply with the specified requirements.

   (5) All materials are properly stored, handled and protected from moisture or other damages. Liquid components are properly mixed prior to application.

   (6) Adhesives are applied uniformly to both mating surfaces and checked for proper set prior to

bonding mating materials. Mechanical attachments are spaced as required, including additional fastening of membrane in corner and perimeter areas as required.

(7) Membrane is properly overlapped.

(8) Membrane seaming is as specified by PVC membrane manufacturer. All seams are checked at the end of each work day.

(9) Applied membrane is inspected and repaired as necessary prior to paver installation.

(10) Membrane is adhered without ridges, wrinkles, kinks, and fishmouths.

(11) Installer adheres to specified and detailed application parameters.

(12) Associated flashings and sheet metal are installed in a timely manner in accord with the specified requirements.

(13) Paver ballast is within the specified weight range.

(14) Temporary protection measures are in place at the end of each work shift.

3.8.2 Manufacturer's Inspection

Manufacturer's technical representative shall be present full time when Single Source Contract Liability Warranty is desired visit the site a minimum of 3times once per week during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Inspections shall occur during the first 20 squares of membrane installation, at mid-point of the installation, and at substantial completion, at a minimum. Additional inspections need not exceed one for each 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors shall be performed as requested by the Contracting Officer. After each inspection, a report, signed by the manufacturer's technical representative shall be submitted by the roofing Contractor to the Contracting Officer within 3 working days. The report shall note overall quality of work, deficiencies and any other concerns, and recommended corrective action.

3.9 CLEAN UP

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

3.10 INSTRUCTIONS TO GOVERNMENT PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the roof membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair, and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations. Include copies of Safety Data Sheets for maintenance/repair materials.

3.11 ROOF DRAIN TEST

After completing roofing but prior to Government acceptance, perform the following test for watertightness. Plug roof drains and fill with water to edge of drain sump for 8 hours. Do not plug secondary overflow drains at the same time as adjacent primary drain. To ensure some drainage from roof, do not test all drains at same time. Measure water at beginning and end of the test period. When precipitation occurs during test period, repeat test. When water level falls, remove water, thoroughly dry, and inspect installation; repair or

replace roofing at drain to provide for a properly installed watertight flashing seal. Repeat test until there is no water leakage.

-- End of Section --

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08/09

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SECTION 07 55 00
PROTECTED MEMBRANE ROOFING
08/09

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 C1177/C1177M	(2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1396/C1396M	(2017) Standard Specification for Gypsum Board
ASTM C29/C29M	(2017a) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C578	(2017a) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C726	(2017) Standard Specification for Mineral Wool Roof Insulation Board
ASTM D448	(2012; R 2017) Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM D4751	(2016) Standard Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D5034	(2009; R 2017) Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D751	(2006; R 2011) Coated Fabrics

FM GLOBAL (FM)

FM APP GUIDE	(updated on-line) Approval Guide http://www.approvalguide.com/
FM P9513	(2002) Specialist Data Book Set for Roofing Contractors; contains 1-22 (2001), 1-28 (2002), 1-29 (2002), 1-28R/1-29R (1998), 1-30 (2000), 1-31 (2000), 1-32 (2000), 1-33 (2000), 1-34 (2001), 1-49 (2000), 1-52 (2000), 1-54 (2001)

SINGLE PLY ROOFING INDUSTRY (SPRI)

SPRI RP-4	(2013) Wind Design Standard for Ballasted Single-Ply Roofing Systems

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

PL 109-58	Energy Policy Act of 2005 (EPAct05)

UNDERWRITERS LABORATORIES (UL)

UL 580	(2006; Reprint Oct 2013) Tests for Uplift Resistance of Roof Assemblies
UL 790	(2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings

1.2 SYSTEM DESCRIPTION

1.2.1 Wind Uplift Resistance

Wind uplift resistance of the complete roof assembly shall be rated Class I-90 in accordance with UL 580. Wind resistance of loose-laid ballasted system shall be in accordance with FM P9513 and SPRI RP-4.
Submit drawings required for the membrane, modified to include the complete PMR assembly.

1.2.2 Pre-Roofing Conference

After approval of submittals and before performing roofing and insulation installation work, hold a pre-roofing conference to review the following:

a. Drawings, specifications and submittals related to the roof work
b. Roof system components installation
c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representatives to roof manufacturer
d. Plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing
e. Quality control plan for the roof system installation
f. Safety requirements

Coordinate pre-roofing conference scheduling with the Contracting Officer. The conference shall be attended by the Contractor, the Contracting Officer's designated personnel, and personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with roof work , Fire Marshall, and representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings Roof
Assembly
SD-07 Certificates

Material and Equipment Energy
Efficiency Qualifications

1.4 QUALITY ASSURANCE

1.4.1 Material and Equipment

Submit material supplier's or equipment manufacturer's statement that the supplied insulation, filter fabric and membrane materials meet specified requirements. Each certificate shall be signed by an official authorized to certify on behalf of material supplier or product manufacturer and shall identify quantity and date or dates of shipment or delivery to which the certificates apply. Submit certificates of compliance for material and equipment, as specified.

1.4.2 Energy Efficiency

Provide products that meet or exceed the specified energy efficiency requirements of FEMP designated or Energy Star qualified products. Submit documentation certifying that product conforms to PL 109-58 by meeting or exceeding Energy Star or FEMP efficiency requirements as defined at “Energy-Efficient Products" at http://www1.eere.energy.gov/femp/procurement. Indicate Energy Efficiency Rating.

1.4.3 Qualifications

Submit documentation verifying a minimum of 2 years’ experience with PMR systems and certification by the PMR manufacturer as an approved Installer for the specified PMR system.

1.4.4 Fire Resistance

The completed roof system shall be rated Class A as determined by UL 790 or Class I as determined by FM APP GUIDE. Compliance of each component of the roofing system shall be evidenced by the label or written certification from the manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

Store insulation away from areas where welding is being performed or where contact with open flames is possible. Shield insulation from extended exposure to sunlight. Remove materials damaged by moisture from the site. Ballast shall not be stored on the roof.

PART 2 PRODUCTS

2.1 UNDERLAYMENT

Underlayment may be concrete, any insulation which is suitable for the particular membrane, mineral fiberboard in accordance with ASTM C726, or gypsum board in accordance with ASTM C1396 5/8 inch thick or glass mat gypsum roof board in accordance with ASTM C1177, 5/8 inch.

2.2 ROOF MEMBRANE

Roof membrane shall be in accordance with Section 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING, 07 54 19 POLYVINYL CHLORIDE ROOFING or 07 52 00 MODIFIED BITUMINOUS MEMBRANE ROOFING.

2.3 INSULATION ABOVE THE MEMBRANE

Insulation placed above the membrane shall be extruded polystyrene, or extruded polystyrene with a mortar face. Insulation shall be a standard product of the manufacturer, and shall be factory marked with the manufacturer's name or trade mark, the material specification number, the R-value at 75 degrees F, and the thickness. Boards shall be marked individually. The thermal resistance of the insulation shall be not less than the R-value shown on the drawings. Insulation shall conform to ASTM C578, Type V, VI or VII and shall be intended by the manufacturer

for use above a protected roof membrane. Bottom layer of insulation shall provide drainage paths, mostly parallel to the slope, between insulation and membrane. Top surface of mortar-faced insulation shall be 3/8 inch thick Portland cement latex mortar having minimum properties as follows: specific gravity: 2.0, compressive strength: 3000 psi and bond strength to insulation: 10 psi. Top layer of insulation may have ribbed top surfaces when flat-bottom pavers are used as ballast. Comply with EPA requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

2.4 FILTER FABRIC

Filter fabric shall be either woven or non-woven pervious sheet of long chain polymeric filaments or yarns such as polypropylene, polyethylene, polyester, polyamide, or polyvinylidene-chloride, formed into a pattern with distinct and measurable openings. The filter fabric shall provide an ASTM D4751 Apparent Opening Size (AOS) no finer than the No. 120 sieve and no coarser than the No. 70 sieve. Edges of fabric shall be selvaged or otherwise finished to prevent raveling. Fabric shall have minimum weight of 3 oz/sq. yard and shall conform to the following table:

Property	Test Procedure	Result
Tensile strength	ASTM D5034 Grab test method using 1 inch square jaws and a travel rate of 12 inches per minute	65 lbs/inch minimum in any principal direction
Puncture strength	ASTM D751 - Tension testing machine with ring clamp; steel ball replaced with a 5/16 inch diameter solid steel cylinder with a hemispherical tip centered within the ring clamp	40 lbs minimum load

2.5 BALLAST

Ballast shall be screened gravel, screened crushed stone, precast concrete pavers, or extruded polystyrene insulation with integral mortar topping. Size and placement shall be as indicated. Selected ballast exposed to sunlight must have an initial solar reflectance greater or equal to 0.65 and a solar reflectance greater or equal to 0.50 three years after installation under normal conditions.

2.5.1 Pavers

Concrete pavers shall be air-entrained concrete, minimum 1-1/2 inches thick, having 3000 psi minimum compressive strength. Pavers shall be ribbed on the bottom for use over smooth topped insulation and flat on the bottom for use over insulation with ribbed top.

2.5.2 Aggregate Ballast

Gravel and crushed stone shall conform to ASTM D448, Size 4 and 2, with less than 2 percent that passes through a 3/8 inch screen. Ballast shall have minimum unit mass of 60 pcf as determined by ASTM C29.

PART 3 EXECUTION

3.1 INSTALLATION

Install roof membrane and flashing in accordance with Sections 07 51 13 ASPHALT BUILT-UP ROOFING, 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING, 07 54 19 POLYVINYL CHLORIDE ROOFING, or 07 52 00 MODIFIED BITUMINOUS MEMBRANE ROOFING.

3.2 FLOOD TEST Change to read perform a low voltage electronic leak detection test

After the membrane and its flashings are installed, and before the insulation is placed above the membrane, plug the drains and flood the roof with water for 24 hours. Leaks shall be remedied before insulation is installed.

3.3 INSULATION

Insulation shall be loose laid on the membrane after the membrane is completed and flood coat (if any) is cool. When required by the manufacturer of the insulation, a slip sheet shall be installed over the membrane. Drainage paths shall be provided between the lower surface of the insulation and the membrane. Most of the drainage paths shall be parallel to the slope of the roof. Unless otherwise specified by the manufacturer, end joints shall be staggered. Joints between boards shall not exceed 1/4 inch. Insulation shall be installed to within 3/4 inch of projections and cant strips.

3.4 FILTER FABRIC INSTALLATION

Filter fabric shall be laid loose over insulation, smooth and free of tension and stress. Edges and ends shall be lapped a minimum of 1 foot and extended above the ballast 2 to 3 inches at the perimeter and penetrations. Joints parallel to perimeter will not be permitted within 6 feet of the perimeter.

3.5 BALLAST INSTALLATION

Place ballast to provide a weight of 10 psf on the roof area, except that the weight shall be 20 psf within 4 feet of the roof perimeter. At approved intervals, the placed ballast shall be weighed and corrected to be within plus or minus 10 percent of specified weight. Pavers shall be installed where indicated. Pavers above hidden drains shall be marked so that drains may be inspected. Interior roof drains shall be surrounded with gravel or stone graded between 1 and 1-1/2 inches to the level of ballast over insulation or to mid-height of drain bonnet, whichever is lower. During placement of aggregate ballast, drains and other openings shall be covered to prevent inadvertent entry of ballast. Ballast buggy wheels are not allowed on the membrane.

3.6 INSPECTION

Establish and maintain an inspection procedure to ensure compliance of the installed roof with the contract requirements. Any work found not to be in compliance with the contract shall be promptly removed and replaced or corrected in an approved manner. Inspection shall include, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of roofing workers; start and end time of various tasks; condition of substrate.

b. Verification of compliance of materials before, during, and after installation, proper storage and handling of insulation.

c. Inspection of mechanical fasteners; type, number, length, and spacing.

d. Coordination with other materials, cants, nailers, flashings, and penetrations.

e. Inspection of proper placement of insulation, joint orientation and laps between layers, joint widths and bearing of edges of underlayment on deck.

f. Inspection of proper placement of pavers and amount and leveling of ballast.

Submit procedures for approval, prior to start of roofing work including a checklist of points to be observed. The actual inspections shall be documented and a copy of the documentation furnished to the Contracting Officer at the end of each day.

-- End of Section --

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SECTION 07 60 00
FLASHING AND
SHEET METAL
05/17

PART 1 GENERAL

REFERENCES

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

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 189.1	(2014) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings
ASHRAE 90.1 - IP	(2013) Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE 90.1 - SI	(2013) Energy Standard for Buildings Except Low-Rise Residential Buildings

AMERICAN WELDING SOCIETY (AWS)

AWS D1.2/D1.2M	(2014) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A308/A308M	(2010) Standard Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot Dip Process
ASTM A480/A480M	(2017) Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A653/A653M	(2017) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B101	(2012) Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)

ASTM B221	(2014) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B32	(2008; R 2014) Standard Specification for Solder Metal
ASTM B370	(2012) Standard Specification for Copper Sheet and Strip for Building Construction
ASTM B69	(2013) Standard Specification for Rolled Zinc
ASTM C1549	(2016) Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
ASTM D1784	(2011) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D41/D41M	(2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free
ASTM E1918	(2016) Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
ASTM E1980	(2011) Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
ASTM E408	(2013) Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
ASTM E971	(2011) Standard Practice for Calculation of Photometric Transmittance and Reflectance of Materials to Solar Radiation

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

SINGLE PLY ROOFING INDUSTRY (SPRI)

ANSI/SPRI RD-1	(2014) Performance Standard for Retrofit Drains

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

1.1 GENERAL REQUIREMENTS

Finished sheet metal assemblies must form a weathertight enclosure without waves, warps, buckles, fastening stresses or distortion, while allowing for expansion and contraction without damage to the system. The sheet metal installer is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal modifications required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous, uninterrupted roofing operations.

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Exposed Sheet Metal Coverings;
Gutters;
Downspouts;
Expansion Joints;
Gravel Stops and Fasciae;
Splash Pans;
Flashing for Roof Drains;
Base Flashing;
Counterflashing;
Flashing at Roof Penetrations and Equipment Supports; Reglets;
Scuppers;
Copings;
Drip Edges;
Conductor Heads;
Open Valley Flashing;
Eave Flashing;

SD-03 Product Data

Cool Roof Data;

SD-04 Samples
Finish Samples;

SD-07 Certificates

Certificates of Compliance;

SD-08 Manufacturer's Instructions

Instructions for Installation;
Quality Control Plan;

SD-10 Operation and Maintenance Data Cleaning
and Maintenance;

SD-11 Closeout Submittals

Recycled Content;

1.3 MISCELLANEOUS REQUIREMENTS

1.3.1 Product Data

Indicate thicknesses, dimensions, fastenings, anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction.Scaled manufacturer's catalog data may be submitted for factory fabricated items.

1.3.2 Finish Samples

Submit two color charts and two finish sample chips from manufacturer's standard color and finish options for each type of finish indicated.

1.3.3 Operation and Maintenance Data

Submit detailed instructions for installation and quality control during installation, cleaning and maintenance, for each type of assembly indicated.

1.5 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until installation.

PART 2 PRODUCTS

2.1 RECYCLED CONTENT

Provide products with recycled content and provide certificates of compliance in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

2.2 MATERIALS

Do not use lead, lead-coated metal, or galvanized steel. Use any metal listed by SMACNA 1793 for a particular item, unless otherwise indicated. Provide materials, thicknesses, and configurations in accordance with SMACNA 1793 for each material. Different items need not be of the same metal, except that[if copper is selected for any exposed item, all exposed items must be copper, and that] contact between dissimilar metals must be avoided. Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified

otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used, except as follows:

2.2.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fasciae; cap, valley, steeped, base, and eave flashings and related accessories.

2.2.2 Drainage

Do not use copper for an exposed item if drainage from that item will pass over exposed masonry, stonework or other metal surfaces. In addition to the metals listed in Table I, lead-coated copper may be used for such items.

2.2.3 Copper, Sheet and Strip

Provide in accordance with ASTM B370, cold-rolled temper, H 00 (standard).

2.2.4 Lead-Coated Copper Sheet

Provide in accordance with ASTM B101.

2.2.5 Lead Sheet

Provide in a minimum weight of 4 pounds per square foot.

2.2.6 Steel Sheet, Zinc-Coated (Galvanized)

Provide in accordance with ASTM A653.

2.2.7 Zinc Sheet and Strip

Provide in accordance with ASTM B69, Type I, a minimum of 0.024 inch thick.

2.2.8 Stainless Steel

Provide in accordance with ASTM A480, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

2.2.9 Terne-Coated Steel

Provide in accordance with ASTM A308, a minimum of 14 by 20 inch with minimum of 40 pound coating per double base box. ASTM A308/A308M.

2.2.10 Aluminum Alloy Sheet and Plate

Provide in accordance with ASTM B209 [anodized [clear] [color [_][_____]]] form alloy, and temper appropriate for use.

2.2.10.1 Alclad

When fabricated of aluminum, fabricate the following items with Alclad 3003, Alclad 3004, or Alclad 3005, clad on [one side][both sides] unless otherwise indicated.

a. Gutters, downspouts, and hangers

b. Gravel stops and fasciae

c. Flashing

2.2.11 Finishes

Provide exposed exterior sheet metal and aluminum with a baked on, factory applied color coating of polyvinylidene fluoride (PVF2) or approved equal fluorocarbon coating. Dry film thickness of coatings must be 0.8 to 1.3 mils. Color to be selected from [manufacturer's full range of "cool roof" color choices, manufacturer's standard range of color choices, and manufacturer's full range of color choices, as indicated on the Drawings. Field applications of color coatings are prohibited and will be rejected.

2.2.12 Cool Roof Finishes

Provide cool roof finish coatings and colors in accordance with one of the following methods of analysis:

2.2.12.1 Energy Star Certification

Provide roof finishes having an initial solar reflectance of 0.65 for low slope roofs with a 2:12 pitch or less when tested in accordance with ASTM E1918 and ASTM E1980, 0.25 for steep slope roofs with a greater than 2:12 pitch when tested in accordance with ASTM E971, or as certified by Energy Star for the particular product proposed. Certified Energy Star roof products are listed at https://www.energystar.gov/productfinder/product/certified-roof-products/results

2.2.12.2 ASHRAE 189.1 (2011) Compliance

Provide roof finishes having a minimum initial Solar Reflectance Index of 78 for low slope roofs with a 2:12 pitch or less when tested in accordance with ASTM E1918 and ASTM E1980, 29 for steep slope roofs with a greater than 2:12 pitch when tested in accordance with ASTM E971 to comply with ASHRAE 189.1.

2.2.12.3 ASHRAE 90.1 (2010) Compliance

Provide roof finishes having a minimum 3-year aged solar reflectance of 0.55 when tested in accordance with ASTM C1549 or ASTM E1918, and a minimum 3-year aged thermal emittance of 0.75 when tested in accordance with ASTM E971 or ASTM E408, or, a minimum 3-year aged Solar Reflectance Index of 64 when determined in accordance with the Solar Reflectance Index method in ASTM E1980 using a convection coefficient of 6.62 W per m2 2.1 BTU per h ft2, to comply with ASHRAE 90.1 – SI ASHRAE 90.1 - IP.

2.2.13 Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes ASTM B221.

2.2.14 Solder

Provide in accordance with ASTM B32, 95-5 tin-antimony.

2.2.15 Reglets

2.2.15.1 Polyvinyl Chloride Reglets

Provide in accordance with ASTM D1784, Type II, Grade 1, Class 14333-D, 0.075 inch minimum thickness.

2.2.15.2 Metal Reglets

Provide factory fabricated caulked type or friction type reglets with a minimum opening of 1/4 inch and a depth of 1-1/4 inch, as approved.

2.2.15.2.1 Caulked Reglets

Provide with rounded edges, temporary reinforcing cores, and accessories as required for securing to adjacent construction. Provide built-up mitered corner pieces for inside and outside corners.

2.2.15.2.2 Friction Reglets

Provide with flashing receiving slots not less than 5/8 inch deep, one inch jointing tongues, and upper and lower anchoring flanges installed at 24 inch maximum snap-lock type receiver.

2.2.16 Scuppers

Line interiors of scupper openings with sheet metal. Provide a drip edge at bottom edges with returns of not less than one inch against the face of the outside wall at the top and sides. Provide the perimeter of the lining approximately 1/2 inch less than the perimeter of the scupper.

2.2.17 Conductor Heads

Provide conductor heads and screens in the same material as downspouts. Provide outlet tubes not less than 4 inches long.

2.2.18 Splash Pans

Provide splash pans where downspouts discharge onto roof surfaces and at locations indicated. Unless otherwise indicated, provide pans not less than 24 inches long by 18 inches wide with metal ribs across bottoms of pans. Provide sides of pans with vertical baffles not less than one inch high in the front, and 4 inches high in the back.

Copings

Unless otherwise indicated, provide copings in copper sheets, 8 or 10 feet long, joined by a 3/4 inch locked and soldered seam.

2.2.19 Bituminous Plastic Cement

Provide in accordance with ASTM D4586, Type I.

2.2.20 Roofing Felt

Provide in accordance with ASTM D226 [Type I] [Type II].

2.2.21 Asphalt Primer

Provide in accordance with ASTM D41.

2.2.22 Fasteners

Use the same metal as, or a metal compatible with the item fastened. Use stainless steel fasteners to fasten. Confirm compatibility of fasteners and items to be fastened to avoid galvanic corrosion due to dissimilar materials.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Metal Roofing

3.1.1.1 [Flat Copper,] [Zinc,] [Terne-coated Steel] Roofing

Before applying roofing, cover deck with rosin-sized roofing felt. Lap 2 inch at joints and secure in place with roofing nails. Using solder of equal parts tin and lead, solder slowly with well-heated irons to thoroughly heat sheet and completely sweat solder through full width of seam. Tin edges of copper to be soldered at least 3/4 inch before sheets are locked. Use stainless nails in terne-coated steel; in copper, use solid copper or bronze roofing nails][in zinc, use zinc-coated roofing nails. Where roof decks abut vertical surfaces, turn metal roofing up vertical surfaces about 8 inch where practicable; where vertical surfaces are covered with applied materials, turn up roofing behind applied materials. Use standing-seam method for roofs having rise of more than 3 inch per foot, and use flat-seam method when rise is 3 inch per foot or less. Walking not permitted directly on metal roofs; provide approved walkways.

