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DIVISION 1

GENERAL CONDITIONS

SECTION 01000

SUMMARY OF WORK

PART 1 – GENERAL

1.1 SCOPE OF WORK

These specifications, together with the referenced specifications, standards, and drawings specified in the Contract Documents, cover the requirements **for all work associated with removal and replacing the parking lot pavement at the Federal Aviation Administration Facility, 3975 Rickenbacker Street, Boise, Idaho, 83705. Furnish all necessary materials, labor, supervision, insurance, equipment, payment and performance bonding to accomplish the following:**

1. Remove all plant material from four (4) landscape beds (Junipers and Blue Fescue) located on the north side of the property. Isolate and terminate the irrigation system supporting these flower beds.
2. Remove the “Tuff” shed structure from the property. Contractor to dispose.
3. Remove approximately 1150 lineal feet of 4-inch X 6-inch asphalt curb. Recycle asphalt if possible.
4. Remove the directional sign in the most northwestern flower bed. Remove the electrical conduits and conductors supporting this sign back to the electrical panel. Underground conduits will be abandoned in place after conductors have been removed.
5. Remove and dispose of approximately 3500 square feet of asphalt walkway. Recycle asphalt if possible.
6. Saw cut approximately 90 lineal feet of two inch thick asphalt; across the property entrance and exit and around the fence in the vicinity of the south entrance to the building.
7. Remove approximately 27,000 square feet of 2-inch thick asphalt from the parking lot (167 cubic yards). Haul material off site and dispose of asphalt according to all federal, state and local regulations. Recycle the asphalt if possible.
8. Excavate parking lot sufficiently to allow for a new 6-inch deep sub base, a 2-inch thick asphalt base course and a 2-inch thick asphalt wear course. Dispose of material according to all federal, state and local regulation. This requirement subject to site verification and may be removed depending on the actual site condition.
9. Determine most efficient drainage design for the parking lot and sidewalks. Contour the site to support this design.
10. Furnish, place, grade and compact a 4-inch thick base course using material 1 ½- inches or less in diameter. Achieve a minimum of 95% compaction.

11. Furnish, place, grade and compact a 2-inch thick base course using material $\frac{3}{4}$ -inches or less in diameter. Achieve a minimum of 95% compaction.
12. All compaction will be tested by an independent testing facility.
13. Form, furnish, place and finish approximately 950 lineal feet of concrete, high back curb and 24-inch gutter. Tie new curb and gutter into the existing located at the entrance and exit points of the parking lot. Curb and gutter shall meet or exceed current federal and Idaho State highway standards.
14. Form, furnish, place and finish approximately 2900 square feet of 4-inch thick sidewalk, (8-feet wide by 360- feet long). Meet or exceed local building codes for sidewalk strength and non-slip finish.
15. Form, furnish, place and finish approximately 600 square feet of 4-inch thick sidewalk, (5-feet wide by 120-feet long). Meet or exceed local building codes for sidewalk strength and non-slip finish.
16. Form, furnish, place and finish a 4-inch thick, 20-foot X 20-foot, concrete slab located in the south abandoned drive approach. Concrete strength will meet or exceed 3500 psi.
17. Furnish, place and compact approximately 27,000 square feet of asphalt base course, 2-inches thick. Composition, placement and compaction shall meet or exceed the national and Idaho State highway standards for this application.
18. Furnish, place and compact approximately 27,000 square feet of asphalt wear course, 2-inch thick. Composition, placement and compaction shall meet or exceed the national and Idaho State highway standards for this application.
19. Crack seal approximately 700 lineal feet of cracks in the aircraft pad.
20. Slurry seal approximately 12,000 square feet of asphalt on the aircraft pad.
21. Lay-out and paint 70 parking stalls.
22. Lay-out and paint four (4) handicapped parking stalls.
23. Furnish and install a security fence, minimum 8-foot high (7-foot fabric with 1-foot outrigger) approximately 70 lineal feet long. Include an access controlled, 20-foot wide sliding gate and an access controlled 5-foot wide personnel gate. Gate operator and control access will be compatible with the existing security system and in accordance with the Federal Aviation Administration's security order 1600.69B paragraph 334 Perimeter Fencing.

Contractor is responsible for all quantities, dimensions, signage, traffic control, coordination with local authorities, property owners, airport authority and Resident Engineer.

All work to take place at the Boise Radar, Snake River SSC located at 3975 Rickenbacker Street, Boise, Idaho, 83705.

All work must be coordinated with the assigned Resident Engineer in order to maintain an operational facility.

The total contract duration for completion of all work **shall be 45 calendar days**, excluding the FAA Holiday moratorium specified in Division 01020.1.5.E.

Existing parking lot drawings are provided as a reference for grades, gutters, curbs, and existing material. Contractor shall verify all dimensions and quantities.

1.2 INTENT OF SPECIFICATIONS

- A. This specification identifies all labor and equipment to perform the work required to construct the facility. All material not specifically indicated as furnished by the Government, as listed in Attachment "B" of Part III – Section J, shall be furnished by the Contractor. All work performed and all materials and equipment used shall be approved by the Contracting Officer (CO). This shall include but not be limited to inspection, scheduling, reporting, and submittals.
- B. Title - Titles to division and sections of the specifications and notes and titles on drawings referring to subcontractors, division of work by trade, or type of work, are introduced merely for convenience in reading the specifications and drawings and do not imply any separate contractual arrangements of work assignments. Such separations into titled divisions and sections shall not operate to make the Government an arbiter to establish subcontract limits between the contractor and subcontractors, or between the subcontractors themselves.

1.3 CONTRACT DOCUMENTS

- A. As listed in Attachment "A" of Part III – Section J, drawings for the General, Architectural, Structural, Mechanical, and Electrical, form a part of the construction requirements for this project.
- B. The construction of this facility shall be in accordance with the lines and grades shown on the drawings. The contractor shall not use dimensions scaled from drawings. All dimensions shown on the drawings shall be verified by the contractor by actual measurements in the field. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the CO for adjustment before any work affected is performed.

1.4 PRECEDENCE OF CONTRACT DOCUMENTS

- A. In the event of a difference between the following contract provisions, the order of precedence to determine which provision shall govern is:
 - 1. Contract Clauses and Provisions
 - 2. Project Specifications
 - 3. Project Drawings as listed in Part III – Section J

- B. Any discrepancies between the contract provisions, the specifications and the contract drawings shall be referred to the CO for a written determination in accordance with Contract Clause entitled **SPECIFICATION AND DRAWINGS FOR CONSTRUCTION. Refer to Part II, Section I.**

1.5 CONTRACTING OFFICER

- A. The term "Contracting Officer" (CO) as used herein denotes the person designated to act on behalf of the Government in the performance of this contract. Where reference is made to "Federal Aviation Administration" (FAA), "Resident Engineer" (RE), "Contracting Officer's Representative" (COR), or the like, this shall mean the Contracting Officer or his/her authorized representative.

1.6 CONTRACTOR SUPERINTENDENCE

- A. In accordance with Contract Clause entitled SUPERINTENDENCE BY THE CONTRACTOR, the Contractor shall at all times during performance of this contract and until the work is completed and accepted, directly superintend the work or assign and have on site a competent superintendent with the authority to act for the Contractor.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01020

SITE ACCESS, CONSTRUCTION LIMITS, USE OF FACILITIES AND WORK HOURS

PART 1 – GENERAL

1.1 EXISTING FACILITY OPERATIONS

The Contractor shall perform all work in a manner which does not conflict with or adversely affect the air traffic operational environment or functions of the facility. In the event of any actual or potential conflict, air traffic activities shall have priority over all Contractor activities. The Contractor shall plan for and provide services in such a manner and at such times that will not disrupt facility operations, and shall conform to those procedures considered essential by the FAA for ensuring air traffic safety.

1.2 CONSTRUCTION LIMITS AND ACCESS

Access for the contractor, sub-contractors, employees, deliveries, etc., will be designated by the RE. NO CONTRACTOR OR CONTRACTOR DELIVERY WILL BE ALLOWED ON SITE UNTIL THE RE ARRIVES. The following requirements MUST be followed in order to obtain access to the facility site:

- A. All persons entering or delivering to this federal facility must have valid government issued identification.
 - 1. Valid issued government identification is:
 - a) ID issued by the federal, state, county, or city government or by the military.
 - b) Must have the person's legal name.
 - c) Must have a unique ID number.
 - d) Must have an expiration date.
 - e) Must have a picture of the individual.
 - f) Must have the name of the agency issuing it.
(examples: state issued drivers license or IDs, passports, or military ID.)
- B. CONTRACTORS MUST HAVE SUBMITTED, TO THE FAA, WORKERS OR OTHER COMPANY EMPLOYEES NAMES AND INFORMATION WHO THEY ARE REQUESTING ACCESS TO THE FACILITY AT LEAST 24 HOURS PRIOR TO ENTRY
- C. Persons entering on to federal property are prohibited from having on their person or in their vehicle to include all visitor lots:
 - 1. Weapons of any kind to include but not limited to:
 - a) Guns
 - b) Knives with blades over 3 inches in length except for valid hand tools.
 - c) Projection devices, bow & arrows, paint ball weapons, blow guns etc.....
 - d) Clubs, batons, collapsible batons, or saps.
 - e) Stun guns or tazers.

- f) Chemical agents, mace, or pepper sprays.
- g) Marshal arts weapons of any kind.

- 2. Open alcohol containers. Any container without an intact factory seal is considered "open".
- 3. Illegal drugs.
- 4. All animals with the exception of a verified service animal are prohibited on the facility and will never be left in a vehicle on the facility.
- 5. All persons, vehicles, and property are subject to search at all times.
- 6. Family members, friends, children or minors not listed on the work contract will not be granted access.

- D. The contractor shall confine operations, activities, storage of materials and employee parking within the area, as indicated on the drawings or designated by the Resident Engineer (RE). Additional space the Contractor deems necessary shall be obtained off site, at no additional cost to the Government.

- E. Access to the construction site shall be kept unobstructed. If temporary access obstruction is unavoidable, the contractor shall coordinate the obstruction in advance with the RE.

- F. Temporary roadways and/or other access may be authorized only by the facility, via the RE.

- G. Vehicles transporting materials shall not be loaded beyond the capacity prescribed by Federal, State or Local law.

- H. Vehicles delivering materials shall not have any other project material loaded into/onto the vehicle except for the materials that will be left at the job site.

- I. No deliveries will be accepted or permitted on site from anyone who does not meet the required Government issued identification requirements listed in this specification section.

- J. Damage caused by the Contractor's activities to existing paving, lawns, curbs, sidewalks, interior/exterior of the building shall be repaired. All costs of repairs shall be paid by the contractor. After notice to proceed and prior to the commencement of construction, the contractor and RE shall conduct joint inspections of the existing areas affected by the construction. Existing damage/defects shall be noted and will be used as the basis for determination of damages caused by the Contractor's operations.

1.3 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall assume full responsibility for the protection and safekeeping of products stored on the site.

- B. The contractor and his subcontractors shall maintain the job site in a neat and orderly condition. This includes the daily removal of rubbish, waste and tools, equipment and materials not required for the work in progress.

- C. Concessionaires shall not be allowed on the grounds of the facility.
- D. The use of the existing sanitary facilities by the Contractor's personnel is allowed providing such facilities are left in a clean condition after use. Abuse of the restroom facilities will result in the privilege being revoked.

1.4 GOVERNMENT USE AND ACCESS TO PREMISES

- A. The Government reserves the right to enter the premises during the term of the contract for periodic work inspections and for maintenance of existing equipment. The Contractor shall allow the CO and RE complete access to all portions of the work.
- B. See Part II, Section I, Contract Clause entitled OTHER CONTRACTS, for work by other contractors.

1.5 WORK HOURS

- A. Work shall be performed during normal working hours (7:30 a.m. to 4:00 p.m.) unless an alternate work schedule has been arranged with the facility and through the RE.
- B. The contractor may elect to work two shifts or may elect to work outside the normal working hours, early morning or late afternoons, due to weather conditions, provided that this is scheduled, coordinated, and agreed to by the RE, the facility and CO, a minimum of 5 working days in advance. No claims for increased overhead or equitable adjustment will be entertained if the Contractor elects to work more than one shift.
- C. Shutdowns and cutovers of environmental, utility and electrical systems impacting the facility operations shall be accomplished between the hours of 10 p.m. and 6 a.m. All preparatory work shall be completed prior to shutdown/cutover to minimize downtime. Shutdown and cutovers shall be scheduled and coordinated with the RE a minimum of 10 working days in advance of the shutdown/cutover.
- D. Demolition and construction noise within the facility must be minimized between 7:00 a.m. and 8:30 p.m. and shall be scheduled in advance, coordinated with the facility and approved by the RE.
- E. No work shall be scheduled or take place during the week of and the weekend preceding and following the Thanksgiving, Christmas and New Years Holidays. Only emergency work to restore critical services to the facility will be considered and a moratorium waiver must be submitted and approved. The moratorium period will not be counted against the contract construction duration for the project.

1.6 NOTIFICATION OF PLANNED OVERTIME WORK

- A. In the event the contractor intends to work overtime, nights, weekends or holidays, he shall notify the RE, who will coordinate with the CO for approval, at least 24 hours in advance of his commencement of the overtime work and 48 hours prior to night, weekend or holiday work.

