



# Repair Nose Dock 6 Roof (FAC 434) Grissom Air Reserve Base, IN

## Specifications RTA Final Submittal

Prepared for:



Prepared by:



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Project #17065

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SECTION 01 11 00

SUMMARY OF WORK  
08/15

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Utility Outage Requests

Utility Connection Requests

Excavation Permits

Welding Permits

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

The work includes Roof repair/replacement for Building 434, Grissom Air Reserve Base, including lightning protection system and incidental related work.

1.2.2 Location

The work is located as indicated. The exact location will be shown by the Contracting Officer.

1.3 WORK RESCHEDULING

Allow for a maximum of 10 calendar days in the construction schedule where construction activity is prohibited due to Government operations.

1.4 OCCUPANCY OF PREMISES

Building(s) will be occupied during performance of work under this Contract.

Before work is started, arrange with the Contracting Officer a sequence of procedure, means of access, space for storage of materials and equipment, and use of approaches, corridors, and stairways.

1.5 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

- a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

- b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work must be in a condition equal to or better than that which existed before new work started.

1.6 ON-SITE PERMITS

1.6.1 Utility Outage Requests and Utility Connection Requests

Schedule work to minimize outages. For utility outages and connections required during the execution of work that affect existing systems, schedule outside the regular working hours or on weekends, as approved by the Contracting Officer. Schedule utility outages and connections to minimize disruptions to the Government. No additional payment will be provided for utility outages and connections required to be performed outside the regular work hours.

Submit requests for utility outages and connections in writing to the Contracting Officer for approval at least 7 calendar days in advance of the time required. In each request, state the system involved, area involved, approximate duration of outage, and the nature of work involved.

1.6.2 Excavation and Welding Permits

<u>ACTIVITY</u>	<u>SUBMISSION DATE</u>
Excavation Permits	7 calendar days prior to work
Welding Permits	7 calendar days prior to work

Post permits at a conspicuous location in the construction area.

Burning of trash or rubbish is not permitted on project site. Comply with requirements for burning of trash or rubbish, as established by the Authority having Jurisdiction .

1.7 LOCATION OF UNDERGROUND UTILITIES

Obtain digging permits prior to start of excavation, and comply with Installation requirements for locating and marking underground utilities. Contact local utility locating service a minimum of 7 days prior to excavating, to mark utilities, and within sufficient time required if work occurs on a Monday or after a Holiday. Verify existing utility locations indicated on contract drawings, within area of work.

Identify and mark all other utilities not managed and located by the local utility companies. Scan the construction site with Ground Penetrating Radar (GPR), electromagnetic, or sonic equipment, and mark the surface of the ground or paved surface where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by work to be installed.

1.7.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

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SECTION 01 14 00

WORK RESTRICTIONS

11/11

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 State

"State" when used in reference to states of the United States also includes the Territory of Guam.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

List of Contact Personnel; G

Personnel List; G

Vehicle List; G

1.3 SPECIAL SCHEDULING REQUIREMENTS

- a. Have materials, equipment, and personnel required to perform the work at the site prior to the commencement of the work. Specific items of work to which this requirement applies include:
  - (1) New Roofing Material.
- b. The Hangar will remain in operation during the entire construction period. The Contractor must conduct his operations so as to cause the least possible interference with normal operations of the activity.
- c. Permission to interrupt any Activity roads, railroads, or utility service must be requested in writing a minimum of 15 calendar days prior to the desired date of interruption.
- d. The work under this contract requires special attention to the scheduling and conduct of the work in connection with existing operations. Identify on the construction schedule each factor which constitutes a potential interruption to operations.

1.4 CONTRACTOR ACCESS AND USE OF PREMISES

1.4.1 Activity Regulations

Ensure that Contractor personnel employed on the Activity become familiar with and obey Activity regulations including safety, fire, traffic and security regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any

restricted areas unless required to do so and until cleared for such entry. Mark Contractor equipment for identification.

#### 1.4.1.1 Subcontractors and Personnel Contacts

Provide a [list of contact personnel](#) of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

#### 1.4.1.2 Installation Access

[Refer to Construction Contractor Guide - Appendix A.](#)

##### 1.4.1.2.1 One-Day Passes

Personnel applying for One-Day passes at the Base Visitor Control Office are subject to daily mandatory vehicle inspection, and will have limited access to the installation. The Government is not responsible for any cost or lost time associated with obtaining daily passes or added vehicle inspections incurred by non-participants in the DBIDS.

##### 1.4.1.3 No Smoking Policy

Smoking is prohibited within and outside of all buildings on installation, except in designated smoking areas. This applies to existing buildings, buildings under construction and buildings under renovation. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines. The Contracting Officer will identify designated smoking areas.

#### 1.4.2 Working Hours

Regular working hours must consist of an [9 hour](#) period, between [7:30 a.m. and 4:30 p.m.](#) Monday through Friday, excluding Government holidays.

#### 1.4.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application [7](#) calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress, giving the specific dates, hours, location, type of work to be performed, contract number and project title. Based on the justification provided, the Contracting Officer may approve work outside regular hours. During periods of darkness, the different parts of the work must be lighted in a manner approved by the Contracting Officer. Make utility cutovers after normal working hours or on Saturdays, Sundays, and Government holidays unless directed otherwise.

#### 1.4.4 Exclusionary Period

No work must be performed during the period [November 15 to April 15](#), inclusive, without prior written approval of the Contracting Officer. This period has not been considered in computing the time allowed for the performance of this contract.

#### 1.4.5 Occupied and Existing Buildings

The Contractor shall be working [on and](#) around existing buildings which [are](#)

occupied. Do not enter the buildings without prior approval of the Contracting Officer.

The existing buildings and their contents must be kept secure at all times. Provide temporary closures as required to maintain security as directed by the Contracting Officer.

Provide dust covers or protective enclosures to protect existing work that remains and Government material during the construction period.

The Government will remove and relocate other Government property in the areas of the buildings scheduled to receive work.

#### 1.4.6 Utility Cutovers and Interruptions

- a. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required paragraph WORK OUTSIDE REGULAR HOURS.
- b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.
- c. Interruption to water, sanitary sewer, stormsewer, telephone service, electric service, air conditioning, heating, fire alarm, compressed air, are considered utility cutovers pursuant to the paragraph WORK OUTSIDE REGULAR HOURS.
- d. Operation of Station Utilities: The Contractor must not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor must notify the Contracting Officer giving reasonable advance notice when such operation is required.

#### 1.5 SECURITY REQUIREMENTS

Refer to the Drawings and Appendix A for additional specific requirements.

##### 1.5.1 Personnel List

Submit for approval, at least 15 days prior to the desired date of entry, an original alphabetical list of personnel who require entry into Government property to perform work on the project. Furnish for each person:

- a. Name
- b. Date and place of birth
- c. Citizenship
- d. Home address
- e. Social security number
- f. Current pass expiration date
- g. Naturalization or Alien Registration number

h. Passport number, place of issue, and expiration date

The request for personnel passes must be accompanied with the following certification:

"I hereby certify that all personnel on this list are either born U.S. citizens, naturalized U.S. citizens with the naturalization number shown, or legal aliens with the alien registration number indicated."

Signature/Firm Name

#### 1.5.2 Vehicle List

Submit an original list of vehicles to be utilized at the work site with the following information for each vehicle:

- a. Make
- b. Year
- c. Model
- d. License number
- e. Registered owner

#### PART 2 PRODUCTS

Not Used

#### PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 20 00.00 20

PRICE AND PAYMENT PROCEDURES

11/11

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Schedule of Prices; G

1.2 SCHEDULE OF PRICES

1.2.1 Data Required

Within 15 calendar days of notice of award, prepare and deliver to the Contracting Officer a Schedule of Prices (construction contract) as directed by the Contracting Officer. Provide a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, and extended prices. Costs shall be summarized and totals provided for each construction category.

1.2.2 Schedule Instructions

Payments will not be made until the Schedule of Prices has been submitted to and accepted by the Contracting Officer. Identify the cost for various system components.

1.2.3 Real Property Assets

The Government will provide the Draft DD Form 1354, Transfer and Acceptance of Military Real Property filled in with the appropriate Real Property Unique Identifiers (RPUID) and related construction Category Codes to summarize the designed real property assets that apply to this contract. The Contractor shall meet with the Contracting Officer and the Real Property Accounting Officer during the Pre Construction Meeting and the Project Closeout Meetings to modify and include any necessary changes to the DD Form 1354. The Contractor shall provide the Interim DD Form 1354 that uses the appropriate division of the RPUIDs/ Category Codes to represent the final constructed facility and include all associated cost. Coordinate the Contractor's Price and Payment structure with the structure of the RPUIDs/ Category Codes.

Divide detailed asset breakdown into the RPUIDs and related construction Category Codes and populate associated costs which represent all aspects of the work. Where assets diverge into multiple RPUID/ Category Codes, divide the asset and provide the proportion of the assets in each RPUID/ Category Code. Assets and related RPUID/ Category Codes may be modified by the Contracting Officer as necessary during course of the work. Coordinate identification and proportion of these assets with the Government Real Property Accounting Officer.

Cost data accumulated under this section are required in the preparation of DD Form 1354.

### 1.3 CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT

#### 1.3.1 Content of Invoice

Requests for payment will be processed in accordance with the Contract Clause FAR 52.232-27, Prompt Payment Construction Contracts and FAR 52.232-5, Payments Under Fixed-Price Construction Contracts. The requests for payment shall include the documents listed below.

- a. The Contractor's invoice, on NAVFAC Form 7300/30 furnished by the Government, showing in summary form, the basis for arriving at the amount of the invoice. Form 7300/30 shall include certification by Contractor and Quality Control (QC) Manager.
- b. Updated Project Schedule and reports required by the contract.
- c. Contractor Safety Self Evaluation Checklist.
- d. Other supporting documents as requested.
- e. Updated copy of submittal register.
- f. Invoices not completed in accordance with contract requirements will be returned to the Contractor for correction of the deficiencies.
- g. [Materials on Site.](#)
- h. [Monthly Work-hour report.](#)
- i. [Solid Waste Disposal Report.](#)

#### 1.3.2 Submission of Invoices

If DFARS Clause 5252.232-7006 is included in the contract, provide the documents listed in paragraph CONTENT OF INVOICE in their entirety as attachments in Wide Area Work Flow (WAWF) for each invoice submitted. The maximum size of each WAWF attachment is two megabytes, but there are no limits on the number of attachments. If a document cannot be attached in WAWF due to system or size restriction, provide it as instructed by the Contracting Officer.

#### 1.3.3 Final Invoice

- a. A final invoice shall be accompanied by the certification required by DFARS 252.247.7023 TRANSPORTATION OF SUPPLIES BY SEA, and the Contractor's Final Release. If the Contractor is incorporated, the Final Release shall contain the corporate seal. An officer of the corporation shall sign and the corporate secretary shall certify the Final Release.
- b. For final invoices being submitted via WAWF, the original Contractor's Final Release Form and required certification of Transportation of Supplies by Sea must be provided directly to the respective Contracting Officer prior to submission of the final invoice. Once receipt of the original Final Release Form and required certification

of Transportation of Supplies by Sea has been confirmed by the Contracting Officer, the Contractor shall then submit final invoice and attach a copy of the Final Release Form and required certification of Transportation of Supplies by Sea in WAWF.

- c. Final invoices not accompanied by the Contractor's Final Release and required certification of Transportation of Supplies by Sea will be considered incomplete and will be returned to the Contractor.

#### 1.4 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests by the Contractor which comply with the requirements of this section, and will be subject to reduction for overpayments or increase for underpayments made on previous payments to the Contractor.

##### 1.4.1 Obligation of Government Payments

The obligation of the Government to make payments required under the provisions of this contract will, at the discretion of the Contracting Officer, be subject to reductions and suspensions permitted under the FAR and agency regulations including the following in accordance with FAR 32.503-6:

- a. Reasonable deductions due to defects in material or workmanship;
- b. Claims which the Government may have against the Contractor under or in connection with this contract;
- c. Unless otherwise adjusted, repayment to the Government upon demand for overpayments made to the Contractor; and
- d. Failure to provide up to date record drawings not current as stated in Contract Clause "FAC 5252.236-9310, Record Drawings."

##### 1.4.2 Payment for Onsite and Offsite Materials

Progress payments may be made to the contractor for materials delivered on the site, for materials stored off construction sites, or materials that are in transit to the construction sites under the following conditions:

- a. FAR 52.232-5(b) Payments Under Fixed Price Construction Contracts.
- b. Materials delivered on the site but not installed, including completed preparatory work, and off-site materials to be considered for progress payment shall be major high cost, long lead, special order, or specialty items, not susceptible to deterioration or physical damage in storage or in transit to the construction site. Examples of materials acceptable for payment consideration include, but are not limited to, structural steel, non-magnetic steel, non-magnetic aggregate, equipment, machinery, large pipe and fittings, precast/prestressed concrete products, plastic lumber (e.g., fender piles/curbs), and high-voltage electrical cable. Materials not acceptable for payment include consumable materials such as nails, fasteners, conduits, gypsum board, glass, insulation, and wall coverings.
- c. Materials to be considered for progress payment prior to installation shall be specifically and separately identified in the Contractor's

estimates of work submitted for the Contracting Officer's approval in accordance with Schedule of Prices requirement of this contract. Requests for progress payment consideration for such items shall be supported by documents establishing their value and that the title requirements of the clause at FAR 52.232-5 have been met.

- d. Materials are adequately insured and protected from theft and exposure.
- e. Provide a written consent from the surety company with each payment request for offsite materials.
- f. Materials to be considered for progress payments prior to installation shall be stored in the Continental United States.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --



SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

08/15

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 (2014) Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

View Location Map; G

Progress and Completion Pictures; G

1.3 VIEW LOCATION MAP

Submit, prior to or with the first digital photograph submittals, a sketch or drawing indicating the required photographic locations. Update as required if the locations are moved.

1.4 PROGRESS AND COMPLETION PICTURES

Photographically document site conditions prior to start of construction operations. Provide monthly, and within one month of the completion of work, digital photographs, 4 megapixel (color) minimum resolution in JPEG file format showing the sequence and progress of work. Take a minimum of 10 digital photographs each day throughout the entire project from a minimum of ten views from points. Submit with the monthly invoice one set of digital photographs on a compact disc (CD) or data versatile disc (DVD), cumulative of all photos to date. Indicate photographs demonstrating environmental procedures. Provide photographs for each month in a separate monthly directory and name each file to indicate its location on the view location sketch. Also provide the view location sketch on the CD or DVD as a digital file. Include a date designator in file names. Cross reference submittals in the appropriate daily report. Photographs provided are for unrestricted use by the Government.

1.5 MINIMUM INSURANCE REQUIREMENTS

Provide the minimum insurance coverage required by FAR 28.307-2 LIABILITY, during the entire period of performance under this contract.

## 1.6 SUPERVISION

### 1.6.1 Minimum Communication Requirements

Have at least one qualified superintendent, or competent alternate, capable of reading, writing, and conversing fluently in the English language, on the job-site at all times during the performance of contract work. In addition, if a Quality Control (QC) representative is required on the contract, then that individual must also have fluent English communication skills.

### 1.6.2 Superintendent Qualifications

The project superintendent must have a minimum of 10 years experience in construction with at least 5 of those years as a superintendent on projects similar in size and complexity. The individual must be familiar with the requirements of EM 385-1-1 and have experience in the areas of hazard identification and safety compliance. The individual must be capable of interpreting a critical path schedule and construction drawings. The qualification requirements for the alternate superintendent are the same as for the project superintendent. The Contracting Officer may request proof of the superintendent's qualifications at any point in the project if the performance of the superintendent is in question.

For routine projects where the superintendent is permitted to also serve as the Quality Control (QC) Manager as established in Section 01 45 00.10 20 QUALITY CONTROL FOR MINOR CONSTRUCTION QUALITY CONTROL, the superintendent must have qualifications in accordance with that section.

#### 1.6.2.1 Duties

The project superintendent is primarily responsible for managing and coordinating day-to-day production and schedule adherence on the project. The superintendent or qualified alternative must be on-site at all times during the performance of this contract until the work is completed and accepted.

### 1.6.3 Project Manager

Assign a Project Manager with the responsibility for the overall management of the project. The Contracting Officer may request proof of the Project Manager's qualifications at any point in the project if the performance of the Project Manager is in question.

#### 1.6.3.1 Project Manager Qualifications

The Project Manager must have a minimum 10 years experience as a Project Manager or Superintendent on projects of similar size and complexity.

### 1.6.4 Non-Compliance Actions

The Project Superintendent is subject to removal by the Contracting Officer for non-compliance with requirements specified in the contract and for failure to manage the project to insure timely completion. Furthermore, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders is acceptable as the subject of claim for extension of time for excess costs or damages by the

Contractor.

#### 1.7 PRECONSTRUCTION MEETING CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the safety program, preparation of the schedule of prices, shop drawings, and other submittals, scheduling programming, prosecution of the work, and clear expectations of the "Interim DD Form 1354" Submittal. Major subcontractors who will engage in the work must also attend.

#### 1.8 PARTNERING

To most effectively accomplish this contract, the Government requires the formation of a cohesive partnership within the Project Team whose members are from the Government, the Contractor and their Subcontractors. Key personnel from the Supported Command, the End User (who will occupy the facility), the Government Design and Construction team and Subject Matter Experts, the Installation, the Contractor and Subcontractors, and the Designer of Record will be invited to participate in the Partnering process. The Partnership will draw on the strength of each organization in an effort to achieve a project that is without any safety mishaps, conforms to the Contract, and stays within budget and on schedule.

The Contracting Officer will provide Information on the Partnering Process and a list of key and optional personnel who should attend the Partnering meeting.

##### 1.8.1 Informal Partnering

The Contracting Officer will organize the Partnering Sessions with key personnel of the project team, including Contractor personnel and Government personnel.

The Initial Partnering session should be a part of the Pre-Construction Meeting. Partnering sessions will be held at a location agreed to by the Contracting Officer and the Contractor (typically a conference room provided by the Resident Engineer office or the Contractor). The Initial Informal Partnering Session will be conducted and facilitated using electronic media (a video and accompanying forms) provided by the Contracting Officer. The Partners will determine the frequency of the follow-on sessions, at no more than 3 to six month intervals.

#### 1.9 ELECTRONIC MAIL (E-MAIL) ADDRESS

Establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments as text files, pdf files, and other similar formats. Within 10 days after contract award, provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use email to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes or terrorist threats. Multiple email addresses are not allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including

field office(s). Promptly notify the Contracting Officer, in writing, of any changes to this email address.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION 01 32 16.00 20

SMALL PROJECT CONSTRUCTION PROGRESS SCHEDULES

02/15

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Schedule; G

SD-07 Certificates

Monthly Updates

1.2 ACCEPTANCE

Prior to the start of work, prepare and submit to the Contracting Officer for acceptance a construction schedule in the form of a Bar Chart Schedule in accordance with the terms in Contract Clause "FAR 52.236-15, Schedules for Construction Contracts," except as modified in this contract.

The acceptance of a Baseline Construction Schedule is a condition precedent to:

- a. The Contractor starting work on the demolition or construction stage(s) of the contract.
- b. Processing Contractor's invoice(s) for construction activities/items of work.
- c. Review of any schedule updates.

Submittal of the Baseline Schedule, and subsequent schedule updates, is understood to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor's plan on how the work will be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

1.3 SCHEDULE FORMAT

1.3.1 Bar Chart Schedule

The Bar Chart must, as a minimum, show work activities, submittals, Government review periods, material/equipment delivery, utility outages, on-site construction, inspection, testing, and closeout activities. The Bar Chart must be time scaled and generated using an electronic spreadsheet program.

### 1.3.2 Schedule Submittals and Procedures

Submit Bar Chart Schedules and updates in hard copy and on electronic media that is acceptable to the Contracting Officer. Submit an electronic back-up of the project schedule in an import format compatible with the Government's scheduling program.

### 1.4 SCHEDULE MONTHLY UPDATES

Update the Construction Schedule at monthly intervals or when the schedule has been revised. The updated schedule must be kept current, reflecting actual activity progress and plan for completing the remaining work. Submit copies of purchase orders and confirmation of delivery dates as directed by the Contracting Officer.

a. Narrative Report: Provide with schedule updates. Identify and justify;

- (1) Progress made in each area of the project
- (2) Critical Path
- (3) Date/time constraint(s), other than those required by the contract
- (4) Changes in the following; added or deleted activities, original and remaining durations for activities that have not started, logic, milestones, planned sequence of operations, and critical path
- (5) Status of Contract Completion Date and interim milestones;
- (6) Current and anticipated delays (describe cause of delay and corrective actions(s) and mitigation measures to minimize);
- (7) Description of current and future schedule problem areas.

Each entry in the narrative report must cite the respective Activity ID and Activity Description, the date and reason for the change, and description of the change.

### 1.5 CONTRACT MODIFICATION

Submit a Time Impact Analysis (TIA) with each cost and time proposal for a proposed change. TIA must illustrate the influence of each change or delay on the Contract Completion Date or milestones. No time extensions will be granted nor delay damages paid unless a delay occurs which consumes all available Project Float, and extends the Projected Finish beyond the Contract Completion Date.

- a. Each TIA must be in both narrative and schedule form. The narrative must define the scope and conditions of the change; provide start and finish dates of impact, successor and predecessor activity to impact period, responsible party, describe how it originated, and how it impacts the schedule.
- b. All TIAs must include any mitigation, and must determine the apportionment of the overall delay assignable to each individual delay. The associated narrative must clearly describe the findings in a chronological listing beginning with the earliest delay event.

(1) Identify types of delays as follows:

(a) Excusable Delay: Force-Majeure (e.g. weather) - Contractor may receive time extension, but time will not be compensable.

(b) Inexcusable Delay: Contractor Responsibility - Contractor will not receive time extension.

(c) Compensable Delay: Government Responsibility - Contractor may receive compensable time extension.

(2) If a combination of any of the delay types outlined above occurs, it is considered a Concurrent Delay, which will require an analysis of the facts to determine compensability and entitlement to any time extension under the applicable contract clauses.

c. Submit Data disks containing the narrative and native schedule files.

d. Unless the Contracting Officer requests otherwise, only add conformed contract modifications into the Project [Schedule](#).

1.6 3-WEEK LOOK AHEAD SCHEDULE

Prepare and issue a 3-Week Look Ahead schedule to provide a more detailed day-to-day plan of upcoming work identified on the Construction Schedule. Key the work plans to activity numbers when a NAS is required and update each week to show the planned work for the current and following two-week period. Additionally, include upcoming outages, closures, preparatory meetings, and initial meetings. Identify critical path activities on the Three-Week Look Ahead Schedule. The detail work plans are to be bar chart type schedules, maintained separately from the Construction Schedule on an electronic spreadsheet program and printed on 8-1/2 by 11 inch sheets as directed by the Contracting Officer. Activities must not exceed 5 working days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work. Deliver three hard copies and one electronic file of the 3-Week Look Ahead Schedule to the Contracting Officer no later than 8 a.m. each Monday, and review during the weekly CQC Coordination or Production Meeting.

1.7 CORRESPONDENCE AND TEST REPORTS:

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs) must reference Schedule Activities that are being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure) must reference Schedule Activities that are being addressed.

1.8 ADDITIONAL SCHEDULING REQUIREMENTS

Any references to additional scheduling requirements, including systems to be inspected, tested and commissioned, that are located throughout the remainder of the Contract Documents, are subject to all requirements of this section.

PART 2 PRODUCTS

Not used.

REPAIR NOSE DOCK 6 ROOF (FAC 434)  
GRISSOM AIR RESERVE BASE, IN

W912DY-14-D-0039

PART 3 EXECUTION

Not used.

-- End of Section --



SECTION 01 33 00

SUBMITTAL PROCEDURES

05/11

PART 1 GENERAL

1.1 SUMMARY

The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring Government approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Safety Data Sheets (SDS) and in compliance with existing laws and regulations.

A submittal register showing items of equipment and materials for when submittals are required by the specifications is provided as "Appendix A - Submittal Register".

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by Submittal Description (SD) numbers and titles as follows:

**SD-01 Preconstruction Submittals**

Submittals which are required prior to start of construction (work). issuance of contract notice to proceed.or commencing work on site.or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction progress schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices or Earned Value Report

Health and safety plan

Work plan

Quality Control(QC) plan

Environmental protection plan

#### SD-02 Shop Drawings

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

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

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

#### SD-03 Product Data

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

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

#### SD-04 Samples

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

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

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

#### SD-05 Design Data

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

Design submittals, design substantiation submittals and extensions of design submittals.

#### SD-06 Test Reports

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

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

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

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

#### SD-07 Certificates

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

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

#### SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS) concerning impedances, hazards and safety precautions.

#### SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including

manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

This data is intended to be incorporated in an operations and maintenance manual or control system.

#### SD-11 Closeout Submittals

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

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

#### 1.2.2 Approving Authority

Office or designated person authorized to approve submittal.

#### 1.2.3 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, [except those SD-01 Pre-Construction Submittals noted above](#), construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

#### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor QC approval [and](#) for information only. Submit the following in accordance with this section.

##### SD-01 Preconstruction Submittals

##### Submittal Register; G

#### 1.4 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

##### 1.4.1 Government Approved (G)

[Government approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Government approval is required for any deviations from the Solicitation or Accepted Proposal and other items as designated by the Contracting Officer. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings."](#)

#### 1.4.2 Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Review will be only for conformance with the applicable codes, standards and contract requirements. Generally, design submittals should be identified as SD-05 Design Data submittals.

#### 1.4.3 Designer of Record Approved/Government Conformance Review (DA/CR)

##### 1.4.3.1 Deviations to the Accepted Design

Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if deemed necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

##### 1.4.3.2 Substitutions

Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal. If the Contract otherwise prohibits substitutions of equal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, the request is considered a "variation" to the contract. Variations are discussed below in paragraphs: "Designer of Record Approved/Government Approved" and "VARIATIONS."

#### 1.4.4 Designer of Record Approved/Government Approved (DA/GA)

In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is authorized to proceed with material acquisition or installation for any proposed variation to the contract (the solicitation and/or the accepted proposal), which constitutes a change to the contract terms. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings." The Government reserves the right to accept or reject any such proposed deviation at its discretion.

1.5 FORWARDING SUBMITTALS REQUIRING GOVERNMENT APPROVAL

1.5.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward as directed by the Contracting Officer all submittals required in the technical sections of this specification, including shop drawings, product data and samples. Forward one copy of the transmittal form for all submittals to the Resident Officer in Charge of Construction.

1.5.1.1 O&M Data

In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.6 PREPARATION

1.6.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels to office of approving authority. Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph IDENTIFYING SUBMITTALS. Process transmittal forms to record actions regarding samples.

1.6.2 Identifying Submittals

When submittals are provided by a Subcontractor, the Prime Contractor is to prepare, review and stamp with Contractor's approval all specified submittals prior to submitting for Government approval.

Identify submittals, except sample installations and sample panels, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

- a. Project title and location.
- b. Construction contract number.
- c. Date of the drawings and revisions.
- d. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other subcontractor associated with the submittal.
- e. Section number of the specification section by which submittal is required.
- f. Submittal description (SD) number of each component of submittal.
- g. When a resubmission, add alphabetic suffix on submittal description, for example, submittal 18 would become 18A, to indicate resubmission.
- h. Product identification and location in project.

### 1.6.3 Format for SD-02 Shop Drawings

Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Include the nameplate data, size and capacity on drawings. Also include applicable federal, military, industry and technical society publication references.

Submit drawings in PDF format.

### 1.6.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.

Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, submit as specified for SD-07 Certificates.

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters

Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of construction effort.

Submit manufacturer's instructions prior to installation.

#### 1.6.5 Format of SD-04 Samples

Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

- a. Color Selection Samples: 2 by 4 inch for initial selection and 12 by 12 inch for final selection. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.

When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

#### 1.6.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

#### 1.6.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Provide reports on 8 1/2 by 11 inches paper in a complete bound volume.

Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains.

#### 1.6.8 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified.

#### 1.6.9 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.



#### 1.6.10 Source Drawings for Shop Drawings

The entire set of Source Drawing files (DWG) will not be provided to the Contractor. Only those requested by the Contractor to prepare shop drawings may be provided. Request the specific Drawing Number only for the preparation of Shop Drawings. These drawings may only be provided after award.

##### 1.6.10.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse shall be at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic Source Drawing files are not construction documents. Differences may exist between the Source Drawing files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic Source Drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source Drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic Source Drawing files for use in producing construction data related to this contract, remove all previous indicia of ownership (seals, logos, signatures, initials and dates).

##### 1.6.11 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. In addition to the electronic submittal, provide three hard copies of the submittals. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. Generate PDF files from original documents with bookmarks so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature, or scan of a signature.

Email electronic submittal documents fewer than 10MB to an email address as directed by the Contracting Officer. Provide electronic documents over 10MB on an optical disc, or through an electronic file sharing system such as the AMRDEC SAFE Web Application located at the following website:

<https://safe.amrdec.army.mil/safe/>.

Provide hard copies of submittals when requested by the Contracting Officer. Up to 2 additional hard copies of any submittal may be requested at the discretion of the Contracting Officer, at no additional cost to the Government.

#### 1.7 QUANTITY OF SUBMITTALS

Include submittals on products identified/specified on the drawings.

##### 1.7.1 Number of Copies of SD-02 Shop Drawings

Submit three hard copies and required electronic copy of submittals of shop drawings requiring review and approval by the Government.

##### 1.7.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

##### 1.7.3 Number of Samples SD-04 Samples

- a. Submit two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.

##### 1.7.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

##### 1.7.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

##### 1.7.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit three copies of O&M Data to the Contracting Officer for review and approval.

##### 1.7.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit three sets of administrative submittals.

#### 1.8 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor

to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

#### 1.9 SUBMITTAL REGISTER AND DATABASE

Prepare and maintain submittal register, as the work progresses. Use electronic submittal register program furnished by the Government or any other format. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. A submittal register showing items of equipment and materials for which submittals are required by the specifications is provided as an attachment. This list may not be all inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM).

##### 1.9.1 Use of Submittal Register

Submit submittal register as an electronic database, using submittals management program furnished to Contractor. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register database submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Column (h) Contractor Approval Date: Date Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

##### 1.9.2 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor with each submittal throughout contract.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) List date of submittal transmission.

Column (q) List date approval received.

### 1.9.3 Approving Authority Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in program utilized by Contractor.

Column (b) Transmittal Number: Contractor assigned list of consecutive numbers.

Column (l) List date of submittal receipt.

Column (m) through (p) List Date related to review actions.

Column (q) List date returned to Contractor.

### 1.9.4 Action Codes

Entries for columns (j) and (o), are to be used are as follows (others may be prescribed by Transmittal Form):

#### 1.9.4.1 Government Review Action Codes

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, except as noted on drawings; resubmission required"; "Resubmit"

"D" - "Returned by separate correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply with contract requirements"; "Resubmit"

#### 1.9.4.2 Contractor Action Codes

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

### 1.9.5 Copies Delivered to the Government

Deliver one copy of submittal register updated by Contractor to Government with each invoice request. Deliver in electronic format, unless a paper copy is requested by Contracting Officer.

### 1.10 VARIATIONS

Variations from contract requirements require Government approval pursuant to contract Clause FAR 52.236-21 and will be considered where advantageous

to Government.

#### 1.10.1 Considering Variations

Discussion with Contracting Officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and re-submittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out deviations may result in the Government requiring rejection and removal of such work at no additional cost to the Government.

#### 1.10.2 Proposing Variations

When proposing variation, deliver written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government, including the DOR's written analysis and approval. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

#### 1.10.3 Warranting that Variations are Compatible

When delivering a variation for approval, Contractor, warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

#### 1.10.4 Review Schedule Extension

In addition to normal submittal review period, a period of 10 working days will be allowed for consideration by the Government of submittals with variations.

#### 1.11 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Include certifications to be submitted with the pertinent drawings at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

- a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.
- b. Submittals called for by the contract documents will be listed on the register. If a submittal is called for but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but which have been omitted from the register or marked "N/A."
- c. Re-submit register and annotate monthly by the Contractor with actual

submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

- d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."
- e. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 7 working days for submittals for QC Manager approval and 15 working days for submittals for Contracting Officer approval. Period of review for submittals with Contracting Officer approval begins when Government receives submittal from QC organization.
- f. Period of review for each resubmittal is the same as for initial submittal.

Within 15 calendar days of notice to proceed, but no later than the Preconstruction conference, provide, for approval by the Contracting Officer, the following schedule of submittals:

- a. A schedule of shop drawings and technical submittals required by the specifications and drawings. Indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; the "SD" number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.
- b. A separate schedule of other submittals required under the contract but not listed in the specifications or drawings. Schedule will indicate the contract requirement reference; the type or title of the submittal; the Contractor's anticipated submission date and the approved need date (if approval is required).

#### 1.11.1 Constraints

Conform to provisions of this section, unless explicitly stated otherwise for submittals listed or specified in this contract.

Submit complete submittals for each definable feature of work. Submit at the same time components of definable feature interrelated as a system.

When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

#### 1.12 GOVERNMENT APPROVING AUTHORITY

When approving authority is Contracting Officer, the Government will:

- a. Note date on which submittal was received from QC Manager.
- b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

- c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with markings appropriate for action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. 2 copies of the submittal will be retained by the Contracting Officer and 1 copy of the submittal will be returned to the Contractor. If the Government performs a conformance review of other Designer of Record approved submittals, the submittals will be so identified and returned, as described above.

#### 1.12.1 Review Notations

Contracting Officer review will be completed within 14 calendar days after date of submission. Submittals will be returned to the Contractor with the following notations:

- a. Submittals marked "approved" or "accepted" authorize the Contractor to proceed with the work covered.
- b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize the Contractor to proceed with the work covered provided he takes no exception to the corrections.
- c. Submittals marked "not approved" or "disapproved," or "revise and resubmit," indicate noncompliance with the contract requirements or design concept, or that submittal is incomplete. Resubmit with appropriate changes. No work shall proceed for this item until resubmittal is approved.
- d. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

#### 1.13 DISAPPROVED OR REJECTED SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications; notice as required under the FAR clause entitled CHANGES, is to be given to the Contracting Officer. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and submission of the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

#### 1.14 APPROVED/ACCEPTED SUBMITTALS

The Contracting Officer's approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are

satisfactory.

Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

#### 1.15 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not be construed to change or modify any contract requirements. Before submitting samples, the Contractor to assure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those which may be damaged in testing, will be returned to the Contractor, at his expense, upon completion of the contract. Samples not approved will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which previously has proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Contractor to replace such materials or equipment to meet contract requirements.

Approval of the Contractor's samples by the Contracting Officer does not relieve the Contractor of his responsibilities under the contract.

#### 1.16 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made if all required required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.



1.17 PROGRESS SCHEDULE

1.17.1 Bar Chart

- a. Submit the progress chart, for approval by the Contracting Officer, at the Preconstruction Conference in one reproducible and 4 copies.
- b. Prepare the progress chart in the form of a bar chart utilizing form "Construction Progress Chart" or comparable format acceptable to the Contracting Officer.
- c. Include no less than the following information on the progress chart:
  - (1) Break out by major headings for primary work activity.
  - (2) A line item break out under each major heading sufficient to track the progress of the work.
  - (3) A line item showing contract finalization task which includes punch list, clean-up and demolition, and final construction drawings.
  - (4) A materials bar and a separate labor bar for each line item. Both bars will show the scheduled percentage complete for any given date within the contract performance period. Labor bar will also show the number of men (man-load) expected to be working on any given date within the contract performance period.
  - (5) The estimated cost and percentage weight of total contract cost for each materials and labor bar on the chart.
  - (6) Separate line items for mobilization and drawing submittal and approval. (These items are to show no associated costs.)
- d. Update the progress schedule in one reproduction and 4 copies every 30 calendar days throughout the contract performance period.

1.18 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR  (Firm Name)
_____ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheets(s)
SIGNATURE: _____
TITLE: _____
DATE: _____

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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Line	Activity #	Transmittal #	Specification Section	SD #	Submittal Description	Item Submitted	Paragraph #	Classification: GOVT or A/E Revwr	Submit	Approval Needed By	Material Needed By	Action Code	Date Of Action	Date FWD to APPR / Auth Date RCD From CONTR	Date FWD To Other Revwr	Date RCD From Other Revwr	Action Code	Date Of Action	Mailed To CONTR/ Date RCD From APPR Authority	Remarks									
1			01 11 00	01	Preconstruction Submittals	Utility Outage Requests	1.6.1																						
2			01 11 00	01	Preconstruction Submittals	Utility Connection Requests	1.6.1																						
3			01 11 00	01	Preconstruction Submittals	Excavation Permits	1.6.2																						
4			01 11 00	01	Preconstruction Submittals	Welding Permits	1.6.2																						
5			01 14 00	01	Preconstruction Submittals	List of Contact Personnel	1.5.1.1	G																					
6			01 14 00	01	Preconstruction Submittals	Personnel List	1.6.1	G																					
7			01 14 00	01	Preconstruction Submittals	Vehicle List	1.6.2	G																					
8			01 20 00.00 20	01	Preconstruction Submittals	Schedule of Prices	1.3	G																					
9			01 30 00	01	Preconstruction Submittals	View Location Map	1.3	G																					
10			01 30 00	01	Preconstruction Submittals	Progress and Completion Pictures	1.4	G																					
11			01 32 16.00 20	01	Preconstruction Submittals	Construction Schedule	1.2	G																					
12			01 32 16.00 20	07	Certificates	Monthly Updates	1.4																						
13			01 33 00	01	Preconstruction Submittals	Submittal Register	1.9	G																					
14			01 35 26	01	Preconstruction Submittals	Accident Prevention Plan (APP)	1.8	G																					
15			01 35 26	06	Test Reports	Monthly Exposure Reports	1.4																						
16			01 35 26	06	Test Reports	Notifications and Reports	1.13																						
17			01 35 26	06	Test Reports	Accident Reports	1.13.2	G																					
18			01 35 26	06	Test Reports	LHE Inspection Reports	1.13.3																						
19			01 35 26	07	Certificates	Contractor Safety Self-Evaluation Checklist	1.5																						
20			01 35 26	07	Certificates	Crane Operators/Riggers	1.7.1.3																						
21			01 35 26	07	Certificates	Standard Lift Plan	1.8.2.1	G																					
22			01 35 26	07	Certificates	Critical Lift Plan	1.8.2.2	G																					
23			01 35 26	07	Certificates	Activity Hazard Analysis (AHA)	1.9																						
24			01 35 26	07	Certificates	Hot Work Permit	1.10.1																						
25			01 35 26	07	Certificates	Certificate of Compliance	1.13.4																						
26			01 45 00.10 20	01	Preconstruction Submittals	QC Plan	1.6	G																					
27			01 50 00	01	Preconstruction Submittals	Construction Site Plan	1.3	G																					
28			01 50 00	01	Preconstruction Submittals	Traffic Control Plan	3.4.1	G																					
29			01 74 19	01	Preconstruction Submittals	Waste Management Plan	1.6	G																					
30			01 78 00	03	Product Data	Warranty	1.6.1																						
31			01 78 00	08	Manufacturer's Instructions	Instructions	1.6.2																						
32			01 78 00	10	Operation and Maintenance Data	Operation and Maintenance Manuals	1.6.1	G																					
33			01 78 00	11	Closeout Submittals	As-Built Drawings	3.1	G																					
34			01 78 00	11	Closeout Submittals	Record Drawings	2.2.1	G																					

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35		01 78 00	11	Closeout Submittals	Final Approved Shop Drawings	3.3													
36		01 78 00	11	Closeout Submittals	Construction Contract Specifications	3.4													
37		01 78 00	11	Closeout Submittals	Interim DD FORM 1354	3.6	G												
38		01 78 00	11	Closeout Submittals	Checklist for DD FORM 1354	3.6	G												
39		02 41 00	01	Preconstruction Submittals	Deconstruction Plan	1.2.1	G												
40		02 41 00	01	Preconstruction Submittals	Existing Conditions	1.11													
41		02 41 00	07	Certificates	Notification	1.7	G												
42		05 12 00	01	Preconstruction Submittals	Erection Drawings	1.4.1.1	G												
43		05 12 00	02	Shop Drawings	Fabrication Drawings	1.4.2	G												
44		05 12 00	03	Product Data	Shop Primer	2.4.2													
45		05 12 00	03	Product Data	Welding Electrodes and Rods	2.3.1													
46		05 12 00	06	Test Reports	Weld Inspection Reports	3.5.1.2													
47		05 12 00	07	Certificates	Steel	2.2													
48		05 12 00	07	Certificates	AISC Erector Quality Certification	1.3													
49		05 12 00	07	Certificates	Welding Procedures and Qualifications	1.4.3.1													
50		05 12 00	07	Certificates	Welding Electrodes and Rods	2.3.1													
51		05 46 01	02	Shop Drawings	Calculations	1.7.1													
52		05 46 01	02	Shop Drawings	Erection Details	1.7.1													
53		05 46 01	02	Shop Drawings	Elevations	1.7.1													
54		05 46 01	02	Shop Drawings	Retrofit Roof Framing	1.7.1													
55		05 46 01	03	Product Data	accessories	1.7.2													
56		05 46 01	03	Product Data	Test Reports	1.7.2													
57		05 46 01	03	Product Data	Welder Qualification Test Records	1.7.2													
58		05 46 01	07	Certificates	Manufacturer Qualifications	1.5													
59		05 46 01	07	Certificates	Installation Contractor Qualifications	1.4													
60		07 56 00	02	Shop Drawings	Fluid-applied Roofing	2.1	G												
61		07 56 00	03	Product Data	Fluid-applied Roofing	2.1	G												
62		07 56 00	03	Product Data	Fabric Reinforcement	2.6	G												
63		07 56 00	03	Product Data	Primers	2.3	G												
64		07 56 00	07	Certificates	Qualifications of Manufacturer	1.5.1	G												
65		07 56 00	07	Certificates	Manufacturer's project approval letter	1.5	G												
66		07 56 00	07	Certificates	Qualifications of Applicator	1.5.2	G												
67		07 56 00	07	Certificates	Warranty	1.8	G												
68		07 56 00	07	Certificates	Adhesion Test	1.5	G												
69		07 56 00	08	Manufacturer's Instructions	Installation	1.4													
70		07 56 00	11	Closeout Submittals	Warranty	1.8	G												
71		07 56 00	11	Closeout Submittals	Warranty	1.8	G												
72		07 56 00	11	Closeout Submittals	Information Card	3.6													

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73			07 56 00	11 Closeout Submittals	Instructions To Owner Personnel	3.5																
74			07 61 14.00 20	02 Shop Drawings	Roofing	1.2.3	G															
75			07 61 14.00 20	03 Product Data	Roofing Panels	2.2	G															
76			07 61 14.00 20	03 Product Data	Attachment Clips	2.4																
77			07 61 14.00 20	03 Product Data	Closures	2.5.1																
78			07 61 14.00 20	03 Product Data	Accessories	2.5																
79			07 61 14.00 20	03 Product Data	Fasteners	2.5.2																
80			07 61 14.00 20	03 Product Data	Sealants	2.5.3																
81			07 61 14.00 20	03 Product Data	Insulation	2.6																
82			07 61 14.00 20	03 Product Data	Warranty	1.7	G															
83			07 61 14.00 20	04 Samples	Panel	2.2																
84			07 61 14.00 20	04 Samples	Accessories	2.5																
85			07 61 14.00 20	04 Samples	Sealants	2.5.3																
86			07 61 14.00 20	05 Design Data	Design Calculations	1.5																
87			07 61 14.00 20	06 Test Reports	Field Inspection	3.7																
88			07 61 14.00 20	06 Test Reports	Structural Performance	1.3.3																
89			07 61 14.00 20	06 Test Reports	Finish	1.6.6																
90			07 61 14.00 20	07 Certificates	Manufacturer's Technical Representative	1.6.3																
91			07 61 14.00 20	07 Certificates	Installer's Qualifications	1.6.4																
92			07 61 14.00 20	07 Certificates	Coil Stock	2.2	G															
93			07 61 14.00 20	08 Manufacturer's Instructions	Installation	3.3	G															
94			07 61 14.00 20	11 Closeout Submittals	Information Card	3.9																
95			07 61 14.00 20	11 Closeout Submittals	Warranty	1.7																
96			26 41 00	02 Shop Drawings	Overall lightning protection system	1.4.1.1	G															
97			26 41 00	02 Shop Drawings	Each major component	1.4.1.2	G															
98			26 41 00	06 Test Reports	Lightning Protection and Grounding System Test Plan	1.4.3	G															
99			26 41 00	06 Test Reports	Lightning Protection and Grounding System Test	3.4.1	G															
100			26 41 00	07 Certificates	Lightning Protection System Installers Documentation	1.2.3	G															
101			26 41 00	07 Certificates	Component UL Listed and Labeled	1.4.2	G															
102			26 41 00	07 Certificates	Lightning protection system inspection certificate	1.4.4	G															
103			26 41 00	07 Certificates	Roof manufacturer's warranty	3.1.1	G															
104			32 01 19	03 Product Data	Manufacturer's Recommendations	3.1.2.3	G															
105			32 01 19	03 Product Data	Equipment	3.1																
106			32 01 19	04 Samples	Materials	1.3.1	G															
107			32 01 19	06 Test Reports	Certified Copies of the Test Reports	1.3.1	G															
108			32 12 13	03 Product Data	Waybills and Delivery Tickets	1.1.1																
109			32 12 13	06 Test Reports	Sampling and Testing	3.7																

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110		32 12 15.13	03	Product Data	Mix Design	2.4	G											
111		32 12 15.13	03	Product Data	Contractor Quality Control	3.1	G											
112		32 12 15.13	04	Samples	Aggregates	2.2												
113		32 12 15.13	04	Samples	Asphalt Cement Binder	2.3												
114		32 12 15.13	06	Test Reports	Aggregates	2.2	G											
115		32 12 15.13	06	Test Reports	QC Monitoring	3.1.3.10												
116		32 12 15.13	07	Certificates	Asphalt Cement Binder	2.3	G											
117		32 12 15.13	07	Certificates	Testing Laboratory	3.7												
118		32 13 11	03	Product Data	Dowels	2.9.1	G											
119		32 13 11	03	Product Data	Equipment	2.11												
120		32 13 11	03	Product Data	Proposed Techniques	3.1.2	G											
121		32 13 11	05	Design Data	Preliminary Proposed Proportioning	2.13.2	G											
122		32 13 11	05	Design Data	Proportioning Studies	2.13.2	G											
123		32 13 11	06	Test Reports	Batch Plant Manufacturer's Inspection Report	1.3.1	G											
124		32 13 11	06	Test Reports	Sampling and Testing	2.1.4.1	G											
125		32 13 11	06	Test Reports	Mixer Performance (Uniformity) Testing	2.11.1.3	G											
126		32 13 11	06	Test Reports	Repair Recommendations Plan	3.9.1	G											
127		32 13 11	07	Certificates	Contractor Quality Control Staff	1.3.1	G											
128		32 13 11	07	Certificates	Laboratory Accreditation and Validation	1.3.3												
129		32 13 11	07	Certificates	Commercial Laboratory	1.3.3.3	G											
130		32 13 11	07	Certificates	NRMCA Certificate of Conformance	2.11												

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS  
11/15

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 SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.22	(2007; R 2012) Safety Requirements for Rope-Guided and Non-Guided Workers' Hoists
ASSE/SAFE A10.34	(2001; R 2012) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.0	(2012) Definitions and Nomenclature Used for Fall Protection and Fall Arrest
ASSE/SAFE Z359.1	(2016) The Fall Protection Code
ASSE/SAFE Z359.11	(2014) Safety Requirements for Full Body Harnesses
ASSE/SAFE Z359.12	(2009) Connecting Components for Personal Fall Arrest Systems
ASSE/SAFE Z359.13	(2013) Personal Energy Absorbers and Energy Absorbing Lanyards
ASSE/SAFE Z359.14	(2014) Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
ASSE/SAFE Z359.15	(2014) Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems
ASSE/SAFE Z359.2	(2007) Minimum Requirements for a Comprehensive Managed Fall Protection Program
ASSE/SAFE Z359.3	(2007) Safety Requirements for Positioning and Travel Restraint Systems
ASSE/SAFE Z359.4	(2013) Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components
ASSE/SAFE Z359.6	(2009) Specifications and Design Requirements for Active Fall Protection Systems

ASSE/SAFE Z359.7 (2011) Qualification and Verification  
Testing of Fall Protection Products

ASME INTERNATIONAL (ASME)

ASME B30.20 (2013; INT Oct 2010 - May 2012)  
Below-the-Hook Lifting Devices

ASME B30.22 (2016) Articulating Boom Cranes

ASME B30.23 (2011) Personnel Lifting Systems Safety  
Standard for Cableways, Cranes, Derricks,  
Hoists, Hooks, Jacks, and Slings

ASME B30.26 (2015; INT Jun 2010 - Jun 2014) Rigging  
Hardware

ASME B30.3 (2016) Tower Cranes

ASME B30.5 (2014) Mobile and Locomotive Cranes

ASME B30.7 (2011) Winches

ASME B30.8 (2015) Floating Cranes and Floating  
Derricks

ASME B30.9 (2014; INT Feb 2011 - Nov 2013) Slings

ASTM INTERNATIONAL (ASTM)

ASTM F855 (2015) Standard Specifications for  
Temporary Protective Grounds to Be Used on  
De-energized Electric Power Lines and  
Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048 (2003) Guide for Protective Grounding of  
Power Lines

IEEE C2 (2017; Errata 1 2017) National Electrical  
Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2013) Standard for Portable Fire  
Extinguishers

NFPA 241 (2013; Errata 2015) Standard for  
Safeguarding Construction, Alteration, and  
Demolition Operations

NFPA 51B (2014) Standard for Fire Prevention During  
Welding, Cutting, and Other Hot Work

NFPA 70 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2;  
TIA 17-3) National Electrical Code

NFPA 70E (2015; ERTA 1 2015) Standard for



Electrical Safety in the Workplace

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-1019 (2012; R 2016) Standard for Installation, Alteration and Maintenance of Antenna Supporting Structures and Antennas

TIA-222 (2005G; Add 1 2007; Add 2 2009; Add 3 2014; Add 4 2014; R 2014; R 2016) Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements Manual

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

29 CFR 1910 Occupational Safety and Health Standards

29 CFR 1910.147 Control of Hazardous Energy (Lock Out/Tag Out)

29 CFR 1926 Safety and Health Regulations for Construction

29 CFR 1926.1400 Cranes and Derricks in Construction

29 CFR 1926.16 Rules of Construction

29 CFR 1926.500 Fall Protection

29 CFR 1926.552 Material Hoists, Personal Hoists, and Elevators

29 CFR 1926.553 Base-Mounted Drum Hoists

CPL 02-01-056 (2014) Inspection Procedures for Accessing Communication Towers by Hoist

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying,

evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.3 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.4 Competent Person, Fall Protection

The CP, Fall Protection, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and in accordance with ASSE/SAFE Z359.0, who has been designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the fall protection program, who through training, knowledge and experience in fall protection and rescue systems and equipment, is capable of identifying, evaluating and addressing existing and potential fall hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

#### 1.2.5 Competent Person, Scaffolding

The CP, Scaffolding is a person meeting the competent person requirements in EM 385-1-1 Appendix Q, and designated in writing by the employer to be responsible for immediate supervising, implementing and monitoring of the scaffolding program. The CP for Scaffolding has enough training, knowledge and experience in scaffolding to correctly identify, evaluate and address existing and potential hazards and also has the authority to take prompt corrective measures with regard to these hazards. CP qualifications must be documented and include experience on the specific scaffolding systems/types being used, assessment of the base material that the scaffold will be erected upon, load calculations for materials and personnel, and erection and dismantling. The CP for scaffolding must have a documented, minimum of 8-hours of scaffold training to include training on the specific type of scaffold being used (e.g. mast-climbing, adjustable, tubular frame), in accordance with EM 385-1-1 Section 22.B.02.