3.1.1.2 Standing-seam Method

Make standing seams parallel with slope of roof. Fabricate sheets into long lengths at shop by locking short dimensions together and thoroughly soldering joints thus formed. In applying metal, turn up one edge of course at each side seam at right angles 1.5 inch. Then install 2 by 3 inch cleats spaced 12 inches apart by fastening one end of each cleat to roof with two one inch long nails and folding roof end back over nail heads. Turn end adjoining turned-up side seam up over upstanding edge of course. Turn up adjoining edge of next course 1.75 inches and abutting upstanding edges locked, turned over, and flattened against one side of standing seam. Make standing seams straight, rounded neatly at the top edges, and stand about one inch above roof deck. All sheets must be same length, except as required to complete run or maintain pattern. Locate transverse joints of each panel half way between joints in adjacent sheets. Align joints of alternate sheets horizontally to produce uniform pattern, as shown in SMACNA 1793.

3.1.1.3 Flat-seam Method

Lay metal so short dimension is parallel to gutter or eave lines and so water will flow over and not into seams. Make seams by turning edges of sheet 3/4 inch and lock and solder together. If sheets are laid one at a time, secure to roof deck with cleats, using three cleats to each sheet, two on long side and one on short side. Use cleats 2 inches wide, hooked over 3/4 inch upturned edges of sheets, and nail to roof deck with two one inch long nails. Turn back roof end of cleat over nail heads before next sheet is applied. If desired, sheets may be made into long lengths at shop by locking short dimensions together and soldering seams thus formed. Turn long lengths 3/4 inch, and secure each length to roof deck by cleats spaced 12 inches apart. Mallet and solder seams after pans are in place. All sheets to be same length, except as required to complete run or maintain pattern. Locate transverse joints of each panel half way between joints in adjacent sheets. Align joints of alternate sheets horizontally to produce uniform pattern, as shown in SMACNA 1793.

3.1.2 Workmanship

Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.
Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.

3.1.3 Nailing

Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing of flashing to one edge only. Space nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.

3.1.4 Cleats

Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inches wide by 3 inches long and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry. Pre-tin cleats for soldered seams.

3.1.5 Bolts, Rivets, and Screws

Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Provide mechanically formed joints in aluminum sheets 0.040 inches or less in thickness.

3.1.6 Seams

Straight and uniform in width and height with no solder showing on the face.

3.1.6.1 Flat-lock Seams

Finish not less than 3/4 inch wide.

3.1.6.2 Lap Seams

Finish soldered seams not less than one inch wide. Overlap seams not soldered, not less than 3 inches.

3.1.6.3 Loose-Lock Expansion Seams

Not less than 3 inches wide; provide minimum one inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8 inch thick bed.

3.1.6.4 Standing Seams

Not less than one inch high, double locked without solder.

3.1.6.5 Flat Seams

Make seams in the direction of the flow.

3.1.7 Soldering

Where soldering is specified, apply to copper, terne-coated stainless steel, zinc-coated steel, and stainless steel items. Pre-tin edges of sheet metal before soldering is begun. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.7.1 Edges

Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux the edges of stainless steel to be pre-tinned. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.8 Welding and Mechanical Fastening

Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness must be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

3.1.8.1 Welding of Aluminum

Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2/D1.2M.

3.1.8.2 Mechanical Fastening of Aluminum

Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inches maximum on center. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inches from the end of the overlapping sheet.

3.1.9 Protection from Contact with Dissimilar Materials

3.1.9.1 Copper or Copper-bearing Alloys

Paint with heavy-bodied bituminous paint surfaces in contact with dissimilar metal, or separate the surfaces by means of moistureproof building felts.

3.1.9.2 Aluminum

Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

Metal Surfaces

Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.1.9.3 Wood or Other Absorptive Materials

Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

3.1.10 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fasciae by expansion and contraction joints spaced not more than 12 feet apart.

3.1.11 Base Flashing

[Lay the base flashings with each course of the roof covering, shingle fashion, where practicable, where sloped roofs abut chimneys, curbs, walls, or other vertical surfaces.]Extend up vertical surfaces of the flashing not less than 8 inches and not less than 4 inches under the roof covering. Where finish wall coverings form a counterflashing, extend the vertical leg of the flashing up behind the applied wall covering not less than 6 inches. Overlap the flashing strips or shingles with the previously laid flashing not less than 3 inches. Fasten

the strips [or shingles] at their upper edge to the deck. Horizontal flashing at vertical surfaces must extend vertically above the roof surface and fastened at their upper edge to the deck a minimum of 6 inches on center with [large headed aluminum roofing nails] [hex headed, galvanized shielded screws] a minimum of 2 inch lap of any surface. Solder end laps and provide for expansion and contraction. Extend the metal flashing over crickets at the up-slope side of [chimneys,] [curbs,] [and similar] vertical surfaces extending through sloping roofs, the metal flashings. Extend the metal flashings onto the roof covering not less than 4.5 inches at the lower side of [dormer walls,] [chimneys,] [and similar] vertical surfaces extending through the roof decks. Install and fit the flashings so as to be completely weathertight. Provide factory-fabricated base flashing for interior and exterior corners. Do not use metal base flashing on built-up roofing.

Counterflashing

Except where indicated or specified otherwise, insert counterflashing in reglets located from 9 to 10 inches above roof decks, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inches. Fold the exposed edges of counterflashings 1/2 inch. Where stepped counterflashings are required, they may be installed in short lengths a minimum [8 inches by 8 inches][8 inches by 8 inches] or may be of the preformed single piece type. Provide end laps in counterflashings not less than 3 inches and make it weathertight with plastic cement. Do not make lengths of metal counterflashings exceed 10 feet. Form flashings to the required shapes before installation. Factory form corners not less than 12 inches from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inches apart; on[chimneys and][stair/elevator towers] short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counterflashing with caulking compound. Turn up the concealed edge of counterflashings built into masonry or concrete walls not less than 1/4 inch and extend not less than 2 inches into the walls. Install counterflashing to provide a spring action against base flashing. Where bituminous base flashings are provided, extend down the counter flashing as close as practicable to the top of the cant strip. Factory form counter flashing to provide spring action against the base flashing.

3.1.12 Metal Reglets

Keep temporary cores in place during installation. Ensure factory fabricated caulked type or friction type, reglets have a minimum opening of 1/4 inch and a minimum depth of 1-1/4 inch, when installed.

3.1.12.1 Caulked Reglets

Wedge flashing in reglets with lead wedges every 18 inches, caulked full and solid with an approved compound.

3.1.12.2 Friction Reglets

Install flashing snap lock receivers at 24 inches on center maximum. When flashing has been inserted the full depth of the slot, caulk the slot, lock [with wedges], and fill with sealant.

3.1.14 Polyvinyl Chloride Reglets for Temporary Construction

Rigid polyvinyl chloride reglets may be provided in lieu of metal reglets for temporary construction.

3.1.15 Gravel Stops and Fasciae

Prefabricate in the shapes and sizes indicated and in lengths not less than 8 feet. Extend flange at least 4 inches onto roofing. Provide prefabricated, mitered corners internal and external corners. Install gravel stops and fasciae after all plies of the roofing membrane have been applied, but before the flood coat of bitumen is applied. Prime roof flange of gravel stops and fasciae on both sides with an asphalt primer. After primer has dried, set flange on roofing membrane and strip-in. Nail flange securely to wood nailer with large-head, barbed-shank roofing nails 1.5 inch long spaced not more than 3 inches on center, in two staggered rows.

3.1.15.1 Edge Strip

Hook the lower edge of fasciae at least 3/4 inch over a continuous strip of the same material bent outward at an angle not more than 45 degrees to form a drip. Nail hook strip to a wood nailer at 6 inches maximum on center. Where fastening is made to concrete or masonry, use screws spaced 12 inches on center driven in expansion shields set in the concrete or masonry. Where horizontal wood nailers are slotted to provide for insulation venting, install strips to prevent obstruction of vent slots. Where necessary, install strips over 1/16 inch thick compatible spacer or washers.

3.1.15.2 Joints

Leave open the section ends of gravel stops and fasciae 6 mm 1/4 inch and backed with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 100 mm 4 inches set laps in plastic cement. Face nailing will not be permitted. Install prefabricated aluminum gravel stops and fasciae in accordance with the manufacturer's printed instructions and details.

3.1.16 Metal Drip Edges

Provide a metal drip edge, designed to allow water run-off to drip free of underlying construction, at eaves and rakes prior to the application of roofing shingles. Apply directly on the wood deck at the eaves and over the underlay along the rakes. Extend back from the edge of the deck not more than 75 mm 3 inches and secure with compatible nails spaced not more than 250 mm 10 inches on center along upper edge.

3.1.17 Gutters

The hung type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Bead with hemmed edge or reinforce the outer edge of gutter with a stiffening bar not less than 3/4 by 3/16 inch of material compatible with gutter. Fabricate gutters in sections not less than 8 feet. Lap the sections a minimum of one inch in the direction of flow or provide with concealed splice plate 6 inches minimum. Join the gutters, other than aluminum, by riveted and soldered joints. Join aluminum gutters with riveted sealed joints. Provide expansion-type slip joints midway between outlets. Install gutters below slope line of the roof so that snow and ice can slide clear. Support gutters on[adjustable hangers spaced not more than 30 inches on center][as indicated][by continuous cleats][and][or][by cleats spaced not less than 36 inches apart]. Adjust gutters to slope uniformly to outlets, with high points occurring midway between outlets. Fabricate hangers and fastenings from compatible metals.

3.1.18 Downspouts

Space supports for downspouts according to the manufacturer's recommendation for the [wood][masonry] or [steel] substrate. Types, shapes and sizes are indicated. Provide complete including elbows and offsets. Provide downspouts in approximately 10 foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide gutter outlets with wire ball strainers for each outlet. Provide strainers to fit tightly into outlets and be of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on center with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.

3.1.18.1 Terminations

Neatly fit into the drainage connection the downspouts terminating in drainage lines and fill the joints with a portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with elbow-type fittings. Provide splash pans as specified.

3.1.19 Flashing for Roof Drains

Provide a 30 inches square sheet indicated. Taper insulation to drain from 24 inches out. Set flashing on finished felts in a full bed of asphalt roof cement, ASTM D4586. Heavily coat the drain flashing ring with asphalt roof cement. Clamp the roof membrane, flashing sheet, and stripping felt in the drain clamping ring. Secure clamps so that felts and drain flashing are free of wrinkles and folds. Retrofit roof drains must conform to ANSI/SPRI RD-1.

3.1.20 Scuppers

Extend the scupper liner through and project outside of, the wall it penetrates to form a bottom drip edge against the face of the wall. Fold outside edges under 1/2 inch on all sides. Join the top and sides of the lining on the roof deck side to a closure flange by a locked and soldered joint. Join the bottom edge by a locked and soldered joint to the closure flange, where required, form with a ridge to act as a gravel stop around the scupper inlet. Provide surfaces to receive the scupper lining and coat with bituminous plastic cement.

3.1.21 Conductor Heads

Set the depth of the top opening equal to two-thirds of the width or the conductor head. Flat-lock solder seams. Where conductor heads are used in conjunction with scuppers, set the conductor a minimum of 2 inches wider than the scupper. Attach conductor heads to the wall with masonry fasteners. Securely fasten screens to heads.

3.1.22 Splash Pans

Install splash pans lapped with horizontal roof flanges not less than 4 inches wide to form a continuous surface. Bend the rear flange of the pan to contour of can't strip and extend up 6 inches under the side wall covering or to height of base flashing under counterflashing. Bed the pans and roof flanges in plastic bituminous cement and strip-flash as specified.

3.1.23 Open Valley Flashing

Provide valley flashing free of longitudinal seams, of width sufficient to extend not less than 6 inches under the roof covering on each side. Provide a 1/2 inch fold on each side of the valley flashing. Lap the sheets not less than 6 inches in the direction of flow and secure to roofing construction with cleats attached to the fold on each side. Nail the tops of sheets to roof sheathing. Space the cleats not more than 12 inches on center. Provide exposed flashing not less than 4 inches in width at the top and increase one inch in width for each additional 8 feet in length. Where the slope of the valley is 4.5 inches or less per foot, or the intersecting roofs are on different slopes, provide an inverted V-joint, one inch high, along the centerline of the valley; and extend the edge of the valley sheets 8 inches under the roof covering on each side.

Valley flashing for asphalt shingle roofs is specified in Section 07 31 13 ASPHALT SHINGLES.

3.1.24 Eave Flashing

One piece in width, applied in 8 to 10 foot lengths with expansion joints spaced as specified in paragraph EXPANSION AND CONTRACTION. Provide a 3/4 inch continuous fold in the upper edge of the sheet to engage cleats spaced not more than 10 inches on center. Locate the upper edge of flashing not less than 450 mm 18 inches from the outside face of the building, measured along the roof slope. Fold lower edge of the flashing over and loose-lock into a continuous edge strip on the fascia. Where eave flashing intersects metal valley flashing, secure with one inch flat locked joints with cleats that are 10 inches on center.

3.1.25 Sheet Metal Covering on Flat, Sloped, or Curved Surfaces

Except as specified or indicated otherwise, cover and flash all minor flat, sloped, or curved surfaces such as crickets, bulkheads, dormers and small decks with metal sheets of the material used for flashing; maximum size of sheets, 16 by 18 inches. Fasten sheets to sheathing with metal cleats. Lock seams and solder. Lock aluminum seams as recommended by aluminum manufacturer. Provide an underlayment of roofing felt for all sheet metal covering.

3.1.26 Expansion Joints

Provide expansion joints for roofs, walls, and floors as [specified] [indicated]. Provide expansion joints in continuous sheet metal at 40 foot intervals for copper and stainless steel and at 32 foot intervals for aluminum, aluminum gravel stops and fasciae which must have expansion joints at not more than 12 foot spacing. Provide evenly spaced joints. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing. Conform to the requirements of Table I.

3.1.26.1 Roof Expansion Joints

Consist of curb with wood nailing members on each side of joint, bituminous base flashing, metal counterflashing, and metal joint cover. Bituminous base flashing is specified in Roofing Section. Provide counterflashing as specified in paragraph COUNTERFLASHING, except as follows: Provide counterflashing with vertical leg of suitable depth to enable forming into a horizontal continuous cleat. Secure the inner edge to the nailing member. Make the outer edge projection not less than one inch for flashing on one side of the expansion joint and be less than the width of the expansion joint plus one inch for flashing on the other side of the joint. Hook the expansion joint cover over the projecting outer edges of counterflashing. Provide roof joint with a joint cover of the width indicated. Hook and lock one edge of the joint cover over the shorter projecting flange of the continuous cleat, and the other edge hooked over and loose locked with the longer projecting flange. Joints are specified in Table II.

3.1.26.2 Floor and Wall Expansion Joints

Provide U-shape with extended flanges for expansion joints in concrete and masonry walls and in floor slabs.

3.1.27 Flashing at Roof Penetrations and Equipment Supports

Provide metal flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck. Goose-necks, rain hoods, power roof ventilators, and [_____] are specified in [_____].

Single Pipe Vents See Table I, footnote (d).
Set flange of sleeve in bituminous plastic cement and nail 3 inches on center. Bend the top of sleeve over and extend down into the vent pipe a minimum of 2 inches. For long runs or long rises above the deck, where it is impractical to cover the vent pipe with lead, use a two-piece formed metal housing. Set metal housing with a metal sleeve having a 4 inches roof flange in bituminous plastic cement and nailed 3 inches on center. Extend sleeve a minimum of 8 inches above the roof deck and lapped a minimum of 3 inches by a metal hood secured to the vent pipe by a draw band. Seal the area of hood in contact with vent pipe with an approved sealant.

3.1.28 Stepped Flashing

Provide stepped flashing where sloping roofs surfaced with shingles abut vertical surfaces. Place separate pieces of base flashing in alternate shingle courses.

3.1.29 Copings

Provide coping with locked and soldered seam. Terminate outer edges in edge strips. Install with sealed [lap joints][cover plate joints][standing seam joints] as indicated.

3.2 PAINTING

Touch ups in the field may be applied only after metal substrates have been cleaned and pretreated in accordance with manufacturer's written instructions and products.

Field-paint sheet metal for separation of dissimilar materials.
3.2.1 Aluminum Surfaces

Clean with solvent and apply one coat of zinc-molybdate primer and one coat of aluminum paint.

3.3 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.4 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

3.5 FIELD QUALITY CONTROL

Establish and maintain a Quality Control Plan for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.
b. Verification that specified material is provided and installed.

c. Inspection of sheet metalwork, for proper size(s) and thickness(es), fastening and joining, and proper installation.

3.5.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contracting Officer at the end of each day.

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	[Copper kilograms per square foot]	[Aluminum, inch]	[Stainless Steel, inch]	[Terne-Coated Stainless Steel, inch]	[Zinc-Coated Steel, U.S. Std. Gage]
[Building Expansion Joints]					
[Cover]	16	.032	.015	.015	24
[Waterstop-bellows or flanged, U-type.]	16	-	.015	.015	-

[Covering on minor flat, pitched or curved surfaces]	20	.040	.018	.018	-
[Downspouts and leaders]	16	.032	.015	.015	24
[Downspout clips and anchors]	-	.040 clip .125 anchor	-	-	-
[Downspout straps, 2-inch]	48 (a)	.060	.050	-	-
[Conductor heads]	16	.032	.015	.015	-
[Scupper lining]	20	.032	.015	.015	-
[Strainers, wire diameter or gage]	No. 9 gage	.144 diameter	.109 diameter	-	
[Flashings:]					
[Base]	20	.040	.018	.018	24
[Cap (Counter-flashing)]	16	.032	.015	.015	26
[Eave]	16	-	.015	.015	24
[Spandrel beam]	10	-	.010	.010	-
[Bond barrier]	16	-	.015	.015	-
[Stepped]	16	.032	.015	.015	-
[Valley]	16	.032	.015	.015	-

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES					
Sheet Metal Items	[Copper kilograms per square foot]	[Aluminum, inch]	[Stainless Steel, inch]	[Terne-Coated Stainless Steel, inch]	[Zinc-Coated Steel, U.S. Std. Gage]
[Roof drain]	16 (b)				
[Pipe vent sleave (d)]					
[Coping]	16	-	-	-	-
[Gravel stops and fasciae:]					
[Extrusions]	-	.075	-	-	-
[Sheets, corrugated]	16	.032	.015	.015	-
[Sheets, smooth]	20	.050	.018	.018	24
[Edge strip]	24	.050	.025	-	-
[Gutters:]					
[Gutter section]	16	.032	.015	.015	24
[Continuous cleat]	16	.032	.015	.015	24

[Hangers, dimensions]	1 inch by 1/8 inch (a)	1 inch by . inch (c)	1 inch by .0 inch	-	-
[Joint Cover plates (See Table II)]	16	.032	.015	.015	24
[Reglets (c)]	10	-	.010	.010	-
[Splash pans]	16	.040	.018	.018	-
(a) Brass.					
(b) May be lead weighing 4 pounds per square foot.					
(c) May be polyvinyl chloride.					
(d) 2.5 pound minimum lead sleeve with 4 inch flange. Where lead sleeve is impractical, refer to paragraph SINGLE PIPE VENTS for optional material.					

TABLE II. SHEET METAL JOINTS			
TYPE OF JOINT			
Item Designation	Copper, Terne-Coated Stainless Steel, Zinc-Coated Steel and Stainless Steel	Aluminum	Remarks
Joint cap for building expansion seam, cleated joint at roof	1.25 inch single lock, standing seam, cleated	1.25 inch single lock, standing	--
Flashings			
Base	One inch 3 inch lap for expansion joint	One inch flat locked, soldered; sealed; 3 inch lap for expansion joint	Aluminum manufacturer's recommended hard setting sealant for locked aluminum joints. Fill each metal expansion joint with a joint sealing compound.

Cap-in reglet	3 inch lap	3 inch lap	Seal groove with joint sealing compound.
Reglets	Butt joint	--	Seal reglet groove with joint sealing compound.
Eave	One inch flat locked, cleated. One inch loose locked, sealed expansion joint, cleated.	One inch flat locked, locked, cleated one inch loose locked, sealed expansion joints, cleated	Same as base flashing.
Stepped	3 inch lap	3 inch lap	--
Valley	6 inch lap cleated	6 inch lap cleated	--
Edge strip	Butt	Butt	--
Gravel stops:			

TABLE II. SHEET METAL JOINTS			
TYPE OF JOINT			
Item Designation	Copper, Terne-Coated Stainless Steel, Zinc-Coated Steel and Stainless Steel	Aluminum	Remarks
Extrusions	--	Butt with 1/2 inch space	Use sheet flashing beneath and a cover plate
Sheet, smooth	Butt with 1/4 inch space	Butt with 1/4 inch space	Use sheet flashing backup plate.
Sheet, corrugated	Butt with 1/4 inch space	Butt with 1/4 inch space	Use sheet flashing beneath and a cover plate or a combination unit
Gutters	1.5 inch lap, riveted and soldered	One inch flat locked riveted and sealed	Aluminum producers recommended hard setting sealant for locked aluminum joints.
(a) Provide a 3 inch lap elastomeric flashing with manufacturer's recommended sealant.			
(b) Seal Polyvinyl chloride reglet with manufacturer's recommended sealant.			

-- End of Section --

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UNIFIED FACILITIES GUIDE SPECIFICATIONS
References are in agreement with UMRL dated April 2018

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08/16

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STEEL STANDING SEAM
ROOFING
08/16

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 IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

ASTM INTERNATIONAL (ASTM)

ASTM A1008/A1008M	(2016) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1011/A1011M	(2017a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A653/A653M	(2017) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A792/A792M	(2010) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM B117	(2016) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D1654	(2008; R 2016; E 2017) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D2244	(2016) Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D2247	(2015) Testing Water Resistance of Coatings in 100% Relative Humidity

ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D4214	(2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D523	(2014) Standard Test Method for Specular Gloss
ASTM D714	(2002; R 2017) Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D968	(2017) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E1592	(2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E84	(2018) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G152	(2013) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	(2013) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

1.2 DEFINITIONS

1.2.1 Field-Formed Seam

Seams of panels so configured that when adjacent sheets are installed the seam is sealed utilizing mechanical or hand seamers. Crimped (45 degree bend), roll formed (180 degree bend), double roll formed (2 - 180 degree bends), and roll and lock systems are types of field-formed seam systems.

1.2.2 Snap Together Seam

Panels so configured that the male and female portions of the seam interlock through the application of foot pressure or tamping with a mallet. Snap-on cap configurations are a type of snap together system.