1.7 SECURITY REQUIREMENTS

- A. Contractor shall provide the CO, prior to Notice-To-Proceed, with a complete list of contractor and subcontractor personnel including date of birth, and city of residence. The list shall be kept current during project duration.
- B. Contractor and subcontractor personnel may be subject to a security investigation by the FAA. The contractor shall promptly complete and return applicable security forms furnished with the contract document for each employee as required. Forms must be completed and returned to the CO prior to subject employees working in the facility.
- C. Contractor's personnel shall report to the FAA's Resident Engineer overseeing this project.
- D. Work shall be arranged so that contractor's personnel can be escorted when required by the FAA, in certain areas which are considered to be restricted. No Contractor employee, associate, or other representative shall have any visual, audible, or physical access to any area marked as a "closed area". Any persons gaining access to any "closed area" shall report the access to the CO who will coordinate with the FAA security office for a de-brief. Contractor's personnel shall not violate any security regulations pertaining to the facility. Violators may be removed from the premises with the right to re-enter revocable. Contractor's day-to-day work schedules in the restricted areas shall be so arranged to allow for minimum escort.
- E. Current procedures at FAA facilities include the "right to search". Access to the site constitutes consent to search. If in the judgment of the FAA Security Guard a cause to search a vehicle or the person of personnel exists, such search will be made.

1.8 EMERGENCY EVACUATION

- A. Evacuations may be initiated in the event of a fire, bomb threat, or an airborne asbestos release. Contractor and sub-contractor personnel must immediately evacuate the facility if such notice is given. Contractor personnel will evacuate to the main entrance and account for all personnel. All unaccountable personnel should be reported to the Facility Manager or their representative.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

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- A. Contractor and Subcontractor personnel including identification number, date of birth, and city of residence
- B. Contractor/Subcontractor list (use included form) – Ask RE for electronic version if so desired.
- C. Security Forms (Blank forms to be provided by RE to the Contractor)

***** END OF SECTION *****

SECTION 01030

CONTRACTOR QUALITY CONTROL, COORDINATION, PERMITS, TESTING

PART 1 – GENERAL

1.1 CONTRACTOR QUALITY CONTROL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence.

1.2 QUALITY CONTROL PLAN

- A. General - The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause entitled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.
- B. Content of the CQC Plan.- The CQC plan shall include, as a minimum, the following to cover all construction operations, both on-site and off-site, including work by subcontractors, fabricators, suppliers and purchasing agents:
1. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC system manager who shall report to the project manager or someone higher in the Contractor's organization. Project manager in this context shall mean the individual with responsibility for the overall management of the project including quality and production.
 2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QC function.
 3. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to the Government.

4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, off-site fabricators, suppliers and purchasing agents. These procedures shall be in accordance with Section 1-7 SUBMITTALS.
 5. Control, verification and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person or laboratory responsible for each test.
 6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
 7. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
 8. Reporting procedures, including proposed reporting formats.
 9. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be reviewed for concurrence during the coordination meeting.
- C. Acceptance of Plan.- Acceptance of the Contractor's CQC plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes.- After acceptance of the QC plan, the Contractor shall notify the Contracting Officer in writing a minimum of seven calendar days prior to any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

1.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the Quality Control Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both on-site and off-site work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Contractor and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by

either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

1.4 QUALITY CONTROL ORGANIZATION

- A. General.- The quality control system manager and surveillance personnel shall be fully qualified by experience and background to perform their assigned responsibilities.
- B. System Manager.- The Contractor shall identify an individual, within his organization at the site of the work as Contractor Quality Control System Manager, who shall be responsible for overall management and have the authority to act in all Contractor's Quality Control (CQC) matters for the Contractor; **for this project it is allowed to have the project superintendent act as the CQC System Manager**. The designated System Manager shall have a minimum of 5 years experience in supervision or inspection of building construction projects of complexity, magnitude, and type of work similar to the project or prior approval of the Contracting Officer. The System Manager's performance shall be acceptable to the Contracting Officer, and acceptability will be based principally on timeliness, accuracy, and completeness of the CQC's assessment of the condition of the elements of contract work. Contract work will not be permitted to be performed without an acceptable incumbent CQC System Manager onsite unless specifically authorized by the Contracting Officer.

1.5 QUALITY CONTROL MEETINGS

The Contractor's Project Manager shall meet with the Contracting Officer or the Contracting Officer's Authorized Representative at regular intervals, weekly or monthly as considered necessary by the Contracting Officer, to assess the effectiveness of the Quality Control system. Special meetings may be called at any time when desired by the Contracting Officer. Reports will be reviewed to determine their effectiveness in the overall Quality Control system. Particular emphasis will be placed on discussion of methods to eliminate the recurrence of problem areas.

- A. Submittals.- Procedures for processing shop drawings, samples, certificates, and other submittals shall be developed and submitted for approval as part of the Contractor's Quality Control Plan. The procedures shall include the establishment of responsibilities to assure at each level adequate review and approval; timely delivery, including verification procedures; and proper storage.
- B. Certification.- The Contractor is responsible for, and the Quality Control manager shall certify that, the submittals comply with contract requirements. Submittals shall be as specified in Section 01070 SUBMITTALS.
- C. Government Approved Submittals.- Submittals requiring Government approval will be identified as having received Contractor approval by being so stamped and dated. Delays in the approval process shall not be the basis for consideration of a time extension when such delay is the result of the Contractor's failure to make proper submittal or make corrections in accordance with the specifications or the Contracting Officer's comments or is the result of a resubmittal which is required because of an unsatisfactory original submittal. Approval action will not relieve the Contractor of his

responsibility for compliance with the contract but will indicate only that the general method of construction and detailing is satisfactory.

- D. Deviations.- All proposed deviations from contract requirements shall be submitted in writing for approval.

1.6 CONTROL.-

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations, including both on-site and off-site fabrication, and will be keyed to the proposed construction sequence. The controls shall include at least three phases of control to be conducted by the CQC system manager for all definable features of work, as follows:

- A. Preparatory Phase.- This phase shall be performed prior to beginning work on each definable feature of work and shall include:
1. A review of each paragraph of applicable specifications.
 2. A review of the contract plans.
 3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
 4. A check to assure that provisions have been made to provide required control inspection and testing.
 5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
 6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawing or submitted data, and are properly stored.
 7. Complete the FAA Work Permit (FAA Pre-Construction and Maintenance Project Safety and Health Checklist (N3900.57) to assure safety and risk analysis requirements are met. Work with the Resident Engineer to identify potential life safety and work related risks to the air traffic control system for inclusion in the Project Risk Management Plan. The Risk Management Plan is maintained by the FAA and shall be reviewed before starting any phase of work as applicable.
 8. Discussion of procedures for constructing the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that phase of work.
 9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

10. The Government shall be notified at least 48 hours in advance of beginning any of the required action of the preparatory phase. This phase shall include a meeting conducted by the CQC system manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC system manager and attached to the daily QC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.
- B. Initial Phase.- This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:
1. A check of preliminary work to ensure that it is in compliance with contract requirements. Review minutes of the preparatory meeting.
 2. Verification of full contract compliance. Verify required control inspection and testing.
 3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels is appropriate.
 4. Resolve all differences.
 5. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
 6. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC system manager and attached to the daily QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
 7. The initial phase should be repeated for each new crew to work on-site, or any time acceptable specified quality standards are not being met.
- C. Follow-up Phase.- Daily checks shall be performed to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.
- D. Additional Preparatory and Initial Phases.- Additional preparatory and initial phases may be conducted on the same definable features of work as determined by the Government if the quality of on-going work is unacceptable; or if there are changes in the applicable QC

staff or in the on-site production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

1.7 CONTRACTOR REQUEST FOR INFORMATION (RFI)

In accordance with Contract Clause "SPECIFICATIONS AND DRAWINGS", in case of discrepancy either in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the RE, who shall promptly respond in writing. Submit a written request to RE and allow at least 3 working days for Government response. Include the date of the request, the date response is needed, a description of the problem, identification of work on hold, impact of delay in Government response, scope changes deemed necessary and recommended solutions, and any other information pertinent. The Government reserves the right to charge the contractor for administrative costs associated with responding to an RFI, which does not involve discrepancies in the specifications and drawings.

1.8 TESTS

- A. Testing Procedure.- The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of an approved testing laboratory or establish an approved testing laboratory at the project site. A list of tests to be performed shall be furnished as a part of the CQC plan. The list shall give the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required. The Contractor shall perform the following activities and record and provide the following data:
1. Verify that testing procedures comply with contract requirements.
 2. Verify that facilities and testing equipment are available and comply with testing standards.
 3. Check test instrument calibration data against certified standards.
 4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
 5. Results of all tests taken, both passing and failing tests, will be recorded on the Quality Control report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. Actual test reports may be submitted later, if approved by the Contracting Officer, with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the Contracting Officer. Failure to submit timely test reports, as stated, may result in nonpayment for related work performed and disapproval of the test facility for this contract.

1.9 COMPLETION INSPECTION

At the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC system manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved plans and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC system manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Government. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

1.10 DOCUMENTATION

The Contractor shall maintain current records of quality control operations, activities, and tests performed, including the work of subcontractors and suppliers. These records shall be on an acceptable form and shall include factual evidence that required quality control activities and/or tests have been performed, including but not limited to the following:

- A. Contractor/subcontractor and their area of responsibility.
- B. Operating plant/equipment with hours worked, idle, or down for repair.
- C. Work performed today, 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/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
- E. Material received with statement as to its acceptability and storage.
- F. Identify submittals reviewed, with contract reference, by whom, and action taken.
- G. Off-site surveillance activities, including actions taken.
- H. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- I. List instructions given/received and conflicts in plans and/or specifications.
- J. Contractor's verification statement.
- K. These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement

that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 24 hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC system manager. The report from the CQC system manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

1.11 SAMPLE FORMS

Sample Contractor Quality Control Report forms are enclosed at the end of this section.

1.12 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor at the site of the work, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

1.13 COORDINATION, LOCAL PERMITS AND TESTING

A. Project Coordination

1. It shall be the duty of the Contractor to prepare a detailed schedule of work and work layout to resolve conflicts and to assure coordination of the work by different trades.
2. It shall be the duty of the Contractor to resolve all coordination conflicts that arise among his subcontractors. If, in the opinion of the RE, a potential or actual conflict exists, the RE will notify the CO, who shall instruct the contractor to take immediate steps to coordinate the work and resolve any conflicts.

B. Local Permits

1. The Contractor shall make application, pay fees, etc., to obtain local building permits and inspection as required.
2. This project is designed in accordance with the Uniform Building Code, the Uniform Plumbing Code, and the National Electric Code. The Contractor shall perform all work in compliance with the latest edition of these codes.
3. An asbestos control work permit request is necessary for this project. The form is located at the end of this specification section.

- C. Testing.- The Contractor shall arrange and pay for the services of Independent Testing Laboratories/Engineers to perform specified services and testing as required. (sample of typical Contractor's daily report)

1.14 SAFETY REQUIREMENTS

- A. Contractor Safety Plan.- The Contractor shall develop and submit a required Safety Plan and other safety documents showing how the work shall be accomplished in accordance with OSHA 29 CFR 1910 and OSHA 29 CFR 1926. The Safety Plan, and other safety documents, shall be submitted to the COTR for review and approval. The Safety Plan shall be submitted with in 10 days of the Notice-to-proceed. No construction will be authorized until the Safety Plan has been approved.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

***** END OF SECTION *****

SECTION 01080

TEMPORARY FACILITIES

PART 1 – GENERAL

1.1 REQUIREMENT INCLUDED

- A. Furnish, install and maintain temporary facilities required for construction; remove on completion of the work.
- B. Facilities include sanitary, water, electricity, lighting, heating, ventilation, telephone, construction aids, barriers, project sign, parking and site access.

1.2 RELATED REQUIREMENTS

- A. Section 01020: Site Access, Construction Limits, Use of Facilities and Work Hours.
- B. Section 01750: Protection of Existing Conditions and Installed Work

1.3 REFERENCES

- A. Occupational Safety and Health Standards for Construction (29 CFR PART 1926)
 - 1. Subpart G - Signs, Signals and Barricades
 - 2. Subpart L - Scaffolds
 - 3. Subpart M - Fall Protection
 - 4. Subpart N - Cranes, Derricks, Hoists, Elevators and Conveyors
 - 5. Subpart X - Stairways and Ladders

PART 2 – PRODUCTS

2.1 TEMPORARY SANITARY FACILITIES

- A. The contractor may use the existing facilities.
- B. Maintain in a clean and sanitary condition; failure to do so will result in a loss of privileges.

2.2 TEMPORARY WATER

- A. The existing building water system may be used for construction purposes at no cost to the contractor. Obtain location connections from the RE. Extend system as necessary to comply with temporary water requirements.

2.3 TEMPORARY ELECTRICAL POWER

- A. Reasonable amounts of electrical power will be furnished at no cost. Contractor will have to supply breakers to perform work required to access power. Connections to the existing facility electrical system at any other point are prohibited.

- B. The contractor shall provide a fused disconnect switch at the point of connection.
- C. The contractor shall provide all supply lines for lights and power, extension outlets, and extension cords, trailers, receptacles, bulbs, fuses and other equipment required for safety and for proper execution of the work, and for inspection purposes. **ALL ELECTRICAL WORK THAT CONNECTS TO THE FACILITY ELECTRICAL SYSTEM SHALL BE COORDINATED THROUGH THE RESIDENT ENGINEER.** The only personnel authorized to access energized electrical panels are the FAA Environmental Support Unit personnel. Failure to adhere to these requirements may result in removal from the jobsite.

2.4 TEMPORARY LIGHTING

Provide temporary artificial lighting for all areas when natural light does not meet minimum requirements for:

- A. Construction Areas: Uniform illumination of 20 foot-candles.
- B. Security.
- C. Temporary offices, storage, shop and other construction buildings.