#### 1.2.6 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

#### 1.2.7 High Risk Activities

High Risk Activities are activities that involve work at heights, crane

and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

#### 1.2.8 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

#### 1.2.9 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or horizontally move a load).

#### 1.2.10 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

#### 1.2.11 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

#### 1.2.12 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

#### 1.2.13 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

#### 1.2.14 Qualified Person, Fall Protection (QP for FP)

A QP for FP is a person meeting the requirements of EM 385-1-1 Appendix Q, and ASSE/SAFE Z359.0, with a recognized degree or professional certificate and with extensive knowledge, training and experience in the fall protection and rescue field who is capable of designing, analyzing, and evaluating and specifying fall protection and rescue systems.

#### 1.2.15 USACE Property and Equipment

Interpret "USACE" property and equipment specified in USACE EM 385-1-1 as Government property and equipment.

1.2.16 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G

LHE Inspection Reports

SD-07 Certificates

Contractor Safety Self-Evaluation Checklist

Crane Operators/Riggers

Standard Lift Plan; G

Critical Lift Plan ; G

Activity Hazard Analysis (AHA)

Hot Work Permit

Certificate of Compliance

1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

## 1.5 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction conference. Complete the checklist monthly and submit with each request for payment voucher. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90 may result in retention of up to 10 percent of the voucher.

## 1.6 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent edition of USACE EM 385-1-1, and federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

## 1.7 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

### 1.7.1 Personnel Qualifications

#### 1.7.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one (1) person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

#### 1.7.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO may also serve as the Quality Control Manager. The SSHO may also serve as the Superintendent.

#### 1.7.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in

writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the Competent Persons(s) to the the Contracting Officer for information in consultation with the Safety Office.

#### 1.7.1.2.1 Competent Person for Fall Protection

Provide a Competent Person for Fall Protection who meets the requirements of EM 385-1-1, Section 21.C.04 and herein.

#### 1.7.1.3 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. Provide proof of current qualification.

#### 1.7.2 Personnel Duties

##### 1.7.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.
- b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.
- c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.
- d. Maintain applicable safety reference material on the job site.
- e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.
- f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.
- g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.
- h. Ensure subcontractor compliance with safety and health requirements.
- i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

- j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.
- k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSO are subject to dismissal if the above duties are not being effectively carried out. If Superintendent, QC Manager, or SSO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

### 1.7.3 Meetings

#### 1.7.3.1 Preconstruction Conference

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational Health officer, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).
- b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.
- c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin work until an APP is established that is acceptable to the Contracting Officer.

#### 1.7.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors on the project location. The SSO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

### 1.8 ACCIDENT PREVENTION PLAN (APP)

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of [EM 385-1-1](#),

Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34), and the environment.

#### 1.8.1 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

- a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.
- b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of



the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

## 1.8.2 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

### 1.8.2.1 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of 3 months.

### 1.8.2.2 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

- a. Lifts over 50 percent of the capacity of crane's hoist.
- b. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.
- c. For lifts with anticipated binding conditions.
- d. When erecting cranes.

#### 1.8.2.2.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

#### 1.8.2.2.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

### 1.8.2.3 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. Demonstrate that

the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

#### 1.8.2.4 Fall Protection and Prevention (FP&P) Plan

The plan must comply with the requirements of EM 385-1-1, Section 21.D and ASSE/SAFE Z359.2, be site specific, and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A competent person or qualified person for fall protection must prepare and sign the plan documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, roles and responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Review and revise, as necessary, the Fall Protection and Prevention Plan documentation as conditions change, but at a minimum every six months, for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Plan documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Plan documentation in the Accident Prevention Plan (APP).

#### 1.8.2.5 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSE/SAFE Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

#### 1.8.2.6 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A.

### 1.9 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

### 1.9.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

### 1.9.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOV must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

## 1.10 DISPLAY OF SAFETY INFORMATION

### 1.10.1 Safety Bulletin Board

Within 7 calendar day(s) after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

- a. Hot work permit.

### 1.10.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

- a. Date deficiency identified;
- b. Description of deficiency;
- c. Name of person responsible for correcting deficiency;
- d. Projected resolution date;
- e. Date actually resolved.

### 1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

#### 1.12 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment.  
Government has no responsibility to provide emergency medical treatment.

#### 1.13 NOTIFICATIONS and REPORTS

##### 1.13.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than 4 hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

##### 1.13.2 Accident Reports

- a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete an investigation report within 30 days for those mishaps defined by EM 385-1-1 01.D.04. Mishaps defined by EM 385-1-1 01.D.04 and 01.D.05 must include a written report using the following outline: (1) Mishap summary description to include process, findings and outcomes; (2) Root Cause; (3) Direct Factors; (4) Indirect and Contributing Factors; (5) Corrective Actions; and (6) Recommendations. Complete the applicable USACE Accident Report Form 3394, and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.
- b. Near Misses: Report all "Near Misses" to the GDA, using local mishap reporting procedures, within 24 hrs. The Contracting Officer will provide the Contractor the required forms. Near miss reports are considered positive and proactive Contractor safety management actions.
- c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with

crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

#### 1.13.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

#### 1.13.4 Certificate of Compliance and Pre-lift Plan/Checklist for LHE and Rigging

Provide a FORM 16-1 Certificate of Compliance for LHE entering an activity under this contract and in accordance with EM 385-1-1. Post certifications on the crane.

Develop a Standard Lift Plan (SLP) in accordance with EM 385-1-1, Section 16.H.03 using Form 16-2 Standard Pre-Lift Crane Plan/Checklist for each lift planned. Submit SLP to the Contracting Officer for approval within 15 calendar days in advance of planned lift.

#### 1.14 HOT WORK

##### 1.14.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Fire Division. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

#### 1.15 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

- a. Secure outside equipment and materials and place materials that could be damaged in protected areas.
- b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.
- c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

- a. Hard Hat
- b. Long Pants
- c. Appropriate Safety Shoes
- d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. An employee check-in/check-out communication procedure must be developed to ensure employee safety.

3.1.2 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4, "Changes" and FAR 52.236-2, "Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Apply for utility outages at least 14 days in advance. As a minimum, the request must include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the Contracting Officer and the

Installation representative to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

### 3.3 FALL PROTECTION PROGRAM

Establish a fall protection program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify roles and responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures in accordance with ASSE/SAFE Z359.2 and EM 385-1-1, Sections 21.A and 21.D.

#### 3.3.1 Training

Institute a fall protection training program. As part of the Fall Protection Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with EM 385-1-1, Section 21.C. Document training and practical application of the competent person in accordance with EM 385-1-1, Section 21.C.04 and ASSE/SAFE Z359.2 in the AHA.

#### 3.3.2 Fall Protection Equipment and Systems

Enforce use of personal fall protection equipment and systems designated (to include fall arrest, restraint, and positioning) for each specific work activity in the Site Specific Fall Protection and Prevention Plan and AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21.

Provide personal fall protection equipment, systems, subsystems, and components that comply with EM 385-1-1 Section 21.I, 29 CFR 1926.500 Subpart M, ASSE/SAFE Z359.0, ASSE/SAFE Z359.1, ASSE/SAFE Z359.2, ASSE/SAFE Z359.3, ASSE/SAFE Z359.4, ASSE/SAFE Z359.6, ASSE/SAFE Z359.7, ASSE/SAFE Z359.11, ASSE/SAFE Z359.12, ASSE/SAFE Z359.13, ASSE/SAFE Z359.14, and ASSE/SAFE Z359.15.

##### 3.3.2.1 Additional Personal Fall Protection

In addition to the required fall protection systems, other protection such as safety skiffs, personal floatation devices, and life rings, are required when working above or next to water in accordance with EM 385-1-1, Sections 21.0 through 21.0.06. Personal fall protection systems and equipment are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall protection systems are required when operating other equipment such as scissor lifts. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, travel, or while performing work.

##### 3.3.2.2 Personal Fall Protection Harnesses

Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. The use of body belts is not acceptable. Harnesses must have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Snap

hooks and carabiners must be self-closing and self-locking, capable of being opened only by at least two consecutive deliberate actions and have a minimum gate strength of 3,600 lbs in all directions. Use webbing, straps, and ropes made of synthetic fiber. The maximum free fall distance when using fall arrest equipment must not exceed 6 feet, unless the proper energy absorbing lanyard is used. Always take into consideration the total fall distance and any swinging of the worker (pendulum-like motion), that can occur during a fall, when attaching a person to a fall arrest system. All full body harnesses must be equipped with Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance in accordance with EM 385-1-1, Section 21.I.06.

### 3.3.3 Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

#### a. Low Sloped Roofs:

- (1) For work within 6 feet of an edge, on a roof having a slope less than or equal to 4:12 (vertical to horizontal), protect personnel from falling by use of personal fall arrest/restraint systems, guardrails, or safety nets. A safety monitoring system is not adequate fall protection and is not authorized. Provide in accordance with 29 CFR 1926.500.
- (2) For work greater than 6 feet from an edge, erect and install warning lines in accordance with 29 CFR 1926.500 and EM 385-1-1, Section L.

- #### b. Steep-Sloped Roofs:
- Work on a roof having a slope greater than 4:12 (vertical to horizontal) requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also applies to residential or housing type construction.

### 3.3.4 Horizontal Lifelines (HLL)

Provide HLL in accordance with EM 385-1-1, Section 21.I.08.d.2. Commercially manufactured horizontal lifelines (HLL) must be designed, installed, certified and used, under the supervision of a qualified person, for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500). The competent person for fall protection may (if deemed appropriate by the qualified person) supervise the assembly, disassembly, use and inspection of the HLL system under the direction of the qualified person. Locally manufactured HLLs are not acceptable unless they are custom designed for limited or site specific applications by a Registered Professional Engineer who is qualified in designing HLL systems.

### 3.3.5 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1, Section 21.F.01 and 29 CFR 1926 Subpart M.



### 3.3.6 Rescue and Evacuation Plan and Procedures

When personal fall arrest systems are used, ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue or assisted-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP). The plan must comply with the requirements of EM 385-1-1, ASSE/SAFE Z359.2, and ASSE/SAFE Z359.4.

## 3.4 WORK PLATFORMS

### 3.4.1 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Comply with the following requirements:

- a. Scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system.
- b. Ladders commonly provided by scaffold system manufacturers are prohibited for accessing scaffold platforms greater than 20 feet maximum in height.
- c. An adequate gate is required.
- d. Employees performing scaffold erection and dismantling must be qualified.
- e. Scaffold must be capable of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan.
- f. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.
- g. Special care must be given to ensure scaffold systems are not overloaded.
- h. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to 4 times the width of the smallest dimension of the scaffold base.
- i. Scaffolding other than suspended types must bear on base plates upon wood mudsills (2 in x 10 in x 8 in minimum) or other adequate firm foundation.
- j. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than 6 feet.
- k. Delineate fall protection requirements when working above 6 feet or above dangerous operations in the Fall Protection and Prevention

(FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

### 3.4.2 Elevated Aerial Work Platforms (AWPs)

Workers must be anchored to the basket or bucket in accordance with manufacturer's specifications and instructions (anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP). Lanyards used must be sufficiently short to prohibit worker from climbing out of basket. The climbing of rails is prohibited. Lanyards with built-in shock absorbers are acceptable. Self-retracting devices are not acceptable. Tying off to an adjacent pole or structure is not permitted unless a safe device for 100 percent tie-off is used for the transfer.

Use of AWPs must be operated, inspected, and maintained as specified in the operating manual for the equipment and delineated in the AHA. Operators of AWPs must be designated as qualified operators by the Prime Contractor. Maintain proof of qualifications on site for review and include in the AHA.

## 3.5 EQUIPMENT

### 3.5.1 Material Handling Equipment (MHE)

- a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work platform attachments are prohibited from traveling or positioning while personnel are working on the platform.
- b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.
- c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

### 3.5.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during such operations must be reported.

- a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.
- b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated.
- c. Comply with the LHE manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the

work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

- d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.
- e. When operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.
- f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.
- g. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.
- h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.
- i. Use cribbing when performing lifts on outriggers.
- j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.
- k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.
- l. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.
- m. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.
- n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).
- o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination

as part of the activity hazard analysis plan for that operation.

- p. On mobile cranes, lifts where the load weight is greater than 90 percent of the equipment's capacity are prohibited.

### 3.5.3 Machinery and Mechanized Equipment

- a. Proof of qualifications for operator must be kept on the project site for review.
- b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

### 3.5.4 Base Mounted Drum Hoists

- a. Operation of base mounted drum hoists must comply with EM 385-1-1 and ASSE/SAFE A10.22.
- b. Rigging gear must comply with applicable ASME/OSHA standards
- c. When used on telecommunication towers, base mounted drum hoists must comply with TIA-1019, TIA-222, ASME B30.7, 29 CFR 1926.552, and 29 CFR 1926.553.
- d. When used to hoist personnel, the AHA must include a written standard operating procedure. Operators must have a physical examination in accordance with EM 385-1-1 Section 16.B.05 and trained, at a minimum, in accordance with EM 385-1-1 Section 16.U and 16.T. The base mounted drum hoist must also comply with OSHA Instruction CPL 02-01-056 and ASME B30.23.
- e. Material and personnel must not be hoisted simultaneously.
- f. Personnel cage must be marked with the capacity (in number of persons) and load limit in pounds.
- g. Construction equipment must not be used for hoisting material or personnel or with trolley/tag lines. Construction equipment may be used for towing and assisting with anchoring guy lines.

### 3.5.5 Use of Explosives

Explosives must not be used or brought to the project site.

Storage of explosives is not allowed.

## 3.6 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

### 3.6.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area in addition to any station locating service and coordinated with the station utility

department.

### 3.6.2 Utility Location Verification

Physically verify underground utility locations, including utility depth, by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within 3 feet of the underground system.

### 3.6.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

## 3.7 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1, Appendix A, Sections 11 and 12.

### 3.7.1 Conduct of Electrical Work

As delineated in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the Contracting Officer. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

When working in energized substations, only qualified electrical workers are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.147.

### 3.7.2 Qualifications

Electrical work must be performed by QP personnel with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State and Local requirements applicable to where work is being performed.

### 3.7.3 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

Check grounding circuits to ensure that the circuit between the ground and a grounded power conductor has a resistance low enough to permit sufficient current flow to allow the fuse or circuit breaker to interrupt the current.

### 3.7.4 Testing

Temporary electrical distribution systems and devices must be inspected, tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

-- End of Section --

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS  
11/14

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g. ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)  
444 North Capital Street, NW, Suite 249  
Washington, DC 20001  
Ph: 202-624-5800  
Fax: 202-624-5806  
E-Mail: [info@aaashto.org](mailto:info@aaashto.org)  
Internet: <http://www.aashto.org>

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)  
38800 Country Club Drive  
Farmington Hills, MI 48331-3439  
Ph: 248-848-3700  
Fax: 248-848-3701  
E-mail: [bkstore@concrete.org](mailto:bkstore@concrete.org)  
Internet: <http://www.concrete.org>

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)  
One East Wacker Drive, Suite 700  
Chicago, IL 60601-1802  
Ph: 312-670-2400  
Fax: 312-670-5403  
Bookstore: 800-644-2400  
E-mail: [aisc@ware-pak.com](mailto:aisc@ware-pak.com)  
Internet: <http://www.aisc.org>

AMERICAN IRON AND STEEL INSTITUTE (AISI)  
25 Massachusetts Avenue, NW Suite 800  
Washington, DC 20001  
Ph: 202-452-7100  
Internet: <http://www.steel.org>

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)  
1801 Alexander Bell Drive  
Reston, VA 20191  
Ph: 703-295-6300; 800-548-2723  
E-mail: [member@asce.org](mailto:member@asce.org)  
Internet: <http://www.asce.org>

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)  
1800 East Oakton Street  
Des Plaines, IL 60018  
Ph: 847-699-2929  
Internet: <http://www.asse.org>

AMERICAN WELDING SOCIETY (AWS)  
13301 NW 47 Ave  
Miami, FL 33054

Ph: 888-WELDING, 305-824-1177, 305-826-6192  
Fax: 305-826-6195  
E-mail: [customer.service@awspubs.com](mailto:customer.service@awspubs.com)  
Internet: <http://www.aws.org>

ASME INTERNATIONAL (ASME)  
Two Park Avenue, M/S 10E  
New York, NY 10016-5990  
Ph: 800-843-2763  
Fax: 973-882-1717  
E-mail: [customercare@asme.org](mailto:customercare@asme.org)  
Internet: <http://www.asme.org>

ASPHALT INSTITUTE (AI)  
2696 Research Park Drive  
Lexington, KY 40511-8480  
Ph: 859-288-4960  
Fax: 859-288-4999  
E-mail: [info@asphaltinstitute.org](mailto:info@asphaltinstitute.org)  
Internet: <http://www.asphaltinstitute.org>

ASTM INTERNATIONAL (ASTM)  
100 Barr Harbor Drive, P.O. Box C700  
West Conshohocken, PA 19428-2959  
Ph: 877-909-2786  
Internet: <http://www.astm.org>

FM GLOBAL (FM)  
270 Central Avenue  
P.O. Box 7500  
Johnston, RI 02919-4923  
Ph: 877-364-6726  
Fax: 401-275-3029  
E-mail: [servicedesk.myrisk@fmglobal.com](mailto:servicedesk.myrisk@fmglobal.com)  
Internet: <http://www.fmglobal.com>

GREEN SEAL (GS)  
1001 Connecticut Avenue, NW  
Suite 827  
Washington, DC 20036-5525  
Ph: 202-872-6400



Fax: 202-872-4324  
Internet: <http://www.greenseal.org>

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)  
445 and 501 Hoes Lane  
Piscataway, NJ 08854-4141  
Ph: 732-981-0060 or 800-701-4333  
Fax: 732-562-9667  
E-mail: [onlinesupport@ieee.org](mailto:onlinesupport@ieee.org)  
Internet: <http://www.ieee.org>

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)  
1 Batterymarch Park  
Quincy, MA 02169-7471  
Ph: 617-770-3000  
Fax: 617-770-0700  
Internet: <http://www.nfpa.org>

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)  
Manager, Customer Service  
900 Spring Street  
Silver Spring, MD 20910  
Ph: 240-485-1165  
E-mail: [jjenkins@nrmca.org](mailto:jjenkins@nrmca.org) (Jacques Jenkins)  
Internet: <http://www.nrmca.org>

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)  
10255 West Higgins Road, Suite 600  
Rosemont, IL 60018-5607  
Ph: 866-275-6722 (866-ASK-NRCA)  
Fax: 847-299-1183  
E-mail: [info@nrca.net](mailto:info@nrca.net)  
Internet: <http://www.nrca.net>

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION  
(SMACNA)  
4201 Lafayette Center Drive  
Chantilly, VA 20151-1219  
Ph: 703-803-2980  
Fax: 703-803-3732  
Internet: <http://www.smacna.org>

SOCIETY FOR PROTECTIVE COATINGS (SSPC)  
40 24th Street, 6th Floor  
Pittsburgh, PA 15222  
Ph: 412-281-2331  
Fax: 412-281-9992  
E-mail: [info@sspc.org](mailto:info@sspc.org)  
Internet: <http://www.sspc.org>

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)  
1320 N. Courthouse Rd., Suite 200  
Arlington, VA 22201  
Ph: 703-907-7700  
Fax: 703-907-7727  
Internet: <http://www.tiaonline.org>

U.S. AIR FORCE (USAF)  
Air Force Publishing Distribution Center  
Ph: 202-404-2438 Internet: <http://www.e-publishing.af.mil/>

U.S. ARMY CORPS OF ENGINEERS (USACE)  
CRD-C DOCUMENTS available on Internet:  
[http://www.wbdg.org/ccb/browse\\_cat.php?c=68](http://www.wbdg.org/ccb/browse_cat.php?c=68)  
Order Other Documents from:  
USACE Publications Depot  
Attn: CEHEC-IM-PD  
2803 52nd Avenue  
Hyattsville, MD 20781-1102  
Ph: 301-394-0081  
Fax: 301-394-0084  
E-mail: [pubs-army@usace.army.mil](mailto:pubs-army@usace.army.mil)  
Internet: <http://www.publications.usace.army.mil/>  
or  
<http://www.hnc.usace.army.mil/Missions/Engineering/TECHINFO.aspx>

U.S. DEPARTMENT OF DEFENSE (DOD)  
Order DOD Documents from:  
Room 3A750-The Pentagon  
1400 Defense Pentagon  
Washington, DC 20301-1400  
Ph: 703-571-3343  
FAX: 215-697-1462  
E-mail: [customerservice@ntis.gov](mailto:customerservice@ntis.gov)  
Internet: <http://www.ntis.gov>  
Obtain Military Specifications, Standards and Related Publications  
from:  
Acquisition Streamlining and Standardization Information System  
(ASSIST)  
Department of Defense Single Stock Point (DODSSP)  
Document Automation and Production Service (DAPS)  
Building 4/D  
700 Robbins Avenue  
Philadelphia, PA 19111-5094  
Ph: 215-697-6396 - for account/password issues  
Internet: <http://assist.daps.dla.mil/online/start/>; account  
registration required  
Obtain Unified Facilities Criteria (UFC) from:  
Whole Building Design Guide (WBDG)  
National Institute of Building Sciences (NIBS)  
1090 Vermont Avenue NW, Suite 700  
Washington, DC 20005  
Ph: 202-289-7800  
Fax: 202-289-1092  
Internet: [http://www.wbdg.org/references/docs\\_refs.php](http://www.wbdg.org/references/docs_refs.php)

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)  
Order for sale documents from:  
Superintendent of Documents  
U.S. Government Printing Office (GPO)  
710 North Capitol Street, NW  
Washington, DC 20401  
Ph: 202-512-1800  
Fax: 202-512-2104  
E-mail: [contactcenter@gpo.gov](mailto:contactcenter@gpo.gov)  
Internet: <http://www.gpoaccess.gov>

Order free documents from:  
Federal Aviation Administration  
Department of Transportation  
800 Independence Avenue, SW  
Washington, DC 20591  
Ph: 1-866-835-5322  
Internet: <http://www.faa.gov>

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)  
FHWA, Office of Safety  
1200 New Jersey Ave., SE  
Washington, DC 20590  
Ph: 202-366-4000  
Internet: <http://www.fhwa.dot.gov>

Order from:  
Superintendent of Documents  
U. S. Government Printing Office (GPO)  
710 North Capitol Street, NW  
Washington, DC 20401  
Ph: 202-512-1800  
Fax: 202-512-2104  
E-mail: [contactcenter@gpo.gov](mailto:contactcenter@gpo.gov)  
Internet: <http://www.gpoaccess.gov>

U.S. GENERAL SERVICES ADMINISTRATION (GSA)  
General Services Administration  
1275 First St. NE  
Washington, DC 20417  
Ph: 202-501-1231  
Internet: <http://www.gsa/library.gsa.gov/ElibMain/home.do>  
Obtain documents from:  
Acquisition Streamlining and Standardization Information System  
(ASSIST)  
Internet: <https://assist.dla.mil/online/start/>; account  
registration required

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)  
8601 Adelphi Road  
College Park, MD 20740-6001  
Ph: 866-272-6272  
Fax: 301-837-0483  
Internet: <http://www.archives.gov>  
Order documents from:  
Superintendent of Documents  
U.S. Government Printing Office (GPO)  
710 North Capitol Street, NW  
Washington, DC 20401  
Ph: 202-512-1800  
Fax: 202-512-2104  
E-mail: [contactcenter@gpo.gov](mailto:contactcenter@gpo.gov)  
Internet: <http://www.gpoaccess.gov>

UNDERWRITERS LABORATORIES (UL)  
2600 N.W. Lake Road  
Camas, WA 98607-8542  
Ph: 877-854-3577  
E-mail: [CEC.us@us.ul.com](mailto:CEC.us@us.ul.com)  
Internet: <http://www.ul.com/>  
UL Directories available through IHS at <http://www.ihs.com>

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

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 (2014) Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

QC Plan; G

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

1.3 INFORMATION FOR THE CONTRACTING OFFICER (KO)

Prior to commencing work on construction, the Contractor can obtain a single copy set of the current report forms from the KO. 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.

Deliver the following to the KO:

- a. CQC Report: Original and one copy, by 10:00 AM the next working day that work is performed;
- b. Contractor Production Report: Original and one copy by 10:00 AM the next working day 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 two working days after the test is performed, attached to the CQC Report;

f. QC Meeting Minutes: One copy, within two working days 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. In addition to implementing and managing the QC program, the QC Manager may perform the duties of project superintendent. 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

An individual with a minimum of 10 years combined experience as a

superintendent, inspector, QC Manager, project manager, or construction manager on similar size and type construction contracts which included the major trades that are part of this contract. The individual must be familiar with the requirements of the EM 385-1-1 and 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 weeks 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 Safety Data Sheets (SDS) 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 DFWO, conduct the Initial Phase with the foreman responsible for that DFWO. 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 DFWO:

- 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 DFWO 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 DFWO 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 DFWO 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

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."

#### 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), the American Association for Laboratory Accreditation (A2LA), the Washington Association of Building Officials (WABO) (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) (Approval authority by WACEL is limited to projects within the NAVFAC WASH and Public Works Center Washington geographical area).

#### 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 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.

#### 1.15 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

-- End of Section --

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS  
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.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 241 (2013; Errata 2015) Standard for Safeguarding Construction, Alteration, and Demolition Operations

NFPA 70 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3) National Electrical Code

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1 (2015; Rev L) Obstruction Marking and Lighting

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD (2009) Manual on Uniform Traffic Control Devices

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Site Plan; G

Traffic Control Plan; G

1.3 CONSTRUCTION SITE PLAN

Prior to the start of work, submit a site plan showing the locations and dimensions of temporary facilities (including layouts and details, equipment and material storage area (onsite and offsite), and access and haul routes, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Indicate if the use of a supplemental or other staging area is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

#### 1.4 CONDITION OF READINESS

Unless directed otherwise, comply with:

- a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards. Contact Contracting Officer for Condition of Readiness (COR) updates and completion of required actions.
- b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.
- c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.
- d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

#### PART 2 PRODUCTS

##### 2.1 TEMPORARY SIGNAGE

###### 2.1.1 Bulletin Board

Immediately upon beginning of work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer.

###### 2.1.2 Project Signs

Erect signs within 15 days after receipt of the notice to proceed. Correct the data required by the safety sign daily, with light colored metallic or non-metallic numerals.



## 2.2 TEMPORARY TRAFFIC CONTROL

### 2.2.1 Haul Roads

Construct access and haul roads necessary for proper prosecution of the work under this contract. Construct with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic are to be avoided. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, must be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads are subject to approval by the Contracting Officer. Lighting must be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations.

### 2.2.2 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

### 2.2.3 Fencing

Provide fencing along the construction site at all open excavations and as indicated on the drawings to control access by unauthorized people.

- a. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to posts located on maximum 10 foot centers, constructed at the approved location.

## 2.3 TEMPORARY WIRING

Provide temporary wiring in accordance with NFPA 241 and NFPA 70. Include frequent inspection of all equipment and apparatus.

## PART 3 EXECUTION

### 3.1 EMPLOYEE PARKING

Contractor employees will park privately owned vehicles as shown on the drawings. This area will be within reasonable walking distance of the construction site. Contractor employee parking must not interfere with existing and established parking requirements of the government installation.

### 3.2 TEMPORARY BULLETIN BOARD

Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer.

3.3 AVAILABILITY AND USE OF UTILITY SERVICES

3.3.1 Temporary Utilities

Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions, and not violate applicable codes and standards.

3.3.2 Payment for Utility Services

- a. Reasonable amounts of the following utilities will be made available to the Contractor without charge from a metered location to be determined after award.

Utility Services		
	Cost (\$) per	Unit
Electricity		
Bulk Water		
Salt Water		
Compressed Air		
Steam		
Natural Gas		
Sanitary Sewer		

- b. Hook up to Base water system is not allowed.

3.3.3 Electricity

Provide connections, sized to provide service required for power and lighting. Locate feeder and branch wiring with area distribution boxes so that power is available throughout the project site by use of power cords. Provide lighting as required for safe and secure operations. Electricity used will not be furnished by the Government.

3.3.4 Sanitation

- a. Provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the Contracting Officer. The doors shall be self-closing. The exterior of the unit shall match the base standard color. Locate the facility behind the construction fence or out of the public view.

3.3.5 Telephone

Make arrangements and pay all costs for telephone facilities desired.

Maintain at a minimum a cell phone on site at all times; provide number to Contracting Officer.

### 3.3.6 Obstruction Lighting of Cranes

Provide a minimum of 2 aviation red or high intensity white obstruction lights on temporary structures (including cranes) over 100 feet above ground level. Light construction and installation must comply with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer.

### 3.3.7 Fire Protection

Provide temporary fire protection equipment for the protection of personnel and property during construction. Remove debris and flammable materials daily to minimize potential hazards.

## 3.4 TRAFFIC PROVISIONS

### 3.4.1 Maintenance of Traffic

- a. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on railways or highways except with written permission of the Contracting Officer at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. Make all notifications and obtain any permits required for modification to traffic movements outside Station's jurisdiction. Contractor may move oversized and slow-moving vehicles to the worksite provided requirements of the highway authority have been met.
- b. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Contracting Officer prior to starting any activity that will obstruct traffic.
- c. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

### 3.4.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

### 3.4.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations without notification to and approval by the Contracting Officer.

#### 3.4.4 Dust Control

Dust control methods and procedures must be approved by the Contracting Officer. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

### 3.5 CONTRACTOR'S TEMPORARY FACILITIES

#### 3.5.1 Safety

Protect the integrity of any installed safety systems or personnel safety devices. If entrance into systems serving safety devices is required, the Contractor must obtain prior approval from the Contracting Officer. If it is temporarily necessary to remove or disable personnel safety devices in order to accomplish contract requirements, provide alternative means of protection prior to removing or disabling any permanently installed safety devices or equipment and obtain approval from the Contracting Officer.

Provide measures to protect Government staff and equipment within or adjacent to the facility.

#### 3.5.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

#### 3.5.3 lay Down Area

Do not place or store Trailers, materials, or equipment outside the fenced area. Do not stockpile materials outside the fence. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day.

#### 3.5.4 Supplemental Storage Area

Upon Contractor's request, the Contracting Officer will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor is responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the Government.

#### 3.5.5 Appearance of Trailers

a. Trailers utilized by the Contractor for administrative or material storage purposes must present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the Contracting Officer, require exterior painting or maintenance will not be allowed on installation property.

#### 3.5.6 Maintenance of Storage Area

a. Keep fencing in a state of good repair and proper alignment. Grassed or unpaved areas, which are not established roadways, will be covered with a layer of gravel as necessary to prevent rutting and the

tracking of mud onto paved or established roadways, should the Contractor elect to traverse them with construction equipment or other vehicles; gravel gradation will be at the Contractor's discretion. Mow and maintain grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers will be edged or trimmed neatly.

- b. Cut grass (or annual weeds) within the construction and storage sites to a maximum 4 inch height at least once a week during the growing season unless the grass area is not visible to the public. Trim the grass around fences at time of grass cutting. Maintain grass or weeds on stockpiled earth as described above.

### 3.5.7 Security Provisions

Provide adequate outside security lighting at the Contractor's temporary facilities. The Contractor will be responsible for the security of its own equipment; in addition, the Contractor will notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

### 3.5.8 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

#### 3.5.8.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions must include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

### 3.6 TEMPORARY PROJECT SAFETY FENCING

As soon as practicable, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work site.

### 3.7 DUMPSTERS

Equip dumpsters with a secure cover. Keep dumpster closed, except when being loaded with trash and debris. Locate dumpsters where approved. Empty site dumpsters at least once a week, or as needed to keep the site free of debris and trash.

### 3.8 CLEANUP

Remove construction debris, waste materials, packaging material and the

like from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways must be cleaned away. Store any salvageable materials resulting from demolition activities within the fenced area described above or at the supplemental storage area. Neatly stack stored materials not in trailers, whether new or salvaged.

### 3.9 RESTORATION OF STORAGE AREA

Upon completion of the project remove the bulletin board, signs, barricades, haul roads, and any other temporary products from the site. After removal of trailers, materials, and equipment from within the fenced area, remove the fence that will become the property of the Contractor. Restore areas used by the Contractor for the storage of equipment or material, or other use to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to its original condition, including top soil and seeding as necessary.

-- End of Section --

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT  
01/07

PART 1 GENERAL

1.1 GOVERNMENT POLICY

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse. Divert a minimum of 60 percent by weight of total project solid waste from the landfill.

1.2 MANAGEMENT

Develop and implement a waste management program. Take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. [The Contractor is responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the project.](#) Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste, consider the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. Implement any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling accrue to the Contractor. Appropriately permit firms and facilities used for recycling, reuse, and disposal for the intended use to the extent required by federal, state, and local regulations. Also, provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval [and](#) for information only. Submit the following in accordance with Section [01 33 00](#) SUBMITTAL PROCEDURES:

[SD-01 Preconstruction Submittals](#)

[Waste Management Plan; G](#)

1.4 MEETINGS

After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the Contracting Officer to discuss the proposed Waste Management Plan and to develop a mutual understanding relative to

the details of waste management. At a minimum, discuss environmental and waste management goals and issues at the following meetings:

- a. Pre-bid meeting.
- b. Preconstruction meeting.
- c. Regular site meetings.
- d. Work safety meetings.

#### 1.5 WASTE MANAGEMENT PLAN

Submit a waste management plan within 15 days after contract award and not less than 10 days before the preconstruction meeting. The plan demonstrates how to meet the the project waste diversion goal. Also, include the following in the plan:

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.
- c. Characterization, including estimated types and quantities, of the waste to be generated.
- d. List of specific waste materials that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, location, and phone number, including a copy of the permit or license for each facility.
- e. Description of the means by which any waste materials identified in item (h) above will be protected from contamination.
- f. Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Distribute copies of the Waste Management Plan to each subcontractor, the Quality Control Manager, and the Contracting Officer.

#### 1.6 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Quantities may be measured by weight or by volume, but must be consistent throughout. List each type of waste separately noting the disposal or diversion date. Identify the landfill, recycling center, waste processor, or other organization used to process or receive the solid waste. Provide explanations for any waste not recycled or reused. With each application for payment, submit updated documentation for solid waste disposal and diversion, and submit



manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. Make the records available to the Contracting Officer during construction, and deliver to the Contracting Officer upon completion of the construction a copy of the records.

#### 1.7 REPORTS

Provide quarterly reports and a final report. Include project name, information for waste generated this quarter, and cumulative totals for the project in quarterly and final reports. Also include in each report, supporting documentation to include manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. Include timber harvest and demolition information, if any.

#### 1.8 COLLECTION

Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in a manner that maximizes recyclability and salvagability of identified materials. Provide the necessary containers, bins and storage areas to facilitate effective waste management and clearly and appropriately identify them. Provide materials for barriers and enclosures around recyclable material storage areas which are nonhazardous and recyclable or reusable. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Recycling and waste bin areas are to be kept neat and clean, and handle recyclable materials to prevent contamination of materials from incompatible products and materials. Clean contaminated materials prior to placing in collection containers. Use cleaning materials that are nonhazardous and biodegradable. Handle hazardous waste and hazardous materials in accordance with applicable regulations. Separate materials by one of the following methods:

##### 1.8.1 Source Separated Method.

Separate waste products and materials that are recyclable from trash and sorted as described below into appropriately marked separate containers and then transported to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the following category types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

- a. Land clearing debris.
- b. Asphalt.
- c. Concrete and masonry.
- d. Metal (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, lead brass, bronze).
  - (1) Ferrous.
  - (2) Non-ferrous.
- e. Wood (nails and staples allowed).

- f. Debris.
- g. Glass (colored glass allowed).
- h. Paper.
  - (1) Bond.
  - (2) Newsprint.
  - (3) Cardboard and paper packaging materials.
- i. Plastic.

Type	
1	Polyethylene Terephthalate (PET, PETE)
2	High Density Polyethylene (HDPE)
3	Vinyl (Polyvinyl Chloride or PVC)
4	Low Density Polyethylene (LDPE)
5	Polypropylene (PP)
6	Polystyrene (PS)
7	Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

- j. Insulation.
- k. Beverage containers.

#### 1.8.2 Other Methods

Other proposed methods may be used when approved by the Contracting Officer.

#### 1.9 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the Contracting Officer and in compliance with waste management procedures. Except as otherwise specified in other sections of the specifications, dispose of in accordance with the following:

##### 1.9.1 Reuse

Give first consideration to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form.

1.9.2 Recycle

Recycle waste materials not suitable for reuse, but having value as being recyclable. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

1.9.3 Waste

Dispose of materials with no practical use or economic benefit to waste-to-energy plants where available. As the last choice, dispose of materials at a landfill or incinerator.

1.9.4 Return

Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used. -- End of Section --

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SECTION 01 78 00

CLOSEOUT SUBMITTALS  
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.

ASTM INTERNATIONAL (ASTM)

**ASTM E1971** (2005; R 2011) Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings

GREEN SEAL (GS)

**GS-37** (2012) Cleaning Products for Industrial and Institutional Use

U.S. ARMY CORPS OF ENGINEERS (USACE)

**ERDC/ITL TR-12-1** (2015) A/E/C Graphics Standard, Release 2.0

**ERDC/ITL TR-12-6** (2015) A/E/C CAD Standard - Release 6.0

U.S. DEPARTMENT OF DEFENSE (DOD)

**UFC 1-300-08** (2009, with Change 2) Criteria for Transfer and Acceptance of DoD Real Property

1.2 DEFINITIONS

1.2.1 As-Built Drawings

As-built drawings are developed and maintained by the Contractor and depict actual conditions, including deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to Contractor submitted Requests for Information; direction from the Contracting Officer; designs which are the responsibility of the Contractor, and differing site conditions. Maintain the as-builts throughout construction as red-lined hard copies on site and or red-lined PDF files. As-built drawings are further defined in NFAS 5252.236-9310. These files serve as the basis for the creation of the record drawings.

1.2.2 Record Drawings

The record drawings are the final compilation of actual conditions reflected in the as-built drawings.

### 1.3 SOURCE DRAWING FILES

Request the full set of electronic drawings, in the source format, for Record Drawing preparation, after award and at least 30 days prior to required use.

#### 1.3.1 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction drawings and data for the referenced project. Any other use or reuse is not allowed. The Contractor must make no claim and waives to the fullest extent permitted by law, any claim or cause of action of any nature against the Government, its agents or sub consultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic CAD drawing files are not construction documents. Differences may exist between the CAD files and the corresponding construction documents. The Government makes no representation regarding the accuracy or completeness of the electronic CAD files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished Source drawing files, the signed and sealed construction documents govern. The Contractor is responsible for determining if any conflict exists. Use of these Source Drawing files does not relieve the Contractor of duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate the work of all contractors for the project.

### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Warranty

SD-08 Manufacturer's Instructions

Posted Instructions

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

As-Built Drawings; G

Record Drawings; G

Final Approved Shop Drawings

Construction Contract Specifications

Interim DD FORM 1354; G  
Checklist for DD FORM 1354; G

1.5 QUALITY CONTROL

Additions and corrections to the contract drawings must be equal in quality and detail to that of the originals. Line colors, line weights, lettering, layering conventions, and symbols must be the same as the original line colors, line weights, lettering, layering conventions, and symbols.

1.6 WARRANTY MANAGEMENT

1.6.1 Warranty

Develop a warranty management plan and submit at the time of substantial completion. Include within the warranty management plan all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan must be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below must include due date and whether item has been submitted or was accomplished. Warranty information made available during the construction phase must be submitted to the Contracting Officer for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period will begin on the date of project acceptance and continue for the full product warranty period. A joint 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contractor, Contracting Officer and the Customer Representative. Include within the warranty management plan, but not limited to, the following:

- a. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the Contractors, subcontractors, manufacturers or suppliers involved.
- b. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- c. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs and lightning protection.
- d. A list for each warranted equipment, item, feature of construction or system indicating:
  - (1) Name of item.
  - (2) Model and serial numbers.
  - (3) Location where installed.
  - (4) Name and phone numbers of manufacturers or suppliers.
  - (5) Names, addresses and telephone numbers of sources of spare parts.
  - (6) Warranties and terms of warranty. Include one-year overall warranty of construction, including the starting date of warranty of construction. Items which have extended warranties must be indicated with separate warranty expiration dates.
  - (7) Cross-reference to warranty certificates as applicable.

