SPECIFICATIONS

100% Submittal

CONSTRUCT NEW PARKING LOT #3, B1000

Offutt A.F.B., Nebraska

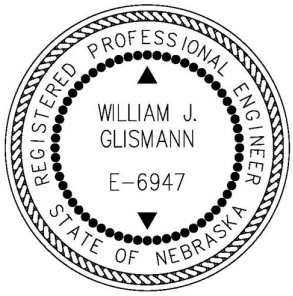
OAFB Project No. SGBP 24-0018

Contract No. FA4600-22-D-0003

HGM Project No. 740924

hgm ASSOCIATES INC.

June 9, 2026



COA NE CA-0065

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Nebraska.

William J. Glismann June 9, 2026

William J. Glismann, P.E.

My registration renewal date is December 31, 2027.

Pages or sheets covered by this seal:

All Divisions.

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LIST OF DRAWINGS
02/24

PART 1 GENERAL

1.1 SUMMARY

This section lists the drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings and Specifications."

1.2 CONTRACT DRAWINGS

Contract drawings are as follows:

SHEET NO.	DRAWING NO.	TITLE
1	Cover	Cover Sheet & Location Plan
2	C0.1	Contractor Access & Staging Plan
3	C0.2	Topographic Survey
4	C1.1	Removal Plan - BASE BID
5	C1.2	Site Plan
6	C1.3	Enlarged Site Plan Area B - BASE BID
7	C1.4	Enlarged Site Plan Area C - BASE BID
8	C1.5	Grading Plan Area B - BASE BID
9	C1.6	Grading Plan Area C - BASE BID
10	C1.7	Drainage Plan - BASE BID
11	C1.8	Erosion Control Plan - BASE BID
12	C1.9	Permanent Stabilization Plan - BASE BID
13	C2.1	Removal Plan - ALTERNATIVE
14	C2.2	Site Plan - ALTERNATIVE
15	C2.3	Enlarged Site Plan Area A - ALTERNATIVE
16	C2.4	Enlarged Site Plan Area B - ALTERNATIVE
17	C2.5	Enlarged Site Plan Area C - ALTERNATIVE
18	C2.6	Grading Plan Area A - ALTERNATIVE
19	C2.7	Grading Plan Area B - ALTERNATIVE
20	C2.8	Grading Plan Area C - ALTERNATIVE
21	C2.9	Drainage Plan - ALTERNATIVE
22	C2.10	Erosion Control Plan - ALTERNATIVE

SHEET NO.	DRAWING NO.	TITLE
23	C2.11	Permanent Stabilization Plan - ALTERNATIVE
24	C3.1	Pavement Details
25	C3.2	Storm Drainage Details
26	C3.3	Curb Inlet Details
27	C3.4	Curb Inlet Details
28	C3.5	Area Inlet Details
29	ED1.01	Site - Electrical Demolition
30	E1.01	Site Plan - BASE BID ELECTRICAL
31	E1.02	Site Plan - ALTERNATE ELECTRICAL
32	E1.03	Site Plan - PHOTOMETRICS

-- End of Document --

SECTION 00 10 00

GENERAL CONDITIONS

PART 1 - GENERAL

1.1 PRINCIPAL FEATURES.
The work covered by these specifications and accompanying drawings consists of furnishing all plans, labor, materials, tools, and equipment necessary in performing all operations in connection with this contract.

1.2 REQUEST FOR INFORMATION (RFI).
RFIs shall be submitted electronically in an MS Word Macro file format on the 55 CES RFI form. The form can be obtained from the Contracting Officer Representative (COR). The RFI shall be submitted on the web based submittal system in an RFI log for action and tracking.

1.3 SUBMITTALS
a. Contractor Daily Logs (reference paragraph 1.8)
b. Material Delivery Receipt (reference paragraph 1.11)
c. Traffic Control Plan (reference paragraph 1.12c)
d. Security-Listing of Employees (reference paragraph 1.23a)
e. Security-Training (reference paragraph 1.23b)
f. Confined Space Permit (reference paragraph 1.24c6)
g. Air Space Coordination (reference paragraph 1.25)
h. Digging Permit (reference paragraph 1.27a)
i. Contractor Single Point of Contact (reference paragraph 1.37c)
j. AF Form 3064 (reference paragraph 1.39)
k. AF Form 3065 (reference paragraph 1.39)
l. MS Project Gant Schedule (reference paragraph 1.39)
m. CD of all Submittals (reference paragraph 1.39)
n. Not Used
o. Not Used
p. Not Used
q. Warranty Book (reference paragraph 1.45)
r. Not Used

1.4 OCCUPANCY
During construction, the Government may occupy the existing facilities. The Contractor shall not restrict pedestrian or vehicular traffic to these facilities and shall coordinate construction with the COR to minimize conflicts. The Contractor shall perform the work so as not to interfere with ongoing operations.

1.5 ELECTRONIC SUBMITTALS.
All submittals shall be submitted electronically, unless specified otherwise, using a web based electronic submittal tracking system as outlined in Section 01 33 00.

1.6 CONSTRUCTION TRAILER USE/IDENTIFICATION.
The location of any trailer/temporary building, etc. used during a contract period shall be approved by the Government (Chief of Construction Management) [(402) 294-5084] prior to installation or delivery to the base (allow 7-10 days for this approval to be processed). For security, safety, and/or emergency notification purposes, each trailer/building, etc. must be prominently marked, identifying the Contractor and providing telephone number(s) for a point of contact during both duty and non-duty hours. Use either sign(s) or permanent markings, professional in appearance, as determined by the Government Construction Representative. Maintain and keep neat in appearance each trailer and its immediate area. See paragraph 1.21 for information on utility connections.

1.7 GROUNDS MAINTENANCE / SNOW REMOVAL.
The Contractor is responsible for maintaining the construction site in a manner that is safe and provides a

clean and neat appearance. This includes keeping trash picked up, keeping vegetation shorter than 4” and keeping roadways and sidewalks free from snow and ice.

1.8 CONTRACTOR DAILY LOGS.
The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of sub-Contractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/sub-Contractor and their area of responsibility.
b. Operating plant/equipment with hours worked, idle, or down for repair.
c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.
d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.
e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
g. Offsite surveillance activities, including actions taken.
h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
i. Instructions given/received and conflicts in plans and/or specifications.
j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. One report shall be prepared and submitted for each no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the Contractor’s Superintendent. The reports shall be provided in pdf format and uploaded to a log on the required website submittal system and weekly meetings no later than two business days following the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed.

1.9 UTILITY SERVICE INTERRUPTIONS

a. The Contractor shall provide written REQUEST not less than 14 calendar days (unless waived by the COR) in advance of each planned interruption of each utility and communication service to or within existing buildings and facilities being used by others and new facilities in use and possession prior to completion. No single outage will exceed 4 hours unless approved in writing. The Contractor shall describe the work to be done, the desired time, date, and duration of the outage. No work shall be done until approval is received from the COR.To the maximum extent practicable all utility outages will be conducted during non-duty hours. When a non-duty hour outage is not practical or is not in the best interest of the government the outage may be permitted to occur during duty hours. The time and duration of all outages will be coordinated through the COR. All utility service interruptions shall be kept to a minimum. In order to minimize interruption durations, the Contractor shall make every attempt to complete maximal preparation prior to each utility interruption.

b. All overhead utility pole removal, relocation, and/or bracing shall be accomplished by Omaha Public Power District (OPPD). The Contractor shall coordinate any work within 5 feet of any utility pole with OPPD. The OPPD point of contact is David Ortiz at 402-636-3396. Any required stand-off charges for bracing, pole relocates, or required overhead changes to ensure safety of property and personnel shall be at the Contractor expense.

1.10 TESTING
All material sampling and testing as required in the specifications and retests required due to failure of original test shall be performed by a laboratory or laboratories employed by the Contractor at no additional cost to the Government. All test results shall be provided to the Government by logging them on the electronic submittal

system.

1.11 DELIVERY AND STORAGE OF MATERIAL
The Contractor shall use only established roadways, entrances, and exits as prescribed by the COR. Materials and equipment shall be stored only in designated areas, and shall be transported directly to and from the construction site under strict regulations as prescribed by the COR. Materials quantity receipt shall be given to the COR upon delivery of materials to job site. All items of stored materials, containers, vehicles and other equipment shall be removed from the base prior to final payment.

a. Delivery of time sensitive materials, including but not limited to, concrete are not permitted prior to 0900 M-F. All weekend deliveries must be

1.12 TRAFFIC ROUTING DURING CONSTRUCTION
In order to reduce confusion and provide the best possible flow of traffic during construction, the Contractor shall closely coordinate his work schedule with the COR.

a. Traffic control plans shall be developed by a Professional Traffic Operations Engineer (PTOE) and submitted prior to the start of any project work and shall allow a ***minimum*** of two weeks for review and approval/disapproval prior to the intended date of implementation. Any changes to the plan must be updated and submitted to the COR a ***minimum*** of two weeks before planned implementation for review and approval.

b. The Contractor shall submit a written request to the COR at least fourteen (14) calendar days before any planned closure of traffic lanes, blocking streets, or otherwise changing traffic routes. Written request shall include updated traffic control plans showing planned start and completion dates for the sequence of work indicated.

c. The Contractor shall be responsible for providing, placing, maintaining, relocating, and removing all traffic control devices required for construction. All traffic control shall comply with the requirements of the Manual on Uniform Traffic Control Devices (latest edition).

d. Traffic control shall be considered a cost incidental to the project.

1.13 PROTECTION, PATCHING AND REPAIRING
All holes, damaged finishes, exposed unfinished surfaces or any damage caused by work under this contract shall be repaired at no additional cost to the Government. Restore exposed finishes of patched areas where directed by the COR. Extend finish restoration into adjoining areas in a manner that will eliminate evidence of patching and refinishing.

1.14 VEGETATION AND LANDSCAPING
The Contractor shall remove any existing building perimeter vegetation and landscaping including mulches and gravel to permit completion of the work. The Contractor shall restore all vegetation and landscaping to original condition before completing work as approved by the COR. Replace any existing vegetation or landscaping damaged by work under this contract. When seeding a disturbed area, only S-31 UVD single straw matting, or approved equal shall be used. The Contractor shall ensure this meets their contract and permit requirements for erosion control. Straw matting is not permitted on the flight-line. Whether S-31 or an alternate product is used the product must be completely broken down at the time of the final inspection or completely removed by the Contractor prior to the final inspection and turnover. If this is in conflict with another specification that must be brought to the attention of the Government for resolution but in any case, the full removal of the system is required.

1.15 FIRE PROTECTION CONSTRUCTION CRITERIA
The Contractor will be required to comply with the provisions of National Fire Protection Act 241 entitled "Building Construction and Demolition Operations," including Appendix A. The Contractor shall make themselves knowledgeable and comply with the fire protection requirements of AFI 91-203, Air Force Consolidated Occupational Safety Instruction” Chapter 6, Fire Protection and Prevention to apply during the construction period. The Contractor shall furnish and maintain required fire extinguisher(s) during the

construction period and shall remove the extinguisher(s) upon project completion.

1.16 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

This paragraph specifies the procedure for the determination of time extensions for unusually severe weather. In order for the Government to award a time extension under this paragraph, the following conditions must be satisfied:

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

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

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

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

JAN	12	MAY	9	SEP	7
FEB	10	JUN	8	OCT	5
MAR	7	JUL	8	NOV	7
APR	7	AUG	6	DEC	11

(4) Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will discuss the occurrence of adverse weather and resultant impact to normally scheduled work with the COR on the day the Contractor believes to be an adverse weather day. If the COR concurs that it is an adverse weather day, he will log that on the AF 1477. The Contractor must contact the COR on the adverse weather day or it will be assumed the Contractor completed their scheduled work and an adverse weather day will not be counted. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. The number of actual adverse weather delay days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph (3) above, the contracting officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a bilateral modification at no additional cost to the government.

1.17 CLEAN UP

Clean up of all items shall be accomplished by the end of each day. Debris, trash, and items removed and to be disposed of shall be removed from the work site and storage areas at the end of each day's work and disposed of outside the confines of the construction areas, in a Contractor provided area. The Contractor will also be responsible for cleaning mud, rock, and debris deposited by the Contractor’s, subcontractor’s, or supplier's vehicles from all roads in the construction areas used by these vehicles. Clean up on flightline surfaces via sweeping shall be performed using Nylon bristled brushes, metal bristles are NOT allowed.

1.18 WELDING

Welding within the building will be permitted. The Contractor shall obtain the proper welding permit and coordinate welding regulations with the Base Fire Department.

1.19 GPS SURVEY

The Contractor is responsible for conducting a GPS survey of all site conditions disrupted during the construction project. They included but not necessarily limited to the following: Structural corners, Electrical Utilities, Water Utilities, Wastewater Utilities, Storm Sewer Utilities, Natural Gas Utilities, POL/Fuel Utilities, and Communication Utilities. During construction, the Contractor will conduct GPS surveys to record locations

for all structures and existing utilities lines to be abandoned in place and to record all locations of all existing lines exposed during construction and all new building foundations, utility tap points, elbows, joints, tees, valves, etc. The Contractor shall include the GPS information on their as-constructed drawings and provide a SDSFIE Personal Geodatabase of as-construction conditions. See Section 01 33 00 for submittal requirements.

1.20 WEATHER TIGHTNESS - NOT USED

1.21 USE OF UTILITIES
All reasonable quantities of utilities will be made available to the Contractor without charge if available. Any temporary connections or lines that may be required will be installed, maintained, and removed by the Contractor at his own expense and in a manner satisfactory to the COR. Outside power connections to the exterior utility system shall be accomplished by the local utility and all fees shall be included in the Contractor bid. Removal of such connections or lines will be accomplished before final acceptance of the construction. If utilities are not available the Contractor is responsible for providing any temporary utilities required (generator, fuel tanks, water tanks, etc.) as part of the base bid and at no additional cost to the Government. It is the Contractor's responsibility to shut off lights and other utility services at nights, weekends, etc. when they are not needed.

1.22 WORK SCHEDULE
Working hours for the Contractor will normally be between the hours of 7:30 a.m. and 5:00 p.m., excluding Saturdays, Sundays, and Federal holidays. If the Contractor wishes to work during periods other than above, additional Government inspection forces may be required. The Contractor must request permission from the Contracting Officer in writing ***14 days prior to the requested dates*** to work during periods other than above sufficiently in advance to allow assignment of additional inspection forces when the COR determines that the additional inspection force is reasonably available. If such force is reasonably available, the Government may authorize the Contractor to perform work during periods other than normal duty hours/days. ***If the government does not authorize work outside of the indicated days/hours above the contractor shall not claim government delay.***

1.23 SECURITY REQUIREMENTS
The Contractor will be working in a secure area and will abide by all applicable rules and regulations. The Contractor will coordinate with the COR for Government escorts to be present while working on the job site as necessary.

a. Listing of Employees. The Contractor shall maintain a current listing of employees. The list shall include the employee's name, driver's license number and AF 75 number. The list shall be maintained on and provided to the Government in log form. The list shall be updated within a week when an employee's status or information changes. In the event that an employee is terminated the Contractor shall advise the COR immediately.

b. Security Training**.** The Contractor shall ensure all employees receive initial and recurring security training conducted IAW DOD 5200.1-R, Information Security Program Regulation, and AFI 31-401, "Information Security Program Management". The Contractor will be responsible for ensuring all employees working at Offutt AFB complete the 55 CES CONTRACTOR TRAINING (INITIAL/ANNUAL) package that includes required Integrated Defense Awareness, Operations Security (OPSEC), and Information Security (INFOSEC) training. This training package can be obtained from the 55th Civil Engineering Squadron (55 CES) Security Manager upon request. The Contractor will submit a listing of names of all employees who have completed the training. In addition, Contractor personnel who work in Air Force controlled/restricted areas must be trained IAW AFI 31-101, Integrated Defense. Additional security training will be required for a secure facility/area including but not limited to the flightline, Buildings 500, 501, 515, 522, & 524.

c. Pass and Identification and Base Entry. An Air Force Form 75 (AF 75), Visitors Pass is required for all employees and vehicles. The AF 75 will be issued IAW OAFBI 31-101, section 8.5.11. The Contractor shall ensure the pass and identification items required for contract performance are obtained and renewed (as required) for employees and non-government owned vehicles. The

Contractor shall access the base using the Contractor gate (south entrance) and are subject to vehicle search. The Contractor will be responsible for escorting all material trucks required for the project from the Contractor gate to the job site and back off base.

d. Retrieving Identification Media. The Contractor shall retrieve all government identification media, including vehicle passes from employees who depart for any reason before the contract expires; e.g. terminated for cause, retirement, etc. The Contractor must turn in badges for all employees under the contract for final payment to be made.

e. For Official Use Only (FOUO). The Contractor shall comply with DoD 5400.7-R, Chapter 4, DoD Freedom of Information Act (FOIA) Program, requirements. This regulation sets policy and procedures for the disclosure of records to the public and for marking, handling, transmitting, and safeguarding FOUO material.

f. Reporting Requirements. The Contractor shall report to an appropriate authority any information or circumstances of which the Contractor are aware may pose a threat to the security of DOD personnel, Contractor personnel, resources, and classified or unclassified defense information. Contractor employees shall be briefed by their immediate supervisor upon initial on-base assignment.

g. Physical Security. The Contractor shall be responsible for safeguarding all Government property and controlled forms provided for Contractor use. At the end of each work period, all Government facilities, equipment, and materials shall be secured.

h. Controlled/Restricted Areas. The Contractor shall implement local base procedures for entry to Air Force controlled/restricted areas where Contractor personnel will work. An AF Form 2586, Unescorted Entry Authorization Certificate, must be completed and signed by the sponsoring agencies Security Manager before a Restricted Area Badge (RAB) will be issued. Not all workers will require a RAB, only supervisors and/or shift foremen will require restricted access. The Contractor's employees must have furnished a National Agency Check (NAC) and have a favorable local files review before receiving a Restricted Area Badge. Access shall be granted IAW AFI 31-501, Personnel Security Program Management.

i. Key Control. The Contractor shall establish and implement methods of making sure all keys issued to the Contractor by the Government are not lost or misplaced and are not used by unauthorized persons. The Contractor shall not duplicate any keys issued by the government.

1) The Contractor shall immediately report to the COR any occurrences of lost or duplicated keys.

2) In the event keys, other than master keys, are lost or duplicated, the Contractor may be required, upon written direction of the Government, to re-key or replace the affected lock or locks without cost to the government. The Government may, however, at its option, replace the affected lock or locks or perform re-keying and deduct the cost of such from the monthly payment due the Contractor. In the event a master key is lost or duplicated, all locks and keys for that system shall be replaced by the Government and the total cost deducted from the monthly payment due the Contractor.

3) The Contractor shall prohibit the use of keys, issued by the Government, by any persons other than the Contractor's employees and the opening of locked areas by Contractor employees to permit entrance of persons other than Contractor employees engaged in performance of contract work requirements in those areas.

j. Explosives or Fire Arms: The Contractor shall NOT use or possess explosives or fire arms.

k. Routes**:** The Contractor shall use only established roadways, entrances, and exits as prescribed by the COR.

l. Locations: The Contractor's employees shall be restricted to areas within the contract scope plus

direct routes to and from the site from off base.

m. Seat Belts: The use of seat belts by all vehicle and equipment occupants is required at all times while in vehicles and movable equipment. Failure to comply could result in loss of on base driving privileges.

n. Riding in the bed or back of trucks: The Contractor's employees will not ride in the back of pickup trucks. If the employees ride in the back of step vans or other type utility vehicles, personnel will be seated on seats meant for transport and will remain seated while the vehicle is in motion.

o. Parking: The Contractor's employees shall park only in areas designated by the Government for this purpose.

p. Vehicle Emblems: The Contractor's commercial vehicles shall display emblems indicating the company name.

q. Cell Phone Use: The use of cell phones while driving is prohibited unless using a hands free device. Texting while driving is also prohibited.

1.24 CONFINED SPACE ENTRY

The Contractor shall comply with 29 CFR 1910.146 for permit required Confined Space Entry requirements. Details and information pertaining to confined space entry are contained within the OSHA Standard.

Confined space entry shall include an entrance into a space that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, boilers, and pits are spaces that may have limited means of entry/exit) and is not meant for continuous human occupancy.

a. The Contractor is required to ensure that a Contractor generated confined space entry permit has been generated and is available on site for the duration of each permit required confined space entry. A permit is required to enter a confined space that has one or more of the following conditions:

   1) Contains or has a potential to contain a hazardous atmosphere.

   2) Contains a material that has the potential for engulfing an entrant.

   3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.

   4) Contains any other recognized serious safety or health hazard.

b. All confined spaces shall be considered permit required spaces until pre-entry procedures demonstrate otherwise. Testing and classification of confined spaces will be done by a qualified person employed by the Contractor who is trained in the operation of direct reading oxygen, flammability, and toxicity monitoring equipment prior to each confined space entry. Initial testing of confined spaces shall be performed by drop test or insertion of sample probes and hoses into the space in a manner that measures high, medium and low areas in the space.

c. Each Contractor who is retained to perform permit space entry operations is allowed entry only through compliance with a permit space program meeting the requirements of 29 CFR 1910.146.

   1) The Government will appraise the Contractor of the elements, including hazards identified and what experience with the space that make the space in question a permit space.

   2) The Government will appraise the Contractor of any precautions or procedures that have been implemented for the protection of employees in or near the permit spaces where the Contractor personnel will be working.

3) Coordinate entry operations with the Government when Government and Contractor personnel will be working in or near permit spaces.

4) Inform the Government of the permit space program that the Contractor will follow and of any hazards confronted or created in permit spaces whether through a briefing or during the entry operation.

5) At the conclusion of entry operations, the Contractor will notify the Base Civil Engineer or their designated representative regarding any hazards confronted or created in permit spaces during entry operations or of any new spaces that were created because of the work performed. The government will update base maps with any new or decommissioned (filled in) space information and will notify the Confined Space Team of the changes by email or at 294-6357.

6) **Copies of Contractor generated Permit Required Confined Space Entry Permits will be provided to the appropriate squadron with responsibility for the space for the purposes of confined space history.** The permits will remain on file for a minimum of one calendar year from the date of entry. These permits shall be submitted to the Government in the log as a permit in the electronic submittal tracking system.

d. The Contractor is responsible to ensure their personnel are fully trained and certified to perform confined space duties. The Government is not responsible to train Contractor employees on confined space entry program or procedures, or conduct atmospheric or soils testing.

e. Coordinate entry operations and procedures with the Government and agree upon the permit space entry system to be used when both Government and Contractor personnel will be working in a permit required confined space.

f. Review emergency rescue responsibilities to determine whether the Contractor supplies rescue or if the installation fire department is expected to supply a rescue function. Ensure the fire chief coordinates on the contract and either approves or disapproves the use of a rescue team if supplied by the installation fire department. If the installation fire department provides rescue, they must be notified by the Contractor prior to permit space entry and when the space is vacated in order to ensure a rescue team is available to stand up or down as necessary. This must be accomplished for each entry.

1.25 AIRSPACE COORDINATION

a. The Contractor is responsible for completion and submittal of FAA Form 7460 to the Federal Aviation Administration for construction activities which may affect the airspace for Offutt Air Force Base. Obstacle survey accuracy code information shall also be provided. The Contractor shall furnish a copy of both the submitted and approved Form 7460 to the COR using the electronic submittal tracking system in a log under permits. Coordination with the FAA shall be at no additional cost to the Government. The Contractor's project schedule shall allow time for this coordination during the contract's performance period. The Contractor should expect 30-45 days after submittal to the FAA for the FAA approval to be completed. This time is included in the performance period and no additional time will be granted for approvals taking less than 45 days.

b. An Airfield Construction Waiver is required prior to any construction within the airfield space. Coordinate with the COR to facilitate completion and submission of the waiver by Government personnel within 5 days of the Notice to Proceed. This may be a long lead item and the Contractor shall schedule accordingly.

1.26 MOBILE PHONE

The Contractor's site representative (superintendent or foreman), throughout the execution of the project, shall be accessible via a mobile phone. The number to the phone shall be local and provided to the Government Officer prior to the start of work. The Contractor is informed that mobile phone usage without a hands-free device while driving on base is prohibited. Personnel violating this regulation may be cited.

1.27 CONSTRUCTION PERMITS

a) Digging Permits: The Contractor will be responsible for coordinating a Government supplied, Base Civil Engineer Work Clearance Request (AF Form 103) prior to performing digging of any type. The Contractor shall process the digging permit by coordinating with and obtaining signatures from responsible representatives of the organizations listed on the AF Form 103 prior to obtaining final approval from the Base Civil Engineer or their designated representative. The area requested for clearance for each individual permit shall be limited to a maximum of two (2) weeks production for an individual permit. Government assistance in obtaining the signatures will be limited to an as-needed basis in the event of unusual circumstances. It will be the Contractor's responsibility to coordinate the completion of the necessary AF Form 103 and arrange to have existing utilities located as indicated on the completed form, prior to the beginning of digging operations in the individual areas. This coordination is anticipated to take approximately three (3) working days to complete per request, and may require coordination with as many as twenty (20) individuals located on or near the base. Digital AF103 form can be initiated by visiting CEO Customer Service Unit or CEO Administration in building 301-D (402-294-6101 or 402-232-5550), paper AF103 forms will be utilized in the event the digital system is down. Any unusual delay in obtaining approval from any particular organization will be reported immediately to the COR for assistance. The Contractor must comply with the four Contractor responsibilities on the back of the AF Form 103, including maintaining a copy of the approved AF Form 103 on the job site while working (for approved digital form, must request a copy to be emailed). These shall be entered in the log as a submittal in the web based submittal tracking system.

b) Utility Staking Requirements: The Contractor shall layout and mark his intended area(s) of excavation before calling for field coordination by utility personnel. This shall be done a minimum of five (5) working days in advance of when digging is expected to begin. The layout marks shall be either flags or stakes, white in color and having the Contractor’s name, phone number, project number and project title clearly printed on them. Once all responsible utility representatives have field located crossover and/or interference points between the new utility route and existing utilities, and signed off on the digging permit to signify completion of the field coordination of the digging permit, then digging in the area represented by the digging permit may begin.

c) Recording and Maintenance of Utility Markings: Contractor is required to maintain and refresh all utility markings/locates after the initial coordination and marking/location actions of the Air Force Form 103 Dig Permit are accomplish by the government. Contractor shall GPS all initial markings for each system (water, sanitary sewer, gas, electrical, communications, storm sewer, mechanical) to enable the contractor to reestablish locations/markings when the marking is disturbed/removed/washed away or as needed for the duration of the project.

d) Digging Operations: Digging near established interference or crossover points shall be done by hand, five (5) feet either side of the point along the intended route, in order to prevent disturbing the existing utility. If the existing utility is uncovered in the new excavation, it shall be protected from damage and movement while in the open excavation and during backfill. The Contractor shall be responsible for the repairs and associated costs for repairs of any utility damaged by construction, whose location was made known to the Contractor. Digging operations will be conducted IAW OSHA standard 29 CFR 1926.651. Inspections of excavations, adjacent areas and protective systems will be inspected by a competent person. As a minimum, daily inspections will be conducted prior to work, and as needed throughout the shift. Inspections will be made after every rainstorm or other hazard increasing occurrence.

e) National Pollutant Discharge Elimination System (NPDES) Permits for Construction Activities. See Section 01 57 19.

f) NPDES Permit for Dewatering Operations: See Section 01 57 19.

1.28 EXISTING CONDITIONS

The plans represent the best available information at the time they were prepared. While every effort has been made to correctly show all major existing items which will affect the work, it is recommended that prospective bidders examine the site prior to submitting a bid. The Contractor shall verify all measurements at the site and shall be responsible for dimensions and proper installation of all materials. No additional payment will be made for extra work required by obstacles which were in place and clearly visible at the time of bidding.

1.29 TEMPORARY TOILETS

The Contractor shall provide and maintain sanitary temporary toilets for all work accomplished in and adjacent to project. These toilets shall be located as directed by the COR. The temporary toilets shall be portable, enclosed and weatherproofed and kept in a sanitary condition at all times.

1.30 CONTRACTOR DAMAGES

Areas not identified to be removed/worked under this contract that are disturbed or damaged during construction shall be removed and replaced at no additional cost to the Government.

1.31 SENSITIVE INFORMATION

The Contractor, his employees, sub-Contractor personnel, and supplier personnel shall treat all information about the project specifically and about the surrounding military facilities in general as sensitive and proprietary and with confidentiality. The Contractor, his employees, sub-Contractor personnel, and supplier personnel shall share project and base information with others only on a need to know basis and only in support of the project. The Contractor, his employees, sub-Contractor personnel, and supplier personnel shall discard printed information generated incidental to the project only after shredding.

1.32 DISCREPANCY

In case of discrepancies within the contract documents in regards to work requirements, the greater quality and quantity indicated shall control in resolving discrepancies.

1.33 SOD RESTORATIONS

Except where seeding is indicated elsewhere in the construction documents, the Contractor shall sod all areas which he disturbs incidental to construction. He shall maintain the new sod for a minimum of three weeks after setting. Maintenance shall include providing at least one inch of water twice per week. Any new sod that is not vigorously growing after the maintenance period shall be removed and replaced by the Contractor with new at no additional cost to the Government. Each time sod is removed, the maintenance requirement shall restart at no additional cost to the Government.

1.34 FINAL ACCEPTANCE INSPECTION

Upon completion of all of the work, the Contractor shall coordinate in writing with the Government, 14 days in advance, for a final acceptance inspection. Prior to scheduling the Final Acceptance Inspection, the Contractor shall write a Punch list that shows all work the Contractor believes must still be performed, including any remaining items from the deficiency list. The Punch list shall also contain the Contractor's expected date of completion for each item and a column for actual completion date. The Contractor shall add any items found to be deficient during the Final Acceptance Inspection and forward the Final Punch List to all attendees of the Final Inspection. The Contractor shall provide a copy of the punch list and a list of all AF 75s issued for this contract as attachments when requesting the Final Acceptance Inspection. All AF75s shall be returned to the COR. A copy of the Interim DD 1354 Transfer and Acceptance of DoD Real Property must be signed and provided to the Government at the Final Acceptance Inspection per Section 01 33 00. Separate lists of installed building equipment (IBE) (real property) and equipment in place (EIP) (personal property) shall be attached to the DD Form 1354.

1.35 REMOVALS
The Government shall have the right of first refusal in regards to all items indicated for removal. The Government may choose to retain ownership on an exception basis of any removal item up until the time at which the Contractor disturbs the item. Generally, however, the Government will surrender ownership of all removal items. Removal items shall become the property of the Contractor and removed from Offutt AFB by the Contractor on a daily basis.

1.36 GOVERNMENT ACCESS
Government officials will have access to all parts of the project at all times for inspection purposes.

1.37 COORDINATION.

a. WEEKLY MEETINGS. The Contractor shall hold weekly coordination meetings. The Contractor shall prepare an agenda for each meeting and post meeting minutes after the meeting. The agenda and minutes shall include but not be limited to the Contractor's description of the previous week's accomplishments, next 2-weeks detailed scheduled, Submittal status, RFI status, quality control (deficiencies), safety, old business and new business. In addition to the agenda, the Contractor shall provide, at each weekly meeting, to meeting attendees an updated MS Project schedule that shows major construction operations through time to the end of construction, a current submittal log, a current RFI log and a current deficiency log for discussion. The Contractor shall hold and begin the meeting at the same time each week such as at 9:00 a.m. on Tuesdays. The Contractor shall coordinate the time and location during the preconstruction meeting with the Government such as to maximize convenience for the Government representatives who may need to attend. These typically include Contracting, Civil Engineering Project Manager, Construction Inspector, and any individuals affected by the construction project. Meeting minutes shall be submitted no later than two business days following the conclusion of any meeting.

    i. Old Business
    ii. New Business
    iii. Two Week Look Ahead
    iv. Submittal Summary
    v. RFI Log
    vi. MS Project Gantt Chart Update
    vii. Due Outs

b. OTHER PROJECTS: The Contractor shall be fully responsible for coordinating his operations with those of any other construction, renovation, repair, or maintenance projects in the vicinity. Coordination shall include but not be limited to vehicle access, movement of equipment, security, installation and removal of utilities, storage, staging and parking.

c. SINGLE POINT OF CONTACT. The Contractor shall designate one primary and one alternate employee who will be on the site at all times while work is in progress to serve as the Government's single point of contact for matters of daily concern. The single point of contact shall serve as the Contractor's safety officer, environmental compliance officer and Equal Employment Office (EEO) officer and shall generally exercise authority over all of the Contractor's employees and subcontractors. The Contractor shall route all submittals through the single point of contact. An appointment letter for these individual's, with contact information (mobile phone number and email address), shall be submitted within 10 days of the Notice to Proceed and be updated prior to any personnel changes.

d. OFFUTT AIR SHOW. The Contractor shall not be allowed to work during the annual Offutt Air Show. This is generally a three day weekend (Fri-Sat-Sun) event normally held once per year in the month of August. It is possible that the preceding Thursday a practice session may be held. In this event no work will be allowed Thursday thru Sunday. It is heavily advertised to the public each year beginning in June. Dates subject to change.

e. NOTIFICATION OF DELAYS. The Contractor shall provide prior written notification to the Government in writing, when the Contractor plans to stop work for a period of more than four days. The prior notification shall indicate proposed date of the stoppage and proposed date to restart work.

f. COORDINATION OF GOVERNMENT FURNISHED ITEMS. The Contractor is responsible for providing a schedule and coordinating requirements for all items identified as Government Furnished Contractor Installed (GFCI) and Government Furnished Government Installed (GFGI) on the contract drawings. This includes coordinating the location and placement of blocking for the attachment of these items, power and communications jack locations, etc.

g. MISSION DELAY DAYS. The Government has included in the performance period 5 mission delay days. A mission delay day is a day when the Government informs the Contractor that the Contractor cannot perform scheduled work due to mission requirements of the Government. Days in excess of 5 days will be added to the end of the contract via a contract modification at no additional cost to the Government.

1.38 OCCUPATIONAL, SAFETY AND HEALTH ACT

The Contractor shall comply with OSHA 1926, Construction Standards and the portions of OSHA 1910 Standards that are applicable to construction. The U.S. Army Corps of Engineers Manual EM 385-1-1, shall be used in the absence of guidance in OSHA standards.