1.2.3 Pre-Formed

Formed to the final, less field-formed seam, profile and configuration in the factory.

1.2.4 Field-Formed

Formed to the final, less field-formed seam, profile and configuration at the site of work prior to installation.

1.2.5 Roofing System

The roofing system is defined as the assembly of roofing components, including roofing panels, flashing, fasteners, and accessories which, when assembled properly result in a watertight installation.

1.2.6 SSMRS

Standing Seam Metal Roof System (SSMRS) is abbreviation of the entire roof system specified herein with all components and parts coming from a single manufacturer's system.

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements

a. Panels must be continuous lengths up to manufacturer's standard longest lengths, with no joints or seams, except where indicated or specified. Ribs of adjoining sheets must be in continuous contact from eave to ridge. Individual panels of snap together type systems must be removable for replacement of damaged material.

b. There must be no exposed or penetrating fasteners except where shown on approved shop drawings. Fasteners into steel must be stainless steel, zinc cast head, or cadmium plated steel screws inserted into predrilled holes. There must be a minimum of two fasteners per clip. Single fasteners will be allowed when supporting structural members are prepunched or predrilled.

c. Snap together type systems must have a capillary break and a positive side lap locking device. Field-formed seam type systems must be mechanically locked closed by the manufacturer's locking tool. The seam must include a continuous factory applied sealant when required by the manufacturer to withstand the wind loads specified.

d. Roof panel anchor clips must be concealed and designed to allow for longitudinal thermal movement of the panels, except where specific fixed points are indicated. Provide for lateral thermal movement in panel configuration or with clips designed for lateral and longitudinal movement.

1.3.2 Design Conditions

Design the system to resist positive and negative loads specified herein in accordance with the AISI SG03-3. Panels must support walking loads without permanent distortion or telegraphing of the structural supports.

1.3.2.1 Wind Uplift

Compute and apply the design uplift pressures for the roof system using a basic wind speed of 124 miles per hour (mph). Roof system and attachments must resist the following wind loads, in pounds per square foot (psf):

	Negative
a. At eaves	[_____]
b. At rakes	[_____]
c. At ridge	[_____]
d. At building corners	[_____]
e. At central areas	[_____]

The design uplift force for each connection assembly must be that pressure given for the area under consideration, multiplied by the tributary load area of the connection assembly, and multiplied by the appropriate factor of safety, as follows:

a. Single fastener in a connection: 3.0

b. Two or more fasteners in each connection: 2.25

1.3.2.2 Roof Live Loads

Loads must be applied on the horizontal projection of the roof structure. The minimum roof design live load must be 20 psf.

1.3.2.3 Thermal Movement

System must be capable of withstanding thermal movement based on a temperature range of 10 degrees F below zero degrees F and 140 degrees F.

Deflection

Panels must be capable of supporting design loads between unsupported spans with deflection of not greater than L/180 of the span.

1.3.3 Structural Performance

The structural performance test methods and requirements of the Standing Seam Roofing Systems (SSRS) must be in accordance with ASTM E1592.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings
Roofing
SD-03 Product Data

Roofing Panels
Attachment Clips
Closures
Accessories
Fasteners
Sealants

Insulation, including Joint Sealing Measures for Vapor Barrier Facing
Sample Warranty Certificate; G
Submit for materials to be provided. Submit data sufficient to indicate conformance to specified requirements.

SD-04 Samples

Roofing Panel: Submit a 12 inch long by full width section of typical panel.

For color selection, submit 2 by 4 inch metal samples in color, finish and texture specified or selected. When colors are not indicated, submit samples of not less than six different manufacturer's standard colors for selection.

Accessories: Submit each type of accessory item used in the project including, but not limited to each type of anchor clip, closure, fastener, and leg clamp.

Sealants

Intermediate Support Section

Submit full size samples of each intermediate support section, 12 inches long.

SD-05 Design Data
Design Calculations
SD-06 Test Reports Field Inspection: Submit manufacturer's technical representative's field inspection reports as specified in paragraph MANUFACTURER'S FIELD INSPECTION.

Structural Performance Tests
Finish Tests
SD-07 Certificates

Manufacturer's Technical Representative's Qualifications: Submit documentation from roofing manufacturer proving the manufacturer's technical representative meets below specified requirements. Include name, address, telephone number, and experience record.
Statement of Installer's Qualifications: Submit documentation proving the installer is factory-trained, has the specified experience, and authorized by the manufacturer to install the products specified.
Coil Stock Compatibility: Provide certification of coil compatibility with roll forming machinery to be used for forming panels without warping, waviness, and rippling not part of panel profile; to be done without damage, abrasion or marking of finish coating.

SD-08 Manufacturer's Instructions Installation Manual; Submit manufacturers printed installation manual, instructions, and standard details.

SD-11 Closeout Submittals Information Card: For each roofing installation, submit a typewritten card or photoengraved aluminum card containing the information listed on Form 1 located at the end of this section.

Warranty

1.5 DESIGN CALCULATIONS

Provide design calculations prepared by a professional engineer specializing in structural engineering verifying that system supplied and any additional framing meets design load criteria indicated. Coordinate calculations with manufacturer's test results. Include calculations for:

Wind load uplift design pressure at roof locations specified in paragraph WIND UPLIFT.

Clip spacing and allowable load per clip.
Fastening of clips to structure or intermediate supports.
Intermediate support spacing and framing and fastening to structure when required.
Allowable panel span at anchorage spacing indicated. Safety factor used in design loading.
Governing code requirements or criteria. Edge and termination details.

1.6 QUALITY ASSURANCE

1.6.1 Preroofing Conference

After submittals are received and approved but before roofing and insulation work, including associated work, is preformed, the Contracting Officer's Representative will hold a preroofing conference to review the following:

a. The drawings and specifications

b. Procedure for on site inspection and acceptance of the roofing substrate and pertinent structural details relating to the roofing system

c. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing

d. Safety requirements

The preroofing conference must be attended by the Contractor and personnel directly responsible for the roofing and insulation installation, mechanical and electrical work, and the roofing manufacturer's technical representative. Conflicts among those attending the preroofing conference must be resolved and confirmed in writing before roofing work, including associated work, is begun. Prepare written minutes of the preroofing conference and submit to the Contracting Officer.

1.6.2 Manufacturer

The SSMRS must be the product of a metal roofing industry - recognized manufacturer who has been in the practice of manufacturing SSMRS for a period of not less than 5 years and who has been involved in at least 5 projects similar in size and complexity to this project.

1.6.3 Manufacturer's Technical Representative

The representative must have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and with installations in the geographical area where construction will take place. The manufacturer's representative must be an employee of the manufacturer with at least 5 years' experience in installing the roof system. The representative must be available to perform field inspections and attend meetings as required herein, and as requested by the Contracting Officer.

1.6.4 Installer's Qualifications

The roofing system installer must be factory-trained, approved by the steel roofing system manufacturer to install the system, and must have a minimum of three years' experience as an approved applicator with that manufacturer. The applicator must have applied five installations of similar size and scope as this project within the previous 3 years.

1.6.5 Single Source

Roofing panels, clips, closures, and other accessories must be standard products of the same manufacturer; must be the latest design by the manufacturer; and must have been designed by the manufacturer to operate as a complete system for the intended use.

1.6.6 Laboratory Tests For Panel Finish

The term "appearance of base metal" refers to the metal coating on steel. Panels must meet the following test requirements:

a. Formability Test: When subjected to a 180 degree bend over a 3 mm 1/8 inch diameter mandrel in accordance with ASTM D522, exterior coating film may show only slight microchecking and no loss of adhesion.

b. Accelerated Weathering Test: Withstand a weathering test for a minimum of 2000 hours in accordance with ASTM G152 and ASTM G153, Method 1 without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with a penknife blade or similar instrument will be considered to indicate loss of adhesion.

c. Chalking Resistance: After the 2000-hour weatherometer test, exterior coating may not chalk greater than No. 8 rating when measured in accordance with ASTM D4214 test procedures.

d. Color Change Test:

After the 2000-hour weatherometer test, exterior coating color change must not exceed 2 NBS units when measured in accordance with ASTM D2244 test procedure.

e. Salt Spray Test: Withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B117, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating must receive a rating of 8, few blisters in field as determined by ASTM D714; and an average rating of 6, 1/8 inch failure at scribe, as determined by ASTM D1654. Rating Schedule No. 1.

f. Abrasion Resistance Test for Color Coating: When subjected to the falling sand test in accordance with ASTM D968, coating system must withstand a minimum of 100 liters of sand per mil thickness before appearance of base metal.

g. Humidity Test: When subjected to a humidity cabinet test in accordance with ASTM D2247 for 1000 hours, a scored panel must show no signs of blistering, cracking, creepage, or corrosion.

h. Gloss Test: The gloss of the finish must be 30 plus or minus 5 at an angle of 60 degrees, when measured in accordance with ASTM D523.

i. Glare Resistance Test:

Surfaces of panels that will be exposed to the exterior must have a specular reflectance of not more than 10 when measured in accordance with ASTM D523 at an angle of 85 degrees. Specular reflectance may be obtained with striations or embossing. Requirements specified under FORMABILITY TEST will be waived if necessary to conform to this requirement.

1.6.7 Shop Drawing Requirements

Submit roofing drawings to supplement the instructions and diagrams. Include design and erection drawings containing an isometric view of the roof showing the design uplift pressures and dimensions of edge, ridge and corner zones; and show typical and special conditions including flashings, materials and thickness, dimensions, fixing lines, anchoring methods, sealant locations, sealant tape locations, fastener layout, sizes, and spacing, terminations, penetrations, attachments, and provisions for thermal movement. Details of installation must be in accordance with the manufacturer's Standard Instructions and details or the SMACNA 1793. Prior to

submitting shop drawings, have drawings reviewed and approved by the manufacturer's technical engineering department.

1.7 WARRANTY

Furnish manufacturer's no-dollar-limit materials and workmanship warranty for the roofing system. The warranty period must be not less than 20 years from the date of Government acceptance of the work. The warranty must be issued directly to the Government. The warranty must provide that if within the warranty period the metal roofing system becomes non-watertight or shows evidence of corrosion, perforation, rupture or excess weathering due to deterioration of the roofing system resulting from defective materials or installed workmanship the repair or replacement of the defective materials and correction of the defective workmanship must be the responsibility of the roofing system manufacturer. Repairs that become necessary because of defective materials and workmanship while roofing is under warranty must be performed within 7 days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time will constitute grounds for having the repairs performed by others and the cost billed to the manufacturer. In addition, provide a 2 year contractor installation warranty.

1.8 DELIVERY, STORAGE AND HANDLING

Deliver, store, and handle preformed panels, bulk roofing products and other manufactured items in a manner to prevent damage or deformation.

1.8.1 Delivery

Provide adequate packaging to protect materials during shipment. Crated materials must not be uncrated until ready for use, except for inspection. Immediately upon arrival of materials at the jobsite, inspect materials for damage, dampness, and staining. Replace damaged or permanently stained materials that cannot be restored to like-new condition with satisfactory material. If materials are wet, remove the moisture and re-stack and protect the panels until used.

1.8.2 Storage

Stack materials on platforms or pallets and cover with tarpaulins or other suitable weathertight covering which prevents water trapping or condensation. Store materials so that water which might have accumulated during transit or storage will drain off. Do not store the panels in contact with materials that might cause staining, such as mud, lime, cement, fresh concrete or chemicals. Protect stored panels from wind damage.

1.8.3 Handling

Handle material carefully to avoid damage to surfaces, edges and ends.

PART 2 PRODUCTS

2.1 PRODUCT SUSTAINABILITY CRITERIA

For products in this section, where applicable and to extent allowed by performance criteria, provide and document the following:

2.1.1 Energy Efficient Steel Roofing Products

Energy Star Label requirement is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph ENERGY EFFICIENT EQUIPMENT.

2.1.2 Recycled Content of Steel Roofing Products

Recycled content is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph RECYCLED CONTENT.

2.2 ROOFING PANELS

Provide panels with interlocking ribs for securing adjacent sheets and with concealed clip fastening system for securing the roof covering to structural framing members. Fasteners must not penetrate the panels except at the ridge, eave, rakes, penetrations, and end laps. Backing plates and ends of panels at end laps must be predrilled or prepunched. Factory prepare ends of panels to be lapped by trimming part of seam, die-setting, or swaging ends of panels. Individual sheets must be sufficiently long to cover the entire length of any unbroken roof slope when such slope is 30 feet or less. Provide panels that extend over two or more spans when length of run exceeds 30 feet. Obtain Contracting Officer (KO) approval for sheets longer than 30 feet before submitting shop drawings. Sheets must provide not less than 12 inches of coverage (width) in place. Provide panels with a minimum corrugation height of 1.75 inches (nominal). Make provisions for expansion and contraction at either ridge or eave, consistent with the type of system to be used. Form panels from coil stock without warping, waviness or ripples not part of the panel profile, and free of damage to the finish coating system.

Provide steel roofing product that is Energy Star labeled. Provide data identifying Energy Star label for steel roofing product. Provide solar reflectance product with an initial solar reflectance greater than or equal to 0.25 and a solar reflectance greater than or equal to 0.15 three years after installation under normal conditions.

2.2.1 Material

Zinc-coated steel conforming to ASTM A653, Z275 G90 coating designation or aluminum-zinc alloy coated steel conforming to ASTM A792, AZ 165 AZ 55 coating. Provide material with a minimum thickness of 0.023 inch thick (24 gage) minimum except when mid field of roof is subject to design wind uplift pressures of 60 psf or greater, entire roof system must have a minimum thickness of 0.030 inch (22 gage). Steel roofing materials must contain a minimum of 30 percent total recycled content. Provide data identifying percentage of recycled content for steel roofing product. Prior to shipment, treat mill finish panels with a passivating chemical and oil to inhibit the formation of oxide corrosion products. Dry, retreat, and re-oil panels that have become wet during shipment or storage but have not started to oxidize.

2.2.2 Texture

Stucco embossed, Smooth or Smooth with raised intermediate ribs for added stiffness.

2.2.3 Finish

Factory color finish.

2.2.3.1 Factory Color Finish

Provide factory applied, thermally cured coating to exterior and interior of metal roof and wall panels and metal accessories. Provide exterior finish top coat of 70 percent resin polyvinylidene fluoride with not less than 0.8 mil dry film thickness. Provide exterior primer standard with panel manufacturer with not less than 0.2 mil dry film thickness. Interior finish must consist of 0.2 mil dry film thickness prime coat of the same coating and dry film thickness as the exterior coating. Provide exterior and interior coating meeting test requirements specified below. Tests must have been performed on the same factory finish and thickness provided. Provide clear factory edge coating on all factory cut or unfinished edges.

2.3 INTERMEDIATE SUPPORTS

Fabricate panel subgirts, subpurlins, T-bars, Z-bars and tracks from galvanized steel conforming to ASTM A653, Z275 G90, Grade D (16 gage and heavier), Grade A (18 gage and lighter); or steel conforming to ASTM A36, ASTM A1011 , or ASTM A1008 prime painted with zinc-rich primer. Size, shape, thickness and capacity as required to meet the load, insulation thickness and deflection criteria specified.

2.4 ATTACHMENT CLIPS

Fabricate clips from ASTM A1011, or ASTM A1008 steel hot-dip galvanized in accordance with ASTM A653, Z275 G 90, or Series 300 stainless steel. Size, shape, thickness and capacity as required to meet the load, insulation thickness and deflection criteria specified.

2.5 ACCESSORIES

Sheet metal flashings, [gutters,] [downspouts,] trim, moldings, closure strips, pre-formed crickets, caps, equipment curbs, and other similar sheet metal accessories used in conjunction with preformed metal panels must be of the same material as used for the panels. Provide metal accessories with a factory color finish to match the roofing panels, except that such items which will be concealed after installation may be provided without the finish if they are stainless steel. Metal must be of a thickness not less than that used for the panels. Thermal spacer blocks and other thermal barriers at concealed clip fasteners must be as recommended by the manufacturer except that wood spacer blocks are not allowed.

2.5.1 Closures

2.5.1.1 Rib Closures

Corrosion resisting steel, closed-cell or solid-cell synthetic rubber, neoprene or polyvinyl chloride pre-molded to match configuration of rib opening. Material for closures must not absorb water.

2.5.1.2 Ridge Closures

Metal-clad foam or metal closure with foam secondary closure matching panel configuration for installation on surface of roof panel between panel ribs at ridge and headwall roof panel flashing conditions and terminations. Foam material must not absorb water.

2.5.2 Fasteners

Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Design the fastening system to withstand the design loads specified. Exposed fasteners must be gasketed or have gasketed washers on the exterior side of the covering to waterproof the penetration. Washer material must be compatible with the covering; have a minimum diameter of 3/8 inch for structural connections; and gasketed portion of fasteners or washers must be neoprene or other equally durable elastomeric material approximately 1/8 inch thick.

2.5.2.1 Screws

Not smaller than No. 14 diameter if self-tapping type and not smaller than No. 12 diameter if self-drilling and self-tapping.

2.5.2.2 Bolts

Not smaller than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.5.2.3 Automatic End-Welded Studs

Automatic end-welded studs must be shouldered type with a shank diameter of not smaller than 5 mm 3/16 inch and cap or nut for holding covering against the shoulder.

2.5.2.4 Explosive Driven Fasteners

Fasteners for use with explosive actuated tools must have a shank diameter of not smaller than 0.145 inch with a shank length of not smaller than 1/2 inch for fastening to steel and not smaller than 1 inch for fastening to concrete.

2.5.2.5 Rivets

Blind rivets must be stainless steel with 1/8 inch nominal diameter shank. Rivets must be threaded stem type if used for other than the fastening of trim. Rivets with hollow stems must have closed ends.

2.5.3 Sealants

Elastomeric type containing no oil or asphalt. Exposed sealant must cure to a rubberlike consistency. Concealed sealant must be the non-hardening type. Seam sealant must be factory-applied, non-skinning, non-drying, and must conform to the roofing manufacturer's recommendations. Silicone-based sealants must not be used in contact with finished metal panels and components unless approved otherwise by the Contracting Officer.

2.5.4 GASKETS AND INSULATING COMPOUNDS

Nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds must be nonrunning after drying.

2.6 THERMAL INSULATION

Flexible blanket, rigid, or semi-rigid faced with a flexible vapor retarder. Insulation and facing must have a flame-spread rating of 50 or less in accordance with ASTM E84. Vapor retarder facing must have a permeance rating of 0.05 perm or less. Provide a thermal resistance "R" value of 30 or more. Exposed insulation must have a white nondusting and nonshedding finish. Facings and finishes must be factory-applied.

2.7 UNDERLAYMENT FOR WOOD SUBSTRATES

ASTM D226/D226M, Type I perforated, covered by water-resistant rosin sized building paper.

2.8 LINER PANELS

Fabricate liner panels of the same material as roof panels, and formed or patterned to prevent waviness and distortion. Liner panels must have a factory applied, one mil thick minimum painted coating on the inside face and a prime coat on the liner side.

PART 3 EXECUTION

Do not install building construction materials that show visible evidence of biological growth.

3.1 EXAMINATION

Examine surfaces to receive standing seam metal roofing and flashing. Ensure that surfaces are plumb and true, clean, even, smooth, as dry and free from defects and projections which might affect the installation.

3.2 PROTECTION FROM CONTACT WITH DISSIMILAR MATERIALS

3.2.1 Cementitious Materials

Paint metal surfaces which will be in contact with mortar, concrete, or other masonry materials with one coat of alkali-resistant coating such as heavy-bodied bituminous paint.

3.2.2 Contact with Wood

Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.3 INSTALLATION

Install in accordance with the approved manufacturer's erection instructions, shop drawings, and diagrams. Panels must be in full and firm contact with attachment clips. Where prefinished panels are cut in the field, or where any of the factory applied coverings or coatings are abraded or damaged in handling or installation, they must, after necessary repairs have been made with material of the same color as the weather coating, be approved before being installed. Seal completely openings through panels. Correct defects or errors in the materials. Replace materials which cannot be corrected in an approved manner with nondefective materials. Provide molded closure strips where indicated and where necessary to provide weathertight construction. Use shims as required to ensure attachment clip line is true. Use a spacing gage at each row of panels to ensure that panel width is not stretched or shortened. [Provide one layer of asphalt-saturated felt placed perpendicular to roof slope, covered by one layer of rosin-sized building paper placed parallel to roof slope with side laps down slope and attached with roofing nails. Overlap side and end laps 3 inches, offset seams in building paper with seams in felt.]

3.3.1 Roof Panels

Apply roofing panels with the standing seams parallel to the slope of the roof. Provide roofing panels in longest practical lengths from ridge to eaves (top to eaves on shed roofs), with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys, and similar openings. Install flashing to assure positive water drainage away from roof penetrations. Locate panel end laps such that fasteners do not engage supports or otherwise restrain the longitudinal thermal movement of panels. Form field-formed seam type system seams in the field with an automatic mechanical seamer approved by the manufacturer. Attach panels to the structure with concealed clips incorporated into panel seams. Clip attachment must allow roof to move independently of the structure, except at fixed points as indicated.

3.3.2 Insulation Installation

Install between covering and supporting members to present a neat appearance. Fold and staple [and tape] seams unless approved otherwise by the Contracting Officer.

3.3.2.1 Rigid or Semi-Rigid Insulation

Install in areas where insulation is exposed to view. Fasten securely without loose joints or unsightly sags.

3.3.2.2 Blanket Insulation

May be used in concealed locations. Lap facing at joints and fasten in a manner that will provide tight joints.

3.3.3 Flashings

Provide flashing, related closures and accessories as indicated and as necessary to provide a weathertight installation. Install flashing to ensure positive water drainage away from roof penetrations. Flash and seal the roof at the ridge, eaves and rakes, and projections through the roof. Place closure strips, flashing, and sealing material in an approved manner that will assure complete weathertightness. Details of installation which are not indicated must be in accordance with the SMACNA 1793, panel manufacturer's approved printed instructions and details, or the approved shop drawings. Allow for expansion and contraction of flashing.

3.3.4 Flashing Fasteners

Fastener spacings must be in accordance with the panel manufacturer's recommendations and as necessary to withstand the design loads indicated. Install fasteners in roof valleys as recommended by the manufacturer of

the panels. Install fasteners in straight lines within a tolerance of 1/2 inch in the length of a bay. Drive exposed penetrating type fasteners normal to the surface and to a uniform depth to seat gasketed washers properly and drive so as not to damage factory applied coating. Exercise extreme care in drilling pilot holes for fastenings to keep drills perpendicular and centered. Do not drill through sealant tape. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Torque used in applying fasteners must not exceed that recommended by the manufacturer. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.