2.5 TEMPORARY VENTILATION

- A. Provide local exhaust ventilation to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas.
- B. Provide local exhaust ventilation with capacity to produce negative pressure and enclose the immediate work area with dust partitions to protect adjacent equipment.
- C. Dispose of exhaust materials in a manner which will not result in harmful exposure to persons.

2.6 TEMPORARY TELEPHONE

- A. If necessary, the Contractor shall arrange with local telephone Service Company to provide their own direct line service for use of personnel and employees throughout the construction period.
 - 1. One direct line instrument in contractor's field office.
 - 2. Other instruments at contractor's option, or as required by regulations.
- B. The contractor shall pay cost for installation, maintenance and removal of temporary services, and restoration of existing or permanent facilities used.
- C. The Contractor shall pay service company charges for local telephone service, and for toll charges. Cell phones may be used with in the construction area.

2.7 CONSTRUCTION AIDS

- A. Furnish, install and maintain required construction aids. Remove on completion of work.
- B. Provide construction aids and equipment required by personnel and to facilitate execution of the work i.e. trench boxes, scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.

2.8 BARRIERS

- A. Furnish, install and maintain suitable barriers as required to prevent public entry, and to protect the work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of work.
- B. Materials of contractor's option, as appropriate to serve required purpose and approved by RE.
- C. Where any removal, drilling or cutting of walls or other surfaces in areas of existing facilities operations occurs, the contractor shall install temporary partitions prior to demolition to prevent entrance of dust or other matter into the working areas. Where normal activities are to be carried on inside the building adjacent to the partition, the partition shall be thermally insulated and acoustically treated to prevent entry of temperature extremes and construction noise.

2.9 TEMPORARY PARKING AND ACCESS

- A. Provide and maintain all vehicular access to site and within site to provide uninterrupted access:
 - 1. To temporary construction facilities, storage and work areas.
 - 2. For use by persons and equipment involved in construction project.
 - 3. For use by emergency vehicles.
- B. Provide and maintain all temporary parking facilities for use by construction personnel.
- C. Locate roads, drives, walks and parking facilities to provide uninterrupted access to construction offices, mobilization, work, storage areas, and other areas required for execution of the contract.
 - 1. Contractor and the contractor's personnel shall utilize the parking areas designated by the RE.
- D. Provide access for emergency vehicles.
 - 1. Maintain driveways a minimum of 15 feet wide between and around combustible materials in storage and mobilization areas.
- E. Maintain traffic areas free as possible of excavated materials, construction equipment, products, snow, ice and debris.

- F. Keep fire hydrants and water control valves free from obstruction and accessible for use.
- G. Maintain roads, walks and parking areas in sound, clean condition.
 - 1. Repair or replace any portions damaged during progress of construction work.
- H. Completely remove temporary materials and construction when construction needs can be met by use of permanent installation.
 - 1. Remove and dispose of compacted materials to depths required by various conditions to be met in completed work.
- I. Restore areas to original or to specified conditions at completion of work.

PART 3 – EXECUTION

3.1 UTILITY COSTS

Consumption costs of the temporary power service and temporary water service furnished to the contractor will be paid by the Government. Extension from the point of connection, including equipment, operation and attendance shall be paid for by the contractor.

3.2 MAINTENANCE

All costs in connection with the maintenance of all temporary facilities shall be paid by the contractor.

3.3 COMPLIANCE

All work covered in this section shall comply with provisions of other applicable divisions and all applicable local requirements

3.4 OPERATION OF PERMANENT EQUIPMENT

Use of permanent equipment by the contractor is strictly prohibited without written approval of the FAA prior to use.

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

- A. Barriers

***** END OF SECTION *****

SECTION 01090

MATERIALS AND EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE

- A. Material and equipment incorporated into the work:
 - 1. Conform to applicable specifications and standards.
 - 2. Comply with size, make, type and quality specified, or as specifically approved in writing by the CO.
 - 3. Manufactured and Fabricated Products:
 - a) Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - b) Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c) Two or more items of the same kind shall be identical, by the same manufacturer.
 - d) Products shall be suitable for service conditions.
 - e) Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 - 4. Do not use material or equipment for any purpose other than for which it is designed or is specified.
 - 5. No asbestos containing materials (ACM) will be used in this project.

1.2 APPLICABLE DOCUMENTS

- A. Part I, Section E, F, G.
- B. Section 01300: Submittals
- C. Occupational Safety and Health Standards for Construction (29 CFR PART 1926) Subpart H - Materials Handling, Storage, Use and Disposal

1.3 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents requires that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the RE. Maintain one set of complete instructions at the job site during installation and until completion.

- B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the RE for further instructions.
 - 2. Do not proceed with work without clear instructions.
- C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.4 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site. **All deliveries shall be coordinated in advance with the Resident Engineer. The contractor shall have a point of contact identified and available to receive the shipment. Failure to adhere to these requirements may result in the shipment being turned away. Any additional costs or time as a result of failure to adhere to these requirements shall be the responsibility of the Contractor.**
 - 1. Deliver products in undamaged condition, in manufacturer's original containers or packing, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packing.

1.5 STORAGE

- A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- B. Exterior Storage
 - 1. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

1.6 SUBSTITUTIONS.-

- A. Submit separate request for each substitution, Support each request with:
1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
 - a) Product identification, including manufacturer's name and address.
 - b) Manufacturer's literature; identify:
 - 1) Product description.
 - 2) Reference standards.
 - 3) Performance and test data.
 - c) Samples, as applicable.
 - d) Name and address of similar projects on which product has been used, and date of each installation.
 2. Itemized comparison of the proposed substitution with product specified. List significant variations.
 3. Data relating to changes in construction schedule.
 4. Any effect of substitution on separate contracts.
 5. List of changes required in other work or products.
 6. Accurate cost data comparing proposed substitution with product specified include:
 - a) Amount of any net change to Contract Sum.
 7. Designation of required license fees or royalties.
 8. Designation of availability of maintenance services, sources of replacement materials.
- B. Substitutions will not be considered for acceptance when:
1. They are indicated or implied on shop drawings or product data submittals without a formal request from contractor.
 2. They are requested directly by a subcontractor or supplier.
 3. Acceptance will require substantial revision of Contract Documents.
- C. Substitute products shall not be ordered or installed without written acceptance of the CO.
- D. CO will determine acceptability of proposed substitutions.

- E. In making formal request for substitution contractor represents that:
1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
 2. He will provide same warranties or bonds for substitutions as for product specified.
 3. He will coordinate installation of accepted substitution into work to be complete in all respects.
 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
 5. Cost data is complete and includes related costs under his contract.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

- A. Manufacturer's Instructions

***** END OF SECTION *****

SECTION 01730

OSHA SAFETY REQUIREMENTS

PART 1 – GENERAL

1.1 SCOPE

- A. This section identifies some of the requirements of the OSHA Construction Standard.
- B. Formulation of a site specific safety plan

1.2 CONTRACTOR RESPONSIBILITY

- A. General Safety Provisions - The Contractor shall bear full responsibility to provide safe working conditions for its employees and Contractors. The Contractor shall not permit any employee or Subcontractor to work in surroundings or under working conditions that are unsanitary, hazardous, or dangerous to the health and safety of the employee.
- B. Accident Prevention - The Contractor shall bear the responsibility of maintaining an accident prevention program such that frequent and regular inspections of the job site, materials and equipment are made by a competent person designated by the employer.
- C. Use of Equipment - The Contractor shall not permit the use of any machinery, tool, material, or equipment that is not in compliance with OSHA regulations. The employer shall permit only those employees qualified by training and/or experience to operate equipment and machinery.

1.3 CONTRACTOR RESPONSIBILITY

- A. The FAA shall not be held responsible for safety inspections to assure Contractor conformance with the OSHA safety regulations. The FAA, however, reserves the right to notify the Contractor of any deficiencies regarding worker safety.
- B. The FAA will evaluate the Contractor on its safety performance, including that of its Subcontractors. The number and severity of safety and security violations will be considered in this evaluation. Contractor safety violations are cause for termination for default, may result in notification of the Contractor's bonding company, and will affect the Contractor's opportunity to propose on future work. Failure to correct such deficiencies may impact the Contractor's ability to work on future FAA contracts.

1.4 OSHA REGULATIONS

- A. The Contractor shall comply with the latest Occupational Safety and Health Administration regulations (CFR 29 Part 1926) regarding safety in the work area.
- B. The Contractor shall be responsible for obtaining copies of non-FAA referenced documents without additional cost to the FAA. If Contractor requests, a copy of FAA directives may be obtained by contacting the Contracting Officer.

- C. The Contractor is not relieved from adhering to other OSHA requirements not listed herein. The Contractor shall consult the latest referenced OSHA documents for safety regulations.
1. Documents:
 - a) OSHA Documents:
 - 1) CFR 29 Part 1926 Safety and Health Regulations for Construction
 - 2) CFR 29 Part 1910 General Industry Standards Applicable to Construction Industry
 2. FAA Documents:
 - a) FAA Order 3900.49 Control of Hazardous Energy During Maintenance, Servicing and Repair
 - b) FAA Order 3900.19B Chapter 11. Confined Space program. Contractor shall not enter any spaces marked "Danger, Do Not Enter, Permit Required Confined Space" without getting a permit from the Safety and Environmental Manager (SECM). SECMs are located at the ARTCC.
 - c) FAA Order 3900.19B, Chapter 13. Lockout Tagout Program. Contractor shall follow the Lockout Tagout (LO/TO) procedures as detailed in the ARTCC Lockout/Tagout Program. A copy of this program is available through the Environmental Support Unit (ESU) No equipment will be locked out without prior approval of the Resident Engineer.

1.5 SAFETY PLAN

The contractor must develop and implement a site specific comprehensive Health and Safety Plan (HASP) based on the scope of work, for his or her employees as well as others in the area and the properties around. It shall cover all aspects of onsite construction operations and activities associated with the contract. This plan must comply with 29 CFR 1926, FAA Order 3900.19B, other applicable health and safety regulations and any project-specific requirements. The contractor must provide the Contracting Officer with a copy of this plan. Acceptance of the contractor's HASP only signifies that the plan generally conforms to the requirements of the contract. It does not relieve the contractor of the responsibility for providing with a safe and healthful work environment. At a minimum the HASP shall address the following:

- A. Workplace address
- B. Name and address of the principal contractor
- C. Key Personnel, phone nos and addresses
- D. Estimated duration of the work
- E. Hazard assessment and identification of the hazards in the scope of work

- F. Mitigation of hazards and proposed control measures for the risks
- G. Hazard Communication methods
- H. How the controls will be implemented
- I. Personal Protective Equipment
- J. Training
- K. Temperature Extreme
- L. Medical Surveillance
- M. Exposure Monitoring and Air Sampling
- N. Site Control
- O. Emergency Response/Contingency Plan
- P. Emergency Action Plan
- Q. Confined Space Entry
- R. Spill Containment
- S. Documentation and Record Control
- T. Arrangements for monitoring and reviewing controls

The plan must be written so it is easy to understand, signed and dated by the General Contractor. It must be available for the length of the project. The General Contractor cannot allow work to start unless the plan has been discussed with or a copy given to all relevant people and the plan is readily available for inspection. The plan must be amended if there are changes in how risks will be managed. The General Contractor must inform any affected person of the change

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 CFR 29 PART 1926 -- SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

- A. This section contains a partial listing of the referenced OSHA standards. The Contractor is responsible for adhering to all applicable regulations including those not specifically referenced herein.

1. Subpart D (Occupational Health and Environmental Controls) - Contractor shall furnish adequate supply of potable water in containers clearly marked as potable water. Containers containing non-potable water shall be clearly marked. See CFR 29 Part 1926 Subpart D for complete requirements.
2. Subpart E (Personal Protective Equipment) - The Contractor shall provide adequate protection for the head, hearing, and eyes for all employees working in an area where hazards to the head, ear and eyes exist. See CFR 29 Part 1926 Subpart E for complete requirements.
3. Subpart I (Tools) - All hand tools and power tools and similar equipment whether furnished by the Contractor or the employee shall be maintained and operated in a safe condition. Personal protection shall be used when applicable. The use of tools shall be limited to the intended use of said tools. See CFR 29 Part 1926 Subpart I for complete requirements.
4. Subpart K (Electrical) - The Contractor shall furnish ground fault protection for all electrical equipment used on the jobsite. Extension cords shall be three wire ground in good shape. Installation of the facilities will require energizing numerous circuits. The Contractor shall protect against electrical shock by methods such as posting warning signs, supplying insulated gloves, locking out and tagging de-energized circuits, and other similar methods. See CFR 29 Part 1926 Subpart K for complete requirements.
5. Subpart P (Excavation/Trenching) - Prior to commencing trenching or excavation, the Contractor shall ascertain that the area has been inspected for all utility lines and has been adequately marked. Trenches over four (4) feet in depth shall require either adequate bracing or approved slope or bench methods. All trenches and excavations shall be regularly checked for stability. In the event of a rain shower, the Contractor shall suspend work activity within the trench or excavation until the stability of the trench or excavation is ascertained. See CFR 29 Part 1926 Subpart P and Division 2 of the Subcontract Specifications for complete requirements for additional requirements.

3.2 CFR 29 PART 1910 -- GENERAL INDUSTRY STANDARDS APPLICABLE TO CONSTRUCTION INDUSTRY

- A. This section contains a partial listing of the referenced OSHA standards. The Contractor is responsible for adhering to all applicable regulations including those not specifically referenced herein.
 1. Section 1910.147 - Contractor shall maintain a written hazardous energy control procedure in accordance with CFR 29 1910.147. The written procedure shall describe contractor's responsibilities regarding shift changes or personnel changes. A specific coordinated lockout/tagout procedure shall be recorded in writing and signed by the Contractor and Contracting Officer with copies to each party.