1.39 CONTRACT PROGRESS SCHEDULE

a. AF Form 3064 is required showing the order in which the work is to be completed. The AF Form 3064 must be submitted and approved prior to the start of any work on the project. The AF Form 3064 cannot be approved without the approved submission of the AF Form 3065, Progress Report and a MS Project Gant Schedule, below. When writing the AF Form 3064 two items must be included / scheduled at the conclusion of the contract and one throughout the project. These items are:

1. Project Close-out – 5%.

   Payment for this line requires the receipt and approval of all non-approved or non-furnished submittals that are owed to the Government including as-constructed drawings and a CD copy of all submittals.

2. AF Form 75 Turn-in – 3%.

   All base passes must be accounted for. 100% accountability is required for payment of this line.

b. MS Project Gant Schedule. The contract progress schedule must be an MS Project compatible Gant chart outlining all major aspects of the project and the timeline. Digital submittals filed in a log using the electronic submittal system are required. Hardcopy submissions are usually acceptable for the weekly coordination meetings but the MS project file must be provided upon request of the Government. The initial Contract Progress Schedule must be approved prior to the start of any work on the project.

1.40 PROJECT COMMISSIONING - NOT USED

1.41 DEFICIENCY LIST

The Contractor shall maintain an up to date list of all construction deficiencies found. This list shall include all deficiencies found including items identified by the Contractor or the Government. The list shall include the date the deficiency was identified and after the work is complete, the date corrected. The item can be removed from the list once the COR has verified that the deficiency has been corrected. This list shall be provided for discussion during the weekly coordination meeting.

1.42 TERMITE TREATMENT REPORTING - NOT USED

1.43 AIRFIELD DRIVING - NOT USED

1.44 OPERATIONS AND MAINTENANCE MANUAL - NOT USED

1.45 WARRANTY
All manufacturer warranties required by their respective specification section shall commence upon government acceptance of Beneficial Occupancy and be documented as such on the warranty documents provided in the Warranty Book as described in the following paragraph.
Within 30 days of Beneficial Occupancy and where required by various technical sections and/or the AF Form 66, the Contractor shall provide a three-ring or bound book containing a listing of all equipment items which are specified to be guaranteed along with the warranty papers for each piece of equipment. The book shall be indexed alphabetically by equipment type. For each guaranteed item, the name, address, and telephone number shall be shown on the list for the sub-Contractor who installed the equipment, equipment supplier or distributor and equipment manufacturer. Completion date of the guarantee period shall correspond to the applicable specification requirements for each guaranteed item. The names of service representatives that will make warranty calls along with the day, night, weekend and holiday contacts for response to a call within the time period specified shall also be identified. A cover shall be provided with the title “Warranty Book” along with the building number, project number, contract number and project title at a minimum. Inside the cover shall be the prime Contractor’s contact information and a table of contents listing all warranted systems in the book. A pdf copy of the manual shall be submitted on the electronic submittal system.

1.46 EXTRA STOCK - NOT USED

1.47 TEMPORARY HEATING/COOLING
Where HVAC outages are expected to exceed 4 hours the Contractor shall at all times provide temporary heating and or cooling for the duration of the project. All spaces are to be protected from freezing temperatures. Warehouse, hangar, or unoccupied spaces are to be kept at a minimum of 55° F. Occupied spaces shall be kept at or above 68° F when the outside air temperature is at 50° F or below, and shall be kept at or below 78° F when the outside air temperature is at 60° F or above. Between 50° F and 60° F no heating or cooling is required. Special Occupancy spaces such as, but not limited to, data centers, simulators, telecom, etc will require temporary heating/cooling, temperatures to be coordinated with users on a project by project basis. Temporary electric heating/cooling equipment may be connected to the existing building electrical service however, if use of these devices cause breakers to trip and impede the operation of the facility or its personnel the contractor will be required to provide an exterior power generation source and all the necessary fuel and connecting cabling to support the temporary heating/cooling equipment. In the case of temporary cooling the contractor is required to monitor the condensation off the units and either manually drain it as necessary or route the output to an acceptable drain location in a safe and secure manner acceptable to the user and CE/CONS personnel. Damage resulting from condensation, leaks/overflows shall be repaired by the contractor at no additional cost to the government.

1.48 DEFINITIONS
The following definitions shall apply throughout the contract documents:

a. Contracting Officer: Representative of the Contracting Squadron with authority to enter into, administer, and/or terminate contracts and make related determinations and findings.
b. Contracting Officer’s Representative (COR): An individual designated and authorized in writing by the Contracting Officer to perform specific technical or administrative functions. Typically, these individuals will be the Government Construction Representative (GCR), and/or the Government Project Manager (PM). GCR is a representative of 55 CES, typically from the Engineering Flight’s Construction Management Office, whose function is to observe and report on Contractor performance and adherence to the contract documents. PM is a representative of 55 CES, typically from the Engineering Flight’s Architect/Engineering Office, whose is responsible for overall management of the technical aspects of the contract.
c. Contract Administrator (CA): Representative of the Contracting Squadron who provides the day to day administration functions necessary for the execution of the contract and all requirements therein.

d. Base Civil Engineer (BCE): Leader of 55 CES who holds overall responsibility for all Civil Engineering activities on the base.
e. Base Civil Engineer's Representative: Any individual in the squadron that the BCE has delegated authority to act on his behalf.
f. Code: All applicable national, state and local codes.
g. Contractor: Any entity performing work required by the Contract Documents.

- - END OF SECTION - -

SECTION 01 11 00

SUMMARY OF WORK
02/24

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

The work includes construction of an addition to the south parking lot of Building B1000. The construction includes new pavement, storm sewer system, coordination with Omaha Public Power District (OPPD) for installation of lot light poles and bases and incidental related work.

1.1.2 Location

The work is located at the southernmost parking lot of the STRATCOM building. The exact location will be shown by the Contracting Officer.

1.2 OCCUPANCY OF PREMISES

Portions of the existing parking lot will be occupied during performance of work under this Contract.

Before work is started, arrange with the Contracting Officer a sequence of procedure, access route, and space for storage of materials and equipment.

1.3 EXISTING WORK

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

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.

1.4 LOCATION OF UNDERGROUND UTILITIES

Obtain digging permits prior to start of excavation and comply with Installation requirements for locating and marking underground utilities. See Section 00 10 00 GENERAL CONDITIONS for additional digging permit requirements. 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 or utilities encased in pier structures are discovered. Verify the elevations of existing piping, utilities, and any type of underground or encased obstruction not indicated, or specified to be removed, that is indicated or discovered during scanning, in locations to be traversed by piping, ducts, and other work to be conducted or installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.4.1 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 --

SECTION 01 33 00

GENERAL CONDITIONS - SHOP DRAWINGS/SUBMITTALS

PART 1 – GENERAL

1.1 SHOP DRAWINGS
In accordance with the contract, and within 30 days after Notice to Proceed, the Contractor shall submit to the Government for approval, in the quantities indicated on AF Form 66 Schedule of Material of Submittals, complete shop drawings of materials and equipment to be incorporated in the work. Shop drawings shall include catalog number, cuts, diagrams, drawings and such other descriptive data as may be required by the Government. Shop drawings on component items forming a system, or that are interrelated, shall be submitted at one time as a single submittal in order to demonstrate the items have been properly coordinated and will function properly as a system. A notation shall be made on each shop drawing submitted as to the item's specific use, either by the particular type number reference on the drawings; or in the specifications: by a reference to the applicable paragraph of the specifications, or by a description of its specific location. All materials requiring a color sample and/or color selection shall be submitted at the same time. All items requiring Operations and Maintenance manuals or Operating Instructions will be submitted together, in one bound manual as specified in Section 00 10 00 para 1.44. All items with a warranty shall be submitted together, in one bound warranty manual as specified in Section 00 10 00 para 1.45.

1.2 DEVIATIONS
Shop drawings shall represent the equipment and material requirements as specified herein and on the drawings. Where shop drawings deviate from the specifications or drawings, the Contractor shall inform the Government in writing and clearly indicate the deviations and the reasons therefore. Such deviations shall be evaluated and, if accepted, will be processed as a modification to the contract. The contract specifications and drawings shall govern over shop drawings, even though approved by the Government, where the Contractor has not identified a deviation to the Government. In such cases, the Contractor will be required to comply with the contract specifications and drawings at no additional cost to the Government.

1.3 SUBMITTALS
a. Shop Drawings (reference paragraph 1.1)
b. Color Samples/Selections (reference paragraph 1.1)
c. Close out CD of all project submittals (reference paragraph 1.4-D.2.n)
d. As-Constructed Drawings (reference paragraph 1.5)
e. Record Shop Drawings (reference paragraph 1.6)
f. Draft DD Form 1354 (reference paragraph 1.7)
g. Interim DD Form 1354 (reference paragraph 1.7)
h. Final DD Form 1354 (reference paragraph 1.7)
i. Corrective Plan for Lead Based Paint/Asbestos (reference paragraph 1.9)
j. Personal Geodatabase (reference paragraph 1.10)

1.4 ELECTRONIC SUBMITTAL
Shop drawings, samples, letters, certificates, etc., shall be submitted for, but not limited to the items listed in each section of the specifications. Submittals in addition to those listed, may be required by the Government. The AF Form 66 summarizes the required items contained within the construction documents, but may not be complete. All submittals shall be submitted to the Government electronically:

ELECTRONIC SUBMITTAL PROCEDURES

A. Summary:
   1. Shop drawing and product data submittals shall be transmitted to the Government in electronic (PDF) format using Submittal Exchange (www.submittalexchange.com) or equal pre-approved website service designed specifically for transmitting submittals between all construction team members.
   2. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.

3. The electronic submittal process is not intended for color samples, color charts, or physical material samples. A copy of the AF Form 3000 will be submitted electronically but the color samples will be delivered to 55 CES/CEPW (Engineering Flight Admin) with a hardcopy of the AF Form 3000 for approval.

B. Procedures:
1. Create submittal log in website service by inserting required submittals listed in individual specification sections.
2. Submittal Preparation - Contractor may use any or all of the following options:
   a. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via the Submittal Exchange website.
   b. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via email.
3. Printed Submittals: Provide two printed sets of submittals for shop drawings for structural framing in addition to electronic submittals with a hardcopy of the AF Form 3000.
4. The Contractor shall review and apply electronic stamp (on AF Form 3000) certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
5. The Contractor shall transmit each submittal to the Government using the review website.
6. The Governments review comments will be made available on the review website for downloading. The Contractor will receive email notice of completed review.
7. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.
8. Submit paper copies of any reviewed submittals not submitted electronically at project closeout for record purposes.

C. Costs:
1. The Contractor shall include the full cost of electronic submittal project subscription in their proposal. This cost is included in the Contract Amount and Contractor is responsible for verifying the cost prior to bid.
2. The intent is for the electronic submittal service cost to be in lieu of postage, shipping or delivery costs typically paid for paper submittals. Service cost is a net cost savings to the Contractor because submittals sent electronically do not need to be shipped physically.
3. After award of contract, training will be provided by electronic submittal system regarding use of website and PDF submittals.
4. Typical internet Service and Equipment Requirements:
   a. Email address and Internet access at the Contractor's main office.
   b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

D. Products:
1. Basis of specification is Submittal Exchange website system for electronic construction submittals (www.submittalexchange.com) or equal.
2. Substitution may be considered if submitted prior to bid date for pre-approval. Product requirements:
   a. Independently hosted, web-based system for construction communications. FTP site and e-mail exchanges are not acceptable.
   b. Utilize SSL encryption and hosted at SAS70 Type II compliant data centers.
   c. Minimum four years documented experience of use on comparable commercial construction projects.
   d. Unlimited individual user accounts and system access for all project subcontractors, general contractor, owner, design consultants, and subconsultants.
   e. Separate locations for owner, design consultant, and subconsultant review comments with contractors restricted from viewing comments until final review or release by owner or primary design consultant.
   f. Automatic customized company-specific PDF review and transmittal forms setup as required for Government, design consultants, subconsultants, and general contractor.

g. Full version histories and dates of exchanges automatically tracked and available for viewing, searching, and reporting in a linear log format compatible with AIA G712.
h. Automatic, configurable email notifications for each project team member for new and reviewed submittals and other items.
i. Automatic, configurable email reminders of past due items.
j. Prior to project start, system vendor shall create submittal log with all required items from project manual. The Government shall have full control over required items list and access to edit, add, or remove items during project.
k. Training shall be provided to the Contractor, Government, design consultants, and sub-consultants prior to project start.
l. Training sessions for sub-Contractors shall be provided minimum of twice weekly throughout project if required.
m. Allowance for scanning and printing services provided by local third-party reprographic vendor to assist with obtaining documents electronically and online print ordering.
n. At completion of project closeout, automatic archival discs that include all documents and tracking logs shall be distributed to the Government.

E. Suggested Source:
1. Submittal Exchange (www.submittalexchange.com) 1-800-714-0024 ext. 2.

1.5 AS-CONSTRUCTED DRAWINGS
The Contractor shall maintain, and have on site for review at all times, a separate set of full-scale Contract Drawings marked-up to fully indicate as-constructed conditions along with a complete set of project specifications with all amendments posted. All variations from the Contract Drawings, for whatever reason, including those resulting from the use of optional materials, shall be indicated. The Contractor shall update all material and equipment schedules to reflect materials and equipment used. Adjust tables to correspond to in use values, for example RPMs, GPMs, amps, impeller dia. etc. after final balance or similar activity. These variations shall be shown in the same general detail utilized in the initial Contract Drawings. After the Beneficial Occupancy inspection is conducted the contractor will have 90 days to edit the AutoCAD drawings provided by the Government to accurately reflect the as-constructed conditions. As-Built drawings shall be drawn in the same drawing convention/standard/version format as the original AutoCAD files. The revised as-constructed drawings, in AutoCAD format, must also be submitted on CD. The Government shall review the as-constructed drawings to determine whether they are correct and complete. If they are not deemed correct and complete or have not been saved in a useable format, they shall be returned to the Contractor for additional updating until they are satisfactory to the Government. Final payment shall not be made prior to satisfactory completion.

1.6 RECORD SHOP DRAWINGS/GUARANTEES
Record shop drawings submitted upon completion of the work under this contract shall be suitably bound and labeled with project name and number. Include therein a list of all equipment items specified to be guaranteed or which have separate manufacturer's guarantees accompanied by a copy of each specific guarantee and the name, address and telephone number for the manufacturer, supplier/distributor and installer. See Section 00 10 00 para 1.45 for further information.

1.7 TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY DD FORM 1354
The Contractor shall accurately complete and provide a DD Form1354 current edition for the project. A draft copy shall be submitted for review 30 days prior to project completion. After review, a copy will be returned to the Contractor to incorporate any comments and to produce the Interim DD form 1354. The Interim DD form 1354 must be complete to schedule the final inspection and the Government shall receive a copy at the conclusion of the final inspection. The Contractor has 30 days after the final inspection to complete the final DD form1354 and submit it to the government. He shall do this both electronically and in hard copy. The DD Form 1354 is a form to document quantities and transfer military real property from Contractor control to the Government control. The COR can provide a sample of a previously completed form upon request.

1.8 CONTRACTOR PROVIDED SPECIFICATIONS
In the event that there is a disagreement regarding referenced specifications (such as by ASTM, AWWA, AASHTO, NSF, ANSI, UBC, etc.) it shall be the responsibility of the Contractor to purchase and submit copies of the specifications over which there is disagreement.

1.9 CONTRACTOR PROVIDED DOCUMENTS for LBP AND ASBESTOS
The Contractor will be required to submit all relative documents for corrective action when Lead Base Paint or Asbestos is scheduled to be removed from the respective project.

1.10 PERSONAL GEODATABASE
During the Pre-Construction meeting, the Contractor shall obtain the most up-to-date copy of the Common Installation Picture in a personal geodatabase SDSFIE format from the GeoBase Office. Contact their office to determine their required software and data model version. The Contractor shall populate the personal geodatabase with all variations from the original version during the course of the contract. After the Beneficial Occupancy inspection is conducted the contractor will have 90 days to edit the personal geodatabase provided by the Government to accurately reflect the as-constructed conditions.

1.11 INSTALLED BUILDING EQUIPMENT
Provide a list of installed building equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "INSTALLED BUILDING EQUIPMENTLIST" include, as applicable, the following for each piece of equipment installed: description of item, quantity (for ubiquitous items), manufacturer, model number, capacity (size), serial number, unit cost, exact location of item in the building (room number), warranty information, equipment label, remarks.

Submit the final list no later than 30 days after substantial completion.

Key the designations to the related area depicted on the contract drawings. List the following data:

INSTALLED BUILDING EQUIPMENT															
BLDG NO.							CONTRACTOR:			DIVISION:					
PROJECT NO.							DATE:								
CONTRACT NO.							CONTACT NAME:						PHONE NO:		
ITEM	DESCRIPTION/TAG	QTY	MFG	MODEL / TYPE	SIZE # (UOM)	SERIAL NO.	UNIT COST	EXACT LOCATION OF EQUIPMENT	WARRANTY INFORMATION				EQUIP LABELED	REMARKS
									Factory Start Date	Warranty Years	Contract or Start Date	Warranty Years	YES / NO	
1														
2														
3														
4														
5														

- - END OF SECTION - -

SCHEDULE OF MATERIAL SUBMITTALS
(AF Form 66)

PROJECT NO.	PROJECT TITLE	SOLICITATION/CONTRACT NO.
SGBP 24-0018	CONSTRUCT PARKING LOT #3, BUILDING 1000 OFFUTT AFB, NEBRASKA	

TO BE COMPLETED BY PROJECT ENGINEER													TO BE COMPLETED BY CONTRACT ADMINISTRATOR								
		NO. OF COPIES REQUIRED																			
		BEFORE CONSTR						AFTER CONSTR													
LINE NUMBER	ITEM OR DESCRIPTION OF ITEM, CONTRACT REFERENCE, TYPE OF SUBMITTAL	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	CATALOG DATA	OTHER MATERIAL OR DATA	CERTIFICATION OF COMPLIANCE AND CLOSEOUT	CLOSEOUT	MANUFACTURER'S WARRANTY	OPERATING INSTRUCTIONS	REQUIRED SUBMITTAL DATE	DATE RECEIVED IN CONTRACTING	DATE TO CIVIL ENGR.	RETURN SUSPENSE DATE	FOLLOW-UP	DATE CONTRACTOR NOTIFIED		CONTRACTOR RESUBMITTAL	FINAL APPROVAL	REMARKS
																	APPROVED	DISAPPROVED			
1	Contractor Daily Logs. Sec 00 10 00 Para 1.8																				
2	Material Delivery Receipt. Sec 00 10 00 Para 1.11																				CEI Approval Required
3	Traffic Control Plan. Sec 00 10 00 Para 1.12c											As Required									
4	Security - Listing of Employees. Sec 00 10 00 Para 1.23a											Prior to start of any work									
5	Security - Training. Sec 00 10 00 Para 1.23b											Prior to start of any work									
6	Confined Space Permit. Sec 00 10 00 Para 1.24c6											Prior to Confined Space work									
7	Air Space Coordniation. Sec 00 10 00 Para 1.25											As Required									
8	Digging Permit. Sec 00 10 00 Para 1.27a											Prior to any Earthwork									
9	Contractor Single Point of Contact. Sec 00 10 00 Para 1.37c											Within 10 days of NTP									
10	AF Form 3064. Sec 00 10 00 Para 1.39											Within 10 days of NTP									Must submit with #5
11	AF Form 3065. Sec 00 10 00 Para 1.39																				
12	MS Project Gant Schedule. Sec 00 10 00 Para 1.39											Within 10 days of NTP									Must submit with #4
13	CD of all Submittals. Sec 00 10 00 Para 1.39											NLT + 30 days BO									
14	~~Project Commissioning Plan. Sec 00 10 00 Para 1.40~~											Within 30 days of NTP									
15	~~Termite Treatment Reporting. Sec 00 10 00 Para 1.42~~											As Required									
16	~~O & M Manuals. Sec 00 10 00 Para 1.44~~								3			NLT + 30 days BO									
17	Warranty Book. Sec 00 10 00 Para 1.45								3			NLT + 30 days BO									
18	~~Extra Stock. Sec 00 10 00 Para 1.46~~								1			At Final Inspection									
19	Shop Drawings. Sec 01 33 00 Para 1.1																				
20	Color Sample/Selections. Sec 01 33 00 Para 1.1																				
21	Close-out cd of all project submittals. Sec 01 33 00 Para 1.4D2n								1			NLT + 90 days									
22	As-Constucted Drawings Sec 01 33 00 Para 1.5								1			NLT + 90 days									
23	Record Shop Drawings. Sec 01 33 00 Para 1.6																				
24	Draft DD Form 1354. Sec 01 33 00 Para 1.7							1				-30 days of BO									
25	Interim DD Form 1354. Sec 01 33 00 Para 1.7							1				Beneficial Occupancy (BO)									Hardcopy provided at Beneficial Occupancy
26	Final DD Form 1354. Sec 01 33 00 Para 1.7							1				NLT + 30 days BO									
27	Corrective Plan for Lead Based Paint /Asbetos. Sec 01 33 00 Para 1.9																				
28	Personal Geodatabase. Sec 01 33 00 Para 1.10											NLT + 90 days BO									
29	Safety Data Sheets. Sec 01 57 19 Para 1.2.3																				CEI Approval Required
30	Hazardous Material Storage Plan. Sec 01 57 19 Para 1.2.4																				CEI Approval Required
31	Spill Reporting. Sec 01 57 19 Para 1.2.5																				CEI Approval Required

SCHEDULE OF MATERIAL SUBMITTALS
(AF Form 66)

PROJECT NO.	PROJECT TITLE	SOLICITATION/CONTRACT NO.
SGBP 24-0018	CONSTRUCT PARKING LOT #3, BUILDING 1000 OFFUTT AFB, NEBRASKA	

TO BE COMPLETED BY PROJECT ENGINEER													TO BE COMPLETED BY CONTRACT ADMINISTRATOR								
		NO. OF COPIES REQUIRED																			
		BEFORE CONSTR						AFTER CONSTR													
LINE NUMBER	ITEM OR DESCRIPTION OF ITEM, CONTRACT REFERENCE, TYPE OF SUBMITTAL	SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURER'S RECOMMENDATIONS	CATALOG DATA	OTHER MATERIAL OR DATA	CERTIFICATION OF COMPLIANCE AND CLOSEOUT	CLOSEOUT	MANUFACTURER'S WARRANTY	OPERATING INSTRUCTIONS	REQUIRED SUBMITTAL DATE	DATE RECEIVED IN CONTRACTING	DATE TO CIVIL ENGR.	RETURN SUSPENSE DATE	FOLLOW-UP	DATE CONTRACTOR NOTIFIED APPROVED	DATE CONTRACTOR NOTIFIED DISAPPROVED	CONTRACTOR RESUBMITTAL	FINAL APPROVAL	REMARKS
32	Contractor HAZMAT Request. Sec 01 57 19 Para 1.4																				CEI Approval Required
33	Certificate of Hazardous Waste Training. Sec 01 57 19 Para 1.5.1																				CEI Approval Required
34	Waste Analysis Reports. Sec 01 57 19 Para 1.5.4																				
35	Request for Disposal. Sec 01 57 19 Para 1.5.4																				CEI Approval Required
36	Test Results. Sec 01 57 19 Para 1.5.4																				CEI Approval Required
37	SPCC Plan. Sec 01 57 19 Para 1.6.2																				
38	Petroleum Container Storage Plan. Sec 01 57 19 Para 1.6.2																				CEI Approval Required
39	Report of Waste Water Discharges. Sec 01 57 19 Para 1.7																				CEI Approval Required
40	NPDES Weekly Inspection Reports. Sec 01 57 19 Para 1.8																				
41	NPDES CSW-NOI and SWPPP. Sec 01 57 019 Para 1.8.1																				CEI Approval Required
42	NPDES CSW Permit. Sec 01 57 19 Para 1.8.1																				CEI Approval Required
43	Sediment and Contamination Control Plan Sec 01 57 19 Para 1.8.4																				CEI Approval Required
44	SWPPP. Sec 01 57 19 Para 1.8.2																				CEI Approval Required
45	NPDES / SWPPP Termination Letter. Sec 01 57 19 Para 1.8.5																				CEI Approval Required
46	NPDES NOI Dewatering. Sec 01 57 19 Para 1.9																				CEI Approval Required
47	NPDES Dewatering Permit. Sec 01 57 19 Para 1.9																				CEI Approval Required
48	NPDES Permit Requirements. Sec 01 57 19 Para 1.9																				CEI Approval Required
49	NPDES Dewatering Permit Disposal Method. Sec 01 57 19 Para 1.9																				CEI Approval Required
50	Nonhazardous Solid Waste Diversion. Sec 01 57 19 Para 1.11																				CEI Approval Required
51	Environmental Management System. Sec 01 57 19 Para 1.15											Within 10 days of NTP									
52	Record of Designated Equipment and Materials Data Sec 01 33 00 Para 1.11							1				Beneficial Occupancy (BO)									
	02 41 00 DEMOLITION																				
52	Demolition Plan						D														
53	Existing Conditions						D														
54	Notification						D														
	31 00 00 EARTHWORK																				
55	Disposition of Surplus Materials						D														
56	Preconstruction Meeting						D														

SCHEDULE OF MATERIAL SUBMITTALS
(AF Form 66)

PROJECT NO.	PROJECT TITLE	SOLICITATION/CONTRACT NO.
SGBP 24-0018	CONSTRUCT PARKING LOT #3, BUILDING 1000 OFFUTT AFB, NEBRASKA	

TO BE COMPLETED BY PROJECT ENGINEER													TO BE COMPLETED BY CONTRACT ADMINISTRATOR								
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																	APPROVED	DISAPPROVED			
57	Material Test Reports						D														
	32 12 13 BITUMINOUS TACK AND PRIME COATS																				
58	Waybills and Delivery Tickets						1														
59	Prime Coat Certification of Analysis						D														
60	Tack Coat Certification of Analysis						D														
61	Sampling and Testing						D														
62	Application Rate Calibration						D														
63	Certificates of Compliance						D														
	32 12 16.16 ROAD-MIX ASPHALT PAVING																				
64	Placement Plan						D														
65	Diamond Grinding Plan						D														
66	Mix Design					D															
67	Contractor Quality Control						D														
68	Aggregates						D														
69	Asphalt Cement Binder						D														
70	QC Monitoring						D														
71	Laboratory Accredidation and Validation						D														
	32 16 19 CONCRETE CURBS, GUTTERS AND SIDEWALKS																				
72	Concrete						D														
73	Biodegradable Form Release Agent																				
74	Field Quality Control						D														
	32 17 23.16 ROAD AND PARKINGLOT PAVEMENT MARKINGS																				
75	Quality Control Plan						D														
76	Qualifications						D														
77	Safety Data Sheets for Each Paint Type						D														
78	Safety Data Sheets for Chemicals Ysed in Surface Preparation						D														
79	Surface Preparation Equipment List						D														

SCHEDULE OF MATERIAL SUBMITTALS
(AF Form 66)

PROJECT NO.	PROJECT TITLE	SOLICITATION/CONTRACT NO.
SGBP 24-0018	CONSTRUCT PARKING LOT #3, BUILDING 1000 OFFUTT AFB, NEBRASKA	

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																	APPROVED	DISAPPROVED			
80	Marking Application Equipment List						D														
81	Maufacturer's Data Sheets for All Marking Materials					D															
82	Marking Application Wet Film Thickness Test						D														
83	Manufacturer's Certificate of Compliance for Marking Materials						D														
84	Manufacturer's Certificate of Compliance for Volitile Organic Compliance						D														
85	Marking Materials Storage and Application				D																
86	Chemicals Used in Surface Preparation				D																
	32 92 19 SEEDING																				
87	Fertilizer					D															
88	State Certification and Approval for Seed						D														
89	Erosion Control Materials				D																
	33 01 30.16 TV INSPECTION OF SEWER LINES																				
90	Disposal Plan						D														
91	CCTV Technician's Qualifications						D														
92	Post-TV Inspection						D														
93	RE-TV Inspection						D														
94	Records of Disposals						D														
	33 40 00 STORMWATER UTILITIES																				
95	Leakage Test						D														
96	Hydrostatic Test on Water tight Joints						D														
97	Frame and Cover or Grating						D														
98	Placing Pipe						D														
99	Post- Installation Inspection Report						D														

NOTE: This Submittal Schedule is for the Contractor's use in assembling and organizing the Submittals to be made to the Government. See individual specification sections for possible additional submittal requirements.

LEGEND:
A - Include with line 10 Operations and Maintenance Manual
B - Include with line 11 Warranty Book
C - Include with line 15 Color Samples

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS
05/24

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)
555 12th Street NW, Suite 1000
Washington, DC 20004
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aashto.org
Internet: https://www.transportation.org/

AMERICAN CONCRETE INSTITUTE (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331-3439
Ph: 248-848-3800
Fax: 248-848-3701
Internet: https://www.concrete.org/

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)
520 N. Northwest Highway
Park Ridge, IL 60068
Ph: 847-699-2929
E-mail: customerservice@assp.org
Internet: https://www.assp.org/

ASPHALT INSTITUTE (AI)
2696 Research Park Drive
Lexington, KY 40511-8480 Ph: 859-288-4960 or 1-866-540-9577
Fax: 859-288-4999
E-mail: 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: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: https://www.astm.org/

COMPOSITE PANEL ASSOCIATION (CPA)
19465 Deerfield Avenue, Suite 306
Leesburg, VA 20176
Ph: 703-724-1128
Fax: 703-724-1588
Internet: https://www.compositepanel.org/

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
933 North Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200
Email: crsi@crsi.org
Fax: 847-517-1206
Internet: http://www.crsi.org/

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)
100 Bureau Drive
Gaithersburg, MD 20899
Ph: 301-975-2000
Internet: https://www.nist.gov/

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)
400 Commonwealth Drive
Warrendale, PA 15096
Ph: 877-606-7323 or 724-776-4841
Fax: 724-776-0790
E-mail: customerservice@sae.org
Internet: https://www.sae.org/

U.S. ARMY CORPS OF ENGINEERS (USACE) CRD-C DOCUMENTS available on Internet: http://www.wbdg.org/ffc/army-coe/standards Order Other Documents from:
Official Publications of the Headquarters, USACE
E-mail: hqpublications@usace.army.mil Internet:
http://www.publications.usace.army.mil/ or
https://www.hnc.usace.army.mil/Missions/Engineering-Directorate/TECHINFO/

U.S. DEPARTMENT OF AGRICULTURE (USDA) Order AMS Publications from:
AGRICULTURAL MARKETING SERVICE (AMS)
Seed Regulatory and Testing Branch
801 Summit Crossing Place, Suite C
Gastonia, NC 28054-2193
Ph: 704-810-8884
E-mail: PA@usda.gov

Internet: https://www.ams.usda.gov/ Order Other Publications from:
USDA Rural Development Rural Utilities Service STOP 1510, Rm 5135
1400 Independence Avenue SW
Washington, DC 20250-1510
Phone: (202) 720-9540 Internet:
https://www.rd.usda.gov/about-rd/agencies/rural-utilities-service

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA) 1200 New Jersey Ave., SE
Washington, DC 20590
Ph: 202-366-4000
E-mail: ExecSecretariat.FHWA@dot.gov
Internet: https://highways.dot.gov/ Order from:
Superintendent of Documents
U.S. Government Publishing Office (GPO) 732 N. Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800 or 866-512-1800
Bookstore: 202-512-0132
Internet: https://www.gpo.gov/

U.S. GENERAL SERVICES ADMINISTRATION (GSA) General Services Administration
1800 F Street, NW
Washington, DC 20405
Ph: 1-844-472-4111
Internet: https://www.gsaelibrary.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
Internet: https://www.archives.gov/ Order documents from:
Superintendent of Documents
U.S. Government Publishing Office (GPO) 732 N. Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800 or 866-512-1800
Bookstore: 202-512-0132
Internet: https://www.gpo.gov/

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

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DoD Unified Specs: https://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs

Note 1. 55 CES/CEIE Environmental Special Condition specs utilize the above weblink or DoD unified specs as a boiler plate and then incorporates regulatory requirements for local/state/federal that are unique to Offutt AFB.

Note 2. All permits and regulatory driven documentation must first be coordinated with 55 CES/CEIE - Environmental, 402-294-4087.

SECTION 01 57 19

ENVIRONMENTAL SPECIAL CONDITIONS

PART 1 – GENERAL

1.1 ENVIRONMENTAL COMPLIANCE

1.1.1 The Contractor shall comply with all current Air Force, Department of Defense, Federal, State and local laws, regulations, instructions, policies and permits relating to environmental compliance.

1.1.2 Unfamiliarity or disregard by the Contractor of such laws, regulations, instructions, policies and permits shall not constitute a defense for violations issued by Federal, State or local compliance authorities. The cost of any fine, penalty or remediation for violations shall be borne fully by the Contractor.

1.1.3 The 55th Civil Engineer Squadron's (55 CES) Environmental Element (CEIE) is the subject matter POC for environmental compliance on Offutt Air Force Base and its associated properties. CEIE can be accessed by the Contractor via the 55th Contracting Squadron (55 CONS) or the Contracting Officer's Representative (COR) or directly at 402-294-4087 during duty hours or 402-650-5685 after duty hours for emergent issues.

1.1.4. Federal Acquisition Regulation (FAR) Clauses to Consider in all contracts:

- FAR Clause 52.223-3, *Hazardous Material Identification and Material Safety Data*
- FAR Clause 52.223-5, *Pollution Prevention and Right-to-Know Information*
- FAR Clause 52.223-7, *Notice of Radioactive Materials*
- FAR Clause 52.223-19, *Compliance with Environmental Management Systems*
- AF FAR Supplement Clause 5352.223-9001, *Health and Safety on Government Installations*

1.2 SAFETY DATA SHEETS (formerly called: MATERIAL SAFETY DATA SHEETS)

1.2.1 Definitions

'Enterprise Environmental, Safety and Occupational Health – Management Information System' (EESOH-MIS) is a single point validated entry, which provides a secure, scalable development environment based on Oracle 9I, that is platform independent. Database allows ESOH to effectively manage multiple years of information and enables users to retrieve historical information regarding hazmat usage and environmental reporting.