3.3.5 Rib and Ridge Closure/Closure Strips

Set closure/closure strips in joint sealant material and apply sealant to mating surfaces prior to adding panel.

3.4 PROTECTION OF APPLIED ROOFING

Do not permit storing, walking, wheeling, and trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to indicated live load limits of roof construction.

3.5 CLEANING

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces must be free of dents, creases, waves, scratch marks, solder or weld marks and damage to the finish coating.

3.6 MANUFACTURER'S FIELD INSPECTION

Manufacturer's technical representative must visit the site as necessary during the installation process to assure panels, flashings, and other components are being installed in a satisfactory manner. Manufacturer's technical representative must perform a field inspection during the first 20 squares of roof panel installation and at substantial completion prior to issuance of warranty, as a minimum, and as otherwise requested by the Contracting Officer. Additional inspections must not exceed one for 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors must be performed as requested by the Contracting Officer. Each inspection visit must include a review of the entire installation to date. After each inspection, submit a report, signed by the manufacturer's technical representative, to the Contracting Officer noting the overall quality of work, deficiencies and any other concerns, and recommended corrective actions in detail. Notify Contracting Officer a minimum of 2 working days prior to site visit by manufacturer's technical representative.

3.7 COMPLETED WORK

Completed work must be plumb and true without oil canning, dents, ripples, abrasion, rust, staining, or other damage detrimental to the performance or aesthetics of the completed roof assembly.

3.8 INFORMATION CARD

For each roof, provide a typewritten card, laminated in plastic and framed for interior display or a photoengraved 0.032 inch thick aluminum card for exterior display. Card to be 8 1/2 by 11 inches minimum and contain the information listed on Form 1 at end of this section. Install card near point of access to roof, or where indicated.

3.9 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of English unit measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The English and metric units for the measurements shown are as follows:

PRODUCTS	ENGLISH UNITS	METRIC UNITS
a. Steel sheets	0.023 inch	0.6 mm
	0.030 inch	0.8 mm
b. Gasket washers	3/8 inch	10 mm
	1/8 inch	3 mm
c. Screws	No. 14	4.75 mm
	No. 12	4 mm
d. Bolts	1/4 inch	6 mm
e. Studs	3/16 inch	5 mm
f. Fasteners	0.145 inch by 1/2 inch	4 mm by 13 mm
	One inch	25 mm
g. Rivets	1/8 inch	3 mm

3.10 FORM ONE

FORM 1 - PREFORMED STEEL STANDING SEAM ROOFING SYSTEM COMPONENTS

1. Contract Number:
2. Building Number & Location:
3. NAVFAC Specification Number:
4. Deck/Substrate Type:
5. Slopes of Deck/Roof Structure:
6. Insulation Type & Thickness:
7. Insulation Manufacturer:
8. Vapor Retarder: ( )Yes ( )No
9. Vapor Retarder Type:
10. Preformed Steel Standing Seam Roofing Description:
a. Manufacturer (Name, Address, & Phone No.):
b. Product Name: c. Width: d. Gage:
e. Base Metal: f. Method of Attachment:
11. Repair of Color Coating:
a. Coating Manufacturer (Name, Address & Phone No.):
b. Product Name:
c. Surface Preparation:
d. Recoating Formula:

e. Application Method:

12. Statement of Compliance or Exception:_____

_____

_____

13. Date Roof Completed:

14. Warranty Period: From_____

15. Roofing Contractor (Name & Address):

16. Prime Contractor (Name & Address):

To_____

Contractor's Signature_____ Date:

Inspector's Signature _____

-- End of Section –

********** USACE / NAVFAC / AFCEC / NASA UFGS-07 61 15.00 20 (August 2016)

Preparing Activity: NAVFAC **Superseding UFGS-07 61 15.00 20 (May 2011)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2018

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ALUMINUM STANDING SEAM
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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.

ALUMINUM ASSOCIATION (AA)

AA ADM	(2015) Aluminum Design Manual
AA ASM-35	(2000) Specifications for Aluminum Sheet Metal Work in Building Construction, Construction Manual Series Section 5

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN WOOD COUNCIL (AWC)

AWC NDS	(2015) National Design Specification (NDS) for Wood Construction

ASTM INTERNATIONAL (ASTM)

ASTM B117	(2016) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM D1654	(2008; R 2016; E 2017) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D2247	(2015) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D2565	(2016) Standard Practice for Xenon Arc Exposure of Plastics Intended for Outdoor Applications

ASTM D4214	(2007; R 2015) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D522/D522M	(2014) Mandrel Bend Test of Attached Organic Coatings
ASTM D523	(2014) Standard Test Method for Specular Gloss
ASTM D714	(2002; R 2017) Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D968	(2017) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E1592	(2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E330/E330M	(2014) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E84	(2018) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G152	(2013) Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	(2013) Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA CONDET	(2014) Construction Details Manual

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

1.2 DEFINITIONS

1.2.1 Field-Formed Seam

Seams of panels so configured that when adjacent sheets are installed the seam is sealed utilizing mechanical or hand seamers. Crimped (45 degree bend), roll formed (180 degree bend), double roll formed (2 - 180 degree bend), and roll and lock systems are types of field-formed seam systems.

1.2.2 Snap Together Seam

Panels so configured that the male and female portions of the seam interlock through the application of foot pressure or tamping with a mallet. Snap-on cap configurations are a type of snap together system.

1.2.3 Pre-Formed

Formed to the final, less field-formed seam, profile and configuration in the factory.

1.2.4 Field-Formed

Formed to the final, less field-formed seam, profile and configuration at the site of work prior to installation.

1.2.5 Roofing System

The roofing system is defined as the assembly of roofing components, including roofing panels, flashing, fasteners, and accessories which, when assembled properly result in a watertight installation.

1.2.6 SSMRS

Standing Seam Metal Roof System (SSMRS) is abbreviation of the entire roof system specified herein with all components and parts coming from a single manufacturer's system.

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements

a. Provide continuous length panels with no joints or seams, except where indicated. Individual panels must be removable for replacement of damaged material.

b. There must be no exposed or penetrating fasteners except where shown on the approved shop drawings. Fasteners into wood must be stainless steel sheet metal screws with full length threads. Fasteners into steel must be stainless steel or cadmium plated stainless steel screws inserted into predrilled holes. Length and diameter of screws must be sufficient to meet the design loads with a suitable factor of safety for the material to which the roofing components are attached. Calculate fastener capacity in accordance with AISI SG03-3, AA ADM or AWC NDS as applicable.

c. Roof panel standing seam must include a capillary break and be mechanically locked closed by the manufacturer's locking tool. The seam must include a continuous sealant when required by the manufacturer to withstand the rainfall and wind specified in paragraph MANUFACTURER'S REQUIREMENTS.

d. Roof panel anchor clips must be concealed and designed to allow for thermal movement of the panels, except where specific fixed points are indicated.

e. The system must resist the positive and negative loads specified herein in accordance with "Sheet Building Sheathing Design Guide" of the AA ADM. Determine capacity in accordance with principles of ASTM E330 modified as follows:

(1) Test panels must be production material of the type proposed for use. Use either full

length or partial length panels with attachment representative of the main part of the roof.

(2) Test specimens must be five panels wide, span one or more supports, and must have no end or edge attachment or seals that will restrict crosswise movement of the panels under load. Do not bridge longitudinal seams with tape or film that can restrict separation.

(3) Test panels to failure. Report load at failure.

f. Panels must support walking loads without excessive distortion or telegraphing of the structural supports. Panels must support a 250 pound load concentrated on a 4 square inch area at the center of the panel without buckling or permanent distortion.

1.3.2 Performance Requirements

1.3.2.1 Wind Loads

Resistance to wind uplift generated by winds of 124 mph. The roof system and attachments must resist the following wind loads (kPapsf) with a factor of safety appropriate for the material holding the anchor:

	Positive	Negative
At eaves	[_____]	[_____]
At rakes	[_____]	[_____]
At ridge	[_____]	[_____]
At building corners	[_____]	[_____]
At central areas	[_____]	[_____]

1.3.2.2 Resistance to Water Infiltration

Roofing system must show no infiltration at seams, edges, flashings, counter flashings and penetrations when subjected to a rainfall of 5 inches per hour with 124 mph wind.

1.3.2.3 Thermal Movement

The system must be capable of withstanding thermal movement based on a temperature range of 10 degrees F below design low air temperature and 140 degrees F for mill finish and light colors. 180 degrees F for dark colors.

1.3.2.4 Deflection

Panel deflection must not exceed L/140.

1.3.2.5 Structural Performance

The structural performance test methods and requirements must be in accordance with ASTM E1592.

1.4 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roofing Panels;

Submit drawings as necessary to supplement the instructions and diagrams. Include design and erection drawings containing an isometric view of the roof showing the design uplift pressures and dimensions of edge, ridge and corner zones. Show typical and special conditions including flashings, accessory installation, materials and thicknesses, all dimensions, anchoring methods, sealant locations, sealant tape locations, fastener layout, sizes, spacing, provisions for thermal movement, terminations, penetrations, and attachments. Details of installation must be in accordance with the manufacturer's Standard Instructions and details or the SMACNA 1793. The manufacturer's technical engineering department must approve the drawings before they are submitted.

SD-03 Product Data

Roofing Panels; G
Attachment Clips
Closures
Accessories
Underlayment
Sample Warranty Certificate;

Submit for all materials to be provided. Submit data sufficient to indicate conformance to specified requirements.

SD-04 Samples

Roofing Panels
Submit a 12 inch long section of typical panel in color specified, in color selected.
When colors are not indicated, submit samples of not less than six different manufacturer's standard colors for selection.
Accessories
Submit each type of accessory item used in the project including, but not limited to: each type of anchor clip, closures, fasteners and leg clamps.

SD-05 Design Data

Load Calculations; G _____

SD-06 Test Reports
Structural Performance; G _____
Panel Finish; G
Submit reports of the tests required by this section.
Manufacturer's Field Inspection; G
Submit manufacturer's technical representative's inspection reports as required in paragraph MANUFACTURER'S FIELD INSPECTION.

SD-07 Certificates

Technical Representative Qualification of Installer
Submit documentation proving the installer is factory-trained, has the specified experience and is authorized by the manufacturer to install the products specified.

Coil Stock Compatibility; G

Provide certification of coil compatibility with roll forming machinery to be used for forming panels without warping, waviness, and rippling not part of panel profile; to be done without damage, abrasion or marking of finish coating.

SD-08 Manufacturer's Instructions

Sealant

Submit manufacturer's sealant requirements for roofing.

Installation Manual; G

Submit manufacturer's printed installation manual/instructions and standard details.

SD-11 Closeout Submittals

Information Card

For each roofing installation, submit a typewritten card or photoengraved aluminum card containing the information listed on Form 1 located at the end of this section.

Warranty

1.5 LOAD CALCULATIONS

Submit load calculations for the following by a structural engineer registered as a Professional Engineer in any jurisdiction verifying that the system supplied meets the design loads indicated. Coordinate calculations with manufacturer's test results.

a. Wind load uplift design pressure at roof locations specified in paragraph WIND LOADS.
b. Clip spacing and allowable load per clip calculations.
c. The fastening of clips to structure or intermediate support spacing.
d. Intermediate support spacing and fastening to structure when required.
e. Allowable panel span at anchorage spacing indicated.
f. Safety factor used in determining loading.

1.6 QUALITY ASSURANCE

1.6.1 Preroofing Conference

After submittals are received and approved but before roofing and insulation work, including associated work, is preformed, the Contracting Officer Representative will hold a preroofing conference to review the following:

a. The drawings and specifications

b. Procedure for onsite inspection and acceptance of the roofing substrate and pertinent structural details relating to the roofing system

c. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing

d. Safety requirements.

The preroofing conference must be attended by the Contractor and personnel directly responsible for the roofing and insulation installation, mechanical and electrical work, and the roofing manufacturer's technical representative. Conflicts among those attending the preroofing conference must be resolved and confirmed in writing before roofing work, including associated work, is begun. Prepare written minutes of the preroofing conference and submit to the Contracting Officer.

1.6.2 Manufacturer's Technical Representative

The representative must have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and with installations in the geographical area where construction will take place. The manufacturer's representative must be an employee of the manufacturer with at least 5 years' experience in installing the roof system. The representative must be available to perform field inspections and attend meetings as required herein, and as requested by the Contracting Officer.

1.6.3 Qualification of Installer

The roofing system installer must be factory-trained, approved by the aluminum roofing system manufacturer to install the system, and must have a minimum of three years' experience as an approved applicator with that manufacturer. The applicator must have applied five installations of similar size and scope to this project within the previous 3 years.

1.6.4 Single Source

Provide roofing panels, clips, closures and other accessories from a single manufacturer.

1.6.5 Manufacturer

The SSMRS must be the product of an aluminum roofing industry recognized SSMRS manufacturer who has been in the practice of manufacturing SSMRS for a period of not less than 5 years and who has been involved in at least 5 projects similar in size and complexity to this project.

1.6.6 Laboratory Tests For Panel Finish

Previously manufactured panels of the same type and finish as proposed for the project must have been tested by an approved testing laboratory to ensure conformance to specifications. The term "appearance of base metal" refers to the aluminum base metal. Panels must meet the following test requirements.

1.6.6.1 Salt Spray Test

Panels must withstand a salt spray test for a minimum of 1000 hours in accordance with ASTM B117, including the scribe requirement in the test. Immediately upon removal of the panel from the test, coating must receive a rating of 10, no blistering, as determined by ASTM D714; and a rating of 7, 1/16 inch failure at scribe, as determined by ASTM D1654, Rating Schedule No. 1.

1.6.6.2 Formability Test

For formability test, when subjected to a 180 degree bend over a 1/8 inch diameter mandrel in accordance with ASTM D522, exterior coating film must show only microchecking of the exterior film and there must be no loss of adhesion.

1.6.6.3 Accelerated Weathering Test

Panels must withstand an accelerated weathering test for a minimum of 2000 hours in accordance with ASTM G152, ASTM G153 or ASTM D2565 without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with a penknife blade or similar instrument will be considered to indicate loss of adhesion.

1.6.6.4 Chalking Resistance

After the 2000-hour weatherometer test, exterior coating may not chalk greater than No. 8 rating when measured in accordance with ASTM D4214 test procedures.

1.6.6.5 Abrasion Resistance Test for Color Coating

When subjected to the falling sand test in accordance with ASTM D968, coating system must withstand a minimum of 100 liters of sand per 0.025 mm (mil) of coating thickness before appearance of base metal.

1.6.6.6 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D2247 for 1000 hours, a scored panel must show no signs of blistering, cracking, creepage, or corrosion.

1.6.6.7 Fire Hazard

The finish on factory-fabricated panels must have a flame spread rating of not more than 75 when tested in accordance with ASTM E84.

1.6.6.8 Gloss

The gloss of the finish must be 30 plus or minus 5 at an angle of 60 degrees, when measured in accordance with ASTM D523.

1.6.6.9 Glare Resistance

Surfaces of panels that will be exposed to the exterior must have a specular reflectance of not more than 10 when measured in accordance with ASTM D523 at an angle of 85 degrees. Requirements specified under FORMABILITY TEST will be waived if necessary to conform to this requirement.

1.7 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle preformed panels, bulk roofing products and other manufactured items in a manner to prevent damage or deformation.

1.7.1 Delivery

Provide adequate packaging to protect materials during shipment. Do not uncrate materials until ready for use except for inspection. Immediately upon arrival of materials at jobsite, inspect materials for damage, dampness, and staining. Replace damaged or permanently stained materials that cannot be restored to like-new condition with new material. If materials are wet, remove moisture, restack and protect panels until used.

1.7.2 Handling

Handle material carefully to avoid damage to surfaces, edges and ends.

1.7.3 Storage

Stack materials stored on the site on platforms or pallets and cover with tarpaulins or other suitable weathertight coverings which prevent water trapping or condensation. Store panels so that water which might have accumulated during transit or storage will drain off. Do not store the panels in contact with materials that might cause staining, such as mud, lime, cement, fresh concrete or chemicals. Protect stored panels from wind damage.

1.8 WARRANTY

Furnish manufacturer's no dollar limit materials and workmanship warranty for the roofing system. The warranty period must be not less than 20 years from the date of Government acceptance of the work. Issue the warranty directly to the Government. The warranty must provide that if within the warranty period the

aluminum roofing system becomes non-watertight or shows evidence of corrosion, perforation, peeling paint, rupture or excess weathering due to deterioration of the roofing system resulting from defective materials or workmanship the repair or replacement of the defective materials and correction of the defective workmanship must be the responsibility of the roofing system manufacturer. Repairs that become necessary because of defective materials and workmanship while roofing is under warranty must be performed within 7 days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time will constitute grounds for having the repairs performed by others and the cost billed to the manufacturer. In addition, provide a 2 year contractor installation warranty.

PART 2 PRODUCTS

2.1 PRODUCT SUSTAINABILITY CRITERIA

For products in this section, where applicable and to extent allowed by performance criteria, provide and document the following:

2.1.1 Energy Efficient Aluminum Roofing Products

Energy Star Label requirement is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph ENERGY EFFICIENT EQUIPMENT.

2.1.2 Recycled Content of Aluminum Roofing Products

Recycled content is identified for some products in this section; provide documentation in accordance with Section 01 33 29 SUSTAINABILITY REPORTING paragraph RECYCLED CONTENT.

2.2 ROOFING PANELS

2.2.1 Material

3004 aluminum, ASTM B209. Aluminum roofing materials must contain a minimum of 30 percent total recycled content. Provide data identifying percentage of recycled content of aluminum roofing products.

Provide aluminum roofing product that is Energy Star labeled. Provide data identifying Energy Star label for aluminum roofing product. Provide solar reflectance product with an initial solar reflectance greater than or equal to 0.25 and a solar reflectance greater than or equal to 0.15 three years after installation under normal conditions.

2.2.1.1 Thickness

0.040 inch minimum.

2.2.1.2 Finish

Alclad fluorocarbon baked enamel exterior and neutral washcoat interior.

2.2.1.3 Texture

Stucco embossed, smooth, or Smooth with raised intermediate ribs for added stiffness depending upon the requirements outlined in the statement of work for the task order.

2.2.1.4 Color

Color as selected by the Government from the manufacturer's standard colors.

2.2.1.5 Configuration

Provide panels of continuous lengths from ridge to eaves or from top to eaves on shed roof designs. Panels must be a minimum of 12 inches wide with a minimum 2.0 inch high vertical legs and two 0.37 inch stiffening ribs at 4 inches on center between the legs to minimize oil-canning and telegraphing of structural members. Leading vertical leg must have a continuous groove in the rib top for anti-siphon protection when hook-rib top of next panel is locked over leading vertical leg to form the standing seam. Panels from coil stock must be formed without warping, waviness or ripples not a part of the panel profile, and must be free of damage to the finish coating system.

2.2.1.6 Prefinished Coating System

Fluorocarbon baked enamel, factory-applied, minimum total dry film nominal thickness of 2.0 mils, and conforming to test requirements specified herein. Provide prefinished coating system on the exterior face. Interior face must receive same coating system, or, at the manufacturer's option, receive a coat of acrylic wash coat applied to a minimum total dry film nominal thickness of 0.20 mil.

2.3 ATTACHMENT CLIPS

Series 300 non-magnetic stainless steel.

a. Type 1: [_____] clip, minimum capacity [_____] lbs.

b. Type 2: [_____] clip, minimum capacity [_____] lbs.

c. Type 3: [_____] clip, minimum capacity [_____] lbs.

2.4 ACCESSORIES

Sheet metal flashings, trim, moldings, closure strips, caps, preformed crickets, equipment curbs, gutters, down spouts, and other similar sheet aluminum accessories provided in conjunction with preformed aluminum panels must be of the same material and finish as panels, except that such items which will be concealed after installation may be provided without the finish if they are aluminum or stainless steel. Provide ridge and rib closures, as specified. Aluminum must be of thickness not less than that of panels. Molded closure strips must be closed-cell synthetic rubber, neoprene, or polyvinyl chloride premolded to match configurations of preformed aluminum panels. Thermal spacer blocks and other thermal barriers at concealed fasteners must be as recommended by the roofing panel manufacturer.

2.4.1 Closures

2.4.1.1 Ridge Closure

Aluminum-clad foam or aluminum closure with foam secondary closure matching panel configuration for installation on surface of roof panel between panel ribs at ridge and headwall roof panel flashing conditions and terminations. Foam material must not absorb water.

2.4.1.2 Rib Closure

Aluminum, closed-cell or solid-cell synthetic rubber, neoprene or polyvinyl chloride pre-molded to match configuration of rib opening. Material for closures must not absorb water.

2.4.2 Fasteners

Series 300 stainless steel with composite metal and neoprene composition washers. Fasteners for attachment to structural supports and fasteners for attachment of panels must be as approved and in accordance with

manufacturer's recommendation. Unless specified otherwise herein, fasteners must be either self-tapping screws, bolts and nuts, or self-locking bolts. Design fastening system to withstand design loads indicated. Fasteners must not be over-torqued and must develop full capacity of attachment clips.

2.4.2.1 Screws

Provide not less than No. 14 diameter for self-tapping type and not less than No. 12 diameter for self-drilling and self-tapping.

2.4.2.2 Bolts

Provide not less than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.4.2.3 Automatic End-Welded Studs

Provide shouldered type with a shank diameter of not less than 3/16 inch and cap or nut for holding covering against the shoulder.

2.4.2.4 Explosive Driven Fasteners

Provide fasteners to be driven with explosive actuated tools and with a shank diameter of not less than 1/2 inch for fastening to steel and not less than 1 inch for fastening to concrete.

2.4.2.5 Rivets

Blind rivets must be aluminum with 3/16 inch nominal diameter shank or stainless steel with 1/8 inch nominal diameter shank. Rivets must be threaded stem type if used for other than fastening trim. Rivets with hollow stems must have closed ends.

2.4.3 Sealant

Elastomeric type containing no oil or asphalt. Exposed sealant must cure to a rubberlike consistency. Concealed sealant must be the non-hardening type. Seam sealant must be factory-applied, non-skinning, non-drying, and must conform to the roofing manufacturer's recommendations. Do not use silicone-based sealants in contact with finished metal panels and components unless approved otherwise by the Contracting Officer.