2. Section 1910.120 - The Contractor shall develop and implement an Emergency Response and Contingency Plan in accordance with OSHA Standard 29 CFR 1910.120. In the event of an emergency associated with remedial action, the Contractor shall, without delay, take diligent action to remove or otherwise minimize the cause of the emergency; alert the Contractor; and institute whatever measures might be necessary to prevent any repetition of the conditions of actions leading to, or resulting in, the emergency. Emergency contact names and telephone numbers shall be posted at all project phones and in site-support vehicles as well as included within the plan.

PART 4 – QUALITY ASSURANCE

4.1 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

- A. Contractor Health and Safety Plan – FAA to keep 1 copy

***** END OF SECTION *****

SECTION 01770

FINAL INSPECTION AND ACCEPTANCE OF WORK

PART 1 – GENERAL

1.1 SECTION INCLUDES

This section sets out the requirements for final inspection and acceptance of work at completion of the work.

1.2 FINAL SUBMITTAL REQUIREMENTS

Prior to final acceptance, the Contractor shall assemble all appropriate warranties, product information, certifications, equipment installation instructions, MSDS sheets, and the results of all tests.

1.3 COMPLETION CERTIFICATE

A. When Contractor considers the work completed, Contractor shall submit a signed certification in the certifying the following:

1. Contract Documents have been reviewed and work inspected for compliance with the Contract, including Punchlist work, and accepted by the FAA.
2. All materials used in the project are asbestos and lead free.
3. Record Documents, As-Builts, final project photographs, damage or settlement survey, property survey, Record Drawings and similar final record information as required and acceptable to the COTR have been submitted by the Contractor.
4. Equipment/systems have been tested in the presence of the COTR and are operational.
5. Required operational, and maintenance manuals, data and parts list have been submitted and approved.
6. Spare parts have been provided as required.
7. Warranties and guarantees have been prepared and found acceptable to COTR.
8. Work is completed, premises cleaned and ready for inspection, temporary facilities and services have been removed, and pre-existing conditions have been restored.
9. All maintenance personnel have been properly instructed in the use of the facilities and all installed equipment as required by the Contract Documents.
10. Contractor has released all property installed in the performance of the contract and all GFE/GFP not used has been transferred to the FAA and delivered to place of origin.
11. Return of all FAA identification badges and keys issued for this project.

1.4 CONTRACTOR ACCEPTANCE INSPECTION (CAI)

A. The Contractor shall coordinate with the COTR the date to schedule the CAI. The Contractor shall notify the COTR in writing seven days (or as otherwise agreed to) before an agreed upon CAI date.

- B. The Contractor shall have the superintendent present at the CAI. The COTR shall conduct an inspection of the facility to verify all contract conditions are met. Any additional required test results shall be submitted to the COTR at this time. The COTR reserves the right to have local FAA personnel conduct additional tests to verify that operational requirements are met. The FAA reserves the right to have personnel present to document any concerns regarding final condition of the Site.

1.5 PUNCH LIST

- A. When the Contractor feels the project is ready for punch list, the COTR shall be notified. The Contractor and COTR shall perform the initial punch lists independent of one another. This list shall include but not be limited to a list of discrepancies in the work, material, and equipment that is unacceptable as a final product. The two lists will then be combined by the Contractor. The Contractor shall correct all deficiencies, if any, noted on the punch list before final acceptance. Each item on the punch list that is completed will be initialed and dated by the COTR. Work showing evidence of substandard performance will not be accepted and shall be corrected by the Contractor at its expense.

1.6 FINAL ACCEPTANCE OF WORK

- A. The Contractor shall correct discrepancies noted on the punch list prior to the final acceptance. The premises shall be thoroughly clean prior to final acceptance. Contractor shall schedule final inspection and notify in writing the COTR seven days (or as otherwise agreed to) before the planned inspection date.
- B. Contractor shall have the superintendent present at the final inspection. The COTR shall conduct the final inspection of the facility to verify all contract conditions are met.
- C. Upon acceptance by FAA, Contractor may submit Final Application for Payment

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

PART 4 – QUALITY ASSURANCE

NOT USED

***** END OF SECTION *****

DIVISION 2

SITE WORK

2-3 GRADING, EXCAVATING, AND BACKFILLING

2-3.1 General.-

2-3.1.1 Scope.- This Section includes excavation, and placement of backfill for underground utility installations.

2-3.1.2 Definitions.-

- (a) Earth excavation: Excavation in materials of any nature except rock as defined below.
- (b) Rock excavation: Excavation in natural material that cannot be excavated without blasting or using rippers.
- (c) Building area: The area enclosed within a perimeter line established five (5) feet outside the neat lines of the foundation.
- (d) Pavement area: The area enclosed within a perimeter line established two (2) feet outside the neat lines of the pavement.
- (e) Granular material: Natural mineral aggregates having 35% or less passing the No. 200 sieve.
- (f) Acceptable material: Material which meets specified requirements for use in the work.
- (g) Unsuitable material: Material which does not meet specified requirements for use in the work.
- (h) Overexcavation: Excavation beyond or below the limits indicated, or, if not indicated, beyond or below the extent required for proper construction of the work.

2-3.1.3 Job conditions.-

2-3.1.3.1 Existing drainage.-

- (a) Preserve, protect, and maintain existing operable drains and sewers during excavating and backfilling operations.
- (b) Keep excavations dry.

2-3.1.3.2 Subsurface conditions.- Determine the nature and characteristics of the subsurface conditions at the site.

2-3.1.3.4 Excavation near buildings.- Control excavation in areas near buildings or structures to maintain stability of buildings or structures.

2-3.2 Applicable documents.- The current issues of the following documents, in effect on the date of the invitation for bid, form a part of this specification and are applicable to the extent specified herein.

2-3.2.1 American Association of State Highway and Transportation Officials (AASHTO).-

M147 Standard Specification for Materials for Aggregate and Soil-Aggregate Sub-base, Base and Surface Courses

2-3.2.2 American Society for Testing and Materials (ASTM).-

C33 Concrete Aggregates

C136 Sieve Analysis of Fine and Coarse Aggregates

D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort

D1556 Test Method for Density of Soil in Place By The Sand-Cone Method

D2487 Standard Classification of Soil for Engineering Purposes

D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

E329 Evaluation of Testing and Inspection Agencies as Used in Construction.

2-3.3 Materials.-

2-3.3.1 General.-

- (a) Use imported granular materials for bedding material. Materials from the site meeting the requirements herein, may be used for backfill material.
- (b) Material supplier shall be listed on the state highway department's current list of acceptable material sources.

2-3.3.2 Backfill material.-

- (a) Well graded soil aggregate mixture comprised of stone, gravel, sand, silt, or combinations of such materials.
- (b) Prohibited material: Organic matter, debris, coal, cinders, slag, clay, frozen material, and cobbles.
- (c) Additional requirements:
 - 1. Particle size: Three inches maximum, but not exceeding one inch within one foot of finished grade, or when used for trench backfill.

2. Gradation: 35% or less passing the No. 200 sieve.
3. Liquid limit: Forty maximum, determined in accordance with ASTM D4318.
4. Plasticity index: Ten maximum, determined in accordance with ASTM D4318.
5. Maximum dry density: Not less than 100 pounds per cubic foot.
6. Material shall be non-expansive and granular.

2-3.3.3 Select material.- AASHTO M147, No. 57 Coarse Aggregate.

2-3.3.4 Permeable material.- AASHTO M147, No. 57 Coarse Aggregate.

2-3.3.5 Bedding material.- AASHTO M147, No. 7 Coarse Aggregate.

2-3.3.6 Pea gravel.- ASTM C33, Paragraph 9.1 for quality and soundness, uniformly graded from 1/4 to 3/8 inch in size with not more than three percent passing the No. 8 sieve; smooth, rounded pieces of gravel, clean and free from objectionable material, such as soft particles, coal and lignite particles, or friable particles.

2-3.3.7 Pervious material.- ASTM C33, natural, clean, free draining sand.

2-3.4 Execution.-

2-3.4.1 Equipment.- Use appropriate equipment in sufficient quantity and sizes to perform the work as indicated.

2-3.4.2 Earth excavation.-

2-3.4.2.1 General.-

- (a) Excavate to the lines, grades, and limits required for the installation of the work. Provide sufficient clearance for the installation of formwork, drainage, and removal of unsuitable material.
- (b) Carefully maintain benchmarks, monuments, and other reference points. Replace if damaged or disturbed.
- (c) Excavate in sequences and stages which will not impair existing installations or surfaces.
- (d) Sawcut existing pavements before excavating. Make sawcuts full depth and in a straight line for the full width of the pavement opening.
- (e) Safely support sides of excavation and maintain the work safe for personnel.
- (f) Hand dig in areas of underground utilities.

- (g) Maintain suitable drainage to prevent water from entering the excavation. Remove water by an approved method as it accumulates in excavations.
- (h) Remove excavated material to stockpile or disposal locations. Dispose of material offsite.

2-3.4.2.2 Excavation for underground facilities and utilities.-

- (a) Excavate trenches for utility piping after fill has been placed to final subgrade elevation.
- (b) Excavate below bottom of pipe a distance sufficient to allow bedding material to be properly placed and compacted to the thickness shown on the drawings.
- (c) During excavation, deposit material a sufficient distance from the excavation to prevent slides, cave-ins, or interference with operations.

2-3.4.2.3 Stability of Excavations.-

- (a) Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
- (b) Slope sides of excavations in compliance with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- (c) Provide shoring and bracing as required to perform the work. Design of shoring and bracing systems by a professional engineer licensed in the state of Utah is required. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

2-3.4.3 Backfill.-

2-3.4.3.1 General.-

- (a) All backfill will be placed using controlled fill placement methods.
- (b) Unless otherwise indicated, use backfill material or select material for trench backfill.
- (c) Unless otherwise indicated, place backfill materials in eight (8) inch (maximum) loose lifts for the entire length and width of the excavation. Compact each lift uniformly for its full extent to the specified density. Decrease lift thickness if necessary to achieve specified density.

- (d) Use placement methods which do not segregate the material. If material segregation occurs, remove the material and replace with acceptable material.
- (e) In confined areas, use acceptable power actuated compactors to achieve the specified density.
- (f) Maintain backfill in a stable, well drained condition.
- (g) Where space limitations do not allow for conventional backfill compaction operations, special backfill materials and procedures may be permitted. Pea gravel or select material may be used in deeper excavations where space is limited. A slurry of sand and portland cement (2 sacks per cubic-yard mix) shall be used for shallow backfill near final subgrade elevation. Obtain approval of the COR before using special backfill measures.
- (h) Allowable tolerances.- Construct finished subgrade to vary not more than 0.05 foot above or 0.10 foot below elevation shown.

2-3.4.3.2 Backfill against structures.-

- (a) When backfilling against structures, place material uniformly on both sides of structures to equalize opposing horizontal pressures.
- (b) Do not place unbalanced fill against concrete structures until the concrete has reached its full 28 day strength. Adequately brace structures to withstand loads induced during construction operations.
- (c) Aggregate base for roadway and parking is specified in Section 2-7.

2-3.4.3.3 Trench backfill.-

- (a) Use bedding material for pipe bedding.
- (b) Use backfill material for trench backfill.
- (c) Place bedding material in four (4) inch lifts. Compact bedding below pipe to specified density.
- (d) After installing pipe, place and compact bedding material uniformly on both sides of pipe to the depth shown on the drawings.
- (e) Backfill existing underground utilities exposed during construction as specified for new utilities.

2-3.4.4 Compaction and density.-

- (a) Compact each lift of material to 95 percent of the maximum dry weight density as determined in accordance with ASTM D698, at moisture content within tolerance specified, except the following:

1. Compact the final 12 inches of fill under slabs, pavements, or sidewalks to 100 percent of the maximum dry density.
2. Compact bedding between pipe and trench wall to top of pipe using hand tampers to achieve the stability necessary to prevent deflection of the pipe after construction is complete.
3. Compact trench backfill above bedding to 100 percent of the maximum dry density.

(b) Within five feet of structures, compact fill or backfill materials using lightweight compactors.

2-3.4.5 Removal of unsuitable materials.- Remove excavated and unsuitable materials from the site. Replace unsuitable material with acceptable material and compact as specified.

2-3.4.6 Restoration.- Restore the lawn, landscaped, paved, or otherwise improved areas as indicated. If not indicated, restore to the condition existing before construction operations began, using the same quality and type materials. Conform to the adjacent contours or elevations, and grade to drain freely away from buildings and structures without ponding.

2-3.5 Quality assurance.-

2-3.5.1 Testing.-

2-3.5.1.1 General.- Retain the services of an approved independent testing agency and pay all costs associated with testing and submitting test reports.

2-3.5.1.2 Qualifications of testing agency.- Qualified in compliance with ASTM E329.

2-3.5.1.3 Sampling.- Have testing agency take samples and perform tests on in-situ materials, on materials to be used in the work, and on materials and work in place.

- (a) Test imported materials for compliance with specified requirements before delivery to site.
- (e) Trench: Take at least one density test for every 100 linear feet of each lift of trench backfill.

2-3.5.1.4 Tests and test methods.-

- (a) Classification: Determine the classification of each material in accordance with ASTM D2487.
- (b) Gradation: Determine the gradation of each material in accordance with ASTM C136.
- (c) Maximum dry density: Determine the maximum dry weight density and the optimum moisture content for each material in accordance with ASTM D698.
- (d) In-place density: Determine the in-place density and moisture content of materials in accordance with ASTM D1556 or ASTM D2922.