'Priority chemical' means a chemical identified by the interagency Environmental Leadership as such.

'Toxic chemical' means a chemical or chemical category listed in 40 CFR Chapter 1, Subpart D, § 372.65.

'Hazardous material' includes the following:

- Hazardous materials as defined by The Department of Transportation in 49 CFR 172
- Hazardous substances, extremely hazardous substances, toxic chemicals and hazardous waste as

defined by EPA in Title III of the Superfund Amendments and Reauthorization Act and the Resource Conservation and Recovery Act, in 40 CFR
- Hazardous Chemicals and Hazardous Substances as defined by the Occupational Safety and Health Administration (OSHA) in 29 CFR 1910, Subpart H – "Hazardous Materials"

1.2.2 Federal facilities must comply with the provisions of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11001-11023) and elements of the Pollution Prevention Act of 1990 (PPA) section 6607 (42 U.S.C. 13106).

The Contractor Reporting sections of Federal Acquisition Regulation (FAR) 52.223-5 (Pollution Prevention and Right-to-Know Information), require Contractors to provide all information needed by the Federal facility to comply with the following:

(1) The emergency planning reporting requirements of Section 370 of EPCRA;
(2) The emergency notice requirements of Section 302 of EPCRA;
(3) The list of Safety Data Sheets required by Section 311 of EPCRA;
(4) The emergency and hazardous chemical inventory forms of Section 312 of EPCRA; and
(5) The toxic chemical release inventory of Section 313 of EPCRA, which includes the reduction and recycling information required by Section 6607 of the Pollution Prevention Act of 1990.

1.2.3 Safety Data Sheets (SDS)
Fifteen (15) working days prior to bringing hazardous materials onto Offutt AFB the Contractor shall submit the Safety Data Sheets and usage information on all hazardous materials they (including all Sub-Contractors) intend to use throughout the life of the contract. The COR will review the information with the Environmental Element.

1.2.4 Storage and Handling
All hazardous materials shall be stored and handled in accordance with all Occupational Safety and Health Administration (OSHA) and National Fire Prevention Association (NFPA) requirements. In addition to those requirements, all storage and staging areas shall be provided with secondary containment and shall be located away from traffic areas and protected from any incursion into the area that could damage the containers or cause a spill. Secondary containment shall be provided by the Contractor to contain at least 110% of the volume of the largest container stored so as to contain any spills or leaks. When stored outdoors, all hazardous materials shall be covered to avoid contact with the elements and to keep precipitation from entering the secondary containment structure.

A Hazardous Material Storage Plan shall be submitted for approval by the Government from the Environmental Element prior to beginning any project. Upon approval from the Government, a copy shall be kept on site and available at all times.

1.2.5 Spill Reporting
The Contractor shall immediately report all spills of hazardous materials to the Government, via the Offutt Fire Department at 402-294-3582, Environmental Element at 402-294-4087, and the Contracting Officer's Representative assigned to the project.

The report shall include the following information:
- Identification of the hazardous material spilled
- Location of release
- Time of release
- Cause of release
- Amount released
- Corrective actions taken

A written report containing the same information as the verbal report shall be submitted for Government records within 24-hours of the release. The Contractor is responsible for the cost of all clean up associated with any release. The Government will file all reports required for environmental regulatory compliance. The

Contractor is responsible for the cleanup of all spilled material, including restoration of all areas contaminated by the spill, and for costs incurred by the Government for any assistance or remedial action taken by the Government on behalf of the Contractor. All clean up and restoration shall be done to the satisfaction of the Government. A copy of all clean up and restoration reports shall be submitted for Government recordkeeping via AF Form 66. Handling and disposal of spill clean-up material shall be in accordance with Paragraph 1.5.4.

1.3 SUBMITTALS

a. Safety Data Sheets (reference paragraph 1.2.3)
b. Hazardous Material Storage Plan (reference paragraph 1.2.4)
c. Spill Reporting (reference paragraph 1.2.5)
d. Contractor Hazardous Request Form (reference paragraph 1.4)
e. Certificate of Hazardous Waste Training (reference paragraph 1.5.1)
f. Waste Analysis Reports (reference paragraph 1.5.4)
g. Request for Disposal (reference paragraph 1.5.4)
h. Test Results (reference paragraph 1.5.4)
i. SPCC Plan (reference paragraph 1.6.2)
j. Petroleum Container Storage Plan (reference paragraph 1.6.2)
k. Report of Waste Water Discharges (reference paragraph 1.7)
l. NPDES Weekly and Post Rain Event Inspection Reports (reference paragraph 1.8)
m. NPDES CSW-NOI Permit and SWPPP (reference paragraph 1.8.1)
n. Project Plan to Control Sediment and Other Contaminants (reference paragraph 1.8.4)
o. NPDES/SWPPP Termination Letter (reference paragraph 1.8.5)
p. NPDES NOI Dewatering Permit (reference paragraph 1.9)
q. NPDES NOI Dewatering Permit Required Reports and Test Results (reference paragraph 1.9)
r. Dewatering Method of Disposal (reference paragraph 1.9)
s. Nonhazardous Solid Waste Diversion Volumes (reference paragraph 1.11)
t. Environmental Training (reference paragraph 1.15)
u. US Army Corps of Engineers Section 404 Permit (reference paragraph 1.16)

1.4 HAZARDOUS MATERIAL AUTHORIZATION - PRIOR TO INSTALLATION ACCESS

Per AFM 32-7002 para 3.3.3., 55 CES/CEIE (Environmental Element) Ensures hazardous materials brought onto the installation by contractors are properly authorized, managed, and tracked, to include completion of appropriate contract close-out actions to remove left-over HAZMAT from the installation developed installation-specific procedures to ensure HAZMAT brought onto the installation by contractors are properly authorized, managed, and tracked. The Contractor shall submit a list of potential hazardous materials either handwritten; or, in Word or Excel format through the Contracting Officer Representative (COR). The COR will submit the Contractor Hazardous Material List and current Safety Data Sheets to the Environmental Office for authorization and assignment of a government hazmat tracking database number within the Enterprise Environmental, Safety and Occupational Health – Management Information System (EESOH-MIS). Once authorized, the Environmental Office will return authorized list back to the COR. For convenience only, the Contractor may utilize the Contractor HAZMAT Request form provided at the end of this section.

FAR Clause 52.223-3 Hazardous Material and Material Safety Data Identification states as follows:

(a) Hazardous material, as used in this clause, includes any material defined as hazardous under the latest version of Federal Standard No. 313 (including revisions adopted during the term of the contract).
(b) The offeror must list any hazardous material, as defined in paragraph (a) of this clause, to be delivered under this contract. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. This information shall also be included on the Safety Data Sheet submitted under this contract.
(c) This list must be updated during performance of the contract whenever the Contractor determines that any other material to be delivered under this contract is hazardous.

1.5 DISPOSAL OF REGULATED WASTES

The Contractor shall comply with all current Air Force, Department of Defense, Federal, State and local laws, regulations, policies and permits concerning the proper handling, accumulation, and disposal of regulated

wastes. These include, but are not limited to:

- Title 40 Code of Federal Regulations (CFR) Parts 260/282 (40 CFR 260-282)
  Federal solid and hazardous waste regulations.
- Title 49 Code of Federal Regulations (CFR) Parts 171-173 (49 CFR 171-173)
  Federal transportation regulations.
- Title 40 Code of Federal Regulations (CFR) Part 112 (40 CFR 112)
  Spill Prevention Control and Countermeasure Plan
- State of Nebraska Administrative Code Title 128
  State solid and hazardous waste regulations.
- City of Omaha Code Chapter 31
  City of Omaha sewer standards
- Offutt AFB Hazardous Waste Management Plan
  Summarizes the hazardous waste accumulation and storage requirements.

1.5.1 Hazardous Waste Training
The Contractor is responsible for ensuring all contract personnel who handle or are exposed to hazardous waste are trained in accordance with applicable regulations and requirements. The Contractor shall maintain hazardous waste training records for all contract personnel. These records will be maintained at the jobsite and available to Government personnel upon request.

1.5.2 Accumulation, Storage, and Sampling Wastes
Contractor activities that generate hazardous waste must operate an Initial Accumulation Point (IAP) for the collection of wastes. The IAP must have its siting approved by the Government (Offutt Fire Department, Ground Safety, Bioenvironmental Engineering and Environmental Compliance). The operation of the IAP must conform to 40 CFR 262.15 and the Offutt AFB Hazardous Waste Management Plan (HWMP). Waste sampling shall be accomplished by the Contractor at an accredited laboratory at no additional cost to the Government. Waste analysis records shall be maintained by the Contractor and forwarded to the Government. Waste accumulated at the IAP shall be correctly disposed by the contractor. No contractor waste is to be left behind. Contractor waste shall not be left behind to include partially used or unused Hazardous Materials, even if they plan to return to similar project at a later time during the year or the following years. The contractor will be contacted to remove and dispose of same at their expense.

1.5.3 Containers and Containment
The Contractor shall supply all waste storage containers, which shall be new or refurbished and labeled as Department of Transportation (DOT) approved. Containers shall be compatible with the material/waste stored in them. Secondary containment, as required in Paragraph 2.4, for all containers shall be provided by the Contractor. All additional storage and handling requirements of the Offutt AFB HWMP shall be followed.

1.5.4 Disposal Procedures
The Contractor shall dispose of all hazardous wastes in accordance with all current applicable regulations and policies. Waste Analysis Reports, including but not limited to, sampling results, safety data sheets and waste stream information will be provided to the Government via AF Form 66. Waste may not be accumulated in excess of 55 gallons.

Fluorescent lamps, bulbs, and all batteries except lead acid (recycled) may be reused by base facility users if still in working condition; otherwise, these items are considered a *Universal Waste* and must be removed from equipment or fixtures and placed in an approved container for proper disposal through a *Universal Waste* handler and disposal facility. Note, *Universal Waste* items cannot go in a solid waste dumpster or landfill.

Prohibited wastes are liquids or liquids containing solids that are prohibited by City of Omaha Code from being disposed of to the sanitary sewer. The Contractor shall submit test results for the Government to determine proper disposal.

Special wastes (e.g. fuel-contaminated soil) are wastes which may be disposed of at specially-designated landfills, with the landfill's prior approval. The Contractor must submit a Request for Disposal at the landfill

along with any landfill-required Testing Analysis, and receive Government approval for disposal of special wastes to a landfill. The Contractor is responsible for all costs associated with disposal of special wastes.

Non-regulated wastes shall be disposed of at a Nebraska Department of Environmental & Energy (NDEE) approved landfill. The Contractor is responsible for all costs associated with the disposal of non-regulated wastes.

1.6 SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) PLAN

1.6.1 Condition of Equipment
All Contractor equipment (including containers and vehicles) shall be kept in good condition while on Offutt AFB property. Any equipment found leaking or dripping any hazardous material shall be taken out of service immediately until repaired and all spilled material shall be cleaned up in accordance with the requirements of Paragraph 1.2.5.

1.6.2 SPCC Plan
The Contractor is responsible for handling, using, and storing all regulated petroleum oil (including fuel) on the facility in accordance with the requirements of 40 CFR 112 and Offutt's Integrated Contingency Plan (ICP). Prior to bringing any petroleum storage container on base the Contractor shall submit certification for Government approval that the owner of the container has in-place a Spill Prevention Control and Countermeasures (SPCC) Plan in accordance with 40 CFR 112 and that the container is a part of that plan. The Contractor shall submit a Petroleum Container Storage Plan for Government approval prior to transporting or storing any petroleum-based products on Offutt AFB. The plan shall include the following information:

(a) Site plan with the location of containers
(b) Capacity of each container
(c) Contents of each container
(d) Containers must have secondary containment that will contain at least 110% of the capacity of the container. If secondary containment is not available the container must be labeled with a certification that it has passed integrity testing performed in accordance with 40 CFR 112 within the past two years.
(e) List (type and quantity) of spill control and clean-up materials in sufficient quantity to contain and clean up the quantity of regulated petroleum products stored, and
(f) Certification that the tanks meet the following requirements:

- The capacity of the tank shall not exceed 12,000 gal (45,420 L).
- All piping connections to the tank shall be made above the normal maximum liquid level.
- Means shall be provided to prevent the release of liquid from the tank by siphon flow.
- Means shall be provided for determining the level of liquid in the tank. This means shall be accessible to the delivery operator.
- As a minimum, all fuel storage tanks shall have as a minimum a functioning fuel level site gauge, when the fuel storage tank reaches about 90 percent full by visual observation, the person responsible for issuing fuel shall stop further fueling processes for that storage tank. Otherwise, a means shall be provided to prevent overfilling by sounding an alarm when the liquid level in the tank reaches 90 percent of capacity and by automatically stopping delivery of liquid to the tank when the liquid level in the tank reaches 95 percent of capacity. In no case shall these provisions restrict or interfere with the proper functioning of the normal vent or the emergency vent.

1.7 WASTE WATER DISCHARGES

The Contractor shall not discharge any waste water onto the ground or into any Waters of the State (including all storm water inlets and open drainage ditches) unless expressly permitted to do so by NDEE. Any release of waste water onto the ground or into Waters of the State (including all storm water inlets and open drainage ditches) from Offutt's sanitary sewer collection system shall be immediately reported to the Government via the Environmental Element at 402-294-4087 during duty hours or 402-650-5685 after duty hours for emergent issues.

The report shall include the following information:

- Location of release
- Time of release
- Cause of release
- Amount released
- Corrective actions taken

The Contractor is responsible for the cost of all clean up associated with any release. A written report containing the same information as the verbal report shall be submitted for Government records within 24-hours of the release.

1.8 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS FOR CONSTRUCTION ACTIVITIES

Construction activities (including other land-disturbing activities) that disturb one (1) acre or more are regulated under the NPDES storm water program and require a NPDES Permit for Storm Water Discharges from a Construction Site. This includes smaller sites that are part of a larger common plan of development that will or has the potential to disturb one (1) acre or more of land over the duration of the contract. The Contractor is responsible for all material and labor costs associated with the required permit. A copy of the standard permit for construction sites is available on the NDEE web site. The Contractor shall submit to the Government all Weekly Inspection Reports as well as required inspections after rain events in .pdf format and upload to a log on the required website submittal system. Note that where state and Environmental Protection Agency (EPA) guidelines conflict, the more stringent shall apply on federal installations.

1.8.1 Permit Application

Operators of regulated construction sites equal to or greater than one (1) acre are required to obtain permit coverage from the Nebraska Department of Environmental Quality (NDEE) and to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the permit. A copy of the Construction Storm Water - Notice of Intent (CSW-NOI) submittal and the SWPPP required by NDEE shall be submitted for approval by the Government to the Environmental Element prior to beginning any project. Upon approval from the Government and receipt of the CSW Permit issued by NDEE, a copy shall be submitted to the Government for recordkeeping and a copy shall be kept on site and available at all times.

1.8.2 Storm Water Pollution Prevention Plan (SWPPP) for State-regulated sites.

In addition to the NPDES requirements in the SWPPP, the following items shall also be addressed:

- Spill prevention and control for materials and wastes,
- Construction debris and litter management,
- Concrete waste management (including rinsing concrete from trucks),
- Sanitary/septic waste management,
- Liquid waste management.

Contractors shall use the EPA SWPPP Template available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates for all SWPPP submittals, and Contractors shall reference the City of Omaha storm water website, www.omahastormwater.org and the Omaha Regional Storm Water Design Manual, http://omahastormwater.org/orsdm/ in their preparation. SWPPP samples and guides are available at these websites, and additional questions regarding the creation and approval of the SWPPP should be directed via the COR or 55 CONS to the Environmental Element's Storm Water Program Manager at 402-294-4087 during duty hours or 785-221-3404 after duty hours for emergent issues.

Prior to beginning construction, the Contractor shall have both a NDEE CSW-NPDES Permit and approval of the SWPPP from the Government.

1.8.3 Grading and Erosion Control

Temporary and permanent structural practices shall be installed in accordance with the City of Omaha Soil Erosion and Sediment Control Manual (copies available from the city of Omaha Public Works Department) and maintained in accordance with the issued NPDES permit requirements to eliminate sediment and other

contaminants from leaving the construction site.

Documentation of all inspections required by the permit shall be kept on site in accordance with the permit and copies of all documentation shall be submitted for Government recordkeeping within two (2) days of the completion of the document. Any deficiencies with the SWPPP discovered during the course of the project shall be corrected immediately.

1.8.4 Construction Activities Less Than One Acre
Beyond industry standard best management practices, construction activities that disturb less than one acre normally do not require any special plans or submittals. The Government, at its discretion, reserves the right to require submittal for Government approval of a project plan addressing the installation and maintenance of temporary and permanent structural devices and practices (conforming to the City of Omaha Soil Erosion and Sediment Control Manual) to eliminate sediment and other contaminants from leaving the construction site. If the Government requires this plan, the Contractor shall have 30 days to complete submission to the Government and inspections of the control structures are required at the same frequency as if a permit was received from the State of Nebraska.

1.8.5 NPDES / SWPPP Termination Letter
Per State of Nebraska requirements, termination of the permit is required in writing at the completion of construction. A copy of the Contractor's letter to the state and the State's response shall be submitted to the Government. If the site is less than 1 acre and a State permit is not required, the Contractor shall submit a letter to the Government terminating their SWPPP.

1.9 NPDES PERMIT FOR DEWATERING OPERATIONS
All dewatering operations (including, but not limited to, pumping from an excavation, lowering the groundwater level via well points, hydrostatic testing, etc.) require dewatering permits issued by NDEE. The Contractor is responsible for obtaining and meeting all the requirements of dewatering permits. A copy of the NOI for the Dewatering Permit shall be submitted to the Government for review and approval. No dewatering operation shall occur until a permit has been issued by NDEE to the Contractor and submitted to the Government for verification. Copies of all reports, inspections, analytical testing, etc. required as part of the permit requirements shall be submitted to the Government within two (2) days of completion. If any of these items are to be submitted to NDEE, a copy of the submittal letter to NDEE will accompany the Government submittal. For dewatering in areas with contaminated groundwater, the Contractor shall be responsible for weekly sampling and analysis for priority pollutants (Volatile Organic Chemicals [VOCs] and semi-VOCs, metals, etc.) in accordance with the permit requirements. In addition, the Contractor shall submit for Government approval the Method of Disposal of the water. If analysis indicates contamination levels below the permit limits, the Contractor, upon Government approval, can discharge the water to the storm sewer. The Contractor shall be responsible for all the material and labor cost associated with the requirements of the permit and discharging the water to either type of sewer based on the weekly analytical results. The Contractor is not responsible for any sewer fees for disposal of effluent from an approved dewatering operation to the sanitary sewer.

1.10 AIR PROGRAM REQUIREMENTS
New equipment install(s) that may use a fuel source, store a fuel source, or evaporation cooling such as a generator with tank, boiler, cooling tower/evaporator, and storage tank must first be coordinated through 55 CES/CEIE, 402-294-4087. The Contractor shall ensure compliance with all current Air Force, Department of Defense, Federal, State and local laws, regulations, instructions, policies and permits, including Nebraska Administrative Code (NAC) Title 129, relating to Air Quality, prior to beginning construction work.

Any questions regarding Air Quality requirements should be directed via 55 CONS or the COR to the Environmental Element's Air Quality Program Manager at 402-294-4087 during duty hours or 402-650-5685 after duty hours for emergent issues.

The 55 CONS, 55 CE/55 CE CORs to include US Army Corps of Engineers (USAGE) CORs, and their contractors or staff shall apply for a Nebraska of Environment and Energy (NDEE) Air Quality Construction permit, 30+ days prior to construction, anytime a new or modified generator or cooling tower is installed on Offutt AFB IAW Offutt AFB's Air Quality (AQ) Synthetic Minor Permit. Also 30+ days prior notification to

NDEE is required IAW title 129/AQ Synthetic Minor Permit before the generator/cooling tower goes online or is tested. The CORs/staff members can keep the Instillation AQ Manager up to date with NDEE

correspondence and decision making during the permitting process. "*Air Quality Construction Permits*" http://dee.ne.gov/Publica.nsf/pages/05-165 and "*What is Potential to Emit (PTE)?*" http://dee.ne.gov/Publica.nsf/pages/18-005. Paper copies of forms and guidance documents are available on request or downloadable via the Department's website: http://dee.ne.gov/ .

1.11 NONHAZARDOUS SOLID WASTE DIVERSIONS

In keeping with the Air Force solid waste diversion rate goal, the Contractor shall divert at least 50% of the construction and demolition debris generated during the project. The waste may be reused, recycled, sent to a waste-to-energy incinerator, or managed in another approved manner that keeps it from going to a landfill. The Contractor shall track and report the amount of construction and demolition debris disposed in a landfill, recycled, or sent to a waste-to-energy incinerator each quarter. The following form shall be completed and submitted to the Government no later than the first working day after the end of each quarter (31 Dec, 31 Mar, 30 Jun, and 30 Sept of any year). AFMAN 32-7002 *Environmental Compliance and Pollution Prevention*, para 6.8.2, Installation civil engineering must ensure weight and cost data for C&D debris diverted and disposed are documented and reported to the Office of the Secretary of Defense in accordance with DoDI 4715.23.

Contact Information		
Name		
Phone		
Date		
Fiscal Year Quarter Q1 =October 1 - December 31 Q2 = January 1 - March 31 Q3= April 1 - June 30 Q4 = July 1 - September 30		
Project Name(s) (e.g. construction of Wing Headquarters)		
Construction and demolition related solid waste disposal data (Do not include base-wide routine solid waste picked up by BFI)		
Total solid waste disposed (cost and tons)	Cost:	Tons:
Construction and demolition related recycling data (Do not include base-wide, routine recycling such as aluminum cans and paper.)		
Total recycled (tons and cost)	Cost:	Tons:
Materials recycled (provide cost and tonnage)		
Asphalt	Cost:	Tons:
Concrete	Cost:	Tons:
Wood scrap	Cost:	Tons:
Metal	Cost:	Tons:
Soil	Cost:	Tons:

Other recycling (Do not include base-wide, routine recycling such as aluminum cans and paper.) Describe and provide tonnage.	
Items reused that would otherwise be disposed. Describe and provide tonnage.	

NON-HAZARDOUS SOLID WASTE DIVERSION

1.12 EXCAVATION ENVIRONMENTAL RESPONSE PROCEDURES

In the past, burial /dumping was an industry accepted practice often used to dispose of materials no longer needed or wanted. Accidental spills also occurred periodically. Since the mid-1980's, the OAFB environmental program has been identifying, investigating, and remediating as necessary, waste disposal and spill sites. During any grading or excavation there is potential to uncover previously unknown waste or spilled material.

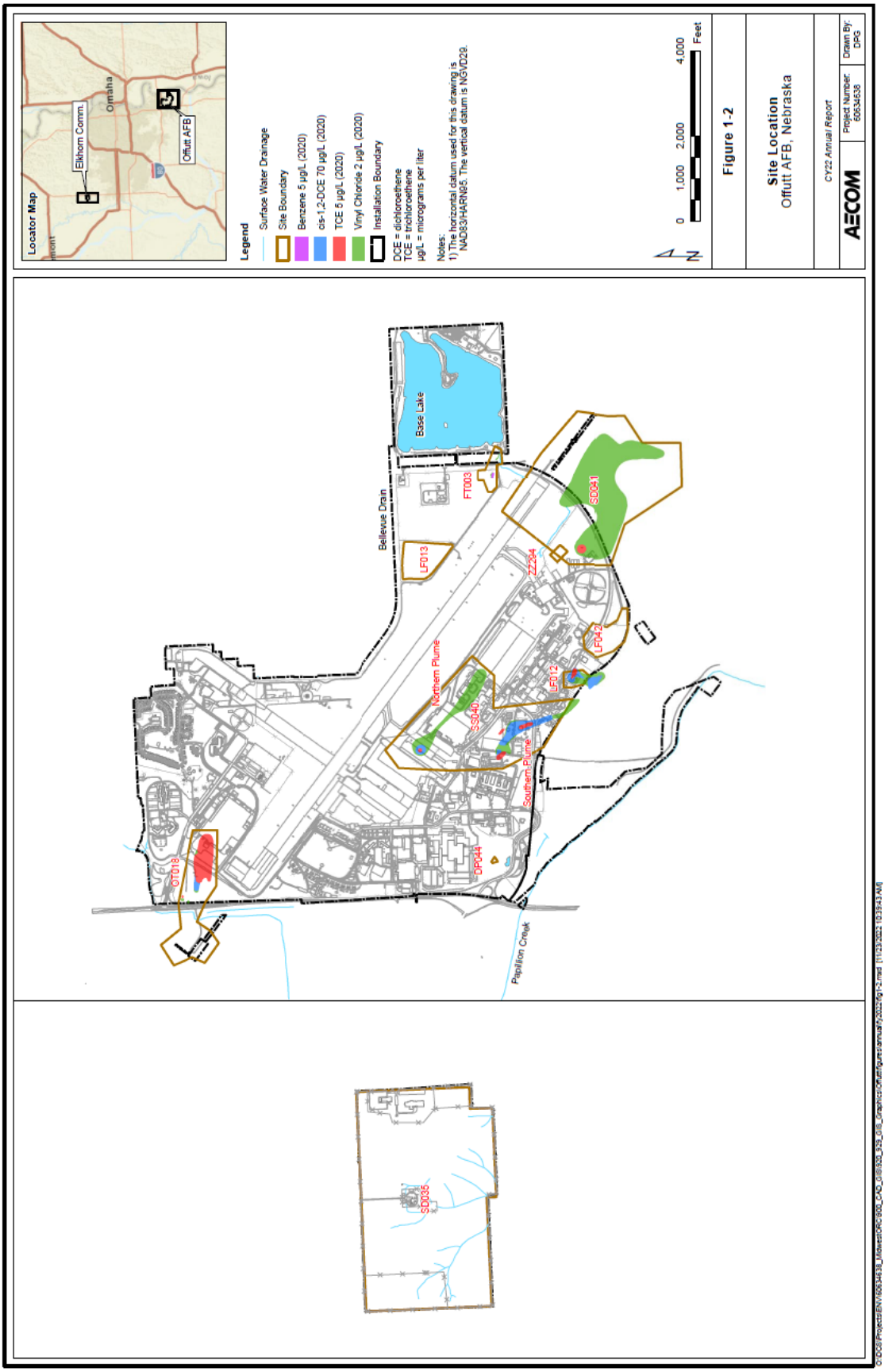
Known contaminated sites and groundwater contaminant plumes are identified in Figure 1, below. The areas currently under investigation for PFAS are identified in Figure 2 and highly subject to change since the plume delineation work is on-going. Work affecting soil or groundwater must first be coordinated with the Offutt Environmental Restoration Program Manager (AFCEC/CZOM) located in Building 88 at 402-294-1387.

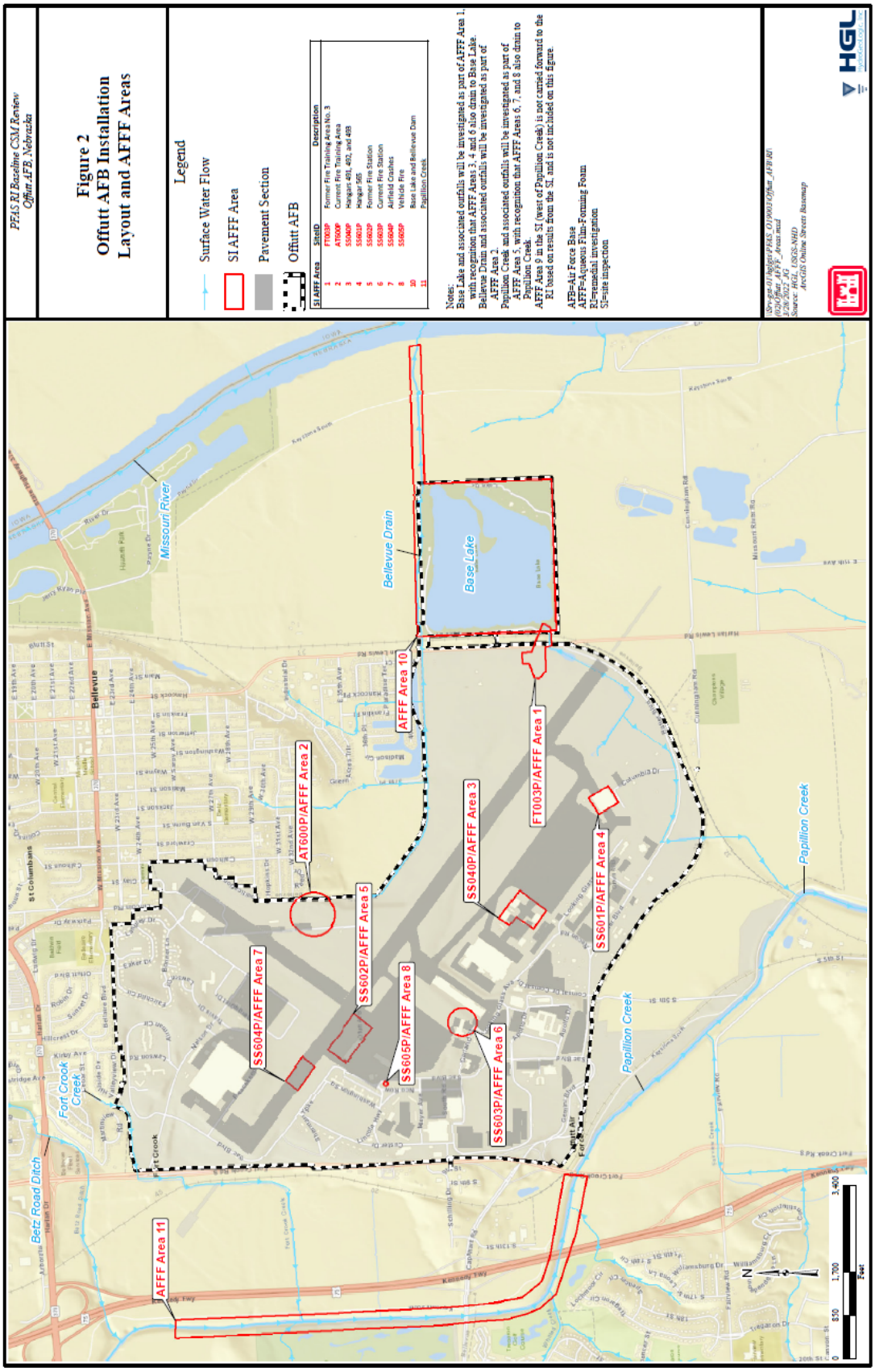
Response - If the contractor encounters unusual materials* during excavation or grading, the contractors shall:

1. Immediately stop the excavation or grading operation.
2. Shut down the equipment and leave it in its present location.
3. Do not attempt to determine the contents of any bottles, containers, boxes, etc.
4. Withdraw personnel from the equipment and the excavation a distance of at least 50 feet upwind or cross wind or as directed.
5. Contact the escort, inspector, contracting officer or the contracting officer's designated representative immediately, or call 911.
6. Remain in the area until released by the CO or designated representative.

*Unusual Material - Unusual material as used in this section shall mean any materials other than soils, rock or bedrock encountered during excavation that is not specifically identified as part of the work in the contract document. This includes but is not limited to: stained soils; free product fuels, oils, etc.; suspicious odors; bottles, cans, drums, or other containers; wooden, metal, or cardboard boxes; rags, gloves, or personal protective equipment; trash or common landfill debris; concrete, concrete block, wood, metal, or other building materials and construction debris; or any other unidentified materials.

Every contractor and subcontractor employee shall be briefed on the response procedures in this section prior to beginning work on OAFB. Training shall be documented by the employee signing and dating a training log sheet. Log sheet shall be maintained on the immediate jobsite in the contractor's project office and shall be available for inspection by the contracting officer or designated representative. Response procedures review shall be included in the contractor's periodic safety meetings.


Locator Map
Elkhorn Comm.
Omaha
Offutt AFB
Legend
Surface Water Drainage
Site Boundary
Benzene 5 µg/L (2020)
cis-1,2-DCE 70 µg/L (2020)
TCE 5 µg/L (2020)
Vinyl Chloride 2 µg/L (2020)
Installation Boundary
DCE = dichloroethene
TCE = trichloroethene
µg/L = micrograms per liter
Notes:
1) The horizontal datum used for this drawing is NAD83/HARN95. The vertical datum is NGVD29.
0 1,000 2,000 4,000 Feet
Figure 1-2
Site Location
Offutt AFB, Nebraska
CY22 Annual Report
AECOM
Project Number: 60634638
Drawn By: DPG
Base Lake
Bellevue Drain
FT003
LF013
SD041
ZZ234
LF042
LF012
Northern Plume
SS040
Southern Plume
DP044
OT018
Papillion Creek
SD035


PFAS RI Baseline CSM Review
Offutt AFB, Nebraska
Figure 2
Offutt AFB Installation
Layout and AFFF Areas
Legend
Surface Water Flow
SI AFFF Area
Pavement Section
Offutt AFB
SI AFFF Area | SiteID | Description
1 | FT003P | Former Fire Training Area No. 3
2 | AT600P | Current Fire Training Area
3 | SS040P | Hangars 489, 492, and 498
4 | SS601P | Hangar 585
5 | SS602P | Former Fire Station
6 | SS603P | Current Fire Station
7 | SS604P | Airfield Crashes
8 | SS605P | Vehicle Fire
10 | Base Lake and Bellevue Dam
11 | Papillion Creek
Notes:
Base Lake and associated outfalls will be investigated as part of AFFF Area 1, with recognition that AFFF Areas 3, 4 and 6 also drain to Base Lake.
Bellevue Drain and associated outfalls will be investigated as part of AFFF Area 2.
Papillion Creek and associated outfalls will be investigated as part of AFFF Area 5, with recognition that AFFF Areas 6, 7, and 8 also drain to Papillion Creek.
AFFF Area 9 in the SI (west of Papillion Creek) is not carried forward to the RI based on results from the SI, and is not included on this figure.
AFB=Air Force Base
AFFF=Aqueous Film-Forming Foam
RI=remedial investigation
SI=site inspection
\\Sp-gis-01\Projects\PFAS_O13000\Offutt_AFB\RI
(020)\Offutt_AFFF_Areas.mxd
2/28/2024 12:12 PM CST
Source: FSA, USGS, NHD
ArcGIS Online Streets Basemap
HGL
AFFF Area 11
Betz Road Ditch
Fort Crook Creek
SS604P/AFFF Area 7
AT600P/AFFF Area 2
SS602P/AFFF Area 5
SS605P/AFFF Area 8
SS603P/AFFF Area 6
SS040P/AFFF Area 3
FT003P/AFFF Area 1
AFFF Area 10
SS601P/AFFF Area 4
Bellevue Drain
Base Lake
Missouri River
Papillion Creek
Bellevue
0 850 1,700 3,400
Feet

1.13 ARCHEOLOGICAL DISCOVERIES

If archeological discoveries are encountered during construction, the Contractor shall immediately cease operations and report their findings to the COR who will consult with the installation Cultural Resource Manager (CRM) in the Environmental Element at 402-294-4087 during duty hours or 402-650-5685 after duty hours for emergent issues.