2.4.4 Sealant Tape

Polyvinyl chloride closed cell foam tape or composed of 99 percent solids in a base of butyl polyisobutylene rubber with the following properties and characteristics:

a. Webbing and Elongation: 100 percent minimum at 25 degrees C 77 degrees F

b. Adhesion: Excellent to surfaces used

c. U-V light exposure: No effect

d. Ozone: No effect

e. Weathering: 1000 hours in QUV Test Apparatus - Excellent, no cracking, bleeding, or significant changes.

f. Moisture Transmission: 0.05 to 0.15 grams per 100 square inches in 24 hours.

g. Service Temperature Tests: Bending over 1/2 inch mandrel at minus 60 degrees F

with no cracking. Expose sealed typical metal lap joint to plus 350 degrees F for 24 hours with no significant loss of original properties.

h. Reaction to Metals: Non-corrosive to aluminum

2.5 UNDERLAYMENT FOR WOOD SUBSTRATES

Provide underlayment ASTM D226, Type I perforated, covered by water-resistant rosin sized building paper.

2.6 LINER PANELS

Fabricate liner panels of the same material as roof panels, and formed or patterned to prevent waviness and distortion. Liner panels must have a factory applied, one mil thick minimum painted coating on the inside face, and a prime coat on the liner side.

PART 3 EXECUTION

3.1 EXAMINATION

Do not use building construction materials that show visible evidence of biological growth. Examine surfaces to receive standing seam aluminum roofing and flashing. Provide plumb and true surfaces, clean, even, smooth and as dry as possible. Ensure that surfaces are free from defects and projections which might affect the installation. Report unsuitable conditions to Contracting Officer.

3.2 PROTECTION OF DISSIMILAR METALS

Where an aluminum component is in contact with, fastened to, or contacted by drainage from dissimilar metals other than stainless steel, give such dissimilar metals one of the following treatments:

a. A heavy brush coat of primer followed by two coats of aluminum metal and masonry paint.

b. A heavy coat of alkali-resistant bituminous paint.

c. Separate contact surfaces with non-absorptive tape or gasket.

3.2.1 Contact with Masonry

Where aluminum is in contact with masonry, concrete, or plaster, apply a heavy coat of alkali-resistant bituminous paint.

3.2.2 Contact with Wood

Where aluminum is in contact with wood or other absorptive material subject to wetting, or with wood treated with a preservative not compatible with aluminum, seal joints with sealing compound and apply one heavy brush coat of aluminum pigmented bituminous paint.

3.3 INSTALLATION

Install in accordance with approved manufacturer's erection instructions shop drawings, and diagrams, except as specified otherwise herein. Provide panels in full and firm contact with clips. Obtain approval prior to installation on prefinished panels cut in the field, and factory applied coverings or coatings that were repaired after being abraded or damaged during handling or installation. Make repairs with material of same color as weather coating. Completely seal openings through panels. Correct defects or errors in materials in an approved manner. Replace materials which cannot be corrected in an approved manner with new materials. Provide molded closure strips where indicated and where necessary for weathertight construction. Use shims

as required to ensure clip line is true. Use a spacing gage at each row of panels to ensure that panel width is not stretched or shortened. Provide one layer of asphalt-saturated felt placed perpendicular to roof slope covered by one layer of rosin-sized building paper placed parallel to roof slope with side laps down slope and attached with roofing nails. Overlap side end laps 3 inches, offset seams in building paper with seams in felt.

3.3.1 Roof Panels

Apply roofing panels with standing seams parallel to slope of roof. Provide roofing panels in full lengths from ridge to eaves (top to eaves on shed roofs), with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys, and similar openings. Form interlocking rib type panel seams in the field with an automatic mechanical seamer approved by the manufacturer. Attach panels to structure with concealed clips which are incorporated into the panel seams. Clip attachment must allow roof to move freely and independently of the structure, except at fixed points as indicated.

3.3.2 Flashings

Provide flashing and related closures and accessories in connection with preformed metal panels as indicated and as necessary to provide a weathertight installation. Install flashing to ensure positive water drainage away from roof penetrations. Flash and seal roof at ridge, eaves and rakes, at projections through roof, and elsewhere as necessary. Accomplish placement of closure strips, flashing, and sealing material in an approved manner that will ensure complete weather tightness. Details of installation which are not indicated must be in accordance with the NRCA CONDET, SMACNA 1793, AA ASM-35, panel manufacturer's printed instructions and details of the approved shop drawings. Installation must allow for expansion and contraction of flashing.

3.3.3 Flashing Fasteners

Fastener spacing must be in accordance with the panel manufacturer's recommendations and as necessary to withstand the indicated design loads. Install fasteners in roof valleys as recommended by the manufacturer of the panels. Install fasteners in straight lines within a tolerance of 1/2 inch in the length of a bay. Drive exposed penetrating type fasteners normal to the surface and to a uniform depth to seat gasketed washers properly and drive so as not to damage factory applied coating. Exercise extreme care in drilling pilot holes for fastenings to keep drills perpendicular and centered. Do not drill through sealant tapes. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Torque used in applying fasteners must not exceed that recommended by the manufacturer. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.

3.3.4 Closure/Closure Strips

Set closure/closure strips in joint sealant material.

3.4 CLEANING

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs on completion to prevent discoloration and harm to the panels and flashing. Remove grease and oil films, excess sealants handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces must be free of dents, creases, waves, scratch marks, and solder or weld marks.

3.5 MANUFACTURER'S FIELD INSPECTION

Manufacturer's technical representative must visit the site as necessary during the installation process to assure panels, flashings, and other components are being installed in a satisfactory manner. Manufacturer's technical representative must perform a field inspection during the first 20 squares of roof panel installation and at substantial completion prior to issuance of warranty, as a minimum, and as otherwise requested by the Contracting Officer. Additional inspections must not exceed one for each 100 squares of total roof area with

the exception that follow-up inspections of previously noted deficiencies or application errors must be performed as requested by the Contracting Officer. Each inspection visit must include a review of the entire installation to date. After each inspection, submit a report, signed by the manufacturer's technical representative, to the Contracting Officer noting the overall quality of work, deficiencies and any other concerns, and recommended corrective actions in detail. Notify Contracting Officer a minimum of 2 working days prior to site visit by manufacturer's technical representative.

3.6 COMPLETED WORK

Completed work must be plumb and true without oil canning, dents, ripples, abrasion, rust, staining, or other damage detrimental to the performance or aesthetics of the completed roof assembly.

3.7 INFORMATION CARD

For each roof, provide a typewritten card, laminated in plastic and framed for interior display or a photoengraved 0.032 inch thick aluminum card for exterior display. Card to be 8 1/2 by 11 inches minimum and contain the information listed on Form 1 at end of this section. Install card near point of access to roof, or where indicated.

3.8 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of English unit measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The English and metric units for the measurements shown are as follows:

PRODUCTS	ENGLISH UNITS	METRIC UNITS
a. Sheet Aluminum	0.040 inch	1.0 mm
b. Panels	12 inches	300 mm
- vertical legs	2 inches	50 mm
- stiffening ribs	4 inches	100 mm
c. Screws	No. 14	0.242 mm
	No. 12	0.216 mm
d. Bolts	1/4 inch	6 mm
e. Studs	3/16 inch	5 mm
f. Fasteners	1/2 inch	13 mm
	One inch	25 mm
g. Rivets	1/16 inch	5 mm
	1/8 inch	3 mm

3.9 FORM ONE

FORM 1 - PREFORMED STEEL STANDING SEAM ROOFING SYSTEM COMPONENTS

1. Contract Number:
2. Building Number & Location:
3. NAVFAC Specification Number:
4. Deck/Substrate Type:
5. Slopes of Deck/Roof Structure:
6. Insulation Type & Thickness:
7. Insulation Manufacturer:
8. Vapor Retarder: ( )Yes ( )No
9. Vapor Retarder Type:
10. Preformed Steel Standing Seam Roofing Description:
a. Manufacturer (Name, Address, & Phone No.):
b. Product Name: c. Width: d. Gage:
e. Base Metal: f. Method of Attachment:

11. Repair of Color Coating:
a. Coating Manufacturer (Name, Address & Phone No.):
b. Product Name:
c. Surface Preparation:
d. Recoating Formula:
e. Application Method:

12. Statement of Compliance or Exception:_____
_____
_____

13. Date Roof Completed:
14. Warranty Period: From_____
15. Roofing Contractor (Name & Address):
16. Prime Contractor (Name & Address):

Contractor's Signature_____ Date:

Inspector's Signature _____

-- End of Section --

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USACE / NAVFAC / AFCEC / NASA **UFGS-26 41 00 (November 2013)**

Preparing Activity: NAVFAC **Superseding**
UFGS-26 41 01.00 10 (November 2008)
UFGS-26 41 00.00 20 (April 2006) UNIFIED

FACILITIES GUIDE SPECIFICATIONS
References are in agreement with UMRL dated April 2018

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26 41 00
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SYSTEM

11/13

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SECTION 26 41 00
LIGHTNING PROTECTION SYSTEM
11/13

PART 1 GENERAL

1.1 REFERENCES

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

U.S. AIR FORCE (USAF)

AFI 32-1065	(1998) Grounding Systems

UNDERWRITERS LABORATORIES (UL)

UL 467	(2013; Reprint Jun 2017) UL Standard for Safety Grounding and Bonding Equipment
UL 96	(2016a) UL Standard for Safety Lightning Protection Components
UL Electrical Construction Directory	(2012) Electrical Construction Equipment

1.2 RELATED REQUIREMENTS

1.2.1 Verification of Dimensions

Confirm all details of work, verify all dimensions in field, and advise Contracting Officer of any discrepancy before performing work. Obtain prior approval of Contracting Officer before making any departures from the design.

1.2.2 System Requirements

Provide a system furnished under this specification consisting of the latest UL Listed products of a manufacturer regularly engaged in production of lightning protection system components. Comply with NFPA 70, NFPA 780, and UL 96.

1.2.3 Lightning Protection System Installers Documentation

Provide documentation showing that the installer is certified with a commercial third-party inspection company whose sole work is lightning protection, or is a UL Listed Lightning Protection Installer. In either case, the documentation must show that they have completed and passed the requirements for certification or listing, and have a minimum of 2 years documented experience installing lightning protection systems for DoD projects of similar scope and complexity.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Overall lightning protection system;
Each major component;

SD-06 Test Reports

Lightning Protection and Grounding System Test Plan;
Lightning Protection and Grounding System Test;
SD-07 Certificates

Lightning Protection System Installers Documentation;
Component UL Listed and Labeled;
Lightning protection system inspection certificate;
Roof manufacturer's warranty; G

1.4 QUALITY ASSURANCE

In each standard referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" or "must" has been substituted for "should" wherever it appears. Interpret references in these standards to "authority having jurisdiction," or words of similar meaning, to mean Contracting Officer.

1.4.1 Installation Drawings

1.4.1.1 Overall System Drawing

Submit installation shop drawing for the overall lightning protection system. Include on the drawings the physical layout of the equipment (plan view and elevations), mounting details, relationship to other parts of the work, and wiring diagrams.

1.4.1.2 Major Components

Submit detail drawings for each major component including manufacturer's descriptive and technical literature, catalog cuts, and installation instructions.

1.4.2 Component UL Listed and Labeled

Submit proof of compliance that components are UL Listed and Labeled. Listing alone in UL Electrical Construction, which is the UL Electrical Construction Directory, is not acceptable evidence. In lieu of Listed and Labeled, submit written certificate from an approved, nationally recognized testing organization equipped to perform such services, stating that items have been tested and conform to requirements and testing methods of Underwriters Laboratories.

1.4.3 Lightning Protection and Grounding System Test Plan

Provide a lightning protection and grounding system test plan. Detail both the visual inspection and electrical testing of the system and components in the test plan. Identify (number) the system test points/locations along with a listing or description of the item to be tested and the type of test to be conducted. As a minimum, include a sketch of the facility and surrounding lightning protection system as part of the specific test plan for each structure. Include the requirements specified in paragraph, "Testing of Integral Lightning Protection System" in the test plan.

1.4.4 Lightning Protection System Inspection Certificate

Provide certification from a commercial third-party inspection company whose sole work is lightning protection, stating that the lightning protection system complies with NFPA 780. Third Party

Inspection Company cannot be the system installer or the system designer. Alternatively, provide a UL Lightning Protection Inspection Master Label Certificate for each facility indicating compliance to NFPA 780.

Provide certification from a commercial third-party inspection company whose sole work is lightning protection, stating that the lightning protection system complies with NFPA 780 and AFI 32-1065. Third Party Inspection Company cannot be the system installer or the system designer. Alternatively, provide a UL Lightning Protection Inspection Master Label Certificate for each facility indicating compliance to NFPA 780 and AFI 32-1065. In either case, AFI 32-1065 takes precedence over NFPA 780, whether or not it is more stringent.

Inspection must cover every connection, air terminal, conductor, fastener, accessible grounding point and other components of the lightning protection system to ensure 100% system compliance. This includes witnessing the tests for the resistance measurements for ground rods with test wells, and for continuity measurements for bonds. It also includes verification of proper surge protective devices for power, data and telecommunication systems. Random sampling or partial inspection of a facility is not acceptable.

1.5 SITE CONDITIONS

Confirm all details of work, verify all dimensions in field, and advise Contracting Officer of any discrepancy before performing work. Obtain prior approval of Contracting Officer before changing the design.

PART 2 PRODUCTS

2.1 MATERIALS

Do not use a combination of materials that forms an electrolytic couple of such nature that corrosion is accelerated in the presence of moisture unless moisture is permanently excluded from the junction of such metals. Where unusual conditions exist which would cause corrosion of conductors, provide conductors with protective coatings, such as tin or lead, or oversize conductors. Where a mechanical hazard is involved, increase conductor size to compensate for the hazard or protect conductors. When metallic conduit or tubing is provided, electrically bond conductor to conduit or tubing at the upper and lower ends by clamp type connectors or welds (including exothermic). All lightning protection components, such as bonding plates, air terminals, air terminal supports and braces, chimney bands, clips, connector fittings, and fasteners are to comply with the requirements of UL 96 classes as applicable.

2.1.1 Main and Bonding Conductors

NFPA 780 and UL 96 Class I, Class II, or Class II modified materials as applicable.

2.1.2 Copper Only

Provide copper conductors, except where aluminum conductors are required for connection to aluminum equipment.

2.2 COMPONENTS

2.2.1 Air Terminals

Provide solid air terminals with a blunt tip. Tubular air terminals are not permitted. Support air terminals more than 24 inches in length by suitable brace, supported at not less than one-half the height of the terminal.

2.2.2 Ground Rods

Provide ground rods made of copper-clad steel solid copper conforming to conform to UL 467. Provide ground rods that are not less than 3/4 inch in diameter and 10 feet in length. Do not mix ground rods of copper-clad steel or solid copper on the job.

2.2.3 Grounding Plates

Provide grounding plates made of copper-clad steel, iron, stainless steel, solid copper conforming to UL 96.

2.2.4 Connections and Terminations

Provide connectors for splicing conductors that conform to UL 96, class as applicable. Conductor connections can be made by clamps or welds (including exothermic). Provide style and size connectors required for the installation.

2.2.5 Connector Fittings

Provide connector fittings for "end-to-end", "Tee", or "Y" splices that conform to NFPA 780 and UL 96.

PART 3 EXECUTION

3.1 INTEGRAL SYSTEM

Provide a lightning protection system that meets the requirements of NFPA 780, including tie-ins to existing lightning protection systems. Lightning protection system consists of air terminals, roof conductors, down conductors, ground connections, and grounding electrodes and ground ring electrode conductor. Expose conductors on the structures except where conductors are required to be in protective sleeves. Bond secondary conductors with grounded metallic parts within the building. Make interconnections within side-flash distances at or below the level of the grounded metallic parts.

3.1.1 Roof-Mounted Components

Coordinate with the roofing manufacturer and provide certification that the roof manufacturer's warranty is not violated by the installation methods for air terminals and roof conductors. Components shall be mounted in accordance with the roofing membrane manufacturer’s installation instructions and/or the National Roofing Contractors Association (NRCA) manual and construction details.

3.1.1.1 Air Terminals

Use adhesive shoes with adhesive approved by the roof manufacturer when installing air terminals on "rubber" (EPDM) type roofs. In areas of snow or constant wind, ensure that a section of roofing material (minimum dimensional area of 1 square foot) is first glued to the roof and then the air terminal is glued to it unless the roof manufacturer recommends another solution. Use a standing seam base for installation of air terminals on a standing seam metal roof that does not produce any roof penetrations.

3.1.1.2 Roof Conductors

Use adhesive shoes with adhesive approved by the roof manufacturer when installing roof conductors on "rubber" (EPDM) type roofs. Use a standing seam base for installation of roof conductors on a standing seam metal roof that does not produce any roof penetrations. Roof conductors are to be concealed within the ceiling cavities as much as practicable.

3.1.2 Down Conductors

Protect exposed down conductors from physical damage as required by NFPA 780. Use Schedule 80 PVC to protect down conductors. Paint the Schedule 80 PVC to match the surrounding surface with paint that is approved for use on PVC. Down conductors are to be concealed within the wall cavities.

3.1.3 Ground Connections

Attach each down conductor [and ground ring electrode to ground rods by welding (including exothermic), brazing, or compression. All connections to ground rods below ground level must be by exothermic weld connection or with a high compression connection using a hydraulic or electric compression tool to provide the correct circumferential pressure. Accessible connections above ground level and in test wells can be accomplished by mechanical clamping.

3.1.4 Grounding Electrodes

Extend driven ground rods vertically into the existing undisturbed earth for a distance of not less 10 feet. Set ground rods not less than 3 feet nor more than 8 feet, from the structure foundation, and at least beyond the drip line for the facility. After the completed installation, measure the total resistance to ground using the fall-of-potential method described in IEEE 81. Maximum allowed resistance of a driven ground rod is 25 ohms, under normally dry conditions When a ground ring electrode is not used. Contact the Contracting Officer for direction on how to proceed when two of any three ground rods, driven not less than 10 feet into the ground, a minimum of 10 feet apart, and equally spaced around the perimeter, give a combined value exceeding 50 ohms immediately after having driven. For ground ring electrode, provide continuous No. 1/0 bare stranded copper cable. Lay ground ring electrode around the perimeter of the structure in a trench not less than 3 feet nor more than 8 feet from the nearest point of the structure foundation, and at least beyond the drip line for the facility. Install ground ring electrode to a minimum depth of 30 inches. Install a ground ring electrode in earth undisturbed by excavation, not earth fill, and do not locate beneath roof overhang, or wholly under paved areas or roadways where rainfall cannot penetrate to keep soil moist in the vicinity of the cable.

3.1.5 Grounding Plates

Provide a grounding plate for each down conductor. Set grounding plates not less than 3 feet nor more than 8 feet, from the structure foundation, and at least beyond the drip line for the facility. Grounding plate is to be buried as deeply in the existing dirt as local conditions allow, without exceeding 10 feet in depth.

3.2 APPLICATIONS

3.2.1 Nonmetallic Exterior Walls with Metallic Roof

Bond metal roof sections together which are insulated from each other so that they are electrically continuous, having a surface contact of at least 3 square inches.

3.2.2 Personnel Ramps and Covered Passageways

Place a down conductor and a driven ground at one of the corners where the ramp connects to each building or structure. Connect down conductor and driven ground to the ground ring electrode or nearest ground connection of the building or structure. Where buildings or structures and connecting ramps are clad with metal, separately bond the metal of the buildings and ramps to a down conductor as close to grade as possible.

3.3 INTERFACE WITH OTHER STRUCTURES

3.3.1 Fences

Bond metal fence and gate systems to the lightning protection system whenever the fence or gate is within 6 feet of any part of the lightning protection system in accordance with ANSI C2.

3.3.2 Exterior Overhead Systems

Bond to the nearest down conductor as close to grade as possible. This includes overhead pipes, conduits, cable trays, or any other metallic objects on the exterior of the building that enter a building. In addition, bond pipes, conduits, and cable trays to any metallic objects (such as steel structural support of air handling units or cooling towers) that are within 6 feet.

3.4 RESTORATION

Where sod has been removed, place sod as soon as possible after completing the backfilling. Restore, to original condition, the areas disturbed by trenching, storing of dirt, cable laying, and other work. Overfill to accommodate for settling. Include necessary topsoil, fertilizing, liming, seeding, sodding, sprigging or mulching in any restoration. Maintain disturbed surfaces and replacements until final acceptance.

3.5 FIELD QUALITY CONTROL

3.5.1 Lightning Protection and Grounding System Test

Test the lightning protection and grounding system to ensure continuity is not in excess of 1 ohm and that resistance to ground is not in excess of 25 ohms. Provide documentation for the measured values at each test point. Test the ground rod for resistance to ground before making connections to the rod. Tie the grounding system together and test for resistance to ground. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall. Include in the written report: locations of test points, measured values for continuity and ground resistances, and soil conditions at the time that measurements were made. Submit results of each test to the Contracting Officer.

-- End of Section --

AWARD TASK ORDER INSTRUCTIONS

The Government will issue task orders by selecting the appropriate ITEMS/SUB-ITEMS (CLINs or subCLINs) listed in the attached spreadsheets. An Excel spreadsheet will be attached to each awarded task order to specify which SubCLINs are awarded, quantities, and unit pricing. The task order will define the work to be completed, the price and the bid schedule.

Task orders shall be issued on a firm-fixed-price basis under the terms and conditions of the basic contract. The contractor shall begin performance and complete the work in accordance with the date(s) specified in the order. Occasionally, there may be new or rare items that are not priced out in the spreadsheets but that are called for in the task order SOW. For such items, the contractor may be required to provide additional price backup/justification since they were not evaluated prior to award of the contract. At the discretion of the Contracting Officer, these items may or may not be added permanently to the contract spreadsheets via modification. In rare circumstances and if deemed appropriate by the Contracting Officer, the Government may request a task order cost/price proposal using RS Means Cost Works or via a method that does not utilize the spreadsheet pricing line items.

Section 00 45 00 - Representations and Certifications

CLAUSES INCORPORATED BY FULL TEXT

52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (OCT 2018)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 238160.

(2) The small business size standard is $15,000,000.

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

(b)(1) If the provision at 52.204-7, System for Award Management, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the provision at 52.204-7, System for Award Management, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may
choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by
checking one of the following boxes:

(XX) Paragraph (d) applies.

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

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

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

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

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

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

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $150,000.

(iii) 52.203-18, Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements or Statements--Representation. This provision applies to all solicitations.

(iv) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the provision at 52.204-7, System for Award Management.

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

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

(B) Exceed the simplified acquisition threshold; and

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

(vi) 52.209-2; Prohibition on Contracting with Inverted Domestic Corporations--Representation.