- (8) Starting point and duration of warranty period.
- (9) Summary of maintenance procedures required to continue the warranty in force.
- (10) Cross-reference to specific pertinent [Operation and Maintenance manuals](#).
- (11) Organization, names and phone numbers of persons to call for warranty service.
- (12) Typical response time and repair time expected for various warranted equipment.

- e. The plans for attendance at the 9 month post-construction warranty inspections conducted by the Government.

#### 1.6.2 Performance Bond

The Performance Bond must remain effective throughout the construction period, [including the 12 month period from beneficial occupancy](#).

- a. In the event the Contractor fails to commence and diligently pursue any construction warranty work required, the Contracting Officer will have the work performed by others, and after completion of the work, will charge the remaining construction warranty funds of expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.
- b. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Contracting Officer will have the right to recoup expenses from the bonding company.
- c. Following oral or written notification of required construction warranty repair work, respond in a timely manner. Written verification will follow oral [instructions](#). Failure to respond will be cause for the Contracting Officer to proceed against the Contractor.

#### 1.6.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the Contracting Officer to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Contracting Officer for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, be continuously available, and be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

#### 1.6.4 Contractor's Response to Construction Warranty Service Requirements

[Following oral or written notification by the Contracting Officer, respond to construction warranty service requirements in accordance with the](#)



"Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and back charge the construction warranty payment item established.

- a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.
- b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.
- c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.
- d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Roof Leaks

Temporary repairs will be made where major damage to property is occurring.

Code 2-Roof Leaks

Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.

## PART 2 PRODUCTS

### 2.1 GOVERNMENT FURNISHED MATERIALS

The Government will provide an optical disc (CD or DVD) at the preconstruction conference that contains the following:

- a. One set of "as-designed" electronic CAD files in the specified software and format revised to reflect all amendments and the final contract PDF drawings. The CAD files are provided to enable preparation of as-built or as-constructed drawings. If discrepancies exist between the CAD files and the contract PDF drawings, correct the CAD files to show the contract PDF drawings.

### 2.2 SYSTEM DESCRIPTION

Prepare the CAD drawing files in AutoCAD Release 2016.

#### 2.2.1 Additional Drawings

If additional drawings are required, prepare them using the specified electronic file format applying the same graphic standards specified for original drawings. The title block and drawing border to be used for any new final **record drawings** must be identical to that used on the contract drawings.

##### 2.2.1.1 Sheet Numbers and File Names

If a sheet needs to be added between two sequential sheets, append a Supplemental Drawing Designator in accordance with **ERDC/ITL TR-12-6** Adding

a drawing sheet, and ERDC/ITL TR-12-1 Adding or deleting drawing sheets and index sheet procedures.

### PART 3 EXECUTION

#### 3.1 AS-BUILT DRAWINGS

Provide and maintain two black line print copies of the PDF contract drawings for As-Built Drawings. Provide and maintain As-Built Drawings in accordance with NFAS 5252.236-9310. Submit As-Built Drawings 30 days prior to Beneficial Occupancy Date(BOD).

##### 3.1.1 Markup Guidelines

Make comments and markup the drawings complete without reference to letters, memos, or materials that are not part of the As-Built drawing. Show what was changed, how it was changed, where item(s) were relocated and change related details. These working as-built markup prints must be neat, legible and accurate as follows:

- a. Use base colors of red, green, and blue. Color code for changes as follows:
  - (1) Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes.
  - (2) Deletions (Red) - Over-strike deleted graphic items (lines), lettering in notes and leaders.
  - (3) Additions (Green) - Added items, lettering in notes and leaders.
- b. Provide a legend if colors other than the "base" colors of red, green, and blue are used.
- c. Add and denote any additional equipment or material facilities, service lines, incorporated under As-Built Revisions if not already shown in legend.
- d. Use frequent written explanations on markup drawings to describe changes. Do not totally rely on graphic means to convey the revision.
- e. Use legible lettering and precise and clear digital values when marking prints. Clarify ambiguities concerning the nature and application of change involved.
- f. Wherever a revision is made, also make changes to related section views, details, legend, profiles, plans and elevation views, schedules, notes and call out designations, and mark accordingly to avoid conflicting data on all other sheets.
- g. For deletions, cross out all features, data and captions that relate to that revision.
- h. For changes on small-scale drawings and in restricted areas, provide large-scale inserts, with leaders to the applicable location.
- i. Indicate one of the following when attaching a print or sketch to a markup print:

- 1) Add an entire drawing to contract drawings
  - 2) Change the contract drawing to show
  - 3) Provided for reference only to further detail the initial design.
- j. Incorporate all shop and fabrication drawings into the markup drawings.

### 3.1.2 As-Built Drawings Content

Revise As-Built Drawings in accordance with ERDC/ITL TR-12-1 and ERDC/ITL TR-12-6. Provide 2 sets of paper copies from PDF drawings to show the as-built conditions by red-line process during the execution of the project. Keep these working as-built markup drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract drawings which are made during construction or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Submit the working as-built markup drawings for approval prior to submission of each monthly pay estimate. For failure to maintain the working and final record drawings as specified herein, the Contracting Officer will withhold 10 percent of the monthly progress payment until approval of updated drawings. Show on the as-built drawings, but not limited to, the following information:

- a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, show by offset dimensions to two permanently fixed surface features the end of each run including each change in direction on the record drawings. Locate valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Also record the average depth below the surface of each run.
- b. The location and dimensions of any changes within the building structure.
- c. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to shop drawings, fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- d. Changes or Revisions which result from the final inspection.
- e. Where contract drawings or specifications present options, show only the option selected for construction on the working as-built markup drawings.
- f. Changes in location of equipment and architectural features.
- g. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

### 3.2 RECORD DRAWING FILES

If additional drawings are required, prepare them using the specified electronic file format applying the same graphic standards specified for

original drawings. The title block and drawing border to be used for any new final record drawings must be identical to that used on the contract drawings. Accomplish additions and corrections to the contract drawings using CAD files. Provide all program files and hardware necessary to prepare final PDF record drawings. The Contracting Officer will review final PDF record drawings for accuracy and return them to the Contractor for required corrections, changes, additions, and deletions.

### 3.2.1 Rename the CAD Drawing files

Rename the CAD Drawing files using the contract number as the Project Code field, (e.g., W91238-15-C-10A-102.DWGDGN) as instructed in the Pre-Construction conference. Use only those renamed files for the Marked-up changes. Make all changes on the layer/level as the original item.

- a. For AutoCAD files (DWG), enter all as-built delta changes and notations on the AS-BUILT layer.
- c. When final revisions have been completed, show the wording "RECORD DRAWING AS-BUILTS" followed by the name of the Contractor in letters at least  $\frac{3}{16}$  inch high on the cover sheet drawing. Date RECORD DRAWING AS-BUILTS" drawing revisions in the revision block.
- d. Within 14 days after Government approval of all of the working record drawings, prepare the final CAD record drawings and submit PDF drawing files and two sets of prints for review and approval. The Government will promptly return one set of prints annotated with any necessary corrections. Within 10 days revise the CAD files accordingly at no additional cost. Submit one set of electronic CAD files, and one set of the approved working record PDF files on an optical disc with two sets of prints. The CAD files must be complete in all details and identical in form and function to the CAD drawing files supplied by the Government. Prepare AutoCAD files for transmittal using e-Transmit. Make any transactions or adjustments necessary to accomplish this. The Government reserves the right to reject any drawing files it deems incompatible with the customer's CAD system. Paper prints, drawing files and storage media submitted will become the property of the Government upon final approval. Failure to submit final record PDF drawing files, CAD files and marked prints as specified will be cause for withholding any payment due under this contract. Approval and acceptance of final record drawings must be accomplished before final payment is made.

### 3.3 FINAL APPROVED SHOP DRAWINGS

Submit final approved project shop drawings 30 days after transfer of the completed facility.

### 3.4 CONSTRUCTION CONTRACT SPECIFICATIONS

Submit final PDF file record construction contract specifications, including revisions thereto, 30 days after transfer of the completed facility.

### 3.5 CLEANUP

Provide final cleaning in accordance with ASTM E1971. Leave premises "broom clean." Comply with GS-37 for general purpose cleaning and

bathroom cleaning. Use only nonhazardous cleaning materials, including natural cleaning materials, in the final cleanup. Remove temporary labels, stains and foreign substances. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Recycle, salvage, and return construction and demolition waste from project in accordance with Section 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.

### 3.6 REAL PROPERTY RECORD

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft DD FORM 1354 and submit an accounting of all installed property with Interim DD FORM 1354. Include any additional assets, improvements, and alterations from the Draft DD FORM 1354. Contact the Contracting Officer for any project specific information necessary to complete the DD FORM 1354. Refer to UFC 1-300-08 for instruction on completing the DD FORM 1354. For information purposes, a blank fillable PDF DD FORM 1354 may be obtained at the following: <http://www.dtic.mil/whs/directives/forms/eforms/dd1354.pdf>

Submit the completed Checklist for DD FORM 1354 of Installed Building Equipment items. Attach this list to the updated DD FORM 1354.

### 3.7 NAVFAC SUSTAINABLE & ENERGY DATA RECORD CARD

Within 60 days of the completion of Project, complete an electronic copy of the NAVFAC Sustainable & Energy Data Record Card, and submit to the Contracting Officer. Draft Record card for this project should be available from Designer of Record (DOR) or Contracting Officer. Instructions and a blank DD Form (fill-able) in ADOBE (PDF) may be obtained at the Whole Building Design Guide web site by navigating: Home > Participating Agencies > Department of Defense (DoD) > NAVFAC Sustainable Development Program > Contract Documents > NAVFAC Sustainable & Energy Data Record Card; or directly at [http://www.wbdg.org/pdfs/navfac\\_sustainable\\_energy\\_data\\_record\\_card.pdf](http://www.wbdg.org/pdfs/navfac_sustainable_energy_data_record_card.pdf).

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SECTION 02 41 00

DEMOLITION AND DECONSTRUCTION  
05/10

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.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

AASHTO M 145 (1991; R 2012) Standard Specification for  
Classification of Soils and Soil-Aggregate  
Mixtures for Highway Construction Purposes

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.6 (2006) Safety Requirements for Demolition  
Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety and Health Requirements  
Manual

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1 (2015; Rev L) Obstruction Marking and  
Lighting

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

40 CFR 61 National Emission Standards for Hazardous  
Air Pollutants

1.2 PROJECT DESCRIPTION

1.2.1 Demolition/Deconstruction Plan

Prepare a [Deconstruction Plan](#) and submit proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be [recycled](#). [Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be Removed.](#) [Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use.](#) Include statements affirming Contractor inspection of the existing roof deck and its suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with [EM 385-1-1](#). Plan shall be approved by Contracting

Officer prior to work beginning.

#### 1.2.2 General Requirements

Do not begin demolition or deconstruction until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations outside the buildings and on airfield pavements. The work includes demolition and deconstruction, salvage of identified items and materials for recycle, and removal of rubbish and debris. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

#### 1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

##### 1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

##### 1.3.2 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

##### 1.3.3 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction. When needed, erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this contract with like-kind or as approved by the Contracting Officer.

##### 1.3.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to



start of work, utilities serving each area of alteration or removal will be shut off by the Government and disconnected and sealed by the Contractor.

#### 1.3.5 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

#### 1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted. Where burning is permitted, adhere to federal, state, and local regulations.

#### 1.5 AVAILABILITY OF WORK AREAS

As indicated.

#### 1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

##### SD-01 Preconstruction Submittals

Deconstruction Plan; G  
Existing Conditions

##### SD-07 Certificates

Notification; G

##### SD-11 Closeout Submittals

#### 1.7 QUALITY ASSURANCE

Submit timely notification of demolition, deconstruction and renovation projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

#### 1.7.1 Dust and Debris Control

Prevent the spread of dust and debris to occupied portions of the building on airfield pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep roof and pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

#### 1.8 PROTECTION

##### 1.8.1 Traffic Control Signs

a. Where pedestrian, driver and aircraft safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind, jet or prop blast. Notify the Contracting Officer prior to beginning such work.

Provide a minimum of 2 FAA type L-810 steady burning red obstruction lights on temporary structures (including cranes) over 100 feet, but less than 100 ft, above ground level. The use of LED based obstruction lights are not permitted. For temporary structures (including cranes) over 200 ft above ground level provide obstruction lighting in accordance with FAA AC 70/7460-1. Light construction and installation shall comply with FAA AC 70/7460-1. Lights shall be operational during periods of reduced visibility, darkness, and as directed by the Contracting Officer. Maintain the temporary services during the period of construction and remove only after permanent services have been installed and tested and are in operation.

##### 1.8.2 Protection of Personnel

Before, during and after the demolition and deconstruction work continuously evaluate the condition of the structure being deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

#### 1.9 FOREIGN OBJECT DAMAGE (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade shall include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

#### 1.10 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to

be relocated which are damaged by the Contractor with new undamaged items as approved by the Contracting Officer.

#### 1.11 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

### PART 2 PRODUCTS

#### 2.1 FILL MATERIAL

- a. Fill material shall conform to the definition of satisfactory soil material as defined in AASHTO M 145, Soil Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material shall be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

### PART 3 EXECUTION

#### 3.1 EXISTING FACILITIES TO BE REMOVED

Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal.

##### 3.1.1 Utilities and Related Equipment

###### 3.1.1.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

###### 3.1.1.2 Disconnecting Existing Utilities

When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area.

##### 3.1.2 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs including aggregate base as indicated. Provide neat sawcuts at limits of pavement

removal as indicated. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

### 3.1.3 Roofing

Remove existing roof system and associated components **as shown**. Sequence work to minimize building exposure between demolition or deconstruction and new roof materials installation.

#### 3.1.3.1 Temporary Roofing

Install temporary roofing and flashing as necessary to maintain a watertight condition throughout the course of the work. Remove temporary work prior to installation of permanent roof system materials unless approved otherwise by the Contracting Officer. Make provisions for worker safety during demolition, deconstruction, and installation of new materials as described in paragraphs entitled "Statements" and "Regulatory and Safety Requirements."

#### 3.1.3.2 Reroofing

When removing the existing roofing system from the roof deck, remove only as much roofing as can be recovered by the end of the work day, unless approved otherwise by the Contracting Officer. Do not attempt to open the roof covering system in threatening weather. Reseal all openings prior to suspension of work the same day.

#### 3.1.4 Concrete

Saw concrete along straight lines to a depth **as indicated**.

#### 3.1.5 Miscellaneous Metal

Scrap metal shall become the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

#### 3.1.6 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

- a. Concrete: Completely fill holes and depressions, left as a result of removals, with an approved patching material, applied in accordance with the manufacturer's printed instructions.

### 3.2 DISPOSITION OF MATERIAL

#### 3.2.1 Title to Materials

All materials and equipment removed shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

### 3.3 CLEANUP

Remove debris and rubbish. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

### 3.4 DISPOSAL OF REMOVED MATERIALS

#### 3.4.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified.

#### 3.4.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

#### 3.4.3 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures, from Government property for legal disposal.

-- End of Section --

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SECTION 05 12 00

STRUCTURAL STEEL

05/14

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

- AISC 201 (2006) AISC Certification Program for Structural Steel Fabricators
- AISC 303 (2016) Code of Standard Practice for Steel Buildings and Bridges
- AISC 325 (2017) Steel Construction Manual
- AISC 326 (2009) Detailing for Steel Construction
- AISC 360 (2016) Specification for Structural Steel Buildings

AMERICAN WELDING SOCIETY (AWS)

- AWS A2.4 (2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
- AWS D1.1 (2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

- ASME B46.1 (2009) Surface Texture, Surface Roughness, Waviness and Lay

ASTM INTERNATIONAL (ASTM)

- ASTM A29 (2016) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
- ASTM A36 (2014) Standard Specification for Carbon Structural Steel
- ASTM A992 (2011) Standard Specification for Structural Steel Shapes

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

- SSPC PA 1 (2016) Shop, Field, and Maintenance Coating of Metals

SSPC Paint 20	(2002; E 2004) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)
SSPC Paint 29	(2002; E 2004) Zinc Dust Sacrificial Primer, Performance-Based
SSPC SP 3	(1982; E 2004) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
U.S. DEPARTMENT OF DEFENSE (DOD)	
UFC 3-301-01	(2013; with Change 3) Structural Engineering

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-01 Preconstruction Submittals

Erection Drawings; G

### SD-02 Shop Drawings

Fabrication Drawings; G

### SD-03 Product Data

Shop Primer

Welding Electrodes and Rods

### SD-06 Test Reports

Weld Inspection Reports

### SD-07 Certificates

Steel

AISC Erector Quality Certification

Welding Procedures and Qualifications

Welding Electrodes and Rods

## 1.3 AISC QUALITY CERTIFICATION

Work must be erected by an AISC Certified Erector, Category ASCE. Submit AISC erector quality certification.



#### 1.4 QUALITY ASSURANCE

##### 1.4.1 Preconstruction Submittals

###### 1.4.1.1 Erection Drawings

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing. The erection drawings must conform to **AISC 303**. Erection drawings must be reviewed, stamped and sealed by a registered professional engineer.

##### 1.4.2 Fabrication Drawing Requirements

Submit **fabrication drawings** for approval prior to fabrication. Prepare in accordance with **AISC 326** and **AISC 325**. Fabrication drawings must not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of welds, member sizes and lengths. Use **AWS A2.4** standard welding symbols. Any deviations from the details shown on the contract drawings must be clearly highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

##### 1.4.3 Certifications

###### 1.4.3.1 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate must be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in **AWS D1.1**.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Provide the structural steel system, including shop primer **or** galvanizing **as indicated**, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing must be provided in accordance with **AISC 360**, **and UFC 3-301-01** except as modified in this contract.

### 2.2 STEEL

#### 2.2.1 Structural Steel

Wide flange and WT shapes, **ASTM A992**. Angles, Channels and Plates, **ASTM A36**, **and A572 Grade 50 to match existing**.

## 2.3 STRUCTURAL STEEL ACCESSORIES

### 2.3.1 Welding Electrodes and Rods

AWS D1.1.

### 2.3.2 Welded Shear Stud Connectors

ASTM A29, Type B. AWS D1.1.

## 2.4 FABRICATION

Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible.

### 2.4.1 Markings

Prior to erection, members must be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections must be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

### 2.4.2 Shop Primer

SSPC Paint 20 or SSPC Paint 29, (zinc rich primer). Shop prime structural steel, except as modified herein, in accordance with SSPC PA 1. Do not prime surfaces within 0.5 inch of the toe of the welds prior to welding. If flash rusting occurs, re-clean the surface prior to application of primer. Apply primer in accordance with endorsement "P1" of AISC 201 to a minimum dry film thickness of 2.0 mil.

Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Contracting Officer. Repair damaged primed surfaces with an additional coat of primer.

#### 2.4.2.1 Cleaning

SSPC SP 6/NACE No.3, except steel exposed in spaces above ceilings, attic spaces, furred spaces, and chases that will be hidden to view in finished construction may be cleaned to SSPC SP 3 when recommended by the shop primer manufacturer. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly.

### 2.4.3 Surface Finishes

ASME B46.1 maximum surface roughness of 125 for pin, pinholes, and sliding bearings, unless indicated otherwise.

## 2.5 DRAINAGE HOLES

Adequate drainage holes must be drilled to eliminate water traps. Hole diameter must be 1/2 inch and location must be indicated on the detail drawings. Hole size and location must not affect the structural integrity.

### PART 3 EXECUTION

#### 3.1 ERECTION

- a. Erection of structural steel must be in accordance with the applicable provisions of [AISC 325](#).

##### 3.1.1 STORAGE

Material must be stored out of contact with the ground in such manner and location as will minimize deterioration.

#### 3.2 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

#### 3.3 WELDING

Welding must be in accordance with [AWS D1.1](#). Grind exposed welds smooth as indicated. Provide [AWS D1.1](#) qualified welders, welding operators, and tackers.

Develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified must be submitted for approval.

##### 3.3.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

#### 3.4 SHOP PRIMER REPAIR

Repair shop primer in accordance with the paint manufacturer's recommendation for surfaces damaged by handling, transporting, cutting, welding, or bolting.

##### 3.4.1 Field Priming

Steel exposed to the weather, or located in building areas without HVAC for control of relative humidity must be field primed. After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat must be cleaned and primed with paint of the same quality as that used for the shop coat.

#### 3.5 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. The Contracting Officer must be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of the inspection.

3.5.1 Welds

3.5.1.1 Visual Inspection

**AWS D1.1.** Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections.

Inspect proper preparation, size, gaging location, and acceptability of welds; identification marking; operation and current characteristics of welding sets in use.

3.5.1.2 Nondestructive Testing

Nondestructive testing must be in accordance with **AWS D1.1**. Test locations must be selected by the Contracting Officer. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder must be tested by ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing must be used only in areas inaccessible to ultrasonic testing. Retest defective areas after repair. Submit [weld inspection reports](#).

Testing frequency: Provide the following types and number of tests:

<u>Test Type</u>	<u>Number of Tests</u>
Ultrasonic or Dye Penetrant	20% of Fillet Welds
Visual	100%
Ultrasonic of Dye Penetrant	100% of Partial of Full Penetration Welds

-- End of Section --

SECTION 05 46 01

RETROFIT ROOF FRAMING SYSTEM  
05/10

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.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-10 (2010; Errata 2011; Supp 1 2013) Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.3/D1.3M (2008; Errata 2008) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A1011/A1011M (2017) 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 A370 (2014) Standard Test Methods and Definitions for Mechanical Testing of Steel Products

ASTM A653/A653M (2015; E 2016) 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 E329 (2014a) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 DESCRIPTION

The structural retrofit roof framing system will provide support for a new metal roofing system constructed over the existing building roof. The system is described as an overlay system (installed over the existing roof) consisting of miscellaneous galvanized steel shapes including zees, cees, hats, and other shapes as needed to transfer loads from the new roof to the existing roof framing. It shall be engineered in accordance with the

specified codes and design loading indicated and shall transfer positive acting loads at each attachment location into an existing roof structure. The framing shall accommodate inconsistencies in the roof's topography and perimeter geometry to develop a new roof slope plane and will minimize irregularities that could produce oil-canning in the new metal roof system.

Basis of Design: Roof Hugger LLC. Other systems in compliance with specifications are allowable.

Furnish labor, material, tools, equipment and services for the retrofit roof framing as indicated, in accordance with provisions of the Contract Documents.

Completely coordinate with work of other trades.

Although such work is not specifically indicated, furnish and install supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

##### Calculations

Calculations and Design Drawings must be signed and sealed by a Licensed Professional Engineer.

##### Erection Details

##### Elevations

##### Retrofit Roof Framing

- a. Cross sections, plans, and/or elevations showing component types and locations for each framing application; including material thicknesses for each framing component.
- b. Connection details showing fastener type, quantity, location, and other information to assure proper installation.
- c. Drawings depicting panel configuration, dimensions, components and locations.

#### SD-03 Product Data

Steel, tracks, plates, zee's, channels, bracing, bridging and accessories

##### Test Reports

##### Welder Qualification Test Records

#### SD-07 Certificates

## Manufacturer Qualifications

## Installation Contractor Qualifications

### 1.4 INSTALLATION CONTRACTOR QUALIFICATIONS

The installation contractor must have a minimum of 5 years experience in the application of retrofit roof framing systems.

### 1.5 MANUFACTURER QUALIFICATIONS

Manufacturer must have a minimum of five years experience in manufacturing and fabrication of retrofit roof framing systems of this nature. Light gauge structural components specified in this section shall be produced in a factory environment (not job-site formed) with fixed-base, roll forming and press-brake equipment assuring the highest level of quality control. A letter from the manufacturer certifying compliance will accompany the product approval submittals.

### 1.6 DELIVERY, STORAGE, AND HANDLING

Deliver retrofit roof framing to jobsite properly packaged to provide protection against transportation damage. Exercise extreme care in unloading, storage and erecting retrofit roof framing to prevent bending, warping, twisting and surface damage. Store all materials and accessories above ground on well-skidded platforms under waterproof covering.

### 1.7 QUALITY ASSURANCE

#### 1.7.1 Drawing Requirements

Submit complete [calculations](#), shop drawings and [erection details](#). Do not proceed with manufacture, prior to approval of shop drawings. Do not use drawings prepared by the architect for shop or erection drawings. Shop drawings shall show methods of erection, [elevations](#) and plans of [retrofit roof framing](#), sections and details, loads at framing anchorage locations, interfaces with materials not supplied and proposed identification of component parts and their finishes. Shop drawings shall include an existing roof plan that shows actual field obtained perimeter dimensions establishing the limits of the new retrofit construction, changes in roof elevation, location of HVAC, plumbing and electrical equipment and other information that is relative to the existing roof's relationship with the new retrofit roof system. All dimensions are to be verified by the contractor prior to returning approved submittals to the manufacturer. Shop drawings shall be accompanied by an engineering design calculation package for the structural design of the retrofit roof framing system components and metal roof panel system. Shop drawings and design calculations shall bear the seal and signature of a registered Professional Engineer. Coordinate the framing systems with the roof system Section [07 61 14.00 20 STEEL STANDING SEAM ROOFING](#). Roofing system wind load resistance is directly related to the retrofit system design.

#### 1.7.2 Design Data Required

Submit the following:

[Steel](#), tracks, plates, zee's, channels, bracing, bridging and [accessories](#).

Mill certificates or test reports from independent testing agency, qualified in accordance with [ASTM E329](#), showing that the steel sheet used in the manufacture of each cold-formed component complies with the minimum yield strengths and uncoated steel thickness specified. [Test reports](#) shall be based on the results of three coupon tests in accordance with [ASTM A370](#).

Certified copies of [welder qualification test records](#) showing qualification in accordance with [AWS D1.3/D1.3M](#).

#### 1.8 PRE-INSTALLATION CONFERENCE

Prior to installation of the retrofit roof framing system, conduct a pre-installation conference at the project site. Attending parties shall be Owner's representative, Contractor, Project Superintendent, Metal Roofing Installer and Retrofit roof framing Installer. Agenda to include framing details and anchorage methods, critical sequencing and review of phasing if applicable and inspection sequencing. Preparation work on the existing roof that is required to be completed prior to framing installation commences shall be inspected to approve its readiness to proceed.

#### 1.9 INSTALLATION QUALITY CONTROL

The contractor shall conduct an inspection of the retrofit roof framing system immediately prior to metal roof panel installation. This is to ensure the system is installed per the approved shop drawings and to confirm all roof planes are properly aligned and straight to minimize oil-canning. All system component connections and anchorage will be inspected to ensure they have been installed in accordance with the installation documents.

#### 1.10 DESIGN REQUIREMENTS

##### 1.10.1 General

Design in accordance with the included drawings and these specifications, a complete structural retrofit roof framing package, engineered and factory fabricated by one manufacturer in accordance with AISI, MBMA and ASCE references. Coordinate design with the metal roofing system. Any additions/revisions to framing members as a result of field conditions and/or demands, shall be the contractor's responsibility, and shall be submitted for review and approval by the manufacturer.

##### 1.10.2 Building Code

The retrofit metal roof system manufacturer shall engineer the entire system to meet the most current version of the IBC 2015 and [ASCE 7-10](#) code.

##### 1.10.3 Wind Load Design

The retrofit framing assembly shall withstand wind pressures as indicated on the drawings. The design uplift force for each connection assembly shall be that pressure given for the area under consideration, multiplied by the tributary load area of the connection assembly. The safety factor listed below is the minimum that shall be applied to the design force and compared against the ultimate capacity. Prying shall be considered when calculating fastener design loads.



Single Fastener each connection.....3.00

Two or more fasteners each connection.....2.25

#### 1.10.4 Live Load Design

Horizontal Assemblies shall withstand minimum live loads as required by the building code plus the weight of the retrofit roof framing components and the metal roof panel system. Provide stiffness as required to resist the roof system loads.

#### 1.10.5 Dead Loads

The retrofit roof system shall be designed to support the weight of the new metal roof system as well as any collateral loads such as roof mounted mechanical and electrical systems including curbs that may be supported by the retrofit roof system. Coordinate with the mechanical and electrical contact documents.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

##### 2.1.1 Retrofit Roof Framing System Components

Roof purlins shall be zee shapes with the top-flange roll formed or press broken to match the slope and profile of the retrofit roof system. Provide sub purlins and other shapes as required for the design installation of a complete system. Conform to [ASTM A1011/A1011M](#), minimum yield strength of 50 ksi. The gauge and depth will be as required by the engineering calculations. Supply all hardware items required for installation of retrofit roof framing system in accordance with manufacturer's installation instructions. Provide additional framing as needed for the support of rooftop equipment.

##### 2.1.2 Finishes

Provide either: (1) Galvanized components will conform to [ASTM A653/A653M G-90](#) or (2) Galvalume® components will conform to [ASTM A792/A792M AZ55](#).

#### 2.2 MISCELLANEOUS PRODUCTS

##### 2.2.1 Fasteners and Anchors

Anchors used for the attachment of the new retrofit roof framing system to the existing roof structural support system shall be of the type and size appropriate for secure attachment to satisfy the required wind uplift and lateral pressure values at each location, as specified by the retrofit system manufacturer and as specified above. All anchors shall be hot dipped galvanized or stainless steel and will securely attach to existing structural members. A minimum of two (2) anchors shall be used for all connections or more if recommended by the retrofit roof system manufacturer. Fasteners used for the retrofit roof framing system shall be a minimum [1/4-inch](#) diameter with 14 threads per inch having a stress relief head and a corrosion resistant coating.

PART 3 EXECUTION

3.1 EXISTING ROOF SYSTEM SURVEY AND TESTING

The existing roof structure is generally as indicated on the existing drawings.

Before design work begins by the retrofit system manufacturer, the installation contractor shall perform a rooftop survey to collect critical information about the existing roof and its support system. This information shall be provided to the retrofit system manufacturer and will include the following:

Perimeter dimensions in plan view.

Dimensions of existing exterior and interior parapet walls including height above existing roof, width of coping and slope if applicable.

Existing gravel stop or fascia dimensions including vertical exterior face dimension for concealing by new perimeter flashing.

Existing perimeter gutters that will not be removed per the drawings.

Existing roof support joist type, spacing and span orientation with field verified dimensions.

Depth and type of existing decking and thickness of thermal insulation.

Type of existing weatherproofing membrane.

Existing roof elevation changes and slope to interior and/or perimeter roof drainage.

Wall construction type at any areas requiring new roof counterflashing.

Exact locations of existing HVAC equipment relative to the roof's edge including height and physical size of units. For units that are to be elevated above the new roof plane and supported by framing provided by the retrofit system manufacturer, the weight of each unit and the required curb size shall be provided.

The contractor shall obtain pullout values on proposed anchors for attaching the retrofit roof system base members to the existing roof's structural system. This testing shall be conducted atop the existing roof at multiple areas using a calibrated pull-out tester. All anchors are to penetrate the existing roof assembly and substrate and attach directly to a structural member. The contractor shall then have the anchorage connection designed to satisfy the minimum wind uplift reactions supplied by the retrofit roof system manufacturer multiplied by a safety factor of 2.50. This design analysis shall be submitted for review accompanied by the jobsite pull-out testing report along with technical product information on the proposed anchors to be used for attachment of the retrofit roof framing.

3.2 FRAMING SYSTEM INSTALLATION

3.2.1 General

The contractor shall install the retrofit roof framing system as specified and in accordance with the retrofit systems manufacturer's approved

installation documents and erection drawings. Install the retrofit purlins to prevent waves, warpage, buckles, fastening stresses or other distortion. Extreme care should be taken when installing the retrofit roof framing purlins and other roof plane components to minimize oil canning in the metal roof panel system. Field cutting of framing members shall be accomplished by power tools and will be done in a safe manner to prevent damage to the existing roof and adjacent materials. The contractor shall practice good material utilization of members to minimize scrap and to not jeopardize the construction schedule due to unnecessary shortages of framing components.

#### 3.2.1.1 Erection Tolerances

Variation of vertical members from plumb:

1/8-inch, maximum

Variation of horizontal members from level:

1/8-inch, maximum over length of member

Variation of purlins from true roof plane:

1/4-inch in 20'-0" and 3/8" maximum in 40'-0"

Variation in purlin runs at ridge and panel end laps:

1/4-inch maximum in 20'-0"

#### 3.3 EXISTING COMPONENTS REINSTALLATION

All equipment being relocated to the new metal roof plane shall be installed securely to prevent displacement and to provide a watertight installation.

#### 3.4 CLEAN UP

The contractor will protect installed framing from damage by subsequent construction activities until final acceptance. All framing system cuttings and debris including unused anchors, framing fasteners, sealant and associated materials shall be collected and disposed of from the jobsite.

-- End of Section --

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SECTION 07 56 00

FLUID-APPLIED ROOFING

02/12

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.

ASTM INTERNATIONAL (ASTM)

- |               |  |
|---------------|--|
| ASTM D1644-01 | (2017) Standard Test Methods for Nonvolatile Content of Varnishes      |
| ASTM D4541    | (2009e1) Pull-Off Strength of Coatings Using Portable Adhesion Testers |
| ASTM E108     | (2011) Fire Tests of Roof Coverings                                    |

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 |

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

- |      |  |
|------|--|
| NRCA | (2015) The NRCA Roofing and Waterproofing Manual |
|------|--|

UNDERWRITERS LABORATORIES (UL)

- |        |   |
|--------|---|
| UL 790 | (2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings |
|--------|---|

1.2 DESCRIPTION OF FLUID-APPLIED ROOFING SYSTEM

The fluid-applied roofing system shall be installed on three roof areas as identified on the drawings. These are the lower roof areas on the north, east, and south sides of the building. Provide 100% membrane coverage on the existing roof panels and perimeter edge flashings. Membrane system shall be a partially reinforced polyurethane coating. All seams, fasteners, laps, transitions, and penetrations shall be prepared and sealed with a fabric reinforced, flashing grade polyurethane sealant/coating.

Color of finish coat shall be custom matched to new metal roof panels for the main roof. Color is a medium/dark bronze.

Basis of Design: Acrylabs PR-20 System. Other systems in compliance with specifications are allowable.

Fluid-applied roofing system shall include all other ancillary waterproofing work including, but not limited to penetrations, vertical flashing, and other metal work as specified.

- a. All membrane materials shall have a superior coefficient of expansion, to allow for differential movement between horizontal and vertical surface of the flashed penetration projection.
- b. Membrane system shall provide fast drying primers to allow substrate preparation, priming, and membrane application to be completed the same day.
- c. The use of fabric reinforcement will be required for all transitions and flashings.

All work must follow the NRCA Roofing and Waterproofing Manual guidelines and all standards stated within this section.

### 1.3 SUBMITTALS

Owner/Owner's Representative approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor quality control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Fluid-applied Roofing; G

#### SD-03 Product Data

Fluid-applied Roofing; G  
Fabric Reinforcement; G  
Primers; G

Submit material description and physical properties, application details, and recommendations regarding shelf life, application procedures, and precautions on flammability and toxicity.

#### SD-07 Certificates

Qualifications of Manufacturer; G  
Manufacturer's project approval letter; G  
Qualifications of Applicator; G  
Sample Warranty; G  
Adhesion Test; G

#### SD-08 Manufacturer's Instructions

Installation Manual; G

Submit manufacturers printed installation manual, instructions, and standard details.

#### SD-11 Closeout Submittals

Warranty; G  
Information Card  
Installer's Warranty; G

Complete form of warranties must be submitted concurrent with roof.

Instructions To Owner Personnel

Include copies of Material Safety Data Sheets for  
maintenance/repair materials.

#### 1.4 PREROOFING CONFERENCE

After approval of submittals and before performing roofing 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 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;
- e. Quality control plan for the roof system installation; and
- f. Safety requirements.

Coordinate preroofing conference scheduling with the Owner/ Owner's Representative. The conference shall be attended by the Contractor, the Owner/ Owner's Representative, personnel directly responsible for the installation of roofing and insulation, flashing and sheet metal work, other trades interfacing with the roof work, designated safety personnel; 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 QUALITY ASSURANCE

Submit manufacturer's project approval letter that the system materials indicated by specifications and drawing details are acceptable for the deck and surfacing to which they are to be applied.

- a. All detailing - including but not limited to walls, curbs, drains, penetrations, edges, and expansion and control joints - shall be installed in strict accordance with approved membrane manufacturer details.

- b. Inspection: A final inspection shall be required prior to issuance of warranty.
- c. Inspections shall be performed by a Technical Representative employed full-time by the Manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the Manufacturer only.
- d. A final inspection report from the Technical Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications. Approved Details and good general roofing practice shall be provided.
- e. Any failure by the Owner's or Manufacturers' Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the Contractor, or reduce, or in any way limit, his responsibility of full performance of work required of him under these specifications.
- f. Random tests to determine tensile bond strength of membrane to substrate shall be conducted by the Contractor at the job site by the performance of a manual pull test. Contractor shall perform tests at the beginning of the Work and at intervals as required to assure specified adhesion with a minimum of three tests. Test results shall be submitted to the Owner or his designated Representative and the Membrane Manufacturer. Contractor shall immediately notify the Owner or his designated Representative and Membrane Manufacturer in the event bond test results are below specified values.
- g. Adequate surface preparation will be indicated by tensile bond strength of membrane to substrate greater than or equal to 219 psi for pedestrian traffic and water flow/containment, as determined by use of an adhesion tester.
- h. Adequate surface preparation will be indicated by 135 degree peel bond strength of membrane to substrate such that cohesive failure of substrate occurs before adhesive failure of membrane/substrate interface.
- i. In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.
- j. Adhesion tests are to be conducted in accordance with ASTM D4541.
- k. Monitor quantities of installed materials. Monitor application of membrane coating, reinforcing fleece and flashing. Perform Work in accordance with manufacturer's instructions.

#### 1.5.1 Qualifications of Manufacturer

Liquid membrane system manufacturer must have a minimum of five years experience in manufacturing liquid membrane products.

#### 1.5.2 Qualifications of Applicator

Liquid membrane system applicator must be approved, authorized, or licensed in writing by the liquid membrane 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. The applicator must supply the names, locations, and client contact information for five projects of similar size and scope that the applicator has constructed using the manufacturer's products submitted for this project within the previous three years.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

Deliver waterproofing materials in manufacturer's original, unopened containers, with labels intact and legible. Containers of materials covered by a referenced specification number shall bear the specification number, type, and class of the contents. Deliver materials in sufficient quantity to continue work without interruption. Store and protect materials in accordance with manufacturer's instructions, and use within their indicated shelf life. When hazardous materials are involved, adhere to special precautions of the manufacturer, unless precautions conflict with local, state, and federal regulations. Promptly remove from the site materials or incomplete work adversely affected by exposure to moisture or freezing. Store materials on pallets and cover from top to bottom with canvas tarpaulins.

#### 1.7 ENVIRONMENTAL CONDITIONS

Do not apply roofing/waterproofing membrane during or with the threat of inclement weather. Application of fluid-applied roofing and waterproofing membrane may proceed while air temperature is between 40 degree F and 95 degree F providing the substrate is a minimum of 5 degree F above the dew point. When ambient temperatures are at or expected to fall below 40 degree F (0 degree C), or reach 86 degree F (30 degree C) or higher, follow Membrane System Manufacturer's recommendations for weather related application procedures. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials. Where required by the Owner or his designated Representative, Contractor shall implement odor control and elimination measures prior to and during the application of the roofing/waterproofing materials. Contractor shall confirm to the following measures:

- a. Provide protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.
- b. When disposing of all refuse or unused materials, observe all EPA, OSHA or local disposal requirements.

#### 1.8 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 cover full system water-tightness, and shall have a minimum duration of 10 years. Warranty shall not be prorated over the covered period. Submit sample certificate.

### 1.8.1 Roof Membrane Manufacturer Warranty

Furnish the roof membrane manufacturer's 10-year, water tightness warranty, including system materials and installation workmanship warranty, flashing, and accessories necessary for a watertight roof system construction. Provide additional preparations and reinforcing as required to obtain warranty terms. Provide warranty directly to the Owner and commence warranty effective date at time of Owner'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 48 hours of notification, emergency temporary repairs performed by others does not void the warranty.
- c. Roof warranty shall have no exclusions for hail events up to 1 inches.
- d. The warranty shall be for the roof as installed without exclusion. Manufacturer's final inspection report will verify the roof as installed meet all manufacturers warranty requirements.
- e. Future alterations to the roof will not void the entire roof warranty. If areas are modified in a manner not consistent with the manufacturer's standard then only the modified portions shall not be covered by the warranty.
- f. The warranty will cover wind speeds up to 100 MPH and the basis of the wind speed will be a reasonably close wind recording station.
- g. Warranties with unapproved exclusions may be cause for rejection of the material submission.

### 1.8.2 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, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. Write the warranty directly to the Owner. 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

Approved 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 FLUID-APPLIED ROOFING

Fluid-applied roofing shall consist of a base coat and finish coat with partial reinforcement. Elastomeric coatings shall be water-dispersed 100% acrylic elastomeric coatings designed for use in reinforced composite membrane systems. Materials shall have a minimum solids content of 67% by weight per ASTM D1644-01. Elongation shall be a minimum of 195%. Tensile strength shall be a minimum of 235 psi. Minimum dry film thickness shall be 20 mils.

### 2.2 Performance Requirements

- a. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
- b. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- c. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM 4450 or FM 4470 as part of a roofing system, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
  1. Fire Classification: Class 1A
- d. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A or B; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

### 2.3 PRIMERS

As recommended by the fluid-applied roofing manufacturer unless specifically prohibited by the manufacturer of the fluid-applied roofing.

### 2.4 SEALANT

As recommended by the fluid-applied roofing manufacturer unless specifically prohibited by the manufacturer of the fluid-applied roofing. Silicone sealants are unacceptable.

### 2.5 SEALANT PRIMER

As recommended by the sealant manufacturer.

## 2.6 FABRIC REINFORCEMENT

Stitch-bonded polyester for use in cold fluid-applied roof membrane that shall provide high strength and good elongation.

## 2.7 FASTENERS

Self drilling, self tapping, gasketed fasteners shall be 304 stainless steel.

## PART 3 EXECUTION

### 3.1 PREPARATION

#### 3.1.1 General Requirements

Coordinate work with that of other trades to ensure that components to be incorporated into the waterproofing system are available when needed. Inspect and approve surfaces immediately before application of waterproofing materials. Remove laitance, loose aggregate, sharp projections, grease, oil, dirt, curing compounds, and other contaminants which could adversely affect the complete bonding of the fluid-applied membrane to the substrate. Substrate shall be free of moisture and evaluated using a moisture meter to ensure surface dryness.

Surfaces to be prepared as a substrate for the new fluid-applied roofing as follows:

- a. The contractor shall determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new waterproofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials shall be removed as required and repaired with new to match existing.
- b. Prepare flashing substrates as required for application of new waterproofing membrane flashings.
- c. Inspect substrates, and correct defects before application of new waterproofing. Fill all surface voids greater than 1/8 inch (3 mm) wide with an acceptable fill material.
- d. Remove all ponded water, snow, frost and/or ice from the work substrate prior to installing new waterproofing materials.
- e. The final substrate for waterproofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, waterproofing agents, curing compounds, and free of projections which could damage membrane materials.
- f. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of three inches beyond the termination of the membrane flashing materials. Notch steel surfaces to provide a rust-stop.
- g. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A wire brush finish is not acceptable.

- h. Stitch all loose metal seams to be coated as required to obtain an acceptable joint condition.
- i. Contractor shall conduct adhesion tests at all roof areas/ substrates to receive a coating prior to ordering material and performing the work.

### 3.1.2 Adhesion Tests

Adhesion test shall be conducted in accordance with manufacturer's written instructions. Test locations and quantities shall be as directed by the manufacturer. Submit a written report of adhesion tests conducted to document: substrate, primers/ coating's tested, location/ quantity of tests, failure mode of tested samples, and adhesion pass or fail.

### 3.1.3 Cracks and Joints

Joints, cracks and fractures in the structural deck/substrate shall be prepared prior to installation of the waterproofing membrane.

- a. Panels with vertical seam gaps of 1/8 inch or more shall be stitched as tight as possible with additional fasteners.
- b. Any horizontal seams where the purlin screws are more than 2 inches from the overlap must be stitched tight at the seam with a minimum of 6 fasteners per 3 foot panel.
- c. Apply additional stitch screws and / or fabric reinforcement in the pan of the panel as required to reduce deflection.
- d. Seal all gaps with manufacturer's approved sealant prior to stitching metal.

### 3.1.4 Flashings

Make penetrations watertight before application of waterproofing.

#### 3.1.4.1 Walls and Vertical Surfaces

Flash wall intersections with a flashing grade fluid-applied roofing membrane adhered to vertical wall surfaces and adjacent roof surface.

### 3.1.5 Priming

Prime surfaces to receive fluid-applied waterproofing membrane as required by the manufacturer. Apply primer as required by membrane manufacturer's printed instructions.

## 3.2 FIELD QUALITY CONTROL

Prior to application of fluid-applied waterproofing, measure moisture content of substrate with a moisture meter in the presence of the Owner/Owner's Representative. Do not begin application until meter reading indicates "dry" range.

### 3.2.1 Film Thickness

Measure wet film thickness every 100 square feet during application by placing flat metal plates on the substrate or using a mil-thickness gage

especially manufactured for the purpose.