1.14 TESTING

The Contractor shall analyze and test environmental samples using standardized methods in current editions of approved testing references such as SW-846, "*Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*"; 40 CFR 136, "*Guidelines Establishing Test Procedures for the Analysis of Pollutants*"; and "*Standard Examination of Water and Wastewater*". The Contractor shall ensure the defensibility of test and analytical results through execution of sound scientific principles.

1.15 DUST CONTROL

Control of dust during construction, demolition activities, debris removal and any other activities required as a part of the work under this contract must be thorough and complete. For outdoors construction, dust and/or particulate matter associated with the construction process shall not become airborne in such quantities and concentrations that it remains visible in the ambient air beyond the boundaries of the construction site. Dust control shall be addressed in the Storm Water Pollution Prevention Plan (SWPPP) as required by Section 1.8, above.

1.16 ENVIRONMENTAL MANAGEMENT SYSTEM

The Air Force has implemented an Environmental Management System (EMS). Every contract employee that will physically work on the installation is required to be familiar with and understand the installation Environmental Policy which is posted on Offutt AFB public web page at

https://www.offutt.af.mil/Portals/97/Resources/Environmental/EMS%20Tri-fold%202024v2.pdf?ver=KmXIzZbAzyMZCoCMQK7Duw%3d%3d&timestamp=1719348624502

The acronym ***P.I.C.K.*** may be useful in remembering and demonstrating familiarization with this policy. The policy contains overarching commitments that include ***P***ollution Prevention, ***I***mproving Continuously, ***C***ompliance with applicable environmental laws and policies, and ***K***now how one's job impacts the environment.

Additionally, every contract employee that will physically work on the installation is required to know the environmental requirements that apply to their duties and receive appropriate environmental training.

In the event the contracting officer determines it to be necessary, the Contractor shall provide proof of completion of such training by employees and subcontractors to the contracting officer.

Publically accessible web-based training is available at no cost at The Environmental Awareness Course Hub, otherwise known as TEACH, (https://usaf.learningbuilder.com).

1.17 JURISDICTIONAL WETLANDS

The Contractor shall obtain approval from the Government prior to conducting any work in, or potentially impacting, a ditch, stream, or other body of water which may be classified as a jurisdictional wetland on Offutt AFB property, per 33 CFR 328 and 40 CFR 230 Section 404(b). If the area is deemed to be a jurisdictional wetland, a section 404(b) permit must be obtained by the Contractor from the US Army Corps of Engineers prior to the start of any work. If applicable, a copy shall be submitted to the Government for recordkeeping and a copy shall be kept on site and available at all times.

1.18 RADIOACTIVE SOURCES

Any Contractor required to bring materials of a "Radioactive Source" onto Offutt AFB property must have the prior written approval of the Offutt AFB Radiation Safety Officer (RSO), located in the Bioenvironmental

Engineering Flight. The RSO can be reached at (402) 294-6319. A copy of the written permission shall be kept on site and available at all times.

1.19 REGULATORY INSPECTIONS

The Contractor shall immediate report inform regulatory inspections to the Environmental Element office, 55 CES/CEIE, at 294-4087 that is coordinated through the Contracting Officer's Representative assigned to the project. Written notices of noncompliance from regulatory agencies are reported in accordance with AFI 32-7001, paragraphs 2.31.10 and 2.31.11.

1.20 ENDOPHYTE FESCUE GRASS IMPLEMENTATION

Within runway security fencing and where possible at the end of runways, Endophyte fescue grass MUST be utilized to reduce potential aircraft bird air strikes.

1.21 BUILDING FOUNDATION AND TERMITE CONTROL

During new building construction and any alterations near existing building foundations must utilize Fipronil pesticide to maintain a permanent continuous barrier necessary to prevent termite infestation. Reference DoDI 4150.07 DoD Pest Management Program, effective 26 Dec 2019, para 1.2 Policy. The DoD: c. Uses AFPMB-approved, Environmental Protection Agency (EPA)-registered pesticides applied by trained and certified pesticide applicators. https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodi/415007p.pdf

Note, Premise isn't on the DoD Approved Insecticide list.
https://extranet.acq.osd.mil/eie/afpmb/cac/standardlists/DOD_PEST_MANAGEMENT_MATERIAL_LIST.pdf

Reference DoDI 4150.07, Vol 1, 22 Jan 2020, Section 4.3 PEST MANAGEMENT MATERIEL PESTICIDE ACQUASITION, b. After receiving Pest Management Consultant approval, authorities may locally procure pest management materiel that complies with applicable federal, State, local, and HN requirements if that procurement is in response to an emergency or a unique local situation, or when the materiel is to be used in such small quantities that NSN assignment is not feasible.
https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodm/415007_vol1.pdf?ver=2020-01-22-132922-467

UFGS-31 31 16.13, Aug 2022, Part 1 General, modification of this section, including materials, concentrations, or rates of application, which are considered necessary because climatic conditions, porosity of soil to be treated, type of termite, or heavy infestation of termites, will be in accordance with the guidance contained in the installation pest integrated management plan.

1.22 ALL STORAGE TANKS THAT WILL CONTAIN OIL, 55 GAL AND LARGER

New tanks must first be coordinated through 55 CES/CEIE, 402-294-4087. Complete Nebraska state fire marshal (SFM) storage tank installation application forms plus a $50 application fee to the SFM office. Note, no fuel can be placed in any newly installed fuel tank without the written approval from the SFM office. If possible, ASTs should be used instead of USTs, or where a UST is required as mission essential, then consider installing an AST in a subterranean enclosure with an open reinforced roof structure covered with open steel walkway panels.

END OF SECTION

Underground Storage Tank (UST) for Secondary Containment Integrity Testing Form

UFC 3-460-03
10 November 2017
Change 1, 29 April 2021

\1\

APPENDIX B CONTAINMENT INTEGRITY TESTING CHECKLIST

Secondary Containment/Drainage System Integrity Testing			
UST Facility		**Person Conducting Test**	
Facility Name	Facility ID#	Tester's Name:	
Physical Address		Testing Company:	
City	State	City	State

Testing Requirements	
Type of Test	☐ Code of practice developed by a nationally recognized association or independent testing
Purpose of Test	☐ Notice of Alleged Violation
	☐ Required Annual Test
	☐ Post Repair Test

Liquid Tight Test Procedure

1. Clean containment of any debris.
2. Visually exam containment area for problem areas (gaps, cracks, sealant failure, etc.)
3. Make sure drainage valve is completely closed, *IF* adding water.
4. Add water to observe standing water at a highest point within the containment area (or conduct this test after a rain event where water has filled the secondary containment area).
5. Ensure water is calm (i.e. it is not still raining), and mark and record the high water line (e.g. using a tape measure with 1/16-in increments).
6. Leave water in containment, undisturbed for one hour (i.e. no operations are taking place).
7. Compare the starting water level to the ending level:
   - If the water level is the same or changed less than 1/8th (vertical) inch, the containment passed the test.
   - If the water level has dropped 1/8th inch or more, an investigation must be conducted.
8. After the investigation, justify why this is not a leak or identify the leak and necessary repairs.

Test Data Table						
Test Date						
Containment Item ID No.						
Test Start Time						
Test End Time						
Test Beginning Water Level						
Test Ending Water Level						
Test Result (P/F)						
Comments:						

I hereby certify that all the information contained in this report is true, accurate, and in full compliance with legal requirements. Maintain six (6) years of test records. (Two Test Periods)

Tester's Signature: _____ Date:_____

UFC 3-460-03
10 November 2017
Change 1, 29 April 2021

Secondary Containment Drainage System Integrity Testing

General Guidance

Who must complete this form?
Any person or their authorized representative (such as a tester or contractor) that conducts the secondary containment liquid tight testing.

What sites must complete this testing?
All underground secondary containment drainage systems to include bulk fuel storage, aircraft fueling systems, truck and railcar loading & unloading areas, marine facilities, and ground vehicle fuel facilities.

Petroleum Equipment Institute (PEI) Recommended Practice 1200-17: *Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at Underground Storage Tank Facilities* is an acceptable protocol.

Instructions for Completing the Fill-Port Containment Integrity Form:

UST Facility Information: Enter name and complete address of the facility, and the permit identification number for the facility.

Person Conducting the Test: Enter the tester's name and their company (if not completed by site operator) including the city and state from which they operate.

2) Purpose of the Test: Indicate by checking the box why the test is being done. Note: Testing must occur after repairs or replacement of parts connected to secondary containment.

Liquid Tight Test Procedure: Please review the methodology (if this is the desired test) before conducting the test.

Test Data Table:

1) Test Date: Indicate the date YYYYMMDD the test was completed
2) Indicate the starting and ending time for each Fill-Port Containment being tested.
3) Indicate the starting and ending water level for each Fill-Port Containment being tested.
4) Indicate if the test passed (P) or failed (F).
5) Comments: Add any comments or notes, particularly if there were any failing results.

Tester's Signature: The person conducting the test must sign and date the test.

CONTRACTOR HAZARDOUS MATERIALS REQUEST. . . *for Offutt AFB*

REQUIREMENT: AFM 32-7002 para 3.3.2.2.2. Ensure hazardous materials brought onto the installation by contractors are properly authorized, managed, and tracked, to include completion of appropriate contract close-out actions to remove left-over HAZMAT from the installation.

SAFETY DATA SHEETS (SDSs): Submit current SDSs for all HAZMAT to be used on base with this completed form.

NOTES:

1. Contractors will use this form to request authorization for potential HAZMAT use before they are brought on Offutt AFB.
2. Contractors must remove all remaining chemicals brought on base by final project acceptance or beneficial occupancy.

Project Number/Title: _____ Project Start Date: _____

Project Location: _____ Project End Date: _____

Contractor Company Name: _____ Contact Name : _____

Contact Phone: _____ Contact eMail Address: _____

INSTRUCTION: List information from the SDSs below, use additional lines and sheets as necessary. **NSN - National Stock Number*

	Product Name	Manufacturer Name	*NSN or SDS #:	SDS Date	Container		Government Authorizing Signature	Date
					Size	Qty		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

SECTION 02 41 00

DEMOLITION
08/22

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 PROFESSIONALS (ASSP)

ASSP A10.6	(2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

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 Definitions

1.2.1.1 Demolition

Demolition is the process of tearing apart and removing any feature of a facility together with any related handling and disposal operations.

1.2.1.2 Demolition Plan

Demolition Plan is the planned steps and processes for managing demolition activities and identifying the required sequencing activities and disposal mechanisms.

1.2.2 DemolitionPlan

Prepare a Demolition Plan and submit proposed demolition, and removal procedures for approval before work is started. Include in the plan procedures coordination with other work in progress, and a disconnection schedule of utility services. Coordinate with Waste Management Plan. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan must be approved by Contracting Officer prior to work beginning.

1.2.3 General Requirements

Do not begin demolition until authorization is received from the Contracting Officer. The work includes demolition and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. 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 17, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Comply with FAR 52.236-9 to protect existing vegetation, structures, equipment, utilities, and improvements. 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 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, and which are indicated to be left in place 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. the Government or utility provider will disconnect and seal utilities serving each area of alteration or removal upon written request from 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.

1.5 SUBMITTALS

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

SD-01 Preconstruction Submittals

Demolition Plan; G

Existing Conditions

SD-07 Certificates

Notification; G

SD-11 Closeout Submittals

Receipts

1.6 QUALITY ASSURANCE

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the State's environmental protection agency and 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 ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.6.1 Dust and Debris Control

Prevent the spread of dust and debris 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.

1.7 PROTECTION

1.7.1 Traffic Control Signs

a. Where pedestrian and driver 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. Notify the Contracting Officer prior to beginning such work.

1.7.2 Protection of Personnel

Before, during, and after the demolition work continuously evaluate the condition of the site-specific features being demolished and take immediate action to protect all personnel working in and around the project site.

1.8 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 or the Contracting Officer's Representative showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs or electronic images with a minimum resolution of 3072 x 2304 pixels, capable of a print resolution of 300 dpi, 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 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 to the Contracting Officer or the Contracting Officer's Representative.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Disassemble existing construction scheduled to be removed for reuse. Dismantled and removed materials are to be separated, set aside, prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Designate materials for reuse onsite whenever possible.

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.

3.1.2 Paving and Slabs

Sawcut and remove concrete and asphaltic concrete paving and slabs including aggregate base as indicated. Provide neat sawcuts at limits of pavement removal as indicated. Remove pavement and slabs not to be used in this project from the project site at Contractor's expense.

3.1.3 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. Make finished surfaces of patched area flush with the adjacent existing surface and match the existing adjacent surface as closely as possible to texture and finish. Provide patching as specified and indicated, and include the following:

a. Concrete and Masonry: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing masonry walls to remain, with an approved masonry 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 and not reused , become the property of the Contractor and must be removed from Government property. Materials approved for storage by the Contracting Officer must be removed before completion of the contract. 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. 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 from project site and similar excavations. 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 off of Base property. Storage of removed materials on the project site is prohibited.

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 demolition from Government property for legal disposal. Dispose of waste soil as directed.

-- End of Section --

SECTION 03 30 00

CAST-IN-PLACE CONCRETE
02/19, CHG 9: 08/24

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 (ACI)

ACI 117	(2010; R 2015) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 301	(2020) Specifications for Structural Concrete
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2023) Specification for Curing Concrete
ACI MNL-2	(2019; 11th Edition) ACI Manual of Concrete Inspection
ACI MNL-15	(2020) Field Reference Manual: Specifications for Concrete Construction ACI 301-20 with Selected ACI References

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2024) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A775/A775M	(2022) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A934/A934M	(2022) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM C31/C31M	(2024c) Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C33/C33M	(2024a) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2024) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C78/C78M	(2022) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C94/C94M	(2024c) Standard Specification for Ready-Mixed Concrete
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C138/C138M	(2024a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2024) Standard Specification for Portland Cement
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2024a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2024) 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 C311/C311M	(2024) Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C330/C330M	(2017a) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C494/C494M	(2024) Standard Specification for Chemical Admixtures for Concrete
ASTM C567/C567M	(2019) Determining Density of Structural Lightweight Concrete
ASTM C595/C595M	(2024) Standard Specification for Blended Hydraulic Cements

ASTM C618	(2023; E 2023) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C803/C803M	(2023) Standard Test Method for Penetration Resistance of Hardened Concrete
ASTM C845/C845M	(2018) Standard Specification for Expansive Hydraulic Cement
ASTM C873/C873M	(2015) Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds
ASTM C900	(2015) Standard Test Method for Pullout Strength of Hardened Concrete
ASTM C920	(2018; R 2024) Standard Specification for Elastomeric Joint Sealants
ASTM C989/C989M	(2024) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1012/C1012M	(2024) Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution
ASTM C1074	(2019; E 2021) Standard Practice for Estimating Concrete Strength by the Maturity Method
ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1157/C1157M	(2023) Standard Performance Specification for Hydraulic Cement
ASTM C1218/C1218M	(2020c) Standard Test Method for Water-Soluble Chloride in Mortar and Concrete
ASTM C1240	(2020) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2023) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

ASTM C1567	(2023) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2022) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C1778	(2023) Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2628	(1991; R 2016) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	(1989; R 2017) Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D5759	(2012; R 2020) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2021) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E329	(2023) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

COMPOSITE PANEL ASSOCIATION (CPA)

ANSI/CPA A135.4	(2012; R2020) Basic Hardboard

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2018; Errata 2019) Manual of Standard Practice
CRSI RB4.1	(2016) Supports for Reinforcement Used in Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.2 DEFINITIONS

a. "Cementitious material" as used herein includes all portland cement, pozzolan, fly ash, slag cement, and silica fume.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Supplementary cementing materials" (SCM) include coal fly ash, silica fume, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.

e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.

f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.

g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.

h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.

i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mold properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concrete Curing Plan

Quality Control Program; G

Quality Control Personnel Certifications; G

Quality Control Organizational Chart

Laboratory Accreditation; G

Form Removal Schedule; G

Maturity Method Data

SD-02 Shop Drawings

Formwork

Reinforcing Steel; G

SD-03 Product Data

Joint Sealants; S

Joint Filler; S

Formwork Materials

Recycled Aggregate Materials; S

Cementitious Materials; S

Concrete Curing Materials

Reinforcement; S

Admixtures

Reinforcing Fibers

Mechanical Reinforcing Bar Connectors

Waterstops

Local/Regional Materials; S Biodegradable Form Release Agent

Nonshrink Grout

SD-05 Design Data

Concrete Mix Design; G

Formwork Calculations

SD-06 Test Reports Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Tolerance Report

Compressive Strength Tests; G

Unit Weight of Structural Concrete Chloride Ion Concentration

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

Silica Fume Manufacturer's Representative

VOC Content for Form Release Agents, Curing Compounds, and

Concrete Penetrating Sealers

Safety Data Sheets

Forest Stewardship Council (FSC) Certification

Field Testing Technician and Testing Agency

SD-08 Manufacturer's Instructions

Joint Sealants; S

Curing Compound

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until vapor retarder, vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.5.1.1 Epoxy Coated Reinforcing Steel

Record coating lot on each shipping notice and carefully identify and re-tag bar bundles from bending plant. Provide systems for handling coated bars which have padded contact areas such as, nylon slings, all free of dirt and grit. Lift bundled coated bars with strong back, multiple supports, or platform bridge to prevent sagging and abrasion. Pad bundling bands where in contact with bars. Do not drop or drag bars or bundles. Store coated bars both in shop and in field, aboveground, on wooden or padded cribbing. Space the dunnage close enough to prevent excessive sags. Stack large quantities of straight bars with adequate protective blocking between layers. Schedule deliveries of epoxy coated bars to the job site to avoid the need for long term storage. Protect from direct sunlight and weather. Cover bars to be stored longer than 12 hours at the job site with opaque polyethylene sheeting or other suitable equivalent protective material.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit all documentation required in ACI 301 Section 4 and as specified in this section. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. Required average strength can be documented

by field experience if field strength test data are available and represent a single group of at least 10 consecutive strength tests for one mixture, using materials and conditions similar to those expected for work, and encompassing a period of not less than 45 days. The average of field strength tests must equal or exceed fcr'. Changes in materials, conditions, and proportions within the test record must not have been more closely restricted than those for the proposed work. Test records must not be more than 24 months old. Obtain mix design approval from the contracting officer prior to concrete placement.

1.6.2 Shop Drawings

1.6.2.1 Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

1.6.3 Control Submittals

1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1.

1.6.3.2 VOC Content for form release agents, curing compounds, and concrete penetrating sealers

Submit certification for the form release agent, curing compounds, and concrete penetrating sealers that indicate the VOC content of each product.

1.6.3.3 Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.4.2 Slag Cement

Submit test results in accordance with ASTM C989/C989M for slag cement.

Submit test results performed within 6 months of submittal date.

1.6.4.3 Aggregates

Submit test results in accordance with ASTM C33/C33M, or ASTM C330/C330M for lightweight aggregate, and ASTM C1293 or ASTM C1567 as required in the paragraph titled ALKALI-AGGREGATE REACTION.

1.6.5 Quality Control Program

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. Include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. Provide all quality control reports to the Contracting Officer, Quality

Manager and Concrete Supplier. Maintain a copy of ACI MNL-15 and CRSI 10MSP at project site.

1.6.6 Quality Control Personnel Certifications

Submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor. Submit American Concrete Institute certification for the following:

a. CQC personnel responsible for inspection of concrete operations.

b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.

c. Field Testing Technicians: ACI Concrete Field-Testing Technician, Grade I.

1.6.6.1 Quality Manager Qualifications

Holds a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

1.6.6.2 Field-Testing Technician and Testing Agency

Submit data on qualifications of proposed testing agency and technicians for approval by the Contracting Officer prior to performing testing on concrete.

a. Work on concrete under this contract must be performed by an ACI

Concrete Field-Testing Technician Grade 1 qualified in accordance with ACI MNL-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI MNL-2.

b. Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.

c. Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

1.6.7 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected.

1.6.8 Laboratory Accreditation

Laboratory and testing facilities are provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Studies performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C31/C31M.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

PART 2 PRODUCTS

2.1 FORMWORK MATERIALS

a. Form-facing material in contact with concrete must be lumber, plywood, tempered concrete-form-grade hardboard, metal, or plastic. Submit product information on proposed form-facing materials if different from that specified herein.

b. Design formwork, shores, reshores, and backshores to support loads transmitted to them and to comply with applicable building code requirements.

c. Design formwork and shoring for load redistribution resulting from stressing of post-tensioned reinforcement. Ensure that formwork allows movement resulting from application of prestressing force.

d. Design formwork to withstand pressure resulting from placement and vibration of concrete and to maintain specified tolerances.

e. Design formwork to accommodate waterstop materials in joints at locations indicated in Contract Documents.

f. Provide temporary openings in formwork if needed to facilitate cleaning and inspection.

g. Design formwork joints to inhibit leakage of mortar.

h. Limit deflection of facing materials for concrete surfaces exposed to view to 1/240 of center-to-center spacing of facing supports.

i. Do not use earth cuts as forms for vertical or sloping surfaces.

2.1.1 Wood Forms

Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or ANSI/CPA A135.4, hardboard for smooth form lining.

2.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.1.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.1.2 Steel Forms

Provide steel form surfaces that do not contain irregularities, dents, or sags.

2.2 FORMWORK ACCESSORIES

a. Use commercially manufactured formwork accessories, including ties and hangers.

b. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.2.1 Waterstops

Submit manufacturer's data sheet on waterstop materials and splices.

2.2.1.1 PVC Waterstop

Conform to COE CRD-C 572.

2.2.1.2 Rubber Waterstop

Conform to COE CRD-C 513.

2.2.1.3 Thermoplastic Elastomeric Rubber Waterstop

Conform to ASTM D471.

2.2.2 Biodegradable Form Release Agent

a. Provide form release agent that is colorless, biodegradable, with a low (maximum of 55 grams/liter (g/l)) VOC content.

b. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

c. Provide form release agent that reduces formwork moisture absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar

value of biobased content products to total dollar value of products included in project.

d. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

2.3 CONCRETE MATERIALS

2.3.1 Cementitious Materials

2.3.1.1 Portland Cement

a. Unless otherwise specified, provide cement that conforms to ASTM C150/C150M Type I or Type II.

b. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

c. Submit information along with evidence demonstrating compliance with referenced standards. Include types of cementitious materials, manufacturing locations, shipping locations, and certificates showing compliance.

d. Store cementitious materials and keep dry and free from contaminants.

2.3.1.2 Blended Cements

a. Conform to ASTM C595/C595M Type IP or IS.

b. Slag cement added to the Type IS or Type IT blended cements must meet ASTM C989/C989M.

c. The pozzolan added to the Type IP or Type IT blended cements must meet ASTM C618 Class N and interground with the cement clinker. The manufacturer must state in writing that the amount of pozzolan in the finished cement will 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 pozzolan used in the blend must not change from that submitted for the aggregate evaluation and mixture proportioning.

2.3.1.3 Fly Ash

a. ASTM C618, Class F, except that the maximum allowable loss on ignition must not exceed 3 percent.

b. If fly ash is used it must range from 15 to 20 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Do not use fly ash when it cannot meet the minimum level. Report the chemical analysis of the fly ash in accordance with ASTM C311/C311M. Evaluate and classify fly ash in accordance with ASTM D5759.

2.3.1.4 Slag Cement

ASTM C989/C989M, Grade 100.

2.3.1.5 Other Supplementary Cementitious Materials

Natural pozzolan must be raw or calcined and conform to ASTM C618, Class N, including the optional requirement for uniformity.

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) must conform to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age at least 95 percent of the control specimens.

b. The average particle size not to exceed 6 microns.

c. The sum of SiO_2 plus Al_2O_3 plus Fe_2O_3 greater than 77 percent.

2.3.2 Water

a. Water or ice must comply with the requirements of ASTM C1602/C1602M.

b. Minimize the amount of water in the mix. Improve workability by adjusting the grading of the aggregate and using admixture rather than by adding water.

c. Provide water potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

d. Protect mixing water and ice from contamination during storage and delivery.

e. Submit test report showing water complies with ASTM C1602/C1602M.

f. When nonpotable source is proposed for use, submit documentation on effects of water on strength and setting time in compliance with ASTM C1602/C1602M.

2.3.3 Aggregate

2.3.3.1 Normal-Weight Aggregate

a. Conform to ASTM C33/C33M.

b. Obtain aggregates used in concrete from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.

c. Provide sand that is at least 50 percent natural sand.

d. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain freely. Do not use aggregates that contain frozen lumps.

e. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with ASTM C33/C33M, and ASTM C1293 expansion data not more than 18 months old.

2.3.4 Admixtures

a. Chemical admixtures must conform to ASTM C494/C494M.

b. Air-entraining admixtures must conform to ASTM C260/C260M.

c. Do not use calcium chloride admixtures unless approved by the contracting officer.

d. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.

e. Protect stored admixtures against contamination, evaporation, or damage.

f. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.

g. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards required herein.

2.4 MISCELLANEOUS MATERIALS

2.4.1 Concrete Curing Materials

Provide concrete curing material in accordance with ACI 301 Section 5 and ACI 308.1 Section 2. Submit product data for concrete curing compounds.

Submit manufactures instructions for placement of curing compound.

2.4.2 Nonshrink Grout

Nonshrink grout in accordance with ASTM C1107/C1107M.

2.4.3 Expansion/Contraction Joint Filler

ASTM D1751 or ASTM D1752 Type I or Type II. Provide material 1/2 inch thick, unless otherwise indicated.

2.4.4 Joint Sealants

Submit manufacturer's product data, indicating VOC content.

2.4.4.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D6690 or ASTM C920, Type M, Class 25, Use T.

2.4.4.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C920, Type M, Grade NS, Class 25, Use T.

2.4.4.3 Preformed Polychloroprene Elastomeric Type

ASTM D2628.

2.4.4.4 Lubricant for Preformed Compression Seals

ASTM D2835.

2.5 CONCRETE MIX DESIGN

2.5.1 Properties and Requirements

a. Use materials and material combinations listed in this section and the contract documents.

b. Cementitious material content must be adequate for concrete to satisfy the specified requirements for strength, w/cm, durability, and finishability described in this section and the contract documents.

c. The minimum cementitious material content for concrete used in floors must meet the following requirements:

Nominal maximum size of aggregate, in.	**Minimum cementitious material content, pounds per cubic yard**
1-1/2	470
1	520
3/4	540
3/8	610

d. Selected target slump must meet the requirements of this section, the contract documents, and must not exceed 9 in. Concrete must not show visible signs of segregation.

e. Enforce the target slump for the duration of the project. Determine the slump by ASTM C143/C143M. Slump tolerances must meet the requirements of ACI 117.

f. The nominal maximum size of coarse aggregate for a mixture must not exceed three-fourths of the minimum clear spacing between reinforcement, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

g. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3, with the total air content in accordance with the requirements of the paragraph titled DURABILITY.

h. Measure air content at the point of delivery in accordance with ASTM C173/C173M or ASTM C231/C231M.

i. Concrete for slabs to receive a hard-troweled finish must not contain an air-entraining admixture or have a total air content greater than 3 percent.

j. Concrete properties and requirements for each portion of the structure are specified in the table below. Refer to the paragraph titled DURABILITY for more details on exposure categories and their requirements.

	Minimum *f'c* psi	**Exposure Categories^**	**Miscellaneous Requirements**
Slabs-on-ground	4000 at 28 days		

2.5.2 Durability

2.5.2.1 Alkali-Aggregate Reaction

Do not use any aggregate susceptible to alkali-carbonate reaction (ACR). Use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction (ASR):

a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.

b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 must not exceed 0.10 percent at an age of 16 days.

c. Alkali content in concrete (LBA) must not exceed 4 pounds per cubic yard for moderately reactive aggregate or 3 pounds per cubic yard for highly reactive aggregate. Determine reactivity by testing in accordance with ASTM C1293 and categorize in accordance with ASTM C1778. Alkali content is calculated as follows: LBA = (cement content, pounds per cubic yard) × (equivalent alkali content of portland cement in percent/100 percent)

2.5.2.2 Freezing and Thawing Resistance

a. Provide concrete meeting the following requirements based on exposure class assigned to members for freezing-and-thawing exposure in

Contract Documents:

Exposure class	**Maximum *w/cm****	**Minimum *f'c*, psi**	**Air content**	**Additional Requirements**
F0	N/A	2500		N/A
F1	0.55	3500	Depends on aggregate size	N/A
F2	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass
F3	0.40	5000	Depends on aggregate size	See limits on maximum cementitious material by mass
F3 plain concrete	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass

*The maximum *w/cm* limits do not apply to lightweight concrete.

b. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. Meet the requirements of the following table:

Nominal maximum aggregate size, in.	Total air content, percent*^	
	Exposure Class F2 and F3	Exposure Class F1
3/8	7.5	6.0
1/2	7.0	5.5
3/4	6.0	5.0
1	6.0	4.5
1-1/2	5.5	4.5
2	5.0	4.0
3	5.5	3.5

*Tolerance on air content as delivered must be plus/minus 1.5 percent.
^For f'c greater than 5000 psi, reducing air content by 1.0 percentage point is acceptable.

c. Submit documentation verifying compliance with specified requirements.

d. For sections of the structure that are assigned Exposure Class F3, submit certification on cement composition verifying that concrete mixture meets the requirements of the following table:

Cementitious material	Maximum percent of total cementitious material by mass*
Fly ash or other pozzolans conforming to ASTM C618	25
Slag cement conforming to ASTM C989/C989M	50
Silica fume conforming to ASTM C1240	10
Total of fly ash or other pozzolans, slag cement, and silica fume	50^
Total of fly ash or other pozzolans and silica fume	35^

*Total cementitious material also includes ASTM C150/C150M, ASTM C595/C595M, ASTM C845/C845M, and ASTM C1157/C1157M cement. The maximum percentages above must include:

i. Fly ash or other pozzolans present in ASTM C1157/C1157M or ASTM C595/C595M Type IP or Type IT blended cement.

ii. Slag cement present in ASTM C1157/C1157M or ASTM C595/C595M Type IS or Type IT blended cement.

iii. Silica fume conforming to ASTM C1240 present in ASTM C1157/C1157M or ASTM C595/C595M Type IP or Type IT blended cement.

^Fly ash or other pozzolans and silica fume must constitute no more than 25 percent and 10 percent, respectively, of the total mass of the cementitious materials.

2.5.2.3 Corrosion and Chloride Content

a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members requiring protection against reinforcement corrosion in Contract Documents.

b. Submit documentation verifying compliance with specified requirements.

c. Determine water-soluble chloride ion content contributed from constituents including water, aggregates, cementitious materials, and admixtures for the concrete mixture by ASTM C1218/C1218M at age between 28 and 42 days.

d. The maximum water-soluble chloride ion (Cl-) content in concrete, percent by mass of cement is as follows:

Exposure class	**Maximum *w/cm****	**Minimum f'c, psi**	**Maximum water-soluble chloride ion (CL-) content in concrete, percent by mass of cement**
Reinforced concrete			
C0	N/A	2500	1.00
C1	N/A	2500	0.30
C2	0.4	5000	0.15
Prestressed concrete			
C0	N/A	2500	0.06
C1	N/A	2500	0.06
C2	0.4	5000	0.06

*The maximum w/cm limits do not apply to lightweight concrete.

2.5.2.4 Sulfate Resistance

a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members for sulfate exposure.

Exposure class	**Maximum w/cm**	**Minimum f'c, psi**	**Required cementitious materials-types**			**Calcium chloride admixture**
			ASTM C150/C150M	**ASTM C595/C595M**	**ASTM C1157/C1157M**	
S0	N/A	2500	N/A	N/A	N/A	No restrictions
S1	0.50	4000	II*^	Types with (MS) designation	MS	No restrictions
S2	0.45	4500	V^	Types with (HS) designation	HS	Not permitted
S3	0.45	4500	V + pozzolan or slag cement**	Types with (HS) designation plus pozzolan or slag cement**	HS + pozzolan or slag cement**	Not permitted
S3	0.40	5000	V***	Types with (HS) designation	HS	Not permitted

* For seawater exposure, other types of portland cements with tricalcium aluminate (C3A) contents up to 10 percent are acceptable if the w/cm does not exceed 0.40.

** The amount of the specific source of the pozzolan or slag cement to be used must be at least the amount determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the

pozzolan or slag used must not be less than the amount tested in accordance with ASTM C1012/C1012M and meeting the requirements maximum expansion requirements listed herein.

*** If Type V cement is used as the sole cementitious material, the optional sulfate requirement of 0.040 percent maximum expansion in ASTM C150/C150M is required.

^ Other available types of cement, such as Type III or Type I, are acceptable in exposure classes S1 or S2 if the C3A contents are less than 8 or 5 percent, respectively.

b. The maximum w/cm limits for sulfate exposure do not apply to lightweight concrete.

c. Alternative combinations of cementitious materials of those listed in this paragraph are acceptable if they meet the maximum expansion requirements listed in the following table:

Exposure class	**Maximum expansion when tested using ASTM C1012/C1012M**		
	At 6 months	**At 12 months**	**At 18 months**
S1	0.10 percent	N/A	N/A
S2	0.05 percent	0.10 percent^	N/A
S3	N/A	N/A	0.10 percent

^The 12-month expansion limit applies only when the measured expansion exceeds the 6-month maximum expansion limit.