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

(viii) 52.209-11, Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law. This provision applies to all solicitations.

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

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

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

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

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

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

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

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

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

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

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

(xviii) 52.223-22, Public Disclosure of Greenhouse Gas Emissions and Reduction Goals--Representation. This provision applies to solicitations that include the clause at 52.204-7.)

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

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

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

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

(C) If the acquisition value is $50,000 or more but is less than $80,317, the provision with its Alternate II applies.

(D) If the acquisition value is $80,317 or more but is less than $100,000, the provision with its Alternate III applies.

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

(xxii) 52.225-20, Prohibition on Conducting Restricted Business Operations in Sudan--Certification. This provision applies to all solicitations.

(xxiii) 52.225-25, Prohibition on Contracting with Entities Engaging in Certain Activities or Transactions Relating to Iran—Representation and Certification. This provision applies to all solicitations.

(xxiv) 52.226-2, Historically Black College or University and Minority Institution Representation. This provision applies to solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions.

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

[Contracting Officer check as appropriate.]

X (i) 52.204-17, Ownership or Control of Offeror.

X (ii) 52.204-20, Predecessor of Offeror.

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

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

X (v) 52.222-52 Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services--Certification.

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

X (vii) 52.227-6, Royalty Information.

X (A) Basic.

X (B) Alternate I.

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

(d) The Offeror has completed the annual representations and certifications electronically in SAM accessed through https://www.sam.gov. After reviewing the SAM information, the Offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [offeror to insert changes, identifying change by clause number, title, date]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause	Title	Date	Change

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

(End of provision)

52.209-5 CERTIFICATION REGARDING RESPONSIBILITY MATTERS (OCT 2015)

(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 (X) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ( ) have not (X), 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, violating Federal criminal tax laws, or receiving stolen property (if offeror checks “have”, the offeror shall also see 52.209-7, if included in this solicitation); and

(C) Are ( ) are not (X) 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.; and

(D) Have , have not (X), within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds $3,500 for which the liability remains unsatisfied.

(1) Federal taxes are considered delinquent if both of the following criteria apply:

(i) The tax liability is finally determined. The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(ii) The taxpayer is delinquent in making payment. A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(2) Examples. (i) The taxpayer has received a statutory notice of deficiency, under I.R.C. Sec. 6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(ii) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. Sec. 6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(iii) The taxpayer has entered into an installment agreement pursuant to I.R.C. Sec. 6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(iv) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. 362 (the Bankruptcy Code).

(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) Principal, for the purposes of this certification, means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a division or business segment; and similar positions).

(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)

52.209-11 REPRESENTATION BY CORPORATIONS REGARDING DELINQUENT TAX LIABILITY OR A FELONY CONVICTION UNDER ANY FEDERAL LAW (FEB 2016)

(a) As required by sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235), and similar provisions, if contained in subsequent appropriations acts, the Government will not enter into a contract with any corporation that--

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(b) The Offeror represents that--

(1) It is [ ] is not [X] a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and

(2) It is [ ] is not [X] a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (OCT 2014) - ALTERNATE I (SEPT 2015)

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

Economically disadvantaged women-owned small business (EDWOSB) concern means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127. It automatically qualifies as a women-owned small business concern eligible under the WOSB Program.

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 (b) of this provision.

Small disadvantaged business concern, consistent with 13 CFR 124.1002, means a small business concern under the size standard applicable to the acquisition, that--

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by--

(i) One or more socially disadvantaged (as defined at 13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States, and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(2) The management and daily business operations of which are controlled (as defined at 13 CFR 124.106) by individuals who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

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.

Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with 13 CFR part 127), means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States.

(b)(1) The North American Industry Classification System (NAICS) code for this acquisition is 238160--[insert NAICS code].

(2) The small business size standard is $15.0 million.

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

(c) 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 (c)(1) of this provision.] The offeror represents 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 (c)(1) of this provision.] The offeror represents as part of its offer that it [___] is, [___] is not a women-owned small business concern.

(4) Women-owned small business (WOSB) concern eligible under the WOSB Program. [Complete only if the offeror represented itself as a women-owned small business concern in paragraph (c)(3) of this provision.] The offeror represents as part of its offer that--

(i) It [___] is, [___] is not a WOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [___] is, [___] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (c)(4)(i) of this provision is accurate for each WOSB concern eligible under the WOSB Program participating in the joint venture. [The offeror shall enter the name or names of the WOSB concern eligible under the WOSB Program and other small businesses that are participating in the joint venture: ___ --.] Each WOSB concern eligible under the WOSB Program participating in the joint venture shall submit a separate signed copy of the WOSB representation.

(5) Economically disadvantaged women-owned small business (EDWOSB) concern. [Complete only if the offeror represented itself as a women-owned small business concern eligible under the WOSB Program in (c)(4) of this provision.] The offeror represents as part of its offer that--

(i) It [___] is, [___] is not an EDWOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [___] is, [___] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (c)(5)(i) of this provision is accurate for each EDWOSB concern participating in the joint venture. [The offeror shall enter the name or names of the EDWOSB concern and other small businesses that are participating in the joint venture: ___ --.] Each EDWOSB concern participating in the joint venture shall submit a separate signed copy of the EDWOSB representation.

(6) [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents as part of its offer that it [___] is, [___] is not a veteran-owned small business concern.

(7) [Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(6) of this provision.] The offeror represents as part of its offer that it [___] is, [___] is not a service-disabled veteran-owned small business concern.

(8) [Complete only if the offeror represented itself as a small business concern in paragraph (c)(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 changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR Part 126; and

(ii) It [___] is, [___] is not a HUBZone joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (c)(8)(i) of this provision is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [The offeror shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture: ___ --.] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

(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 business concern that is small, HUBZone small, small disadvantaged, service-disabled veteran-owned small, economically disadvantaged women-owned small, or women-owned small eligible under the WOSB Program in order to obtain a contract to be awarded under the preference programs established pursuant to section 8, 9, 15, 31, and 36 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.

(9) [Complete if offeror represented itself as disadvantaged in paragraph (c)(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, 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.

(End of provision)

WAGE DETER.-HARFORD-V1/11/2019

General Decision Number: MD190034 01/11/2019 MD34

Superseded General Decision Number: MD20180048

State: Maryland

Construction Type: Building

County: Harford County in Maryland.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	01/11/2019

ASBE0024-007 10/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 35.13	16.22

Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems

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CARP0219-002 05/01/2018

	Rates	Fringes
MILLWRIGHT	$ 31.81	14.93

CARP0441-002 05/01/2018

	Rates	Fringes
PILEDRIVERMAN	$ 30.18	15.03

ELEC0024-012 12/02/2018

	Rates	Fringes
ELECTRICIAN (Including low voltage wiring for and installation of alarms; HVAC controls)	$ 37.25	5.25%+16.19

ELEC0024-013 06/03/2018

	Rates	Fringes
ELECTRICIAN (Communication and Sound Equipment)	$ 27.53	4.75%+12.67

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day

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ENGI0037-027 04/01/2017

	Rates	Fringes
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 26.98	12.85+a
OPERATOR: Bulldozer	$ 28.93	12.85+a
OPERATOR: Forklift	$ 28.93	12.85+a
OPERATOR: Gradall	$ 28.93	12.85+a
OPERATOR: Loader (Front End)		
1 1/4 yards and over	$ 28.93	12.85+a
1 Yard and Under	$ 26.98	12.85+a
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 28.93	12.85+a
OPERATOR: Roller excluding Asphalt	$ 23.35	12.85+a

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day.

IRON0016-012 04/01/2016

	Rates	Fringes
GLAZIER	$ 28.48	19.45
IRONWORKER (Fence Erection-Chain Link/Cyclone)	$ 28.23	19.45
IRONWORKER, ORNAMENTAL, REINFORCING AND STRUCTURAL	$ 28.48	19.45
IRONWORKER, SHEETING	$ 28.73	19.45

LABO0710-003 04/01/2017

	Rates	Fringes
LABORER: Common or General	$ 17.31	5.90
LABORER: Mason Tender - Cement/Concrete	$ 18.47	5.90

PAIN0051-024 06/01/2018

	Rates	Fringes
PAINTER		
Brush, Roller, Spray, Drywall Finisher/Taper and Paperhanger	$ 25.06	9.76
Industrial	$ 31.10	11.48

PLAS0891-005 07/01/2018

	Rates	Fringes
PLASTERER	$ 29.53	6.80

PLAS0891-006 02/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 28.15	10.58

PLAS0891-008 08/01/2016

	Rates	Fringes
PLASTERER (Fireproofing Including Sprayer, Mixer, and Handler)		
Handler	$ 16.50	4.89
Mixer/Pump	$ 18.50	4.89
Sprayer	$ 23.00	4.89

PLUM0486-013 04/01/2017

	Rates	Fringes

PLUMBER.....$ 39.20 19.19

PLUM0486-014 04/01/2017

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe Installation).....	$ 39.20	19.19

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* ROOF0030-033 07/01/2018

	Rates	Fringes
ROOFER, Excludes Installation of Metal Roofs.....	$ 25.94	11.74

SFMD0669-001 04/01/2018

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	$ 35.60	20.24

SHEE0100-026 11/01/2018

	Rates	Fringes
SHEET METAL WORKER, Includes HVAC Duct Installation (Excludes Metal Roof Installation).....	$ 33.06	20.35

SUMD2010-082 04/30/2010

	Rates	Fringes
ABATEMENT WORKER: ASBESTOS (Removal from Mechanical Systems).....	$ 12.60	3.91
BRICKLAYER (Excludes Pointing, Caulking and Cleaning).....	$ 23.88	5.86
CARPENTER (Acoustical Ceiling Installation Only).....	$ 16.00	2.60
CARPENTER (Drywall Hanging, Form Work, Metal Stud Installation and Scaffold Building Only).....	$ 17.55	5.07
CARPENTER, All other work.....	$ 17.76	5.14
ELEVATOR MECHANIC.....	$ 29.66	9.34

LABORER: Grade Checker	$ 16.00	2.90
LABORER: Landscape	$ 10.00	0.00
LABORER: Mason Tender - Brick	$ 14.76	7.73
LABORER: Mason Tender - Stone	$ 14.03	0.00
LABORER: Mortar Mixer	$ 16.61	9.08
LABORER: Pipelayer	$ 14.78	3.96
LABORER: Mason Tender (For Pointing, Caulking and Cleaning)	$ 12.93	0.00
MASON - STONE	$ 29.82	10.05
OPERATOR: Asphalt Roller	$ 21.35	5.38
OPERATOR: Backhoe	$ 22.78	5.94
OPERATOR: Boom	$ 21.44	8.29
OPERATOR: Crane	$ 20.17	4.64
OPERATOR: Excavator	$ 18.38	7.29
OPERATOR: Grader/Blade	$ 16.75	5.79
POINTER, CAULKER, CLEANER, Includes pointing, caulking, cleaning of existing masonry, brick, stone and cement structures (restoration work); excludes pointing, caulking, cleaning of new or replacement masonry, brick, stone or cement	$ 19.75	0.00
SHEET METAL WORKER (Metal Roofs Installation)	$ 20.71	6.23
TILE FINISHER	$ 17.32	0.00
TILE SETTER	$ 21.38	4.65
TRUCK DRIVER: Dump Truck	$ 15.40	1.96
TRUCK DRIVER: Tractor Haul Truck	$ 17.87	9.98

WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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 (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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, DC 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, DC 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, DC 20210

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

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END OF GENERAL DECISION

WAGE DETER.-BALT CNTY-V1/11/19
General Decision Number: MD190030 01/11/2019 MD30

Superseded General Decision Number: MD20180044

State: Maryland

Construction Type: Building

County: Baltimore County in Maryland.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	01/11/2019

ASBE0024-007 10/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 35.13	16.22

Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems

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BRMD0001-011 04/29/2018

	Rates	Fringes
BRICKLAYER (Excluding		

Pointing, Caulking and
Cleaning).....$ 31.36 10.78

CARP0197-003 01/01/2018

	Rates	Fringes
CARPENTER (Including Drywall Hanging, Drywall Finishing, Form Work, Metal Stud Installation and Scaffold Building)	$ 26.66	14.68

CARP0219-002 05/01/2018

	Rates	Fringes
MILLWRIGHT	$ 31.81	14.93

CARP0441-002 05/01/2018

	Rates	Fringes
PILEDRIVERMAN	$ 30.18	15.03

ELEC0024-012 12/02/2018

	Rates	Fringes
ELECTRICIAN (Including low voltage wiring for and installation of alarms; HVAC controls)	$ 37.25	5.25%+16.19

ELEC0024-013 06/03/2018

	Rates	Fringes
ELECTRICIAN (Communication and Sound Equipment)	$ 27.53	4.75%+12.67

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day

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ENGI0037-026 04/01/2017

	Rates	Fringes
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 26.98	12.85+a
OPERATOR: Bulldozer	$ 28.93	12.85+a
OPERATOR: Excavator	$ 28.93	12.85+a
OPERATOR: Forklift	$ 28.93	12.85+a
OPERATOR: Gradall	$ 28.93	12.85+a

OPERATOR: Paver (Asphalt,
Aggregate, and Concrete).....$ 28.93 12.85+a
OPERATOR: Roller excluding
Asphalt.....$ 23.35 12.85+a

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day.

IRON0016-012 04/01/2016

	Rates	Fringes
GLAZIER	$ 28.48	19.45
IRONWORKER (Fence Erection-Chain Link/Cyclone)	$ 28.23	19.45
IRONWORKER, ORNAMENTAL, REINFORCING AND STRUCTURAL	$ 28.48	19.45
IRONWORKER, SHEETING	$ 28.73	19.45

LABO0710-007 04/01/2017

	Rates	Fringes
LABORER: Mason Tender - Brick	$ 18.47	5.90
LABORER: Mason Tender - Cement/Concrete	$ 18.47	5.90

PAIN0051-022 06/01/2018

	Rates	Fringes
PAINTER		
Industrial	$ 31.10	11.48
Spray and Paperhanger	$ 25.06	9.76

PLAS0891-005 07/01/2018

	Rates	Fringes
PLASTERER	$ 29.53	6.80

PLAS0891-008 08/01/2016

	Rates	Fringes
PLASTERER (Fireproofing Including Sprayer, Mixer, and Handler)		
Handler	$ 16.50	4.89
Mixer/Pump	$ 18.50	4.89
Sprayer	$ 23.00	4.89

PLUM0486-012 04/01/2017

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe and System Installation)	$ 39.20	19.19

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* ROOF0030-033 07/01/2018

	Rates	Fringes
ROOFER, Excludes Installation of Metal Roofs	$ 25.94	11.74

SFMD0669-001 04/01/2018

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 35.60	20.24

SHEE0100-026 11/01/2018

	Rates	Fringes
SHEET METAL WORKER, Includes HVAC Duct Installation (Excludes Metal Roof Installation)	$ 33.06	20.35

SUMD2010-078 04/30/2010

	Rates	Fringes
ABATEMENT WORKER: ASBESTOS (Removal from Mechanical Systems)	$ 12.60	3.91
CARPENTER (Acoustical Ceiling Installation Only)	$ 16.00	2.60
CEMENT MASON/CONCRETE FINISHER	$ 19.52	5.96
ELEVATOR MECHANIC	$ 29.66	9.34
LABORER: Common or General	$ 11.85	2.40
LABORER: Grade Checker	$ 16.00	2.90
LABORER: Landscape	$ 10.00	0.00
LABORER: Mason Tender - Stone	$ 14.03	0.00
LABORER: Mortar Mixer	$ 16.61	9.08
LABORER: Pipelayer	$ 14.78	3.96
LABORER: Mason Tender (for		

Pointing, Caulking and Cleaning)	$ 12.93	0.00
MASON - STONE	$ 29.82	10.05
OPERATOR: Asphalt Roller	$ 21.35	5.38
OPERATOR: Backhoe	$ 22.78	5.94
OPERATOR: Boom	$ 21.44	8.29
OPERATOR: Crane	$ 20.17	4.64
OPERATOR: Grader/Blade	$ 16.75	5.79
OPERATOR: Loader	$ 20.01	6.38
PAINTER: Brush and Roller	$ 19.28	5.04
PLUMBER	$ 27.88	10.97
POINTER, CAULKER, CLEANER, Includes pointing, caulking, cleaning of existing masonry, brick, stone and cement structures (restoration work); excludes pointing, caulking, cleaning of new or replacement masonry, brick, stone or cement	$ 19.75	0.00
SHEET METAL WORKER (Metal Roofs Installation)	$ 20.71	6.23
TILE FINISHER	$ 17.32	0.00
TILE SETTER	$ 21.38	4.65
TRUCK DRIVER: Dump Truck	$ 15.40	1.96
TRUCK DRIVER: Tractor Haul Truck	$ 17.87	9.98

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

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours

they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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 (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that

classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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
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U.S. Department of Labor
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Washington, DC 20210

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

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END OF GENERAL DECISION

CONTRACT MINIMUM/MAXIMUM QUANTITY AND CONTRACT VALUE

The minimum quantity and contract value for all orders issued against this contract shall not be less than the minimum quantity and contract value stated in the following table. The maximum quantity and contract value for all orders issued against this contract shall not exceed the maximum quantity and contract value stated in the following table.

MINIMUM QUANTITY	MINIMUM AMOUNT	MAXIMUM QUANTITY	MAXIMUM AMOUNT
			$70,000,000.00

CLIN DELIVERY/TASK ORDER MINIMUM/MAXIMUM QUANTITY AND CLIN ORDER VALUE

The minimum quantity and order value for the given Delivery/Task Order issued for this CLIN shall not be less than the minimum quantity and order value stated in the following table. The maximum quantity and order value for the given Delivery/Task Order issued for this CLIN shall not exceed the maximum quantity and order value stated in the following table.

CLIN	MINIMUM QUANTITY	MINIMUM AMOUNT	MAXIMUM QUANTITY	MAXIMUM AMOUNT
1000		$		$
1001		$		$
1002		$		$
2000		$		$
2001		$		$
2002		$		$
3000		$		$
3001		$		$
3002		$		$
4000		$		$
4001		$		$
4002		$		$
5000		$		$
5001		$		$
5002		$		$

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
1000	Destination	Government	Destination	Government

1001	Destination	Government	Destination	Government
1002	Destination	Government	N/A	Government
2000	Destination	Government	Destination	Government
2001	Destination	Government	Destination	Government
2002	Destination	Government	N/A	Government
3000	Destination	Government	Destination	Government
3001	Destination	Government	Destination	Government
3002	Destination	Government	N/A	Government
4000	Destination	Government	Destination	Government
4001	Destination	Government	Destination	Government
4002	Destination	Government	N/A	Government
5000	Destination	Government	Destination	Government
5001	Destination	Government	Destination	Government
5002	Destination	Government	N/A	Government

CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	NOV 2013
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	MAY 2014
52.203-6	Restrictions On Subcontractor Sales To The Government	SEP 2006
52.203-7	Anti-Kickback Procedures	MAY 2014
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	MAY 2014
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	MAY 2014
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	OCT 2010
52.203-13	Contractor Code of Business Ethics and Conduct	OCT 2015
52.203-17	Contractor Employee Whistleblower Rights and Requirement To Inform Employees of Whistleblower Rights	APR 2014
52.203-19	Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements	JAN 2017
52.204-2	Security Requirements	AUG 1996
52.204-4	Printed or Copied Double-Sided on Postconsumer Fiber Content Paper	MAY 2011
52.204-7	System for Award Management	OCT 2018
52.204-9	Personal Identity Verification of Contractor Personnel	JAN 2011
52.204-10	Reporting Executive Compensation and First-Tier Subcontract Awards	OCT 2018
52.204-13	System for Award Management Maintenance	OCT 2018
52.204-16	Commercial and Government Entity Code Reporting	JUL 2016
52.204-18	Commercial and Government Entity Code Maintenance	JUL 2016
52.204-19	Incorporation by Reference of Representations and Certifications.	DEC 2014
52.204-22	Alternative Line Item Proposal	JAN 2017
52.204-23	Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab and Other Covered Entities.	JUL 2018
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	OCT 2015
52.209-7	Information Regarding Responsibility Matters	OCT 2018

52.209-9	Updates of Publicly Available Information Regarding Responsibility Matters	OCT 2018
52.209-10	Prohibition on Contracting With Inverted Domestic Corporations	NOV 2015
52.210-1	Market Research	APR 2011
52.211-6	Brand Name or Equal	AUG 1999
52.211-13	Time Extensions	SEP 2000
52.215-1	Instructions to Offerors--Competitive Acquisition	JAN 2017
52.215-2	Audit and Records--Negotiation	OCT 2010
52.217-5	Evaluation Of Options	JUL 1990
52.219-6	Notice Of Total Small Business Set-Aside	NOV 2011
52.219-8	Utilization of Small Business Concerns	OCT 2018
52.219-14	Limitations On Subcontracting	JAN 2017
52.222-1	Notice To The Government Of Labor Disputes	FEB 1997
52.222-3	Convict Labor	JUN 2003
52.222-4	Contract Work Hours and Safety Standards - Overtime Compensation	MAY 2018
52.222-6	Construction Wage Rate Requirements	AUG 2018
52.222-7	Withholding of Funds	MAY 2014
52.222-8	Payrolls and Basic Records	AUG 2018
52.222-9	Apprentices and Trainees	JUL 2005
52.222-10	Compliance with Copeland Act Requirements	FEB 1988
52.222-11	Subcontracts (Labor Standards)	MAY 2014
52.222-12	Contract Termination-Debarment	MAY 2014
52.222-13	Compliance With Construction Wage Rate Requirements and Related Regulations	MAY 2014
52.222-14	Disputes Concerning Labor Standards	FEB 1988
52.222-15	Certification of Eligibility	MAY 2014
52.222-21	Prohibition Of Segregated Facilities	APR 2015
52.222-26	Equal Opportunity	SEP 2016
52.222-27	Affirmative Action Compliance Requirements for Construction	APR 2015
52.222-30	Construction Wage Rate Requirements--Price Adjustment (None or Separately Specified Method)	AUG 2018
52.222-35	Equal Opportunity for Veterans	OCT 2015
52.222-36	Equal Opportunity for Workers with Disabilities	JUL 2014
52.222-37	Employment Reports on Veterans	FEB 2016
52.222-38	Compliance With Veterans' Employment Reporting Requirements	FEB 2016
52.222-40	Notification of Employee Rights Under the National Labor Relations Act	DEC 2010
52.222-50	Combating Trafficking in Persons	MAR 2015
52.222-54	Employment Eligibility Verification	OCT 2015
52.222-62	Paid Sick Leave Under Executive Order 13706	JAN 2017
52.223-2	Affirmative Procurement of Biobased Products Under Service and Construction Contracts	SEP 2013
52.223-5	Pollution Prevention and Right-to-Know Information	MAY 2011
52.223-6	Drug-Free Workplace	MAY 2001
52.223-11	Ozone-Depleting Substances and High Global Warming Potential Hydrofluorocarbons.	JUN 2016
52.223-15	Energy Efficiency in Energy-Consuming Products	DEC 2007
52.223-16 Alt I	Acquisition of EPEAT - Registered Personal Computer Products - Alternate I	JUN 2014
52.223-17	Affirmative Procurement of EPA-Designated Items in Service and Construction Contracts	AUG 2018