2-3.5.2 Corrective action.-

- (a) Correct areas where testing indicates that the work does not meet specified requirements.
- (b) Repair areas damaged or rendered unstable or unsuitable by construction operations.
- (c) Repair settled or eroded areas after determining and correcting the cause of settlement or erosion.
- (d) In areas to be corrected or repaired, re-excavate and place fill in conformance with specified requirements.

2-3.5.3 Submittals.- Comply with specified procedures.

2-3.5.3.1 Shop drawings.- Submit complete designs and shop drawings for proposed shoring and bracing systems sealed and signed by a professional engineer licensed in the state of Utah.

2-3.5.3.2 Material source.- Submit name and location of source for each material.

2-3.5.3.3 Materials.-

- (a) At least 15 days before beginning backfill operations, submit test reports which verify that proposed materials comply with specified requirements.
- (b) Submit a representative sample of each material to be used in the work. Provide 80-lb samples in heavy fabric sacks labeled as required by the COR. Samples will be the standard for visual comparison of materials delivered to the site. Dispose of samples when the work has been accepted.

2-3.5.3.4 Test reports.- Submit test reports of each test taken to include the following information:

- (a) Project name and location.

- (b) Material placement date.
- (c) Testing firm name and name of individual performing the test.
- (d) Test date.
- (e) Material type and class.
- (f) Exact location of test.
- (g) Purpose or type of test.
- (h) Specified requirements.
- (i) Results of test.
- (j) Corrective action taken, if necessary.
- (k) Reference to retest after corrective action, if necessary.

2-3.5.3.5 Certificates.- Submit the following:

- (a) Verification that supplier of fill or backfill material is listed on the state highway department's current list of acceptable material sources.
- (b) Manufacturer's certification that materials conform to specified requirements.
- (c) Delivery tickets for imported materials.

2-3.5.3.6 Field quality control.-

- (a) Adjust moisture content of material to within specified limits by drying or watering material at source.
- (b) When observation or a significant variation in compactive effort indicates a change in the material, retest the material for compliance with specified requirements. If material meets specified requirements, retest for maximum density and optimum moisture content. Recalibrate testing equipment before testing new material.

END OF SECTION

2-7 PAVING AND SURFACING

2-7.1 General.-

2-7.1.1 Scope.- This Section includes bituminous pavement for restoration of existing facilities.

2-7.1.2 Related work in other sections.-

Section 2-3: Grading, Excavating and Backfilling

2-7.2 Applicable documents.- The current issues of the following documents, in effect on the date of invitation for bid, form a part of this specification and are applicable to the extent specified herein.

2-7.2.1 Federal Specifications (FS).-

TT-P-1952B Paint, Traffic and Airfield Marking, Water Emulsion Base.

2-7.2.2 State of Idaho Department of Transportation (UDOT).-

Standard Specifications for Road and Bridge Construction.

2-7.2.3 American Society for Testing and Materials (ASTM).-

D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
E329 Evaluation of Testing and Inspection Agencies as Used in Construction

2-7.3 Materials.-

2-7.3.1 Asphalt pavement, asphalt products, and aggregate base.- Comply with requirements of UDOT Standard Specifications. Paving asphalt, viscosity grade AR-4000.

2-7.3.2 Paint.- FS TT-P-1952B, Traffic Paint. Primer as recommended by paint manufacturer.

2-7.4 Installation.-

2-7.4.1 Asphalt pavement, asphalt products, and aggregate base.- Comply with applicable requirements of UDOT Standard Specifications subject to the additional requirements of this Section as follows:

2-7.4.1.1 Aggregate base.- Place the material in two equal lifts to obtain the total thickness required. Compact each lift to 100 percent of the maximum dry weight density as determined by ASTM D698.

2-7.4.1.2 Asphalt concrete pavement.- Place the material in two equal lifts to obtain the total thickness required.

2-7.4.4 Traffic paint.-

2-7.4.4.1 Environmental conditions.-

- (a) Apply only when ambient air temperature is above 40 degrees F and temperature surface to be painted is above 45 degrees F.
- (b) If pavement is wet, allow surface to dry for eight hours minimum after surface appears dry.

2-7.4.4.2 Width, thickness and color of lines.-

- (a) Parking space dividers: Four inches, white.
Road center line: Four inches, yellow.
- (b) Coverage rate: In accordance with manufacturer's written instructions to result in a dry film thickness of 4.5 to 5.75 mils.

2-7.4.4.3 Application.-

- (a) Use equipment suitable for mechanical application of paint.
- (b) Apply paint with atomizing spray machines designed for striping to apply stripes of uniform cross section and thickness, with clear cut edges permitting easy and accurate adjustment of width and rate of application as well as immediate shutoff.
- (c) Schedule marking and striping operations to permit paint to set and harden before parking lot is opened to traffic.
- (d) Allow hot laid bituminous material to cure at least 48 hours before applying pavement markings.
- (e) Remove foreign matter from surfaces prior to painting.
- (f) Apply pavement markings accurately with straight clean cut, sharply defined parallel edges and of uniform cross section.
- (g) Clean striping machines as often as necessary, to ensure application of markings of specified quality and physical requirements.

2-7.5 Quality assurance.-

2-7.5.1 Testing.-

2-7.5.1.1 General.- Retain the services of an approved independent testing agency and pay all costs associated with testing and submission of test reports.

2-7.5.1.2 Qualifications of testing agency.- In compliance with ASTM E329.

2-7.5.1.3 Density.- Perform density testing using an acceptable method to verify that required compaction has been achieved. Take at least one test per 250 square yards of each lift of pavement or aggregate base placed. Correct areas that do not have proper compaction.

2-7.5.1.4 Surface drainage.- Upon completion of paving work, flood newly paved areas with water to determine the existence and location of depressions or low spots from which water will not drain by gravity. If such areas are found, correct the areas to obtain positive drainage.

2-7.5.2 Submittals.- Comply with specified procedures.

2-7.5.2.1 Mix design.- Submit mix design for asphalt concrete pavement.

- (a) At least 15 days before beginning pavement operations, submit a mix design for asphalt concrete. Certify that proposed pavement ingredients and proportions will result in a pavement mix meeting the specification requirements.
- (b) Prepare mix design by an approved materials design laboratory.
- (c) Do not begin pavement work until mix design has been reviewed by the COR.

2-7.5.2.2 Test reports.- Submit test reports of each test taken to include the following information:

- (a) Project name and location.
- (b) Material placement date.
- (c) Testing firm name and name of individual performing the test.
- (d) Test date.
- (e) Material type and class.
- (f) Exact location of test.
- (g) Purpose or type of test.
- (h) Specified requirements.
- (i) Results of test.

2-7.5.2.3 Certificates.- Submit the following:

- (a) Manufacturer's certification that materials conform to specified requirements.
- (b) Asphalt pavement and aggregate base material delivery tickets.

END OF SECTION

2-8 DEMOLITION.-

2-8.1 General.- Applicable provisions of Division 1 - General Requirements, Drawings, and other provisions and requirements of the Contract Documents apply to work of this Section.

2-8.1.1 Summary.- This Section includes removal, and disposal of existing materials, equipment, and piping.

2-8.1.2 Related work in other Sections.-

Section 15-1: Mechanical general provisions

Section 16-1: Electrical general provisions

2-8.1.3 Title to removed property.- Materials and equipment to be removed and disposed of shall become the property of the contractor.

2-8.1.4 Safety and protection.- Initiate, maintain and supervise safety precautions and programs in connection with the work. Take necessary precautions for the safety of, and provide the necessary protection to prevent damage, injury or loss to Government property or personnel working within the facility.

2-8.1.5 Materials, equipment and fixtures to be removed.-

2-8.1.5.1 General.-

(a) Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building as required.

2-8.2 Applicable documents.- Not used.

2-8.3 Materials.- Not used.

2-8.4 Execution.-

2-8.4.1 Disconnection of utilities -

(a) Written approval from the COR is required before:

1. Disconnecting utilities.

2. Disrupting or interfering with the utility service to other facilities not a part of this work.

2-8.5 Quality assurance.-

2-8.5.1 Submittals.- Comply with the requirements of Submittals section.

2-8.5.1.1 Dismantling and demolition plan.- Submit a written dismantling and demolition plan indicating the method whereby portions of existing systems may be dismantled without affecting the operation of the equipment left in place. The dismantling and demolition plan shall be coordinated with the requirements for maintaining the facility in an operating mode. Procedures shall not conflict with the approved network or work schedule.

2-8.5.1.2 Certification.- Submit copies of request to utility companies owning or agency controlling services and appurtenances affected by demolition work for discontinuance of services. The request shall be in the form of a letter requesting discontinuance of services and specifying the stop and start times and dates where they apply.

END OF SECTION

SECTION 02742

HOT MIX BITUMINOUS PAVEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications listed below are referenced as the latest edition published as of the date of this document. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO MP 1a Performance Graded Asphalt Binder

ASPHALT INSTITUTE (AI)

AI MS-02 Mix Design Methods for Asphalt

ASTM INTERNATIONAL (ASTM)

ASTM C 117 Materials Finer Than 75 micrometer (No. 200)
Sieve in Mineral Aggregates by Washing

ASTM C 127 Density, Relative Density (Specific Gravity),
and Absorption of Coarse Aggregate

ASTM C 128 Density, Relative Density (Specific Gravity),
and Absorption of Fine Aggregate

ASTM C 131 Resistance to Degradation of Small-Size
Coarse Aggregate by Abrasion and Impact in
the Los Angeles Machine

ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates

ASTM C 188 Density of Hydraulic Cement

ASTM C 29/C 29M Bulk Density ("Unit Weight") and Voids in
Aggregate

ASTM C 88 Soundness of Aggregates by Use of Sodium
Sulfate or Magnesium Sulfate

ASTM D 1073 Fine Aggregate for Bituminous Paving Mixtures

ASTM D 1188 Bulk Specific Gravity and Density of
Compacted Bituminous Mixtures Using Paraffin-
Coated Specimens

ASTM D 140 Sampling Bituminous Materials

ASTM D 1559	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 2726	Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4867/D 4867M	Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 546	Sieve Analysis of Mineral Filler for Bituminous Paving Mixtures
ASTM D 692	Coarse Aggregate for Bituminous Paving Mixtures
ASTM D 70	Specific Gravity and Density of Semi-Solid Bituminous Materials (Pycnometer Method)
ASTM D 75	Sampling Aggregates
ASTM D 854	Specific Gravity of Soil Solids by Water Pycnometer
ASTM D 946	Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 979	Sampling Bituminous Paving Mixtures
ASTM D 995	Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures

1.2 SUBMITTALS

The FAA shall review and recommend, accept, reject or take other appropriate action on the Contractor's submittals including shop drawings, samples, documentation, record drawings, system certification reports and test reports. This review is to verify conformance to project contract documents to include design concepts expressed in the contract documents. This action shall be taken with all reasonable promptness as to cause no delay in the work, while allowing adequate time to permit complete review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details (i.e., dimensions) or for substantiating installation or performance of equipment or systems designed by the Contractor, all of which remain the Contractor's responsibility to the extent required by the contract documents. Review shall not constitute approval of safety precautions of construction, means, methods, techniques,

sequences of procedures, or approval of a specific assembly of which the item is a part. Only complete submittals or resubmittals will be reviewed. Incomplete submittals or resubmittals will be returned to the Contractor, within 7 working days, without being reviewed. Contractor review of all submittals for completeness, accuracy and consistency, prior to submission, is required:

SD-05 Design Data

Job-mix formula

Submit a job-mix formula, prepared specifically for this project, for approval by the Government prior to preparing and placing the bituminous mixture. Design mix using procedures contained in Chapter V, Marshall Method of Mix Design, of AI MS-02. Formulas shall indicate physical properties of the mixes as shown by tests made by a commercial laboratory approved by the Contracting Officer, using materials identical to those to be provided on this project. Submit formulas with material samples. Job-mix formula for each mixture shall be in effect until modified in writing by the Contractor and approved by the Contracting Officer. Provide a new job-mix formula for each source change. Submittal shall include all tests indicated in MIX DESIGN section of this specification.

ASPHALT CEMENT BINDER

MIX DESIGN

SD-06 Test Reports

Specific gravity test of asphalt
Coarse aggregate tests
Weight of slag test
Percent of crushed pieces in gravel
Fine aggregate tests
Specific gravity of mineral filler
Bituminous mixture tests
Aggregates tests
Bituminous mix tests
Pavement courses

1.3 QUALITY ASSURANCE

1.3.1 Safety Requirements

Provide adequate and safe stairways with handrails to the mixer platform, and safe and protected ladders or other means for accessibility to plant operations. Guard equipment and exposed steam or other high temperature lines or cover with a suitable type of insulation.

1.3.2 Required Data

Job-mix formula shall show the following:

- a. Source and proportions, percent by weight, of each ingredient of the mixture;
- b. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture;
- c. Amount of material passing the No. 200 sieve determined by dry sieving;
- d. Number of blows of hammer compaction per side of molded specimen;
- e. Temperature viscosity relationship of the asphalt cement;
- f. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight;
- g. Asphalt absorption by the aggregate;
- h. Effective asphalt content as percent by weight of total mix;
- i. Temperature of the mixture immediately upon completion of mixing;
- j. Asphalt performance grade viscosity grade; and
- k. Curves for the leveling, binder and wearing courses.

1.3.3 Charts

Plot and submit, on a grain size chart, the specified aggregate gradation band, the job-mix gradation and the job-mix tolerance band.