### 3.3 FLUID-APPLIED ROOFING MEMBRANE INSTALLATION

- a. Following inspection and acceptance of substrate condition, install the fluid-applied roofing membrane system using minimum coverages indicated in the manufacturer's guidelines. Adherence to guidelines will yield a minimum membrane thickness of 20 mils dry film thickness on the field of the roof and a minimum of 45 mils dry film thickness on the reinforced areas.
- b. Apply flashings at roof penetrations and detail work:
  1. All flashing must be completed in accordance with published manufacturer details before application of finish coat.
  2. Apply heavy base coat to the area to be flashed and embed reinforcing fabric into wet coating. Use a brush to ensure reinforcing fabric is fully embedded. Apply additional coating to the top of fabric taking care to completely saturate fabric and provide a weatherproof seal.
- c. Seams
  1. All seams requiring treatment shall be treated with the base coat and reinforcing fabric of appropriate width to create a reinforced elastomeric membrane. Subsequent top coats will be applied to areas to provide a minimum membrane thickness of 45 mils dry film thickness.
  2. All seams to be reinforced must be completed in accordance with manufacturer details before final application of finish coating(s).
  3. Apply heavy base coat to the area to be flashed and embed reinforcement fabric into wet coating. Brush shall be used to ensure fabric is fully embedded. Apply additional coating to the top of fabric taking care to completely saturate fabric and provide a weatherproof seal.
- d. Apply intermediate coat of the base coat to the entire prepared roof surface to produce a membrane of 10 mils minimum dry film thickness on the field of the roof.
- e. Apply finish coat to areas previously coated to produce a total minimum dry film thickness (including the previously applied base coat) of 20 mils. Apply finish coats in 2 coats to ensure minimum dry film thickness as well as proper coverage.

### 3.4 MANUFACTURER'S INSPECTION

Manufacturer's technical representative shall visit the site a minimum of 3 times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Inspections shall occur at start up and document first 10 squares, 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 Owner/Owner's Representative. After each inspection, a report, signed by

the manufacturer's technical representative shall be submitted by the roofing Contractor to the Owner within 3 working days. The report shall note overall quality of work, deficiencies and any other concerns, and recommended corrective action. Manufacturer's representative will continue to inspect the site until 100% of the roof is installed and accepted, and all punch list items are resolved and completed.

### 3.5 INSTRUCTIONS TO OWNER PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated 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.

### 3.6 INFORMATION CARD

For each roof application, furnish a minimum 8-1/2 inch by 11 inch information card for facility records. 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, date of completion; installing contractor identification and contract information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Install card at roof top or access location as directed by the Owner/Owner's Representative and provide a paper copy to the Owner/Owner's Representative.

FORM 1

LIQUID APPLIED ROOFING MEMBRANE COMPONENTS

1. Contract Number
2. Date Work Completed
3. Project Specification Designation
4. Substrate Material
5. Slope of Substrate
6. Fluid-applied roofing
  - a. Membrane
  - b. Sealant
  - c. Materials Manufacturer(s)
7. Warranty
  - a. Manufacturer warranty expiration
  - b. Warranty reference number
8. Statement of Compliance or Exception

Contractor's Signature                      Date Signed

Inspector's Signature                      Date Signed

-- End of Section --



SECTION 07 61 14.00 20

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 (2017) 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 A240/A240M (2017) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

ASTM A36/A36M (2014) Standard Specification for Carbon Structural Steel

ASTM A653/A653M (2015; E 2016) 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 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 2009) 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 E1646

(1995; R 2011) Standard Test Method for  
Water Penetration of Exterior Metal Roof  
Panel Systems by Uniform Air Pressure  
Difference

ASTM E1680

(2016) Standard Test Method for Rate of  
Air Leakage Through Exterior Metal Roof  
Panel Systems

ASTM E84

(2017) 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

## 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, roll formed (180 degree bend) or double roll formed (2 - 180 degree bends) seam systems with factory applied sealant in the seams.

### 1.2.2 Field-Formed

Formed to the final, less field-formed seam, profile and configuration at the site of work prior to installation.

### 1.2.3 Roofing System

The roofing system is defined as the assembly of roofing components, including roofing and wall panels, flashing, fasteners, and accessories which, when assembled properly result in a watertight installation. The assembly must be coordinated with the retrofit sub-framing system. refer to Section 05 46 01 RETROFIT ROOF FRAMING SYSTEM.

### 1.2.4 SSMRS

Standing Seam Metal Roof System (SSMRS) is abbreviation of the entire roof and wall panel 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 with no joints or seams, except where indicated or specified. Ribs of adjoining sheets must be in continuous contact from eave to ridge..
- b. There must be no exposed or penetrating fasteners except where shown on approved shop drawings. Fasteners into steel must be stainless steel or zinc cast head, inserted into predrilled holes. There must be a minimum of two fasteners per clip.
- c. 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.
- e. Air Leakage: Maximum rate of air leakage allowable through exterior metal panel roof system is between 0.004 and 0.010 cfm/sq.ft. according to ASTM E1680.
  1. 0.004 cfm per lineal foot of side joint at +/- 1.57 psf.
  2. 0.010 cfm per lineal foot of side joint at +/- 6.24 psf.

- f. Water Penetration: No water leakage at 12 psf when five gallons per hour of water is sprayed per sq.ft. of roof area when testing according to ASTM E1646.

### 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

Minimum loads are shown on the drawings.

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 minus 10 degrees F and 160 degrees F.

#### 1.3.2.4 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. Coordinate this section with Section 05 46 01 RETROFIT ROOF FRAMING SYSTEM.

## 1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roofing; G

SD-03 Product Data

Roofing Panels; G

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 up to six 2 by 4 inch metal samples for initial selection in color. Color is to match Base Standard MBCI "Midnight Bronze".

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

#### SD-05 Design Data

Design Calculations

#### SD-06 Test Reports

Field Inspection; G

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

Statement of Installer'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.

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; 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**

**Installation Manual; G**

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.

**Snow Retention System Calculations:** Include calculation of number and

location of snow guards based on snow load, roof slope, panel length and finish, and seam type and spacing. Drawings shall indicate number of rows and spacing of rows for snow guards required at locations indicated in accordance with snow guard manufacturer's design. Submit design formulation with shop drawings. Indicated locations of diverters to protect penetrations. Manufacturer's design shall at a minimum meet the design indicated on the project drawings.

## 1.6 QUALITY ASSURANCE

### 1.6.1 Preroofing Conference

After submittals are received and approved but before roofing, retrofit framing, and insulation work, including associated work, is preformed, the Contractor must 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, framing 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 7 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 **three** 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 **1/8 inch** diameter mandrel in accordance with **ASTM D522/D522M**, 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 **3** 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 **50** 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 5 year contractor installation warranty.

##### 1.7.1 Manufacturer's Finish Warranty

Provide a manufacturers' 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 D4214](#); or fade or change colors in excess of 5 NBS units as measured in accordance with [ASTM D2244](#).

##### 1.7.2 Metal Roof System Installer Warranty

Provide roof system installer warranty for a period of not less than five years that the roof system, as installed, is free from defects in installation workmanship, to include the roof panel installation, flashing, underlayment, accessories, attachments, and sheet metal installation integral to a complete watertight roof system assembly. 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.

### 1.7.3 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.

### 1.7.4 Metal Roof Panel Manufacturer Warranty

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.

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, underlayment, components, trim, and accessories necessary for a watertight roof system construction. No exceptions or exclusion shall be permitted. Make warranty directly to the Government, commencing at time of Government's acceptance of the roof work. Warranty shall not be prorated over the covered period. 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 48 hours of notification, emergency temporary repairs performed by others does not void the warranty.
- c. Warranty shall be unaffected by sustained wind speeds as indicated on the drawings, measured by a reasonably close wind recording station.
- d. The warranty shall be for the roof as installed without exclusions. Manufacturer's final inspection report will verify the roof as installed meets all the manufacturer warranty requirements.
- e. Future alternations to the roof will not void the entire roof warranty. If areas are modified in a manner not consistent with the manufacturer's standard, then only the modified portion shall not be covered by the 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 Recycled Content of Steel Roofing Products

Recycled content is identified for some products in this section; provide documentation. Other products listed in this section may be available with recycled content; identify those products that meet project requirements for 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. Sheets must provide not less than 16 inches of coverage (width) in place. Provide panels with a minimum corrugation height of 2.25 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.

### 2.2.1 Material

Aluminum-zinc alloy (Galvalume) coated steel conforming to ASTM A792/A792M, AZ 55 coating. Provide material with 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

Smooth with raised intermediate ribs for added stiffness.

### 2.2.3 Finish

Factory color finish.

#### 2.2.3.1 Factory Color Finish - Match MBCI "Midnight Breeze"

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 minimum 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. 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/A653M, G90, Grade D ( 16 gage and heavier), Grade A ( 18 gage and lighter); or steel conforming to ASTM A36/A36M, ASTM A1011/A1011M , or ASTM A1008/A1008M 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/A1011M, or ASTM A1008/A1008M steel hot-dip galvanized in accordance with ASTM A653/A653M, 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 Ridge/Rib Closures

Metal closures matching panel configuration for installation on surface of roof panel between panel ribs at ridge and headwall roof panel flashing conditions and terminations. Embed in continuous non-curing sealant.

## 2.5.2 Fasteners

Exposed fasteners painted stainless steel - (SS), non-exposed (covered) hot-dipped galvanized. 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 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 "bottle" 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.

#### 2.5.4 GASKETS AND INSULATING COMPOUNDS

Nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds must be nonrunning after drying.

#### 2.5.5 Downspout Adapters

12 gauge 0.1094" stainless steel minimum, ASTM A240/A240M, Type 304. Size to conform to existing underground drainage and downspouts. Shall have a powder coat custom color finish to match downspouts. Provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, roller marks, or roughness.

#### 2.6 THERMAL INSULATION

Flexible blanket, rigid, or semi-rigid un-faced. Insulation must have a flame-spread rating of 50 or less in accordance with ASTM E84. Provide a thermal resistance "R" value of 12 or more.

#### 2.7 PIPE BOOTS

Provide high temperature silicone and stainless steel boots with 20-year water-tight warranty. Mechanically attach with sealant.

#### 2.8 UNDERLAYMENT

High temperature rubberized self adhering modified asphalt sheet. Minimum 30 mils specifically designed as an underlayment for metal roof applications.

Basis of Design: Grace Ice and Water Shield HT.

#### 2.9 SEAM-MOUNTED, RAIL-TYPE SNOW GUARDS

Snow guard rails fabricated from metal extrusions, anchored to brackets and equipped with one rail with color-matching inserts of material and finish used for metal roofing.

Material and Finish:

- a. Clamps: Aluminum with Stainless Steel Hardware
- b. Cross Members: Aluminum
- c. Snow Clips: Aluminum
- d. Inserts: Same as metal roof panels

### 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 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 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.

#### 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.

#### 3.3.2 Insulation Installation

Install between covering and supporting members. [Butt tightly without gaps](#). Fold and staple and tape seams unless approved otherwise by the Contracting Officer.

#### 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

Minimize exposed fasteners. Use concealed fasteners and cleats where practical or indicated. 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.

### 3.3.6 Seam-Mounted, Rail-Type Snow Guards

Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty. Secure each clamp to the ribs of standing-seam metal roof panels with a minimum of two (2) set screws. Having nominal diameter of .375 inches. Set screws are to have a round nose point to prevent damage to panel finish. Cup point set screws are not acceptable. Set screws and other clamp hardware is to be 300 series stainless steel (18-8 alloy) having no iron content. Aluminum extrusion shall be complete with receptacle in face to provide for insertion of color strip. Color strip is to be the same pre-finished material and originate from the same supplier as the roof panels. Cross member is to be continuous, 2 inches high, and include splice connectors to join adjacent sections, ensuring alignment and structural continuity. Aluminum clips that attach to the cross member shall be installed at a rate of one (1) per panel at each row of cross members. The snow clips shall have a protective guard where they contact the panel to prevent damaging the panel finish.

## 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 DOWNSPOUT ADAPTERS

Install adapters according to manufacturers written instruction. Adapters shall be able to resist exposure to weather without failing, rattling, and leaking. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.



### 3.6 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.

### 3.7 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 5 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.

### 3.8 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.

### 3.9 INFORMATION CARD

For each roof, provide 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 where directed. Provide 2 photocopies to the Government.

### 3.10 SCHEDULES

#### 3.10.1 Form One

FORM 1 - PREFORMED STEEL PANEL ROOFING SYSTEM AND 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 \_\_\_\_\_ To \_\_\_\_\_
15. Roofing Contractor (Name & Address):
16. Prime Contractor (Name & Address):

Contractor's Signature \_\_\_\_\_ Date:

Inspector's Signature \_\_\_\_\_ Date:

3.10.2 Date of Installation Wall-Mounted Placard

For each metal roof panel installation, furnish an exterior "Date of Installation Placard", 0.032 inch thick steel, 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.

3.10.3 USACE Warranty

CONTRACTOR'S TWENTY (20) YEAR NO PENAL SUM WARRANTY  
FOR  
STRUCTURAL METAL ROOF SYSTEM

FACILITY DESCRIPTION \_\_\_\_\_

BUILDING NUMBER: \_\_\_\_\_

CORPS OF ENGINEERS CONTRACT NUMBER: \_\_\_\_\_

CONTRACTOR

CONTRACTOR: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

POINT OF CONTACT: \_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

OWNER

OWNER: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

POINT OF CONTACT: \_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

CONSTRUCTION AGENT

CONSTRUCTION AGENT: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

POINT OF CONTACT: \_\_\_\_\_

TELEPHONE NUMBER: \_\_\_\_\_

CONTRACTOR'S TWENTY (20) YEAR NO PENAL SUM WARRANTY  
FOR  
STRUCTURAL METAL ROOF SYSTEM  
(continued)

THE STRUCTURAL METAL ROOF SYSTEM INSTALLED ON THE ABOVE NAMED BUILDING IS WARRANTED BY \_\_\_\_\_ FOR A PERIOD OF FIVE (5) YEARS AGAINST WORKMANSHIP AND MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE. FOR THE NON-STRUCTURAL METAL ROOFING SYSTEM COVERED UNDER THIS WARRANTY INCLUDE, BUT DO NOT LIMIT TO, THE FOLLOWING: THE ENTIRE ROOFING SYSTEM, MANUFACTURER SUPPLIED FRAMING AND STRUCTURAL MEMBERS, METAL ROOF PANELS, FASTENERS, CONNECTORS, ROOF SECUREMENT COMPONENTS, AND ASSEMBLIES TESTED AND APPROVED IN ACCORDANCE WITH UL 580. IN ADDITION, THE SYSTEM PANEL FINISHES, SLIP SHEET, INSULATION, VAPOR RETARDER, ALL ACCESSORIES, COMPONENTS, AND TRIM AND ALL CONNECTIONS ARE INCLUDED. THIS INCLUDES ROOF PENETRATION ITEMS SUCH AS VENTS, CURBS, SKYLIGHTS; INTERIOR OR EXTERIOR GUTTERS AND DOWNSPOUTS; EAVES, RIDGE, HIP, VALLEY, RAKE, GABLE, WALL, OR OTHER ROOF SYSTEM FLASHING INSTALLED AND ANY OTHER COMPONENTS SPECIFIED WITHIN THIS CONTRACT TO PROVIDE A WEATHERTIGHT ROOF SYSTEM; AND ITEMS SPECIFIED IN OTHER SECTIONS OF THE SPECIFICATIONS THAT ARE PART OF THE NON-STRUCTURAL METAL ROOFING SYSTEM.

REPAIR ALL MATERIAL DEFICIENCIES, WIND DAMAGE, STRUCTURAL FAILURE, AND LEAKAGE ASSOCIATED WITH THE NON-STRUCTURAL METAL ROOF SYSTEM COVERED UNDER THIS WARRANTY AS APPROVED BY THE CONTRACTING OFFICER. IN THIS WARRANTY COVER THE ENTIRE COST OF REPAIR OR REPLACEMENT, INCLUDING ALL MATERIAL, LABOR, AND RELATED MARKUPS. THE ABOVE REFERENCED WARRANTY COMMENCED ON THE DATE OF FINAL ACCEPTANCE ON \_\_\_\_\_ AND WILL REMAIN IN EFFECT FOR STATED DURATION FROM THIS DATE.

SIGNED, DATED, AND NOTARIZED (BY COMPANY PRESIDENT)

\_\_\_\_\_  
(Company President)

\_\_\_\_\_  
(Date)

CONTRACTOR'S TWENTY (20) YEAR NO PENAL SUM WARRANTY  
FOR  
STRUCTURAL METAL ROOFING SYSTEM  
(continued)

ENSURE THE CONTRACTOR SUPPLEMENTS THIS WARRANTY WITH WRITTEN WARRANTIES FROM THE MANUFACTURER AND/OR INSTALLER OF THE NON-STRUCTURAL METAL ROOFING SYSTEM. SUBMIT ALONG WITH THE CONTRACTOR'S WARRANTY. HOWEVER, THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR THIS WARRANTY AS OUTLINED IN THE SPECIFICATIONS AND AS INDICATED IN THIS WARRANTY EXAMPLE.

EXCLUSIONS FROM COVERAGE

1. NATURAL DISASTERS, ACTS OF GOD (LIGHTNING, FIRE, EXPLOSIONS, SUSTAINED WIND FORCES IN EXCESS OF THE DESIGN CRITERIA, EARTHQUAKES, AND HAIL).
2. ACTS OF NEGLIGENCE OR ABUSE OR MISUSE BY GOVERNMENT OR OTHER PERSONNEL, INCLUDING ACCIDENTS, VANDALISM, CIVIL DISOBEDIENCE, WAR, OR DAMAGE CAUSED BY FALLING OBJECTS.
3. DAMAGE BY STRUCTURAL FAILURE, SETTLEMENT, MOVEMENT, DISTORTION, WARPAGE, OR DISPLACEMENT OF THE BUILDING STRUCTURE OR ALTERATIONS MADE TO THE BUILDING.
4. CORROSION CAUSED BY EXPOSURE TO CORROSIVE CHEMICALS, ASH OR FUMES GENERATED OR RELEASED INSIDE OR OUTSIDE THE BUILDING FROM CHEMICAL PLANTS, FOUNDRIES, PLATING WORKS, KILNS, FERTILIZER FACTORIES, PAPER PLANTS, AND THE LIKE.
5. FAILURE OF ANY PART OF THE STRUCTURAL METAL ROOF DUE TO ACTIONS BY THE OWNER TO INHIBIT FREE DRAINAGE OF WATER FROM THE ROOF AND GUTTERS AND DOWNSPOUTS OR ALLOW PONDING WATER TO COLLECT ON THE ROOF SURFACE. IN CONTRACTOR'S DESIGN ENSURE FREE DRAINAGE FROM THE ROOF AND DO NOT ALLOW PONDING WATER.
6. THIS WARRANTY APPLIES TO THE STRUCTURAL METAL ROOFING SYSTEM. IT DOES NOT INCLUDE ANY CONSEQUENTIAL DAMAGE TO THE BUILDING INTERIOR OR CONTENTS WHICH IS COVERED BY THE WARRANTY OF CONSTRUCTION CLAUSE INCLUDED IN THIS CONTRACT.
7. THIS WARRANTY CANNOT BE TRANSFERRED TO ANOTHER OWNER WITHOUT WRITTEN CONSENT OF THE CONTRACTOR; AND THIS WARRANTY AND THE CONTRACT PROVISIONS WILL TAKE PRECEDENCE OVER ANY CONFLICTS WITH STATE STATUTES.

CONTRACTOR'S TWENTY (20) YEAR NO PENAL SUM WARRANTY  
FOR  
STRUCTURAL METAL ROOF SYSTEM  
(continued)

\*\*RESPOND TO REPORTS OF LEAKS AND ROOF SYSTEM DEFICIENCIES WITHIN 48 HOURS OF RECEIPT OF NOTICE, BY TELEPHONE OR IN WRITING, FROM EITHER THE OWNER OR CONTRACTING OFFICER. INITIATE EMERGENCY REPAIRS TO PREVENT FURTHER ROOF LEAKS IMMEDIATELY; SUBMIT A WRITTEN PLAN FOR APPROVAL TO REPAIR OR REPLACE THIS ROOF SYSTEM WITHIN SEVEN (7) CALENDAR DAYS. COMMENCE ACTUAL WORK FOR PERMANENT REPAIRS OR REPLACEMENT WITHIN 30 DAYS AFTER RECEIPT OF NOTICE, AND COMPLETED WITHIN A REASONABLE TIME FRAME. IF THE CONTRACTOR FAILS TO ADEQUATELY RESPOND TO THE WARRANTY PROVISIONS, AS STATED IN THE CONTRACT AND AS CONTAINED HEREIN, THE CONTRACTING OFFICER MAY HAVE THE NON-STRUCTURAL METAL ROOF SYSTEM REPAIRED OR REPLACED BY OTHERS AND CHARGE THE COST TO THE CONTRACTOR.

IN THE EVENT THE CONTRACTOR DISPUTES THE EXISTENCE OF A WARRANTABLE DEFECT, THE CONTRACTOR MAY CHALLENGE THE OWNER'S DEMAND FOR REPAIRS AND/OR REPLACEMENT DIRECTED BY THE OWNER OR CONTRACTING OFFICER EITHER BY REQUESTING A CONTRACTING OFFICER'S DECISION UNDER THE CONTRACT DISPUTES ACT, OR BY REQUESTING THAT AN ARBITRATOR RESOLVE THE ISSUE. MAKE THE REQUEST FOR AN ARBITRATOR WITHIN 48 HOURS OF BEING NOTIFIED OF THE DISPUTED DEFECTS. UPON BEING INVOKED, WITHIN TEN (10) DAYS, ENSURE THE PARTIES JOINTLY REQUEST A LIST OF FIVE (5) ARBITRATORS FROM THE FEDERAL MEDIATION AND CONCILIATION SERVICE. THE PARTIES TEN (10) DAYS AFTER RECEIPT OF THE LIST TO SEEK AGREEMENT ON AN ARBITRATOR TO CONFER. IF THE PARTIES CANNOT AGREE ON AN ARBITRATOR, THE CONTRACTING OFFICER AND THE PRESIDENT OF THE CONTRACTOR'S COMPANY WILL STRIKE ONE (1) NAME FROM THE LIST ALTERNATIVELY UNTIL ONE (1) NAME REMAINS. THE REMAINING PERSON IS THE DULY SELECTED ARBITRATOR. THE COSTS OF THE ARBITRATION, INCLUDING THE ARBITRATOR'S FEE AND EXPENSES, COURT REPORTER, COURTROOM OR SITE SELECTED, ETC., WILL BE BORNE EQUALLY BETWEEN THE PARTIES. EITHER PARTY DESIRING A COPY OF THE TRANSCRIPT PAYS FOR THE TRANSCRIPT. A HEARING WILL BE HELD AS SOON AS THE PARTIES CAN MUTUALLY AGREE. REQUEST A WRITTEN ARBITRATOR'S DECISION NO LATER THAN 30 DAYS FOLLOWING THE HEARING. THE DECISION OF THE ARBITRATOR WILL NOT BE BINDING; HOWEVER, IT WILL BE ADMISSIBLE IN ANY SUBSEQUENT APPEAL UNDER THE CONTRACT DISPUTES ACT.

POST A FRAMED COPY OF THIS WARRANTY IN THE MECHANICAL ROOM OR OTHER APPROVED LOCATION DURING THE ENTIRE WARRANTY PERIOD.

-- End of Section --

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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.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81 (2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3) National Electrical Code

NFPA 780 (2014) Standard for the Installation of Lightning Protection Systems

U.S. AIR FORCE (USAF)

AFI 32-1065 (1998) Grounding Systems

UNDERWRITERS LABORATORIES (UL)

UL 467 (2007) Grounding and Bonding Equipment

UL 96 (2005; Reprint Sep 2013) Standard for Lightning Protection Components

UL Electrical Construction (2012) Electrical Construction Equipment Directory

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

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Overall lightning protection system; G,

Each major component; G,

#### SD-06 Test Reports

Lightning Protection and Grounding System Test Plan; G

Lightning Protection and Grounding System Test; G

#### SD-07 Certificates

Lightning Protection System Installers Documentation; G,

Component UL Listed and Labeled; G,

Lightning protection system inspection certificate; G

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 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.

### 2.2 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 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 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.

#### 2.2.4 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](#). Lightning protection system consists of air terminals, roof conductors, down conductors, ground connections, grounding electrodes. 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.

#### 3.1.1.1 Air Terminals

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 a standing seam base for installation of roof conductors on a standing seam metal roof that does not produce any roof penetrations.

### 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.

### 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.

## 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](#).

## 3.3 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.

### 3.4 FIELD QUALITY CONTROL

#### 3.4.1 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 --

SECTION 32 01 19

FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS  
08/08

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 C1016 (2014) Standard Test Method for Determination of Water Absorption of Sealant Backing (Joint Filler) Material

ASTM D6690 (2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

ASTM D789 (2015) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 525 (1989) Corps of Engineers Test Method for Evaluation of Hot-Applied Joint Sealants for Bubbling Due to Heating

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS SS-S-200 (Rev E; Am 1; Notice 1) Sealant, Joint, Two-Component, Jet-Blast-Resistant, Cold-Applied, for Portland Cement Concrete Pavement

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Recommendations; G.  
Equipment.

SD-04 Samples

Materials; G.

SD-06 Test Reports

Certified Copies of the Test Reports; G.

1.3 QUALITY ASSURANCE

1.3.1 Test Requirements

Test the joint sealant and backup or separating material for conformance with the referenced applicable material specification. Perform testing of the materials in an approved independent laboratory and submit **certified copies of the test reports** for approval 30 days prior to the use of the materials at the job site. Samples will be retained by the Government for possible future testing should the materials appear defective during or after application. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of the in-place **materials**. Submit samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval 30 days prior to the beginning of work. No material will be allowed to be used until it has been approved.

1.3.2 Trial Joint Sealant Installation

Prior to the cleaning and sealing of the joints for the entire project, prepare a test section at least **200 feet** long using the specified materials and approved equipment, so as to demonstrate the proposed joint preparation and sealing of all types of joints in the project. Following the completion of the test section and before any other joint is sealed, inspect the test section to determine that the materials and installation meet the requirements specified. If it is determined that the materials or installation do not meet the requirements, remove the materials, and reclean and reseal the joints at no cost to the Government. When the test section meets the requirements, it may be incorporated into the permanent work and paid for at the contract unit price per linear foot for sealing items scheduled. Prepare and seal all other joints in the manner approved for sealing the test section.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the job site for defects, unload, and store them with a minimum of handling to avoid damage. Provide storage facilities at the job site for maintaining materials at the temperatures and conditions recommended by the manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

The ambient air temperature and the pavement temperature within the joint wall shall be a minimum of **50 degrees F** and rising at the time of application of the materials. Do not apply sealant if moisture is observed in the joint.

PART 2 PRODUCTS

2.1 SEALANTS

Materials for sealing cracks in the various paved areas indicated on the drawings shall be as follows:



Area	Sealing Material
All other pavements	ASTM D6690, Type II and COE CRD-C 525
Aircraft movement areas	FS SS-S-200 Type M and COE CRD-C 525
Aircraft movement areas	FS SS-S-200 Type H and COE CRD-C 525

2.2 PRIMERS

When primers are recommended by the manufacturer of the sealant, use them in accordance with the recommendation of the manufacturer.

2.3 BACKUP MATERIALS

Provide backup material that is a compressible, nonshrinking, nonstaining, nonabsorbing material, nonreactive with the joint sealant. The material shall have a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The material shall have a water absorption of not more than 5 percent of the sample weight when tested in accordance with ASTM C1016. Use backup material that is 25 plus or minus 5 percent larger in diameter than the nominal width of the crack.

2.4 BOND BREAKING TAPES

Provide a bond breaking tape or separating material that is a flexible, nonshrinkable, nonabsorbing, nonstaining, and nonreacting adhesive-backed tape. The material shall have a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch wider than the nominal width of the joint and shall not bond to the joint sealant.

PART 3 EXECUTION

3.1 EXECUTING EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, 30 days prior to use on the project.

3.1.1 Joint Cleaning Equipment

3.1.1.1 Tractor-Mounted Routing Tool

Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The

use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

#### 3.1.1.2 Concrete Saw

Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified or for refacing joints or cleaning sawed joints where sandblasting does not provide a clean joint.

#### 3.1.1.3 Waterblasting Equipment

Include with the waterblasting equipment a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. Provide water tank and auxiliary resupply equipment of sufficient capacity to permit continuous operations. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. Adjust the height, angle of inclination and the size of the nozzle as necessary to obtain satisfactory results. A pressure gauge mounted at the pump shall show at all times the pressure in psi at which the equipment is operating.

#### 3.1.1.4 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

### 3.1.2 Sealing Equipment

#### 3.1.2.1 Hot-Poured Sealing Equipment

The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

#### 3.1.2.2 Two-Component, Cold-Applied, Machine Mix Sealing Equipment

Provide equipment used for proportioning, mixing, and installing FS SS-S-200 Type M joint sealants designed to deliver two semifluid components through hoses to a portable mixer at a preset ratio of 1 to 1 by volume using pumps with an accuracy of plus or minus 5 percent for the quantity of each component. The reservoir for each component shall be equipped with mechanical agitation devices that will maintain the components in a uniform condition without entrapping air. Incorporate provisions to permit thermostatically controlled indirect heating of the components, when required. However, immediately prior to proportioning and mixing, the temperature of either component shall not exceed 90 degrees F. Provide screens near the top of each reservoir to remove any foreign particles or partially polymerized material that could clog fluid lines or otherwise cause misproportioning or improper mixing of the two

components. Provide equipment capable of thoroughly mixing the two components through a range of application rates of 10 to 60 gallons per hour and through a range of application pressures from 50 to 1500 psi as required by material, climatic, or operating conditions. Design the mixer for the easy removal of the supply lines for cleaning and proportioning of the components. The mixing head shall accommodate nozzles of different types and sizes as may be required by various operations. The dimensions of the nozzle shall be such that the nozzle tip will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval.

### 3.1.2.3 Two-Component, Cold-Applied, Hand-Mix Sealing Equipment

Mixing equipment for FS SS-S-200 Type H sealants shall consist of a slow-speed electric drill or air-driven mixer with a stirrer in accordance with the manufacturer's recommendations. Submit printed copies of manufacturer's recommendations, 30 days prior to use on the project, where installation procedures, or any part thereof, are required to be in accordance with those recommendations. Installation of the material will not be allowed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

## 3.2 SAFETY

Do not place joint sealant within 25 feet of any liquid oxygen (LOX) equipment, LOX storage, or LOX piping. Thoroughly clean joints in this area and leave them unsealed.

## 3.3 PREPARATION OF JOINTS

Immediately before the installation of the sealant, thoroughly clean the joints to remove all laitance, curing compound, filler, protrusions of hardened concrete, and old sealant from the sides and upper edges of the joint space to be sealed.

### 3.3.1 Existing Sealant Removal

Cut loose the in-place sealant from both joint faces and to the depth shown on the drawings, using the tractor-mounted routing equipment, concrete saw, or waterblaster as specified in paragraph EQUIPMENT. Depth shall be sufficient to accommodate any separating or backup material that is required to maintain the depth of new sealant to be installed. Prior to further cleaning operations, remove all loose old sealant remaining in the joint opening by blowing with compressed air. Hand tools may be required to remove sealant from random cracks. Chipping, spalling, or otherwise damaging the concrete will not be allowed.

### 3.3.2 Sawing

#### 3.3.2.1 Refacing of Joints

Accomplish refacing of joints using a concrete saw as specified in paragraph EQUIPMENT to remove all residual old sealant and a minimum of concrete from the joint face to provide exposure of newly cleaned concrete, and, if required, to enlarge the joint opening to the width and depth shown on the drawings. Stiffen the blade with a sufficient number of suitable dummy (used) blades or washers. Thoroughly clean, immediately

following the sawing operation, the joint opening using a water jet to remove all saw cuttings and debris.

#### 3.3.2.2 Refacing of Random Cracks

Accomplish sawing of the cracks using a power-driven concrete saw as specified in paragraph EQUIPMENT. The saw blade shall be 6 inches or less in diameter to enable the saw to follow the trace of the crack. Stiffen the blade, as necessary, with suitable dummy (or used) blades or washers. Immediately following the sawing operation, thoroughly clean the crack opening using a water jet to remove all saw cuttings and debris.

#### 3.3.3 Back-Up Material

When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a back-up material to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backup material is placed at the specified depth and is not stretched or twisted during installation.

#### 3.3.4 Bond Breaking Tape

Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond breaker separating tape to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

#### 3.3.5 Rate of Progress of Joint Preparation

Limit the stages of joint preparation, which include sandblasting, air pressure cleaning and placing of the back-up material to only that lineal footage that can be sealed during the same day.

### 3.4 PREPARATION OF SEALANT

#### 3.4.1 Hot-Poured Sealants

Do not heat sealants conforming to ASTM D6690 in excess of the safe heating temperature recommended by the manufacturer as shown on the sealant containers. Withdraw and waste sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation.

#### 3.4.2 Type M Sealants

Inspect the FS SS-S-200 Type M sealant components and containers prior to use. Reject any materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory. Settlement of constituents in a soft mass that can be readily and uniformly remixed in the field with simple tools will not be cause for rejection. Prior to transfer of the components from the shipping containers to the appropriate reservoir of the application equipment, thoroughly mix the materials to ensure homogeneity of the components and incorporation of all constituents at the time of transfer. When necessary for remixing prior to transfer to the application equipment reservoirs, warm the components to a temperature not to exceed 90 degrees F by placing the components in heated storage or by other approved methods

but in no case shall the components be heated by direct flame, or in a single walled kettle, or a kettle without an oil bath.

### 3.4.3 Type H Sealants

Mix the **FS SS-S-200** Type H sealant components either in the container furnished by the manufacturer or a cylindrical metal container of volume approximately 50 percent greater than the package volume. Thoroughly mix the base material in accordance with the manufacturer's instructions. The cure component shall then be slowly added during continued mixing until a uniform consistency is obtained.

## 3.5 INSTALLATION OF SEALANT

### 3.5.1 Time of Application

Seal joints immediately following final cleaning of the joint walls and following the placement of the separating or backup material. Open joints, that cannot be sealed under the conditions specified, or when rain interrupts sealing operations shall be recleaned and allowed to dry prior to installing the sealant.

### 3.5.2 Sealing Joints

Immediately preceding, but not more than **50 feet** ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to **1/8 inch** plus or minus **1/16 inch** below the pavement surface. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Contracting Officer. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

## 3.6 INSPECTION

### 3.6.1 Joint Cleaning

Inspect joints during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Cleaned joints will be approved prior to installation of the separating or back-up material and joint sealant.

### 3.6.2 Joint Sealant Application Equipment

Inspect the application equipment to ensure conformance to temperature requirements, proper proportioning and mixing (if two-component sealant) and proper installation. Evidences of bubbling, improper installation, failure to cure or set will be cause to suspend operations until causes of the deficiencies are determined and corrected.

### 3.6.3 Joint Sealant

Inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid,

entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified herein at no additional cost to the Government.

3.7 CLEAN-UP

Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

-- End of Section --

SECTION 32 12 13

BITUMINOUS TACK AND PRIME COATS  
05/17

PART 1 GENERAL

1.1 UNIT PRICES 1.1.1 [Waybills and Delivery Tickets](#)

Submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the Contracting Officer certified waybills and certified delivery tickets for all bituminous materials used in the construction of the pavement covered by the contract. These submittals are required for Unit Pricing bid only. Do not remove bituminous material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken.

1.2 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 ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

[AASHTO T 102](#) (2009; R 2013) Standard Method of Test for  
Spot Test of Asphaltic Materials

ASTM INTERNATIONAL (ASTM)

[ASTM D140/D140M](#) (2016) Standard Practice for Sampling  
Asphalt Materials

[ASTM D2028/D2028M](#) (2015) Cutback Asphalt (Rapid-Curing Type)

[ASTM D2397/D2397M](#) (2013) Standard Specification for Cationic  
Emulsified Asphalt

[ASTM D2995](#) (1999; R 2009) Determining Application  
Rate of Bituminous Distributors

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section [01 33 00 SUBMITTAL PROCEDURES](#):

[SD-03 Product Data](#)

[Waybills and Delivery Tickets](#)

## SD-06 Test Reports

### Sampling and Testing

#### 1.4 QUALITY ASSURANCE

Certificates of compliance for asphalt materials delivered will be obtained and checked to ensure that specification requirements are met. Quantities of applied material will be determined. Payment will be for amount of residual asphalt applied. Tack coat materials will not be diluted. Prime coat materials when emulsions are used can be diluted on site with potable water up to 1 part emulsion to 1 part water.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

#### 1.6 EQUIPMENT, TOOLS AND MACHINES

##### 1.6.1 General Requirements

Equipment, tools and machines used in the work are subject to approval. Maintain in a satisfactory working condition at all times. Calibrate equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment within 12 months of their use. If the calibration expires during project, recalibrate the equipment before work can continue.

##### 1.6.2 Bituminous Distributor

Provide a self propelled distributor with pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the surface being sprayed. Calibrate the distributor in accordance with [ASTM D2995](#). Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled total liquid rates from [0.50 to 0.75 gallons per square yard](#), with a pressure range of [25 to 75 psi](#) and with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. The distributor will be capable of circulating and agitating the bituminous material during the heating process.

##### 1.6.3 Heating Equipment for Storage Tanks

Use steam, electric, or hot oil heaters for heating the bituminous material. Provide steam heaters consisting of steam coils and equipment for producing steam, so designed that the steam cannot come in contact with the bituminous material. Fix an armored thermometer to the tank with a temperature range from [40 to 400 degrees F](#) so that the temperature of the bituminous material may be determined at all times.



#### 1.6.4 Power Brooms and Power Blowers

Use power brooms and power blowers suitable for cleaning the surfaces to which the bituminous coat is to be applied.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

Apply bituminous coat only when the surface to receive the bituminous coat is dry. A limited amount of moisture (approximately 0.03 gallon/square yard) can be sprayed on the surface of unbound material when prime coat is used to improve coverage and penetration of asphalt material. Apply bituminous coat only when the atmospheric temperature in the shade is 50 degrees F or above and when the temperature has not been below 35 degrees F for the 12 hours prior to application, unless otherwise directed.

### PART 2 PRODUCTS

#### 2.1 PRIME COAT

Provide asphalt conforming to one of the following grades:

##### 2.1.1 Cutback Asphalt

Provide cutback asphalt conforming to Grade MC-70 [ASTM D2028/D2028M](#).

##### 2.1.2 Emulsified Asphalt

Provide emulsified asphalt conforming to [ASTM D2397/D2397M](#), Type CSS-1h. Asphalt emulsion can be diluted up to 1 part water to 1 part emulsion for prime coat use. Do not dilute asphalt emulsion for tack coat use.

#### 2.2 TACK COAT

##### 2.2.1 Cutback Asphalt

Provide cutback asphalt conforming to [ASTM D2028/D2028M](#), Grade RC-70 RC-250.

##### 2.2.2 Emulsified Asphalt

Provide emulsified asphalt conforming to [ASTM D2397/D2397M](#), Type CSS-1h. For prime coats the emulsified asphalt can be diluted with up to 1 part emulsion to 1 part water. No dilution is allowed for tack coat applications. The base asphalt used to manufacture the emulsion is required to show a negative spot when tested in accordance with [AASHTO T 102](#) using standard naphtha.

### PART 3 EXECUTION

#### 3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a power broom or blower supplemented with hand brooms. Apply treatment only when the surface is dry and clean.

#### 3.2 APPLICATION RATE

The exact quantities within the range specified, which may be varied to

suit field conditions, will be determined by the Contracting Officer.

3.2.1 Tack Coat

Apply bituminous material for the tack coat in quantities of not less than 0.03 gallons nor more than 0.08 gallons per square yard of residual asphalt onto the pavement surface as approved by the Contracting Officer. Do not dilute asphalt emulsion when used as a tack coat.

3.2.2 Prime Coat

Apply bituminous material for the prime coat in quantities of not less than 0.50 gallons nor more than 0.75 gallons per square yard of residual asphalt for asphalt emulsion up to a 1 to 1 dilution rate or for residual asphalt for cutback asphalt.

3.3 APPLICATION TEMPERATURE

3.3.1 Viscosity Relationship

Apply asphalt at a temperature that will provide a viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. Furnish the temperature viscosity relation to the Contracting Officer.

3.3.2 Temperature Ranges

The viscosity requirements determine the application temperature to be used. The following is a normal range of application temperatures:

Cutback Asphalts	
MC-70	120-225 degrees F
Asphalt Emulsion	
All Grades	70-160 degrees F

Some of these temperatures for rapid cure cutbacks are above the flash point of the material and care should be taken in their heating.

3.4 APPLICATION

3.4.1 General

Following preparation and subsequent inspection of the surface, apply the bituminous prime or tack coat with the bituminous distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots, not capable of being sprayed with the distributor, with the hand spray. Until the succeeding layer of pavement is placed, maintain the surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the Government. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment are permitted within 25 feet of heating, distributing, and transferring operations of cutback materials. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether

primed or not, until the surfacing is completed. The bituminous coat requirements are described herein.

#### 3.4.2 Prime Coat

Apply a prime coat at locations shown on the Drawings. The prime coat is required if it will be at least 7 days before the asphalt mixture is constructed on the underlying (base course, etc.) compacted material. The type of liquid asphalt and application rate will be as specified herein. Protect the underlying layer from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven days, the choice of protection measures or actions to be taken is at the Contractor's option. Repair (recompact or replace) damage to the underlying material caused by lack of, or inadequate, protection by approved methods at no additional cost to the Government. If the Contractor opts to use the prime coat, apply as soon as possible after consolidation of the underlying material. Apply the bituminous material uniformly over the surface to be treated at a pressure range of 25 to 75 psi; the rate will be as specified above in paragraph APPLICATION RATE. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application remove and destroy the building paper.

#### 3.4.3 Tack Coat

Apply tack coat at the locations shown on the drawings. A tack coat should be applied to every bound surface (asphalt or concrete pavement) that is being overlaid with asphalt mixture and at transverse and longitudinal joints. Apply the tack coat when the surface to be treated is clean and dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature specified herein and at a rate as specified above in paragraph APPLICATION RATE. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor by spraying with a hand wand or using other approved method. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

#### 3.5 CURING PERIOD

Following application of the bituminous material and prior to application of the succeeding layer of asphalt mixture allow the bituminous coat to cure and water or volatiles to evaporate prior to overlaying. Maintain the tacked surface in good condition until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up excess bituminous material.

### 3.6 FIELD QUALITY CONTROL

Obtain certificates of compliance for all asphalt material delivered to the project. Obtain samples of the bituminous material under the supervision of the Contracting Officer. The sample may be retained and tested by the Government at no cost to the Contractor.

### 3.7 SAMPLING AND TESTING

Furnish certified copies of the manufacturer's test reports indicating temperature viscosity relationship for cutback asphalt or asphalt cement, compliance with applicable specified requirements, not less than 5 days before the material is required in the work.

#### 3.7.1 Sampling

Unless otherwise specified, sample bituminous material in accordance with [ASTM D140/D140M](#).

#### 3.7.2 Calibration Test

Furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibrate using the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibrate the bituminous distributor in accordance with [ASTM D2995](#).

#### 3.7.3 Trial Applications

Before applying the spray application of tack or prime coat, apply three lengths of at least [100 feet](#) for the full width of the distributor bar to evaluate the amount of bituminous material that can be satisfactorily applied.

##### 3.7.3.1 Tack Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous tack coat materials in the amount of [0.05 gallons per square yard](#). Make other trial applications using various amounts of material as may be deemed necessary.

##### 3.7.3.2 Prime Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous materials in the amount of [0.15 gallon per square yard](#). Make other trial applications using various amounts of material as may be deemed necessary.

#### 3.7.4 Sampling and Testing During Construction

Perform quality control sampling and testing as required in paragraph FIELD QUALITY CONTROL.

### 3.8 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

-- End of Section --

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SECTION 32 12 15.13

HOT-MIX ASPHALT AIRFIELD PAVING  
11/15

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 ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
(AASHTO)

- AASHTO M 156 (2013) Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
- AASHTO M 320 (2016) Standard Specification for Performance-Graded Asphalt Binder
- AASHTO T 304 (2011; R 2015) Standard Method of Test for Uncompacted Void Content of Fine Aggregate
- AASHTO T 308 (2016) Standard Method of Test for Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method
- AASHTO T 329 (2015) Standard Test Method for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method

ASPHALT INSTITUTE (AI)

- AI MS-2 (2015) Asphalt Mix Design Methods

ASTM INTERNATIONAL (ASTM)

- ASTM C117 (2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
- ASTM C127 (2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
- ASTM C128 (2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
- ASTM C131/C131M (2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the

Los Angeles Machine

ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C142/C142M	(2017) Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C29/C29M	(2016) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C566	(2013) Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM C88	(2013) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM D140/D140M	(2016) Standard Practice for Sampling Asphalt Materials
ASTM D1461	(2011) Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D2172/D2172M	(2017) Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
ASTM D2419	(2014) Sand Equivalent Value of Soils and Fine Aggregate
ASTM D242/D242M	(2009; R 2014) Mineral Filler for Bituminous Paving Mixtures
ASTM D2489/D2489M	(2016) Standard Test Method for Estimating Degree of Particle Coating of Asphalt Mixtures
ASTM D2726/D2726M	(2014) Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D3203/D3203M	(2017) Standard Test Method for Percent Air Voids in Compacted Asphalt Mixtures
ASTM D3665	(2012) Random Sampling of Construction Materials
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4125/D4125M	(2010) Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D4791	(2010) Flat Particles, Elongated Particles, or Flat and Elongated Particles



	in Coarse Aggregate
ASTM D4867/D4867M	(2009; R 2014) Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5444	(2015) Mechanical Size Analysis of Extracted Aggregate
ASTM D6307	(2016) Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D6926	(2016) Standard Practice for Preparation of Asphalt Mixture Specimens Using Marshall Apparatus
ASTM D6927	(2015) Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D75/D75M	(2014) Standard Practice for Sampling Aggregates
ASTM D979/D979M	(2015) Sampling Bituminous Paving Mixtures
U.S. ARMY CORPS OF ENGINEERS (USACE)	
COE CRD-C 171	(1995) Standard Test Method for Determining Percentage of Crushed Particles in Aggregate

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-03 Product Data

Mix Design; G  
Contractor Quality Control; G

### SD-04 Samples

Aggregates  
Asphalt Cement Binder

### SD-06 Test Reports

Aggregates; G  
QC Monitoring

### SD-07 Certificates

Asphalt Cement Binder; G  
Testing Laboratory

1.3 QUALITY ASSURANCE

The **Government** quality assurance (QA) program for this project is separate and distinct from the Contractor's quality control (QC) program specified in Part 3. Testing for acceptability of work will be performed by the **Government** or by an independent laboratory hired by the **Contracting Officer**, except for grade and smoothness testing which shall be performed by the Contractor. Acceptance of the plant produced mix and in-place requirements will be on a lot to lot basis. A standard lot for all requirements will be equal to 2000 **short** tons. Where appropriate, adjustment in payment for individual lots of hot-mix asphalt will be made based on in-place density, laboratory air voids, grade and smoothness in accordance with the following paragraphs. Grade and surface smoothness determinations will be made on the lot as a whole. Exceptions or adjustments to this will be made in situations where the mix within one lot is placed as part of both the intermediate and surface courses, thus grade and smoothness measurements for the entire lot cannot be made. In order to evaluate laboratory air voids and in-place (field) density, each lot will be divided into four equal sublots.