52.223-18	Encouraging Contractor Policies To Ban Text Messaging While Driving	AUG 2011
52.225-12	Notice of Buy American Requirement - Construction Materials Under Trade Agreements	MAY 2014
52.225-13	Restrictions on Certain Foreign Purchases	JUN 2008
52.227-1	Authorization and Consent	DEC 2007
52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	DEC 2007
52.227-4	Patent Indemnity-Construction Contracts	DEC 2007
52.228-2	Additional Bond Security	OCT 1997
52.228-5	Insurance - Work On A Government Installation	JAN 1997
52.228-11	Pledges Of Assets	AUG 2018
52.228-12	Prospective Subcontractor Requests for Bonds	MAY 2014
52.228-15	Performance and Payment Bonds--Construction	OCT 2010
52.229-3	Federal, State And Local Taxes	FEB 2013
52.232-5	Payments under Fixed-Price Construction Contracts	MAY 2014
52.232-17	Interest	MAY 2014
52.232-23 Alt I	Assignment of Claims (May 2014) - Alternate I	APR 1984
52.232-25	Prompt Payment	JAN 2017
52.232-27	Prompt Payment for Construction Contracts	JAN 2017
52.232-33	Payment by Electronic Funds Transfer--System for Award Management	OCT 2018
52.232-39	Unenforceability of Unauthorized Obligations	JUN 2013
52.232-40	Providing Accelerated Payments to Small Business Subcontractors	DEC 2013
52.233-1	Disputes	MAY 2014
52.233-3	Protest After Award	AUG 1996
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.236-2	Differing Site Conditions	APR 1984
52.236-3	Site Investigation and Conditions Affecting the Work	APR 1984
52.236-5	Material and Workmanship	APR 1984
52.236-6	Superintendence by the Contractor	APR 1984
52.236-7	Permits and Responsibilities	NOV 1991
52.236-8	Other Contracts	APR 1984
52.236-9	Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements	APR 1984
52.236-10	Operations and Storage Areas	APR 1984
52.236-11	Use and Possession Prior to Completion	APR 1984
52.236-12	Cleaning Up	APR 1984
52.236-13	Accident Prevention	NOV 1991
52.236-14	Availability and Use of Utility Services	APR 1984
52.236-15	Schedules for Construction Contracts	APR 1984
52.236-17	Layout of Work	APR 1984
52.236-21	Specifications and Drawings for Construction	FEB 1997
52.236-26	Preconstruction Conference	FEB 1995
52.236-28	Preparation of Proposals--Construction	OCT 1997
52.242-13	Bankruptcy	JUL 1995
52.242-14	Suspension of Work	APR 1984
52.242-15	Stop-Work Order	AUG 1989
52.242-17	Government Delay Of Work	APR 1984
52.243-1	Changes--Fixed Price	AUG 1987
52.243-4	Changes	JUN 2007
52.243-5	Changes and Changed Conditions	APR 1984
52.244-5	Competition In Subcontracting	DEC 1996
52.244-6	Subcontracts for Commercial Items	OCT 2018

52.245-9	Use And Charges	APR 2012
52.246-12	Inspection of Construction	AUG 1996
52.246-21 Alt I	Warranty of Construction (Mar 1994) - Alternate I	APR 1984
52.247-34	F.O.B. Destination	NOV 1991
52.248-3	Value Engineering-Construction	OCT 2015
52.249-1	Termination For Convenience Of The Government (Fixed Price) (Short Form)	APR 1984
52.249-2	Termination For Convenience Of The Government (Fixed-Price)	APR 2012
52.249-10	Default (Fixed-Price Construction)	APR 1984
52.249-14	Excusable Delays	APR 1984
52.253-1	Computer Generated Forms	JAN 1991
252.201-7000	Contracting Officer's Representative	DEC 1991
252.203-7000	Requirements Relating to Compensation of Former DoD Officials	SEP 2011
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	DEC 2008
252.203-7002	Requirement to Inform Employees of Whistleblower Rights	SEP 2013
252.203-7004	Display of Hotline Posters	OCT 2016
252.203-7005	Representation Relating to Compensation of Former DoD Officials	NOV 2011
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7005	Oral Attestation of Security Responsibilities	NOV 2001
252.204-7008	Compliance With Safeguarding Covered Defense Information Controls	OCT 2016
252.204-7012	Safeguarding Covered Defense Information and Cyber Incident Reporting	OCT 2016
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Country that is a State Sponsor of Terrorism	OCT 2015
252.223-7001	Hazard Warning Labels	DEC 1991
252.223-7004	Drug Free Work Force	SEP 1988
252.223-7006	Prohibition On Storage, Treatment, and Disposal of Toxic or Hazardous Materials	SEP 2014
252.225-7002	Qualifying Country Sources As Subcontractors	DEC 2017
252.225-7008	Restriction on Acquisition of Specialty Metals	MAR 2013
252.225-7012	Preference For Certain Domestic Commodities	DEC 2017
252.225-7021	Trade Agreements--Basic	DEC 2017
252.227-7022	Government Rights (Unlimited)	MAR 1979
252.227-7023	Drawings and Other Data to become Property of Government	MAR 1979
252.227-7024	Notice and Approval of Restricted Designs	APR 1984
252.227-7033	Rights in Shop Drawings	APR 1966
252.232-7003	Electronic Submission of Payment Requests and Receiving Reports	DEC 2018
252.232-7010	Levies on Contract Payments	DEC 2006
252.236-7000	Modification Proposals-Price Breakdown	DEC 1991
252.236-7005	Airfield Safety Precautions	DEC 1991
252.236-7013	Requirement for Competition Opportunity for American Steel Producers, Fabricators, and Manufacturers	JUN 2013
252.239-7001	Information Assurance Contractor Training and Certification	JAN 2008
252.241-7001	Government Access	DEC 1991
252.243-7001	Pricing Of Contract Modifications	DEC 1991
252.243-7002	Requests for Equitable Adjustment	DEC 2012
252.244-7000	Subcontracts for Commercial Items	JUN 2013

252.245-7004	Reporting, Reutilization, and Disposal	DEC 2017
252.246-7004	Safety of Facilities, Infrastructure, and Equipment for Military Operations	OCT 2010
252.247-7023	Transportation of Supplies by Sea	APR 2014
252.247-7024	Notification Of Transportation Of Supplies By Sea	MAR 2000

CLAUSES INCORPORATED BY FULL TEXT

52.203-14 DISPLAY OF HOTLINE POSTER(S) (OCT 2015)

(a) Definition.

United States, as used in this clause, means the 50 States, the District of Columbia, and outlying areas.

(b) Display of fraud hotline poster(s). Except as provided in paragraph (c)--

(1) During contract performance in the United States, the Contractor shall prominently display in common work areas within business segments performing work under this contract and at contract work sites--

(i) Any agency fraud hotline poster or Department of Homeland Security (DHS) fraud hotline poster identified in paragraph (b)(3) of this clause; and

(ii) Any DHS fraud hotline poster subsequently identified by the Contracting Officer.

(2) Additionally, if the Contractor maintains a company website as a method of providing information to employees, the Contractor shall display an electronic version of the poster(s) at the website.

(3) Any required posters may be obtained as follows:

Poster(s) Obtain from

https://www.oig.dhs.gov/index.php?option=com_content&view=article&id=135:dhs-oig-hotline-poster&catid=16

(Contracting Officer shall insert—

(i) Appropriate agency name(s) and/or title of applicable Department of Homeland Security fraud hotline poster); and

(ii) The website(s) or other contact information for obtaining the poster(s).)

(c) If the Contractor has implemented a business ethics and conduct awareness program, including a reporting mechanism, such as a hotline poster, then the Contractor need not display any agency fraud hotline posters as required in paragraph (b) of this clause, other than any required DHS posters.

(d) Subcontracts. The Contractor shall include the substance of this clause, including this paragraph (d), in all subcontracts that exceed $5.5 million , except when the subcontract--

(1) Is for the acquisition of a commercial item; or

(2) Is performed entirely outside the United States.

(End of clause)

52.204-1 APPROVAL OF CONTRACT (DEC 1989)

This contract is subject to the written approval of the Contracting Officer and shall not be binding until so approved.

(End of clause)

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

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 the date specified on each task order (DD Form 1155). The time stated for completion shall include final cleanup of the premises.

(End of clause)

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a Firm-Fixed Price Indefinite Delivery Requirements-Type contract resulting from this solicitation.

(End of provision)

52.216-18 ORDERING. (OCT 1995)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from the date of contract award through the last option period.

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

(End of clause)

52.216-19 ORDER LIMITATIONS (OCT 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than $10,000.00, the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) Maximum order. The Contractor is not obligated to honor -

(1) Any order for a single item in excess of $5,000,000.00;

(2) Any order for a combination of items in excess of $5,000,000.00; or

(3) A series of orders from the same ordering office within 5 days that together call for quantities exceeding the limitation in paragraph (b) (1) or (2) of this section.

(c) If this is a requirements contract (i.e., includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation (FAR)), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) of this section.

(d) Notwithstanding paragraphs (b) and (c) of this section, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office within 5 days after issuance, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

(End of clause)

52.216-21 REQUIREMENTS (OCT 1995)

(a) This is a requirements contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies or services specified in the Schedule are estimates only and are not purchased by this contract. Except as this contract may otherwise provide, if the Government's requirements do not result in orders in the quantities described as "estimated" or "maximum" in the Schedule, that fact shall not constitute the basis for an equitable price adjustment.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. Subject to any limitations in the Order Limitations clause or elsewhere in this contract, the Contractor shall furnish to the Government all supplies or services specified in the Schedule and called for by orders issued in accordance with the Ordering clause. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(c) Except as this contract otherwise provides, the Government shall order from the Contractor all the supplies or services specified in the Schedule that are required to be purchased by the Government activity or activities specified in the Schedule.

(d) The Government is not required to purchase from the Contractor requirements in excess of any limit on total orders under this contract.

(e) If the Government urgently requires delivery of any quantity of an item before the earliest date that delivery may be specified under this contract, and if the Contractor will not accept an order providing for the accelerated delivery, the Government may acquire the urgently required goods or services from another source.

(f) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after six (6) months beyond the contract expiration date.

(End of clause)

52.217-8 OPTION TO EXTEND SERVICES (NOV 1999)

The Government may require continued performance of any services within the limits and at the rates specified in the contract. These rates may be adjusted only as a result of revisions to prevailing labor rates provided by the Secretary of Labor. The option provision may be exercised more than once, but the total extension of performance hereunder shall not exceed 6 months. The Contracting Officer may exercise the option by written notice to the Contractor within 5 calendar days of the expiration date of the base year or any option period exerised.

(End of clause)

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

(a) The Government may extend the term of this contract by written notice to the Contractor within 30 calendar days; provided that the Government gives the Contractor a preliminary written notice of its intent to extend at least 60 calendar days before the contract expires. The preliminary notice does not commit the Government to an extension.

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

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed 60 months.
(End of clause)

52.219-17 SECTION 8(a) AWARD (JAN 2017)

(a) By execution of a contract, the Small Business Administration (SBA) agrees to the following:

(1) To furnish the supplies or services set forth in the contract according to the specifications and the terms and conditions by subcontracting with the Offeror who has been determined an eligible concern pursuant to the provisions of section 8(a) of the Small Business Act, as amended (15 U.S.C. 637(a)).

(2) Except for novation agreements, delegates to the Army Contracting Command – Aberdeen Proving Ground the responsibility for administering the contract with complete authority to take any action on behalf of the Government under the terms and conditions of the contract; provided, however that the contracting agency shall give advance notice to the SBA before it issues a final notice terminating the right of the subcontractor to proceed with further performance, either in whole or in part, under the contract.

(3) That payments to be made under the contract will be made directly to the subcontractor by the contracting activity.

(4) To notify the Army Contracting Command – Aberdeen Proving Ground Contracting Officer immediately upon notification by the subcontractor that the owner or owners upon whom 8(a) eligibility was based plan to relinquish ownership or control of the concern.

(5) That the subcontractor awarded a subcontract hereunder shall have the right of appeal from decisions of the cognizant Contracting Officer under the “Disputes” clause of the subcontract.

(b) The offeror/subcontractor agrees and acknowledges that it will, for and on behalf of the SBA, fulfill and perform all of the requirements of the contract.

(c) The offeror/subcontractor agrees that it will not subcontract the performance of any of the requirements of this subcontract to any lower tier subcontractor without the prior written approval of the SBA and the cognizant Contracting Officer of the Army Contracting Command – Aberdeen Proving Ground.

52.219-18 NOTIFICATION OF COMPETITION LIMITED TO ELIGIBLE 8(A) PARTICIPANTS (JAN 2017)

(a) Offers are solicited only from small business concerns expressly certified by the Small Business Administration (SBA) for participation in the SBA's 8(a) Program and which meet the following criteria at the time of submission of offer--

(1) The Offeror is in conformance with the 8(a) support limitation set forth in its approved business plan; and

(2) The Offeror is in conformance with the Business Activity Targets set forth in its approved business plan or any remedial action directed by the SBA.

(b) By submission of its offer, the Offeror represents that it meets all of the criteria set forth in paragraph (a) of this clause.

(c) Any award resulting from this solicitation will be made to the Small Business Administration, which will subcontract performance to the successful 8(a) offeror selected through the evaluation criteria set forth in this solicitation.

(d)(1) Agreement. A small business concern submitting an offer in its own name shall furnish, in performing the contract, only end items manufactured or produced by small business concerns in the United States or its outlying areas. If this procurement is processed under simplified **acquisition** procedures and the total amount of this contract does not exceed $25,000, a small business concern may furnish the product of any domestic firm. This paragraph does not apply to construction or service contracts.

(2) The TBD will notify the Army Contracting Command – Aberdeen Proving Ground Contracting Officer in writing immediately upon entering an agreement (either oral or written) to transfer all or part of its stock or other ownership interest to any other party.

(End of clause)

52.219-28 POST-AWARD SMALL BUSINESS PROGRAM REREPRESENTATION (JULY 2013)

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

Long-term contract means a contract of more than five years in duration, including options. However, the term does not include contracts that exceed five years in duration because the period of performance has been extended for a cumulative period not to exceed six months under the clause at 52.217-8, Option to Extend Services, or other appropriate authority.

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 (c) of this clause. Such a concern is ``not

dominant in its field of operation" when it does not exercise a controlling or major influence on a national basis in a kind of business activity in which a number of business concerns are primarily engaged. In determining whether dominance exists, consideration shall be given to all appropriate factors, including volume of business, number of employees, financial resources, competitive status or position, ownership or control of materials, processes, patents, license agreements, facilities, sales territory, and nature of business activity.

(b) If the Contractor represented that it was a small business concern prior to award of this contract, the Contractor shall rerepresent its size status according to paragraph (e) of this clause or, if applicable, paragraph (g) of this clause, upon the occurrence of any of the following:

(1) Within 30 days after execution of a novation agreement or within 30 days after modification of the contract to include this clause, if the novation agreement was executed prior to inclusion of this clause in the contract.

(2) Within 30 days after a merger or acquisition that does not require a novation or within 30 days after modification of the contract to include this clause, if the merger or acquisition occurred prior to inclusion of this clause in the contract.

(3) For long-term contracts--

(i) Within 60 to 120 days prior to the end of the fifth year of the contract; and

(ii) Within 60 to 120 days prior to the date specified in the contract for exercising any option thereafter.

(c) The Contractor shall rerepresent its size status in accordance with the size standard in effect at the time of this rerepresentation that corresponds to the North American Industry Classification System (NAICS) code assigned to this contract. The small business size standard corresponding to this NAICS code can be found at http://www.sba.gov/content/table-small-business-size-standards.

(d) The small business size standard for a Contractor providing a product which it does not manufacture itself, for a contract other than a construction or service contract, is 500 employees.

(e) Except as provided in paragraph (g) of this clause, the Contractor shall make the representation required by paragraph (b) of this clause by validating or updating all its representations in the Representations and Certifications section of the System for Award Management (SAM) and its other data in SAM, as necessary, to ensure that they reflect the Contractor's current status. The
Contractor shall notify the contracting office in writing within the timeframes specified in paragraph (b) of this clause that the data have been validated or updated, and provide the date of the validation or update.

(f) If the Contractor represented that it was other than a small business concern prior to award of this contract, the Contractor may, but is not required to, take the actions required by paragraphs (e) or (g) of this clause.

(g) If the Contractor does not have representations and certifications in SAM, or does not have a representation in SAM for the NAICS code applicable to this contract, the Contractor is required to complete the following rerepresentation and submit it to the contracting office, along with the contract number and the date on which the rerepresentation was completed:

The Contractor represents that it ( ) is, ( ) is not a small business concern under NAICS Code - assigned to contract number .

(Contractor to sign and date and insert authorized signer's name and title).

(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
23%	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 Aberdeen Proving Ground, Maryland (Harford County).

(End of provision)

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)

52.225-11 BUY AMERICAN--CONSTRUCTION MATERIALS UNDER TRADE AGREEMENTS (OCT 2016)

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

Caribbean Basin country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a Caribbean Basin 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 Caribbean Basin country into a new and different construction material distinct from the materials from which it was transformed.

Commercially available off-the-shelf (COTS) item—

(1) Means any item of supply (including construction material) that is--

(i) A commercial item (as defined in paragraph (1) of the definition at FAR 2.101);

(ii) Sold in substantial quantities in the commercial marketplace; and

(iii) Offered to the Government, under a contract or subcontract at any tier, without modification, in the same form in which it is sold in the commercial marketplace; and

(2) Does not include bulk cargo, as defined in 46 U.S.C. 40102(4) such as agricultural products and petroleum products.

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 construction material.

Designated country means any of the following countries:

(1) A World Trade Organization Government Procurement Agreement (WTO GPA) country (Armenia, Aruba, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, Ukraine, or United Kingdom);

(2) A Free Trade Agreement (FTA) country (Australia, Bahrain, Canada, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Korea (Republic of), Mexico, Morocco, Nicaragua, Oman, Panama, Peru, or Singapore);

(3) A least developed country (Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Laos, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Tanzania, Timor-Leste, Togo, Tuvalu, Uganda, Vanuatu, Yemen, or Zambia); or

(4) A Caribbean Basin country (Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bonaire, British Virgin Islands, Curacao, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saba, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sint Eustatius, Sint Maarten, or Trinidad and Tobago).

Designated country construction material means a construction material that is a WTO GPA country construction material, an FTA country construction material, a least developed country construction material, or a Caribbean Basin country construction material.

Domestic construction material means--

(1) An unmanufactured construction material mined or produced in the United States;

(2) A construction material manufactured in the United States, if--

(i) 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; or

(ii) The construction material is a COTS item.

Foreign construction material means a construction material other than a domestic construction material.

Least developed country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a least developed 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 least developed country into a new and different construction material distinct from the materials from which it was transformed.

“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.

“Least developed country construction material” means a construction material that—

(1) Is wholly the growth, product, or manufacture of a least developed 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 least developed 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.

WTO GPA country construction material means a construction material that--

(1) Is wholly the growth, product, or manufacture of a WTO GPA 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 WTO GPA country into a new and different construction material distinct from the materials from which it was transformed.

(b) Construction materials.

(1) This clause implements 41 U.S.C. chapter 83, Buy American, by providing a preference for domestic construction material. In accordance with 41 U.S.C. 1907, the component test of the Buy American statute is waived for construction material that is a COTS item. (See FAR 12.505(a)(2)). In addition, the Contracting Officer has determined that the WTO GPA and Free Trade Agreements (FTAs) apply to this acquisition. Therefore, the Buy American restrictions are waived for designated country construction materials.

(2) The Contractor shall use only domestic or designated 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 information technology that is a commercial item or 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 statute 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 statute 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 statute.

(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 statute 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 statute applies, use of foreign construction material is noncompliant with the Buy American statute.

(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)

52.228-14 IRREVOCABLE LETTER OF CREDIT (NOV 2014)

(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 40 U.S.C. chapter 31, subchapter III, Bonds, 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)(1) Only federally insured financial institutions rated investment grade by a commercial rating service shall issue or confirm the ILC.

(2) Unless the financial institution issuing the ILC had letter of credit business of at least $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 at least $25 million in the past year.

(3) The Offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institutions have the required credit rating as of the date of issuance of the ILC.

(4) The current rating for a financial institution is available through any of the following rating services registered with the U.S. Securities and Exchange Commission (SEC) as a Nationally Recognized Statistical Rating Organization (NRSRO). NRSRO's can be located at the Web site http://www.sec.gov/answers/nrsro.htm maintained by the SEC.

(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, International Chamber of Commerce Publication No. ____ -- (Insert version in effect at the time of ILC issuance, e.g., ``Publication 600, 2006 edition'') 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, International Chamber of Commerce Publication No. ____ -- (Insert version in effect at the time of ILC issuance, e.g., ``Publication 600, 2006 edition") 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)

52.232-16 PROGRESS PAYMENTS (APR 2012)

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

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

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

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

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

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

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

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

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

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

(ii) Costs incurred by subcontractors or suppliers.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(i) Failure to make progress or

(ii) Unsatisfactory financial condition.

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

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

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

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

(d) Title.

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

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

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

(ii) Special tooling and special test equipment to which the Government is to acquire title;

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

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

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

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

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

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

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

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

vested in the Government under this clause.

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

(e) Risk of loss. Before delivery to and acceptance by the Government, the Contractor shall bear the risk of loss for property, the title to which vests in the Government under this clause, except to the extent the Government expressly assumes the risk. The Contractor shall repay the Government an amount equal to the unliquidated progress payments that are based on costs allocable to property that is lost (see 45.101).

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

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

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

(3) Each Contractor request for progress payment shall:

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

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

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

(i) Reservations of rights.