1.3.4 Selection of Optimum Asphalt Content

Base selection on percent of total mix and the average of values at the following points on the curves for each mix:

- a. Stability: Peak
- b. Unit Weight: Peak
- c. Percent Air Voids: Median

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage and store with a minimum of handling. Store aggregates in such a manner as to prevent segregation, contamination, or intermixing of the different aggregate sizes.

1.5 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature of the underlying course is greater than 45 degrees F for course thicknesses greater than one inch and 55 degrees F for course thicknesses one inch or less.

1.6 CONSTRUCTION EQUIPMENT

Calibrated equipment, such as scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory approved by the Contracting Officer within 12 months of commencing work.

1.6.1 Mixing Plant

Design, coordinate, and operate the mixing plant to produce a mixture within the job-mix formula tolerances and to meet the requirements of ASTM D 995, including additional plant requirements specified herein. The plant shall be a batch type, continuous mix type or drum-dryer mixer type, and shall have sufficient capacity to handle the new bituminous construction. Minimum plant capacity shall be 100 tons per hour. The mixing plant and equipment shall remain accessible at all times for inspecting operation, verifying weights, proportions and character of materials, and checking mixture temperatures.

1.6.1.1 Cold Aggregate Feeder

Provide plant with a feeder or feeders capable of delivering the maximum number of aggregate sizes required in their proper proportion. Provide adjustment for total and proportional feed and feeders capable of being locked in any position. When more than one cold elevator is used, feed each elevator as a separate unit and install individual controls integrated with a master control.

1.6.1.2 Dryer

Provide rotary drum-dryer which continuously agitates the mineral aggregate during the heating and drying process. When one dryer does not dry the aggregate to specified moisture requirements, provide additional dryers.

1.6.1.3 Plant Screens and Bins for Batch and Continuous Mix Plants

Use screen to obtain accurate gradation and allow no bin to contain more than 10 percent oversize or undersize. Inspect screens each day prior to commencing work for plugged, worn, or broken screens. Clean plugged screens and replace worn or broken screens with new screens prior to beginning operations. Divide hot aggregate bins into at least three compartments arranged to ensure separate and adequate storage of appropriate fractions of the aggregate.

1.6.1.4 Testing Laboratory

Provide a testing laboratory for control and acceptance testing functions during periods of mix production, sampling and testing, and whenever materials subject to the provisions of these specifications are being supplied or tested. The laboratory shall provide adequate equipment, space, and utilities as required for the performance of the specified tests.

1.6.1.5 Surge and Storage Bins

Use for temporary storage of hot bituminous mixtures will be permitted under the following conditions:

- a. When stored in surge bins for a period of time not to exceed 3 hours.
- b. When stored in insulated and heated storage bins for a period of time not to exceed 12 hours. If it is determined by the Contracting Officer that there is an excessive amount of heat loss, segregation and oxidation of the mixture due to temporary storage, discontinue use of surge bins or storage bins.

1.6.1.6 Drum-Dryer Mixer

Do not use drum-dryer mixer if specified requirements of the bituminous mixture or of the completed bituminous pavement course cannot be met. If drum-dryer mixer is prohibited, use either batch or continuous mix plants meeting the specifications and producing a satisfactory mix.

1.6.2 Paving Equipment

1.6.2.1 Spreading Equipment

Self-propelled electronically controlled type, unless other equipment is authorized by the Contracting Officer. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

1.6.2.2 Rolling Equipment

Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to

keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair depressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

1.6.2.3 Hand Tampers

Minimum weight of 25 pounds with a tamping face of not more than 50 square inches.

1.6.2.4 Mechanical Hand Tampers

Commercial type, operated by pneumatic pressure or by internal combustion.

PART 2 PRODUCTS

2.1 AGGREGATES

Grade and proportion aggregates and filler so that combined mineral aggregate conforms to specified grading.

2.1.1 Coarse Aggregates

ASTM D 692, except as modified herein. At least 75 percent by weight of aggregate retained on the No. 4 sieve shall have two or more fractured faces. Percentage of wear, Los Angeles test, except for slag, shall not exceed 40 in accordance with ASTM C 131. Weight of slag shall not be less than 70 pounds per cubic foot. Soundness test is required in accordance with ASTM C 88; after 5 cycles, loss shall not be more than 12 percent when tested with sodium sulfate or 18 percent when tested with magnesium sulfate.

2.1.2 Fine Aggregate

ASTM D 1073, except as modified herein. Fine aggregate shall be produced by crushing stone, slag or gravel that meets requirements for wear and soundness specified for coarse aggregate. Where necessary to obtain the gradation of aggregate blend or workability, natural sand may be used. Quantity of natural sand to be added shall be approved by the Contracting Officer and shall not exceed 15 percent of weight of coarse and fine aggregate and material passing the No. 200 sieve.

2.1.3 Mineral Filler

Nonplastic material meeting the requirements of ASTM D 242.

2.1.4 Aggregate Gradation

The combined aggregate gradation shall conform to gradations specified in Table I, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table I. Aggregate Gradations

Sieve Size, inch	Gradation 1	Gradation 2	Gradation 3
	Percent Passing by Mass	Percent Passing by Mass	Percent Passing by Mass
1	100	---	---
3/4	76-96	100	---
1/2	68-88	76-96	100
3/8	60-82	69-89	76-96
No. 4	45-67	53-73	58-78
No. 8	32-54	38-60	40-60
No. 16	22-44	26-48	28-48
No. 30	15-35	18-38	18-38
No. 50	9-25	11-27	11-27
No. 100	6-18	6-18	6-18
No. 200	3-6	3-6	3-6

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to AASHTO MP 1a Performance Grade (PG) 58-28, or as reviewed by the Contracting Officer. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the Contracting Officer/Engineer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer/Engineer may sample and test the binder at the mix plant at any time before or during mix production. Samples for this verification testing shall be obtained by the Contractor in accordance with ASTM D 140 and in the presence of the Contracting Officer/Engineer. These samples shall be furnished to the Contracting Officer/Engineer for the verification testing, which shall be at no cost to the Contractor. Samples of the asphalt cement specified shall be submitted for approval not less than 14 days before start of the test section.

2.3 MIX DESIGN

The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using procedures contained in AI MS-02 and the criteria shown in Table II. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867/D 4867M is less than 75, the aggregates shall be rejected or the asphalt mixture treated with an approved anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an antistrip agent is required, it shall be provided by the Contractor at no additional cost.

2.3.1 JMF Requirements

The job mix formula shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

- a. Percent passing each sieve size.
- b. Percent of asphalt cement.
- c. Percent of each aggregate and mineral filler to be used.
- d. Asphalt viscosity grade, penetration grade, or performance grade.
- e. Number of blows of hammer per side of molded specimen.
- f. Laboratory mixing temperature.
- g. Lab compaction temperature.
- h. Temperature-viscosity relationship of the asphalt cement.
- i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.
- j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-02.
- 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.
- q. Antistrip agent (if required) and amount.
- r. List of all modifiers and amount.
- s. Percentage and properties (asphalt content, binder properties, and aggregate properties) of RAP in accordance with paragraph RECYCLED HOT-MIX ASPHALT, if RAP is used.

Table II. Marshall Design Criteria

Test Property	75 Blow Mix	50 Blow Mix
Stability, pounds Minimum	*2150	*1350
Flow, 0.01 inch	8-16	8-18
Air voids, percent	3-5	3-5
Percent Voids in mineral aggregate (minimum)	See Table III	See Table III
TSR, minimum percent	75	75

* This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.

Table III. Minimum Percent Voids in Mineral Aggregate (VMA)**

Aggregate (See Table 2)	Minimum VMA, percent
Gradation 1	13.0
Gradation 2	14.0
Gradation 3	15.0

** Calculate VMA in accordance with AI MS-02, based on ASTM D 2726 bulk specific gravity for the aggregate.

2.3.2 Adjustments to JMF

The JMF for each mixture shall be in effect until a new formula is approved in writing by the Contracting Officer. Should a change in sources of any materials be made, a new mix design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the JMF within the limits specified below to optimize mix volumetric properties. Adjustments to the JMF shall be limited to plus or minus 3 percent on the 1/2 inch, No. 4, and No. 8 sieves; plus or minus 1.0 percent on the No. 200 sieve; and plus or minus 0.40 percent binder content. If adjustments are needed that exceed these limits, a new mix design shall be developed. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table I; this is acceptable.

2.4 RECYCLED HOT MIX ASPHALT

Recycled HMA shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, and asphalt cement. The RAP shall be of a consistent gradation and asphalt content and properties. When RAP is fed into the plant, the maximum RAP chunk size shall not exceed 2 inches. The recycled HMA mix shall be designed using procedures contained in AI MS-02. The job mix shall meet the requirements of paragraph MIX DESIGN. RAP should only be used for shoulder surface course mixes and for any intermediate courses. The amount of RAP shall be limited to 30 percent.

2.4.1 RAP Aggregates and Asphalt Cement

The blend of aggregates used in the recycled mix shall meet the requirements of paragraph AGGREGATES. The percentage of asphalt in the RAP shall be established for the mixture design according to ASTM D 2172 using the appropriate dust correction procedure.

2.5 SOURCE QUALITY CONTROL

Employ a commercial laboratory approved by the Contracting Officer to perform testing. The laboratory used to develop the JMF and the laboratory used to perform all sampling and testing shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the Contracting Officer prior to the start of construction. The certification shall contain as a minimum:

- a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
- b. A listing of equipment to be used in developing the job mix.
- c. A copy of the laboratory's quality control system.
- d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

2.5.1 Tests

Perform testing in accordance with the following:

- a. Specific Gravity Test of Asphalt: ASTM D 70
- b. Coarse Aggregate Tests:
 1. Bulk Specific Gravity: ASTM C 127
 2. Abrasion Loss: ASTM C 131
 3. Soundness Loss: ASTM C 88
- c. Weight of Slag Test: ASTM C 29/C 29M
- d. Percent of Crushed Pieces in Gravel: Count by observation and weight
- e. Fine Aggregate Tests:
 1. Bulk Specific Gravity: ASTM C 128
 2. Soundness Loss: ASTM C 88
- f. Specific Gravity of Mineral Filler: ASTM C 188 or ASTM D 854

g. Bituminous Mixture Tests:

1. Bulk Specific Gravity: ASTM D 1188 or ASTM D 2726
2. Theoretical Maximum Specific Gravity: ASTM D 2041
3. Tensile Strength Ratio: ASTM D 4867/D 4867M

2.5.2 Specimens

ASTM D 1559 for the making and testing of bituminous specimens with the following exceptions:

- a. Compaction: Apply 75 blows of the hammer to each flat face of the specimens.
- b. Curves: Plot curves for the leveling, binder, and wearing courses to show the effect on the test properties of at least four different percentages of asphalt on the unit weight, stability, flow, air voids, and voids in mineral aggregate; each point on the curves shall represent the average of at least four specimens.
- c. Cooling of Specimen: After compaction is completed, allow the specimen to cool in air to the same temperature approximately as that of the water, 77 degrees F, to be used in the specific gravity determination.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Preparation of Asphalt Binder Material

The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 160 degrees C 325 degrees F when added to the aggregates. Modified asphalts shall be no more than 174 degrees C 350 degrees F when added to the aggregate.

3.1.2 Preparation of Mineral Aggregates

Store different size aggregate in separate stockpiles so that different sizes will not mix. Stockpile different-sized aggregates in uniform layers by use of a clam shell or other approved method so as to prevent segregation. The use of bulldozers in stockpiling of aggregate or in feeding aggregate to the dryer is prohibited. Feed aggregates into the cold elevator by means of separate mechanical feeders so that aggregates are graded within requirements of the job-mix formulas and tolerances specified. Regulate rates of feed of the aggregates so that moisture content and temperature of aggregates are within tolerances specified herein. Dry and heat aggregates to the temperature necessary to achieve the mixture determined by the job mix formula within the job tolerance specified. Provide adequate dry storage for mineral filler.

3.1.3 Preparation of Bituminous Mixture

Accurately weigh aggregates and dry mineral filler and convey into the mixer in the proportionate amounts of each aggregate size required to meet the job-mix formula. In batch mixing, after aggregates and mineral filler have been introduced into the mixer and mixed for not less than 15 seconds, add asphalt by spraying or other approved methods and continue mixing for a period of not less than 20 seconds, or as long as required to obtain a homogeneous mixture. The time required to add or spray asphalt into the mixer will not be added to the total wet-mixing time provided the operation does not exceed 10 seconds and a homogeneous mixture is obtained. When a continuous mixer is employed, mixing time shall be more than 35 seconds to obtain a homogeneous mixture. Additional mixing time, when required, will be as directed by the Contracting Officer. When mixture is prepared in a twin-pugmill mixer, volume of the aggregates, mineral filler, and asphalt shall not extend above tips of mixer blades when blades are in a vertical position. Overheated and carbonized mixtures, or mixtures that foam or show indication of free moisture, will be rejected. When free moisture is detected in batch or continuous mix plant produced mixtures, waste the mix and withdraw the aggregates in the hot bins immediately and return to the respective stockpiles; for drum-dryer mixer plants, waste the mix, including that in surge or storage bins that is affected by free moisture.

3.1.4 Transportation of Bituminous Mixtures

Transport bituminous material from the mixing plant to the paving site in trucks having tight, clean, smooth beds that have been coated with a minimum amount of concentrated solution of hydrated lime and water or other approved coating to prevent adhesion of the mixture to the truck. Petroleum products will not be permitted for coating truck. If air temperature is less than 60 degrees F or if haul time is greater than 30 minutes, cover each load with canvas or other approved material of ample size to protect the mixture from the loss of heat. Make deliveries so that the spreading and rolling of all the mixture prepared for one day's run can be completed during daylight, unless adequate approved artificial lighting is provided. Deliver mixture to area to be paved so that the temperature at the time of dumping into the spreader is within the range specified herein. Reject loads that are below minimum temperature, that have crusts of cold unworkable material, or that have been wet excessively by rain. Hauling over freshly laid material is prohibited.