1.3.1 Sublot Sampling

One random mixture sample for determining laboratory air voids, theoretical maximum density, and for any additional testing the **Government** desires, will be taken from a loaded truck delivering mixture to each sublot, or other appropriate location for each sublot. All samples will be selected randomly, using commonly recognized methods of assuring randomness conforming to **ASTM D3665** and employing tables of random numbers or computer programs. Laboratory air voids will be determined from three laboratory compacted specimens of each sublot sample in accordance with **ASTM D3203/D3203M**. The specimens will be compacted within 2 hours of the time the mixture was loaded into trucks at the asphalt plant. Samples will not be reheated prior to compaction and insulated containers will be used as necessary to maintain the temperature.

1.3.2 Additional Sampling and Testing

The **Contracting Officer** reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. The cost of any additional testing will be paid for by the **Government**. Testing in these areas will be treated as a separate lot. Payment will be made for the quantity of HMA represented by these tests in accordance with the provisions of this section.

1.3.3 In-place Density

For determining in-place density, obtain one random core (**4 inches** or **6 inches** in diameter) at locations identified by the **Government** from the mat (interior of the lane and at least **12 inches** from longitudinal joint or pavement edge) of each sublot, and one random core taken from the joint (immediately over joint) of each sublot, in accordance with **ASTM D979/D979M**. Fill all core holes with hot-mix and compact using a standard Marshall hammer to a mat density as specified. Tack coat dry core holes before filling. Each random core will be full thickness of the layer being placed. When the random core is less than **1 inch** thick, it will not be

included in the analysis. In this case, another random core will be taken. After air drying to meet the requirements for laboratory-prepared, thoroughly dry specimens, cores obtained from the mat and from the joints will be used for in-place density determination in accordance with [ASTM D2726/D2726M](#).

#### 1.3.4 Surface Smoothness

Use a straightedge for measuring surface smoothness of [airfield pavements](#). Perform all testing in the presence of the [Government](#). Maintain detailed notes of the testing results and provide a copy to the [Government](#) immediately after each day's testing. Where drawings show required deviations from a plane surface (for instance crowns, drainage inlets), finish the surface to meet the approval of the [Government](#).

##### 1.3.4.1 Smoothness Requirements

###### 1.3.4.1.1 Straightedge Testing

Provide finished surfaces of the pavements with no abrupt change of [1/8 inch](#) or more when checked with an approved [12 foot](#) straightedge.

##### 1.3.4.2 Testing Method

After the final rolling, but not later than 24 hours after placement, test the surface of the pavement in each entire lot in a manner to reveal surface irregularities exceeding the tolerances specified above. If any pavement areas are diamond ground, retest these areas immediately after diamond grinding. The maximum area allowed to be corrected by diamond grinding is 10 percent of the total area of the lot. Test the entire area of the pavement with a profilograph. Check a number of random locations along with any observed suspicious locations primarily at transverse and longitudinal joints with the straightedge.

###### 1.3.4.2.1 Straightedge Testing

Hold the straightedge in contact with the pavement surface and measure the maximum distance between the straightedge and the pavement surface. Determine the amount of surface irregularity by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. Use the straightedge to measure abrupt changes in surface grade.

#### 1.4 ENVIRONMENTAL REQUIREMENTS

Do not place the hot-mix asphalt upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the [Government](#), if requested; provided all other requirements, including compaction, are met.

Table 4. Surface Temperature Limitations of Underlying Course	
Mat Thickness, inches	Degrees F
3 or greater	40
Less than 3	45

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Perform the work consisting of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. Provide hot-mix asphalt (HMA) designed and constructed in accordance with this section conforming to the lines, grades, thicknesses, and typical cross sections shown on the drawings. Construct each course to the depth, section, or elevation required by the drawings and rolled, finished, and approved before the placement of the next course.

2.1.1 Asphalt Mixing Plant

Provide plants used for the preparation of hot-mix asphalt conforming to the requirements of [AASHTO M 156](#) with the following changes:

2.1.1.1 Truck Scales

Weigh the asphalt mixture on approved scales, or on certified public scales at no additional expense to the Government. Inspect and seal scales at least annually by an approved calibration laboratory.

2.1.1.2 Inspection of Plant

Provide access to the [Contracting Officer](#) at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. Provide assistance as requested, for the [Government](#) to procure any desired samples.

2.1.1.3 Storage Bins

The asphalt mixture may be stored in non-insulated storage bins for a period of time not exceeding 3 hours. The asphalt mixture may be stored in insulated storage bins for a period of time not exceeding 8 hours. Provide the mix drawn from bins that meets the same requirements as mix loaded directly into trucks.

2.1.2 Hauling Equipment

Provide trucks used for hauling hot-mix asphalt that have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, lightly coat the truck beds with a minimum amount of paraffin oil, lime solution, or other approved material. Do not use petroleum based products as a release agent. Provide each truck with a suitable cover to protect the mixture from adverse weather. When necessary to ensure that the mixture is delivered to the site at the specified temperature, provide

insulated or heated truck beds with covers (tarps) that are securely fastened.

#### 2.1.3 Material Transfer Vehicle (MTV)

Provide Material Transfer Vehicles for placement of the hot mix asphalt. To transfer the material from the hauling equipment to the paver, use a self-propelled, material transfer vehicle with a swing conveyor that delivers material to the paver from outside the paving lane and without making contact with the paver. Provide MTV capable to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. Provide Material Transfer Vehicle with remixing and storage capability to prevent physical and thermal segregation.

#### 2.1.4 Asphalt Pavers

Provide mechanical spreading and finishing equipment consisting of a self-powered paver, capable of spreading and finishing the mixture to the specified line, grade, and cross section. Provide paver screed capable of laying a uniform mixture to meet the specified thickness, smoothness, and grade without physical or temperature segregation, the full width of the material being placed. Provide a screed equipped with a compaction device to be used during all placement.

##### 2.1.4.1 Receiving Hopper

Provide paver with a receiving hopper of sufficient capacity to permit a uniform spreading operation and a distribution system to place the mixture uniformly in front of the screed without segregation. Provide a screed that effectively produces a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

##### 2.1.4.2 Automatic Grade Controls

If an automatic grade control device is used, provide a paver equipped with a control system capable of automatically maintaining the specified screed elevation that is automatically actuated from either a reference line or through a system of mechanical sensors or sensor-directed mechanisms or devices which maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. Provide transverse slope controller capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. Do not use the transverse slope controller to control grade. Provide controls capable of working in conjunction with any of the following attachments:

- a. Ski-type device of not less than 30 feet in length.
- b. Taut stringline set to grade.
- c. Short ski or shoe for joint matching.
- d. Laser control.

#### 2.1.5 Rollers

Provide rollers in good condition and operated at slow speeds to avoid displacement of the asphalt mixture. Provide sufficient number, type, and weight of rollers to compact the mixture to the required density while it

is still in a workable condition. Do not use equipment which causes excessive crushing of the aggregate.

## 2.2 AGGREGATES

Sample aggregates in the presence of a Government Representative. Obtain samples in accordance with [ASTM D75/D75M](#) and be representative of the materials to be used for the project. Provide aggregates consisting of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The portion of material retained on the [No. 4](#) sieve is coarse aggregate. The portion of material passing the [No. 4](#) sieve and retained on the [No. 200](#) sieve is fine aggregate. The portion passing the [No. 200](#) sieve is defined as mineral filler. Submit sufficient materials to produce [200 pounds](#) of blended mixture for mix design verification. Submit all aggregate test results and samples to the [Government](#) at least 14 days prior to start of construction. Perform job aggregate testing no earlier than 6 months before contract award.

### 2.2.1 Coarse Aggregate

Provide coarse aggregate consisting of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Provide coarse aggregate particles meeting the following requirements:

- a. The percentage of loss not be greater than 40 percent after 500 revolutions when tested in accordance with [ASTM C131/C131M](#).
- b. The sodium sulfate soundness loss not exceeding 12 percent, or the magnesium sulfate soundness loss not exceeding 18 percent after five cycles when tested in accordance with [ASTM C88](#).
- c. At least 75 percent by weight of coarse aggregate contain at least two or more fractured faces when tested in accordance with [COE CRD-C 171](#) with fractured faces produced by crushing.
- d. The particle shape essentially cubical and the aggregate containing not more than 20 percent, by weight, of flat particles and elongated particles (3:1 ratio of maximum to minimum) when tested in accordance with [ASTM D4791](#).
- e. Slag consisting of air-cooled, blast furnace slag, with a compacted weight of not less than [75 pounds per cubic foot](#) when tested in accordance with [ASTM C29/C29M](#).
- f. Clay lumps and friable particles not exceeding 0.3 percent, by weight, when tested in accordance with [ASTM C142/C142M](#).

### 2.2.2 Fine Aggregate

Provide fine aggregate consisting of clean, sound, tough, durable particles. Provide aggregate particles that are free from coatings of clay, silt, or any objectionable material, contain no clay balls, and meet the following requirements:

- a. Quantity of natural sand (noncrushed material) added to the aggregate blend not exceeding 15 percent by weight of total aggregate.

- b. Individual fine aggregate sources with a sand equivalent value greater than 45 when tested in accordance with [ASTM D2419](#).
- c. Fine aggregate portion of the blended aggregate with an uncompacted void content greater than 45.0 percent when tested in accordance with [AASHTO T 304](#) Method A.
- d. Clay lumps and friable particles not exceeding 0.3 percent, by weight, when tested in accordance with [ASTM C142/C142M](#).

2.2.3 Mineral Filler

Provide mineral filler consisting of a nonplastic material meeting the requirements of [ASTM D242/D242M](#).

2.2.4 Aggregate Gradation

Provide a combined aggregate gradation that conforms to gradations specified in Table 5, when tested in accordance with [ASTM C136/C136M](#) and [ASTM C117](#), and does not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grades uniformly from coarse to fine. Provide a JMF within the specification limits; however, the gradation can exceed the limits when the allowable deviation from the JMF shown in Tables 8 and 9 are applied.

	Gradation 1	Gradation 2	Gradation 3
Sieve Size, inch	Percent Passing by Mass	Percent Passing by Mass	Percent Passing by Mass
1	100	---	---
3/4	90-100	100	---
1/2	68-88	90-100	100
3/8	60-82	69-89	90-100
No. 4	45-67	53-73	58-78
No. 8	32-54	38-60	40-60
No. 16	22-44	26-48	28-48
No. 30	15-35	18-38	18-38
No. 50	9-25	11-27	11-27
No. 100	6-18	6-18	6-18
No. 200	3-6	3-6	3-6

### 2.3 ASPHALT CEMENT BINDER

Provide asphalt cement binder that conforms to AASHTO M 320 Performance Grade (PG) 70-22. Provide test data indicating grade certification by the supplier at the time of delivery of each load to the mix plant. Submit copies of these certifications to the Government. The supplier is defined as the last source of any modification to the binder. The Government may sample and test the binder at the mix plant at any time before or during mix production. Obtain samples for this verification testing in accordance with ASTM D140/D140M and in the presence of the Government. Provide these samples to the Government for the verification testing, which will be performed at the Government's expense. Submit 5 gallon sample of the asphalt cement specified for mix design verification and approval not less than 14 days before start of the test section.

### 2.4 MIX DESIGN

Develop the mix design. Perform Job Mix formula (JMF) and aggregates testing no earlier than 6 months before contract award. Provide asphalt mix composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. Provide aggregate fractions sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of Table 5. Do not produce hot-mix asphalt for payment until a JMF has been approved. Design the hot-mix asphalt using hand-held hammer procedures contained in AI MS-2 and the criteria shown in Table 6. Use laboratory compaction temperatures for Polymer Modified Asphalts as recommended by the asphalt cement manufacturer. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D4867/D4867M is less than 75, reject the aggregates or the asphalt mixture treated with an anti-stripping agent. Add a sufficient amount of anti-stripping agent to produce a TSR of not less than 75. If an antistrip agent is required, provide it at no additional cost to the Government. Provide sufficient materials to produce 200 pound of blended mixture to the Government for verification of mix design at least 14 days prior to construction of test section.

#### 2.4.1 JMF Requirements

Submit the proposed JMF in writing, for approval, at least 14 days prior to the start of the test section, including as a minimum:

- a. Percent passing each sieve size.
- b. Percent of asphalt cement.
- c. Percent of each aggregate and mineral filler to be used.
- d. Asphalt viscosity grade, penetration grade, or performance grade.
- e. Number of blows of hammer per side of molded specimen.
- f. Laboratory mixing temperature.
- g. Lab compaction temperature.
- h. Temperature-viscosity relationship of the asphalt cement.
- i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.



- j. Graphical plots and summary tabulation of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-2. Include summary tabulation that includes individual specimen data for each specimen tested.
- k. Specific gravity and absorption of each aggregate.
- l. Percent natural sand.
- m. Percent particles with two or more fractured faces (in coarse aggregate).
- n. Fine aggregate angularity.
- o. Percent flat or elongated particles (in coarse aggregate).
- p. Tensile Strength Ratio and wet/dry specimen test results.
- q. Antistrip agent (if required).
- r. List of all modifiers.
- s. Percentage and properties (asphalt content, binder properties, and aggregate properties) of RAP in accordance with paragraph RECYCLED HOT-MIX ASPHALT, if RAP is used.

Table 6. Marshall Design Criteria		
Test Property	75 Blow Mix	50 Blow Mix
Stability, pounds minimum	2150 <sup>(1)</sup>	1350 <sup>(1)</sup>
Flow, 0.01 inch	8-16 <sup>(2)</sup>	8-18 <sup>(2)</sup>
Air voids, percent	4 <sup>(4)</sup>	4 <sup>(4)</sup>
Percent Voids in mineral aggregate (minimum)	See Table 7	See Table 7
Dust Proportion <sup>(3)</sup>	0.8-1.2	0.8-1.2
TSR, minimum percent	75	75
TSR Conditioned Strength (minimum psi)	60	60
(1) This is a minimum requirement. Provide significantly higher average during construction to ensure compliance with the specifications.		
(2) The flow requirement is not applicable for Polymer Modified Asphalts		

Table 6. Marshall Design Criteria		
Test Property	75 Blow Mix	50 Blow Mix
(3) Dust Proportion is calculated as the aggregate content, expressed as a percent of mass, passing the No. 200 sieve, divided by the effective asphalt content, in percent of total mass of the mixture.		
(4) Select the JMF asphalt content corresponding to an air void content of 4 percent. Verify the other properties of Table 6 meet the specification requirements at this asphalt content.		

Table 7. Minimum Percent Voids in Mineral Aggregate (VMA) <sup>(1)</sup>	
Aggregate (See Table 5)	Minimum VMA, percent
Gradation 1	13
Gradation 2	14
Gradation 3	15
(1) Calculate VMA in accordance with AI MS-2, based on ASTM D2726/D2726M bulk specific gravity for the aggregate.	

2.4.2 Adjustments to JMF

The JMF for each mixture is in effect until a new formula is approved in writing by the Government . Should a change in sources of any materials be made, perform a new mix design and a new JMF approved before the new material is used. Make minor adjustments within the specification limits to the JMF to optimize mix volumetric properties. Adjustments to the original JMF are limited to plus or minus 4 percent on the No. 4 and coarser sieves; plus or minus 3 percent on the No. 8 to No. 50 sieves; and plus or minus 1 percent on the No. 100 sieve. Adjustments to the JMF are limited to plus or minus 1.0 percent on the No. 200 sieve. Asphalt content adjustments are limited to plus or minus 0.40 from the original JMF. If adjustments are needed that exceed these limits, develop a new mix design.

PART 3 EXECUTION

3.1 CONTRACTOR QUALITY CONTROL

3.1.1 General Quality Control Requirements

Submit the Quality Control Plan. Do not produce hot-mix asphalt for payment until the quality control plan has been approved. In the quality control plan, address all elements which affect the quality of the pavement including, but not limited to:

- a. Mix Design and unique JMF identification code
- b. Aggregate Grading
- c. Quality of Materials

- d. Stockpile Management and procedures to prevent contamination
- e. Proportioning
- f. Mixing and Transportation
- g. Correlation of mechanical hammer to hand hammer. Determine the number of blows of the mechanical hammer required to provide the same density of the JMF as provided by the hand hammer. Use the average of three specimens per trial blow application.
- h. Mixture Volumetrics
- i. Moisture Content of Mixtures
- j. Placing and Finishing
- k. Joints
- l. Compaction, including HMA-Portland Cement Concrete joints
- m. Surface Smoothness
- n. Truck bed release agent

### 3.1.2 Testing Laboratory

Provide a fully equipped asphalt laboratory located at the plant or job site that is equipped with heating and air conditioning units to maintain a temperature of 75 plus or minus 5 degrees F. Provide laboratory facilities that are kept clean and all equipment maintained in proper working condition. Provide the Government with unrestricted access to inspect the laboratory facility, to witness quality control activities, and to perform any check testing desired. The Government will advise in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to adversely affect test results, immediately suspend the incorporation of the materials into the work. Incorporation of the materials into the work will not be permitted to resume until the deficiencies are corrected.

### 3.1.3 Quality Control Testing

Perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. Required elements of the testing program include, but are not limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, moisture in the asphalt mixture, laboratory air voids, stability, flow, in-place density, grade and smoothness. Develop a Quality Control Testing Plan as part of the Quality Control Program.

#### 3.1.3.1 Asphalt Content

A minimum of two tests to determine asphalt content will be performed per lot (a lot is defined in paragraph QUALITY ASSURANCE) by one of the following methods: extraction method in accordance with ASTM D2172/D2172M, Method A or B, the ignition method in accordance with the AASHTO T 308, ASTM D6307, or the nuclear method in accordance with ASTM D4125/D4125M,

provided each method is calibrated for the specific mix being used. For the extraction method, determine the weight of ash, as described in [ASTM D2172/D2172M](#), as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. Use the last weight of ash value in the calculation of the asphalt content for the mixture.

#### 3.1.3.2 Aggregate Properties

Determine aggregate gradations a minimum of twice per lot from mechanical analysis of recovered aggregate in accordance with [ASTM D5444](#) or [ASTM D6307](#). For batch plants, test aggregates in accordance with [ASTM C136/C136M](#) using actual batch weights to determine the combined aggregate gradation of the mixture. Determine the specific gravity of each aggregate size grouping for each 5,000 tons in accordance with [ASTM C127](#) or [ASTM C128](#). Determine fractured faces for gravel sources for each 5,000 tons in accordance with [COE CRD-C 171](#). Determine the uncompacted void content of manufactured sand for each 20,000 tons in accordance with [AASHTO T 304](#) Method A.

#### 3.1.3.3 Temperatures

Check temperatures at least four times per lot, at necessary locations, to determine the temperature at the dryer, the asphalt cement in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

#### 3.1.3.4 Aggregate Moisture

Determine the moisture content of aggregate used for production a minimum of once per lot in accordance with [ASTM C566](#).

#### 3.1.3.5 Moisture Content of Mixture

Determine the moisture content of the mixture at least once per lot in accordance with [AASHTO T 329](#).

#### 3.1.3.6 Laboratory Air Voids, VMA, Marshall Stability and Flow

Obtain mixture samples at least four times per lot and compacted into specimens, using 50 and 75 blows per side with the Marshall hand-held hammer as described in [ASTM D6926](#). After compaction, determine the laboratory air voids and VMA of each specimen, as well as the Marshall stability and flow, as described in [ASTM D6927](#). Provide VMA within the limits of Table 7.

#### 3.1.3.7 In-Place Density

Conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge or other non-destructive testing device may be used to monitor pavement density.

#### 3.1.3.8 Grade and Smoothness

Conduct the necessary checks to ensure the grade and smoothness requirements are met in accordance with paragraph QUALITY ASSURANCE.

#### 3.1.3.9 Additional Testing

Perform any additional testing, deemed necessary to control the process.

#### 3.1.3.10 QC Monitoring

Submit all QC test results to the [Government](#) on a daily basis as the tests are performed. The [Government](#) reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

#### 3.1.4 Sampling

When directed by the [Government](#), sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected. Perform all sampling in accordance with standard procedures specified.

#### 3.1.5 Control Charts

For process control, establish and maintain linear control charts on both individual samples and the running average of last four samples for the parameters listed in Table 8, as a minimum. Post the control charts as directed by the [Government](#) and maintain current at all times. Identify the following on the control charts, the project number, the test parameter being plotted, the individual sample numbers, the Action and Suspension Limits listed in Table 8 applicable to the test parameter being plotted, and the test results. Also show target values (JMF) on the control charts as indicators of central tendency for the cumulative percent passing, asphalt content, and laboratory air voids parameters. When the test results exceed either applicable Action Limit, take immediate steps to bring the process back in control. When the test results exceed either applicable Suspension Limit, halt production until the problem is solved. When the Suspension Limit is exceeded for individual values or running average values, the [Government](#) has the option to require removal and replacement of the material represented by the samples or to leave in place and base acceptance on mixture volumetric properties and in place density. Use the control charts as part of the process control system for identifying trends so that potential problems can be corrected before they occur. Make decisions concerning mix modifications based on analysis of the results provided in the control charts. In the Quality Control Plan, indicate the appropriate action to be taken to bring the process into control when certain parameters exceed their Action Limits.

Table 8. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts				
Parameter to be Plotted	Individual Samples		Running Average of Last Four Samples	
	Action Limit	Suspension Limit	Action Limit	Suspension Limit
No. 4 sieve, Cumulative Percent Passing, deviation from JMF target; plus or minus values	6	8	4	5
No. 30 sieve, Cumulative Percent Passing, deviation from JMF target; plus or minus values	4	6	3	4
No. 200 sieve, Cumulative Percent Passing, deviation from JMF target; plus or minus values	1.4	2.0	1.1	1.5
Asphalt content, percent deviation from JMF target; plus or minus value	0.4	0.5	0.2	0.3
Laboratory Air Voids, percent deviation from JMF target value	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Mat Density, percent of TMD	No specific action and suspension limits set since this parameter is used to determine percent payment			
In-place Joint Density, percent of TMD	No specific action and suspension limits set since this parameter is used to determine percent payment			
VMA				
Gradation 1	13.3	13.0	13.5	13.0
Gradation 2	14.3	14.0	14.5	14.0

Table 8. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts				
Parameter to be Plotted	Individual Samples		Running Average of Last Four Samples	
	Action Limit	Suspension Limit	Action Limit	Suspension Limit
Gradation 3	15.3	15.0	15.0	15.0

Table 8 cont'd. Marshall Compaction				
Stability, pounds (minimum)				
75 blow JMF	1760	1640	2150	2030
50 blow JMF	950	830	1350	1230
Flow, 0.01 inch				
75 blow JMF	8 min.	7 min.	9 min.	8 min.
	16 max.	17 max.	15 max.	16 max.
50 blow JMF	8 min.	7 min.	9 min.	8 min.
	18 max.	19 max.	17 max.	18 max.

3.2 PREPARATION OF ASPHALT BINDER MATERIAL

Heat the asphalt cement material while avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. Maintain the temperature of unmodified asphalts to no more than 325 degrees F when added to the aggregates. The temperature of modified asphalts is not to exceed 350 degrees F.

3.3 PREPARATION OF MINERAL AGGREGATE

Heat and dry the aggregate for the mixture prior to mixing. No damage to the aggregates due to the maximum temperature and rate of heating used is allowed. Limit the temperature of the aggregate and mineral filler to 350 degrees F when the asphalt cement is added. Maintain the temperature no lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.4 PREPARATION OF HOT-MIX ASPHALT MIXTURE

Weigh or meter the aggregates and the asphalt cement and introduce into the mixer in the amount specified by the JMF. Mix the combined materials until the aggregate obtains a thorough and uniform coating of asphalt binder (testing in accordance with ASTM D2489/D2489M may be required by the Contracting Officer) and is thoroughly distributed throughout the mixture. The moisture content of all hot-mix asphalt upon discharge from the plant is not to exceed 0.5 percent by total weight of mixture as measured by ASTM D1461.

3.5 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the hot mix asphalt, clean the underlying course of dust and debris. Apply a prime coat or tack coat in accordance with the contract specifications.

3.6 TEST SECTION

Prior to full production, place a test section for each JMF used. Construct a test section consisting of a maximum of 250 tons and two paver passes wide placed in two lanes, with a longitudinal cold joint. Do not place the second lane of test section until the temperature of pavement edge is less than 175 degrees F. Construct the test section with the same depth as the course which it represents. Ensure the underlying grade or pavement structure upon which the test section is to be constructed is the same or very similar to the underlying layer for the project. Use the same equipment in construction of the test section as on the remainder of the course represented by the test section. Construct the test section as part of the project pavement as approved by the Government.

3.6.1 Sampling and Testing for Test Section

Obtain one random sample at the plant, triplicate specimens compacted, and tested for stability, flow, and laboratory air voids. Test a portion of the same sample for theoretical maximum density (TMD), aggregate gradation and asphalt content. Test an additional portion of the sample to determine the Tensile Strength Ratio (TSR). Adjust the compactive effort as required to provide TSR specimens with an air void content of 7 plus or minus 1 percent. Obtain four randomly selected cores from the finished pavement mat, and four from the longitudinal joint, and tested for density. Perform random sampling in accordance with procedures contained in ASTM D3665. Construction may continue provided the test results are within the tolerances or exceed the minimum values shown in Table 9. If all test results meet the specified requirements, the test section may remain as part of the project pavement. If test results exceed the tolerances shown, remove and replace the test section and construct another test section at no additional cost to the Government.

Table 9. Test Section Requirements for Material and Mixture Properties	
Property	Specification Limit
Aggregate Gradation-Percent Passing (Individual Test Result)	
No. 4 and larger	JMF plus or minus 8
No. 8, No. 16, No. 30, and No. 50	JMF plus or minus 6
No. 100 and No. 200	JMF plus or minus 2.0
Asphalt Content, Percent (Individual Test Result)	JMF plus or minus 0.5
Laboratory Air Voids, Percent (Average of 3 specimens)	JMF plus or minus 1.0



Table 9. Test Section Requirements for Material and Mixture Properties	
Property	Specification Limit
VMA, Percent (Average of 3 specimens)	See Table 7
Tensile Strength Ratio (TSR) (At 7 percent plus/minus 1 percent air void content)	75 percent minimum
Conditioned Strength	60 psi minimum
Mat Density, Percent of TMD (Average of 4 Random Cores)	92.0 - 96.0
Joint Density, Percent of TMD (Average of 4 Random Cores)	90.5 minimum
Table 9. cont'd - Marshall Compaction	
Stability, (Average of 3 specimens)	2150 pounds minimum for 75-blow, 1350 pounds minimum for 50-blow
Flow, 0.01 inch (Average of 3 specimens)	8 - 16 for 75-blow, 8 - 18 for 50-blow

### 3.6.2 Additional Test Sections

If the initial test section proves to be unacceptable, make the necessary adjustments to the JMF, plant operation, placing procedures, and rolling procedures before beginning construction of a second test section. Construct and evaluate additional test sections, as required, for conformance to the specifications. Full production paving is not allowed until an acceptable test section has been constructed and accepted.

### 3.7 TESTING LABORATORY

Laboratories used to develop the JMF, perform Contractor Quality Control testing, and Government quality assurance and acceptance testing are required to meet the requirements of ASTM D3666. Perform all required test methods by an accredited laboratory. The Government will inspect the laboratory equipment and test procedures prior to the start of hot-mix operations for conformance with ASTM D3666. Maintain the laboratory validation for the duration of the project. Submit a certification of compliance signed by the manager of the laboratory stating that it meets these requirements to the Government prior to the start of construction. At a minimum, include the following certifications:

- a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
- b. A listing of equipment to be used in developing the job mix.
- c. A copy of the laboratory's quality control system.
- d. Evidence of participation in the AASHTO Materials Reference Laboratory

(AMRL) program.

### 3.8 TRANSPORTING AND PLACING

#### 3.8.1 Transporting

Transport the hot-mix asphalt from the mixing plant to the site in clean, tight vehicles. Schedule deliveries so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Provide adequate artificial lighting for night placements. Hauling over freshly placed material is not permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F.

#### 3.8.2 Placing

Place the mix in lifts of adequate thickness and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, place the mixture to the full width by an asphalt paver; strike off in a uniform layer of such depth that, when the work is completed, the required thickness and conform to the grade and contour indicated. Do not broadcast waste mixture onto the mat or recycled into the paver hopper. Collect waste mixture and dispose off site. Regulate the speed of the paver to eliminate pulling and tearing of the asphalt mat. Begin placement of the mixture along the centerline of a crowned section or on the high side of areas with a one-way slope. Place the mixture in consecutive adjacent strips having a minimum width of 10 feet. Offset the longitudinal joint in one course from the longitudinal joint in the course immediately below by at least 1 foot; however, locate the joint in the surface course at the centerline of the pavement. Offset transverse joints in one course by at least 10 feet from transverse joints in the previous course. Offset transverse joints in adjacent lanes a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

### 3.9 COMPACTION OF MIXTURE

#### 3.9.1 General

- a. After placing, thoroughly and uniformly compact the mixture by rolling. Compact the surface as soon as possible without causing displacement, cracking or shoving. Determine the sequence of rolling operations and the type of rollers used, except as specified in paragraph HMA-PORTLAND CEMENT CONCRETE JOINTS and with the exception that application of more than three passes with a vibratory roller in the vibrating mode is prohibited. Maintain the speed of the roller, at all times, sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Correct at once any displacement occurring as a result of reversing the direction of the roller, or from any other cause.
- b. Furnish sufficient rollers to handle the output of the plant. Continue rolling until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, keep the wheels properly moistened, but excessive water is not permitted. In areas not accessible to the roller, thoroughly compact the mixture with hand tampers. Remove the full depth of any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way

defective, replace with fresh hot mixture and immediately compact to conform to the surrounding area. Perform this work at no expense to the Government. Skin patching is not allowed.

### 3.9.2 Segregation

The Government can sample and test any material that looks deficient. When the in-place material appears to be segregated, the Government has the option to sample the material and have it tested and compared to the aggregate gradation, asphalt content, and in-place density requirements in Table 9. If the material fails to meet these specification requirements, remove and replace the extent of the segregated material the full depth of the layer of asphalt mixture at no additional cost to the Government. When segregation occurs in the mat, take appropriate action to correct the process so that additional segregation does not occur.

## 3.10 JOINTS

Construct joints to ensure a continuous bond between the courses and to obtain the required density. Provide all joints with the same texture as other sections of the course and meet the requirements for smoothness and grade.

### 3.10.1 Transverse Joints

Do not pass the roller over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, construct by means of placing a bulkhead or by tapering the course. Utilize a dry saw cut on the transverse joint full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. Cutting equipment that uses water as a cooling or cutting agent nor milling equipment is permitted. Remove the cutback material from the project. In both methods, provide a light tack coat of asphalt material to all contact surfaces before placing any fresh mixture against the joint.

### 3.10.2 Longitudinal Joints

Cut back longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing the adjacent lane), or otherwise defective, a maximum of 3 inches from the top edge of the lift with a cutting wheel to expose a clean, sound, near vertical surface for the full depth of the course. Remove all cutback material from the project. Cutting equipment that uses water as a cooling or cutting agent nor milling equipment is permitted. Provide a light tack coat of asphalt material to all contact surfaces prior to placing any fresh mixture against the joint.

### 3.10.3 HMA-Portland Cement Concrete Joints

Joints between HMA and PCC require specific construction procedures for the HMA. The following criteria are applicable to the first 10 feet or paver width of HMA adjacent to the PCC.

- a. Pave the HMA side of the joint in a direction parallel to the joint.
- b. Place the HMA side sufficiently high so that when fully compacted the HMA is greater than 1/8 inch but less than 1/4 inch higher than the PCC side of the joint.

- c. Compact with steel wheel rollers and at least one rubber tire roller. Compact with a rubber tire roller that weights at least 20 tons with tires inflated to at least 90 psi. Avoid spalling the PCC during placement and compaction of the HMA. Operate steel wheel rollers in a way that prevents spalling the PCC. Repair any damage to PCC edges or joints as directed by the Government. If damage to the PCC joint or panel edge exceeds a total of 3 feet, remove and replace the PCC panel at no additional expense to the Government.
  
- e. Consider the HMA next to the PCC as a separate lot for evaluation. Lots are based on individual lifts. Do not comingle cores from different lifts for density evaluation purposes. Take four cores for each lot of material placed adjacent to the joint. The size of lot is 10 feet wide by the length of the joint being paved. Locate the center of each of the four cores 6 inches from the edge of the concrete. Take each core at a random location along the length of the joint. The requirements for density for this lot, adjacent to the joint, are the same as that for the mat specified earlier. For HMA-PCC joints at taxiways abutting runways, aprons, or other taxiways, take two additional randomly located cores along each taxiway intersection.
  
- f. All procedures, including repair of damaged PCC, are required to be in accordance with the approved Quality Control Plan.

-- End of Section --

SECTION 32 13 11

CONCRETE PAVEMENT FOR AIRFIELDS AND OTHER HEAVY-DUTY PAVEMENTS  
11/15

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 CONCRETE INSTITUTE INTERNATIONAL (ACI)

- |            |  |
|------------|--|
| ACI 201.1R | (2008) Guide for Conducting a Visual Inspection of Concrete in Service                               |
| ACI 211.1  | (1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete |
| ACI 214R   | (2011) Evaluation of Strength Test Results of Concrete   |
| ACI 305R   | (2010) Guide to Hot Weather Concreting   |
| ACI 306R   | (2016) Guide to Cold Weather Concreting  |

ASTM INTERNATIONAL (ASTM)

- |                   |   |
|-------------------|---|
| ASTM A615/A615M   | (2016) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement   |
| ASTM A775/A775M   | (2016) Standard Specification for Epoxy-Coated Steel Reinforcing Bars   |
| ASTM A996/A996M   | (2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement  |
| ASTM C1017/C1017M | (2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete   |
| ASTM C1064/C1064M | (2011) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete  |
| ASTM C1077        | (2016) Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation |
| ASTM C117         | (2013) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in   |

Mineral Aggregates by Washing

ASTM C123/C123M	(2014) Standard Test Method for Lightweight Particles in Aggregate
ASTM C1240	(2014) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2014) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C131/C131M	(2014) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C138/C138M	(2017a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C142/C142M	(2017) Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C143/C143M	(2015) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2017) Standard Specification for Portland Cement
ASTM C1567	(2013) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2012) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C1646/C1646M	(2016) Making and Curing Test Specimens for Evaluating Frost Resistance of Coarse Aggregate in Air-Entrained Concrete by Rapid Freezing and Thawing
ASTM C172/C172M	(2014a) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C174/C174M	(2016) Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C192/C192M	(2016a) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231/C231M	(2017) Standard Test Method for Air

	Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C29/C29M	(2016) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C294	(2012) Standard Descriptive Nomenclature for Constituents of Concrete Aggregates
ASTM C295/C295M	(2012) Petrographic Examination of Aggregates for Concrete
ASTM C31/C31M	(2015a; E 2016) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2016) Standard Specification for Concrete Aggregates
ASTM C494/C494M	(2016) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2017) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2012a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666/C666M	(2015) Resistance of Concrete to Rapid Freezing and Thawing
ASTM C78/C78M	(2016) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C88	(2013) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C881/C881M	(2015) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C94/C94M	(2017) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2017) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

- ASTM D1752 (2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
- ASTM D2995 (1999; R 2009) Determining Application Rate of Bituminous Distributors
- ASTM D3665 (2012) Random Sampling of Construction Materials
- ASTM D4791 (2010) Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
- ASTM D75/D75M (2014) Standard Practice for Sampling Aggregates

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

- NRMCA QC 3 (2011) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

U.S. AIR FORCE (USAF)

- AF ETL 97-5 (1997) Proportioning Concrete Mixtures with Graded Aggregates for Rigid Airfield Pavements

U.S. ARMY CORPS OF ENGINEERS (USACE)

- COE CRD-C 130 (2001) Standard Recommended Practice for Estimating Scratch Hardness of Coarse Aggregate Particles
- COE CRD-C 300 (1990) Specifications for Membrane-Forming Compounds for Curing Concrete
- COE CRD-C 521 (1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete
- COE CRD-C 55 (1992) Test Method for Within-Batch Uniformity of Freshly Mixed Concrete
- COE CRD-C 662 (2009) Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:



SD-03 Product Data

Dowels; G

Equipment

Proposed Techniques; G

SD-05 Design Data

Preliminary Proposed Proportioning; G

Proportioning Studies; G

SD-06 Test Reports

Batch Plant Manufacturer's Inspection Report; G

Sampling and Testing; G

Mixer Performance (Uniformity) Testing; G

Repair Recommendations Plan; G

SD-07 Certificates

Contractor Quality Control Staff; G

Laboratory Accreditation and Validation

Commercial Laboratory; G

NRMCA Certificate of Conformance

1.3 QUALITY CONTROL

1.3.1 Contractor Quality Control Staff

Reference Section 01 45 00.10 20 QUALITY CONTROL FOR MINOR CONSTRUCTION for Contractor personnel qualification requirements. Submit American Concrete Institute certification for Contractor Quality Control staff. Qualifications and resumes for petrographer, surveyor, concrete batch plant operator, and profilograph operator. All Contractor Quality Control personnel assigned to concrete construction are required to be American Concrete Institute (ACI) certified in the following grade:

- a. The minimum requirements for the CQC System Manager consist of being a graduate engineer or a graduate of construction management, with a minimum of 5 years airfield construction experience and a minimum of 1 year experience as a CQC System Manager on an airfield construction project.
- b. CQC personnel responsible for inspection of concrete paving operations: ACI Concrete Transportation Inspector. The ACI Concrete Transportation Inspector is required to be present at the paving site during all paving operations, with the exception of the initial saw

cutting operation. The QC manager is required to be present during initial saw cutting operations.

- c. CQC staff is required to oversee all aspects of sawing operations (sawing, flushing, vacuuming, checking for random cracking, lighting).
- d. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews: ACI Concrete Flatwork Technician/Finisher.
- e. Batch Plant Manufacturer's Representative: A representative from the batch plant manufacturer is required to be on site to inspect and make necessary adjustments to all components of the batch plant including but not limited to aggregate bin weighing operations, water metering, cement and fly ash weighing devices. All necessary inspections and adjustments by the manufacturer representative is required to be performed prior to uniformity testing. Submit a written [Batch Plant Manufacturer's Inspection Report](#) signed by the representative noting all inspection items and corrections and stating the batch plant is capable of producing the volume of concrete as required herein.
- f. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.
- g. Laboratory Testing Technicians: ACI Concrete Strength Testing Technician and Laboratory Testing Technician, Grade I or II.

#### 1.3.2 Other Staff

Submit for approval, the qualifications and resumes for the following staff:

- a. Petrographer: Bachelor of Science degree in geology or petrography, trained in petrographic examination of concrete aggregate according to [ASTM C294](#) and [ASTM C295/C295M](#) and trained in identification of the specific deleterious materials and tests identified in this specification. Detail the education, training and experience related to the project-specific test methods and deleterious materials in the Resume and submit at least 20 days before petrographic and deleterious materials examination is to commence.
- b. Licensed Surveyor: Perform all survey work under the supervision of a Licensed Surveyor.
- c. Concrete Batch Plant Operator: National Ready Mix Concrete Association (NRMCA) Plant Manager certification.

#### 1.3.3 [Laboratory Accreditation and Validation](#)

Provide laboratory and testing facilities. Submit accreditation of the commercial laboratory by an independent evaluation authority, indicating conformance to [ASTM C1077](#), including all applicable test procedures. The laboratories performing the tests are required to be accredited in accordance with [ASTM C1077](#), including [ASTM C78/C78M](#) and [ASTM C1260](#). Provide current accreditation and include the required and optional test methods, as specified. In addition, all contractor quality control testing laboratories performing acceptance testing require USACE validation by the Material Testing Center (MTC) for both parent laboratory and on-site laboratory. Validation on all laboratories is required to remain current throughout the duration of the paving project. Contact the

MTC manager listed at

<http://www.erd.c.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/9254/ArticleID/1234567890>  
for costs and scheduling. Provide onsite temperature-controlled concrete curing facilities.

#### 1.3.3.1 Aggregate Testing and Mix Proportioning

Aggregate testing and mixture proportioning studies are required to be performed by a commercial laboratory.

#### 1.3.3.2 Acceptance Testing

Provide all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the paving site and in the laboratory. Provide steel molds for molding the beam specimens. Provide and maintain boxes or other facilities suitable for storing and curing the specimens at the paving site while in the mold within the temperature range stipulated by [ASTM C31/C31M](#). Provide flexural loading equipment in accordance with [ASTM C78/C78M](#).

#### 1.3.3.3 Contractor Quality Control

All sampling and testing is required to be performed by an approved, onsite, independent, [commercial laboratory](#), or for cementitious materials and admixtures, the manufacturer's laboratory.

#### 1.3.3.4 Laboratory Inspection

The Government will inspect all laboratories requiring validation for equipment and test procedures prior to the start of any concreting operations for conformance to [ASTM C1077](#). Schedule and provide payment for laboratory inspections. Additional payment or a time extension due to failure to acquire the required laboratory validation is not allowed. The laboratory is to maintain this certification for the duration of the project.

#### 1.3.4 Preconstruction Testing of Materials

All sampling and testing is required to be performed. Use an approved commercial laboratory or, for cementitious materials and chemical admixtures, a laboratory maintained by the manufacturer of the material. Materials are not allowed to be used until notice of acceptance has been given. Additional payment or extension of time due to failure of any material to meet project requirements, or for any additional sampling or testing required is not allowed. Additional tests may be performed by the Government; such Government testing does not relieve any required testing responsibilities.

##### 1.3.4.1 Aggregates

Sample aggregates in the presence of a Government Representative. Obtain samples in accordance with [ASTM D75/D75M](#) and be representative of the materials to be used for the project. Submit test results a minimum of 7 days before commencing mixture proportioning studies.

##### 1.3.4.2 Chemical Admixtures, Curing Compounds and Epoxies

At least 30 days before the material is used, submit certified copies of test results for the specific lots or batches to be used on the project.

Provide test results less than 6 months old prior to use in the work. Retest chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing, and rejected if test results do not meet manufacturer requirements.

#### 1.3.4.3 Cementitious Materials

Cement, slag cement, and pozzolan will be accepted on the basis of manufacturer's certification of compliance, accompanied by mill test reports showing that the material in each shipment meets the requirements of the specification under which it is provided. Provide mill test reports no more than 1 month old, prior to use in the work. Do not use cementitious materials until notice of acceptance has been given. Cementitious materials may be subjected to testing by the Government from samples obtained at the mill, at transfer points, or at the project site. If tests prove that a cementitious material that has been delivered is unsatisfactory, promptly remove it from the project site. Retest cementitious material that has not been used within 6 months after testing, and reject if test results do not meet manufacturer requirements.

#### 1.3.5 Testing During Construction

During construction, sample and test aggregates, cementitious materials, and concrete as specified herein. The Government will sample and test concrete and ingredient materials as considered appropriate. Provide facilities and labor as may be necessary for procurement of representative test samples. Testing by the Government does not relieve the specified testing requirements.

#### 1.3.6 Test Section

Up to 10 days, but not more than 60 days, prior to construction of the concrete pavement, construct a test section near the job site, but not as part of the production pavement area. Construct test section of the same depth as the course which it represents. The underlying grade or pavement structure upon which the test section is to be constructed is required to be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section is required to be the same equipment to be used on the remainder of the course represented by the test section. Use the test section to develop and demonstrate the proposed techniques of mixing, hauling, placing, consolidating, finishing, curing, initial saw cutting, start-up procedures, testing methods, plant operations, and the preparation of the construction joints. Perform variations in mixture proportions, other than water, if directed. Operate and calibrate the mixing plant prior to start of placing the test section. Use the same equipment, materials, and construction techniques on the test section proposed for use in all subsequent work. Perform base course preparation, concrete production, placing, consolidating, curing, construction of joints, and all testing in accordance with applicable provisions of this specification. Three days after completion of the test section, provide eight cores at least 6 inches in diameter by full depth cut from points selected in the test section by the Government. The cores will be evaluated for surface paste, uniformity of aggregate distribution, segregation, voids, and thickness. Construct the test section meeting all specification requirements and being acceptable in all aspects, including surface texture, thickness, grade, and longitudinal and transverse joint alignment. Failure to construct an acceptable test section necessitates construction of additional test sections at no additional cost to the Government. Remove test sections

allowed to be constructed as part of the production pavement which do not meet specification requirements at no expense to the Government. Do not commence production paving until the results on aggregates and concrete, including evaluation of the cores, and all pavement measurements for edge slump, joint face deformation, actual plan grade, surface smoothness and thickness have been submitted and approved.

#### 1.3.7 Acceptability of Work

The materials and the pavement itself will be accepted on the basis of production testing. The Government may make check tests to validate the results of the production testing. If the results of the production testing vary by less than 2.0 percent of the Government's test results, the results of the production testing will be used. If the results of the Government and production tests vary by 2.0 percent, but less than 4.0 percent, the average of the two will be considered the value to be used. If these vary by 4.0 percent or more, carefully evaluate each sampling and testing procedure and obtain another series of Government and production tests on duplicate samples of material. If these vary by 4.0 percent or more, use the results of the tests made by the Government and the Government will continue check testing of this item on a continuous basis until the two sets of tests agree within less than 4.0 percent on a regular basis. Testing performed by the Government does not relieve the specified testing requirements.