2.5.2.5 Concrete Temperature

The temperature of concrete as delivered must not exceed 95 degrees F.

2.5.2.6 Concrete Permeability

a. Provide concrete meeting the requirements of the following table based on exposure class assigned to members requiring low permeability in the Contract Documents.

Exposure class	**Maximum *w/cm****	**Minimum f'c, psi**	**Additional minimum requirements**
W0	N/A	2500	None
W1	0.5	4000	None
W2	0.50	4000	None

*The maximum w/cm limits do not apply to lightweight concrete.

b. Submit documentation verifying compliance with specified requirements.

2.5.3 Contractor's Option for Material Only

At the option of the Contractor, those applicable material sections of City of Omaha Standard Specification for Public Works Construction mix "OPW 4000", 4000 p.s.i strength concrete govern in lieu of this specification for concrete. Do not change the selected option during the course of the work.

2.5.4 Trial Mixtures

In accordance with ACI 301.

2.5.5 Ready-Mix Concrete

Provide concrete that meets the requirements of ASTM C94/C94M.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by ASTM C94/C94M:

a. Type and brand cement

b. Cement and supplementary cementitious materials content in 94-pound bags per cubic yard of concrete

c. Maximum size of aggregate

d. Amount and brand name of admixtures

e. Total water content expressed by water cementitious material ratio

2.6 REINFORCEMENT

Shop Fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

a. Bend reinforcement cold. Reinforcement must be bent cold in the shop to shapes as indicated. Rebending of a reinforcing bar that has been bent incorrectly is not permitted. Bending must be in accordance with the standard approved practice and by approved machine methods. Provide hooks and bends that are in accordance with the Contract Documents. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117.

b. Submit manufacturer's certified test report for reinforcement.

c. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.

d. Submit request with locations and details of splices not indicated in

Contract Documents.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

2.6.1 Reinforcing Bars

a. Deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.

b. ASTM A615/A615M with the bars marked S, Grade 60.

c. Submit mill certificates for reinforcing bars.

2.6.1.1 Epoxy-Coated Reinforcing Bars

a. Provide epoxy-coated reinforcing bars that conform to ASTM A775/A775M, Grade 60.

b. Apply coatings in plants that are certified in accordance with Concrete Reinforcing Steel Institute (CRSI) Epoxy Coating Plant Certification Program or an equivalent program acceptable to the contracting officer.

c. Repair coating damage incurred during shipment, storage, handling, and placing of epoxy-coated reinforcing bars. Repair damaged coating areas with patching material conforming to ASTM A775/A775Mas applicable and in accordance with material manufacturer's written recommendations. If damaged coating area on bars exceed 2 percent of surface area in each linear foot, bar must not be used. The 2 percent limit on damaged coating area includes repaired areas damaged before shipment as required by ASTM A775/A775M. Fading of coating color is not a cause for rejection of epoxy-coated reinforcing bars.

d. Submit concrete Reinforcing Steel Institute (CRSI) Epoxy Coating Plant Certification.

e. Handle and store coated reinforcing bars in accordance with ASTM A775/A775M. If the manufacturer stores bars outdoors for more than 2 months, cover coated reinforcement with opaque protective material.

2.6.2 Reinforcing Bar Supports

a. Provide reinforcement support types within structure as required by Contract Documents. Conform to CRSI RB4.1. Submit description of reinforcement supports and materials for fastening coated reinforcement if not in conformance with CRSI RB4.1.

b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar support.

c. Legs of supports in contact with formwork may be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

PART 3 EXECUTION

3.1 EXAMINATION

a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.

b. If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.

c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

3.2.1 General

a. Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

b. Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

3.2.2 Subgrade Under Foundations and Footings

a. When subgrade material is semi-porous and dry, sprinkle subgrade surface with water as required to eliminate suction at the time concrete is deposited, or seal subgrade surface by covering surface with specified vapor retarder.

b. When subgrade material is porous, seal subgrade surface by covering surface with specified vapor retarder.

3.2.3 Subgrade Under Slabs on Ground

a. Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.

b. Clean previously constructed subgrade or fill of foreign materials.

c. Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of 1/4 inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.

d. Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot below elevation indicated.

3.2.4 Edge Forms and Screed Strips for Slabs

a. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface, strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment.

b. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

3.2.5 Reinforcement and Other Embedded Items

a. Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

b. When concrete is placed, reinforcement must be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

3.3 FORMS

a. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade.

b. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch. Place chamfer strips in corners of formwork to produce beveled edges on permanently exposed surfaces.

c. Provide formwork with clean-out openings to permit inspection and removal of debris.

d. Inspect formwork and remove foreign material before concrete is placed.

e. At construction joints, lap form-facing materials over the concrete of previous placement. Ensure formwork is placed against hardened concrete so offsets at construction joints conform to specified tolerances.

f. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in formwork after concrete has reached initial setting. Brace formwork to resist lateral deflection and lateral instability.

g. Fasten form wedges in place after final adjustment of forms and before concrete placement.

h. Provide anchoring and bracing to control upward and lateral movement of formwork system.

i. Construct formwork for openings to facilitate removal and to produce opening dimensions as specified and within tolerances.

j. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with removable material to prevent concrete entry into voids.

k. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete placement.

3.3.1 Coating

a. Cover formwork surfaces with an acceptable material that inhibits bond with concrete.

b. If formwork release agent is used, apply to formwork surfaces in accordance with manufacturer's recommendations before placing reinforcement. Remove excess release agent on formwork prior to concrete placement.

c. Do not allow formwork release agent to contact reinforcement or hardened concrete against which fresh concrete is to be placed.

3.3.2 Forms for Standard Rough Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction.

3.3.3 Forms for Standard Smooth Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view. Do not provide mockup of concrete surface appearance and texture.

3.3.4 Form Ties

a. For post-tensioned structures, do not remove formwork supports until stressing records have been accepted by the Contracting Officer.

b. After ends or end fasteners of form ties have been removed, repair tie holes in accordance with ACI 301 Section 5 requirements.

3.3.5 Tolerances for Form Construction

a. Construct formwork so concrete surfaces conform to tolerances in ACI 117.

b. Position and secure sleeves, inserts, anchors, and other embedded items such that embedded items are positioned within ACI 117 tolerances.

c. To maintain specified elevation and thickness within tolerances, install formwork to compensate for deflection and anticipated settlement in formwork during concrete placement. Set formwork and intermediate screed strips for slabs to produce designated elevation, camber, and contour of finished surface before formwork removal. If specified finish requires use of vibrating screeds or roller pipe screeds, ensure that edge forms and screed strips are strong enough to support such equipment.

3.3.6 Removal of Forms and Supports

a. If vertical formed surfaces require finishing, remove forms as soon as removal operations will not damage concrete.

b. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform repairs and finishing operations required. If forms are removed before end of specified curing period, provide curing and protection.

c. Do not damage concrete during removal of vertical formwork for columns, walls, and sides of beams. Perform needed repair and finishing operations required on vertical surfaces. If forms are removed before end of specified curing period, provide curing and protection.

d. Leave formwork and shoring in place to support construction loads and weight of concrete in beams, slabs, and other structural members until in-place required strength of concrete is reached.

e. Form-facing material and horizontal facing support members may be removed before in-place concrete reaches specified compressive strength if shores and other supports are designed to allow facing removal without deflection of supported slab or member.

3.3.7 Strength of Concrete Required for Removal of Formwork

If removal of formwork, reshoring, or backshoring is based on concrete reaching a specified in-place strength, mold and field-cure cylinders in accordance with ASTM C31/C31M. Test cylinders in accordance with ASTM C39/C39M. Alternatively, use one or more of the methods listed herein to evaluate in-place concrete strength for formwork removal.

a. Tests of cast-in-place cylinders in accordance with ASTM C873/C873M. This option is limited to slabs with concrete depths from 5 to 12 in.

b. Penetration resistance in accordance with ASTM C803/C803M.

c. Pullout strength in accordance with ASTM C900.

d. Maturity method in accordance with ASTM C1074. Submit maturity method data using project materials and concrete mix proportions used on the project to demonstrate the correlation between maturity and compressive strength of laboratory cured test specimens to the Contracting Officer.

3.4 WATERSTOP INSTALLATION AND SPLICES

a. Provide waterstops in construction joints as indicated.

b. Install formwork to accommodate waterstop materials. Locate waterstops in joints where indicated in Contract Documents. Minimize number of splices in waterstop. Splice waterstops in accordance with manufacturer's written instructions. Install factory-manufactured premolded mitered corners.

c. Install waterstops to form a continuous diaphragm in each joint. Make adequate provisions to support and protect waterstops during progress of work. Protect waterstops protruding from joints from damage.

3.4.1 Rubber Waterstop

Spliced using cold bond adhesive as recommended by the manufacturer.

3.4.2 Thermoplastic Elastomeric Rubber Waterstop

Shop made fittings using a machine specifically designed to mechanically weld the waterstop. Use a portable power saw to miter or straight cut the ends to be joined to ensure good alignment and contact between joined surfaces. Maintain continuity of the characteristic features of the cross section of the waterstop (for example ribs, tabular center axis, and protrusions) across the splice.

3.5 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

a. Unless otherwise specified, place reinforcement and miscellaneous materials in accordance to ACI 301. Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement.

b. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

c. Non-prestressed cast-in-place concrete members must have concrete cover for reinforcement given in the following table:

Concrete Exposure	Member	Reinforcement	Specified cover, in.
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	All	No. 6 through No. 18 bars	2
		No. 5 bar, W31 or D31 wire, and smaller	1-1/2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars	1-1/2
		No. 11 bar and smaller	3/4
	Beams, columns, pedestals, and tension ties	Primary reinforcement, stirrups, ties, spirals, and hoops	1-1/2

d. Cast-in-place prestressed concrete members must have concrete cover for reinforcement, ducts, and end fittings given in the following table:

Concrete	Member	Reinforcement	Specified
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	Slabs, joists, and walls	All	1
	All other	All	1-1/2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	All	3/4
	Beams, columns, and tension ties	Primary reinforcement	1-1/2
		Stirrups, ties, spirals, and hoops	1

3.5.1 General

Provide details of reinforcement that are in accordance with the Contract Documents.

3.5.2 Reinforcement Supports

Provide reinforcement support in accordance with CRSI RB4.1 and ACI 301 Section 3 requirements. Also, coat supports for coated or galvanized bars with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bars.

3.5.3 Epoxy Coated Reinforcing

Meet the requirements of ASTM A934/A934M including Appendix X2, "Guidelines for Job Site Practices" except as otherwise specified herein.

3.5.3.1 Epoxy Coated Reinforcing Steel Placement and Coating Repair

Carefully handle and install bars to minimize job site patching. Use the same precautions as described in the paragraph titled EPOXY-COATED REINFORCING BARS. Do not drag bars over other bars or over abrasive surfaces. Keep bar free of dirt and grit. When possible, assemble reinforcement as tied cages prior to final placement into the forms. Support assembled cages on padded supports. It is not expected that coated

bars, when in final position ready for concrete placement, are completely free of damaged areas; however, excessive nicks and scrapes which expose steel is cause for rejection. Criteria for defects which require repair and for those that do not require repair are as indicated. Inspect for defects and provide required repairs prior to assembly. After assembly, reinspect and provide final repairs.

a. Immediately prior to application of the patching material, manually remove any rust and debonded coating from the reinforcement by suitable techniques employing devices such as wire brushes and emery paper. Exercise cars during this surface preparation so that the damaged areas are not enlarged more than necessary to accomplish the repair. Clean damaged areas of dirt, debris, oil, and similar materials prior to application of the patching material.

b. Do repair and patching in accordance with the patching material manufacturer's recommendations. Have these recommendations, including cure times, available at the job site at all times.

c. Allow adequate time for the patching materials to cure in accordance with the manufacturer's recommendation prior to concrete placement.

d. Rinse placed reinforcing bars with fresh water to remove chloride contamination prior to placing concrete.

3.5.4 Inspection of Reinforcement

Inspect and verify proper reinforcement grade, shape, cross section and condition. Do not use reinforcement with the following defects:

a. Bar lengths, depths, and bends beyond specified fabrication tolerances.

b. Bends or kinks not indicated on drawings or approved shop drawings.

c. Bars with reduced cross section due to rusting or other cause.

3.5.5 Placing Reinforcement

Place reinforcement in accordance with ACI 301.

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

For slabs other than on grade, supports for which any portion is less than 1 inch from concrete surfaces that are exposed to view or to be painted may be precast concrete units, plastic-coated steel, or stainless-steel protected bar supports. Precast concrete units must be wedge shaped, not larger than 3-1/2 by 3-1/2 inches, and of thickness equal to that indicated for concrete protection of reinforcement. Provide precast units that have cast-in galvanized tie wire hooked for anchorage and blend with concrete surfaces after finishing is completed.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

a. Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 301 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

b. Equip supports on ground and similar surfaces with sand-plates.

c. Support welded wire reinforcement as required for reinforcing bars.

d. Secure reinforcements to supports by means of tie wire. Provide black, soft iron wire, not less than 16 gage.

e. Accurately place reinforcement, securely tie at intersections, and hold in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to the Contract Documents.

f. Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract Documents.

3.5.6 Spacing of Reinforcing Bars

a. As indicated in the Contract Documents.

b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

3.5.7 Concrete Protection for Reinforcement

In accordance with the Contract Documents.

3.6 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

In accordance with ASTM C94/C94M, ACI 301, ACI 302.1R and ACI 304R, except as modified herein. Utilize batching equipment such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready-mix concrete.

3.6.1 Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

3.6.2 Mixing

a. Mix concrete in accordance with ASTM C94/C94M, ACI 301 and ACI 304R.

b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates. A retarder shall be used to facilitate placing and finishing when concrete temperature is 85 degrees F or greater.

c. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture, within the manufacturer's recommended dosage, to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

3.6.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.7 PLACING CONCRETE

Place concrete in accordance with ACI 301 Section 5. Place concrete within 15 minutes of discharge into non-agitating equipment.

3.7.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width must be a minimum of 4 inches greater than indicated.

3.7.2 Cold Weather

Meet the requirements of ACI 301 unless otherwise specified. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any one hour and 18 degrees F per 24 hours after heat application.

3.7.3 Hot Weather

Meet the requirements of ACI 301 unless otherwise specified. Maintain required concrete temperature using Figure 4.2 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.7.4 Bonding

Roughen and clean surfaces of set concrete at joints of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, nor damaged concrete at the surface. Obtain bonding of fresh concrete that has set as follows:

a. At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; dampen but do not saturate roughened and cleaned surface of set concrete immediately prior to placing fresh concrete.

b. At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; dampen but do not saturate the roughened and cleaned surface of set concrete and cover with a cement grout coating.

c. Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

3.8 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan. 3.8.1 Reinforcing

Steel Collect reinforcing steel and place in designated area for recycling.

3.8.2 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and/or packaging material.

3.9 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.9.1 Defects

Repair surface defects in accordance with ACI 301 Section 5.

3.9.2 Not Against Forms (Top of Walls)

Finish surfaces not otherwise specified with wood floats to even surfaces. Match adjacent finishes.

3.9.3 Formed Surfaces

3.9.3.1 Tolerances

Tolerances in accordance with ACI 117 and as indicated.

3.9.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0.

Patch holes and defects in accordance with ACI 301.

3.9.3.3 Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with ACI 301.

3.10 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

3.10.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater. Do no use grate tampers ("jitterbugs").

3.10.1.1 Pavement

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straightedge to check slope and flatness; correct and refloat as necessary. Obtain final finish by a burlap drag. Drag a strip of clean, wet burlap from 3 to 10 feet wide and 2 feet longer than the pavement width across the slab. Produce a fine, granular, sandy textured surface without disfiguring marks. Round edges and joints with an edger having a radius of 1/8 inch.

3.10.2 Curbs and Gutters

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

3.11 JOINTS

3.11.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Make joints perpendicular to main reinforcement. Continue and develop reinforcement across construction joints. Locate construction joints as follows:

3.11.1.1 Construction Joints for Constructability Purposes

a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.

b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.

c. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the

beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used for slabs.

3.11.2 Isolation Joints in Slabs on Ground

a. Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

b. Fill joints with premolded joint filler strips 1/2 inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Clean groove of foreign matter and loose particles after surface has dried.

3.11.3 Contraction Joints in Slabs on Ground

a. Provide joints to form panels as indicated.

b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.

c. Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5.

d. Provide joints 1/8-inch wide by 1/5 to 1/4 of slab depth and form by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured for at least 7 days, remove inserts and clean groove of foreign matter and loose particles.

e. Sawcutting will be limited to within 12 hours after set and at 1/4 slab depth.

3.11.4 Sealing Joints in Slabs on Ground

a. Seal contraction and control joints which are to receive finish flooring material with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

b. Leave sealed groove ready to receive filling material that is provided as part of finish floor covering work.

3.12 CURING AND PROTECTION

Curing and protection in accordance with ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding

reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer, hardener, or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that adsorb VOCs.

3.12.1 Requirements for Type III, High-Early-Strength Portland Cement

The curing periods are required to be not less than one-fourth of those specified for portland cement, but in no case less than 72 hours.

3.12.2 Curing Periods

ACI 301 Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

3.12.3 Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.12.4 Curing Unformed Surfaces

a. Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

b. Accomplish final curing of unformed surfaces by any of curing methods specified, as applicable.

c. Accomplish final curing of concrete surfaces to receive liquid floor hardener of finish flooring by moisture-retaining cover curing.

3.12.5 Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 5 degrees F in any one hour nor 49 degrees F in any 24-hour period.

3.12.6 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.12.7 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.13 FIELD QUALITY CONTROL

3.13.1 Aggregate Testing

3.13.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there must be one sieve analysis and fineness modulus determination in accordance with ASTM C136/C136M and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, immediately resample and retest the fine aggregate. If there is another failure on any sieve, immediately report the fact to the Contracting Officer, stop concreting, and take immediate steps to correct the grading.

3.13.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, provide a sieve analysis in accordance with ASTM C136/C136M for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor is responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations must show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, immediately resample and retest the coarse aggregate. If the second sample fails on any sieve, report that fact to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation will be considered out of control and reported to the Contracting Officer. Stop concreting and take immediate steps to correct the grading.

3.13.2 Concrete Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform specified tests. ASTM C31/C31M for making test specimens.

3.13.3 Concrete Testing

3.13.3.1 Slump Tests

ASTM C143/C143M. Take concrete samples during concrete placement/discharge. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made.

3.13.3.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.13.3.3 Compressive Strength Tests

ASTM C39/C39M. Make six 6 inch by 12 inch test cylinders for each set of tests in accordance with ASTM C31/C31M, ASTM C172/C172M and applicable requirements of ACI 305R and ACI 306R. Take precautions to prevent evaporation and loss of water from the specimen. Test one 6 inch by 12 inch cylinders at 7 days, one 6 inch by 12 inch cylinders at 28 days,and hold two 6 inch by 12 inch cylinders in reserve. Take samples for strength tests for each concrete mixture placed each day not less than once a day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two 6 inch by 12 inch cylinders from the same concrete sample tested at 28 days. Concrete compressive tests must meet the requirements of this section, the Contract Document, and ACI 301.

3.13.3.4 Air Content

ASTM C173/C173M or ASTM C231/C231M for normal weight concrete and ASTM C173/C173M for lightweight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.13.3.5 Unit Weight of Structural Concrete

ASTM C567/C567M and ASTM C138/C138M. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

3.13.3.6 Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

a. Failure to meet compressive strength tests as evaluated.

b. Reinforcement not conforming to specified requirements.

c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.

d. Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to specified requirements.

e. Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.

f. Poor workmanship likely to result in deficient strength.

Where the strength of the concrete structure is considered deficient, submit a mitigation or remediation plan for review and approval by the Contracting Officer.

3.13.3.7 Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Conduct investigations into non-conforming materials at the Contractor's expense. The Contractor is responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.14 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure, inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. Prepare a report documenting these defects which includes recommendations for repair, removal or remediation and submit to the Contracting Officer for approval before any corrective work is accomplished.

3.14.1 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

3.14.2 Failure of Quality Assurance Test Results

Proposed mitigation efforts must be approved by the Contracting Officer prior to proceeding.

-- End of Section --

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SECTION 31 00 00

EARTHWORK
08/23

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 C117	(2023) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2216	(2019) Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	(2016; E 2019) Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	(2016) Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4829	(2021) Standard Test Method for Expansion Index of Soils
ASTM D5268	(2019) Topsoil Used for Landscaping Purposes

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

1.2 DEFINITIONS

1.2.1 Structural Fill

Soil material placed to support buildings, walls, pads, and other similar facilities.

1.2.2 Embankment Fill

Soil material placed to construct embankment.

1.2.3 Porous Fill

Free-draining material placed for subsurface drainage, as a capillary break, or another specific purpose.

1.2.4 Topsoil

Surface layer of primarily organic soil capable of supporting vegetation growth.

1.2.5 Utility Bedding Material

Fill placed to directly support pipes, conduits, cables, and appurtenant structures. Bedding may also be used to provide a cushion between utilities and bedrock, obstacles, obstructions and other unyielding materials.

1.2.6 Satisfactory Materials

Satisfactory materials for fill, backfill, and/or any in-situ soils to remain in place comprise any materials classified by ASTM D2487 as CL. Maximum particle size to be no greater than 3 inches in any dimension. On-site materials are suitable for use as fill if free of debris and particles greater than 3 inches.

1.2.7 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; roots and other organic matter or frozen material. Notify the Contracting Officer when encountering any contaminated materials.

1.2.8 Cohesionless Materials

Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as

cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C117, ASTM C136/C136M and ASTM D1140.

1.2.9 Cohesive Materials

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines are plastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C117, ASTM C136/C136M and ASTM D1140.

1.2.10 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.11 Unstable Material

Unstable materials are too weak to adequately support the utility pipe, conduit, equipment, or appurtenant structure. Satisfactory material may become unstable due to ineffective drainage, dewatering, becoming frozen, excessive loading.

1.2.12 Expansive Soils

Expansive soils are defined as soils that have an expansion index greater than 20 when tested in accordance with ASTM D4829.

1.2.13 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.2.14 Capillary Water Barrier

A layer of clean, poorly graded crushed rock, stone, or natural sand or gravel having a high porosity which is placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below a slab.

1.2.15 Degree of Compaction (Proctor)

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch

sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with ASTM D1557, Method C.

1.2.16 Degree of Compaction (Relative Density)

Degree of compaction required for soils with less than 5 percent passing the No. 200 sieve, is expressed as a relative percentage of the maximum index density/dry unit weight and minimum index density/dry unit weight, obtained by the test procedures in accordance with ASTM D4253 and ASTM D4254, respectively, abbreviated as a percent of laboratory relative density.

1.2.17 Borrow

Soil brought to the project site from an external location for the purposes of project construction.

1.2.18 Subgrade

Earth materials directly below foundations and directly below granular base materials in building slab and pavement areas including shoulders.

1.3 SUBSURFACE DATA

Subsurface soil boring logs are shown in an Attachment to these specifications. These data represent available subsurface information; however, variations may exist between boring locations.

1.4 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.
e. Material character is indicated by the boring logs.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Disposition of Surplus Materials; G

Preconstruction Meeting; G

SD-06 Test Reports

Material Test Report; G

1.6 QUALITY CONTROL

1.6.1 Qualified Technician

Provide a Qualified Technician to inspect, monitor, sample, and performing field testing. The technician qualifications need to be one of the following: a current National Institute for Certification in Engineering

Technologies (NICET) Level II minimum certification in Construction Materials Testing Soils; a Geologist-in-Training with minimum one-year experience; an Engineer-in-Training with minimum one-year experience; a Registered Geologist; or a Professional Engineer.

1.6.2 Lab Validation

Perform testing by a Corps validated commercial testing laboratory or Contractor established testing laboratory approved by the Contracting Officer. Submit testing laboratory validation for the testing to be performed. Do not permit work requiring testing until testing facilities have been inspected, Corps validated and approved by the Contracting Officer.

1.6.3 Preconstruction Meeting

Conduct a preconstruction meeting at the jobsite at least five business days prior to the start of earthwork operations on the project. The preconstruction meeting is to be arranged by the Contractor and is to follow the written agenda submitted prior to the meeting. The purpose of this meeting is to review the requirements of this specification and the associated plans. The following individuals must be in attendance at this meeting: Contractor's Project Manager and Project Superintendent, earthwork subcontractor's Project Manager and Site Foreman, Contractor's Geotechnical Engineer and Testing Agency, Government Geotechnical Engineer and Civil Engineer, and Government Construction Manager and Engineering Technician.

The minutes of this meeting are to be recorded by the Contractor and published via email within 48 hours to all attendees. The minutes must be re-published within 48 hours via email pending any subsequent comments from the attendees.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Embankment Fill

Materials classified as CL in accordance with ASTM D2487. Select material type appropriate for the intended purpose.

2.1.2 Topsoil

Material suitable for topsoil obtained from excavations is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Topsoil material will be in accordance with ASTM D5268.

2.2 BORROW

Provide borrow materials from sources located outside of Government property meeting the requirements of paragraph EMBANKMENT FILL and TOPSOIL.

PART 3 EXECUTION

3.1 PROTECTION

Perform all work specified in accordance with applicable requirements of the Corps of Engineers publication EM 385-1-1 Safety and Health Requirements Manual.

Use equipment of type and size appropriate for the site conditions (soil character and moisture content). Maintenance of exposed subgrades and fills is the responsibility of the Contractor. The Contractor is required to prevent damage by ineffective drainage, dewatering, and heavy loads and equipment by implementing precautionary measures. Repair or replace any defects or damage.

3.1.1 Underground Utilities

Location of the existing utilities indicated is approximate. Physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor is responsible for protecting utilities from damage during construction.

3.1.2 Drainage and Dewatering

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.2.1 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity or provide temporary ditches, swales, and other drainage features and equipment as required to keep soils from becoming unstable, prevent erosion, or undermining of foundations. Remove unstable material from working platforms for equipment operation and soil support for subsequent construction features and provide new material as specified herein. It is the responsibility of the Contractor to assess the site conditions to employ necessary measures to permit construction to proceed.

3.1.3 Protection of Graded Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.2 BORROW

Select borrow material to meet the requirements and conditions of the fill or embankment for which it is to be used. Obtain borrow material from from approved private sources. Unless otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval.

3.2.1 Contractor Furnished Borrow Area(s)

Obtain approved borrow materials from approved offsite sources. If a borrow source is selected that is not a commercial entity from which soil material is directly purchased, submit a Borrow Plan that includes the borrow source location, geotechnical test results showing the fill material meets the Contract requirements, environmental test results in accordance with paragraph ENVIRONMENTAL REQUIREMENTS FOR OFF-SITE SOIL, and any Federal, State, and local permits required for excavation and reclamation of the borrow area.

3.3 SURFACE PREPARATION

3.3.1 Clearing and Grubbing

Clear and grub as specified in Section 31 11 00 CLEARING AND GRUBBING.

3.3.2 Stripping

Strip site where indicated on the plans. Strip existing surface materials to a depth of 4inches below the existing ground surface in areas designated as Clear and Grub on the plans. Strip in all areas within the planned limits of disturbance. All stripped materials not suitable for reuse as topsoil will be wasted in specified disposal area. Screen all stripped soils to remove roots and organic materials prior disposal.

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Protect topsoil and keep in segregated piles until needed.

3.3.3 Stockpiling Operations

Place and grade stockpiles of satisfactory and wasted materials as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. Do not create stockpiles that could obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.4 EXCAVATION

Excavate to contours, elevation, and dimensions indicated. Excavate soil disturbed or weakened by Contractor's operations, and soils softened or made unstable for subsequent construction due to exposure to weather. Use material removed from excavations meeting the specified requirements in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes to minimize surplus material and to minimize additional material to brought on site. Do not excavate below indicated depths except to remove unstable material as determined by the Governmentand confirmed by the Contracting Officer. Remove and replace excavations below the grades shown with appropriate materials as directed by the Contracting Officer.

If at any time during excavation, including excavation from borrow areas, the Contractor encounters material that may be classified as rock or as hard/unyielding material, uncover such material, and notify the Contracting Officer. Do not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow sufficient time for classification and delineation of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for the areas of work in which such deposits occur.

3.4.1 Underground Utilities

Perform work adjacent to utilities as indicated Excavation made with power-driven equipment is not permitted within 2 feet of known utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.5 SUBGRADE PREPARATION

3.5.1 General Requirements

Shape subgrade to line, grade, and cross section as indicated. Remove unsatisfactory and unstable material in surfaces to receive fill or in excavated areas, and replaced with satisfactory materials. Do not place material on surfaces that are muddy, frozen, contain frost, or otherwise containing unstable material. Scarify the surface to a depth of 4 inches prior to placing fill. Step or bench sloped surfaces steeper than 1 vertical to 4 horizontal prior to scarifying. Place 4 inches of loose fill and blend with scarified material. When subgrade is part fill and part excavation or natural ground, scarify to a depth of 8 inches.

3.5.2 Subgrade for Pavements

Compact top 12 inches of subgrade for pavements to at least 95 percent of ASTM D1557. After final rolling, the surface of the subgrade for buildings and pavements must not show deviations greater than 0.05 foot when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area.3.6 FILLING AND COMPACTION

Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs for SUBGRADE PREPARATION. Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by vibratory sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary from 0 to plus 3 percent of optimum moisture. Fill and backfill to contours, elevations, and dimensions indicated. Compact and test each lift before placing overlaying lift.

3.6.1 Compaction

3.6.1.1 General Site

Compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area or structure to 90 percent of ASTM D698 .

3.7 EMBANKMENTS

3.7.1 Earth Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than 8 inches in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise break up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Backfill and fill material are to be within the range of 0 to plus 3 percent of optimum moisture.

Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.8 FINISHING/FINISH OPERATIONS

During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, frozen or otherwise unstable subgrade.

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except as indicated for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.8.1 Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and

debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.8.2 Topsoil and Seed

Provide as specified in Section 32 92 19 SEEDING

On areas to receive topsoil, prepare the compacted subgrade soil to a 2 inches depth for bonding of topsoil with subsoil. Spread topsoil evenly to a thickness of 4 inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively wet or dry. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Remove from the site any surplus of topsoil from excavations and gradings. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas.

3.9 DISPOSITION OF SURPLUS MATERIAL

Remove from Government property all surplus or other soil material not required or not suitable for filling or backfilling, along with brush, refuse, stumps, roots, and timber. Properly disposed of in accordance with all applicable laws and regulations. Prepare plan for Disposition of Surplus Materials to include permissions document to dispose of nonsalable products.

3.10 TESTING

Perform testing as indicated in Table 1. Submit Material Test Reports within 7 days of tests being completed.

Material Type	Location of Material	Test Method	Test Frequency
		Moisture Content - ASTM D2216	Two tests per day for each type of fill and backfill. Sample taken immediately prior to compaction after moisture conditioning.
		Moisture Density Relationship - ASTM D698	One representative test per 500cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density. Sample to be taken from stockpile or location of placement.

Material Type	Location of Material	Test Method	Test Frequency
		Relative Density - ASTM D4253 and ASTM D4254	One test per 2000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines. Double testing frequency for areas compacted by hand-operated machines.
		Atterberg Limits - ASTM D4318	One representative test per 500 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density. Sample to be taken from stockpile or location of placement.

-- End of Section --

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SECTION 31 11 00

CLEARING AND GRUBBING
11/18

PART 1 GENERAL

1.1 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.1.2 Trees, Shrubs, and Existing Facilities

Protect trees and vegetation to be left standing from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.1.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor is responsible for the repair of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, notify the Contracting Officer in ample time to minimize interruption of the service. Refer to Section 00 10 00 GENERAL CONDITIONS for additional utility protection.

3.2 CLEARING

Clearing consists of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing also includes the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Cut off flush with or below the original ground surface trees, stumps, roots, brush, and other vegetation in areas to be cleared, except such trees and vegetation as may be indicated or directed to be left standing.

3.2.1 Tree Removal

Where indicated or directed, remove trees and stumps that are designated as trees from areas outside those areas designated for clearing and grubbing. This work includes the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Dispose of trees as specified in paragraph DISPOSAL OF MATERIALS.

3.2.2 Grubbing

Grubbing consists of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Remove material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Fill depressions made by grubbing with suitable material and compact to make the surface conform with the original adjacent surface of the ground.

3.3 DISPOSAL OF MATERIALS

Dispose of excess materials in accordance with the approved solid waste management permit and include those materials in the solid waste management report.

All wood or wood like materials, remaining from clearing or grubbing such as limbs, tree tops, roots, stumps, logs, rotten wood, and other similar materials is the property of the Contractor and dispose of as specified.

-- End of Section --

SECTION 32 12 13

BITUMINOUS TACK AND PRIME COATS
05/24

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 D8	(2022a) Standard Terminology Relating to Materials for Roads and Pavements
ASTM D88/D88M	(2007; R 2009; E 2019) Standard Test Method for Saybolt Viscosity
ASTM D140/D140M	(2016) Standard Practice for Sampling Asphalt Materials
ASTM D1250	(2019; E 2020) Standard Guide for Use of the Joint API and ASTM Adjunct for Temperature and Pressure Volume Correction Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils: API MPMS Chapter 11.1
ASTM D2170/D2170M	(2018) Standard Test Method for Kinematic Viscosity of Asphalts (Bitumens)
ASTM D2397/D2397M	(2020) Standard Specification for Cationic Emulsified Asphalt
ASTM D2995	(2023) Determining Application Rate of Bituminous Distributors

1.2 DEFINITIONS

See ASTM D8 for more definitions relating to this specification.

1.2.1 Prime Coat

Application of a low-viscosity asphalt material to an absorptive surface, such as an unbound granular layer, designed to penetrate, bond, temporarily weatherproof, and stabilize this existing surface and to promote adhesion between it and construction course that follows.

1.2.2 Tack Coat

Tack Coat is also referred to as bond coat. Tack coat is an application of bituminous material to an existing relatively nonabsorptive surface, such as existing densely graded asphalt mixture (milled or new), to provide a thorough bond between old and new surfacing.