3.1.5 Surface Preparation of Underlying Course

Prior to the laying of the asphalt concrete, clean underlying course of foreign or objectionable matter with power blowers or power brooms, supplemented by hand brooms and other cleaning methods where necessary. During the placement of multiple lifts of bituminous concrete, each succeeding lift of bituminous concrete shall have its underlying lift cleaned and provided with a bituminous tack coat if the time period between the placement of each lift of bituminous concrete exceeds 14 days, or the underlying bituminous concrete has become dirty. Remove grass and other vegetative growth from existing cracks and surfaces.

3.1.6 Spraying of Contact Surfaces

Spray contact surfaces of previously constructed pavement with a thin coat of bituminous materials to act as an anti-stripping agent, conforming to

Section 02744N BITUMINOUS TACK COAT. Paint contact surfaces of structures with a thin coat of emulsion or other approved bituminous material prior to placing the bituminous mixture. Tack coat the previously placed primed coats on base courses when surface has become excessively dirty and cannot be cleaned or when primed surface has cured to the extent that it has lost all bonding effect.

3.2 PLACEMENT

3.2.1 Machine Spreading

TABLE VI

MINIMUM SPREADING TEMPERATURES

Base Temp. in Degrees F (*)	Wearing, Binder, or Leveling Course Thickness, Inches								
	1/2	3/4	1	1 1/2	2	3	3 1/2	4	
20-32 (**)	---	---	---	---	---	---	275 (**)	260 (**)	
+32-40 (**)	---	---	---	---	295	280	270	260	
+40-50	---	---	---	300	285	275	265	255	
+50-60	---	---	300	295	280	270	260	255	
+60-70	---	300	290	285	275	265	255	250	
+70-80	300	290	285	280	270	265	255	250	
+80-90	290	280	275	270	265	260	250	250	
+90	280	275	270	265	265	255	250	250	

* Note: Base on which mix is placed.

** Note: Increase by 15 degrees when placement is on base or subbase containing frozen moisture. Normally, hot mix paving is not allowed on base temperatures below 45 degrees F.

The range of temperatures of the mixtures at the time of spreading shall be between 250 degrees F and 300 degrees F. Bituminous concrete having temperatures less than minimum spreading temperature when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device of not less than 30 feet in length and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the speed of placing as needed to permit proper rolling.

3.2.2 Shoveling, Raking, and Tamping After Machine-Spreading

Shovelers and rakers shall follow the spreading machine. Add or remove hot mixture and rake the mixture as required to obtain a course that when completed will conform to requirements specified herein. Broadcasting or fanning of mixture over areas being compacted is prohibited. When segregation occurs in the mixture during placing, suspend spreading operation until the cause is determined and corrected. Correct irregularities in alignment left by the spreader by trimming directly behind the machine. Immediately after trimming, compact edges of the course by tamping laterally with a metal lute or by other approved methods. Distortion of the course during tamping is prohibited.

3.2.3 Hand-Spreading in Lieu of Machine-Spreading

In areas where the use of machine spreading is impractical, spread mixture by hand. The range of temperatures of the mixtures when dumped onto the area to be paved shall be between 250 and 300 degrees F. Mixtures having temperatures less than minimum spreading temperature when dumped onto the area to be paved will be rejected. Spread hot mixture with rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade, thickness, and smoothness. During hand spreading, place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. Do not place mixture by throwing or broadcasting from a shovel. Do not dump loads any faster than can be properly handled by the shovelers and rakers.

3.3 COMPACTION OF MIXTURE

Compact mixture by rolling. Begin rolling as soon as placement of mixture will bear rollers. Delays in rolling freshly spread mixture shall not be permitted. Start rolling longitudinally at the extreme sides of the lanes and proceed toward center of pavement, or toward high side of pavement with a one-way slope. Operate rollers so that each trip overlaps the previous adjacent strip by at least one foot. Alternate trips of the roller shall be of slightly different lengths. Conduct tests for conformity with the specified crown, grade and smoothness immediately after initial rolling. Before continuing rolling, correct variations by removing or adding materials as necessary. If required, subject course to diagonal rolling with the steel wheeled roller crossing the lines of the previous rolling while mixture is hot and in a compactable condition. Speed of the rollers shall be slow enough to avoid displacement of hot mixture. Correct displacement of mixture immediately by use of rakes and fresh mixture, or remove and replace mixture as directed. Continue rolling until roller marks are eliminated and course has a density of at least 95 percent but not more than 100 percent of that attained in a laboratory specimen of the same mixture prepared in accordance with ASTM D 1559. During rolling, moisten wheels of the rollers enough to prevent adhesion of mixture to wheels, but excessive water is prohibited. Operation of rollers shall be by competent and experienced operators. Provide sufficient rollers for each spreading machine in operation on the job and to handle plant output. In places not accessible to the rollers, compact mixture thoroughly with hot hand tampers. Skin patching of an area after compaction is prohibited. Remove mixture that becomes mixed with foreign materials or is defective and replace with fresh mixture compacted to the density specified herein. Roller shall pass over unprotected edge of the course only when laying of course is to be discontinued for such length of time as to permit mixture to become cold.

3.4 JOINTS

Joints shall present the same texture and smoothness as other portions of the course, except permissible density at the joint may be up to 2 percent less than the specified course density. Carefully make joints between old and new pavement or within new pavements in a manner to ensure a thorough and continuous bond between old and new sections of the course. Vertical contact surfaces of previously constructed sections that are coated with dust, sand, or other objectionable material shall be painted with a thin uniform coat of emulsion or other approved bituminous material just before placing fresh mixture.

3.4.1 Transverse

Roller shall pass over unprotected end of freshly laid mixture only when laying of course is to be discontinued. Except when an approved bulkhead is used, cut back the edge of previously laid course to expose an even, vertical surface for the full thickness of the course. When required, rake fresh mixture against joints, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll. Transverse joints in adjacent lanes shall be offset a minimum of 2 feet.

3.4.2 Longitudinal Joints

Space 6 inches apart. Do not allow joints to coincide with joints of existing pavement or previously placed courses. Spreader screed shall overlap previously placed lanes 2 to 3 inches and be of such height to permit compaction to produce a smooth dense joint. With a lute, push back mixture placed on the surface of previous lanes to the joint edge. Do not scatter mix. Remove and waste excess material. When edges of longitudinal joints are irregular, honeycombed, or poorly compacted, cut back unsatisfactory sections of joint and expose an even vertical surface for the full thickness of the course. When required, rake fresh mixture against joint, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll while hot.

3.5 FIELD QUALITY CONTROL

3.5.1 Sampling

3.5.1.1 Aggregates at Source

Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D 75 at the source. Collect each sample by taking three incremental samples at random from the source material to make a composite sample of not less than 50 pounds. Repeat the sampling when the material source changes or when testing reveals unacceptable deficiencies or variations from the specified grading of materials.

3.5.1.2 Cold Feed Aggregate Sampling

Take two samples daily from the belt conveying materials from the cold feed. Collect materials in three increments at random to make a representative composite sample of not less than 50 pounds. Take samples in accordance with ASTM D 75.

3.5.1.3 Coarse and Fine Aggregates

Take a 50 pound sample from the cold feed at least once daily for sieve analyses and specific gravity tests. Additional samples may be required to perform more frequent tests when analyses show deficiencies, or unacceptable variances or deviations. The method of sampling is as specified herein for aggregates.

3.5.1.4 Mineral Filler

ASTM D 546. Take samples large enough to provide ample material for testing.

3.5.1.5 Pavement and Mixture

Take plant samples for the determination of mix properties and field samples for thickness and density of the completed pavements. Furnish tools, labor and material for samples, and satisfactory replacement of pavement. Take samples and tests at not less than frequency specified hereinafter and at the beginning of plant operations; for each day's work as a minimum; each change in the mix or equipment; and as often as directed. Accomplish sampling in accordance with ASTM D 979.

3.5.2 Testing

3.5.2.1 Aggregates Tests

- a. Gradation: ASTM C 136.
- b. Mineral Filler Content: ASTM D 546.
- c. Abrasion: ASTM C 131 for wear (Los Angeles test). Perform one test initially prior to incorporation into the work and each time the source is changed.

3.5.2.2 Bituminous Mix Tests

Test one sample for each 500 tons, or fraction thereof, of the uncompacted mix for extraction in accordance with ASTM D 2172; perform a sieve analysis on each extraction sample in accordance with ASTM C 136 and ASTM C 117. Test one sample for each 500 tons or fraction thereof for stability and flow in accordance with ASTM D 1559. Test one sample for each material blend for Tensile Strength Ratio in accordance with ASTM D 4867/D 4867M.

3.5.2.3 Pavement Courses

Perform the following tests:

- a. Density: For each 1000 tons of bituminous mixture placed, determine the representative laboratory density by averaging the density of four laboratory specimens prepared in accordance with ASTM D 1559. Samples for laboratory specimens shall be taken from trucks delivering mixture to the site; record in a manner approved by the Contracting Officer the project areas represented by the laboratory densities. From each representative area recorded, determine field density of pavement by averaging densities of 4 inch diameter cores obtained from leveling, binder, and wearing courses; take one core

for each 2000 square yards or fraction thereof of course placed. Determine density of laboratory prepared specimens and cored samples in accordance with ASTM D 1188 or ASTM D 2726, as applicable. Separate pavement layers by sawing or other approved means. Maximum allowable deficiency at any point, excluding joints, shall not be more than 2 percent less than the specified density for any course. The average density of each course, excluding joints, shall be not less than the specified density. Joint densities shall not be more than 2 percent less than specified course densities and are not included when calculating average course densities. When the deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

- b. Thickness: Determine thickness of [binder and] wearing courses from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness. Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.
- c. Smoothness: Straightedge test the compacted surface of leveling, binder, and wearing courses as work progresses. Apply straightedge parallel with and at right angles to the centerline after final rolling. Unevenness of leveling and binder courses shall not vary more than 1/4 inch in 10 feet; variations in the wearing course shall not vary more than 1/8 inch in 10 feet. Correct each portion of the pavement showing irregularities greater than that specified.
- d. Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 1/2 inch. Finished surface of the final wearing course will be tested by the Contracting Officer by running lines of levels at intervals of 25 feet longitudinally and transversely to determine elevations of completed pavement. Within 45 days after completion of final placement, perform a level survey at the specified grid spacing and plot the results on a plan drawn to the same scale as the drawings. Elevations not in conformance with the specified tolerance shall be noted on the plan in an approved manner. The survey shall be performed by a registered land surveyor. The Contracting Officer will inform the Contractor in writing of paved areas that fail to meet the final grades indicated within the specified tolerances. Correct deficient paved areas by removing existing work and replacing with new materials that meet the specifications. Skin patching for correcting low areas is prohibited.
- e. Finish Surface Texture of Wearing Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand streaks, indentations, ripples, or lack of uniformity shall be removed and replaced with new materials.

3.6 PROTECTION

Do not permit vehicular traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 120 degrees F. Measure surface temperature by approved surface thermometers or other satisfactory methods.

-- End of Section --

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SECTION 02761

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications listed below are referenced as the latest edition published as of the date of this document. The publications are referred to within the text by the basic designation only. Not all the publications are referenced in this SECTION.

ASTM INTERNATIONAL (ASTM)

ASTM D 2240	Rubber Property - Durometer Hardness
ASTM D 2621	Infrared Identification of Vehicle Solids from Solvent-Reducible Paints
ASTM D 2697	Volume Nonvolatile Matter in Clear or Pigmented Coatings
ASTM D 3335	Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
ASTM D 3718	Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy
ASTM D 3924	Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials
ASTM D 3960	Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D 4280	Extended Life Type, Nonplowable, Raised, Retroreflective Pavement Markers
ASTM D 4541	Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D 471	Rubber Property - Effect of Liquids
ASTM D 522	Mandrel Bend Test of Attached Organic Coatings
ASTM D 711	No-Pick-Up Time of Traffic Paint
ASTM D 792	Density and Specific Gravity (Relative Density) of Plastics by Displacement

ASTM D 823	Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels.
ASTM E 28	Softening Point of Resins Derived from Naval Stores by Ring and Ball Apparatus
ASTM G 53	Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)

ICRI 03732	Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
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U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	Colors, Volume 1
FS A-A-2886	Paint, Traffic, Solvent Based
FS TT-B-1325	Beads (Glass Spheres) Retro-Reflective (Metric)
FS TT-P-1952	Paint, Traffic and Airfield Markings, Waterborne

1.2 SUBMITTALS

The FAA shall review and recommend, accept, reject or take other appropriate action on the Contractor's submittals including shop drawings, samples, documentation, record drawings, system certification reports and test reports. This review is to verify conformance to project contract documents to include design concepts expressed in the contract documents. This action shall be taken with all reasonable promptness as to cause no delay in the work, while allowing adequate time to permit complete review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details (i.e., dimensions) or for substantiating installation or performance of equipment or systems designed by the Contractor, all of which remain the Contractor's responsibility to the extent required by the contract documents. Review shall not constitute approval of safety precautions of construction, means, methods, techniques, sequences of procedures, or approval of a specific assembly of which the item is a part. Only complete submittals or resubmittals will be reviewed. Incomplete submittals or resubmittals will be returned to the Contractor, within 7 working days, without being reviewed. Contractor review of all submittals for completeness, accuracy and consistency, prior to submission, is required:

SD-03 Product Data

Paints for roads and streets

SD-06 Test Reports

Paints for roads and streets

Report from sampling and testing made in accordance with paragraph entitled "Sampling and Testing."