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

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

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

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

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

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

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

(1) The amounts included are limited to--

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

(ii) Any unpaid subcontractor requests for financing payments.

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

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

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

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

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

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

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

(A) The Contractor defaults; or

(B) The subcontractor becomes bankrupt or insolvent.

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

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

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

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

(A) The Contractor defaults; or

(B) The subcontractor becomes bankrupt or insolvent.

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

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

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

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

(A) The Contractor defaults; or

(B) The subcontractor becomes bankrupt or insolvent.

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

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

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

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

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

(l) Due date. The designated payment office will make progress payments on the _____ (Contracting Officer insert date as prescribed by agency head; if not prescribed, insert “30th”) day after the designated billing office receives a proper progress payment request. In the event that the Government requires an audit or other review of a specific progress payment request to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the specified due date. Progress payments are considered contract financing and are not subject to the interest penalty provisions of the Prompt Payment Act.

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

(End of clause)

52.233-2 SERVICE OF PROTEST (SEP 2006)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from Lane M. Gary; Contracting Officer; Chief, Facilities Branch; Army Contracting Command-Aberdeen Proving Ground; 6565 Surveillance Loop, Room C2-102; Aberdeen Proving Ground, Maryland 21005. Email: lane.m.gary.civ@mail.mil.

(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)

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

The Contractor shall perform on the site, and with its own organization, work equivalent to at least twenty-five (25) percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

(End of clause)

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

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

(b) Site visits may be arranged during normal duty hours by contacting:

NOTE: A FORMAL SITE VISIT WILL BE ANNOUNCEMENT AS AN AMENDMENT TO SOLICITATION.

(End of provision)

h52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

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

(End of provision)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

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

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

(End of clause)

52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (APR 1984)

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

(b) The use in this solicitation or contract of any Defense Acquisition Regulation System, Department of Defense (48 CFR Chapter 2) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of clause)

252.219-7010 NOTIFICATION OF COMPETITION LIMITED TO ELIGIBLE 8(A) CONCERNS - PARTNERSHIP AGREEMENT (DEVIATION 2019-O0003)

(a) Offers are solicited only from small business concerns expressly certified by the Small Business Administration (SBA) for participation in the SBA's 8(a) Program and which meet the following criteria at the time of submission of offer:
(1) The Offeror is in conformance with the 8(a) support limitation set forth in its approved business plan.
(2) The Offeror is in conformance with the Business Activity Targets set forth in its approved business plan or any remedial action directed by the SBA.
(3) If the competition is to be limited to 8(a) concerns within one or more specific SBA regions or districts, then the Offeror's approved business plan is on file and serviced by ___ . [Contracting Officer completes by inserting the appropriate SBA District and/or Regional Office(s) as identified by the SBA.]
(b) By submission of its offer, the Offeror represents that it meets all of the criteria set forth in paragraph (a) of this clause.
(c) Any award resulting from this solicitation will be made directly by the Contracting Officer to the successful 8(a) offeror selected through the evaluation criteria set forth in this solicitation.
(d)(1) Agreement. Unless SBA has waived the requirements of paragraphs (d)(1)(i) through (iii) of this clause in accordance with 13 CFR 121.1204, a small business concern that provides an end item it did not manufacture, process, or produce, shall—
(i) Provide an end item that a small business has manufactured, processed, or produced in the United States or its outlying areas;
(ii) Be primarily engaged in the retail or wholesale trade and normally sell the type of item being supplied; and
(iii) Take ownership or possession of the item(s) with its personnel, equipment, or facilities in a manner consistent with industry practice; for example, providing storage, transportation, or delivery.
(2) Paragraph (d)(1) of this clause does not apply to construction or service contracts.
(3) The ___ [insert name of SBA's contractor] will notify the ___ [insert name of contracting agency] Contracting Officer in writing immediately upon entering an agreement (either oral or written) to transfer all or part of its stock or other ownership interest to any other party.

(End of clause)

252.232-7006 WIDE AREA WORKFLOW PAYMENT INSTRUCTIONS (DEC 2018)

(a) Definitions. As used in this clause—

"Department of Defense Activity Address Code (DoDAAC)" is a six position code that uniquely identifies a unit, activity, or organization.

"Document type" means the type of payment request or receiving report available for creation in Wide Area WorkFlow (WAWF).

"Local processing office (LPO)" is the office responsible for payment certification when payment certification is done external to the entitlement system.

"Payment request" and "receiving report" are defined in the clause at 252.232-7003, Electronic Submission of Payment Requests and Receiving Reports.

(b) Electronic invoicing. The WAWF system provides the method to electronically process vendor payment requests and receiving reports, as authorized by Defense Federal Acquisition Regulation Supplement (DFARS) 252.232-7003, Electronic Submission of Payment Requests and Receiving Reports.

(c) WAWF access. To access WAWF, the Contractor shall—

(1) Have a designated electronic business point of contact in the System for Award Management at https://www.sam.gov; and

(2) Be registered to use WAWF at https://wawf.eb.mil/ following the step-by-step procedures for self-registration available at this web site.

(d) WAWF training. The Contractor should follow the training instructions of the WAWF Web-Based Training Course and use the Practice Training Site before submitting payment requests through WAWF. Both can be accessed by selecting the "Web Based Training" link on the WAWF home page at https://wawf.eb.mil/.

(e) WAWF methods of document submission. Document submissions may be via web entry, Electronic Data Interchange, or File Transfer Protocol.

(f) WAWF payment instructions. The Contractor shall use the following information when submitting payment requests and receiving reports in WAWF for this contract or task or delivery order:

(1) Document type. The Contractor shall submit payment requests using the following document type(s):

(i) For cost-type line items, including labor-hour or time-and-materials, submit a cost voucher.

(ii) For fixed price line items—

(A) That require shipment of a deliverable, submit the invoice and receiving report specified by the Contracting Officer.

_____

(Contracting Officer: Insert applicable invoice and receiving report document type(s) for fixed price line items that require shipment of a deliverable.)

(B) For services that do not require shipment of a deliverable, submit either the Invoice 2in1, which meets the requirements for the invoice and receiving report, or the applicable invoice and receiving report, as specified by the Contracting Officer.

_____

(Contracting Officer: Insert either “Invoice 2in1” or the applicable invoice and receiving report document type(s) for fixed price line items for services.)

(iii) For customary progress payments based on costs incurred, submit a progress payment request.

(iv) For performance based payments, submit a performance based payment request.

(v) For commercial item financing, submit a commercial item financing request.

(2) Fast Pay requests are only permitted when Federal Acquisition Regulation (FAR) 52.213-1 is included in the contract.

W905HS

(3) Document routing. The Contractor shall use the information in the Routing Data Table below only to fill in applicable fields in WAWF when creating payment requests and receiving reports in the system.

Routing Data Table*

Field Name in WAWF	*Data to be entered in WAWF*
Pay Official DoDAAC	HQ0490
Issue By DoDAAC	W56ZTN
Admin DoDAAC**	W56ZTN
Inspect By DoDAAC	W905HS
Ship To Code	W905HS
Ship From Code	W905HS
Service Approver (DoDAAC)	W905HS

(4) Payment request. The Contractor shall ensure a payment request includes documentation appropriate to the type of payment request in accordance with the payment clause, contract financing clause, or Federal Acquisition Regulation 52.216-7, Allowable Cost and Payment, as applicable.

(5) Receiving report. The Contractor shall ensure a receiving report meets the requirements of DFARS Appendix F.

(g) WAWF point of contact.

(1) The Contractor may obtain clarification regarding invoicing in WAWF from the following contracting activity’s WAWF point of contact.

WAWF Helpdesk

(2) Contact the WAWF helpdesk at 866-618-5988, if assistance is needed.

(End of clause)

WAGE DETERMINATION

General Decision Number: MD190034 01/11/2019 MD34

Superseded General Decision Number: MD20180048

State: Maryland

Construction Type: Building

County: Harford County in Maryland.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	01/11/2019

ASBE0024-007 10/01/2017

	Rates	Fringes

ASBESTOS WORKER/HEAT & FROST
INSULATOR.....$ 35.13 16.22

Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems

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CARP0219-002 05/01/2018

	Rates	Fringes
MILLWRIGHT	$ 31.81	14.93

CARP0441-002 05/01/2018

	Rates	Fringes
PILEDRIVERMAN	$ 30.18	15.03

ELEC0024-012 12/02/2018

	Rates	Fringes
ELECTRICIAN (Including low voltage wiring for and installation of alarms; HVAC controls)	$ 37.25	5.25%+16.19

ELEC0024-013 06/03/2018

	Rates	Fringes
ELECTRICIAN (Communication and Sound Equipment)	$ 27.53	4.75%+12.67

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day

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ENGI0037-027 04/01/2017

	Rates	Fringes
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 26.98	12.85+a
OPERATOR: Bulldozer	$ 28.93	12.85+a
OPERATOR: Forklift	$ 28.93	12.85+a
OPERATOR: Gradall	$ 28.93	12.85+a
OPERATOR: Loader (Front End)		
1 1/4 yards and over	$ 28.93	12.85+a
1 Yard and Under	$ 26.98	12.85+a
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 28.93	12.85+a
OPERATOR: Roller excluding		

Asphalt.....$ 23.35 12.85+a

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day.

IRON0016-012 04/01/2016

	Rates	Fringes
GLAZIER	$ 28.48	19.45
IRONWORKER (Fence Erection-Chain Link/Cyclone)	$ 28.23	19.45
IRONWORKER, ORNAMENTAL, REINFORCING AND STRUCTURAL	$ 28.48	19.45
IRONWORKER, SHEETING	$ 28.73	19.45

LABO0710-003 04/01/2017

	Rates	Fringes
LABORER: Common or General	$ 17.31	5.90
LABORER: Mason Tender - Cement/Concrete	$ 18.47	5.90

PAIN0051-024 06/01/2018

	Rates	Fringes
PAINTER		
Brush, Roller, Spray, Drywall Finisher/Taper and Paperhanger	$ 25.06	9.76
Industrial	$ 31.10	11.48

PLAS0891-005 07/01/2018

	Rates	Fringes
PLASTERER	$ 29.53	6.80

PLAS0891-006 02/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 28.15	10.58

PLAS0891-008 08/01/2016

	Rates	Fringes
PLASTERER (Fireproofing Including Sprayer, Mixer, and Handler)		
Handler	$ 16.50	4.89

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     Mixer/Pump..................$ 18.50             4.89
     Sprayer.....................$ 23.00             4.89
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 PLUM0486-013 04/01/2017

                                  Rates          Fringes

PLUMBER.........................$ 39.20            19.19
-----------------------------------------------------------------
 PLUM0486-014 04/01/2017

                                  Rates          Fringes

PIPEFITTER (Including HVAC
Pipe Installation)..............$ 39.20            19.19
-----------------------------------------------------------------
* ROOF0030-033 07/01/2018

                                  Rates          Fringes

ROOFER, Excludes Installation
of Metal Roofs..................$ 25.94            11.74
-----------------------------------------------------------------
 SFMD0669-001 04/01/2018

                                  Rates          Fringes

SPRINKLER FITTER (Fire
Sprinklers).....................$ 35.60            20.24
-----------------------------------------------------------------
 SHEE0100-026 11/01/2018

                                  Rates          Fringes

SHEET METAL WORKER, Includes
HVAC Duct Installation
(Excludes Metal Roof
Installation)...................$ 33.06            20.35
-----------------------------------------------------------------
  SUMD2010-082 04/30/2010

                                  Rates          Fringes

ABATEMENT WORKER:  ASBESTOS
(Removal from Mechanical
Systems)........................$ 12.60             3.91

BRICKLAYER (Excludes
Pointing, Caulking and
Cleaning).......................$ 23.88             5.86

CARPENTER (Acoustical Ceiling
Installation Only)..............$ 16.00             2.60

CARPENTER (Drywall Hanging,
Form Work, Metal Stud
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Installation and Scaffold Building Only)	$ 17.55	5.07
CARPENTER, All other work	$ 17.76	5.14
ELEVATOR MECHANIC	$ 29.66	9.34
LABORER: Grade Checker	$ 16.00	2.90
LABORER: Landscape	$ 10.00	0.00
LABORER: Mason Tender - Brick	$ 14.76	7.73
LABORER: Mason Tender - Stone	$ 14.03	0.00
LABORER: Mortar Mixer	$ 16.61	9.08
LABORER: Pipelayer	$ 14.78	3.96
LABORER: Mason Tender (For Pointing, Caulking and Cleaning)	$ 12.93	0.00
MASON - STONE	$ 29.82	10.05
OPERATOR: Asphalt Roller	$ 21.35	5.38
OPERATOR: Backhoe	$ 22.78	5.94
OPERATOR: Boom	$ 21.44	8.29
OPERATOR: Crane	$ 20.17	4.64
OPERATOR: Excavator	$ 18.38	7.29
OPERATOR: Grader/Blade	$ 16.75	5.79
POINTER, CAULKER, CLEANER, Includes pointing, caulking, cleaning of existing masonry, brick, stone and cement structures (restoration work); excludes pointing, caulking, cleaning of new or replacement masonry, brick, stone or cement	$ 19.75	0.00
SHEET METAL WORKER (Metal Roofs Installation)	$ 20.71	6.23
TILE FINISHER	$ 17.32	0.00
TILE SETTER	$ 21.38	4.65
TRUCK DRIVER: Dump Truck	$ 15.40	1.96

TRUCK DRIVER: Tractor Haul
Truck.....$ 17.87 9.98

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

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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 (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number

where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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, DC 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, DC 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, DC 20210

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

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END OF GENERAL DECISION

Superseded General Decision Number: MD20180044

State: Maryland

Construction Type: Building

County: Baltimore County in Maryland.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019
1	01/11/2019

ASBE0024-007 10/01/2017

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 35.13	16.22

Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems

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BRMD0001-011 04/29/2018

	Rates	Fringes
BRICKLAYER (Excluding Pointing, Caulking and Cleaning)	$ 31.36	10.78

CARP0197-003 01/01/2018

	Rates	Fringes
CARPENTER (Including Drywall Hanging, Drywall Finishing, Form Work, Metal Stud Installation and Scaffold		

Building).....$ 26.66 14.68

CARP0219-002 05/01/2018

	Rates	Fringes
MILLWRIGHT.....	$ 31.81	14.93

CARP0441-002 05/01/2018

	Rates	Fringes
PILEDRIVERMAN.....	$ 30.18	15.03

ELEC0024-012 12/02/2018

	Rates	Fringes
ELECTRICIAN (Including low voltage wiring for and installation of alarms; HVAC controls).....	$ 37.25	5.25%+16.19

ELEC0024-013 06/03/2018

	Rates	Fringes
ELECTRICIAN (Communication and Sound Equipment).....	$ 27.53	4.75%+12.67

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, Christmas Day

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ENGI0037-026 04/01/2017

	Rates	Fringes
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	$ 26.98	12.85+a
OPERATOR: Bulldozer.....	$ 28.93	12.85+a
OPERATOR: Excavator.....	$ 28.93	12.85+a
OPERATOR: Forklift.....	$ 28.93	12.85+a
OPERATOR: Gradall.....	$ 28.93	12.85+a
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	$ 28.93	12.85+a
OPERATOR: Roller excluding Asphalt.....	$ 23.35	12.85+a

a. PAID HOLIDAYS: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day.

IRON0016-012 04/01/2016

	Rates	Fringes
GLAZIER.....	$ 28.48	19.45
IRONWORKER (Fence Erection-Chain Link/Cyclone).....	$ 28.23	19.45
IRONWORKER, ORNAMENTAL, REINFORCING AND STRUCTURAL.....	$ 28.48	19.45
IRONWORKER, SHEETING.....	$ 28.73	19.45

LABO0710-007 04/01/2017

	Rates	Fringes

LABORER: Mason Tender - Brick...$ 18.47 5.90
LABORER: Mason Tender -
Cement/Concrete.....$ 18.47 5.90

PAIN0051-022 06/01/2018

	Rates	Fringes
PAINTER		
Industrial	$ 31.10	11.48
Spray and Paperhanger	$ 25.06	9.76

PLAS0891-005 07/01/2018

	Rates	Fringes
PLASTERER	$ 29.53	6.80

PLAS0891-008 08/01/2016

	Rates	Fringes
PLASTERER (Fireproofing Including Sprayer, Mixer, and Handler)		
Handler	$ 16.50	4.89
Mixer/Pump	$ 18.50	4.89
Sprayer	$ 23.00	4.89

PLUM0486-012 04/01/2017

	Rates	Fringes
PIPEFITTER (Including HVAC Pipe and System Installation)	$ 39.20	19.19

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* ROOF0030-033 07/01/2018

	Rates	Fringes
ROOFER, Excludes Installation of Metal Roofs	$ 25.94	11.74

SFMD0669-001 04/01/2018

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers)	$ 35.60	20.24

SHEE0100-026 11/01/2018

	Rates	Fringes
SHEET METAL WORKER, Includes HVAC Duct Installation (Excludes Metal Roof Installation)	$ 33.06	20.35

SUMD2010-078 04/30/2010

	Rates	Fringes
ABATEMENT WORKER: ASBESTOS (Removal from Mechanical Systems)	$ 12.60	3.91
CARPENTER (Acoustical Ceiling Installation Only)	$ 16.00	2.60

CEMENT MASON/CONCRETE FINISHER...$ 19.52 5.96

ELEVATOR MECHANIC.....$ 29.66 9.34

LABORER: Common or General.....$ 11.85 2.40

LABORER: Grade Checker.....$ 16.00 2.90

LABORER: Landscape.....$ 10.00 0.00

LABORER: Mason Tender - Stone...$ 14.03 0.00

LABORER: Mortar Mixer.....$ 16.61 9.08

LABORER: Pipelayer.....$ 14.78 3.96

LABORER: Mason Tender (for
Pointing, Caulking and
Cleaning).....$ 12.93 0.00

MASON - STONE.....$ 29.82 10.05

OPERATOR: Asphalt Roller.....$ 21.35 5.38

OPERATOR: Backhoe.....$ 22.78 5.94

OPERATOR: Boom.....$ 21.44 8.29

OPERATOR: Crane.....$ 20.17 4.64

OPERATOR: Grader/Blade.....$ 16.75 5.79

OPERATOR: Loader.....$ 20.01 6.38

PAINTER: Brush and Roller.....$ 19.28 5.04

PLUMBER.....$ 27.88 10.97

POINTER, CAULKER, CLEANER,
Includes pointing, caulking,
cleaning of existing masonry,
brick, stone and cement
structures (restoration
work); excludes pointing,
caulking, cleaning of new or
replacement
masonry, brick, stone or
cement.....$ 19.75 0.00

SHEET METAL WORKER (Metal
Roofs Installation).....$ 20.71 6.23

TILE FINISHER.....$ 17.32 0.00

TILE SETTER.....$ 21.38 4.65

TRUCK DRIVER: Dump Truck.....$ 15.40 1.96

TRUCK DRIVER: Tractor Haul
Truck.....$ 17.87 9.98

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

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any

solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

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 (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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, DC 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, DC 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, DC 20210

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

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END OF GENERAL DECISION

REQUIREMENTS CONTRACT LIMITS

This contract will guarantee that standalone roofing work (reference thresholds in FAR 52.216-19 and FAR 52.216-21) is offered to the successful contractor for Garrison-driven work that falls under the responsibility of the Directorate of Public Works – Engineering and Construction Division at Aberdeen Proving Ground, Maryland. Very similar work may occur at Aberdeen Proving Ground under contracts awarded by other organizations such as the United States Army Corps of Engineers (USACE) or as incidental roofing work being completed as part of a larger construction project, but that work is not guaranteed by this contract. Tenants organizations at APG may also fund and procure roofing projects on other contract vehicles. The Government only guarantees that new orders that arise during the ordering period of this contract are offered to the contractor. Existing work being performed by other contractors will not be transferred to the new awardee/contractor.

AT OPSEC

AT OPSEC

Army Policy requirement: A signed AT/OPSEC cover sheet is required to be included in all requirements packages except for supply contracts under the Simplified Acquisition Threshold (SAT), field ordering officer actions and Government Purchase Card (GPC) purchases. Command policy may require this form for supply contracts under the SAT.

Anti-Terrorism (AT) Level 1 Awareness Training: This provision/contract training is for contractor employees with an area of performance within an Army controlled installation, facility or area. All contractor employees, to include subcontractor employees, requiring access to Army installations, facilities and controlled access areas shall complete AT Level I Awareness Training within 60 calendar days after contract start date or effective date of incorporation of this requirement into the contract, whichever is applicable. The contractor shall submit certificates of completion for each affected contractor employee and subcontractor employee, to the COR, within 30 calendar days after completion of training by all employees and subcontractor personnel. AT Level 1 Awareness Training is available at the following website: https:/atlevel1.dtic.mil/at.

Access and General Protection/Security Policy and Procedures: The contractor and all associated subcontractors' employees shall comply with applicable installation, facility, and area commander installation and facility access and local security policies and procedures. The contractor shall also provide all information required for background checks to meet installation access requirements to be accomplished by the installation Provost Marshal Office, Director of Emergency Services or Security Office. The contractor workforce must comply with all personnel identity verification requirements as directed by DoD, HQDA and/or Security Office. Should the Force Protection Condition (FPCON) at any individual facility or installation change, the Government may require changes in contractor security matters or processes.

Personnel who need access to Aberdeen Proving Ground must possess one of the following forms of Identification: DoD Common Access Card, DoD Teslin Identification Card (Retiree or Family Member), a DA Form 1602 (Civilian Identification Card) with access to APG or an identification card from another Federal Agency. Contractors who are enrolled in the Rapid Gate Program must be approved for access to APG for the Rapid Gate ID Card to be valid for APG. Companies wishing to enroll in the Rapid Gate Program must contact EID Passport for information on who to enroll. All other personnel without one of the above forms of identification must process through the Visitor Center. All personnel must have a valid state driver's license, state issued identification card or Department of State work authorization card. All drivers must have valid vehicle registration or rental vehicle agreement for the vehicle they are driving. All visitors will be cleared in accordance with Army Access Control policy.

iWATCH training: The contractor and all associated subcontractors shall brief all employees on the local iWATCH program by completing the on line training class at http://www.apg.army.mil/elearning.cfm, under Security and Intelligence, reporting suspicious activity. This locally developed training will be used to inform employees of the types of behavior to watch for. All employees are to report suspicious activity to the COR. This training shall be completed within seven (7) calendar days of contract award and seven (7) calendar days of new employees'
commencing performance, with the results reported to the COR no later than 14 calendar days after contract award.