1.2.3 Emulsion

Emulsion is also known as emulsified asphalt or asphalt emulsion. Mostly made of paving grade asphalt binder and water containing a small amount of emulsifying agent. Emulsifying agent may also be referred to as a surfactant. The purpose of the surfactant is to prevent the coalescence of the asphalt droplets and to keep them suspended independently in the water. Surfactants used in the emulsions can be produced with positive or negative charges resulting in anionic or cationic emulsions.

1.2.4 Diluted Emulsion

An emulsion that has been diluted by adding an additional amount of water equal to or less than the total volume of emulsion.

1.2.5 Residual Asphalt

The amount of asphalt binder remaining after all water has evaporated from an asphalt emulsion.

1.2.6 Shot Rate

Shot rate, also referred to as bar rate, is the application rate set by the computerized control system in the bituminous distributor for the cutback asphalt, asphalt binder, or the asphalt emulsion. This value is typically represented by units of g/yd.

1.2.7 Emulsion Break

Emulsion break, also referred to as break or breaking, is the initiation of asphalt binder droplets coalescing and water separating within the emulsion, at which point color begins to change from brown to black.

1.2.8 Emulsion Set

Emulsion set, also referred to as cure or curing, is the completion of emulsion breaking when water has evaporated, leaving behind a thin film of asphalt binder residue.

1.2.9 Certificate of Analysis (COA)

The COA is the manufacturer’s Certificate of Compliance (COC) including all applicable test results required by the specifications.

1.2.10 Certificate of Compliance (COC)

The manufacturer’s certification stating that materials or assemblies furnished fully comply with the requirements of the contract. Provide signed COC by the manufacturer’s authorized representative. The COC may also be referred to as the Bill of Lading.

1.2.11 Screenings

Screenings are a uniformly sized, fine, sandy material with some silt particles. The term screening is used to designate the finer fraction of crushed stone that accumulates after primary and secondary crushing and separation on a No. 4 sieve. Screenings commonly range in particle size from 1/8 in down to finer than No. 200 sieve. The size distribution, particle shape, and other physical properties can be somewhat different from

one quarry location to another, depending on the geological source of the rock quarried, the crushing equipment used, and the method used for coarse aggregate separation. Screenings generally contain freshly fractured faces, have a fairly uniform gradation, and do not usually contain large quantities of plastic fines.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Equipment; G

Distributor Radar or Distance Measurement Instrument (DMI)

Calibration; G

SD-03 Product Data

Waybills and Delivery Tickets

Prime Coat Certificate Of Analysis (COA); G

Tack Coat Certificate Of Analysis (COA); G

SD-06 Test Reports

Sampling and Testing

Application Rate Calibration; G

Daily Application Rate Verification

SD-07 Certificates

Certificates Of Compliance (COC)

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with minimal handling. Do not allow asphalt emulsions to freeze or boil during transport or storage. Asphalt emulsions, if allowed to freeze or boil, may cause the asphalt emulsion to break. Remove this material from site if allowed to freeze or boil.

1.5 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 40 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 EQUIPMENT

Submit equipment, tools and machines used in the work. Maintain the equipment in satisfactory working condition at all times.

2.1.1 Bituminous Distributor

Provide a self-propelled pressure distributor with pneumatic tires of such size and number to prevent rutting, shoving or otherwise damaging the surface being sprayed. Provide a bituminous distributor capable of circulating and agitating the bituminous material during the heating process. The distributor truck is required to have a ground speed control device (radar or contact-wheel: DMI) interconnected with the asphalt pump such that the desired application rate will be supplied at any speed. Include with the distributor equipment a 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 or wand attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. A uniform double or triple overlap is required to be produced by the equipped spray bar. Equip the distributor and spray bar with an instantaneous shutoff. No dripping of material from the spray bar is allowed after shutoff.

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 0.03 to 1.0 gallon 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.

2.1.1.1 Distributor Radar or Distance Measurement Instrument (DMI)

Calibration

The radar or DMI mounted on the distributor truck, which monitors the travel speed and distance traveled, will be calibrated within 6-months of performing the. Provide certification of radar or DMI calibration with date of calibration by an officer of the company that operates the distributor truck stating the radar or DMI has been calibrated per the distributor manufacturer’s instructions.

2.1.1.2 Sampling Device

Equip the bituminous distributor and transport tanks with a spigot-type sampling device.

2.1.1.3 Temperature Sensing Device

Equip the bituminous distributor and transport tanks with a minimum of

2-inch dial type thermometer with a temperature range of50 degrees F to 500 degrees F, with increments having resolution of 25-degree F or finer. Locate the thermometer near the midpoint of the tank's length and within the middle third of the tank's height, or as specified by the manufacturer. Enclose the thermometer in a well with a protective window or by other means as necessary to keep the instrument clean and in the proper working condition.

2.1.2 Spray Bar Nozzles

On the spray bar, each nozzle is required to be a fan nozzle and be at the same spray angle as all other nozzles except for the outermost left and outermost right nozzle which will be a end nozzle (half-fan) such that the spray stays to the inside of the spray bar, unless otherwise approved by the Government. Orient the nozzles of the spray bar approximately 30-degrees from the axis of the spray bar, unless otherwise directed by the equipment manufacturer. Provide nozzles on the spray bar that produce the same flow rate, at the same distance above the pavement. Change the nozzles on the spray bar, as appropriate, for the material being applied and when substantial adjustments are required to the application rate.

2.1.3 Heating Equipment for Storage Tanks

Use steam, electric, or hot oil heaters for heating the bituminous material. Fix an armored thermometer to the tank with a temperature range from 50 degrees F to 500 degrees F, with increments having resolution of 25-degree F or finer so that the temperature of the bituminous material may be determined at all times.

2.1.4 Cleaning Equipment

Provide cleaning equipment suitable for removing and cleaning loose material from the pavement surface. If using street sweeper type equipment, equip the street sweeper with a water tank, dust control spray assembly, both a pick-up and gutter broom, and a debris hopper.

2.2 PRIME COAT MATERIAL

Provide the prime coat Certificate of Analysis (COA), including specific gravity, for the product specified below. COA's should be provided at preconstruction, prior to Application Rate Calibration, and any other COA's during production:

2.2.1 Emulsified Asphalt

Provide emulsified asphalt conforming to ASTM D2397/D2397M, Type CSS-1 CSS-1h. Asphalt emulsion can be diluted up to 1 part water to 1 part emulsion for prime coat use. Where prime coats are to be diluted, certify the dilution was done in accordance with the specific dilution requirements for each product and for each load of material used.

2.3 TACK COAT MATERIAL

Provide the tack coat Certificate of Analysis (COA), including specific gravity, for the product specified below. No dilution is allowed for tack coat applications.

2.3.1 Emulsified Asphalt

Provide emulsified asphalt conforming to ASTM D2397/D2397M, Type CSS-1 CSS-1h.

PART 3 EXECUTION

3.1 PREPARATION OF ASPHALT STORAGE AND BITUMINOUS DISTRIBUTOR

Most anionic and cationic emulsions are not compatible. Thoroughly clean the asphalt emulsion storage and bituminous distributor if previous asphalt emulsion used is non-compatible with the specified emulsion. As an example, if CSS-1h (cationic) was utilized in the distributor previously, and the specified emulsion is a SS-1h (anionic), this would require the storage to be thoroughly cleaned prior to receiving the material and the bituminous distributor storage tanker to be thoroughly cleaned prior to depositing into the bituminous distributor storage tanker.

Ensure bituminous material is at the recommended application temperature and it has been thoroughly cycled through the distributor bar. Test the bituminous distributor under pressure by means of a test shot area (outside the project limits) to ensure there are no leaks or dripping for the nozzles after shut-off.

3.2 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.

3.3 TRIAL APPLICATIONS AND CALIBRATIONS

3.3.1 Trial Applications

Trial applications below are for the initial settings of the bituminous distributor computer-controlled application rate settings prior to performing the APPLICATION RATE CALIBRATION.

3.3.2 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 (shot rate). For emulsions, make other trial applications using various amounts of material or adjusting other setting as may be deemed necessary to meet the residual application rate and uniform coverage.

3.3.3 Tack Coat Trial Application Rate

Unless otherwise authorized, apply the trial application rate of bituminous tack coat materials in the amount of 0.06 gallons per square yard. Make other trial applications using various amounts of material or adjusting other setting as may be deemed necessary to meet the residual application rate and uniform coverage.

3.3.4 Application Rate Calibration

Provide all equipment, materials, and labor necessary to calibrate the application rate produced from the bituminous distributor per the following guidance. Each distributor truck proposed for use on the project will have the application rate calibrated for each material type proposed for use. Perform the application rate calibration after the distributor arrives on the project, after the test shot, and at least 24 hours prior to use for

application of prime coat and tack coat. Calibrate the application rate in accordance with ASTM D2995. If utilizing an emulsified asphalt, utilize ASTM D2995 Option B. Provide pads made from berber carpet (or other approved durable absorbent pad) with rubber or waterproof backing measuring 12 inches by 12 inches. For transverse testing, stack pads end-to-end that spans the maximum width of the spray bar. For longitudinal testing, stack three sets of six pads end-to-end longitudinally with 100-foot separation between sets.

Measure the transverse and longitudinal application rates with all nozzles inserted in the distributor bar. Submit the results for the application rate calibration in the longitudinal direction and the transverse direction to the Government identifying, at a minimum, the following items:

a. Project name, Contract number, testing date.

b. Emulsified, cutback, or asphalt binder material.

c. Distributor make, model and serial number.

d. Distributor setup at time of calibration including target application rate (shot rate as shown on the computer control system), spray bar height, and distributor truck speed or motor RPM.

e. Dry weight of each pad prior to application.

f. Wet weight of each pad immediately after application.

g. For emulsions, oven dry each pad until constant mass. Record oven dry mass of each pad in 20-minute increments. Mass at the end of a 60-minute oven dry period is considered constant mass.

h. For emulsions, residual asphalt rate for each pad and average residual asphalt rate. For cutbacks, shot rate for each pad and average shot rate.

For the Application Rate Calibration to be acceptable, provide the average residual asphalt rate for emulsions or the average shot rate for cutbacks and asphalt binder in compliance with Table 3a or Table 3b and no individual pad rate is to vary more than 20 percent from the average. Perform the Estimating Application Rate of Bituminous Distributors in the presence of the project QC staff and the Government. Reference ATTACHMENT 1. If the application rate calibration fails to meet the requirements of this section, make adjustments to the distributor setup, shot rate or other settings as appropriate, and re-perform the application rate calibration until the results are within an acceptable range. Do not modify the distributor setup, or shot rate after application rate calibration is accepted without approval by the Government. Use ASTM D2995 to determine the estimation of application rate of bituminous distributors every 14 days of production, or as determined necessary by the Government.

3.3.5 Daily Application Rate Verification

Following acceptable results as outlined in paragraph APPLICATION RATE CALIBRATION, perform daily application rate verification each day when the distributor is in use and provide results daily during execution. The production application rates will utilize the volume method of determination as follows:

a. Determine the total distance to be sprayed.

b. Calculate the area sprayed.

c. Calculate the gallons of material applied by subtracting the beginning volume by the ending volume. Utilizing the dipstick which has been provided with the distributor truck or the onboard meter.

d. Correct for temperature back to 60 degrees F by applying correction factor as provided in ASTM D1250.

e. Calculate and report the temperature corrected shot rate by dividing the corrected gallons per item d. by the total area sprayed.

3.4 APPLICATION RATE CORRECTION

If the daily application rate verification varies by more than 0.015 gallon per square yard from the shot rate established during application rate calibration that met the rates in Table 3a or Table 3b, immediately re-perform the application rate calibration in accordance with paragraph APPLICATION RATE CALIBRATION and ensure results are in compliance with the rates specified in Table 3a or Table 3b prior to applying additional prime coat or tack coat.

3.5 APPLICATION TEMPERATURE

3.5.1 Viscosity Relationship

Apply bituminous material at a temperature that will provide a viscosity between 10.0 and 60.0 seconds, Saybolt Furol in accordance with ASTM D88/D88M or between 20 and 120 centistokes in accordance with ASTM D2170/D2170M. Furnish the temperature viscosity relation to the Contracting Officer.

3.5.2 Temperature Ranges

The viscosity requirements determine the application temperature to be used. Table 2 presents a normal range of application temperatures. If Table 2 is different than the manufacturer's recommendation, use the manufacturer's recommendation.

Table 2	
Tack Coat or Prime Coat Application Temperatures	
Asphalt Emulsion	
Cationic Emulsified Asphalt	130-170 degrees F
Anionic Emulsified Asphalt	150-180 degrees F
Non-Ionic Emulsified Asphalt	150-180 degrees F

3.6 APPLICATION

3.6.1 General

Following preparation and subsequent inspection of the surface, apply the prime coat or tack coat with the 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.

3.6.2 Prime Coat

Apply the prime coat at locations shown on the Drawings only when the underlying material meets the specified material density requirements, and the moisture content is within 2 percent of optimum moisture. Application should be achieved within the limits of the temperature described in paragraph ENVIRONMENTAL REQUIREMENTS and quantities to achieve the rate of residual asphalt shown in Table 3a. At the time of priming, ensure that the base is firm, unyielding and in such condition that no undue distortion will occur. Ensure the prime coat adheres to the underlying material. Apply the prime coat material using a bituminous distributor. 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 discard the building paper. If blotter aggregate is used, lightly sweep the area with a power broom, or other approved means, to remove any excess blotter aggregate.

Table 3a		
Prime Coat Application Rates		
Surface Type	Product Type	Rate (gal/yd^2)
Unbound Layers	Emulsion(1)	0.05 - 0.12 (residual rate)
(1) Emulsion prime coats may be diluted up-to a 1 to 1 dilution rate.		

3.6.3 Tack Coat

Immediately following the preparation of the surface for treatment, apply the tack coat by means of the distributor, within the limits of the temperature described in paragraph ENVIRONMENTAL REQUIREMENTS and in quantities to achieve the rate of residual application rates shown in Table 3b. Ensure the surface is clean and dry. Apply tack coat at the locations shown on the Drawings sufficiently in advance of placing the asphalt mixture to permit breaking and initial stages of curing. Do not apply tack coat so

far in advance that it might lose its adhesiveness as a result of being covered with dust or other foreign material. When using a spray paver with appropriate tack coat products, tack coat breaking requirements do not apply. Dilution of tack coat is prohibited. 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 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. To obtain uniform application of the tack coat, 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 tack 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 discard the building paper. If blotter aggregate is used, lightly sweep with a power broom, or other approved means, to remove any excess blotter aggregate. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

Table 3b		
Tack Coat Application Rates (1,3,4)		
Surface Type	Residual Rate (gal/yd^2)	Approximate Bar Rate Undiluted (2) (gal/yd^2)
New Asphalt (between layers)	0.02 - 0.05	0.03 - 0.07
Existing Asphalt	0.04 - 0.07	0.06 - 0.11
Milled Surface	0.04 - 0.08	0.06 - 0.12
Portland Cement Concrete	0.03 - 0.05	0.05 - 0.08
(1) Dilution of tack coat is not allowed		
(2) Assumes emulsion is 33 percent water and 67 percent asphalt		
(3) Emulsified asphalt is prohibited to be applied at application rates over 0.12 gal/yd^2		
(4) Residual rate is the same as bar rate when using hot-applied asphalt binders. Use residual rate tolerances as shown above for target when using hot-applied asphalt binders.		

3.7 FIELD QUALITY CONTROL

Certificates of compliance (COC) for asphalt materials delivered will be obtained and checked to ensure that specification requirements are met. Quantities of applied material will be determined. Prime coat materials when emulsions are used can be diluted on site with potable water up to 1 part water to 1 part emulsion, as long as the residual rate is still being met. Do not dilute tack coat materials. If requested by the Government, obtain samples of the bituminous material under the supervision of the Government per paragraph SAMPLING and send for analysis.

3.7.1 Sampling and Testing

Furnish certified copies of the manufacturer's test reports indicating temperature-viscosity relationship for asphalt materials and compliance with applicable specified requirements, not less than 5 days before the material is required in the work.

3.7.2 Sampling

Unless otherwise specified, sample bituminous material in accordance with ASTM D140/D140M.

3.8 PRIME COAT SET PERIOD

Allow the prime coat to set 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 blotter aggregate to effectively blot up excess bituminous material.

3.9 TACK COAT BREAKING PERIOD

Following application of an emulsified asphalt tack coat and prior to application of the succeeding layer of asphalt mixture, allow emulsified asphalt tack coats to break. No break period is required for cutback or hot-applied asphalt binder tack coat products.

3.10 TRAFFIC CONTROLS

Maintain the primed surface and 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. Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly

-- End of Section --

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SECTION 32 12 16.16

ROAD-MIX ASPHALT PAVING
11/20

PART 1 GENERAL

1.1 PAYMENT

1.1.1 Method of Measurement

The amount paid for will be the number of tons of hot-mix asphalt pavement mixture used in the accepted work. Weigh the hot-mix asphalt pavement mixture after mixing. No separate payment will be made for weight of asphalt cement material incorporated herein.

1.1.2 Basis of Payment

The measured quantity of hot-mixed asphalt pavement will be paid for and included in the lump sum contract price.

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 M 156	(2013; R 2017) Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO T 304	(2011; R 2015) Standard Method of Test for Uncompacted Void Content of Fine Aggregate
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 C88	(2018) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C127	(2023) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C117	(2024)Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C128	(2022) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate

ASTM C131/C131M	(2020) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C142/C142M	(2017; R 2023) Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C566	(2013) Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75/D75M	(2019) Standard Practice for Sampling Aggregates
ASTM D242/D242M	(2009; R 2014) Mineral Filler for Bituminous Paving Mixtures
ASTM D979/D979M	(2015) Sampling Bituminous Paving Mixtures
ASTM D2041/D2041M	(2011) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2172/D2172M	(2017; E 2018) Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
ASTM D2419	(2014) Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2726/D2726M	(2019) Standard Test Method for 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; R 2017) Standard Practice for Random Sampling of Construction Materials
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4791	(2019) 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 D5361/D5361M	(2016) Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
ASTM D5444	(2015) Mechanical Size Analysis of Extracted Aggregate
ASTM D5821	(2013; R 2017) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6307	(2019) Standard Test Method for Asphalt Content of Asphalt Mixture by Ignition Method
ASTM D6373	(2023) Standard Specification for Performance Graded Asphalt Binder
ASTM D6926	(2020) 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 E1274	(2018); R 2024 Standard Test Method for Measuring Pavement Roughness Using a Profilograph

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Placement Plan; G

SD-03 Product Data

Diamond Grinding Plan; G

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

Laboratory Accreditation and Validation

1.4 ACCEPTANCE

1.4.1 Acceptability of Work

Acquire the services of an independent commercial laboratory to perform acceptance testing. Acceptance of the plant produced mix and in-place requirements will be on a lot-to-lot basis. The materials and the pavement itself will be accepted on the basis of production testing. The Government may make check tests from split samples to validate the results of the production testing. Testing performed by the Government does not reduce the required testing of the independent commercial laboratory. Split samples will be taken for Government testing to reduce the variability between the independent commercial laboratory and the Government's test results. When the difference between the independent commercial laboratory and the Government's test results for split samples exceed the acceptable range of two results for multi-laboratory precision for the appropriate test method (i.e. ASTM) then at least one of the laboratories is determined to be in error. An evaluation of procedures and equipment in both laboratories will be made to determine the cause(s) for the differences. Develop steps to correct procedures and equipment to bring multi-laboratory precision to within acceptable limits.

1.4.2 Acceptance Requirements

Provide all sampling and testing required for acceptance. Where appropriate, acceptance for individual lots of asphalt pavement will be made based on laboratory air voids, in-place density, smoothness, and grade in accordance with the following paragraphs. Surface smoothness and grade 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 smoothness and grade measurements for the entire lot cannot be made.

1.4.3 Pavement Lots

A standard lot for all requirements is equal to one day's production or 2,000 tons, whichever is smaller. Divide each lot into four equal sublots in order to evaluate laboratory air voids and in-place density. 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 and the total number of sublots (i.e. 5 or 6 sublots) is used for acceptance criteria. Include partial lots at the end of asphalt production into the previous lot.

Complete and report all theoretical maximum density, laboratory air voids, and in-place density testing within 24 hours after construction of each lot.

1.4.4 Sublot Sampling

Take one mixture sample for each sublot in accordance with ASTM D979/D979M from a random truck or another location for determining theoretical maximum density, laboratory air voids, any additional testing the Government desires, and Contractor Quality Control. 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.

1.4.5 Additional Sampling and Testing

The Government 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. Acceptance will be made for the quantity of asphalt pavement represented by these tests in accordance with the provisions of this section.

1.4.6 Theoretical Maximum Density (TMD)

Measure theoretical maximum density one time for each sublot in accordance with ASTM D2041/D2041M for purposes of calculating laboratory air voids and determining in-place density. The average TMD for each lot will be determined as the average TMD of the random sublot samples. When the TMD on both sides of a longitudinal joint is different, the average of these two TMD values will be used as the TMD needed to calculate the percent joint density.

1.4.7 Laboratory Air Voids

Prepare one set of laboratory compacted specimens for each sublot in accordance with ASTM D6926 using the hand-held hammer for the Marshall Method. Provide three test specimens prepared from the same sample for each set of laboratory compacted specimens. Compact the specimens within 2 hours of the time the mixture was loaded into trucks at the asphalt plant. Do not reheat samples prior to compaction. Provide insulated containers as necessary to maintain the sample temperature. Measure the bulk density of laboratory compacted specimens in accordance with ASTM D2726/D2726M. Determine laboratory air voids from one set (three laboratory compacted specimens) for each sublot sample in accordance with ASTM D3203/D3203M.

1.4.7.1 Tolerance

Provide laboratory air voids with a mean absolute deviation of 1.00 percent or less from the JMF for each lot. Remove and replace lots that do not meet the laboratory air voids requirement at least 4 inches into the cold (existing) lane adjacent to the longitudinal joint, at no additional cost to the Government. The mean absolute deviation of the laboratory air void contents from the JMF air void content will be evaluated as shown in the example below.

1.4.7.2 Calculating Laboratory Air Voids

Laboratory air void calculations for each lot will use the average theoretical maximum density values obtained for the lot. Determine the average TMD in accordance with paragraph THEORETICAL MAXIMUM DENSITY (TMD).

The mean absolute deviation of the laboratory air void contents (one from each sublot) from the JMF air void content will be evaluated as in the following example:

Assume that the laboratory air voids are determined from 4 sublots where one set of laboratory compacted specimens is from a single sublot. The laboratory air voids for the 4 sublots are determined to be 3.5, 3.0, 4.0, and 3.7. Assume that the target air voids from the JMF is 4.0. The mean absolute deviation is then:

Mean Absolute Deviation = (|3.5 - 4.0| + |3.0 - 4.0| + |4.0 - 4.0| + |3.7 - 4.0|)/4

Mean Absolute Deviation = (0.5 + 1.0 + 0.0 + 0.3)/4 = (1.8)/4 = 0.45

The mean absolute deviation for laboratory air voids is determined to be 0.45. It can be seen that 0.45 is less than 1.00 percent. The lot is acceptable for laboratory air voids.

1.4.8 In-place Density

Obtain one random 4-inch or 6-inch diameter core from the mat and joint of each sublot in accordance with ASTM D5361/D5361M for determining in-place density. Cut samples neatly with a diamond core drill bit. Obtain random cores that are the full thickness of the layer being placed. Select core locations randomly using the procedures contained in ASTM D3665. Locate cores for mat density no closer than 12 inches from a transverse or longitudinal joint including the pavement edge. Center all cores for joint density on the joint. Discard samples that are clearly defective as a result of sampling and take an additional random core. When the random core is less than 1 inch thick, it will not be included in the analysis. In this case, obtain another random core sample. Clean and tack coat dry core holes before filling with asphalt mixture. Fill all core holes with asphalt mixture and compact using a standard Marshall hammer to the density specified. Provide all tools, labor, and materials for cutting samples, cleaning, and filling the cored pavement. Measure in-place density in accordance with ASTM D2726/D2726M using each core obtained from the mat and joint.

1.4.8.1 Tolerance

Provide a minimum in-place mat density of 93.0 percent and a minimum in-place joint density of 90.0 percent for each lot. The average in-place mat and joint densities are expressed as a percentage of the average theoretical maximum density (TMD) for the lot. Determine the average TMD in accordance with paragraph THEORETICAL MAXIMUM DENSITY (TMD). Remove and replace lots that do not meet the in-place mat density requirement at least 4 inches into the cold (existing) lane adjacent to the longitudinal joint, at no additional cost to the Government. Remove and replace the longitudinal joint when the lot does not meet the in-place joint density, at no additional cost to the Government. Use a 10 feet wide paving lane that is centered over the joint.

1.4.9 Surface Smoothness

Use a straightedge and profilograph for measuring surface smoothness. Use the profilograph method for all longitudinal testing, except for paving lanes less than 0.25 miles in length. Use the straightedge method for

transverse testing, for longitudinal testing where the length of each pavement lane is less than 0.25 miles, and at the ends of the paving limits for the project. Smoothness requirements do not apply over crowns or grade breaks. Maintain detailed notes of the testing results and provide a copy to the Government immediately after each day's testing.

1.4.9.1 Smoothness Requirements

1.4.9.1.1 Straightedge Testing

Provide finished surfaces of the pavements with no abrupt change of 1/4 inch or more when checked with an approved 12-foot straightedge. Remove and replace surface lift lots when the surface smoothness exceeds 3/8 inch, at no additional cost to the Government. High spots can be diamond ground as an alternative to remove and replace in order to meet surface smoothness requirements at individual locations.

1.4.9.1.2 Profilograph Testing

Provide finished surfaces with a Profile Index not greater than 9 inches per mile when tested with an approved California-type profilograph. Remove and replace the lot when the Profile Index exceeds the tolerance by 4.0 inches per mile or more, at no additional cost to the Government. Correct any small individual area with surface deviation which exceeds the tolerance given above by more than 5.0 inches per mile or more by diamond grinding to meet the specification requirements above or remove and replace at no additional cost to the Government.

1.4.9.2 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.

1.4.9.2.1 Straightedge Testing

Use the straightedge to measure abrupt changes in surface smoothness. 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.

1.4.9.2.2 Profilograph Testing

Perform profilograph testing using an approved California profilograph and procedures described in ASTM E1274. Provide equipment that utilizes electronic recording and automatic computerized reduction of data to indicate "must-grind" bumps and the Profile Index for the pavement. Use a "blanking band" that is 0.2 inch wide and the "bump template" spanning 1

inch with an offset of 0.4 inch. Provide profilograph operated by an approved, factory-trained operator on the alignments specified above. Provide a copy of the reduced tapes to the Government at the end of each day's testing.

1.4.9.2.3 Bumps ("Must Grind" Areas)

Reduce any bumps ("must grind" areas) shown on the profilograph trace which exceed 0.4 inch in height by diamond grinding until they do not exceed 0.3 inch when retested. Taper diamond grinding in all directions to provide smooth transitions to areas not requiring diamond grinding. The following will not be permitted: (1) skin patching for correcting low areas, (2) planing or milling for correcting high areas. Perform additional profilograph testing in all areas corrected by diamond grinding.

1.4.10 Plan Grade

Provide a final wearing surface of pavement conforming to the elevations and cross sections shown and not vary more than 0.05 foot from the plan grade established and approved at site of work. Within 5 working days after completion of a particular lot incorporating the final wearing course, test the final wearing surface of the pavement for conformance with specified plan grade requirements. Match finished surfaces at juncture with other pavements with finished surfaces of abutting pavements. Deviation from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. For parking lots, the grade will be determined by running lines of levels at intervals of 25 feet or less longitudinally and transversely to determine the elevation of the completed pavement surface. Diamond grinding can be used to remove high spots to meet grade requirements. Skin patching for correcting low areas or planing or milling for correcting high areas will not be permitted. Maintain detailed notes of the results of the testing and provide a copy to the Government immediately after each day's testing. Remove and replace surface lift lots when individual locations exceed 0.05-foot tolerance, at no additional cost to the Government. High spots can be diamond ground as an alternative to remove and replace in order to meet plan grade requirements at individual locations.

1.4.11 Laboratory Accreditation and Validation

Provide laboratories used to develop the Job Mix Formula (JMF), perform acceptance testing, and Contractor Quality Control testing that meet the requirements of ASTM D3666. Provide laboratories with a masonry saw having a diamond blade for trimming pavement cores and samples. Perform all required test methods by an accredited laboratory. Schedule and provide payment for laboratory inspections. Additional payment or a time extension due to failure to acquire the required laboratory accreditation is not allowed. Submit a certificate 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.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not place the asphalt mixture upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The temperature requirements may be waived by the Government, if requested; however, meet all other requirements including compaction.

Table 1. Surface Temperature Limitations of Underlying Course	
Mat Thickness, inches	Degrees F
3 or greater	40
Less than 3	45

PART 2 PRODUCTS

2.1 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 asphalt pavement 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. Submit proposed Placement Plan indicating lane widths and longitudinal joints for each course or lift.

2.1.1 Asphalt Mixing Plant

Provide plants used for the preparation of asphalt mixture 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 Government 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 can be stored in non-insulated storage bins for a period of time not exceeding 3 hours. The asphalt mixture can 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 asphalt mixture 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, contamination, and loss of material during hauling. When necessary, due to long haul distance and cold weather, provide insulated truck beds with covers (tarps) that are securely fastened.

2.1.3 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 paver with a vibrating screed to be used during all placement.

2.1.3.1 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.

2.1.3.2 Automatic Grade Controls

Provide a paver equipped with a control system capable of maintaining the specified screed elevation. One of three methods can be used to control grade: stringline, laser, or computerized elevations along with GPS. For multiple layers it is acceptable to control the grade in the underlying layer and control the grade of the surface layer by applying a constant thickness over the underlying layer which has been placed to the desired grade. Slope control can also be used to control the grade of the surface for roads but is not acceptable for wide pavements such as parking lots. Provide transverse slope controller capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A ski-type device of not less than 30 ft can be used to provide improved smoothness. Use a shoe on one side of the paver to match an existing paved surface to provide a smooth joint.

2.1.4 Rollers

Provide rollers in good condition and operate 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.

2.1.5 Diamond Grinding

Those performing diamond grinding are required to have a minimum of three years' experience in diamond grinding. In areas not meeting the specified limits for surface smoothness and plan grade, reduce high areas to attain the

required smoothness and grade, except as depth is limited below. Reduce high areas by diamond grinding the asphalt pavement with approved equipment. Perform diamond grinding by sawing with saw blades impregnated with an industrial diamond abrasive. Assemble the saw blades in a cutting head mounted on a machine designed specifically for diamond grinding that produces the required texture and smoothness level without damage to the asphalt pavement or joint faces. Provide diamond grinding equipment with saw blades that are 1/8-inch wide, a minimum of 60 blades per 12 inches of cutting head width, and capable of cutting a path a minimum of 3 feet wide. Diamond grinding equipment that causes raveling, fracturing of aggregate, or disturbance to the underlying material will not be allowed. The maximum area corrected by diamond grinding the surface of the asphalt pavement is 10 percent of the total area of any lot. The maximum depth of diamond grinding is 1/2 inch. Provide diamond grinding machine equipped to flush and vacuum the pavement surface. Dispose of all debris from diamond grinding operations off Government property. Prior to diamond grinding, submit a Diamond Grinding Plan for review and approval. At a minimum, include the daily reports for the deficient areas, the location and extent of deficiencies, corrective actions, and equipment. Remove and replace all pavement areas requiring plan grade or surface smoothness corrections in excess of the limits specified.

Prior to production diamond grinding operations, perform a test section at the approved location, consisting of a minimum of two adjacent passes with a minimum length of 40 feet to allow evaluation of the finish and transition between adjacent passes. Production diamond grinding operations cannot be performed prior to approval.

2.2 AGGREGATES

Notify the Government at least 7 days before sampling aggregates. Obtain samples in accordance with ASTM D75/D75M that are 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 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 83 percent by weight of coarse aggregate containing two or more fractured faces when tested in accordance with ASTM D5821 with fractured faces produced by crushing.

d. The particle shape essentially cubical and the aggregate containing not more than 10 percent, by weight, of flat and elongated particles (5:1 ratio of length to thickness) when tested in accordance with

ASTM D4791, Method B.

e. 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 45when 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 2, 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 4 and 5 are applied.

Table 2. Aggregate Gradations

Sieve Size, inch	Gradation 1 Percent Passing by Mass	Gradation 2 Percent Passing by Mass	
1	100	---	---
3/4	90-100	100	---
1/2	68-88	90-100	
3/8	60-82	69-89	

Table 2. Aggregate Gradations			
Sieve Size, inch	Gradation 1 Percent Passing by Mass	Gradation 2 Percent Passing by Mass	
No. 4	45-67	53-73	
No. 8	32-54	38-60	
No. 16	22-44	26-48	
No. 30	15-35	18-38	
No. 50	9-25	11-27	
No. 100	6-18	6-18	
No. 200	3-6	3-6	

2.3 ASPHALT CEMENT BINDER

Provide asphalt cement binder that conforms to ASTM D6373 Performance Grade (PG)58V-34 . 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.

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 mixture composed 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 2. Do not produce asphalt pavement for acceptance until a JMF has been approved. Design the asphalt mixture using 75 blows with the Marshall hand-held hammer procedures contained in AI MS-2 and the criteria shown in Table 3. Use laboratory compaction temperatures for Polymer Modified Asphalts as recommended by the asphalt binder manufacturer. Determine the Tensile Strength Ratio (TSR) of the composite mixture in accordance with ASTM D4867/D4867M. Compact the TSR specimens to an air void content of 7 percent plus or minus 1 percent. If the Tensile Strength Ratio (TSR) of the composite mixture is less than 75, reject the aggregates or treat the asphalt mixture 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 pounds 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 performance grade or penetration grade.

e. Number of blows of hammer per side of molded specimen.

f. Laboratory mixing temperature.

g. Laboratory 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 Marshall 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, aggregate gradation, and aggregate properties) of RAP in accordance with paragraph RECYCLED ASPHALT PAVEMENT, if RAP is used.