#### 1.3.8 Acceptance Requirements

##### 1.3.8.1 Pavement Lots

A lot is that quantity of construction to be evaluated for acceptance with specification requirements. A lot is equal to one shift of production not to exceed 1000 cubic yards. In order to evaluate thickness, divide each lot into four equal sublots. A subplot is equal to one shift of production not to exceed 250 cubic yards. Grade determinations will be made on the lot as a whole. Surface smoothness determinations will be made on every 0.1 mile segment in each lot. Select sample locations on a random basis in accordance with ASTM D3665. When operational conditions cause a lot to be terminated before the specified four sublots have been completed, use the following procedure to adjust the lot size and number of tests for the lot. Where three sublots have been completed, they constitute a lot. Where one or two sublots have been completed, incorporate them into the next lot (except for the last lot), and the total number of sublots used and acceptance criteria adjusted accordingly.

##### 1.3.8.2 Evaluation

Provide all sampling and testing required for acceptance and payment adjustment, including batch tickets with all required acceptance testing. Individuals performing sampling, testing and inspection duties are required to meet the Qualifications. The Government reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. Testing in these areas are in addition to the subplot or lot testing, and the requirements for these areas are the same as those for a subplot or lot. Provide facilities for and, where directed, personnel to assist in obtaining samples for any Government testing.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

##### 1.4.1 Bulk Cementitious Materials

Provide all cementitious materials in bulk at a temperature, as delivered to storage at the site, not exceeding 150 degrees F. Provide sufficient cementitious materials in storage to sustain continuous operation of the concrete mixing plant while the pavement is being placed. Provide separate facilities to prevent any intermixing during unloading, transporting, storing, and handling of each type of cementitious material.

##### 1.4.2 Aggregate Materials

Store aggregate at the site of the batching and mixing plant avoiding breakage, segregation, intermixing or contamination by foreign materials. Store each size of aggregate from each source separately in free-draining stockpiles. Provide a minimum 24 inch thick sacrificial layer left undisturbed for each aggregate stored on ground. Provide free-draining storage for fine aggregate and the smallest size coarse aggregate for at least 24 hours immediately prior to use. Maintain sufficient aggregate at the site at all times to permit continuous uninterrupted operation of the mixing plant at the time concrete pavement is being placed. Do not allow tracked equipment on coarse aggregate stockpiles.

##### 1.4.3 Other Materials

Store reinforcing bars and accessories above the ground on supports. Store all materials to avoid contamination and deterioration.

#### PART 2 PRODUCTS

##### 2.1 SYSTEM DESCRIPTION

This section is intended to stand alone for construction of concrete pavement. However, where the construction covered herein interfaces with other sections, construct each interface to conform to the requirements of both this section and the other section, including tolerances for both.

##### 2.1.1 Surface Smoothness

Use the straightedge method for transverse testing, for longitudinal testing where the length of each pavement lane is less than 200 feet, and at the ends of the paving limits for the project. Smoothness requirements do not apply over crowns, drainage structures, or similar penetration. Maintain detailed notes of the testing results and provide a copy to the Government after each day's testing.

##### 2.1.1.1 Straightedge Testing

Provide the finished surfaces of the pavements with no abrupt change of 1/4 inch or more, and all pavements within the limits specified when checked with an approved 12 foot straightedge. Provide all other airfield areas with a variation from a straight edge not greater than 1/4 inch in either the longitudinal or transverse direction.

##### 2.1.1.2 Testing Method

After the concrete has hardened sufficiently to permit walking thereon, but not later than 48 hours after placement, test the entire surface of

the pavement in each lot in such a manner as to reveal all surface irregularities exceeding the tolerances specified above. Test the entire area of the pavement in both a longitudinal and a transverse direction on parallel lines. Perform the transverse lines 15 feet or less apart, as directed. Perform the longitudinal lines at the centerline of each paving lane shown on the drawings, regardless of whether multiple lanes are allowed to be paved at the same time, and at the 1/8th point in from each side of the lane. Also test other areas having obvious deviations. Perform longitudinal testing lines continuous across all joints. Perform transverse testing lines for pilot lanes carried to construction joint lines and for fill-in lanes carried 24 inches across construction joints, and the readings in this area applied to the fill-in lane. Perform straightedge testing of the longitudinal edges of slipformed pilot lanes before paving fill-in lanes as specified below.

2.1.1.2.1 Straightedge Testing

Hold the straightedge in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. Determine the amount of surface irregularity by placing the freestanding (unleveled) straightedge on the pavement surface and measuring the maximum gap between the straightedge and the pavement surface. Determine measurements along the entire length of the straight edge.

2.1.2 Edge Slump and Joint Face Deformation

2.1.2.1 Edge Slump

Provide a maximum of 15.0 percent of the total free edge of each pavement panel with a maximum edge slump of 1/4 inch and none of the free edge of the pavement lot with an edge slump exceeding 3/8 inch. (A pavement panel is defined as a lane width by the length between two adjacent transverse contraction joints. The total free edge of the pavement is the cumulative total linear measurement of pavement panel edge originally constructed as non-adjacent to any existing pavement; for example, 100 feet of pilot lane originally constructed as a separate lane, would have 200 feet of free edge; 100 feet of fill-in lane would have no free edge). The area affected by the downward movement of the concrete along the pavement edge is a maximum of 18 inches back from the edge.

2.1.2.2 Joint Face Deformation

In addition to the edge slump limits specified above, provide a vertical joint face with a surface within the maximum limits shown below:

Offset from Straightedge Applied Longitudinally to Pavement Surface (a)	Offset from Straightedge Applied Longitudinally to Vertical Face (b)	Offset from Straightedge Applied Top to Bottom Against the Joint Face (c)	Abrupt Offset in Any Direction (d)	Offset of Joint Face from True Vertical (e)
Airfield Pavement				
1/8 inch	1/4 inch	3/8 inch	1/8 inch	1 inch per 12 inches

Offset from Straightedge Applied Longitudinally to Pavement Surface (a)	Offset from Straightedge Applied Longitudinally to Vertical Face (b)	Offset from Straightedge Applied Top to Bottom Against the Joint Face (c)	Abrupt Offset in Any Direction (d)	Offset of Joint Face from True Vertical (e)
All Other Pavement				
1/4 inch	All other items same as airfield pavement			
(a) Measurement is taken by placing the straightedge longitudinally on the pavement surface 1 inch from the free edge.				
(b) Measurement is taken by applying the straightedge longitudinally along the vertical joint face.				
(c) Measurement places a 3/8 inch spacer attached to a straightedge and spaced approximately equal to the thickness of the concrete being measured. The offset from straightedge with spacers is measured by placing the spacers against the top and bottom of the vertical concrete face.				
(d) An abrupt offset in the joint face occurring along a short distance. Check for abrupt offsets at any location that an abrupt offset appears to be a possible issue.				
(e) Measurement of the offset from the joint face to a level in the true vertical position against the joint face.				

2.1.2.3 Slump Determination

Test the pavement surface to determine edge slump immediately after the concrete has hardened sufficiently to permit walking thereon. Perform testing with a minimum 12 foot straightedge to reveal irregularities exceeding the edge slump tolerance specified above. Determine the vertical edge slump at each free edge of each slipformed paving lane constructed. Place the straightedge transverse to the direction of paving and the end of the straightedge located at the edge of the paving lane. Record measurements at 5 to 10 foot spacings, as directed, commencing at the header where paving was started. Initially record measurements at 5 foot intervals in each lane. When no deficiencies are present after 5 measurements, the interval may be increased. The maximum interval is 10 feet. When any deficiencies exist, return the interval to 5 feet. In addition to the transverse edge slump determination above, at the same time, record the longitudinal surface smoothness of the joint on a continuous line 1 inch back from the joint line using the 12 foot straightedge advanced one-half its length for each reading. Perform other tests of the exposed joint face to ensure that a uniform, true vertical joint face is attained. Properly reference all recorded measurements in accordance with paving lane identification and stationing, and a report submitted within 24 hours after measurement is made. Identify areas requiring replacement within the report.

2.1.2.4 Excessive Edge Slump

When edge slump exceeding the limits specified above is encountered on either side of the paving lane, record additional straightedge



measurements to define the linear limits of the excessive slump. Remove and replace concrete slabs having excessive edge slump or joint deformation to the next transverse joint in conformance with paragraph REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS.

### 2.1.3 Plan Grade

Within 5 days after paving of each lot, test the finished surface of the pavement area by running lines of levels at intervals corresponding with every longitudinal and transverse joint to determine the elevation at each joint intersection. Record the results of this survey and provide a copy to the Government at the completion of the survey of each lot. Provide finished surfaces of all airfield pavements that vary less than  $1/2$  inch above or below the plan grade line or elevation indicated. The above deviations from the approved grade line and elevation are not permitted in areas where closer conformance with the planned grade and elevation is required for the proper functioning of appurtenant structures. Provide finished surfaces of new abutting pavements that coincide at their juncture. Provide horizontal control of the finished surfaces of all airfield pavements that vary not more than  $1/2$  inch from the plan alignment indicated.

### 2.1.4 Flexural Strength

Submit certified copies of laboratory test reports and sources for cement, supplementary cementitious materials (SCM), aggregates, admixtures, curing compound, epoxy, and proprietary patching materials proposed for use on this project. Perform all aggregate tests no earlier than 6 months prior to contract award. Each lot of pavement will be evaluated for acceptance in accordance with the following procedures.

#### 2.1.4.1 Sampling and Testing

For acceptance, obtain one composite sample of concrete from each subplot in accordance with ASTM C172/C172M from one batch or truckload. Fabricate and cure test beams 6 x 6 inches in accordance with ASTM C31/C31M; and tested in accordance with ASTM C78/C78M.

#### 2.1.4.2 Computations

Average the eight 14-day strength tests for the lot. Use the average strength in accordance with paragraph CONCRETE STRENGTH FOR FINAL ACCEPTANCE in PART 2.

### 2.1.5 Thickness

Each lot of pavement will be evaluated for acceptance and payment adjustment in accordance with the following procedure. Drill two cores, between 4 and 6 inches in diameter, from the pavement, per subplot (8 per lot). Drill the cores within 3 days after lot placement, filling the core holes with an approved non-shrink concrete, respraying the cored areas with curing compound, and for measuring the cores. Inspect each core for voids, thickness of paste on the surface, and depth of reinforcement (if required). Provide the results with the thickness measurement data. Record eight measurements of thickness around the circumference of each core and one in the center, in accordance with ASTM C174/C174M. Average the pavement thickness from the 8 cores for the lot and evaluate as described in paragraph PAYMENT ADJUSTMENT FOR THICKNESS above.

## 2.2 CEMENTITIOUS MATERIALS

Provide cementitious materials consisting of portland cement, blended cement or only portland cement in combination with supplementary cementitious materials (SCM), that conform to appropriate specifications listed below. New submittals are required when the cementitious materials sources or types change.

### 2.2.1 Portland Cement

Provide portland cement conforming to **ASTM C150/C150M**, Type I or II, low alkali including false set requirements.

### 2.2.2 Blended Cements

Provide blended cement conforms to **ASTM C595/C595M**, Type IP or IS, including the optional requirement for mortar expansion and sulfate soundness. Provide pozzolan added to the Type IP blend consisting of **ASTM C618** Class F or Class N and that is interground with the cement clinker. Include in written statement from the manufacturer that the amount of pozzolan in the finished cement does not vary more than plus or minus 5 mass percent of the finished cement from lot to lot or within a lot. The percentage and type of mineral admixture used in the blend are not allowed to change from that submitted for the aggregate evaluation and mixture proportioning. The requirements of Table 2 in paragraph SUPPLEMENTARY CEMENTITIOUS MATERIALS (SCM) CONTENT do not apply to the SCM content of blended cement.

### 2.2.3 Pozzolan

#### 2.2.3.1 Fly Ash

Provide fly ash that conforms to **ASTM C618**, Class F, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction with a loss on ignition not exceeding 3 percent. Provide Class F fly ash for use in mitigating Alkali-Silica Reactivity with a total equivalent alkali content less than 3 percent.

#### 2.2.3.2 Raw or Calcined Natural Pozzolan

Provide natural pozzolan that is raw or calcined and conforms to **ASTM C618**, Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction with a loss on ignition not exceeding 3 percent. Provide Class N pozzolan for use in mitigating Alkali-Silica Reactivity with a total equivalent alkali content less than 3 percent.

#### 2.2.3.3 Ultra Fine Fly Ash and Ultra Fine Pozzolan

Provide Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) that conforms to **ASTM C618**, Class F or N, and the following additional requirements:

- a. The strength activity index at 28 days of age of at least 95 percent of the control specimens.
- b. The average particle size not exceeding 6 microns.

2.2.3.4 Silica Fume

Provide silica fume that conforms to ASTM C1240, including the optional limits on reactivity with cement alkalis. Provide silica fume as a dry, densified material or as a slurry. Provide the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume, at no expense to the Government. This representative is required to be present on the project prior to and during at least the first 4 days of concrete production and placement using silica fume.

2.2.4 Slag Cement

Provide slag cement (ground-granulated blast-furnace slag) that conforms to ASTM C989/C989M, Grade 120.

2.2.5 Supplementary Cementitious Materials (SCM) Content

Use of one of the SCMs listed below is optional, unless the SCM is required to mitigate ASR.

TABLE 2 SUPPLEMENTARY CEMENTITIOUS MATERIALS CONTENT		
Supplementary Cementitious Material	Minimum Content (percent)	Maximum Content (percent)
Class N Pozzolan and Class F Fly Ash		
SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub> > 70 percent	25	35
SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub> > 80 percent	20	35
SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub> > 90 percent	15	35
UFFA and UFP	7	16
Slag Cement	40	50
Silica Fume	7	10

2.3 AGGREGATES

2.3.1 Aggregate Sources

2.3.1.1 Durability of Coarse Aggregate

Provide aggregate with a satisfactory service record in freezing and thawing of at least 5 years successful service in three concrete paving projects. Include a condition survey of the existing concrete and a review of the concrete-making materials, including coarse aggregates, cement, and mineral admixtures in the service record. Consider the previous aggregate source and test results, cement mill certificate data, mineral admixture chemical and physical composition, and the mix design (cement factor and water-cementitious material ratio) in the review. Provide service record performed by an independent third party professional engineer, petrographer, or concrete materials engineer along with their resume. Include photographs and a written report addressing D-cracks and popouts in accordance with ACI 201.1R in the service record. Provide coarse

aggregate with a durability factor of 80 or more when subjected to freezing and thawing of specimens prepared in accordance with ASTM C1646/C1646M and tested in accordance with ASTM C666/C666M, Procedure A, when a coarse aggregate size group or source proposed for use does not have a satisfactory demonstrable service record. Test all coarse aggregate size groups and sources proposed for use individually.

#### 2.3.1.2 Alkali-Silica Reactivity

Evaluate and test fine and coarse aggregates to be used in all concrete for alkali-aggregate reactivity. Test all size groups and sources proposed for use.

- a. Evaluate the fine and coarse aggregates separately, using ASTM C1260. Reject individual aggregates with test results that indicate an expansion of greater than 0.08 percent after 28 days of immersion in 1N NaOH solution, or perform additional testing as follows: utilize the proposed low alkali portland cement, blended cement, and SCM, or Lithium Nitrate in combination with each individual aggregate. If only SCMs are being evaluated, test in accordance with ASTM C1567. If Lithium Nitrate is being evaluated, with or without SCMs, test in accordance with COE CRD-C 662. Determine the quantity that meets all the requirements of these specifications and that lowers the expansion equal to or less than 0.08 percent after 28 days of immersion in a 1N NaOH solution. Base the mixture proportioning on the highest percentage of SCM required to mitigate ASR-reactivity.
- b. If any of the above options does not lower the expansion to less than 0.08 percent after 28 days of immersion in a 1N NaOH solution, reject the aggregate(s) and submit new aggregate sources for retesting. Submit the results of testing for evaluation and acceptance.

#### 2.3.1.3 Combined Aggregate Gradation

In addition to the grading requirements specified for coarse aggregate and for fine aggregate, provide the combined aggregate grading meeting the following requirements:

- a. Provide materials selected and the proportions used such that when the Coarseness Factor (CF) and the Workability Factor (WF) are plotted on a diagram as described in d. below, the point and its associated production tolerance thus determined falls within the parallelogram described therein. Refer to AF ETL 97-5 for combined aggregate plot area recommendations for the intended placement technique(s).
- b. Determine the Coarseness Factor (CF) from the following equation:
$$CF = \frac{(\text{cumulative percent retained on the } 3/8 \text{ inch sieve})(100)}{(\text{cumulative percent retained on the No. 8 sieve})}$$
- c. The Workability Factor (WF) is defined as the percent passing the No. 8 sieve based on the combined gradation. Adjust the WF, prorated upwards only, by 2.5 percentage points for each 94 pounds of cementitious material per cubic yard greater than 564 pounds per cubic yard.
- d. Plot a diagram using a rectangular scale with WF on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this diagram, plot a

parallelogram with corners at the following coordinates (CF-75, WF-28), (CF-75, WF-40), (CF-45, WF-32.5), and (CF-45, WF-44.5). If the point determined by the intersection of the computed CF and WF does not fall within the above parallelogram, revise the grading of each size of aggregate used and the proportions selected as necessary.

- e. Plot the associated production tolerance limits, identified in Table 6, around the CF and adjusted WF point.

### 2.3.2 Coarse Aggregate

#### 2.3.2.1 Material Composition

Provide coarse aggregate consisting of crushed or uncrushed gravel, crushed stone, crushed adequately seasoned air-cooled iron blast-furnace slag; steel furnace slag is not permitted, or a combination thereof. Provide aggregates, as delivered to the mixers, consisting of clean, hard, uncoated particles meeting the requirements of [ASTM C33/C33M](#) except as specified herein. Provide coarse aggregate that has been cleaned by processing with an approved log washer. Provide iron blast-furnace slag conforming to the grading to be used in the concrete with a compact density of not less than [70 lb per cubic foot](#) determined in accordance with [ASTM C29/C29M](#). Provide coarse aggregate with no more than 40 percent loss when subjected to the Los Angeles abrasion test in accordance with [ASTM C131/C131M](#). Provide coarse aggregates with a maximum sodium sulfate soundness loss of 10 percent, or with a magnesium sulfate soundness loss of 12 percent after five cycles when tested in accordance with [ASTM C88](#).

#### 2.3.2.2 Particle Shape Characteristics

Provide particles of the coarse aggregate that are generally spherical or cubical in shape. The quantity of flat particles and elongated particles in any size group coarser than the [3/8 inch](#) sieve are not allowed to exceed 20 percent by weight as determined by the Flat Particle Test and the Elongated Particle Test of [ASTM D4791](#). A flat particle is defined as one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3.

#### 2.3.2.3 Size and Grading

Provide coarse aggregate with a nominal maximum size of [1.5 inches](#). Grade and provide the individual aggregates in two size groups meeting the individual grading requirements of [ASTM C33/C33M](#), Size No. 4 ([1.5 to 0.75 inch](#)) and Size No. 67 ([0.75 inch to No. 4](#)) to meet the coarseness and workability factor criteria for the proposed combined gradation. A third aggregate size group may be required to meet the above mentioned coarseness and workability criteria of paragraph COMBINED AGGREGATE GRADATION.

#### 2.3.2.4 Deleterious Materials - Airfield Pavements

The amount of deleterious material in each size group of coarse aggregate is not allowed to exceed the limits shown in Table 5 below, determined in accordance with the test methods shown.

TABLE 5		
LIMITS OF DELETERIOUS MATERIALS IN COARSE AGGREGATE FOR AIRFIELD PAVEMENTS		
Percentage by Mass		
Materials (h)	Severe Weather	Moderate Weather
Clay lumps and friable particles (ASTM C142/C142M)	0.2	0.2
Shale (a) (ASTM C295/C295M)	0.1	0.2
Material finer than No. 200 sieve (b) (ASTM C117)	0.5	0.5
Lightweight particles (c) (ASTM C123/C123M)	0.2	0.2
Clay ironstone (d) (ASTM C295/C295M)	0.1	0.5
Chert and cherty stone (less than 2.40 Sp. Gr.) (e) (ASTM C123/C123M and ASTM C295/C295M)	0.1	0.5
Claystone, mudstone, and siltstone (f) (ASTM C295/C295M)	0.1	0.1
Shaly and argillaceous limestone (g) (ASTM C295/C295M)	0.2	0.2
Other soft particles (COE CRD-C 130)	1.0	1.0
Total of all deleterious substances exclusive of material finer than No. 200 sieve	1.0	2.0
<p>(a) Shale is defined as a fine-grained, thinly laminated or fissile sedimentary rock. It is commonly composed of clay or silt or both. It has been indurated by compaction or by cementation, but not so much as to have become slate.</p>		
<p>(b) Limit for material finer than No. 200 sieve is allowed to be increased to 1.5 percent for crushed aggregates if the fine material consists of crusher dust that is essentially free from clay or shale. Use XRD or other appropriate techniques as determined by petrographer to quantify amount and justify increase.</p>		
<p>(c) Test with a separation medium with a density of Sp. Gr. of 2.0. This limit does not apply to coarse aggregate manufactured from blast-furnace slag unless contamination is evident.</p>		
<p>(d) Clay ironstone is defined as an impure variety of iron carbonate, iron oxide, hydrous iron oxide, or combinations thereof, commonly mixed with clay, silt, or sand. It commonly occurs as dull, earthy particles, homogeneous concretionary masses, or hard-shell particles with soft interiors. Other names commonly used for clay ironstone are "chocolate bars" and limonite concretions.</p>		

TABLE 5		
LIMITS OF DELETERIOUS MATERIALS IN COARSE AGGREGATE FOR AIRFIELD PAVEMENTS		
Percentage by Mass		
Materials (h)	Severe Weather	Moderate Weather
<p>(e) Chert is defined as a rock composed of quartz, chalcedony or opal, or any mixture of these forms of silica. It is variable in color. The texture is so fine that the individual mineral grains are too small to be distinguished by the unaided eye. Its hardness is such that it scratches glass but is not scratched by a knife blade. It may contain impurities such as clay, carbonates, iron oxides, and other minerals. Cherty stone is defined as any type of rock (generally limestone) that contains chert as lenses and nodules, or irregular masses partially or completely replacing the original stone.</p>		
<p>(f) Claystone, mudstone, or siltstone, is defined as a massive fine-grained sedimentary rock that consists predominantly of indurated clay or silt without laminations or fissility. It may be indurated either by compaction or by cementation.</p>		
<p>(g) Shaly limestone is defined as limestone in which shale occurs as one or more thin beds or laminae. These laminae may be regular or very irregular and may be spaced from a few inches down to minute fractions of an inch. Argillaceous limestone is defined as a limestone in which clay minerals occur disseminated in the stone in the amount of 10 to 50 percent by weight of the rock; when these make up from 50 to 90 percent, the rock is known as calcareous (or dolomitic) shale (or claystone, mudstone, or siltstone).</p>		
<p>(h) Perform testing in accordance with the referenced test methods, except use the minimum sample size specified below.</p>		

2.3.2.5 Testing Sequence for Deleterious Materials in Coarse Aggregate - Airfields Only

No extension of time or additional payment due to any delays caused by the testing, evaluation, or personnel requirements is allowed. The minimum test sample size of the coarse aggregate is 200 pounds for the 3/4 inch and larger maximum size and 25 pounds for the No. 4 to 3/4 inch coarse aggregate. Provide facilities for the ready procurement of representative test samples. The testing procedure on each sample of coarse aggregate for compliance with limits on deleterious materials is as follows:

Step 1: Wash each full sample of coarse aggregate for material finer than the No. 200 sieve. Discard material finer than the No. 200 sieve.

Step 2: Test remaining full sample for clay lumps and friable particles and remove.

Step 3. Test remaining full sample for chert and cherty stone with SSD density of less than 2.40 specific gravity. Remove lightweight chert and cherty stone. Restore other materials less than 2.40

specific gravity to the sample.

Step 4: Test remaining full sample for lightweight particles (Sp. Gr. 2.0) and remove.

Step 5: Test remaining sample for clay-ironstone, shale, claystone, mudstone, siltstone, shaly and argillaceous limestone, and remove.

Step 6: Test approximately one-fifth of remaining full sample for other soft particles.

### 2.3.3 Fine Aggregate

#### 2.3.3.1 Composition

Provide fine aggregate consisting of natural sand, manufactured sand, or a combination of the two, and composed of clean, hard, durable particles meeting the requirements of [ASTM C33/C33M](#). Stockpile and batch each type of fine aggregate separately. Provide fine aggregate with particles that are generally spherical or cubical in shape.

#### 2.3.3.2 Grading

Provide fine aggregate, as delivered to the mixer, with a grading that conforms to the requirements of [ASTM C33/C33M](#) and having a fineness modulus of not less than 2.30 nor more than 3.40.

#### 2.3.3.3 Deleterious Material

The minimum test sample size for fine aggregate proposed for use in airfield paving is 10 pounds. The amount of deleterious material in the fine aggregate is not to exceed the following limits by mass:

Material	Percentage by Mass
Clay lumps and friable particles <a href="#">ASTM C142/C142M</a>	1.0
Material finer than No. 200 sieve <a href="#">ASTM C117</a>	3.0
Lightweight particles <a href="#">ASTM C123/C123M</a> using a medium with a density of Sp. Gr. of 2.0	0.5
Total of all above	3.0

## 2.4 CHEMICAL ADMIXTURES

### 2.4.1 General Requirements

Chemical admixtures may only be used when the specific admixture type and manufacturer is the same material used in the mixture proportioning studies. Provide air-entraining admixture conforming to [ASTM C260/C260M](#). An accelerating admixture conforming to [ASTM C494/C494M](#), Type C, may be used only when specified in paragraph MIXTURE PROPORTIONS below provided it is not used to reduce the amount of cementitious material. Calcium chloride and admixtures containing calcium chloride are not allowed. Provide retarding or water-reducing admixture that meet the requirements of [ASTM C494/C494M](#), Type A, B, or D, except that the 6-month and 1-year



compressive strength tests are waived. [ASTM C494/C494M](#), Type F and G high range water reducing admixtures and Type S specific performance admixtures are not allowed. [ASTM C1017/C1017M](#) flowable admixtures are not allowed.

#### 2.4.2 High Range Water Reducing Admixture (HRWRA)

Provide a high-range water-reducing admixture that meets the requirements of [ASTM C494/C494M](#), Type F or G, that is free from chlorides, alkalis, and is of the synthesized, sulfonated complex polymer type. Add the HRWRA to the concrete as a single component at the batch plant. Add the admixture to the concrete mixture only when its use is approved or directed, and only when it has been used in mixture proportioning studies to arrive at approved mixture proportions. Submit certified copies of the independent laboratory test results required for compliance with [ASTM C494/C494M](#).

#### 2.5 MEMBRANE FORMING CURING COMPOUND

Provide membrane forming curing compound that conforms to [COE CRD-C 300](#) and is white pigmented.

#### 2.6 WATER

Provide water for mixing and curing that is fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that non-potable water, or water from concrete production operations, may be used if it meets the requirements of [ASTM C1602/C1602M](#).

#### 2.7 JOINT MATERIALS

##### 2.7.1 Expansion Joint Material

Provide preformed expansion joint filler material conforming to [ASTM D1751](#) or [ASTM D1752](#) Type II. Provide expansion joint filler that is  $3/4$  inch thick, unless otherwise indicated, and provided in a single full depth piece.

##### 2.7.2 Slip Joint Material

Provide slip joint material that is  $1/4$  inch thick expansion joint filler, unless otherwise indicated, conforming to paragraph EXPANSION JOINT MATERIAL.

#### 2.8 REINFORCING

Provide reinforcement that is free from loose, flaky rust, loose scale, oil, grease, mud, or other coatings that might reduce the bond with concrete. Removal of thin powdery rust and tight rust is not required. However, reinforcing steel which is rusted to the extent that it does not conform to the required dimensions or mechanical properties is not allowed to be used.

#### 2.9 DOWELS

##### 2.9.1 Dowels

Provide dowels in single piece bars fabricated or cut to length at the shop or mill before delivery to the site. Dowels are to be free of loose, flaky rust and loose scale and be clean and straight. Dowels may be sheared to length provided that the deformation from true shape caused by

shearing does not exceed 0.04 inch on the diameter of the dowel and does not extend more than 0.04 inch from the end of the dowel. Dowels are required to be plain (non-deformed) steel bars conforming to ASTM A615/A615M, Grade 40 or 60; ASTM A996/A996M, Grade 50 or 60. Dowel bars are required to be epoxy coated in conformance with ASTM A775/A775M, to include the ends. Provide grout retention rings that are fully circular metal or plastic devices capable of supporting the dowel until the epoxy hardens. Dowel sleeves or inserts are not permitted.

#### 2.10 EPOXY RESIN

Provide epoxy-resin materials that consist of two-component materials conforming to the requirements of ASTM C881/C881M, Class as appropriate for each application temperature to be encountered, except that in addition, the materials meet the following requirements:

- a. Material for use for embedding dowels shall be Type IV, Grade 3.
- b. Material for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar be Type III, Grade as approved.
- c. Material for use for injecting cracks be Type IV, Grade 1.
- d. Material for bonding freshly mixed portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete be Type V, Grade as approved.

#### 2.11 EQUIPMENT

All plant, equipment, tools, and machines used in the work are required to be maintained in satisfactory working conditions at all times. Submit the following:

- a. Details and data on the batching and mixing plant prior to plant assembly including manufacturer's literature showing that the equipment meets all requirements specified herein.
- b. Obtain National Ready Mixed Concrete Association (NRMCA) certification of the concrete plant, at no expense to the Government. Provide inspection report of the concrete plant by an engineer approved by the NRMCA. A list of NRMCA approved engineers is available on the NRMCA website at <http://www.nrmca.org>. Submit a copy of the NRMCA QC Manual Section 3 Concrete Plant Certification Checklist, [NRMCA Certificate of Conformance](#), and Calibration documentation on all measuring and weighing devices prior to uniformity testing.
- c. A description of the equipment proposed for transporting concrete mixture from the central mixing plant to the paving equipment.
- d. A description of the equipment proposed for the machine and hand placing, consolidating and curing of the concrete mixture. Manufacturer's literature on the paver and finisher, together with the manufacturer's written instructions on adjustments and operating procedures necessary to assure a tight, smooth surface on the concrete pavement. The literature is required to show that the equipment meets all details of these specifications.

### 2.11.1 Concrete Mixers

Provide stationary or truck mixers that are capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. Do not charge the mixers in excess of the capacity recommended by the manufacturer. Operate the mixers at the drum or mixing blade speed designated by the manufacturer. Maintain the mixers in satisfactory operating condition, with the mixer drums kept free of hardened concrete. Replace mixer blades or paddles when worn down more than 10 percent of their depth when compared with the manufacturer's dimension for new blades or paddles.

#### 2.11.1.1 Stationary

Stationary mixers are required to be drum or pan mixers. Provide mixers with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed.

#### 2.11.1.2 Mixing Time and Uniformity for Stationary Mixers

For stationary mixers, before uniformity data are available, the minimum mixing time for each batch after all solid materials are in the mixer, provided that all of the mixing water is introduced before one-fourth of the mixing time has elapsed, is 1 minute for mixers having a capacity of 1 cubic yard. For mixers of greater capacity, increase this minimum time by 20 seconds for each additional 1.33 cubic yard or fraction thereof. After results of uniformity tests are available, the mixing time may be reduced to the minimum time required to meet uniformity requirements; but if uniformity requirements are not being met, increase the mixing time as directed. Perform mixer performance tests at new mixing times immediately after any change in mixing time or volume. Conduct the Regular Test sequence for initial determination of the mixing time or as directed. When regular testing is performed, the concrete is required to meet the limits of any five of the six uniformity requirements listed in Table 1 below.

#### 2.11.1.3 Abbreviated Test

Conduct the Abbreviated Test sequence for production concrete verification at the frequency specified in Table 6. When abbreviated testing is performed, the concrete is required to meet only those requirements listed for abbreviated testing. Use the projects approved mix design proportions for uniformity testing. For regular testing perform all six tests on three batches of concrete. The range for regular testing is the average of the ranges of the three batches. Abbreviated testing consists of performing the three required tests on a single batch of concrete. The range for abbreviated testing is the range for one batch. If more than one mixer is used and all are identical in terms of make, type, capacity, condition, speed of rotation, the results of tests on one of the mixers apply to the others, subject to the approval. Perform all mixer performance (uniformity) testing in accordance with COE CRD-C 55 and with paragraph TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL DURING CONSTRUCTION in PART 3.

TABLE 1 UNIFORMITY REQUIREMENTS--STATIONARY MIXERS		
Parameter	Regular Tests Allowable Maximum Range for Average of 3 Batches	Abbreviated Tests Allowable Maximum Range for 1 Batch
Unit weight of air-free mortar	2.0 pounds per cubic foot	2.0 pounds per cubic foot
Air content	1.0 percent	--
Slump	1.0 inch	1.0 inch
Coarse aggregate	6.0 percent	6.0 percent
Compressive strength at 7 days	10.0 percent	10.0 percent
Water content	1.5 percent	

2.11.1.4 Truck

Truck mixers are not allowed for mixing or transporting slipformed paving concrete. Provide only truck mixers designed for mixing or transporting paving concrete with extra large blading and rear opening specifically for low-slump paving concrete. Provide truck mixers, the mixing of concrete therein, and concrete uniformity and testing thereof that conform to the requirements of [ASTM C94/C94M](#). Determine the number of revolutions between 70 to 100 for truck-mixed concrete and the number of revolutions for shrink-mixed concrete by uniformity tests as specified in [ASTM C94/C94M](#) and in requirements for mixer performance stated in paragraph TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL DURING CONSTRUCTION in PART 3. If requirements for the uniformity of concrete are not met with 100 revolutions of mixing after all ingredients including water are in the truck mixer drum, discontinue use of the mixer until the condition is corrected. Water is not allowed to be added after the initial introduction of mixing water except, when on arrival at the job site, the slump is less than specified and the water-cement ratio is less than that given as a maximum in the approved mixture. Additional water may be added to bring the slump within the specified range provided the approved water-cement ratio is not exceeded. Inject water into the head of the mixer (end opposite the discharge opening) drum under pressure, and turn the drum or blades a minimum of 30 additional revolutions at mixing speed. The addition of water to the batch at any later time is not allowed. Perform mixer performance (uniformity) tests for truck mixers in accordance with [ASTM C94/C94M](#).

2.11.2 Transporting Equipment

Transport fixed form concrete in approved truck mixers designed with extra large blading and rear opening specifically for low slump concrete. Provide transporting equipment designed and operated to deliver and discharge the required concrete mixture completely without segregation.

2.11.3 Transfer and Spreading Equipment

Provide equipment for transferring concrete from the transporting equipment to the paving lane in front of the paver that is specially

manufactured, self-propelled transfer equipment which accepts the concrete outside the paving lane, transfers, and spreads it evenly across the paving lane in front of the paver and strike off the surface evenly to a depth which permits the paver to operate efficiently.

#### 2.11.4 Paver-Finisher

Provide paver-finisher consisting of a heavy-duty, self-propelled machine designed specifically for paving and finishing high quality pavement, with a minimum weight of 2200 pounds per foot of lane width, and powered by an engine having a minimum 6.0 horsepower per foot of lane width. The paver-finisher is required to spread, consolidate, and shape the plastic concrete to the desired cross section in one pass. The mechanisms for forming the pavement are required to be easily adjustable in width and thickness and for required crown. In addition to other spreaders required by paragraph above, the paver-finisher equipped with a full width knock-down auger or paddle mechanism, capable of operating in both directions, which evenly spreads the fresh concrete in front of the screed or extrusion plate.

##### 2.11.4.1 Vibrators

Provide gang mounted immersion vibrators at the front of the paver on a frame equipped with suitable controls so that all vibrators can be operated at any desired depth within the slab or completely withdrawn from the concrete, as required. Provide vibrators that are automatically controlled to immediately stop as forward motion of the paver ceases. Provide the spacing of the immersion vibrators across the paving lane as necessary to properly consolidate the concrete, with a maximum clear distance between vibrators of 30 inches and outside vibrators a maximum of 12 inches from the lane edge. Operate spud vibrators at a minimum frequency of 8000 impulses per minute and a minimum amplitude of 0.03 inch, as determined by COE CRD-C 521.

##### 2.11.4.2 Screed or Extrusion Plate

Equip the paver-finisher with a transversely oscillating screed or an extrusion plate to shape, compact, and smooth the surface and finish the surface that no significant amount of hand finishing, except use of cutting straightedges, is required. Provide a screed or extrusion plate constructed to adjust for crown in the pavement. Provide adjustment for variation in lane width or thickness and to prevent more than 8 inches of the screed or extrusion plate extending over previously placed concrete on either end when paving fill-in lanes. Repair or replace machines that cause displacement of properly installed forms or cause ruts or indentations in the prepared underlying materials and machines that cause frequent delays due to mechanical failures as directed.

##### 2.11.4.3 Longitudinal Mechanical Float

A longitudinal mechanical float may be used. If used, provide a float that is specially designed and manufactured to smooth and finish the pavement surface without working excess paste to the surface that is rigidly attached to the rear of the paver-finisher or to a separate self-propelled frame spanning the paving lane. Provide float plate at least 5 feet long by 8 inches wide and automatically be oscillated in the longitudinal direction while slowly moving from edge to edge of the paving lane, with the float plate in contact with the surface at all times.

#### 2.11.4.4 Other Types of Finishing Equipment

Clary screeds, other rotating tube floats, or bridge deck finishers are not allowed on mainline paving, but may be allowed on irregular or odd-shaped slabs, and near buildings or trench drains, subject to approval. Provide bridge deck finishers with a minimum operating weight of **7500 pounds** that have a transversely operating carriage containing a knock-down auger and a minimum of two immersion vibrators. Only use vibrating screeds or pans for isolated slabs where hand finishing is permitted as specified, and only where specifically approved.

#### 2.11.4.5 Fixed Forms

Provide paver-finisher equipped with wheels designed to ride the forms, keep it aligned with the forms, and spread the load so as to prevent deformation of the forms. Provide paver-finishers traveling on guide rails located outside the paving lane that are equipped with wheels when traveling on new or existing concrete to remain. Alternatively, a modified slipform paver that straddles the forms may be used. Provide a modified slipform paver which has the side conforming plates removed or rendered ineffective and travels over or along pre-placed fixed forms.

#### 2.11.5 Curing Equipment

Provide equipment for applying membrane-forming curing compound mounted on a self-propelled frame that spans the paving lane. Constantly agitate the curing compound reservoir mechanically (not air) during operation and provide a means for completely draining the reservoir. Provide a spraying system that consists of a mechanically powered pump which maintains constant pressure during operation, an operable pressure gauge, and either a series of spray nozzles evenly spaced across the lane to provide uniformly overlapping coverage or a single spray nozzle which is mounted on a carriage which automatically traverses the lane width at a speed correlated with the forward movement of the overall frame. Protect all spray nozzles with wind screens. Calibrate the spraying system in accordance with **ASTM D2995**, Method A, for the rate of application required in paragraph MEMBRANE CURING. Provide hand-operated sprayers allowed by that paragraph with compressed air supplied by a mechanical air compressor. Immediately replace curing equipment if it fails to apply an even coating of compound at the specified rate.

#### 2.11.6 Sawing Equipment

Provide equipment for sawing joints and for other similar sawing of concrete consisting of standard diamond-type concrete saws mounted on a wheeled chassis which can be easily guided to follow the required alignment. Provide diamond tipped blades. If demonstrated to operate properly, abrasive blades may be used. Provide spares as required to maintain the required sawing rate. Provide wheel saws used in the removal of concrete with large diameter tungsten carbide tipped blades mounted on a heavy-duty chassis which produce a saw kerf at least **1-1/2 inches** wide. Provide saws capable of sawing to the full depth required. Early-entry saws may be used, subject to demonstration and approval. No change to the initial sawcut depth is permitted.

#### 2.11.7 Straightedge

Provide and maintain at the job site, in good condition, a minimum **12 foot** straightedge for each paving train for testing the hardened portland

cement concrete surfaces. Provide straightedges constructed of aluminum or magnesium alloy and blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Provide straightedges with handles for operation on the pavement.

#### 2.11.8 Work Bridge

Provide a self-propelled working bridge capable of spanning the required paving lane width where workmen can efficiently and adequately reach the pavement surface.

### 2.12 SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES

#### 2.12.1 Specified Flexural Strength

Specified flexural strength, R, for concrete is 4,000 psi at 28 days, as determined by tests made in accordance with ASTM C78/C78M of beams fabricated and cured in accordance with ASTM C192/C192M

#### 2.12.2 Water-Cementitious Materials Ratio

Maximum allowable water-cementitious material ratio is 0.45. The water-cementitious material ratio is the equivalent water-cement ratio as determined by conversion from the weight ratio of water to cement plus SCM by the mass equivalency method described in ACI 211.1.

#### 2.12.3 Air Content

Provide concrete that is air-entrained with a total air content of 4.5 plus or minus 1.5 percentage points, at the point of placement. Determine air content in accordance with ASTM C231/C231M.

#### 2.12.4 Slump

The maximum allowable slump of the concrete at the point of placement is 3 inches for pavement constructed with fixed forms. The selected slump is applicable to both pilot and fill-in lanes.

#### 2.12.5 Concrete Temperature

The temperature of the concrete as delivered is required to conform to the requirements of paragraphs PAVING IN HOT WEATHER and PAVING IN COLD WEATHER, in PART 3. Determine the temperature of concrete in accordance with ASTM C1064/C1064M.

#### 2.12.6 Concrete Strength for Final Acceptance

The strength of the concrete will be considered acceptable when the equivalent 28-day flexural strengths for each lot are above the 'Specified Flexural Strength' as determined by correlation with 14-day flexural strength tests specified in paragraph MIXTURE PROPORTIONING FOR FLEXURAL STRENGTH below, and no individual set (2 specimens per subplot) in the lot are 25 psi or more below the equivalent 'Specified Flexural Strength'. If any lot or subplot, respectively, fails to meet the above criteria, remove and replace the lot or subplot at no additional cost to the Government. This is in addition to and does not replace the average strength required for day-to-day CQC operations as specified in paragraph AVERAGE CQC FLEXURAL STRENGTH REQUIRED FOR MIXTURES, below.

## 2.13 MIXTURE PROPORTIONS

### 2.13.1 Composition

Provide concrete composed of cementitious material, water, fine and coarse aggregates, and admixtures. Include supplementary Cementitious Materials (SCM) choice and usage in accordance with paragraph SUPPLEMENTARY CEMENTITIOUS MATERIALS (SCM) CONTENT. Provide a minimum total cementitious materials content of **517 pounds per cubic yard**. Acceptable admixtures consist of air entraining admixture and may also include, as approved, accelerating admixture, water reducing and accelerating admixtures.

### 2.13.2 Proportioning Studies

Perform trial design batches, mixture proportioning studies, and testing, at no expense to the Government. Submit for approval the **Preliminary Proposed Proportioning** to include items a., b., and i. below a minimum of 7 days prior to beginning the mixture proportioning study. Submit the results of the mixture proportioning studies signed and stamped by the registered professional engineer having technical responsibility for the mix design study, and submitted at least 30 days prior to commencing concrete placing operations. Include a statement summarizing the maximum nominal coarse aggregate size and the weights and volumes of each ingredient proportioned on a one cubic **yard** basis. Base aggregate quantities on the mass in a saturated surface dry condition. Provide test results demonstrating that the proposed mixture proportions produce concrete of the qualities indicated. Base methodology for trial mixtures having proportions, slumps, and air content suitable for the work as described in **ACI 211.1**, modified as necessary to accommodate flexural strength. Submit test results including:

- a. Coarse and fine aggregate gradations and plots.
- b. Combined aggregate gradation and coarseness vs. workability plots.
- c. Coarse aggregate quality test results, include deleterious materials.
- d. Fine aggregate quality test results.
- e. Mill certificates for cement and supplemental cementitious materials.
- f. Certified test results for air entraining, water reducing, retarding, non-chloride accelerating admixtures.
- g. Specified flexural strength, slump, and air content.
- h. Documentation of required average CQC flexural strength, Ra.
- i. Recommended proportions and volumes for proposed mixture and each of three trial water-cementitious materials ratios.
- j. Individual beam breaks.
- k. Flexural strength summaries and plots.
- l. Correlation ratios for acceptance testing and CQC testing.
- m. Historical record of test results, documenting production standard deviation (if available).
- n. Narrative discussing methodology on how the mix design was developed.
- o. Alternative aggregate blending to be used during the test section if necessary to meet the required surface and consolidation requirements.

#### 2.13.2.1 Water-Cementitious Materials Ratio

Perform at least three different water-cementitious materials ratios, which produce a range of strength encompassing that required on the project. The maximum allowable water-cementitious material ratio required in paragraph SPECIFIED FLEXURAL STRENGTH, above is the equivalent water-cementitious materials ratio. The maximum water-cementitious



materials ratio of the approved mix design becomes the maximum water-cementitious materials ratio for the project, and in no case exceeds 0.45.

#### 2.13.2.2 Trial Mixture Studies

Perform separate sets of trial mixture studies made for each combination of cementitious materials and each combination of admixtures proposed for use. No combination of either are to be used until proven by such studies, except that, if approved in writing and otherwise permitted by these specifications, an accelerating or retarding admixture may be used without separate trial mixture study. Perform separate trial mixture studies for each placing method (slip form, fixed form, or hand placement) proposed. Report the temperature of concrete in each trial batch. Design each mixture to promote easy and suitable concrete placement, consolidation and finishing, and to prevent segregation and excessive bleeding. Proportion laboratory trial mixtures for maximum permitted slump and air content.