Table 3. Mix Design Criteria

Test Property	Marshall (50 Blows)	Marshall (75 Blows)	
Stability, pounds, minimum (NA for Superpave)	1000 (1)	1800 (1)	
Flow, 0.01 inch, (NA for Superpave)	8-18	8-16	
Air voids, percent	3-5	3-5	
Minimum Percent Voids in Mineral Aggregate VMA) (2)			
Gradation 1	13.0	13.0	
Gradation 2	14.0	14.0	
Gradation 3	15.0	15.0	
TSR, minimum percent	75	75	

(1) This is a minimum requirement. Provide significantly higher average during construction to ensure compliance with the specifications.

(2) Calculate VMA in accordance with AI MS-2, based on ASTM C127 and ASTM C128 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 and 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.

2.5 RECYCLED HOT MIX ASPHALT

Provide recycled asphalt mixture consisting of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt cement. Provide RAP of a consistent gradation, asphalt content, and properties. Maintain RAP stockpiles free from contamination including coal-tar sealers. Limit the maximum RAP chunk size to 2 inches when feeding RAP into the plant. The individual aggregates in a RAP chunk are not to exceed the maximum size aggregate of the gradation specified in Table 2. Design the recycled asphalt mixture using procedures contained in AI MS-2. Provide RAP job mix that meets the requirements of paragraph MIX DESIGN. Limit the amount of RAP so the asphalt binder from the RAP does not exceed 25 percent of the total asphalt content.

2.5.1 RAP Aggregates and Asphalt Cement

Provide a blend of aggregates used in the recycled mix that meet the requirements of paragraph AGGREGATES. Establish the percentage of asphalt binder in the RAP for the mixture design according to ASTM D2172/D2172M or ASTM D6307 using the appropriate dust correction procedure.

2.5.2 RAP Mix

Select the virgin asphalt binder as described below:

a. For 0 to 20 percent recycled binder content - no change in virgin binder selection.

b. For 20+ percent to 25 percent recycled binder content - select virgin binder one grade softer than normal.

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 acceptance 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. Mixture Volumetrics

h. Moisture Content of Mixtures

i. Placing and Compaction

j. Joints

k. Surface Smoothness

l. Truck bed release agent

m. 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.

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. Use the independent commercial laboratory for acceptance testing in paragraph ACCEPTANCE. Use in-house capabilities or the independent commercial laboratory for quality control testing. Required elements of the testing program include but are not limited to tests for the control of asphalt content, aggregate gradation, aggregate moisture, moisture in the asphalt mixture, temperatures, VMA, Marshall stability, flow, and in-place density. Develop a Quality Control Testing Plan as part of the Quality Control Program.

3.1.3.1 Asphalt Content

Determine asphalt content a minimum of twice per lot (a lot is defined in paragraph PAVEMENT LOTS) using the ignition method in accordance with ASTM D6307. Use the extraction method in accordance with ASTM D2172/D2172M if

the correction factor for the ignition method in ASTM D6307 is greater than 1.0. The asphalt content for the lot will be determined by averaging the test results.

3.1.3.2 Aggregate Properties

Determine aggregate gradations a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136/C136M, and ASTM C117. Determine the specific gravity of each aggregate size grouping for each 20,000 tons in accordance with ASTM C127 or ASTM C128. Determine fractured faces for gravel sources for each 20,000 tons in accordance with ASTM D5821. Determine the uncompacted void content of natural sand, manufactured sand, and blended aggregate for each 20,000 tons in accordance with AASHTO T 304 Method A.

3.1.3.3 Moisture Content of Aggregate

Determine the moisture content of aggregate used for production a minimum of once per lot in accordance with ASTM C566.

3.1.3.4 Moisture Content of Asphalt Mixture

Determine the moisture content of the asphalt mixture at least once per lot in accordance with AASHTO T 329.

3.1.3.5 Temperatures

Check temperatures at least four times per lot, at necessary locations to determine the temperature at the dryer, the asphalt cement binder in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

3.1.3.6 VMA, Marshall Stability, and Flow

Obtain mixture samples at least four times per lot. Calculate the VMA of each specimen in accordance with AI MS-2 based on ASTM C127 and ASTM C128 bulk specific gravity for the aggregate, as well as the Marshall stability and flow, as described in ASTM D6927. Provide VMA within the limits of Table 3.

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 can be used to monitor pavement density.

3.1.3.8 Additional Testing

Perform any additional testing deemed necessary to control the process.

3.1.3.9 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 to not meet specification requirements 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 4, 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 4 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 4. Action and Suspension Limits for the Parameters to be Plotted on Individual and Running Average Control Charts

	Individual Samples		Running Average of	
Parameter to be Plotted	Action Limit	Suspension Limit	Action Limit	Suspension Limit
No. 4 sieve, Cumulative percent passing, deviation for JMF target; plus or minus values	6	8	4	5
No. 30 sieve, Cumulative percent passing, deviation for JMF target; plus or minus values	4	6	3	4
No. 200 sieve, Cumulative percent passing, deviation for 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
Stability, pounds (minimum) (NA for Superpave)				
75 Blow JMF	1800	1700	1900	1800
50 Blow JMF	1000	900	1100	1000
Flow, 0.01 inch (NA for Superpave)				

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.
Laboratory Air Voids, percent deviation from JMF target value	No specific action and suspension limits set since this parameter is used for acceptance			
In-place Mat Density, percent of TMD	No specific action and suspension limits set since this parameter is used for acceptance			
In-place Joint Density, percent of TMD	No specific action and suspension limits set since this parameter is used for acceptance			
VMA				
Gradation 1	13.5	13.0	13.3	13.0
Gradation 2	14.5	14.0	14.3	14.0
Gradation 3	15.5	15.0	15.3	15.0

3.2 PREPARATION OF ASPHALT BINDER MATERIAL

Heat the asphalt cement material while avoiding local overheating. Provide a continuous supply of the asphalt material to the mixer at a uniform temperature. Maintain the temperature of the asphalt delivered to the mixer to provide a suitable viscosity for adequate coating of the aggregate particles. For hot-mix, do not heat unmodified asphalt to a temperature exceeding 325 degrees F when added to the aggregate. Do not heat modified asphalt to a temperature exceeding 350 degrees F when added to the aggregate.

3.3 PREPARATION OF MINERAL AGGREGATE

Heat and dry the aggregate prior to mixing. Provide a rate of heating and a maximum temperature that does not damage the aggregates. Do not heat the aggregate to a temperature exceeding 350 degrees F when the asphalt binder 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 ASPHALT MIXTURE

Weigh or meter the aggregates and the asphalt cement and introduce into the mixer the amount specified by the JMF. Mix the combined materials until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. The moisture content of all asphalt mixture upon discharge from the plant is not to exceed 0.5 percent by total weight of mixture as measured by AASHTO T 329.

3.5 PREPARATION OF THE UNDERLYING SURFACE

Immediately before placing the asphalt mixture, clean the underlying course of dust and debris. Apply a prime coat or tack coat in accordance with Section 32 12 13 BITUMINOUS TACK AND PRIME COATS.

3.6 TEST SECTION

Prior to full production, place a test section for each JMF used. Construct a test section 250 to 500 feet long and two paver passes wide 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 underlying layer for the project. Use the same equipment and procedures 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 sample at the plant from a random truck. Compact three specimens and test for laboratory air voids as well as the Marshall stability and flow. Test a portion of the same sample for theoretical maximum density (TMD), aggregate gradation, asphalt content, and 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 each finished pavement mat (eight total), four from the longitudinal joint, and test 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 5. 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 5. Test Section Requirements for Material and Mixture Properties

Property	Specification Limit
Aggregate Gradation-Percent Passing (Individual Test Result)	
No. 4 and larger	JMF plus or minus 8
No. 8, No. 16, No. 30, and No. 50	JMF plus or minus 6
No. 100 and No. 200	JMF plus or minus 2.0
Asphalt Content, Percent (Individual Test Result)	JMF plus or minus 0.5
Laboratory Air Voids, Percent (Average of 3 specimens)	JMF plus or minus 1.0
VMA, Percent (Average of 3 specimens)	See Table 3
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)	93.0 minimum
Joint Density, Percent of TMD (Average of 4 Random Cores)	90.0 minimum
Stability, pounds (Average of 3 specimens) (for Marshall only)	1000 minimum for 50 blows
Flow, 0.01 inch (Average of 3 specimens) (for Marshall only with non-modified asphalt)	8 - 18 for 50 blows

3.6.2 Additional Test Sections

If the initial test section should prove 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 section has been constructed and accepted.

3.7 TRANSPORTING AND PLACING

3.7.1 Transporting

Transport asphalt mixture 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 will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F.

3.7.2 Placing

Place the mix in lifts of adequate thickness and compact at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Asphalt lifts shall be 3 inches maximum. 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 is obtained, and the surface conforms to the grade and contour indicated. Do not broadcast waste mixture onto the mat or recycle 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 can be spread and luted by hand tools.

3.8 COMPACTION OF MIXTURE

3.8.1 General

a. After placing, thoroughly and uniformly compact the mixture by rolling. Compaction Equipment weight shall be 8 tons minimum. 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 with 3 to 4 passes of compaction equipment 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 asphalt mixture and to 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 or small compactors. 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 asphalt mixture and immediately compact to conform to the surrounding area. Perform this work at no expense to the Government. Skin patching is not allowed.

3.8.2 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.

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.

3.9 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.

3.9.1 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. 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.

3.9.2 Longitudinal Joints

Provide a joint that meets density and smoothness requirements for joints and has uniform texture. Cut back longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing adjacent lanes), or otherwise defective, a maximum of 3 inches from the top of the course 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. Provide a light tack coat of asphalt material to all contact surfaces prior to placing any fresh mixture against the joint.

-- End of Section --

SECTION 32 16 19

CONCRETE CURBS, GUTTERS AND SIDEWALKS
05/18

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 182	(2005; R 2021) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2024) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C31/C31M	(2024c) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2024a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2024) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C309	(2019) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C920	(2018; R 2024) Standard Specification for Elastomeric Joint Sealants
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled

	PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D5893/D5893M	(2016) Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

1.2 SUBMITTALS

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

SD-03 Product Data

Concrete

Biodegradable Form Release Agent

SD-06 Test Reports

Field Quality Control

1.3 EQUIPMENT, TOOLS, AND MACHINES

1.3.1 General Requirements

Plant, equipment, machines, and tools used in the work will be subject to approval and must be maintained in a satisfactory working condition at all times. Use equipment capable of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Discontinue using equipment that produces unsatisfactory results. Allow the Contracting Officer access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.4 ENVIRONMENTAL REQUIREMENTS

1.4.1 Placing During Cold Weather

Do not place concrete when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Make provisions to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection must be approved in writing. Approval will be contingent upon full conformance with the following provisions. Prepare and protect the underlying material so that it is entirely free of frost when the concrete is deposited. Heat mixing water and aggregates as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating must be approved. Use only aggregates that are free of ice, snow, and frozen lumps before entering the mixer. Provide covering or other means as needed to maintain the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.4.2 Placing During Warm Weather

The temperature of the concrete as placed must not exceed 85 degrees F except where an approved retarder is used. Cool the mixing water and aggregates as necessary to maintain a satisfactory placing temperature. The placing temperature must not exceed 95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 03 30 00 CAST-IN-PLACE CONCRETEexcept as otherwise specified. Concrete must have a minimum compressive strength of 4000 psi at 28 days. Size of aggregate must not exceed 1 inch. Submit copies of certified delivery tickets for all concrete used in the construction.

Concrete mix "OPW 4000" per City of Omaha Standard Specifications for Public Works Construction 2024 Edition may be used for curbs and sidewalks.

2.1.1 Air Content

Use concrete mixtures that have an air content by volume of concrete of 6.5 to 8.5 percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

Use concrete with a slump of 2.5 inches plus or minus 1.5 inch for hand placed concrete as determined in accordance with ASTM C143/C143M.

2.1.3 Reinforcement Steel

Use reinforcement bars conforming to ASTM A615/A615M.

2.2 CONCRETE CURING MATERIALS

2.2.1 Burlap

Use burlap conforming to AASHTO M 182.

2.2.2 White Pigmented Membrane-Forming Curing Compound

Use white pigmented membrane-forming curing compound conforming to ASTM C309, Type 2.

2.3 JOINT FILLER STRIPS

2.3.1 Contraction Joint Filler for Curb and Gutter

Use hard-pressed fiberboard contraction joint filler for curb and gutter.

2.3.2 Expansion Joint Filler, Premolded

Onless otherwise indicated, use 1/2 inch thick premolded expansion joint filler conforming to ASTM D1751 or ASTM D1752.

2.4 JOINT SEALANTS

Use cold-applied joint sealant conforming to ASTM C920 or ASTM D5893/D5893M.

2.5 FORM WORK

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Use wood or steel forms that are straight and of sufficient strength to resist springing during depositing and consolidating concrete.

2.5.1 Wood Forms

Use forms that are surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Use forms with a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness.

2.5.2 Steel Forms

Use channel-formed sections with a flat top surface and welded braces at each end and at not less than two intermediate points. Use forms with interlocking and self-aligning ends. Provide flexible forms for radius forming, corner forms, form spreaders, and fillers as needed. Use forms with a nominal length of 10 feet and that have a minimum of 3 welded stake pockets per form. Use stake pins consisting of solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.5.3 Sidewalk Forms

Use sidewalk forms that are of a height equal to the full depth of the finished sidewalk.

2.5.4 Curb and Gutter Forms

Use curb and gutter outside forms that have a height equal to the full depth of the curb or gutter. Use rigid forms for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

2.5.5 Biodegradable Form Release Agent

Use form release agent that is colorless and biodegradableand that is composed of at least 87 percent biobased material. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces. Provide form release agent that does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

Construct subgrade to the specified grade and cross section prior to concrete placement.

3.1.1 Sidewalk Subgrade

Place and compact the subgrade in accordance with Section 31 00 00 EARTHWORK. The upper 12 inches of subgrade shall be compacted to at least 95 percent of ASTM D698. Test the subgrade for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

Place and compact the subgrade in accordance with Section 31 00 00 EARTHWORK. The upper 12 inches of subgrade shall be compacted to at least 95 percent of ASTM D698. Test the subgrade for grade and cross section by means of a template extending the full width of the curb and gutter. Use subgrade materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

Maintain subgrade in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade must be in a moist condition when concrete is placed. Prepare and protect subgrade so that it is free from frost when the concrete is deposited.

3.2 FORM SETTING

Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Use additional stakes and braces at corners, deep sections, and radius bends, as required. Use clamps, spreaders, and braces where required to ensure rigidity in the forms. Remove forms in a manner that will not injure the concrete. Do not use bars or heavy tools against the concrete when removing the forms. Promptly and satisfactorily repair concrete found to be defective after form removal. Clean forms and coat with form oil or biodegradable form release agent each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment must be checked with a 10 foot straightedge. Sidewalks must have a transverse slope of 1/4 inch per foot unless shown otherwise. Construct sidewalks that are located adjacent to curbs with the low side adjacent to the curb unless shown otherwise. Do not remove side forms less than 48 hours after finishing has been completed.

3.2.2 Curbs and Gutters

Remove forms used along the front of the curb not less than 2 hours nor more than 6 hours after the concrete has been placed. Do not remove forms used along the back of curb until the face and top of the curb have been finished, as specified for concrete finishing. Do not remove gutter forms while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Place concrete in the forms in one layer. When consolidated and finished, the sidewalks must be of the thickness indicated. Use a strike-off guided by side forms after concrete has been placed in the forms to bring the surface to proper section to be compacted. Consolidate concrete with an approved vibrator. Finish the surface to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. Produce a scored surface by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

Finish all slab edges, including those at formed joints, with an edger having a radius of 1/8 inch. Edge transverse joints before brooming. Eliminate the flat surface left by the surface face of the edger with brooming. Clean and solidly fill corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing with a properly proportioned mortar mixture and then finish.

3.3.4 Surface and Thickness Tolerances

Finished surfaces must not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.3.5 Curing

Sidewalks shall be cured in accordance with paragraph 3.7 within one hour of concrete placement.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Place concrete to the required section in a single lift. Consolidate concrete using approved mechanical vibrators. Curve shaped gutters must be finished with a standard curb "mule".

3.4.2 Curb and Gutter Finishing

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Float and finish exposed surfaces with a smooth wood float until true to grade and section and uniform in texture. Brush floated surfaces with a fine-hair brush using longitudinal strokes. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, rub the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the front curb surface, while still wet, in the same manner as the gutter and curb top. Finish the top surface of gutter and entrance to grade with a wood float.

3.4.4 Joint Finishing

Finish curb edges at formed joints as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces must not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4.6 Curing

Curb & Gutter shall be cured in accordance with paragraph 3.7 within one hour of concrete placement.

3.5 SIDEWALK JOINTS

Construct sidewalk joints to divide the surface into rectangular areas. Space transverse contraction joints at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and continuous across the slab. Construct longitudinal contraction joints along the centerline of all sidewalks 10 feet or more in width. Construct transverse expansion joints at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, install transverse expansion joints as indicated. Form expansion joints around structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

Form contraction joints in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness. Unless otherwise approved or indicated, either use a jointer to cut the groove or saw a groove in the hardened concrete with a power-driven saw. Construct sawed joints by sawing a groove in the concrete with a 1/8 inch blade. Provide an ample supply of saw blades on the jobsite before concrete placement is started. Provide at least one standby sawing unit in good working order at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Form expansion joints using 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the

sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper. Hold joint filler in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, round joint edges using an edging tool having a radius of 1/8 inch. Remove any concrete over the joint filler. At the end of the curing period, clean the top of expansion joints and fill with cold-applied joint sealant. Use joint sealant that is gray or stone in color. Thoroughly clean the joint opening before the sealing material is placed. Do not spill sealing material on exposed surfaces of the concrete. Apply joint sealing material only when the concrete at the joint is surface dry and atmospheric and concrete temperatures are above 50 degrees F. Immediately remove any excess material on exposed surfaces of the concrete and clean the concrete surfaces.

3.6 CURB AND GUTTER JOINTS

Construct curb and gutter joints at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Construct contraction joints directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

a. Construct contraction joints by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Remove separators as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

3.6.2 Expansion Joints

Form expansion joints by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Construct expansion joints in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement using the same type and thickness of joints as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, provide expansion joints at least 1/2 inch in width at intervals not less than 30 feet nor greater than 120 feet. Seal expansion joints immediately following curing of the concrete or as soon thereafter as weather conditions permit. Seal expansion joints and the top 1 inch depth of curb and gutter contraction-joints with joint sealant. Thoroughly clean the joint opening before the sealing material is placed. Do not spill sealing material on exposed surfaces of the concrete. Concrete at the joint must be surface dry and atmospheric and concrete temperatures must be above 50 degrees F at the time of application of joint sealing material. Immediately remove excess material on exposed surfaces of the concrete and clean concrete surfaces.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect

unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete must be on hand and ready for use before actual concrete placement begins. Protect concrete as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

Cover the entire exposed surface with two or more layers of burlap. Overlap mats at least 6 inches. Thoroughly wet the mat with water prior to placing on concrete surface and keep the mat continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Membrane Curing Method

Apply a uniform coating of white-pigmented membrane-curing compound to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Coat formed surfaces immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Do not allow concrete surface to dry before application of the membrane. If drying has occurred, moisten the surface of the concrete with a fine spray of water and apply the curing compound as soon as the free water disappears. Apply curing compound in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. Apply the second coat in a direction approximately at right angles to the direction of application of the first coat. The compound must form a uniform, continuous, coherent film that will not check, crack, or peel and must be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, apply an additional coat to the affected areas within 30 minutes. Respray 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 areas where the curing compound is damaged by subsequent construction operations within the curing period. Take precautions necessary to ensure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. Tightly seal the top of the joint opening and the joint groove at exposed edges before the concrete in the region of the joint is resprayed with curing compound. Use a method used for sealing the joint groove that prevents loss of moisture from the joint during the entire specified curing period. Provide approved standby facilities for curing concrete pavement at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. 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 other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, remove debris and backfill, grade, and compact the area adjoining the concrete to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Protect completed concrete from damage until accepted. Repair damaged concrete and clean concrete discolored during construction. Remove and reconstruct concrete that is damaged for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Dispose of removed material as directed.

3.8 FIELD QUALITY CONTROL

Submit copies of all test reports within 24 hours of completion of the test.

3.8.1 General Requirements

Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, take the action and submit reports as required below, and additional tests to ensure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

Take concrete samples in accordance with ASTM C172/C172M not less than once a day nor less than once for every 250 cubic yards of concrete placed. Mold cylinders in accordance with ASTM C31/C31M for strength testing by an approved laboratory. Each strength test result must be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Air Content

Determine air content in accordance with ASTM C173/C173M or ASTM C231/C231M. Use ASTM C231/C231M with concretes and mortars made with relatively dense natural aggregates. Make two tests for air content on randomly selected batches of each class of concrete placed during each shift. Make additional tests when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. Notify the placing foreman if results are out of tolerance. The placing foreman must take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until such time as the air content is within the tolerance specified.

3.8.2.3 Slump Test

Perform two slump tests on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Perform additional tests when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

Determine the anticipated thickness of the concrete prior to placement by passing a template through the formed section The thickness will be determined by measuring each edge of the completed slab.

3.8.4 Surface Evaluation

Provide finished surfaces for each category of the completed work that are uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, reduce high areas either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete must not exceed 5 percent of the area of any integral slab, and the depth of grinding must not exceed 1/4 inch. Remove and replace pavement areas requiring grade or surface smoothness corrections in excess of the limits specified.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Contracting Officer and deficiencies in appearance will be identified. Remove and replace areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work.

-- End of Section --

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SECTION 32 17 23.16

ROAD AND PARKING LOT PAVEMENT MARKINGS
11/24

PART 1 GENERAL

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

ASTM INTERNATIONAL (ASTM)

ASTM D4414	(1995; R 2020) Standard Practice for Measurement of Wet Film Thickness by Notch Gages

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE AMS-STD-595A	(2017) Colors used in Government Procurement

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-1952	(2015; Rev F; Notice 1) Paint, Traffic and Airfield Markings, Waterborne

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Plan; G

Qualifications; G

Safety Data Sheets For Each Paint Type; G Safety Data Sheets For Chemicals Used In Surface Preparation; G

Surface Preparation Equipment List; G

Marking Applications Equipment List; G

SD-03 Product Data

Manufacturer Data Sheets for all Marking Materials; G

SD-06 Test Reports

Marking Application Wet Film Thickness Test; G

SD-07 Certificates

Manufacturer Certificate of Compliance for Marking Materials; G

Manufacturer Certificate of Conformance for Volatile Organic

Compliance; G

SD-08 Manufacturer's Instructions

Marking Materials Storage and Application; G

Chemicals Used in Surface Preparation; G

1.3 QUALITY CONTROL

1.3.1 Quality Control Plan

Within 10 calendar days of project award, submit a quality control plan. The plan must state the means, methods, equipment, and materials to be employed for the performance of the surface preparation, application of reflective and non-reflective marking, and marking layout. At a minimum, provide descriptive criteria for each of the following activities for review and approval by the Contracting Officer:

a. Describe the means and methods used to layout marking geometry and the location of marking elements.

b. Describe the protocol for determination of the operating pressure and speed of the equipment for surface preparation.

c. Describe the protocol for surface preparation when not using water.

d. Define the protocol for the performance of test stripes for each line width, color, and paint type.

e. Provide equipment details to include speed, pressures and application rate for the minimum wet film thickness and the application rate of reflective media to provide the specified glass bead anchoring and reflectivity.

f. Provide and discuss safety directives for maintaining traffic on parking lots.

g. Define communications procedures when operating on roads and parking lots.

1.3.2 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of applicable chemicals. The documentation should include experience on five projects of similar size and scope with references for all personnel.

1.3.3 Qualifications For Roads and Parking Marking Personnel

Submit documentation of qualifications in resume format a minimum of 14 days before pavement marking work is to be performed showing personnel who will be performing the work have experience working on airfields, operating

mobile self-powered marking, cleaning, and paint removal equipment and performing these tasks. Include with their resume a list of references complete with points of contact and telephone numbers. Provide certification for pavement marking machine operator and Foreman demonstrating experience successfully completing a minimum of two airfield pavement marking projects of similar size and scope. Provide documentation demonstrating personnel have a minimum of three years of experience operating similar equipment and performing the same or similar work in similar environments, similar in size and scope of the planned project. The Contracting Officer reserves the right to require additional proof of competency or to reject proposed personnel.

1.4 DELIVERY, STORAGE, AND HANDLING

Provide a conditioned storage and staging area located off the installation for all materials intended to be used on the project. Ensure all materials delivered to the storage location are in the original container and clearly marked with the product name, compliance information, batch number, color, manufactured date, instructions for storage, instructions for application, and the name of the manufacturer. All materials are to be stored in conformance with the manufacturer instructions. Provide manufacturer instructions for; marking materials storage and application, reflective media storage and application, and the chemicals used in surface preparation.

1.5 PROJECT/SITE SPECIAL CONDITIONS

1.5.1 Environmental Requirements

Pavement surface must be free of snow, ice, or slush; with a surface temperature of at least 40 degrees F and rising at the beginning of operations, except those involving shot blasting or grinding. Cease operation during thunderstorms, or during rainfall, except for water blasting and removal of previously applied chemicals. Cease water blasting where surface water accumulation alters the effectiveness of material removal.

1.5.1.1 Weather Limitations for Marking Application

Apply pavement markings to clean, dry surfaces and only when the ambient temperature is at least 5 degrees F above the dew point and the pavement surface temperatures are within the limits recommended by the manufacturer of the material being used unless otherwise noted. Allow the pavement surface to dry after the water has been used for surface preparation or after a precipitation event. Do not perform marking applications when the wind carries overspray onto locations adjacent to the marking. Provide wind screens to shroud application equipment.

1.5.1.2 Testing Dry Surfaces

Do not commence marking until the pavement surface is dry. Use the plastic wrap method as described in paragraph PRE-APPLICATION TESTING to test the pavement surface for moisture. Do not proceed with marking until the Contracting Officer has observed the moisture test and has accepted the area prepared for marking.

1.5.1.3 Volatile Organic Compounds Compliance

Submit a manufacturer certificate stating that the proposed pavement marking paint meets the Volatile Organic Compound (VOC) regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located. Submit manufacturer certificate of conformance for volatile organic compliance.

1.5.2 Traffic Control for Roads and Parking Lots

Place approved signs conforming to MUTCD near the beginning of the worksite and well ahead of the worksite to alert approaching traffic

When traffic is rerouted or controlled to accomplish the work, provide necessary warning signs, and related equipment for the safe passage of vehicles.

1.6 APPLICATION EQUIPMENT CALIBRATION

Before performing any marking application, calibrate the paint application equipment at the necessary speed to execute the application. Calibration and application will be performed using paint that is not diluted or thinned. Paint will be used as formulated by the manufacturer. Calibrate paint guns for each line width and color intended to be applied. Use a wet film gauge in accordance with ASTM D4414, to determine if the wet film thickness is the same at each edge and at the center of the marking. Adjust each paint gun to provide a line of uniform thickness.

PART 2 PRODUCTS

2.1 EQUIPMENT

Submit a surface preparation equipment list by serial number, type, model, and manufacturer. Include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation. Mobile equipment must allow for removal of markings without damaging the pavement surface or joint sealant. Maintain machines, tools, and equipment used in the performance of the work in satisfactory operating condition.

2.1.1 Surface Preparation and Paint Removal for Roads and Parking Lots

Submit data sheets for paint removal equipment intended for use in preparation of the pavement surface for marking. In the submittal, include descriptive information on the means for adjusting coverage per each pass, water pressure adjustment range, and tank and flow capacities. The equipment must have a range of adjustments that will provide a clean surface free of dirt, dust, oil, grease, algae, mildew, mold, and loose paint. When preparing new portland cement concrete for marking, provide equipment capable of removing curing compounds without damage to the concrete surface and joint seal materials. Submit safety data sheets for chemicals used in surface preparation. Chemicals must be bio-degradable.

2.1.1.1 Water Blasting Equipment

Use mobile water blasting equipment capable of producing a pressurized stream of water that effectively removes paint from the pavement surface without significantly damaging the pavement. Provide equipment, tools, and machinery which are safe and in good working order.

2.1.1.2 Chemical Removal Equipment

Use chemical equipment capable of applying and removing chemicals and paint from the pavement surface, leaving only non-toxic biodegradable residue without scarring or other damage to the pavement or joints and joint seals.

2.1.2 Markings Application Equipment

Submit a marking applications equipment list of equipment appropriate for the material(s) to be used. Include the manufacturer's descriptive data and certification for the planned use that indicates the area of coverage per pass, pressure adjustment range, tank and flow capacities, and all safety precautions required for operating and maintaining the equipment. Provide and maintain machines, tools, and equipment used in the performance of the work in satisfactory operating condition or remove equipment that is not providing satisfactory performance from the work site. Provide mobile and maneuverable application equipment to the extent that straight lines can be followed and normal curves can be made in a true arc.

2.1.2.1 Airless or Atomizing Equipment

Provide mobile airless or pneumatic air-atomized application equipment that is maneuverable to the extent that straight lines can be followed, and normal curves can be made in a true arc. Mount equipment on trucks, skids or tractors. Use equipment suitable for application of the marking material specified. Airless systems are used to apply waterborne and epoxy coatings. Pneumatic systems are used only to apply waterborne and solvent based coatings.

Provide equipment capable of applying a marking from 4 inches to 12 inches wide in a single pass and also capable of applying two single solid or intermittent lines using a minimum of two colors. Provide equipment with tanks or reservoirs equipped with mechanical agitators, pressure regulators, and gages in full view of the equipment operator. Use paint strainers suitable to screen paint flowing in all supply lines.

2.1.2.2 Hand-Operated Machines

Provide a hand-operated push-type applicator machine commonly used for the application of water-based paint or two-component, chemically curing paint, thermoplastic, or preformed tape to pavement surfaces for small marking projects, such as legends and cross-walks, parking lots, or surface painted signs. Provide an applicator machine with the necessary tanks and spraying nozzles capable of applying paint uniformly at specified wet film thickness. Provide spray guns for hand application of paint in areas where push-type machines cannot be used.

2.2 ROAD AND PARKING LOT MATERIALS

Submit safety data sheets for each paint type as well as manufacturer data sheets for all marking materials; include with the submittal a manufacturer certificate of compliance for marking materials and a manufacturer certificate of compliance for reflective materials.

2.2.1 Marking Colors

Provide markings for pavements that conform to SAE AMS-STD-595A color numbers as listed in Table I.

Table I - SAE AMS-STD-595A Color Numbers	
Paint Color	SAE AMS-STD-595A Color Number
White	37925
Yellow	33538
Black	37038
Green	34108
Red	33411

2.2.2 Waterborne Paint

Use FS TT-P-1952, Type I or II paint.

PART 3 EXECUTION

3.1 TEST SECTIONS

Before the performance of any marking application, demonstrate to the Government, using the equipment, materials, and personnel identified in the approved quality control plan, that the requirements for acceptance of the final product(s) are attainable. The minimum length of the test section is 50 feet of marking for each line width, color, and wet film thickness. Perform demonstrations in a location designated by the Contracting Officer within the project scope of work. Do not perform the test section(s) until the Contracting Officer is present to observe the test. Table III identifies minimum and maximum wet film thickness based on glass bead type. Each test section's result is the standard of performance for the color, width, wet film thickness, and glass bead application rate for each marking element. Submit the color, line width, wet film thickness, and measured reflectivity.

3.1.1 Surface Preparation and Paint Removal Test Section

Perform a demonstration removal of pavement markings in an area designated by the Contracting Officer. Prepare an area large enough to determine cleanliness, adhesion of remaining markings, and cleaning rate and removal rate. Use the means, methods, and equipment identified in the approved quality control plan. Adjust the means, methods, equipment, or equipment settings until the prepared surface is free of dirt, debris, oils and greases, algae, mold, mildew, and loose or flaking paint without damage to the pavement. Remove any equipment that fails to provide an acceptable product during the demonstration and provide new equipment that will produce an acceptable product. Approved demonstration area establishes the standard for the work.

3.2 SURFACE PREPARATION

Clean surfaces before the application of marking materials. Remove all dust, dirt, scaling or loose paint, algae, oils, and grease and mineral deposits such as iron stains by use of water blasting or chemical removal. Follow the cleaning with sweeping, blowing or using water rinse. Do not begin painting in any location prepared for marking until surfaces are dry and clean.

Scrub areas with oil or grease present with applications of trisodium phosphate solution or other approved detergent or degreaser. Rinse thoroughly after each application to prevent staining of the new marking. After cleaning oil-soaked areas, seal with shellac or primer as the manufacturer recommends to prevent bleeding through the new paint.

3.3 PRE-APPLICATION TESTING

Test the pavement surface for moisture before beginning pavement marking after each period of rainfall, fog, high humidity, or cleaning or when the ambient temperature has fallen below the dew point. Do not commence marking until the pavement is sufficiently dry and the Contracting Officer has approved the pavement condition.

Employ the plastic wrap method, described as follows, to test the pavement for moisture:

a. Cover the pavement with a 12-inch by 12-inch section of clear plastic wrap and seal the edges with tape.

b. After 15 minutes, examine the plastic wrap for any visible moisture accumulation. Do not begin marking operations until the test can be performed with no visible moisture accumulation inside the plastic wrap.

c. Re-test surfaces when work has been stopped due to a precipitation event.

3.4 MARKINGS APPLICATION

3.4.1 Marking Materials for Roads and Parking Lots Pavement

3.4.1.1 Waterborne Paint

The dilution or thinning of paint prior to application is not allowed.

Provide FS TT-P-1952 waterborne paint. Apply non-reflective markings in accordance with Table III. Use the paint type as shown on the drawings. The paint wet film thickness provided in Table III.

Table III. Paint Wet Film Thickness and Bead Application Rate	
Paint Type	Non-Reflectorized Marking Wet Film Thickness (mil)
Type I	14-16
Type II	14-16
Type III	16-20

3.4.1.2 Methacrylate Paint

Apply methacrylate paints at a minimum wet film thickness recommended by the manufacturer.

Apply methacrylate paint only on surfaces prepared for marking application and free of moisture, dirt, debris, oils and greases, algae, mold, or mildew. Apply methacrylate paint only to dry pavement surfaces. Do not apply methacrylate paint when ambient temperature conditions are outside of the ranges recommended by the manufacturer.