#### 2.13.2.3 Mixture Proportioning for Flexural Strength

Follow the step by step procedure below:

- a. Fabricate all beams for each mixture from the same batch or blend of batches. Fabricate and cure all beams in accordance with **ASTM C192/C192M**, using 6 x 6 inches steel beam forms.
- b. Cure test beams from each mixture for 3, 7, 14, and 28-day flexural tests; 6 beams to be tested per age.
- c. Test beams in accordance with **ASTM C78/C78M**.
- d. Using the average strength for each w/c at each age, plot all results from each of the three mixtures on separate graphs for w/c versus:
  - 3-day flexural strength
  - 7-day flexural strength
  - 14-day flexural strength
  - 28-day flexural strength
- e. From these graphs select a w/c that produces a mixture giving a 28-day flexural strength equal to the required strength determined in accordance with the next paragraph.
- f. Using the above selected w/c, select from the graphs the expected 3, 7 and 14-day flexural strengths.
- g. From the above expected strengths for the selected mixture, determine the Ratio of the 7-day flexural strength of the selected mixture to the 28-day flexural strength of the mixture (for CQC control).
- h. From the above expected strengths for the selected mixture, determine the Ratio of the 14-day flexural strength of the selected mixture to the 28-day flexural strength of the mixture (for acceptance).
- i. If there is a change in materials, perform additional mixture design studies using the new materials and new Correlation Ratios determined.
- j. No concrete pavement placement is allowed until the mixture

proportions are approved. The approved water-cementitious materials ratio is restricted to the maximum value specified in paragraph SPECIFIED FLEXURAL STRENGTH, above and not be increased without written approval.

### 2.13.3 Average CQC Flexural Strength Required for Mixtures

In order to ensure meeting the strength requirements specified in paragraph SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES above, during production, the mixture proportions selected during mixture proportioning studies and used during construction requires an average CQC flexural strength exceeding the specified strength, R, by the amount indicated below. This required average CQC flexural strength, Ra, is used only for CQC operations as specified in paragraph TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL DURING CONSTRUCTION in PART 3 and as specified in the previous paragraph. During production, adjust the required Ra, as appropriate and as approved, based on the standard deviation of average 28-day strengths being attained during paving.

#### 2.13.3.1 From Previous Test Records

Where a concrete production facility has previous test records current to within 18 months, establish a standard deviation in accordance with the applicable provisions of ACI 214R. Include test records from which a standard deviation is calculated that represent materials, quality control procedures, and conditions similar to those expected, that represent concrete produced to meet a specified flexural strength or strengths within 150 psi of the 28-day flexural strength specified for the proposed work, and that consist of at least 30 consecutive tests. Perform verification testing to document the current strength. A strength test is the average of the strengths of two specimens made from the same sample of concrete and tested at 28 days. Required average CQC flexural strength, Ra, used as the basis for selection of concrete proportions is the value from the equation that follows, using the standard deviation as determined above:

$$R_a = R + 1.34S$$

Where: S = standard deviation  
R = specified flexural strength  
Ra = required average flexural strength

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, establish a standard deviation as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
30 or more	1.00

### 2.13.3.2 Without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, determine the required average strength,  $R_a$ , by adding 15 percent to the specified flexural strength,  $R$ .

## PART 3 EXECUTION

### 3.1 PREPARATION FOR PAVING

Before commencing paving, perform the following. If used, place cleaned, coated, and adequately supported forms. Have any reinforcing steel needed at the paving site; all transporting and transfer equipment ready for use, clean, and free of hardened concrete and foreign material; equipment for spreading, consolidating, screeding, finishing, and texturing concrete at the paving site, clean and in proper working order; and all equipment and material for curing and for protecting concrete from weather or mechanical damage at the paving site, in proper working condition, and in sufficient amount for the entire placement.

#### 3.1.1 Weather Precaution

When windy conditions during paving appear probable, have equipment and material at the paving site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete.

#### 3.1.2 Proposed Techniques

Submit placing and protection methods; paving sequence; jointing pattern; data on curing equipment; demolition of existing pavements, as specified. Submit for approval the following items:

- a. A description of the placing and protection methods proposed when concrete is to be placed in or exposed to hot, cold, or rainy weather conditions.
- b. A detailed paving sequence plan and proposed paving pattern showing all planned construction joints; transverse and longitudinal dowel bar spacing; and identifying pilot lanes and hand placement areas. Deviations from the jointing pattern shown on the drawings are not allowed without written approval of the **Contracting Officer**.
- c. Plan and equipment proposed to control alignment of sawn joints within the specified tolerances.
- d. Data on the curing equipment, media and methods to be used.
- f. Pavement demolition work plan, presenting the proposed methods and

equipment to remove existing pavement and protect pavement to remain in place.

### 3.2 CONDITIONING OF UNDERLYING MATERIAL

#### 3.2.1 General Procedures

Verify the underlying material, upon which concrete is to be placed is clean, damp, and free from debris, waste concrete or cement, frost, ice, and standing or running water. Prior to setting forms or placement of concrete, verify the underlying material is well drained and have been satisfactorily graded by string-line controlled, automated, trimming machine and uniformly compacted in accordance with the applicable Section of these specifications. Test the surface of the underlying material to crown, elevation, and density in advance of setting forms or of concrete placement using slip-form techniques. Trim high areas to proper elevation. Fill and compact low areas to a condition similar to that of surrounding grade, or filled with concrete monolithically with the pavement. Low areas filled with concrete are not to be cored for thickness to avoid biasing the average thickness used for evaluation and payment adjustment. Rework and compact any underlying material disturbed by construction operations to specified density immediately in front of the paver.

#### 3.2.2 Traffic on Underlying Material

After the underlying material has been prepared for concrete placement, equipment is not permitted thereon. Subject to specific approval, crossing of the prepared underlying material at specified intervals for construction purposes may be permitted, provided rutting or indentations do not occur. Rework and repair the surface before concrete is placed. Transporting equipment is not to be allowed to operate on the prepared and compacted underlying material in front of the paver-finisher.

### 3.3 WEATHER LIMITATIONS

#### 3.3.1 Placement and Protection During Inclement Weather

Do not commence placing operations when heavy rain or other damaging weather conditions appear imminent. At all times when placing concrete, maintain on-site sufficient waterproof cover and means to rapidly place it over all unhardened concrete or concrete that might be damaged by rain. Suspend placement of concrete whenever rain, high winds, or other damaging weather commences to damage the surface or texture of the placed unhardened concrete, washes cement out of the concrete, or changes the water content of the surface concrete. Immediately cover and protect all unhardened concrete from the rain or other damaging weather. Completely remove any slab damaged by rain or other weather full depth, by full slab width, to the nearest original joint, and replaced as specified in paragraph REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS below, at no expense to the Government.

#### 3.3.2 Paving in Hot Weather

When the ambient temperature during paving is expected to exceed 90 degrees F, properly place and finish the concrete in accordance with procedures previously submitted, approved, and as specified herein. Provide concrete that does not exceed the temperature shown in the table below when measured in accordance with ASTM C1064/C1064M at the time of

delivery. Cooling of the mixing water or aggregates or placing in the cooler part of the day may be required to obtain an adequate placing temperature. Cool steel forms and reinforcing as needed to maintain steel temperatures below 120 degrees F. Cool or protect transporting and placing equipment if necessary to maintain proper concrete placing temperature. Keep the finished surfaces of the newly laid pavement damp by applying a fog spray (mist) with approved spraying equipment until the pavement is covered by the curing medium.

Maximum Allowable Concrete Placing Temperature	
Relative Humidity, Percent, During Time of Concrete Placement	Maximum Allowable Concrete Temperature in Degrees F
Greater than 60	90
40-60	85
Less than 40	80

### 3.3.3 Prevention of Plastic Shrinkage Cracking

During weather with low humidity, and particularly with high temperature and appreciable wind, develop and institute measures to prevent plastic shrinkage cracks from developing. If plastic shrinkage cracking occurs, halt further placement of concrete until protective measures are in place to prevent further cracking. Periods of high potential for plastic shrinkage cracking can be anticipated by use of ACI 305R. In addition to the protective measures specified in the previous paragraph, the concrete placement may be further protected by erecting shades and windbreaks and by applying fog sprays of water, the addition of monomolecular films, or wet covering. Apply monomolecular films after finishing is complete, do not use in the finishing process. Immediately commence curing procedures when such water treatment is stopped. Repair plastic shrinkage cracks in accordance with paragraph REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS. Never trowel over or fill plastic shrinkage cracks with slurry.

### 3.3.4 Paving in Cold Weather

Cold weather paving is required to conform to ACI 306R. Use special protection measures, as specified herein, if freezing temperatures are anticipated or occur before the expiration of the specified curing period. Do not begin placement of concrete unless the ambient temperature is at least 35 degrees F and rising. Thereafter, halt placement of concrete whenever the ambient temperature drops below 40 degrees F. When the ambient temperature is less than 50 degrees F, the temperature of the concrete when placed is required to be not less than 50 degrees F nor more than 75 degrees F. Provide heating of the mixing water or aggregates as required to regulate the concrete placing temperature. Materials entering the mixer are required to be free from ice, snow, or frozen lumps. Do not incorporate salt, chemicals or other materials in the concrete to prevent freezing. If allowed under paragraph MIXTURE PROPORTIONS in PART 2, an accelerating admixture may be used when the ambient temperature is below 50 degrees F. Provide covering and other means for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72

hours after placing, and at a temperature above freezing for the remainder of the curing period. Remove pavement slabs, full depth by full width, damaged by freezing or falling below freezing temperature to the nearest planned joint, and replace as specified in paragraph REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS, at no expense to the Government.

### 3.4 CONCRETE PRODUCTION

Provide batching, mixing, and transporting equipment with a capacity sufficient to maintain a continuous, uniform forward movement of the paver of not less than 2.5 feet per minute. Deposit concrete transported in non-agitating equipment in front of the paver within 45 minutes from the time cement has been charged into the mixing drum, except that if the ambient temperature is above 90 degrees F, the time is reduced to 30 minutes. Deposit concrete transported in truck mixers in front of the paver within 90 minutes from the time cement has been charged into the mixer drum of the plant or truck mixer. If the ambient temperature is above 90 degrees F, the time is reduced to 60 minutes. Accompany every load of concrete delivered to the paving site with a batch ticket from the operator of the batching plant. Provide batch ticket information required by ASTM C94/C94M on approved forms. In addition provide design quantities in mass or volume for all materials, batching tolerances of all materials, and design and actual water cementitious materials ratio on each batch delivered, the water meter and revolution meter reading on truck mixers and the time of day. Provide batch tickets for each truck delivered as part of the lot acceptance package to the placing foreman to maintain on file and deliver them to the Government weekly.

#### 3.4.1 Batching and Mixing Concrete

Maintain scale pivots and bearings clean and free of rust. Remove any equipment which fails to perform as specified immediately from use until properly repaired and adjusted, or replaced.

#### 3.4.2 Transporting and Transfer - Spreading Operations

Operate non-agitating equipment only on smooth roads and for haul time less than 15 minutes. Deposit concrete as close as possible to its final position in the paving lane. Operate all equipment to discharge and transfer concrete without segregation. Dumping of concrete in discrete piles is not permitted. No transfer or spreading operation which requires the use of front-end loaders, dozers, or similar equipment to distribute the concrete are permitted.

### 3.5 PAVING

#### 3.5.1 General Requirements

Construct pavement with paving and finishing equipment utilizing rigid fixed forms. Provide paving and finishing equipment and procedures capable of constructing paving lanes of the required width at a rate of at least 2.5 feet of paving lane per minute on a routine basis. Control paving equipment and its operation, and coordinated with all other operations, such that the paver-finisher has a continuous forward movement at a reasonably uniform speed from beginning to end of each paving lane, except for inadvertent equipment breakdown. Backing the paver and refinishing a lane is not permitted. Remove and replace concrete refinished in this manner. Failure to achieve a continuous forward motion requires halting operations, regrouping, and modifying operations to

achieve this requirement. Personnel are not permitted to walk or operate in the plastic concrete at any time. Where an open-graded granular base is required under the concrete, select paving equipment and procedures which operate properly on the base course without causing displacement or other damage.

### 3.5.2 Consolidation

Consolidate concrete with the specified type of lane-spanning, gang-mounted, mechanical, immersion type vibrating equipment mounted in front of the paver, supplemented, in rare instances as specified, by hand-operated vibrators. Insert vibrators into the concrete to a depth that provides the best full-depth consolidation but not closer to the underlying material than **2 inches**. Excessive vibration is not permitted. Discontinue paving operations if vibrators cause visible tracking in the paving lane, until equipment and operations have been modified to prevent it. Vibrate concrete in small, odd-shaped slabs or in isolated locations inaccessible to the gang-mounted vibration equipment with an approved hand-operated immersion vibrator operated from a bridge spanning the area. Do not use vibrators to transport or spread the concrete. Do not operate hand-operated vibrators in the concrete at one location for more than 20 seconds. Insert hand-operated vibrators between **6 to 15 inches** on centers. For each paving train, provide at least one additional vibrator spud, or sufficient parts for rapid replacement and repair of vibrators at the paving site at all times. Any evidence of inadequate consolidation (honeycomb along the edges, large air pockets, or any other evidence) requires the immediate stopping of the paving operation and approved adjustment of the equipment or procedures.

### 3.5.3 Operation

When the paver approaches a header at the end of a paving lane, maintain a sufficient amount of concrete ahead of the paver to provide a roll of concrete which spills over the header. Provide a sufficient amount of extra concrete to prevent any slurry that is formed and carried along ahead of the paver from being deposited adjacent to the header. Maintain the spud vibrators in front of the paver at the desired depth as close to the header as possible before they are lifted. Provide additional consolidation adjacent to the headers by hand-manipulated vibrators. When the paver is operated between or adjacent to previously constructed pavement (fill-in lanes), provide provisions to prevent damage to the previously constructed pavement. Electronically control screeds or extrusion plates from the previously placed pavement so as to prevent them from applying pressure to the existing pavement and to prevent abrasion of the pavement surface. Maintain the overlapping area of existing pavement surface completely free of any loose or bonded foreign material as the paver-finisher operates across it. When the paver travels on existing pavement, maintain approved provisions to prevent damage to the existing pavement. Pavers using transversely oscillating screeds are not allowed to form fill-in lanes that have widths less than a full width for which the paver was designed or adjusted.

### 3.5.4 Required Results

Adjust and operate the paver-finisher, its gang-mounted vibrators and operating procedures coordinated with the concrete mixture being used, to produce a thoroughly consolidated slab throughout that is true to line and grade within specified tolerances. Provide a paver-finishing operation that produces a surface finish free of irregularities, tears, voids of any

kind, and any other discontinuities in a single pass across the pavement; multiple passes are not permitted. Provide equipment and its operation that produce a finished surface requiring no hand finishing other than the use of cutting straightedges, except in very infrequent instances. Stop paving if any equipment or operation fails to produce the above results. Prior to recommencing paving, properly adjust or replace the equipment, modify the operation, or modify the mixture proportions, in order to produce the required results. No water, other than fog sprays (mist) as specified in paragraph PREVENTION OF PLASTIC SHRINKAGE CRACKING above, is allowed to be applied to the concrete or the concrete surface during paving and finishing.

### 3.5.5 Fixed Form Paving

Provide paving equipment for fixed-form paving and the operation that conforms to the requirements of paragraph EQUIPMENT, and all requirements specified herein.

#### 3.5.5.1 Forms for Fixed-Form Paving

- a. Provide straight forms made of steel and in sections not less than 10 feet in length that are clean and free of rust or other contaminants. Seal any holes or perforations in forms prior to paving unless otherwise permitted. Maintain forms in place and passable by all equipment necessary to complete the entire paving operation without need to remove horizontal form supports. Provide flexible or curved forms of proper radius for curves of 100-foot radius or less. Provide wood forms for curves and fillets made of well-seasoned, surfaced plank or plywood, straight, and free from warp or bend that have adequate strength and are rigidly braced. Provide forms with a depth equal to the pavement thickness at the edge. Where the project requires several different slab thicknesses, forms may be built up by bolting or welding a tubular metal section or by bolting wood planks to the bottom of the form to completely cover the underside of the base of the form and provide an increase in depth of not more than 25 percent. Provide forms with the base width of the one-piece or built-up form not less than eight-tenths of the vertical height of the form, except provide forms 8 inches or less in vertical height with a base width not less than the vertical height of the form. Provide forms with maximum vertical deviation of top of any side form, including joints, not varying from a true plane more than 1/8 inch in 10 feet, and the upstanding leg not varying more than 1/4 inch.
- b. Provide form sections that are tightly locked and free from play or movement in any direction. Provide forms with adequate devices for secure settings so that when in place they withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment.
- c. Set forms for full bearing on foundation for entire length and width and in alignment with edge of finished pavement. Support forms during entire operation of placing, compaction, and finishing so that forms do not deviate vertically more than 0.01 foot from required grade and elevations indicated. Check conformity to the alignment and grade elevations shown on the drawings and make necessary corrections immediately prior to placing the concrete. Clean and oil the forms each time before concrete is placed. Concrete placement is not allowed until setting of forms has been checked and approved by the CQC team.



- d. Do not anchor guide rails for fixed form pavers into new concrete or existing concrete to remain.
- e. Securely hold forms for overlay pavements and for other locations where forms set on existing pavements in place with stakes or by other approved methods. Carefully drill holes in existing pavements for form stakes by methods which do not crack or spall the existing pavement. After use, fill the holes flush with the surrounding surface using approved material, prior to overlying materials being placed. Immediately discontinue any method which does not hold the form securely or which damages the existing pavement. Prior to setting forms for paving operations, demonstrate the proposed form setting procedures at an approved location without proceeding further until the proposed method is approved.

#### 3.5.5.2 Form Removal

Keep forms in place at least 12 hours after the concrete has been placed. When conditions are such that the early strength gain of the concrete is delayed, leave the forms in place for a longer time, as directed. Remove forms by procedures that do not damage the concrete. Do not use bars or heavy metal tools directly against the concrete in removing the forms. Promptly repair any concrete found to be defective after form removal, using procedures specified or as directed.

#### 3.5.6 Placing Reinforcing Steel

Provide the type and amount of steel reinforcement indicated.

##### 3.5.6.1 Pavement Thickness Greater Than 12 inches

For pavement thickness of 12 inches or more, install the reinforcement steel by the strike-off method wherein a layer of concrete is deposited on the underlying material, consolidated, and struck to the indicated elevation of the steel reinforcement. Place the reinforcement upon the pre-struck surface, followed by placement of the remaining concrete and finishing in the required manner. When placement of the second lift causes the steel to be displaced horizontally from its original position, provide provisions for increasing the thickness of the first lift and depressing the reinforcement into the unhardened concrete to the required elevation. Limit the increase in thickness only as necessary to permit correct horizontal alignment to be maintained. Remove and replace any portions of the bottom layer of concrete that have been placed more than 30 minutes without being covered with the top layer with newly mixed concrete without additional cost to the Government.

#### 3.5.7 Placing Dowels

Ensure the method used to install and hold dowels in position result in dowel alignment within the maximum allowed horizontal and vertical tolerance of 1/8 inch per foot after the pavement has been completed. Except as otherwise specified below, maintain the horizontal spacing of dowels within a tolerance of plus or minus 5/8 inch. Locate the dowel vertically on the face of the slab within a tolerance of plus or minus 1/2 inch). Measure the vertical alignment of the dowels parallel to the designated top surface of the pavement, except for those across the crown or other grade change joints. Measure dowels across crowns and other joints at grade changes to a level surface. Check horizontal alignment

perpendicular to the joint edge with a framing square. Do not place dowels closer than 0.6 times the dowel bar length to the planned joint line. If the last regularly spaced longitudinal dowel is closer than that dimension, move it away from the joint to a location 0.6 times the dowel bar length, but not closer than 6 inches to its nearest neighbor. Resolve dowel interference at a transverse joint-longitudinal joint intersection by deleting the closest transverse dowel. Do not position the end of a longitudinal dowel closer than 12 inches from the end of the nearest transverse dowel. Install dowels as specified in the following subparagraphs.

#### 3.5.7.1 Contraction Joints

Securely hold dowels in longitudinal and transverse contraction joints within the paving lane in place, as indicated, by means of rigid metal frames or basket assemblies of an approved type. Securely hold the basket assemblies in the proper location by means of suitable pins or anchors. Do not cut or crimp the dowel basket tie wires.

#### 3.5.7.2 Construction Joints-Fixed Form Paving

Install dowels by the bonded-in-place method or the drill-and-dowel method. Installation by removing and replacing in preformed holes is not permitted. Prepare and place dowels across joints where indicated, correctly aligned, and securely held in the proper horizontal and vertical position during placing and finishing operations, by means of devices fastened to the forms. Provide the spacing of dowels in construction joints as indicated, except that, where the planned spacing cannot be maintained because of form length or interference with form braces, provide closer spacing with additional dowels.

#### 3.5.7.3 Dowels Installed in Hardened Concrete

Install dowels in hardened concrete by bonding the dowels into holes drilled into the hardened concrete. Before drilling commences, cure the concrete for 7 days or until it has reached a minimum flexural strength of 450 psi. Drill holes 1/8 inch greater in diameter than the dowels into the hardened concrete using rotary-core drills. Rotary-percussion drills are permitted, provided that excessive spalling does not occur to the concrete joint face. Excessive spalling is defined as spalling deeper than 1/4 inch from the joint face or 1/2 inch radially from the outside of the drilled hole. Continuing damage requires modification of the equipment and operation. Drill depth of dowel hole within a tolerance of plus or minus 1/2 inch of the dimension shown on the drawings. Upon completion of the drilling operation, blow out the dowel hole with oil-free, compressed air. Bond dowels in the drilled holes using epoxy resin. Inject epoxy resin at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel is not permitted. Hold the dowels in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic grout retention ring fitted around the dowel. Provide dowels required between new and existing concrete in holes drilled in the existing concrete, all as specified above.

#### 3.5.7.4 Lubricating Dowel Bars

Wipe the portion of each dowel intended to move within the concrete clean and coat with a thin, even film of lubricating oil or light grease before

the concrete is placed.

### 3.6 FINISHING

Provide finishing operations as a continuing part of placing operations starting immediately behind the strike-off of the paver. Provide initial finishing by the transverse screed or extrusion plate. Provide the sequence of operations consisting of transverse finishing, longitudinal machine floating if used, straightedge finishing, texturing, and then edging of joints. Provide finishing by the machine method. Provide a work bridge as necessary for consolidation and hand finishing operations. Use the hand method only on isolated areas of odd slab widths or shapes and in the event of a breakdown of the mechanical finishing equipment. Keep supplemental hand finishing for machine finished pavement to an absolute minimum. Immediately stop any machine finishing operation which requires appreciable hand finishing, other than a moderate amount of straightedge finishing. Prior to recommencing machine finishing, properly adjust or replace the equipment. Immediately halt any operations which produce more than 1/8 inch of mortar-rich surface (defined as deficient in plus U.S. No. 4 sieve size aggregate) and the equipment, mixture, or procedures modified as necessary. Compensate for surging behind the screeds or extrusion plate and settlement during hardening and take care to ensure that paving and finishing machines are properly adjusted so that the finished surface of the concrete (not just the cutting edges of the screeds) is at the required line and grade. Maintain finishing equipment and tools clean and in an approved condition. Water is not allowed to be added to the surface of the slab with the finishing equipment or tools, or in any other way, except for fog (mist) sprays specified to prevent plastic shrinkage cracking.

#### 3.6.1 Machine Finishing With Fixed Forms

Replace machines that cause displacement of the forms. Only one pass of the finishing machine is allowed over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, immediately stop the operation and the equipment, mixture, and procedures adjusted as necessary.

#### 3.6.2 Surface Correction and Testing

After all other finishing is completed but while the concrete is still plastic, eliminate minor irregularities and score marks in the pavement surface by means of cutting straightedges. Provide cutting straightedges with a minimum length of 12 feet that are operated from the sides of the pavement or from bridges. Provide cutting straightedges operated from the side of the pavement equipped with a handle 3 feet longer than one-half the width of the pavement. Test the surface for trueness with a straightedge held in successive positions parallel and at right angles to the center line of the pavement, and the whole area covered as necessary to detect variations. Advance the straightedge along the pavement in successive stages of not more than one-half the length of the straightedge. Immediately fill depressions with freshly mixed concrete, strike off, consolidate with an internal vibrator, and refinish. Strike off projections above the required elevation and refinish. Continue the straightedge testing and finishing until the entire surface of the concrete is free from observable departure from the straightedge and conforms to the surface requirements specified in paragraph SURFACE SMOOTHNESS. This straightedging is not allowed to be used as a replacement for the straightedge testing of paragraph SURFACE SMOOTHNESS

in PART 1. Use long-handled, flat bull floats very sparingly and only as necessary to correct minor, scattered surface defects. If frequent use of bull floats is necessary, stop the paving operation and the equipment, mixture or procedures adjusted to eliminate the surface defects. Keep finishing with hand floats and trowels to the absolute minimum necessary. Take extreme care to prevent over finishing joints and edges. Produce the surface finish of the pavement essentially by the finishing machine and not by subsequent hand finishing operations. All hand finishing operations are subject to approval.

### 3.6.3 Hand Finishing

Use hand finishing operations only as specified below. Provide a work bridge to be used as necessary for consolidation and placement operations to avoid standing in concrete.

#### 3.6.3.1 Equipment and Template

In addition to approved mechanical internal vibrators for consolidating the concrete, provide a strike-off and tamping template and a longitudinal float for hand finishing. Provide a template at least 1 foot longer than the width of pavement being finished, of an approved design, and sufficiently rigid to retain its shape, that is constructed of metal or other suitable material shod with metal. Provide a longitudinal float at least 10 feet long, of approved design, is rigid and substantially braced, and maintain a plane surface on the bottom. Grate tampers (jitterbugs) are not allowed.

#### 3.6.3.2 Finishing and Floating

As soon as placed and vibrated, strike off the concrete and screeded to the crown and cross section and to such elevation above grade that when consolidated and finished, the surface of the pavement is at the required elevation. In addition to previously specified complete coverage with handheld immersion vibrators, tamp the entire surface with the strike-off and tamping template, and the tamping operation continued until the required compaction and reduction of internal and surface voids are accomplished. Immediately following the final tamping of the surface, float the pavement longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, place additional concrete, consolidated and screeded, and the float operated until a satisfactory surface has been produced. Do not advance the floating operation more than half the length of the float and then continued over the new and previously floated surfaces.

### 3.6.4 Texturing

Before the surface sheen has disappeared and before the concrete hardens or curing compound is applied, texture the surface of the pavement as described herein. After curing is complete, thoroughly power broom all textured surfaces to remove all debris.

#### 3.6.4.1 Burlap Drag Surface

Apply surface texture by dragging the surface of the pavement, in the direction of the concrete placement, with an approved burlap drag. Operate the drag with the fabric moist, and the fabric maintained clean or changed as required to keep clean. Perform the dragging so as to produce a uniform finished surface having a fine sandy texture without disfiguring

marks.

#### 3.6.4.2 Broom Texturing

Complete brooming before the concrete has hardened to the point where the surface is unduly torn or roughened, but after hardening has progressed enough so that the mortar does not flow and reduce the sharpness of the scores. Overlap successive passes of the broom the minimum necessary to obtain a uniformly textured surface. Wash brooms thoroughly at frequent intervals during use. Remove worn or damaged brooms from the job site. Hand brooming is permitted only on isolated odd shaped slabs or slabs where hand finishing is permitted. For hand brooming, provide brooms with handles longer than half the width of slab to be finished. Transversely draw the hand brooms across the surface from the center line to each edge with slight overlapping strokes.

#### 3.6.5 Edging

Before texturing has been completed, carefully finish the edge of the slabs along the forms, and at the joints with an edging tool to form a smooth rounded surface of  $1/8$  inch radius. Eliminate tool marks, and provide edges that are smooth and true to line. Water is not allowed to be added to the surface during edging. Take extreme care to prevent overworking the concrete.

#### 3.6.6 Outlets in Pavement

Construct recesses for the tie-down anchors, lighting fixtures, and other outlets in the pavement to conform to the details and dimensions shown. Carefully finish the concrete in these areas to provide a surface of the same texture as the surrounding area that is within the requirements for plan grade and surface smoothness.

### 3.7 CURING

#### 3.7.1 Protection of Concrete

Continuously protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the completion of finishing operations. Have all equipment needed for adequate curing and protection of the concrete on hand and ready for use before actual concrete placement begins. If any selected method of curing does not afford the proper curing and protection against concrete cracking, remove or replace the damaged pavement, and provide another method of curing as directed. Accomplish curing by one of the following methods.

#### 3.7.2 Membrane Curing

Apply a uniform coating of white-pigmented, membrane-forming, curing compound to the entire exposed surface of the concrete as soon as the free water has disappeared from the surface after finishing. Apply immediately along the formed edge faces after the forms are removed. Do not allow the concrete to dry before the application of the membrane. If any drying has occurred, moisten the surface of the concrete with a fine spray of water, and the curing compound applied as soon as the free water disappears. Apply the curing compound to the finished surfaces by means of an approved automatic spraying machine. Apply the curing compound with an overlapping coverage that provides a two-coat application at a coverage of 400 square feet per gallon, plus or minus 5.0 percent for each coat. A one-coat

application is allowed provided it is applied in a uniform application and coverage of 200 square feet per gallon, plus or minus 5.0 percent is obtained. The application of curing compound by hand-operated, mechanical powered pressure sprayers is permitted only on odd widths or shapes of slabs and on concrete surfaces exposed by the removal of forms. When the application is made by hand-operated sprayers, apply a second coat in a direction approximately at right angles to the direction of the first coat. If pinholes, abrasions, or other discontinuities exist, apply an additional coat to the affected areas within 30 minutes. Respray curing compound to concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied by the method and at the coverage specified above. Respray curing compound to areas where the curing compound is damaged by subsequent construction operations within the curing period immediately. Adequately protect concrete surfaces to which membrane-curing compounds have been applied during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

### 3.8 JOINTS

#### 3.8.1 General Requirements for Joints

Construct joints that conform to the locations and details indicated and are perpendicular to the finished grade of the pavement. Provide joints that are straight and continuous from edge to edge or end to end of the pavement with no abrupt offset and no gradual deviation greater than 1/2 inch. Where any joint fails to meet these tolerances, remove and replace the slabs adjacent to the joint at no additional cost to the Government. Change from the jointing pattern shown on the drawings is not allowed without written approval. Seal joints immediately following curing of the concrete or as soon thereafter as weather conditions permit as specified in Section 32 01 19 FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS.

#### 3.8.2 Longitudinal Construction Joints

Install dowels in the longitudinal construction joints, or thicken the edges as indicated. Install dowels as specified above. After the end of the curing period, saw longitudinal construction joints to provide a groove at the top for sealant conforming to the details and dimensions indicated.

#### 3.8.3 Transverse Construction Joints

Install transverse construction joints at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for 30 minutes or longer. Install the transverse construction joint at a planned transverse joint. Provide transverse construction joints by utilizing headers or by paving through the joint, then full-depth sawcutting the excess concrete. Construct pavement with the paver as close to the header as possible, with the paver run out completely past the header. Provide transverse construction joints at a planned transverse joint constructed as shown or, if not shown otherwise, dowelled in accordance with paragraph DOWELS INSTALLED IN HARDENED CONCRETE, or paragraph FIXED FORM PAVING above.

#### 3.8.4 Expansion Joints

Provide expansion joints where indicated, and about any structures and features that project through or into the pavement, using joint filler of the type, thickness, and width indicated, and installed to form a complete, uniform separation between the structure and the pavement or between two pavements. Attach the filler to the original concrete placement with adhesive and mechanical fasteners and extend the full slab depth. After placement and curing of the adjacent slab, sawcut the sealant reservoir depth from the filler. Tightly fit adjacent sections of filler together, with the filler extending across the full width of the paving lane or other complete distance in order to prevent entrance of concrete into the expansion space. Finish edges of the concrete at the joint face with an edger with a radius of  $1/8$  inch.

#### 3.8.5 Slip Joints

Install slip joints where indicated using the specified materials. Attach preformed joint filler material to the face of the original concrete placement with adhesive and mechanical fasteners. Construct a  $3/4$  inch deep reservoir for joint sealant at the top of the joint. Finish edges of the joint face with an edger with a radius of  $1/8$  inch.

#### 3.8.6 Contraction Joints

Construct transverse and longitudinal contraction joints by sawing an initial groove in the concrete with a  $1/8$  inch blade to the indicated depth. During sawing of joints, and again 24 hours later, the CQC team is required to inspect all exposed lane edges for development of cracks below the saw cut, and immediately report results. If there are more than six consecutive uncracked joints after 48 hours, saw succeeding joints 25 percent deeper than originally indicated at no additional cost to the Government. The time of initial sawing varies depending on existing and anticipated weather conditions and be such as to prevent uncontrolled cracking of the pavement. Commence sawing of the joints as soon as the concrete has hardened sufficiently to permit cutting the concrete without chipping, spalling, or tearing. The sawed faces of joints will be inspected for undercutting or washing of the concrete due to the early sawing, and sawing delayed if undercutting is sufficiently deep to cause structural weakness or excessive roughness in the joint. Continue the sawing operation as required during both day and night regardless of weather conditions. Saw the joints at the required spacing consecutively in the sequence of the concrete placement. Provide adequate lighting for night work. Illumination using vehicle headlights is not permitted. Provide a chalk line or other suitable guide to mark the alignment of the joint. Before sawing a joint, examine the concrete closely for cracks, and do not saw the joint if a crack has occurred near the planned joint location. Discontinue sawing when a crack develops ahead of the saw cut. Immediately after the joint is sawed, thoroughly flush the saw cut and adjacent concrete surface with water and vacuumed until all waste from sawing is removed from the joint and adjacent concrete surface. Respray the surface with curing compound as soon as free water disappears. Take necessary precautions to insure that the concrete is properly protected from damage and cured at sawed joints. Tightly seal the top of the joint opening and the joint groove at exposed edges with cord backer rod before the concrete in the region of the joint is resprayed with curing compound, and be maintained until removed immediately before sawing the joint sealant reservoir. Seal the exposed saw cuts on the faces of pilot lanes with bituminous mastic or masking tape. After expiration of the curing

period, widen the upper portion of the groove by sawing with ganged diamond saw blades to the width and depth indicated for the joint sealer. Center the reservoir over the initial sawcut.

### 3.9 REPAIR, REMOVAL AND REPLACEMENT OF NEWLY CONSTRUCTED SLABS

#### 3.9.1 General Criteria

Repair or remove and replace new pavement slabs that have spalled edges or contain cracks, as specified at no cost to the Government. Removal of partial slabs is not permitted. Remove and replace slabs containing more than 15.0 percent of each of the longitudinal joint edge spalled. Prior to fill-in lane placement, saw full depth to remove the spalled face of pilot lane slabs exceeding this quantity, regardless of spall size. Remove all other slabs as directed. The Government will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores are to be drilled with a minimum diameter of **6 inches**, and be backfilled with an approved non-shrink concrete. Perform drilling of cores and refilling holes at no expense to the Government. Prior to any repairs, submit a [Repair Recommendations Plan](#) detailing areas exceeding the specified limits as well as repair recommendations required to bring these areas within specified tolerances.'

#### 3.9.2 Slabs with Cracks

Clean cracks that do not exceed **2 inches** in depth; then pressure injected full depth with epoxy resin, Type IV, Grade 1. Remove slabs containing cracks deeper than **2 inches**.

#### 3.9.3 Removal and Replacement of Full Slabs

Where it is necessary to remove full slabs, remove in accordance with paragraph REMOVAL OF EXISTING PAVEMENT SLAB below. Remove and replace full depth, by full width of the slab, and the limit of removal normal to the paving lane and extend to each original joint. Install dowels of the size and spacing as specified for other joints in similar pavement by epoxy grouting them into holes drilled into the existing concrete using procedures as specified in paragraph PLACING DOWELS, above. Cut off original damaged dowels flush with the joint face. Paint protruding portions of dowels and lightly oil. Provide dowels for all four edges of the new slab. Place concrete as specified for original construction. Prior to placement of new concrete, recompact and shape the underlying material as specified in the appropriate section of these specifications, and clean the surfaces of all four joint faces of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Take care to prevent any curing compound from contacting dowels or tie bars. Prepare and seal the resulting joints around the new slab as specified for original construction.

#### 3.9.4 Repairing Spalls Along Joints

Repair spalls along joints to be sealed to a depth to restore the full joint-face support prior to placing adjacent pavement. Where directed, repair spalls along joints of new slabs, along edges of adjacent existing concrete, and along parallel cracks by first making a vertical saw cut at least **3 inches** outside the spalled area and to a depth of at least **2 inches**. Provide saw cuts consisting of straight lines forming rectangular areas without sawing beyond the intersecting saw cut. Chip out the concrete



between the saw cut and the joint, or crack, to remove all unsound concrete and into at least **1/2 inch** of visually sound concrete. Thoroughly clean the cavity thus formed with high pressure water jets supplemented with oil-free compressed air to remove all loose material. Immediately before filling the cavity, apply a prime coat to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. Apply the prime coat in a thin coating and scrubbed into the surface with a stiff-bristle brush. Provide prime coat for portland cement repairs consisting of a neat cement grout and for epoxy resin repairs consisting of epoxy resin, Type III, Grade 1. Fill the prepared cavity with: Portland cement concrete or latex modified mortar for larger cavities, those more than **1/3 cubic foot** in size after removal operations; Portland cement mortar for cavities between **0.03 cubic foot** and **1/3 cubic foot**; and epoxy resin mortar or epoxy resin or latex modified mortar for those cavities less than **0.03 cubic foot** in size. Provide portland cement concretes and mortars that consist of very low slump mixtures, **1/2 inch** slump or less, proportioned, mixed, placed, consolidated by tamping, and cured, all as directed. Provide epoxy resin mortars made with Type III, Grade 1, epoxy resin, using proportions and mixing and placing procedures as recommended by the manufacturer and approved. Proprietary patching materials may be used, subject to approval. Place the epoxy resin materials in the cavity in layers with a maximum thickness of **2 inches**. Provide adequate time between placement of additional layers such that the temperature of the epoxy resin material does not exceed **140 degrees F** at any time during hardening. Provide mechanical vibrators and hand tampers to consolidate the concrete or mortar. Remove any repair material on the surrounding surfaces of the existing concrete before it hardens. Where the spalled area abuts a joint, provide an insert or other bond-breaking medium to prevent bond at the joint face. Saw a reservoir for the joint sealant to the dimensions required for other joints. Thoroughly clean the reservoir and then sealed with the sealer specified for the joints. In lieu of sawing, spalls not adjacent to joints and popouts, both less than **6 inches** in maximum dimension, may be prepared by drilling a core **2 inches** in diameter greater than the size of the defect, centered over the defect, and **2 inches** deep or **1/2 inch** into sound concrete, whichever is greater. Repair the core hole as specified above for other spalls.

### 3.9.5 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Diamond grind slabs containing weak surfaces less than **1/4 inch** thick to remove the weak surface. Remove and replace slabs containing weak surfaces greater than **1/4 inch** thick.

### 3.10 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR

Remove existing concrete pavement at locations indicated on the drawings. Prior to commencing pavement removal operations, inventory the pavement distresses (cracks, spalls, and corner breaks) along the pavement edge to remain. After pavement removal, survey the remaining edge again to quantify any damage caused by removal operations. Perform both surveys in the presence of the Government. Perform repairs as indicated and as specified herein. Carefully control all operations to prevent damage to the concrete pavement and to the underlying material to remain in place. Perform all saw cuts perpendicular to the slab surface, forming rectangular areas. Perform all existing concrete pavement repairs prior to paving adjacent lanes.

### 3.10.1 Removal of Existing Pavement Slab

When existing concrete pavement is to be removed and adjacent concrete is to be left in place, perform the first full depth saw cut on the joint between the removal area and adjoining pavement to stay in place with a standard diamond-type concrete saw. Next, perform a full depth saw cut parallel to the joint that is at least 24 inches from the joint and at least 6 inches from the end of any dowels with a wheel saw as specified in paragraph SAWING EQUIPMENT. Remove all pavement beyond this last saw cut in accordance with the approved demolition work plan. Remove all pavement between this last saw cut and the joint line by carefully pulling pieces and blocks away from the joint face with suitable equipment and then picking them up for removal. In lieu of this method, this strip of concrete may be carefully broken up and removed using hand-held jackhammers, 30 lb or less, or other approved light-duty equipment which does not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place. In lieu of the above specified removal method, the slab may be sawcut full depth to divide it into several pieces and each piece lifted out and removed. Use suitable equipment to provide a truly vertical lift, and safe lifting devices used for attachment to the slab.

### 3.10.2 Edge Repair

Protect the edge of existing concrete pavement against which new pavement abuts from damage at all times. Remove and replace slabs which are damaged during construction as directed at no cost to the Government. Repair of previously existing damage areas is considered a subsidiary part of concrete pavement construction. Saw off all exposed keys and keyways full depth.

#### 3.10.2.1 Spall Repair

Not more than 15.0 percent of each slab's edge is allowed to be spalled. Provide a full depth saw cut on the exposed face to remove the spalled face of damaged slabs with spalls exceeding this quantity, regardless of spall size. Provide repair materials and procedures as previously specified in paragraph REPAIRING SPALLS ALONG JOINTS.

#### 3.10.2.2 Underbreak and Underlying Material

Repair all underbreak by removal and replacement of the damaged slabs in accordance with paragraph REMOVAL AND REPLACEMENT OF FULL SLABS above. Protect the underlying material adjacent to the edge of and under the existing pavement which is to remain in place from damage or disturbance during removal operations and until placement of new concrete, and be shaped as shown on the drawings or as directed. Maintain sufficient underlying material in place outside the joint line to completely prevent disturbance of material under the pavement which is to remain in place. Remove and replace any slab with underlying material that is disturbed or loses its compaction.

### 3.11 PAVEMENT PROTECTION

Protect the pavement against all damage prior to final acceptance of the work by the Government. Placement of aggregates, rubble, or other similar construction materials on airfield pavements is not allowed. Exclude traffic from the new pavement by erecting and maintaining barricades and signs until the concrete is at least 14 days old, or for a longer period

if so directed. Take special care in areas where traffic uses or crosses active airfield pavement. Power broom other existing pavements at least daily when traffic operates. For fill-in lanes, provide equipment that does not damage or spall the edges or joints of the previously constructed pavement.

3.12 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL DURING CONSTRUCTION

3.12.1 Testing and Inspection by Contractor

During construction, perform sampling and testing of aggregates, cementitious materials (cement, slag cement, and pozzolan), and concrete to determine compliance with the specifications. Provide facilities and labor as may be necessary for procurement of representative test samples. Furnish sampling platforms and belt templates to obtain representative samples of aggregates from charging belts at the concrete plant. Obtain samples of concrete at the point of delivery to the paver. Testing by the Government in no way relieves the specified testing requirements. Perform the inspection and tests described below, and based upon the results of these inspections and tests, take the action required and submit reports as required. Perform this testing regardless of any other testing performed by the Government, either for pay adjustment purposes or for any other reason.

3.12.2 Testing and Inspection Requirements

Perform CQC sampling, testing, inspection and reporting in accordance with the following Table.