3.4.1.3 Epoxy Paint

Apply epoxy paint only on surfaces prepared for marking application and free of moisture, dirt, debris, oils and greases, algae, mold, or mildew. Apply epoxy paint only to dry pavement surfaces. Do not apply epoxy paint when ambient temperature conditions are outside of the ranges recommended by the manufacturer. Epoxies cannot be placed over markings made from other materials. Epoxy can be applied over existing epoxy markings once, and after a second application, the old material must be removed.

3.5 FIELD QUALITY CONTROL AND ACCEPTANCE

3.5.1 Material Inspection

The Contractor is responsible for examining all materials accepted for delivery for compliance with the certificate of compliance.

3.5.2 Sampling and Testing

As soon as the marking materials are available for sampling, obtain materials by random selection directly from equipment already calibrated. Four quarts of paint are to be collected; two quarts for the Contractor and two quarts for the Government. Samples of marking materials and samples of each reflective media are to be collected by the Contractor in the presence of the Contracting Officer. Identify samples by project name and number, manufacture date, batch number, and the square yards of markings represented by the sample.

The Government will retain samples for the warranty period under storage conditions recommended by the manufacturer. If there is an issue with a material defect during the period of the warranty the Contractor will incur the cost for an accredited independent laboratory to test the material(s) for conformance with the certifications and the contract specifications. The Government reserves the right to test the samples for verification of materials.

3.5.3 Dimensional Tolerance

The Contractor applies layout markings. All layout markings are placed before the marking material application. The edges of a line must not vary from a straight line drawn between the beginning and end of the line more than 1/2-inch to 50 feet. Marking dimensions and spacing must be within the tolerances provided in Table IV.

TABLE IV - Dimensional Tolerance for Marking Elements	
Dimension and Spacing	Tolerance
12 inch or less	+/- 1/2 inch
Greater than 36 inch to 6 feet	+/- 1 inch
Greater than 6 feet to 60 feet	+/- 2 inch
Greater than 60 feet	+/- 3 inch

3.5.4 Coating and Reflective Media Application Reporting

3.5.4.1 Reporting Wet Film Thickness and Reflectivity

Submit documentation on the wet film thickness and reflectivity for each marking element. Provide a reading at the rate of one reading per 1000 linear feet of line marking. A reading is the average of 10 measurements at random locations within the marking element area. Submit the results of the marking application wet film thickness test and Reflective Media Reflectivity Test to the Contracting Officer before proceeding with work on the project.

3.5.4.2 Wet Film Thickness

Conduct a marking application wet film thickness test. Provide a wet film thickness gauge to measure the wet film thickness using ASTM D4414 at the edge(s) and one interior location of the marking. When more than 3 in 10 consecutive measurements of wet film thickness are outside of the tolerances in Table III, remove and replace areas not meeting the wet film thickness requirement.

3.6 CLEANUP AND WASTE DISPOSAL

The worksite and the material staging area must be free of debris, dirt, and items that will blow away during periods of elevated wind speeds. Dispose of all materials at a site approved by the Contracting Officer. Dispose of waste from cleaning the marking equipment at a facility that is permitted to accept the material.

3.6.1 Cleanup Requirements

Provide a vacuum sweeper after each work area when markings are cured. Vacuum sweep the entire pavement surface to provide a clean pavement without fugitive glass beads and debris.

-- End of Section -

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SECTION 32 92 19

SEEDING
08/17, CHG 1: 08/21

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 D4972	(2018) Standard Test Methods for pH of Soils

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act
DOA SSIR 42	(2022) Kellogg Soil Survey Laboratory Methods Manual, Soil Survey Investigations Report, No. 42, Version 6.0

1.2 DEFINITIONS

1.2.1 Stand of Turf

95 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

Section 31 00 00 EARTHWORK applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fertilizer Include physical characteristics, and recommendations.

SD-07 Certificates

State Certification and Approval for Seed

SD-08 Manufacturer's Instructions

Erosion Control Materials

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.5.1.2 Fertilizer Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer may be furnished in bulk with certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Seed, Fertilizer Storage

Store in cool, dry locations away from contaminants.

1.5.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.5.2.3 Handling

Do not drop or dump materials from vehicles. 1.6
TIME RESTRICTIONS AND PLANTING CONDITIONS

1.6.1 Restrictions

Do not plant when the ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit.

1.7 TIME LIMITATIONS

1.7.1 Seed

Apply seed within twenty-four hours after seed bed preparation.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Classification

Provide State-certified seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected.

2.1.2 Planting Dates

Planting Season	Planting Dates
Season 1	March 15 to May 31
Season 2	August 15 to September 31

2.1.3 Seed Mixture

Seed shall be turf type Tall Fescue seed mix and shall have a minimum germination of ninety (90) percent and a purity of ninety-eight (98) percent.

2.2 TOPSOIL

2.2.1 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph COMPOSITION.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph COMPOSITION. Additional topsoil must be furnished by the Contractor.

2.2.3 Composition

Containing from 5 to 10 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4-inch screen. The pH must be tested in accordance with ASTM D4972. Topsoil must be free of sticks, stones, roots, and other debris and objectionable materials.

2.3 FERTILIZER

2.3.1 Granular Fertilizer

Synthetic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

16-18 percent available nitrogen

46-48 percent available phosphorus

2.4 WATER

Source of water must be approved by Contracting Officer and of suitable quality for irrigation, containing no elements toxic to plant life.

2.5 EROSION CONTROL MATERIALS

Erosion control material must conform to the following:

2.5.1 Erosion Control Blanket

100 percent agricultural straw stitched with a degradable nettings, designed to degrade within 12 months.

2.5.2 Erosion Control Material Anchors

Erosion control anchors must be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation prior to planting , fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.1.1.1 Topsoil

Provide 4 inches of off-site topsoil or on-site topsoil to meet indicated finish grade. After areas have been brought to indicated finish grade, incorporate fertilizer into soil a minimum depth of 4 inches by disking, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.1.2 Fertilizer Application Rates

Apply fertilizer at rates as determined by laboratory soil analysis of the soils at the job site. For bidding purposes only apply at rates for the following: Synthetic Fertilizer 1.5 pounds per 1000 square feet.

3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore soil to proper grade. Do not seed when ground is muddy, frozen snow covered or in an unsatisfactory condition for seeding. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance. Apply seed within twenty-four hours after seedbed preparation. Sow seed by approved sowing equipment. Sow one-half the seed in one direction and sow remainder at right angles to the first sowing.

3.2.2 Seed Application Method

Seeding method must be broadcasted and drop seeding.

3.2.2.1 Broadcast and Drop Seeding

Seed must be uniformly broadcast at the rate of 10 pounds per 1000 square feet. Use broadcast or drop seeders. Sow one-half the seed in one direction and sow remainder at right angles to the first sowing. Cover seed uniformly to a maximum depth of 1/4 inch in clay soils and 1/2 inch in sandy soils by means of spike-tooth harrow, cultipacker, raking or other approved devices.

3.2.3 Rolling

Immediately after seeding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.

3.2.4 Erosion Control Material

Install in accordance with manufacturer's instructions, where indicated or as directed by the Contracting Officer.

3.2.5 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water at a rate sufficient to insure thorough wetting of soil to a depth of 2 inches without run off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations at the Contractor's expense. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work in adjacent areas is complete.

-- End of Section --

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SECTION 33 01 30.16

TV INSPECTION OF SEWER LINES
11/21, CHG 1: 02/24

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 CCTV Video

CD or DVD storage media containing the recorded video.

1.1.2 Cleaning

To remove soil or solid deposited materials from a pipe segment when the pipe is less than half full of deposited materials.

1.1.3 Defects

Defects in the pipe, manholes, structures, and services include cracks, separation of joints, collapsed pipe, grade irregularities, leaks, roots, grease buildup, offset joints, reverse grades, obstructions, delamination, missing pipe, restrictions, fractures and similar structural irregularities.

1.1.4 Entry Point

The leading edge of the access point or the manhole or structure wall where the pipe segment begins. Only the pipe is video inspected from manhole or structure wall to manhole or structure wall and does not include any portion of the manhole or structure.

1.1.5 Exit Point

The point where the downstream access manhole or structure wall is encountered. Only the pipe is video inspected from manhole or structure wall to manhole or structure wall and does not include any portion of the manhole or structure.

1.1.6 Heavy Cleaning

To remove soil or solid deposited materials from a pipe segment when the materials in the pipe are between half full to full.

1.1.7 Hydraulically Propelled Cleaning Tools

Tools that depend upon water pressure to provide their cleaning force.

1.1.8 National Association of Sewer Service Companies (NASSCO)

National Association of Sewer Service Companies (NASSCO) identifies the generally accepted industry standards for CCTV inspection, observation coding, and certification.

1.1.9 Pipe Segment

The length of pipe from entry point to exit point along the main or service.

1.1.10 Pipeline Assessment and Certification Program (PACP)

A CCTV Inspection standardization certification and observation coding system sponsored by NASSCO.

1.1.11 Point Repair

The location of a failure where a repair is has occurred.

1.1.12 Post-Installation CCTV (Post-TV)

Post-TV inspection is used to determine the slip lining of sanitary or storm sewers has been completed in accordance with the contract documents.

1.1.13 Re-TV Inspection

Upon the completion of repairs made after performing a Post-TV Inspection or Warranty TV inspection, the mains or services are re-inspected by performing a Re-TV inspection. Also, refers to rework for a TV-Inspection that has video interruptions, gaps, or is not continuous.

1.1.14 TV Inspection Log

Information collected and recorded by the CCTV operator for each CCTV inspection effort and includes pertinent information for the respective inspection section; such as, date of inspection, location of site, CCTV technician, direction of CCTV inspection with manhole or structure identifiers, weather conditions, pipe size(s), pipe materials, conditions found, locations where the conditions were found.

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Disposal Plan

Submit a disposal plan prior to performing any work that might generate waste materials. Include a complete description of the materials that are expected to be encountered and their proposed disposal sites. No changes to the disposal plan will be made without prior written acceptance by the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Disposal Plan; G

SD-07 Certificates CCTV Technician's Qualifications; G

Post-TV Inspection; G

RE-TV Inspection; G

SD-11 Closeout Submittals

Records of Disposals

1.4 QUALITY CONTROL

1.4.1 CCTV Technician's Qualifications

Provide a CCTV technician with three years of total experience with the CCTV technology. Submit a current PACP Operator certification for personnel performing closed circuit television inspection and pipeline assessments.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

TV inspection of sewer pipelines encompasses CCTV inspection and video recording of the storm sewer mains included in the contract documents. This work includes inspection logs, video requirements, and the legal disposal of materials removed from the mains.

It includes the mechanical equipment used to clean and dispose of the materials found in sewer pipes and structures, CCTV cameras and recording devices used to record the internal conditions of non-pressurized sewer piping.

2.2 EQUIPMENT

2.2.1 Cleaning Equipment

Utilize mechanically powered equipment necessary for the proper rodding, bucketing, brushing, root cutting, and flushing of the sewers, including a heavy-duty power rodding machine that is compatible with the cleaning to be performed.

2.2.1.1 Hydraulic Flusher

Provide hydraulic high-pressure sewer cleaners used for sewer cleaning, specifically designed and constructed for such cleaning, that have a minimum usable water capacity of 600 gallons and a pump capable of delivering at least 30 gallons per minute (gpm) at 100 psi and having the following capabilities:

a. Pressure regulator nozzle capable of adjustment from 1 psi to 1500 psi.

b. Constructed for ease of use and safety of operation with two or more high-velocity nozzles capable of producing a scouring action from 15 to 45 degrees in lines designated to be cleaned.

c. A high-velocity gun for washing and scouring the manhole or structure walls and floor capable of producing flows from a fine spray to a solid stream.

d. Carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

2.2.2 CCTV Equipment

Provide a video system capable of producing a sharply focused, well-lit and color balanced picture in accordance with the following requirements:

2.2.2.1 Pipe Inspection Camera and Associated Equipment

a. Provide a pipe inspection camera system specifically designed for sewer inspection that produces a video using a color pan and tilt camera with radial viewing, that pans a minimum of 275 degrees and rotates 360 degrees or a side wall scanning (panoramic) camera capable of 360-degree image capture. Illumination sensitivity of 3 Lux or less and a minimum of 460 lines of resolution is required.

b. Utilize video cameras specifically designed and constructed for CCTV inspection.

c. Provide a camera that is operative in 100 percent humidity conditions.

d. Provide a camera with an accurate footage counter that displays on the monitor the exact distance of the camera to the nearest 1/10 of a foot.

e. Provide a camera with a height adjustment so that the camera lens is typically centered in the pipe or higher depending on water levels in the pipe.

f. Provide equipment that will produce digital color images and allows the CCTV technician to remotely balance the iris and color to produce a clear and true video of the pipeline.

g. Provide lighting for the camera that is suitable to provide a clear color picture of the entire periphery of the pipe.

h. Provide a reflector in front of the camera as necessary to enhance the lighting on dark or large diameter pipes.

i. Provide an accompanying computer and recording device capable of projecting and recording the facility location, project name, Contractor's name, date, line size, material type, line identification, manhole or structure ID numbers and ongoing footage counter onto the video screen.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Sewer Line Cleaning

Immediately prior to conducting CCTV activities, thoroughly clean the segment of sewer pipe to be video inspected. Clean the segments using hydraulically propelled, high-velocity jet, or mechanically powered equipment.

a. During cleaning and preparation operations, undertake precautions to protect the sewer system and property from damage. Restore property damaged as a result of such cleaning and preparation operations to pre-existing conditions.

b. During the course of normal cleaning operations immediately report pre-existing damage such as broken or missing pipe to the Contracting Officer.

c. When hydraulically propelled cleaning tools or tools which retard the flow in the sewer line are utilized, take precautions to ensure that the water pressure created does not damage or cause flooding on the adjacent site.

d. Maintain access to fire hydrants for the purpose of fire protection at all times.

e. If cleaning of an entire sewer section cannot be successfully performed from one manhole or structure, set up the equipment on the other entry or exit point and attempt cleaning again.

f. If successful cleaning cannot be performed from the opposite end or the equipment fails to traverse the entire pipeline section, cease cleaning those specific sewer sections, notify the Contracting Officer and CCTV inspect both sides of the pipeline section to determine the cause of the blockage.

3.1.2 Material Removal and Disposal

Remove sludge, dirt, roots, grease, and other solid or semi-solid material resulting from cleaning operations at the downstream manhole or structure of the section being cleaned.

3.1.2.1 Dams or Weirs

When hydraulic cleaning equipment is used, place dam or weir in the downstream manhole or structure to trap such materials. Do not allow material to pass from pipeline section to pipeline section, which could cause stoppages, accumulations of sand in wet wells, or damage to pumping equipment.

3.1.2.2 Sludge and Debris Storage

Under no circumstances is sludge or other debris removed during these operations to be stored, dumped or spilled into streets, ditches, storm drains, or other sanitary sewer systems.

a. Dispose of solids and semi-solids resulting from the cleaning operations no less often than the end of each workday in accordance with the approved Disposal Plan.

b. Under no circumstances will debris be allowed to accumulate on the work site beyond the end of each workday, except in totally enclosed containers and as acceptable by the Contracting Officer.

c. Continuously maintain the haul route and work areas neat, clean, and reasonably free of odor. Cleanup any spill which occurs during the transport of cleaning or surface preparation by-products. Perform the cleanup of any such material pursuant to this Contract and in accordance with applicable law and environmental regulations.

d. Immediately notify the Contracting Officer of any spill and begin clean up any such spill or waste.

e. The Government will charge to the Contractor for any costs incurred or penalties imposed upon the Government as a result of the spill, dump or discard.

f. Under no circumstances is this material to be discharged into the waterways or any place other than where authorized to do so in accordance with the approved Disposal Plan.

3.1.2.3 Hauling of Waste Material

Provide vehicles hauling such waste material that meet the following requirements:

a. Provide transport vehicles of the type(s) approved for this application by the jurisdictions where those vehicles will be operated in the performance of activities associated with this Contract.

b. Provide transport vehicles with watertight bodies equipped and fitted with seals and covers to prohibit material spillage or drainage.

c. Clean vehicles to prevent deposits of material on roadways.

d. Load vehicles within legal weight limits and operate safely within traffic speed regulations.

e. The routes used for the conveyance of this material on a regular basis is subject to approval by the local governing bodies having jurisdiction over such routes.

3.2 APPLICATION

3.2.1 Inspection of Sewer Lines

Inspection of sewer lines applies to Post-TV inspection and RE-TV inspection. Perform inspections of sewer lines in the presence of the Contracting Officer.

3.2.1.1 Flush Main

Introduce a minimum of 1000 gallons of clear, potable water into the upstream manhole or structure or access structure of the mains to be CCTV inspected just prior to inserting the camera. The Contractor is responsible for collecting and disposing of the water in accordance with the approved disposal plan.

3.2.1.2 Camera Operation

Set counter to 0.00 feet at the entry point, which is the beginning manhole or structure wall. Move the camera through the line in either direction at a moderate speed, stopping to permit proper documentation of the sewer's condition or service connection locations. In no case will the camera be operated at a speed greater than 30 feet per minute. Move the pan and tilt camera slowly at the beginning and ending manhole, structure connections, service connections, joints, visible defects, and pipe arterial transitions. Provide a full 360-degree view of the pipe, joints, and service connections.

Utilize manual winches, power winches, cable, powered rewinds or other devices that do not obstruct the camera view or interfere with camera operation or CCTV inspection of the pipe conditions as the camera is moved through the sewer line.

3.2.1.2.1 Recording Defects

During CCTV inspection, temporarily stop the camera at each defect or feature along the line.

3.2.1.3 Documentation of CCTV Inspection

Documentation of CCTV inspection applies to Post-TV inspection and RE-TV inspection.

Utilize a data logger and reporting system that is PACP compliant to make a video and audio recording of the CCTV inspections. Submit video recordings, inspection logs, and digital photographs as indicated in the following sub-paragraphs.

3.2.1.3.1 Video Recordings

Provide a color video showing the completed work and document the inspection on a digital recorder. Capture inspection video in either MPEG-4 or Windows Media Video (WMV) format with a minimum resolution of 352 x 240 pixels and an interlaced frame rate at a minimum of 24 frames per second. Save video on CD or DVD. However, the CCTV inspection video of a segment must be wholly contained on a single CD or DVD. The video recording must meet the following requirements:

a. Provide a continuous and uninterrupted recorded video for the pipe segment being examined. Include the official project title, Contracting party, Contractor's name, street name, manhole or structure ID numbers, direction of video and flow, date and time video was recorded, continuous counter text, pipe size and material, material changes in the pipe segment, audio and text call outs of laterals, fixtures and problem areas in the recorded video.

b. Include the location, pipe diameter, pipe material, defects, service lateral locations and any unusual conditions found in PACP format.

c. Submit labeled CDs or DVDs of the video inspections.

d. Without exception, CCTV inspections must be continuous without video interruption or gaps for pipe segments.

e. Clean, flush, and RE-TV pipe segments with video interruptions or gaps.

3.2.1.3.2 TV Inspection Logs

Submit computer generated records that clearly show the location and orientation in relation to an adjacent manhole or structure of each infiltration point observed during the inspection.

Record other points of significance such as locations and orientations damaged or broken pipe fractures, cracks, and other discernible features using PACP designations.

3.2.1.3.3 Digital Photographs

Submit JPEG images at a minimum resolution of 640 x 480 pixels. Save digital photographs in JPEG file format on CD or DVD. Document noted defects and lateral connections as color digital files and hard copy print-outs. Photo logs are to accompany each photo submitted.

3.2.2 Post-TV Inspection

Immediate pressure and leak testing complete Post-TV inspection accordance with paragraph INSPECTION OF SEWER LINES. Submit Post-TV inspection documentation in accordance with paragraph DOCUMENTATION OF CCTV INSPECTION.

3.2.2.1 Post-TV Defects

If defects are found in the sewers during the Post-TV inspection, make repairs according to the specifications. RE-TV all repairs accordance with paragraph INSPECTION OF SEWER LINES. Provide additional RE-TV inspections of complete pipe segments as follows:

a. Perform a RE-TV inspection of the complete pipe segment. If no additional defects are found in the Re-TV inspections, then the Post-TV inspection is complete.

b. If defects are found in these additional inspections make repairs according to the specifications and provide Re-TV inspection for the complete pipe segment.

c. If defects are found in these additional inspections make repairs according to the specifications and Re-TV the repaired pipe segments until no Post-TV defects are found.

3.2.3 RE-TV Inspection

After repairs are made to a sewer, complete RE-TV inspection accordance with paragraph INSPECTION OF SEWER LINES and DOCUMENTATION OF CCTV INSPECTION.

3.3 CLOSEOUT ACTIVITIES

3.3.1 Sewer Cleaning

Submit copies of Records of Disposals indicating the disposal site, date, amount, and a brief description of the materials disposed.

-- End of Section --

SECTION 33 40 00

STORMWATER UTILITIES
11/21

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 HB-17	(2002; Errata 2003; Errata 2005, 17th Edition) Standard Specifications for Highway Bridges

ASTM INTERNATIONAL (ASTM)

ASTM A48/A48M	(2022) Standard Specification for Gray Iron Castings
ASTM A123/A123M	(2024) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A536	(2024) Standard Specification for Ductile Iron Castings
ASTM B26/B26M	(2018; E 2018) Standard Specification for Aluminum-Alloy Sand Castings
ASTM C76	(2022a) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C76M	(2022a) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)
ASTM C231/C231M	(2024) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C270	(2019a; E 2019) Standard Specification for Mortar for Unit Masonry
ASTM C443	(2021) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C443M	(2021) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)

ASTM C478/C478M	(2022) Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
ASTM C828	(2023) Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines
ASTM C923/C923M	(2020) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C990	(2009; R 2019) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C990M	(2009; R 2019) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants (Metric)
ASTM C1103	(2022) Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C1103M	(2019) Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2321	(2020) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM F1417	(2011a; E 2024) Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Leakage Test; G

SD-07 Certificates

Hydrostatic Test on Watertight Joints; G

Frame and Cover or Gratings; G

SD-08 Manufacturer's Instructions

Placing Pipe and Box Culvert; G

SD-11 Closeout Submittals

Post-Installation Inspection Report; G

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage and unload and store materials with minimal handling. Do not store materials directly on the ground. Keep the inside of pipes and fittings free of dirt and debris. Before, during, and after installation, protect plastic pipe and fittings from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Contracting Officer. Store solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe in accordance with the manufacturer's recommendations and discard if the storage period exceeds the recommended shelf life. Discard solvents in use when the recommended pot life is exceeded.

1.3.2 Handling

Handle materials in a manner that ensures delivery to the trench in sound, undamaged condition. Carry pipe to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe sizes for culverts and storm drains are indicated on the drawings.

2.1.1 Concrete Pipe

2.1.1.1 Reinforced Culvert and Storm Drain Pipe

Manufactured in accordance with and conforming to ASTM C76M ASTM C76, Class III.

2.2 PIPE JOINTS

Provide joints that have been tested for and meet the requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

2.2.1 Concrete Pipe

2.2.1.1 Rubber Gasket Joints

Provide rubber gasket joints of a design and physical requirements conforming to ASTM C443.

2.2.1.2 Preformed Flexible Sealant Joints

Provide joints made with preformed flexible joint sealant conforming to ASTM C990.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, provide concrete and reinforced concrete conforming to the requirements for 4000 psi concrete under Section 03 30 00 CAST-IN-PLACE CONCRETE. Provide air content by volume of concrete mixture, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Determine air content in accordance with ASTM C231/C231M.

Provide a minimum concrete covering over steel reinforcing of not less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. For concrete deposited directly against the ground, provide a covering thickness of at least 3 inches between steel and ground. Provide expansion-joint filler material conforming to ASTM D1751, or ASTM D1752, or provide be resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752.

2.3.2 Mortar

Mortar is not allowed for pipe joints. Provide mortar for pipe connections to drainage structures and brick or block construction conforming to ASTM C270, Type M, except that the maximum placement time will be 1 hour. Provide a sufficient quantity of water in the mixture to produce a stiff workable mortar but in no case may the quantity exceed 5 gallons of water per sack of cement. Use water that is clean and free of harmful acids, alkalis, and organic impurities. Use the mortar within 30 minutes after the ingredients are mixed with water.

2.3.3 Precast Reinforced Concrete Manholes

Provide precast reinforced concrete manholes conforming to ASTM C478/C478M. Provide joints between precast concrete risers and tops that are made with flexible watertight, rubber-type gaskets meeting the requirements of paragraph PIPE JOINTS.

2.3.4 Frame and Cover or Gratings

Submit certification on the ability of frame and cover or gratings to carry the imposed live load indicated on the drawings. Provide frame and cover or gratings made of cast gray iron, ASTM A48/A48M, Class 35B; cast ductile iron, ASTM A536, Grade 65-45-12; or cast aluminum, ASTM B26/B26M, Alloy 356.0-T6. Stamp or cast the word "Storm Sewer" into covers so that it is plainly visible.

2.3.5 Steel Ladder

Provide a steel ladder where the depth of the storm drainage structure exceeds 12 feet. Provide ladders not less than 16 inches in width, with 3/4-inch diameter rungs spaced 12 inches apart. Provide two stringers that are a minimum 3/8 inch thick and 2-1/2 inches wide. Galvanize ladders and inserts after fabrication in conformance with ASTM A123/A123M.

2.3.6 Resilient Connectors

Provide flexible, watertight connectors conforming to ASTM C923/C923M for connecting pipe to manholes and inlets.

2.3.7 Flared End Sections

2.3.7.1 Concrete Flared End Sections

Provide sections of a standard design fabricated with reinforced concrete.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

2.4.1 Hydrostatic Test on Watertight Joints

Perform a hydrostatic test on the watertight joint types as proposed.

This test will be conducted at the plant or by an independent laboratory. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested.

2.4.1.1 Concrete, Pipe

Provide joints in reinforced and non-reinforced concrete pipe meeting the performance requirements in ASTM C990M ASTM C990 or ASTM C443M ASTM C443.

PART 3 EXECUTION

3.1 EXCAVATION FOR STORM DRAINS, AND DRAINAGE STRUCTURES

Excavate trenches, excavate for appurtenances and backfill for culverts and storm drains, in accordance with the applicable portions of Section 31 00 00 EARTHWORK and the requirements specified below.

3.1.1 Trenching

Excavate trenches to the width indicated on the drawings or as specified herein. Trench width should permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Place sheeting and bracing, where required, within the trench width as specified, without any over-excavation.

3.1.2 Removal of Rock

Replace rock in either ledge or boulder formation with suitable materials to provide a compacted earth cushion. Provide a compacted earth cushion between unremoved rock and the pipe with a thickness of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Maintain the cushion under the bell as well as under the straight portion

of the pipe where bell-and-spigot pipe is used. Provide a compacted earth cushion between unremoved rock and the box culvert of at least 8 inches in thickness for concrete box culverts. Excavate rock as specified and defined in Section 31 00 00 EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe or box culvert, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, remove such material to the depth required and replace with select granular material to the proper grade. Compact select granular material as specified in paragraph FINAL BACKFILL. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, perform such removal and replacement at no additional cost to the Government.

3.2 BEDDING AND INITIAL BACKFILL

Provide a firm bedding foundation of uniform density throughout the entire length of the pipe or box culvert.

3.2.1 Concrete Pipe

Use select granular material conforming to Section 31 00 00 EARTHWORK for haunch and bedding material. Compact haunch and outer bedding to at least 95 percent laboratory maximum density and place in layers not exceeding 4-inch loose thickness for compaction by hand-operated compactors and 6 inches for other than hand-operated machines. Loosely place middle bedding and do not compact. After the pipe has been properly bedded, place haunch material, at a moisture content that will facilitate compaction, evenly along both sides of the pipe and thoroughly compact each layer with mechanical tampers or rammers to the spring-line of the pipe. Thoroughly compact the haunch material under the haunches of the pipe. For bell and spigot pipe, form a depression in bedding material for bells so entire barrel of pipe is uniformly supported. Minimize the length, depth, and width of bell depressions to that required for properly making the particular type of joint.

3.2.1.1 Trenches

After the pipe has been properly bedded and haunch material placed to the midpoint (spring-line) of the pipe, backfill and compact the remainder of the trench by spreading and rolling or compacting by mechanical rammers or tampers in layers not exceeding 6 inches. Test for density as necessary to ensure conformance to the compaction requirements specified below. Leave untreated sheeting in place beneath structures or pavements.

3.2.1.2 Fill Sections

For pipe placed in fill sections, uniformly spread fill material longitudinally on both sides of the pipe in layers not exceeding 6 inches in compacted depth, and compact by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe must extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the

pipe, place and thoroughly compact the remainder of the fill in layers not exceeding 8 inches.

3.3 PLACING PIPE

Submit printed copies of the pipe manufacturer's recommended pipe or box culvert installation procedures prior to installation. Thoroughly examine each section of pipe before being laid; do not use defective or damaged pipe. Protect plastic pipe from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Lay pipelines to the grades and alignment indicated. Provide proper facilities for lowering sections of pipe into trenches. Do not lay pipe in water or when trench conditions or weather are unsuitable for such work. Divert drainage or dewater trenches during construction as necessary.

3.3.1 Concrete, Pipe

Lay pipe proceeding upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4.1 Concrete Pipe

3.4.1.1 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Follow the recommendation of the particular manufacturer in regard to sealing compound special installation requirements. When lubricants, primers, or adhesives are used, only apply on surfaces that are dry and clean. Affix sealing compounds to the pipe or box culvert not more than 3 hours prior to installation of the pipe or box culvert. Protect sealing compounds from the sun, blowing dust, and other deleterious agents at all times. Inspect sealing compounds before installation of the pipe or box culvert and remove and replace any loose or improperly affixed sealing compound. Align the pipe or box culvert with the previously installed pipe or box culvert and pull the joint together.

3.4.1.2 Flexible Watertight Joints

Use lubricants, cements, adhesives, and other special installation requirements for gaskets and jointing materials as recommended by the manufacturer. When lubricants, cements, or adhesives are used, only apply on surfaces that are clean and dry. Affix gaskets and jointing materials to the pipe not more than 24 hours prior to the installation of the pipe, and protect from the sun, blowing dust, and other deleterious agents at all times. Inspect gaskets and jointing materials before installing the pipe; remove and replace any loose or improperly affixed gaskets and jointing materials. Align the pipe with the previously installed pipe and push the joint home. If the gasket becomes visibly dislocated when joining sections of pipe, remove the pipe and remake the joint.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Construct manholes of precast reinforced concrete. Construct inlets of precast or cast in place reinforced concrete. Provide manholes and inlets complete with frames and covers or gratings as indicated.

3.6 FINAL BACKFILL

Backfill trenches with satisfactory material deposited in layers of a maximum of 8 inches loose thickness and compacted to 90 percent of maximum density for cohesive soils and 95 percent of maximum density for cohesionless soils in accordance with Section 31 00 00 EARTHWORK. Testing is the responsibility of the Contractor and will be performed at no additional cost to the Government. Unless otherwise specified, determine field in-place density of final backfill at a frequency of one test per 50 linear feet, or fraction thereof, of each lift of backfill. Submit test results in accordance with Section 31 00 00 EARTHWORK. Do not displace or damage pipe or box when compacting final backfill by rolling or operating heavy equipment parallel with the pipe or box. Movement of construction machinery over a culvert or storm drain at any stage of construction will be at the Contractor's risk. Repair or replace any damaged pipe. Protect concrete pipes with a minimum of 3 feet of cover prior to permitting heavy construction equipment to pass over them during construction. Provide the minimum cover for construction loads over corrugated steel pipes as specified in Section 26, Division II of AASHTO HB-17. Provide minimum cover for construction loads over plastic pipes as specified in ASTM D2321.

3.7 FIELD QUALITYONTROL

3.7.1 Tests

Testing is the responsibility of the Contractor. Perform all testing and retesting at no additional cost to the Government.

3.7.1.1 Leakage Test

3.7.1.1.1 Low Pressure Air Pipeline Tests

Perform low pressure air testing for vitrified clay pipes in accordance with ASTM C828. Perform low pressure air testing for plastic pipe in accordance with ASTM F1417. Perform low pressure air testing procedures for other pipe materials using the pressures and testing times prescribed in ASTM C828, after consultation with the pipe manufacturer.

3.7.1.1.2 Individual Pipe Joint Testing

Testing of individual joints for leakage by low pressure air or water must conform to ASTM C1103M ASTM C1103.

3.7.2 Inspection

3.7.2.1 Post-Installation Inspection

Perform a CCTV inspection and video recording of pipes with diameters 48 inches or less in accordance with UFGS 33 01 30.16 TV INSPECTION OF SEWER LINES. Visually inspect pipes with diameters larger than 48 inches.

Inspect each segment of pipe for alignment, settlement, joint separations, soil migration through the joint, cracks, buckling, bulging and deflection. An engineer must evaluate all defects to determine if any remediation or repair is required.

3.7.2.1.1 Concrete Pipe

An engineer must evaluate all pipes with cracks with a width greater than 0.01 inches, but less than 0.10 inches to determine if any remediation or repair is required.

3.7.2.1.2 Post-Installation Inspection Report

The deflection results and final post installation inspection report must include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, grade, deviation from line, deflection and deformation of flexible pipe, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

3.7.3 Repair of Defects

3.7.3.1 Inspection

Replace pipe or repair defects indicated in the Post-Installation Inspection Report.

3.7.3.1.1 Concrete Pipe

Replace pipes having cracks with a width greater than 0.1 inches.

3.8 PROTECTION

Protect storm drainage piping and adjacent areas from superimposed and external loads during construction.

3.9 WARRANTY PERIOD

Pipe segments found to have defects during the warranty period must be replaced with new pipe and retested.

-- End of Section --

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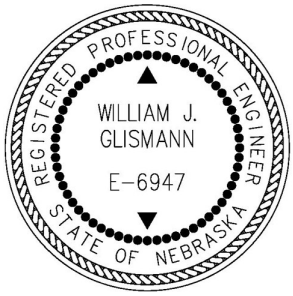

COA NE CA-0065

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Nebraska.

William J. Glismann June 9, 2026

William J. Glismann, P.E.

My registration renewal date is December 31, 2027.

Pages or sheets covered by this seal:

All Divisions.