TABLE 6 TESTING AND INSPECTION REQUIREMENTS			
Frequency	Test Method	Control Limit	Corrective Action
<u>Fine Aggregate Gradation and Fineness Modulus</u>			
2 per lot	ASTM C136/C136M sample at belt	9 of 10 tests must vary less than 0.15 from average	Retest, resolve, retest
		Outside limits on any sieve	Retest
		2nd gradation failure	Stop, resolve, retest
1 per 10 gradations	ASTM C117	Outside limits on any sieve	Retest
		2nd gradation failure	Stop, repair, retest
<u>Coarse Aggregate Gradation (each aggregate size)</u>			
2 per lot	ASTM C136/C136M sample at belt	Outside limits on any sieve	Retest
		2nd gradation failure	report to COR, correct
		2 consecutive averages of 5 tests outside limits	report to COR, stop ops, repair, retest

TABLE 6 TESTING AND INSPECTION REQUIREMENTS			
Frequency	Test Method	Control Limit	Corrective Action
1 per 10 gradations	ASTM C117	Outside limits on any sieve	Retest
		2nd gradation failure	report to COR, correct
		2 consecutive averages of 5 tests outside limits	report to COR, stop ops, repair, reverify all operations
<u>Workability Factor and Coarseness Factor Computation</u>			
Same as C.A. and F.A.	see paragraph AGGREGATES	Use individual C.A. and F.A. gradations. Combine using batch ticket percentages. Tolerances: plus or minus 3 points on WF; plus or minus 5 points on CF from approved adjusted mix design values	Check batching tolerances, recalibrate scales
		2 consecutive averages of 5 tests outside limits	report to COR, stop ops, retest
<u>Aggregate Deleterious, Quality, and ASR Tests</u>			
First test no later than time of uniformity testing and then every 30 days of concrete production	see paragraph AGGREGATES		Stop production, retest, replace aggregate. Increase testing interval to 90 days if previous 2 tests pass
<u>Plant - Scales, Weighing Accuracy</u>			
Monthly	NRMCA QC 3		Stop plant ops, repair, recalibrate
<u>Plant - Batching and Recording Accuracy</u>			
Weekly	Record/Report	Record required/recorded/actual batch mass	Stop plant ops, repair, recalibrate
<u>Plant - Batch Plant Control</u>			
Every lot	Record/Report		Record type and amount of each material per lot
<u>Plant - Mixer Uniformity - Stationary Mixers</u>			

TABLE 6 TESTING AND INSPECTION REQUIREMENTS			
Frequency	Test Method	Control Limit	Corrective Action
Every 4 months during paving	COE CRD-C 55	After initial approval, use abbreviated method	Increase mixing time, change batching sequence, reduce batch size to bring into compliance. Retest
<u>Plant - Mixer Uniformity - Truck Mixers</u>			
Every 4 months during paving	ASTM C94/C94M	Random selection of truck.	Increase mixing time, change batching sequence, reduce batch size to bring into compliance. Retest
<u>Concrete Mixture - Air Content</u>			
When test specimens prepared plus 2 random	ASTM C231/C231M sample at point of discharge within the paving lane	Individual test control chart: Warning plus or minus 1.0	Adjust AEA, retest
		Individual test control chart: Action plus or minus 1.5	Halt operations, repair, retest
		Range between 2 consecutive tests: Warning plus 2.0	Recalibrate AEA dispenser
		Range between 2 consecutive tests: Action plus 3.0	Halt operations, repair, retest
<u>Concrete Mixture - Unit Weight and Yield</u>			
Same as Air Content	ASTM C138/C138M sample at point of discharge within the paving lane	Individual test basis: Warning Yield minus 0 or plus 1 percent	Check batching tolerances
		Individual test basis: Action Yield minus 0 or plus 5 percent	Halt operations
<u>Concrete Mixture - Slump</u>			
When test specimens prepared plus 4 random	ASTM C143/C143M sample at point of discharge within the paving lane	Individual test control chart: Upper Warning minus 1/2 inch below max	Adjust batch masses within max W/C ratio
		Individual test control chart: Upper Action at maximum allowable slump	Stop operations, adjust, retest
		Range between each consecutive test: 1-1/2 inches	Stop operations, repair, retest
<u>Concrete Mixture - Temperature</u>			

TABLE 6 TESTING AND INSPECTION REQUIREMENTS			
Frequency	Test Method	Control Limit	Corrective Action
When test specimens prepared	ASTM C1064/C1064M sample at point of discharge within the paving lane	See paragraph WEATHER LIMITATIONS	
<u>Concrete Mixture - Strength</u>			
8 per lot	ASTM C31/C31M sample at point of discharge within the paving lane	See paragraph CONCRETE STRENGTH TESTING for CQC Perform fabrication of strength specimens and initial cure outside the paving lane and within 1,000 feet of the sampling point.	
<u>Paving - Inspection Before Paving</u>			
Prior to each paving operation	Report	Inspect underlying materials, construction joint faces, forms, reinforcing, dowels, and embedded items	
<u>Paving - Inspection During Paving</u>			
During paving operation		Monitor and control paving operation, including placement, consolidation, finishing, texturing, curing, and joint sawing.	
<u>Paving - Vibrators</u>			
Weekly during paving	COE CRD-C 521	Test frequency (in concrete), and amplitude (in air), average measurement at tip and head.	Repair or replace defective vibrators.
<u>Moist Curing</u>			
2 per lot, min 4 per day	Visual		Repair defects, extend curing by 1 day
<u>Membrane Compound Curing</u>			
Daily	Visual	Calculate coverage based on quantity/area	Respray areas where coverage defective. Recalibrate equipment
<u>Cold Weather Protection</u>			

TABLE 6 TESTING AND INSPECTION REQUIREMENTS			
Frequency	Test Method	Control Limit	Corrective Action
Once per day	Visual		Repair defects, report conditions to COR

3.12.3 Concrete Strength Testing for CQC

Perform Contractor Quality Control operations for concrete strength consisting of the following steps:

- a. Take samples for strength tests at the paving site. Fabricate and cure test beams in accordance with ASTM C31/C31M; test them in accordance with ASTM C78/C78M.
- b. Fabricate and cure 2 test beams per subplot from the same batch or truckload and at the same time acceptance beams are fabricated and test them for flexural strength at 7-day age.
- c. Average all 8 flexural tests per lot. Convert this average 7-day flexural strength per lot to equivalent 28-day flexural strength using the Correlation Ratio determined during mixture proportioning studies.
- d. Compare the equivalent 28-day flexural strength from the conversion to the Average Flexural Strength Required for Mixtures from paragraph of same title.
- e. If the equivalent average 28-day strength for the lot is below the Average Flexural Strength Required for Mixtures by 69 psi flexural strength or more, at any time, adjust the mixture to increase the strength, as approved.
- f. Maintain up-to-date control charts for strength, showing the 7-day CQC flexural strength and the 28-day flexural strength (from acceptance tests) of each of these for each lot.

3.12.4 Reports

Report all results of tests or inspections conducted informally as they are completed and in writing daily. Prepare a weekly report for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, make daily reports of pertinent temperatures. These requirements do not relieve the obligation to report certain failures immediately as required in preceding paragraphs. Confirm such reports of failures and the action taken in writing in the routine reports. The Government has the right to examine all Contractor quality control records.

-- End of Section --

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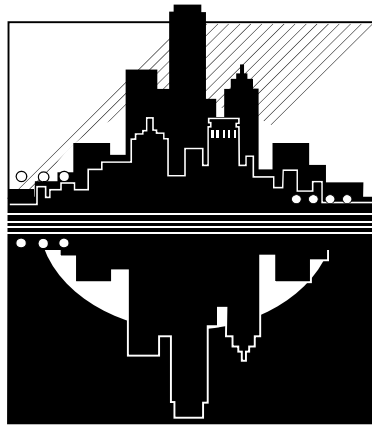


## **APPENDIX A**

**Construction Contractor's Guide  
434<sup>th</sup> Operational  
Contracting Office  
22 Feb 2012**

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# CONSTRUCTION CONTRACTOR'S GUIDE



**434<sup>th</sup> Operational Contracting Office  
1900 W. Mustang Avenue  
Grissom ARB IN 46971  
Telephone 765-688-3101  
Fax 765-688-2803**

**22 February 2012**

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**PART I  
GENERAL INFORMATION**

**1. FUNCTION AND AUTHORITY OF GOVERNMENT PERSONNEL**

a. **CHANGES.** As stated in the Changes Clause of the contract, only a duly appointed Air Force Contracting Officer has the authority to obligate the Government in contractual matters. **The Contracting Officer is the only person with the authority to direct any changes in the contract and his/her signature will be on all contractual documents.** In no event shall any understanding or agreement between the Contractor and any Government employee other than the Contracting Officer on any contract, modification, change order, letter or verbal direction to the Contractor be effective or binding upon the Government. All such actions must be formalized by a proper contractual document executed by an appointed Contracting Officer. The Contractor is hereby put on notice that in the event a Government employee other the Contracting Officer directs a change in the work to be performed or increases the scope of the work to be performed, it is the Contractor's responsibility to make inquiry of the Contracting Officer before making the deviation. Payments will not be made without being authorized by an appointed Contracting Officer with the legal authority to bind the Government.

b. Your regular point of contact on the job-site will be the Civil Engineer Contract Inspector. This individual is the technical representative for the Contracting Officer. Typical matters on which they will represent the Contracting Officer include compliance with plans and specifications, and participation in final inspection and acceptance. You are advised that Contract Inspectors **DO NOT** have the authority to commit the Government to changes in contract price, changes in the scope of work, or time extensions associated with changes in work. The Inspector assigned to your contract is:

c. A Contract Administrator will be assigned by the Contracting Officer to accomplish the actual administration of your contract. **All documentation submitted or any written questions you may have concerning the contract,** should first be presented to the Contract Administrator.

**2. SUPERINTENDENCE BY CONTRACTOR**

During performance of your construction contract and until the work is completed and accepted, you will be required to have a competent superintendent present at the job-site at all times work is being performed. This individual's name must be designated in writing to the Contracting Officer. He/she may also serve in the capacity of a quality control person if also designated in writing. Under no circumstances will this individual be a sub-contractor. (See Attachment 001)

**3. PROGRESS SCHEDULE/REPORTS**

a. The provisions of your contract require you, the contractor, to prepare and submit to the Contracting Officer, for approval, an AF Form 3064, Contract Progress Schedule (see Attachment 002), **within 7 days after receipt of the Notice to Proceed,** indicating the elements of work and their progression throughout the contract. **No work will be permitted until the schedule has been received.** The schedule shall be submitted in triplicate and shall be in accordance with the instructions on the reverse of the form. After approval, a copy of the

schedule will be forwarded to you. Incorrect schedules will be returned for prompt correction and resubmitted.

b. The contractor shall, thereafter submit a monthly AF Form 3065, Contract Progress Report to indicate the percentage of work completed for each element of work specified on your approved schedule (see Attachment 003). Negative reports are required. Since the Contract Inspector also submits a report, the contractor should coordinate the percentage of progress completed with the inspector. An additional line for "cost modification" may be required. Contractor is to add additional line or lines and indicate the the contract modification number.

c. Failure to submit the schedule and reports within the time required or failure to maintain progress in accordance with your progress schedule may result in withholding of payment and/or other action as deemed appropriate by the Contracting Officer.

#### **4. MATERIAL SUBMITTALS**

a. The contract specifications may require that materials be submitted for approval prior to starting the work. Material Submittal Registers (EMG form 4288) have been incorporated into the specifications, which indicate the required submittals and the specific reference that establishes the requirement. Using the Submittal Registers provided, the contractor shall complete columns s, t, and u, entitled "Contractor's Schedule Dates", with the date the contractor intends to provide each required submission. **The schedule must be submitted to the Contracting Officer not later than 7 calendar days after receipt of the Notice to Proceed.** In determining the intended submission dates, consideration shall be given to the following: (1) The Government anticipates the submittal review and approval/disapproval process may take up to 14 calendar days for each submittal; and, (2) Intended submission dates must be compatible with the work elements and progression on the Progress Schedule.

b. All submittals must be submitted using AF Form 3000, Material Approval Submittal. Submit an original AF Form 3000 and three (3) copies with applicable attachments. Each submittal must include project number, title, and paragraph under which it is submitted. Catalog cuts shall be clearly marked to indicate the type, model, style, capacity, and all other pertinent data.

c. After approval of your Submittal Register, any submittals that require changes must be submitted on an AF Form 3000 with the requested change (i.e. date to be submitted change, not applicable to project, etc.)

#### **5. INSPECTIONS**

a. Daily inspections will be conducted by the Contract Inspector for compliance with the contract specifications and drawings. As previously stated, you are expected to know and adhere to the contract documents.

b. The contractor shall be subject to no-notice inspections under OSHA (Occupational Safety and Health Act) and the local Safety Office.

c. Final inspection and acceptance will normally be conducted jointly by the Contract Inspector and a representative from the Contracting Office. You must request a final inspection, in writing, at least ten (10) days in advance. All punch list items must be completed prior to final acceptance of the project.

## **6. CHANGES - AUTHORIZED ONLY BY THE CONTRACTING OFFICER**

Any change to the contract will be in writing as a Modification to the contract and accomplished on a Standard Form 30. In the event a change should result in the increase or decrease of the total price of the contract, the Contracting Officer will request the Contractor to submit a Construction Cost Breakdown (See Attachment 012, CB-01). It is the Government's objective to pay a fair and reasonable market value for any changes required. Contractor costs are thoroughly scrutinized, therefore submit your proposal in sufficient detail for the Government to evaluate all items of proposed cost. Formal or informal negotiations will be accomplished prior to a modification being written to incorporate contract changes.

## **7. CLEAN UP**

The Contractor shall at all times keep the work area, including storage areas, free from accumulation of waste materials. Upon completing the work, the Contractor shall leave the work area in a clean, neat and orderly condition.

## **8. GOVERNMENT PROPERTY OTHER THAN GOVERNMENT FURNISHED PROPERTY**

The Contractor is responsible for any loss, destruction of, or damage to Government property. Also, the contractor assumes the risk of protecting vegetation at or adjacent to the work site.

## **9. OPERATION OF STORAGE AREAS**

a. The Contracting Officer's Representative may designate an area at or near the job-site where the Contractor may store materials. Any temporary fencing and security requirements must be furnished and removed at the completion of the project by the contractor.

b. The erection and removal of temporary buildings in the area designated by the Contracting Officer will be the responsibility of the Contractor. The contractor will be responsible to restore the area to its former condition upon removal of any temporary structure.

c. Roadways/haul routes to and from the temporary storage area or structure, if not existing, will be designated by the Contracting Officer's Representative. The designated roadway will be the only access used and will be restored, within reason, to its original condition, after such use.

d. The Contracting Officer's Representative will designate areas where heavy equipment will be parked overnight.

## **10. SAFETY**

a. General - While performing your work on the contract, the job-site will be subject to visits by representatives of the 434<sup>th</sup> ARW Safety Office and Construction Management Office. Their primary interests in contractor safety focuses on (1) protecting government facilities and employees from hazards posed by contractor's that might adversely affect government personnel, equipment, facilities, or mission and (2) protecting the general public in regards to job-site hazards (e.g. barriers around trenches). If a potential hazard is noted, these government employees will notify the Contracting Officer of the hazards, who will then submit a letter in regards to the hazard. If a known imminent danger to government employees, the general public, government property, or to contractor's employees working on the job-site is noted, the contractor may be notified directly by those government personnel of the imminent danger. A company safety plan for the job-site must be in place prior to the start of work aboard Grissom ARB.

b. Job-Site Hazards - Areas such as ditches, trenches, and holes that are dug create a hazard to personal and are required to be guarded and illuminated during hours of darkness. Every effort must be made to prevent injuries and protect property from damage.

c. Mishap Reporting - The Contracting Office, Telephone 765-688-3101, must be notified of any mishap involving personnel, equipment or property. The Contract Administrator will in turn notify the proper personnel.

## **11. PASSES FOR EMPLOYEES AND VEHICLES**

Requests for employee passes will be obtained from the Contracting Office. A complete list of all employees working on the job must be submitted to the Contracting Officer a minimum of 5 working days before workers arrive. This will allow sufficient time to process the list. The EAL listing is required for the prime contractor employees as well as the sub-contractor's employees. The listing must be updated when employee changes are made. These passes will run through the contract completion date. Vehicle and employee admittance shall be accomplished by Security Forces at the main gate upon approval of the EAL. Attachments 013 and 014 provide the format required for preparing your EAL list of employees requiring entry authorization and for any changes. All EALs with the background release will be e-mailed to the Contracting Officer and Contracting Specialist.

For material deliveries to the job site where a background check could not be performed since the name of the driver is not known until dispatched, government personnel will not escort the delivery vehicle to the job site. It is the contractor's responsibility for escorting the driver to the work site from the main gate and then remain with the driver at all times up to the point the driver exits the main gate. Contractor is responsible to identify those personnel to the Contracting Office that will be able to escort by submitting a letter. Escorts will receive an escort badge and training through SFS. A contractor's escort badge can be confiscated for a security violation, such as abandoning the delivery driver.



**Note:** All trucks requiring entrance to the Base are subject to inspection at the truck inspection facility.

## **12. WELDING PERMIT**

No welding will be permitted without obtaining a permit issued by the Base Fire Department, located at Building 474, Telephone 765-688-3353.

## **13. CONSTRUCTION/DIGGING PERMIT.**

A properly approved and coordinated construction permit (AF Form 103), shall be obtained by the contractor prior to any excavation activities. Contact Civil Engineering, Construction Management Office located at Building 641, Telephone 765-688-4565 or 4564, with any questions.

## **14. RESIDUAL MATERIAL.**

All residual materials generated as a direct result of this contract shall become the property of the contractor unless otherwise addressed in the contract. The contractor agrees to remove all such residual materials from the construction site before the completion date in the contract.

# **PART II MISCELLANEOUS INFORMATION**

## **1. GOVERNMENT FURNISHED PROPERTY**

Government Property is not normally furnished for Contractor use. The Contractor shall have a system to manage (control, use, preserve, protect, repair and maintain) any and all Government property in its possession. The Contractor's responsibility extends from the initial acquisition and receipt of property, through stewardship, custody, and use until formally relieved of responsibility by authorized means, including its vendors or subcontractors.

*Use of Government property.* The Contractor shall use Government property, either furnished or acquired under this contract, only for performing this contract, unless otherwise provided for in this contract or approved by the Contracting Officer. The Contractor shall not modify, cannibalize, or make alterations to Government property unless this contract specifically identifies the modifications, alterations or improvements as work to be performed.

*Title to Government property.* The Government shall retain title to all Government-furnished property.

*Receipt of Government Property.* The Contractor shall receive Government property (document the receipt); record the information necessary to meet the record requirements. The Contractor shall furnish a written statement to the Property Administrator containing all relevant facts, such as cause or condition and a recommended course(s) of action, if overages, shortages,

or damages and/or other discrepancies are discovered upon receipt of Government-furnished property.

*Reports.* The Contractor shall provide written reports of discrepancies; loss, damage, destruction, or theft; physical inventory results; audits and self-assessments; corrective actions; and other property related reports as directed by the Contracting Officer.

*Relief of stewardship responsibility.* Unless the contract provides otherwise, the Contractor shall be relieved of stewardship responsibility for Government property when such property is—Consumed or expended, reasonably and properly, or otherwise accounted for, in the performance of the contract or a Property Administrator granted relief of responsibility for loss, damage, destruction or theft of Government property; disposed of in accordance with the contract.

*Maintenance.* The Contractor shall properly maintain Government property.

*Contractor Liability for Government Property.* The Contractor may be liable for loss, damage, destruction, or theft to the Government property furnished or acquired under this contract.

## **2. APPROVAL OF SUBCONTRACTORS**

The Contractor shall submit a Proposed Sub-Contractor List to the Contracting Officer for approval (see Attachment 005) **within 14 calendar days after award of the contract**. In addition, a Standard Form 1413, Statement and Acknowledgment (see Attachment 006) must be submitted to the Contracting Officer for each sub-contractor at any tier before they can commence work on the job site. If a change in subcontractors is required, a new Proposed Sub-Contractor List and a Standard Form 1413, Statement and **Acknowledgement must be submitted within 14 days after the subcontract is awarded** and must be received before that subcontractor can begin work.

## **3. PAYROLLS AND PAYMENTS**

The contract clauses specify that the Government may make progress payments as the work proceeds and that in making such partial payments, there may be retained an amount of 10% of the estimated amount until final completion and acceptance of the work. In the event the Contractor has failed to submit necessary payrolls (correctly), progress schedules, progress reports and other submittal requirements under the contract, payment may be withheld to protect the interests of the Government.

a. Submission of Payrolls - Payrolls and Statements of Compliance shall be submitted within seven (7) calendar days after the regular payment date of the payroll week covered for the prime contractor and each subcontractor. Payrolls may be submitted on your present payroll forms provided it contains the data required by FAR 52.222-8 along with a DD form 879, Statement of Compliance (see Attachment 007). Payrolls may be submitted on Form WH-347 that has the Statement of Compliance on the reverse side, eliminating the need for the DD Form

879. In either case, the Statement of Compliance must be an **original** document and the signature on the form must be an **original** signature. Payrolls shall include all information required in FAR 52.222-8. Payrolls are not to include the works home address or entire SSN, however a unique identify number is required for each worker. **Payroll submissions are not required for weeks in which no DBA work is performed but the first payroll following such week(s) should state “No work performed since [date].” Final payrolls are to be marked as “final”.**

**NOTE: Apprentices:** If there are apprentices working on the project: Payrolls shall indicate apprentice. Documentation will need to be provided from the appropriate agency for each apprentice stating at what percent they are complete of their apprenticeship program with that agency; submit documentation of the ratio of journeymen to apprentices allowed per that program. Also, documentation on each apprentice indicating the individual is registered in a bona fide apprenticeship program registered with the U.S. Dept of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer, and Labor Services (OATELS) or the State Apprenticeship Agency recognized by the OATELS.

**All apprentice paperwork shall be submitted to the contracting office prior to the apprentice working on site and shall be renewed every 90 days of the contract.**

b. Submission of Invoices - All invoices shall be submitted using Wide Area Work Flow (WAWF). The invoice format (see attachment 009) may be used as an attachment in WAWF. The extra invoice sample is provided for cost modifications.

c. Release of Claims - Final payment is dependent upon the acceptance of the work performed under the contract. Final payment will be made upon final inspection, (100% work completed), receipt of all progress reports, payrolls, submittals, and the signed Release of Claims (see Attachment 009).

#### **4. UTILITIES**

The Government normally furnishes utilities for use by the contractor on an as needed basis. In those instances where utilities are not readily available, a determination by the Contracting Officer shall be made delineating what action will be taken. Temporary utility connections, if required, will be arranged with Construction Management located at Building 641, Telephone 765-688-4565 or 4564.

#### **5. WARRANTIES AND OPERATIONS MANUALS**

The contractor shall obtain and furnish to the Government, all warranties and operating manuals prescribed by the contract and required in normal commercial practice.

**PART III**  
**OTHER TOPICS**

**1. VALUE ENGINEERING (VE)**

a. Value Engineering Change Proposals (VECP) is a proposed change that, if accepted and implemented, provides an eventual overall cost saving to the Government. This is accomplished by a systematic and creative effort that analyzes the function of items or systems to ensure the required function is achieved at the lowest possible overall cost.

b. The objective of the Value Engineering (VE) Program is to motivate you to practice VE and to exercise the provision in your contract by submitting VECP's. The incentive is the monetary amount you receive from a share of the cost savings resulting from VE changes.

c. The end result of a successful contractual VE is an improved profit structure for the contractor with minimum expenditure of tax dollars.

**2. CONTRACTOR QUALITY CONTROL INSPECTION SYSTEM**

a. A daily report of all actions performed during your entire contract is required to be documented on a daily basis by the clause entitled "Contractor Inspection System" (FAR Part 52.246-1).

b. The following should be included in your report, but is not all-inclusive.

- (1) Inspection of equipment and materials when received at the job-site.
- (2) Inspection of any deficiencies discovered during the day and corrective actions taken.
- (3) Inspection and acceptance of subcontractor materials and workmanship.
- (4) Work performed during the day.
- (5) Concerns/anticipated problem areas.

c. This report is required to be kept on the job-site and available for review at all times. (See Attachment 010) Your contract requires submission of daily reports to be delivered to the Contracting Officer in duplicate and arrive within 24 hours of the previous report day.

**3. INSURANCE**

a. In accordance with the provisions of the solicitation you are required to certify that you have obtained or will obtain the insurance required by FAR 52.228-5. You are required to maintain this insurance during the performance of the entire contract, and submit the original certification (see Attachment 011) to the Contracting Officer prior to starting work.

b. You are required to include the clause at FAR 52.228-5 in any subcontracts under your contract.

c. You are also required to maintain a copy of all subcontractors' insurance certificates and shall make these copies available to the Contracting Officer upon request.

#### **4. WELFARE-TO-WORK-INITIATIVE**

DOD is taking an active role in the President's Welfare-to-Work Program. Honoring his pledge to "end welfare as we know it," President Clinton signed the historic welfare reform bill. The focal point to this legislation is the requirement for welfare recipients to find gainful employment. An important aspect of the plan concerns the role our contractors can play in providing jobs for welfare recipients. While your participation in this program is optional, and there are no quotas or requirements, it is important that you support this initiative.

#### **5. LABOR STANDARDS REQUIREMENTS**

The labor standards requirements for the construction contract, which you have been awarded, are based on the following statutes and regulations:

##### **a. Davis-Bacon Act**

(1) All mechanics and laborers (those workers and working foremen who work with their hands or with tools and equipment, whether employed by a prime contractor or by a subcontractor) employed or working directly on the job site will be paid not less than once a week. Each worker shall be paid not less than the hourly rate shown for the classification in the wage determination. Working foremen who devote more than 20 percent of their time during a workweek performing duties of a laborer or mechanic are considered hourly employees and not managers.

(2) Fringe benefit payments will be paid in the amount in the wage determination. They may be paid by making payment in cash or by making payment to an approved fund, plan, or program.

(3) Whenever any laborer or mechanic is to be employed in a classification not listed in the wage determination, you are required to submit a completed Standard Form 1444, Request for Authorization of Additional Classification and Rate, to the Contracting Officer for recommended approval by the Department of Labor. Conformance should be initiated within 30 days of using any unlisted classification. The Standard Form 1444 must be signed by an employee working in the classification. Upon approval, the additional classification and rate shall be posted with the wage determination on the job site.

(4) The wage determination and the Davis-Bacon poster (WH-1321) shall be posted by the contractor and subcontractors at the job site in a prominent and accessible place where the workers can see them.

(5) Violation of any part of this Act may result in the termination of your right to proceed with the work.

**b. Contract Work Hours and Safety Standards Act - Overtime Compensation:**

(1) Any laborer or mechanic doing any part of the work contemplated by this contract who is required or permitted to work more than forty (40) hours in any work week, shall be compensated for such overtime hours at a rate not less than one and one half times his basic hourly rate of pay.

(2) Violations of the provisions set forth in this provision shall result in you or any tier subcontractor being liable to the affected employee for any amounts due, and to the Government liquidated damages in the amount of \$10.00 for each calendar day each employee is permitted to work in violation of the provision.

**c. Copeland ("Anti-Kickback") Act:**

(1) No laborer or mechanic will be forced, intimidated, threatened by dismissal from employment, or induced by any other manner to give you any part of the compensation to which he/she is entitled.

(2) Violation of this Act could result in the violator being fined not more than \$5,000.00 or imprisoned for not more than five (5) years, or both.

**d. Apprentices:**

(1) Apprentices will be permitted to work as such only when they are registered, individually, under an apprenticeship program recognized by or registered with the Department of Labor.

(2) Prior to using any apprentices to work on this contract, you must submit to the Contracting Officer a "Davis Bacon Certification". This certification is available upon written request to the Department of Labor, Bureau of Apprenticeship Training, 46 East Ohio Street, Indianapolis, IN 46204; telephone 317-226-7001, FAX 317-226-7015. In addition, you must submit proof of the percentage of the basic rate to be paid for each apprentice. This can be obtained through the applicable union office location.

**e. Payrolls and Basic Records:**

(1) You are required to maintain during the course of work and for a period of three (3) years thereafter all payrolls and basic records for all laborers and mechanics working on this contract.

(2) These records will be made available for inspection by authorized representatives of the Contracting Officer and the Department of Labor. You are also required to permit these representatives to interview your employees during working hours on the job.

f. Parts 3 and 5 of the Secretary of Labor's Regulations (Parts 3 and 5, Subtitle A, Title 29, Code of Federal Regulations).

**g. Equal Opportunity:**

(1) In connection with the performance of work under this contract, discrimination against any employee or applicant for employment because of race, sex, religion, color, or national origin is prohibited. The aforesaid provision shall include, but not be limited to the following:

(2) Employment upgrading, demotion, or transfer; recruitment or recruitment advertising; lay-off or termination; rates of pay or other form of compensation; selection for training, including apprenticeship.

(3) Posters regarding the above will be supplied to you. Such posters must be posted in conspicuous places at the job site, available to employees and applicants for employment.

(4) Compliance with the intent and requirements of these labor standards provisions will be observed during site visits to the job-site by personnel of the Contracting Office or the Department of Labor. If you have any questions concerning labor standard requirements, contact the Contracting Officer.

**6. LABOR ORGANIZATIONS**

a. It is the desire of the United States Air Force that Contractors cooperate to the fullest extent possible with Federal and State Agencies responsible for enforcing labor requirements. Contractors must insure that such labor standards provisions will be included in all subcontracts.

b. It is imperative that labor difficulties not impede the work. The Contracting Officer will not interfere in the relationship between a contractor, association of contractors and representatives of labor organizations, nor act as a third party in such negotiations. However, the Contracting Officer must be kept immediately informed of any situations involving a work stoppage, or a threatened work stoppage. You are responsible for providing immediate information, by whatever method is most expeditious and practical, of any conditions arising under your contract or your subcontracts, which might be a source of labor, difficulties.

c. It is the policy at Grissom Air Reserve Base to admit labor organization representatives to the Base so long as the agents' entry, presence or activity does not interfere with Base Operations, work progress or violate applicable safety and security regulations. This office will permit representatives of labor organizations to conduct any necessary visits to Contractors or his representatives, or union stewards to discuss and review conditions of employment, grievances and related matters within the terms of the collective bargaining agreements involving employees. The labor representative must have written permission to enter the Base to conduct union business. This individual must report to the Contracting Office to obtain a Request for Base Pass. If the representative does not have permission to enter the Base or is in violation of his/her intended visit, the Contractor shall immediately notify the DOD Police at 765-688-3385

and advise them of the representative's unauthorized presence. The labor representative will in no way be allowed to solicit members or organize while on Base.



# **SAMPLES OF AIR FORCE CONTRACT FORMS AND OTHER DOCUMENTS**



*Get a Jump on the Paperwork . . . . .*

FROM:

TO: 434<sup>th</sup> Operational Contracting  
Attn: Contracting Officer  
1900 W. Mustang Avenue  
Grissom ARB IN 46971-5320

Contract Number: \_\_\_\_\_

Project Title: \_\_\_\_\_

This is to advise that the project superintendent for subject contract will be:

\_\_\_\_\_  
FULL NAME

This individual has authority to act for the contractor in all matters except:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
(Signature of Company Official)

\_\_\_\_\_  
(Typed Name and Title)

Date \_\_\_\_\_



## INSTRUCTIONS TO CONTRACTORS

1 Prepare three copies of AF Form 3064, in accordance with these instructions and submits to the contracting officer at the time stated in the contract or as established by the contracting officer.

2 Block 1, 2 and 3, Enter the contract number, starting date, and completion date shown on the contract

3 Block 8; enter the title of the project shown on the contract.

4 Block 9, Enter name and address of your firm. The three copies submitted to the contracting officer must be date and signed by the contractor or an authorized representative of the firm.

5 Lines 1 through 16, Major elements of work (whether unit price or lump sum contract) such as excavation, concrete work, carpentry, engineering, installation of communication facility, etc., will show in Column B in logical sequence and in sufficient detail to identify the element.

6. The percentage of each listed work element to the complete job will be shown opposite each element in Column C. As an example, if 3 work elements are show: excavation, concrete work, and backfill, and it is estimated the excavation is 50% of the total job, concrete 30%, and backfill 20%, these percentages will be shown opposite each element The total must equal 100%.

7 Columns D through Q will be used to show planned periodic progress, as required by the contracting officer during the period of the contract. Only contractors will use the top half of the space under these columns. Using the example cited above and assuming that the contact period to perform is 8 weeks, and it is planned to accomplish 10% of the excavation work the 1st week and 20% each week until excavation is complete, 10 would be shown in the upper half of Line 1 under Column D 20 under Column E and 20 under Column F for a total of 50%. If it were planned to accomplish the concrete work during the 4th, 5th, and 6th weeks in equal amounts, 10 would be entered under Column G, H, and I on Line 2. Assuming the backfill will be accomplished during the 7th and 8th weeks, 10 would be entered under Column J and K on Line 3. If the contract extends beyond 14 weeks additional copies of AF Form 3064, with appropriate alterations, may be spliced on as a continuation of performance.

8. Total amount of work planned at intervals as shown in Columns D through Q will be totaled and entered in the top half of the space under the appropriate column on Line 16. Again under the example cited above the totals under Columns D through K would read 10, 20, 20, 10, 10, 10, 10, and 10, for a total of 100%. These totals will be used to plot an overlay graph using Lines 6 through 15, beginning with Column D and extending to the right that number of columns (weeks) authorized by the contract for performance time.

9. Beginning at the lower left corner Line 15 Column D the graph will be plotted using a broken or dotted line showing the cumulative total progress for planned intervals. Again using the example cited above the dotted line would for the 1st week extend from Line 15 to Line 14 under Column D for 10%. The second week the dotted line would extend from line 14 to Line 12 under Column E for 20%, making a cumulative total of 30%. The dotted line should end (100%) at the intersection of Line 5 and Column K.

10. In the event the contract is modified by the contracting officer under terms of the contract, changing the progress of work as originally scheduled, adding or deleting work or changing the original completion date, a revised progress schedule will be prepared and submitted to the contracting officer for approval. In preparing the revised schedule the amount of work completed will be considered, together with the changed new completion date set forth in the contract modification. Considering these factors the work under the contract will be rescheduled over the new total performance time in the same manner that the original schedule was prepared. The new completion date will be entered in Block 3. "First Revised Schedule"" Second Revised Schedule" etc. will be entered immediately underneath the form title. The contracting officer will determine time of submission of the revised schedule.

11. At such intervals as may be established by the contacting officer the contractor will submit to the contracting officer AF Form 3065. "Contract Progress Report" indicating the percentage of work accomplished for each work element during the established reporting period Accurate reports are of the utmost importance to the contractor and to the Government since the percentage of completion of progress, thus reported is used in administration of the contract and may be used in connection with approval of partial payments under the contract. Care should be taken to plan the work in such manner that it can be accomplished as stated in this schedule. If for any reason it becomes known that any part of the progress under this contract will be delayed this fact should be reported to the contracting officer immediately





DATE: \_\_\_\_\_

SUBJECT: PROPOSED SUB-CONTRACTORS FOR CONTRACT NR: \_\_\_\_\_

TO: 434th Operational Contracting  
1900 W. Mustang Avenue  
Grissom ARB IN 46971-5320

1. The following list of sub-contractors is submitted for your consideration and approval. This is a complete list of sub-contractors that will be performing work on the job site under the terms of the above referenced contract. I understand that I will be required to submit, or cause to be submitted, complete payroll records each week for my own firm and for each sub-contractor listed below, or written evidence that the particular firm(s) performed no work during such week. (If no sub-contracting, indicate "NONE" below).

<u>NAME AND ADDRESS OF SUB-CONTRACTORS</u>	<u>TYPE OF WORK</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

2. I certify that all applicable labor laws have been brought to the attention of the above listed sub-contractors. The required statements by each sub-contractor will be provided prior to their start of work under the contract. This form does not waive the requirement for the Standard Form 1413, Statement and Acknowledgment of Subcontractors.

\_\_\_\_\_  
(Signature - Contractor Name)

DATE: \_\_\_\_\_

1st Endorsement

The above referenced sub-contractors are approved for use with the above referenced contract, with the following exceptions: \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Signature - Contracting Officer

**STATEMENT AND ACKNOWLEDGMENT**

FORM APPROVED  
OMB NO.  
**3090-0119**

**PART I - STATEMENT OF PRIME CONTRACTOR**

1. PRIME CONTRACT NO.	2. DATE SUBCONTRACT AWARDED	3. SUBCONTRACT NUMBER
-----------------------	-----------------------------------	-----------------------

4. PRIME CONTRACTOR (Name, address and ZIP code)	5. SUBCONTRACTOR (Name, Address and ZIP Code)
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6. The prime contractor states that under the contract shown in Item 1, a subcontract was awarded on date shown in Item 2 by {Name of Awarding Firm) \_\_\_\_\_  
 \_\_\_\_\_ to the subcontractor identified in Item 5, for the following work:

7. PROJECT	8. LOCATION Grissom ARB IN	
9. NAME AND TITLE OF PERSON SIGNING	10. BY (Signature)	11. DATE SIGNED

**PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR**

12. The subcontractor acknowledges that the following clauses of the contract shown in Item 1 are included in this subcontract:

- |   |   |
|---|---|
| Contract Work Hours and Safety Standards Act—Overtime Compensation—Construction Payrolls and Basic Records Withholding of Funds | Davis-Bacon Act Apprentices and Trainees Compliance with Copeland Regulations Subcontracts Contract Termination-Debarment |
|---|---|

13. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY

14. NAME AND TITLE OF PERSON SIGNING	10. BY (Signature)	11. DATE SIGNED
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**STATEMENT OF COMPLIANCE**

Form Approved  
OMB No. 1215-0149  
Expires Aug 31, 1994

Public reporting burden for this collection of information is estimated to average 16 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (1215-1049), Washington DC 20503. **PLEASE DO NOT RETURN YOUR FORM TO EITHER OF THESE ADDRESSES. RETURN THE COMPLETED FORM TO THE CONTRACTING OFFICER.**

<b>1. PAYROLL NUMBER</b>	<b>2. PAYROLL PAYMENT DATE (YYMMDD)</b>	<b>3. CONTRACT NUMBER</b>	<b>4. DATE (YYMMDD)</b>
--------------------------	---	---------------------------	-------------------------

I, \_\_\_\_\_, \_\_\_\_\_ do hereby state.  
*(Name of signatory party) (Title)*

(1) That I pay or supervise the payment of the persons employed by \_\_\_\_\_  
*(Contractor or subcontractor)*

on the \_\_\_\_\_; that during the payroll period commencing on the \_\_\_\_\_ day of  
*(Building or work)*

\_\_\_\_\_, 20\_\_\_\_ and ending the \_\_\_\_\_ Day of \_\_\_\_\_, 20\_\_\_\_ all persons

\_\_\_\_\_ from the full weekly wages earned by any person  
*(Contractor or subcontractor)*

and that no deductions have been either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. 276c), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform without the work performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) **WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS**

- In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in Section 4(c) below:

(b) **WHERE FRINGE BENEFITS ARE PAID IN CASH**

- Each laborer or mechanic listed in the above referenced payroll has been paid as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) **EXCEPTIONS**

EXCEPTION <i>(Craft)</i>	EXPLANATION
--------------------------	-------------

**5. REMARKS**

<b>6. NAME</b> <i>(Last, First, Middle Initial)</i>	<b>7. TITLE</b>	<b>8. SIGNATURE</b>
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The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution. See Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

**DD Form 879, AUG 92**  
Previous editions are obsolete

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## INSTRUCTIONS FOR PREPARATION OF DD FORM 879,

**STATEMENT OF COMPLIANCE** This statement of compliance meets needs resulting from the amendment of the Davis Bacon to include fringe benefits provisions. Under this amended law, the contractor is required to pay fringe benefits as predetermined by the Department of Labor, in addition to payment of the minimum rates. The contractor's obligation to pay fringe benefits may be met by payment of the fringes to the various plans, funds, or programs or by making these payments to the employees as cash in lieu of fringes.

---

The contractor should show on the face of his/her payroll all monies paid to the employees whether as basic rate or as cash in lieu of fringes. The contractor shall represent in the statement of compliance that he/she is paying to others fringes required by the contract and not paid as cash in lieu of fringes. Detailed instruction follows:

### **CONTRACTORS WHO PAY ALL REQUIRED FRINGE BENEFITS**

A contractor who pays fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor shall continue to show on the face of the payroll the basic cash hourly rate and overtime rate paid to employees, just as always done. Such a contractor shall check paragraph 4(a) of the statement to indicate that payment is also being made to approved plans, funds, or programs not less than the amount predetermined as fringe benefits for each craft. Any exception shall be noted in Section 4(c).

### **CONTRACTORS WHO PAY NO FRINGE BENEFITS**

A contractor who pays no fringe benefits shall pay to the employee and insert in the straight time hourly rate column of the payroll an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the applicable wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringes, the overtime rate shall be not less than the sum of the basic predetermined rate, plus the half time premium on the basic or regular rate, plus the required cash in lieu of fringes at the straight time rate. To simplify computation of overtime, it is suggested that the straight time basic rate and cash in lieu of fringe be separately stated in the hourly rate column, thus SX.XX/XX. In addition, the contractor shall mark paragraph 4(b) of the statement to indicate that payment is being made of fringe benefits in cash directly to employees. Any exceptions shall be noted in Section 4(c).

### **USE OF SECTION 4(c). EXCEPTIONS**

Any contractor who is making payment to approved plans, funds, or programs in amounts less than the wage determination required is obliged to pay the deficiency directly to the employees as cash in lieu of fringes. Any exceptions to Section 4(a) or 4(b), whichever the contractor may mark, shall be entered in Section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid the employees as cash in lieu of fringes, and the hourly amount paid to plans, funds, or programs as fringes.

**RELEASE OF CLAIMS**  
**CONTRACT:** \_\_\_\_\_

**CONTRACTOR: Name** \_\_\_\_\_

**Address** \_\_\_\_\_

\_\_\_\_\_

Contingent upon receipt of \$ \_\_\_\_\_ which amount is still payable on Contract

No: \_\_\_\_\_, does for itself and its

(contract number and contractor name)

successors hereby assign, release and shall forever discharge the Government, it's officers, agents and employees of and from all liabilities, obligations and claims whatsoever in law and in equity, arising under or out of said contract.

\_\_\_\_\_  
Contractor's Printed Name

\_\_\_\_\_  
Contractor's Signature

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**INVOICE FOR PAYMENT**

**DATE:** \_\_\_\_\_ **INVOICE NUMBER:** \_\_\_\_\_

**CONTRACT NR:** \_\_\_\_\_

**DESCRIPTION:** \_\_\_\_\_  
**(Project Name and Project Number)**

**COMPANY NAME:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_

- A. Total Contract Price \$ \_\_\_\_\_
- B. % Completed to Date \_\_\_\_\_
- C. Gross Amount Due ( A x B ) \_\_\_\_\_
- D. Less: 10% Retainage ( C x 0.10% ) \_\_\_\_\_
- E. Less: Previous Payments \_\_\_\_\_

**Net Amount Due (This Invoice):** ( C less D & E ) \_\_\_\_\_

I hereby certify, to the best of my knowledge and belief, that -

- (1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;
- (2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subsequent agreements and the requirements of Chapter 39 of Title 31, United States Code; and
- (3) This request for progress payment does not include any amount which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

\_\_\_\_\_  
Name/Title

**INVOICE FOR PAYMENT**

**DATE:** \_\_\_\_\_ **INVOICE NUMBER:** \_\_\_\_\_

**CONTRACT NR:** \_\_\_\_\_

**DESCRIPTION:** \_\_\_\_\_  
**(Project Name and Project Number)**

**COMPANY NAME:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_

A.	Total Contract Price	\$	_____
B.	% Completed to Date		_____
C.	Gross Amount Due ( A x B )		_____
D.	Less: 10% Retainage ( C x 0.10% )		_____
E.	Less: Previous Payments		_____
F.	<b>Net Amount Due (This Invoice):</b> ( C less D & E )		_____

CONTRACT MODIFICATION # P \_\_\_\_\_ CLIN \_\_\_\_\_

A1.	Total Modification Price	\$	_____
B1.	% Completed to Date		_____
C1.	Gross Amount Due ( A x B )		_____
D1.	Less: 10% Retainage ( C x 0.10% )		_____
E1.	Less: Previous Payments		_____
F1.	<b>Net Amount Due (This Invoice):</b> ( C less D & E )		_____

Total Net Amount Due This Invoice (F+F1) \$ \_\_\_\_\_

I hereby certify, to the best of my knowledge and belief, that -  
(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;  
(2) Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subsequent agreements and the requirements of Chapter 39 of Title 31, United States Code; and  
(3) This request for progress payment does not include any amount which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

\_\_\_\_\_  
Name/Title

## CONTRACTOR'S DAILY QUALITY CONTROL REPORT

<b>1. Contractor:</b> _____		<b>2. Report No.</b>		
<b>3. Contract No.</b> _____		<b>Short Title:</b> _____		<b>4. Sheet No.</b>
<b>5. Date</b>	<b>6. Directions: Complete form in detail. If more space is needed, use another sheet. Attach pertinent information such as test reports, delivery slips, etc.</b>			
<b>7. Specs. Para. and/or Drawing No.</b>	<b>Type of construction work performed today and location of work.</b>			
<b>8. Specs. Para. and/or Drawing No.</b>	<b>Equipment &amp; Material Received this</b>	<b>Inspected</b>	<b>Passed</b>	<b>Rejected</b>
<b>9. Safety Briefing:</b>	<b>Number of Employees in Attendance</b>			
<b>CQC Printed Name:</b>	<b>CQC Signature:</b>			

Acknowledge and Certification of Compliance with Contract  
Insurance Requirements Certificate

Contract Nr: \_\_\_\_\_

The undersigned Contractor hereby acknowledges that he has read and understands the insurance requirements specified in this contract and hereby certifies (1) that such insurance shall be maintained in at least the amounts and types as stated in FAR 28.307-2 and during any modifications and/or time extensions granted thereto; (2) that the required insurance policies shall contain an endorsement to the effect that any cancellation of material changes adversely affecting the Government's interest shall not be effective for such period as the laws of the State in which this contract is to be performed prescribe, or until thirty (30) days after the insurer or contractor gives written notice to the Contracting Officer, whichever period is longer; (3) that (state) \_\_\_\_\_ Workmen's Compensation Insurance, or letter of reciprocal agreement with another state, shall be maintained on this contract for and during the entire performance period and for any modifications and/or time extensions granted thereto; and (4) that a copy of all subcontractors' proofs of required insurance shall be maintained and shall be made available to the Contracting Office upon request. This agreement shall be a part of subject contract and shall be legally binding and enforceable at law.

INSURANCE COMPANY(S):

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

POLICY #: \_\_\_\_\_

TELEPHONE #: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

(Address) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Typed Name and Title)

\_\_\_\_\_  
(Authorized Signature)





INSTRUCTIONS FOR COMPLETING FORM CB-01

Col. 1 - Item. Description of materials required, work to be done, special equipment needed, etc. Breakdown should be in sufficient detail to permit itemizing of all direct costs.

Col. 2 – Unit of Measure. Description of the unit in which each item is to be estimated (examples – square yards – SY, cubic yards – CY, square feet – SF, linear feet – LF, board feet – BF, each – EA, pound – LB).

Col. 3 – Quantity. Contractor's estimate of quantity required in terms of unit of measure (Column 2). Items and units of measure will be furnished by the Government. Quantity estimates will be furnished by the Government only when it is anticipated that a unit price contract will be issued. Otherwise, the contractor is responsible for determining quantity estimates.

Col. 4 and 5 – Material Costs. Enter unit cost (Col. 4) of material to be supplied and total cost (Col. 5) for item listed in column 1.

Col. 6, 7 and 8 – Labor Costs. Enter in Col. 6 the estimated number of manhours or mandays needed to perform the work listed in Col. 1. Enter in Col. 7 the average rate per manhour (manday) and in Col. 8 the total labor cost.

Col. 9 – Other Direct Costs. Enter estimated costs of special equipment and other items (listed in Col. 1) which are special to the contract and of significant dollar value.

Col. 10 – Line Total. Self-Explanatory.

NOTE: In addition to other totals entered on various pages, the grand total of Col. 10, plus overhead and profit will be shown on the last page as follows:

TOTAL MATERIAL COSTS	\$ _____
TOTAL LABOR COSTS	\$ _____
TOTAL OTHER DIRECT COSTS	\$ _____
TOTAL DIRECT COSTS	\$ _____
OVERHEAD _____%	\$ _____
PROFIT _____%	\$ _____
TOTAL PRICE	\$ _____

DATE _____.	FIRM NAME _____
TITLE _____.	BY _____ (Signature)

- This cost proposal is valid for \_\_\_\_\_ days.
- The period of performance to perform the extra work is \_\_\_\_\_ days.





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