SD-07 Certificates

Paints for roads and streets

Construction equipment list

SD-08 Manufacturer's Instructions

Paints for roads and streets

Submit manufacturer's Material Safety Data Sheets.

1.3 DELIVERY AND STORAGE

Deliver paints, paint materials and thermoplastic compound materials in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer. Provide storage facilities at the job site for maintaining materials at temperatures recommended by the manufacturer. Make available paint stored at the project site or segregated at the source for sampling not less than 30 days prior to date of required approval for use to allow sufficient time for testing. Notify the Contracting Officer when paint is available for sampling.

1.4 WEATHER LIMITATIONS

Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F for oil-based materials; above 50 degrees F and less than 110 degrees F for water-based materials. Maintain paint temperature within these same limits.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work shall be approved by the Contracting Officer and maintained in satisfactory operating condition. Submit construction equipment list approval by the Contracting Officer.

1.5.1 Paint Applicator

Provide hand-operated push-type applicator machine of a type commonly used for application of paint to pavement surfaces. Paint applicator machine shall be acceptable for marking small street and parking areas. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Applicator for water-based markings shall be equipped with non-stick coated hoses; metal parts in contact with the paint material shall be constructed of grade 302, 304, 316, or equal stainless steel.

PART 2 PRODUCTS

2.1 MATERIALS

Provide materials conforming to the requirements specified herein.

2.1.1 Paints for Roads and Streets

FS A-A-2886, FS TT-P-1952 color as indicated or selected by the Contracting Officer.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Allow new pavement surfaces to cure for a period of not less than 30 days before application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Remove residual curing compounds, and other coatings adhering to the pavement by water blasting.

3.2 APPLICATION

3.2.1 Rate of Application

3.2.1.1 Non-reflective Markings

Apply paint evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet per gallon.

3.2.2 Painting

Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

3.3 FIELD TESTING AND INSPECTION

3.3.1 Sampling and Testing

As soon as the paint materials are available for sampling, obtain by random selection from the sealed containers, two quart samples of each batch in the presence of the Contracting Officer. Accomplish adequate mixing prior to sampling to ensure a uniform, representative sample. A batch is defined as

that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved. Test samples by an approved laboratory. If a sample fails to meet specification, replace the material in the area represented by the samples and retest the replacement material as specified above. Submit copy of the test results to the Contracting Officer. Include in the report of test results a listing of any specification requirements not verified by the test laboratory. At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.

3.3.2 Inspection

Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance. A certificate of compliance shall be accompanied by test results substantiating conformance to the specified requirements.

3.3.2.1 Surface Preparations and Application Procedures

Surface preparations and application procedures will be examined by the Contracting Officer to determine conformance with the requirements specified. Approve each separate operation prior to initiation of subsequent operations.

3.4 TRAFFIC CONTROL AND PROTECTION

Protect freshly painted pavement markings from damage by traffic or other disturbances until it is sufficiently dried.

-- End of Section --

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DIVISION 3

CONCRETE

2-2 CONCRETE CURBS, GUTTERS AND SIDEWALKS

2-2.1 General

2-2.1.1 Scope.- This Section includes concrete curbs, gutters, and sidewalks on prepared sub base.

2-2.1.2 Related work in other sections.-

Section 2-3: Grading and Compaction

Section 3-1: Concrete Formwork

Section 3-2: Concrete Reinforcement

Section 3-3: Cast-In-Place Concrete

Section 3-4: Concrete Finishing and Curing

2-2.2 Applicable documents.- Not used.

2-2.3 Materials

2-2.3.1 Formwork.- Refer to Section 3-1. Construct of either steel or wood, of size and strength to resist movement during concrete placement and retain horizontal and vertical alignment until removal. Use flexible spring steel forms or laminated boards to form radius bends.

2-2.3.2 Pre-molded expansion joint filler.- Self-expanding cork, 1/2 inch thick. Refer to Section 3-1.

2-2.3.3 Cast-in-place concrete.- 4,000 PSI, in compliance with the requirements of Division 3.

2-2.3.4 Concrete reinforcement.- Reinforcing bars or welded wire fabric, as indicted, in compliance with the requirements of Section 3-2.

2-2.4 Installation

2-2.4.1 Equipment.- As an option, an automatic curb and gutter machine may be used for placement. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed minimums indicated. Machine placement shall produce curbs and gutters to the required cross section, lines, grades, finish, and jointing indicated for formed concrete. If results are not acceptable, remove and replace with formed concrete.

2-2.4.2 Surface preparation

(a) Remove all loose material from compacted subbase surface immediately before placing concrete.

- (b) Proof roll prepared sub base surface to check for unstable areas and need for additional compaction, and for unsatisfactory conditions. Do not begin concrete work until such conditions have been corrected and are ready to receive concrete.
- (c) Maintain subbase elevation at no more than 0.05 foot above or below elevations required to establish correct elevation of sidewalk.

2-2.4.3 Form construction.-

- (a) General: Refer to Section 3-1.
- (b) Set forms to required grades and lines, rigidly braced and secured with wood or metal stakes. Install sufficient lengths of forms to allow continuous progress of work so that forms can remain in place at least 24 hours after concrete placement.
- (c) Set formwork within the following tolerances for grade and alignment:
 - 1. Top of form units: Not more than 1/8 inch in ten feet.
 - 2. Vertical face: Longitudinal axis, not more than 1/4 inch in ten feet.
- (d) Clean forms after each use, and coat with form oil, as often as required, to ensure separation from concrete without damage.

2-2.4.4 Reinforcement.- Place reinforcement in accordance with the requirements of Section 3-2.

2-2.4.5 Concrete placement.-

- (a) General: Refer to Section 3-3.
- (b) Do not place concrete until subgrade and forms have been checked for line and grade.
- (c) Moisten subgrade as required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around structures or frames, if any, until they have been brought to the required grade and alignment.
- (d) Place concrete using methods which prevent segregation of the mix, and with as little re-handling as possible.
- (e) Consolidate concrete along the face of forms with an internal vibrator.
- (f) Use only square faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of joint materials.
- (g) Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
- (h) For sidewalks place concrete in one course, monolithic construction, for full width and depth of sidewalks.
- (i) Do not permit persons to walk in freshly placed concrete or on finished concrete with shoes or boots coated with soil or other foreign matter.

2-2.4.6 Joints.-

2-2.4.6.1 General.- Construct expansion, contraction, and construction joints true to line with face perpendicular to surface of curb and gutter. Construct transverse joints at right angles to curb centerline.

2-2.4.6.2 Contraction joints (curb and gutter).- Provide contraction joints at a maximum of 10 feet on centers. Construct joints as follows:

- (a) Tooled joints: Form contraction joints in fresh concrete by grooving the top portion with a recommended cutting tool and finishing edges with a jointer.
- (b) Sawed joint: As an option, form contraction joints using power saws equipped with shatterproof abrasive diamond rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action. Cut joints within 12 hours of placing concrete.

2-2.4.6.3 Contraction joints (sidewalks).- Provide contraction joints where shown on the drawings. If not shown, place joints at intervals of 5 feet. Construct joints for a depth equal to at least 1/3 the sidewalk thickness. Form contraction joints in fresh concrete with pre-molded strip. Tool edges to 1/8 inch radius.

2-2.4.6.4 Construction joints.-

- (a) General: Except where expansion joints are required, place construction joints at ends of all pours and at locations where placement operations are stopped for a period of more than 1/2 hour. Maintain interval specified for contraction joints.
- (b) Construct joints between concrete curbs and gutters and bituminous pavement with unbonded butt joints, without dowels or sealant grooves.
- (c) Construct transverse joint in sidewalks using standard metal keyway section forms.

2-2.4.6.5 Expansion joints.-

- (a) General: Provide expansion joints between curbs and sidewalks, and where curbs or sidewalks abut catch basins, manholes, inlets, structures, sidewalks and other fixed objects. Use premolded expansion joint filler for expansion joints.
- (b) Locate expansion joints at 30 feet on centers and at returns.
- (c) Extend joint fillers full width and depth of joint, except hold top of joint filler below finished surface as shown on the drawings for joint sealant. Furnish joint fillers in one piece for full width of joint being placed. Conform top edge of filler to top profile of curbs and gutters.
- (d) Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after both sides of joint are placed.

2-2.4.7 Finishing (curb and gutter).-

- (a) After striking off and consolidating concrete, smooth exposed surface by screeding and floating. Adjust floating to compact surface and produce a uniform texture.
- (b) After floating, test surface for trueness with a ten foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous, smooth finish.
- (c) Work edges of gutter, back top edge of curb, transverse joints, and contraction joints (except saw cut) with an edging tool, and round to 1/4 inch radius.
- (d) After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows: Broom finish by drawing a fine hair broom across the concrete surface, perpendicular to line of traffic. Repeat operation, if required, to provide a fine line texture.
- (e) Do not remove forms within 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections of major honeycombing.

2-2.4.8 Finishing (sidewalks, door landings).-

- (a) Perform concrete finishing using machine or hand methods as required.
- (b) After striking off and consolidating concrete, smooth the surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce a uniform texture.
- (c) After floating, test surface for trueness with a ten foot straightedge. Distribute concrete as required to remove irregularities, and refloat repaired areas to provide a continuous, smooth finish.
- (d) Work edges of sidewalk and joints with a 1/8 inch radius edging tool.
- (e) After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing by drawing a fine hair broom across the concrete surface, perpendicular to the line of traffic. Repeat operation if required to provide a fine line texture. On the sloping portions of curb ramps, apply a broom texture coarser than the sidewalk texture.
- (f) Do not remove forms within 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections of major honeycombing.

2-2.4.9 Curing.- Refer to Section 3-4. Use moist curing methods for initial curing.

2-2.5 Quality assurance.-

2-2.5.1 Submittals.- Conform to procedures specified.

2-2.5.1.1 Design mix and test reports.- Refer to Section 3-3.

2-2.5.2 Grade control.- Establish and maintain required lines and grades during construction operations.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 – GENERAL

1.1 SCOPE

The Subcontractor shall provide all labor, equipment, and materials as required to locate and place concrete forms as specified herein and on the project drawings.

PART 2 – MATERIAL

2.1 FORMS

Forms shall be wood, plywood, metal, engineered form systems or other approved material. All form materials shall be of the grade or type suitable to obtain the kind of finish specified.

2.2 FORM TIES

Form Ties shall be fixed band type or threaded internal disconnecting type with a working load suitable to prevent deformation of forms. They shall be of a type that allows no metal closer to the surface than 1½ inches for steel ties and 1 inch for stainless steel ties. Twisted wire ties shall not be permitted.

2.3 FORM OIL

Form Oil shall be non-staining and shall not cause softening of the concrete or impede the wetting of surfaces to be cured with water or curing compounds.

PART 3 – EXECUTION

3.1 PLACEMENT

Formwork shall be placed only after inspection, testing, and approval of excavated areas and embedded items by the RE. Forms shall result in a final structure that does not exceed $\pm \frac{1}{2}$ inch variation in any dimension shown on the applicable drawings. Form joints shall be sufficiently tight to prevent leakage of mortar. Form oils shall be placed on forms or form ties and shall be removed from reinforcing steel or conduits if accidentally applied to such.

3.2 CURING

In hot, dry climates, wood forms remaining in place shall not be considered adequate curing, but shall be loosened so that the concrete surfaces may be cured in accordance with Section 03300.

3.3 REMOVAL

Forms shall be removed no less than 3 days after the concrete placement operation has been completed, provided 50°F ambient temperatures have been maintained. Wood forms may be

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PAVEMENT REPLACEMENT PROJECT**

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loosened within 12 to 24 hours after the placement operation if such action will not damage or deform the concrete structure and provided that care is exercised to ensure that concrete curing is accomplished as specified in Section 03300.

*** * * END OF SECTION * * ***

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 SCOPE

The Subcontractor shall provide the necessary labor, material, and equipment for the placement of steel reinforcement as specified herein and shown on the applicable drawings.

1.2 APPLICABLE PUBLICATIONS

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

- A. American Society for Testing and Materials (ASTM) Publication
- B. ASTM A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- C. American Concrete Institute (ACI) Standards -
- D. ACI 315 Details and Detailing of Concrete Reinforcement.

PART 2 – MATERIAL

2.1 REINFORCING STEEL

Reinforcing Steel shall conform to ASTM A 615, grade 60.

2.2 SURFACES

Surfaces shall be free of mud, oil, or other nonmetallic coatings which may affect bonding quality. Mill scale or rust remaining after hand brushing with a wire brush is permissible.

2.3 BENDING

All bends in bars and ties shall be cold bent. No bends shall be made in bars or ties partially embedded in concrete.

2.4 HOOKS

Hooks shall be 180° hooks. The bend diameter as measured on the inside of the bar shall not be less than 6 bar diameters for bars and not less than 1½ inches for ties.

2.5 TIE WIRE, CHAIRS, AND SPACERS

All devices necessary to properly space, support and fasten steel reinforcement in place during concrete placement shall conform to ACI 315. Tie wire shall be 16 gauge or larger annealed iron wire.

PART 3 – EXECUTION

3.1 PLACEMENT

Steel reinforcement shall be accurately spaced and in the sizes indicated on the applicable drawings and secured against displacement during concrete placement operations. Reinforcement shall be placed within $\pm \frac{1}{2}$ inch of the indicated dimensions and shall maintain 3" clearance in all directions.

3.2 EMBEDDED ITEMS

Embedded items, conduit, etc. shall be set level and in their proper positions and shall be securely anchored to the forms prior to placing concrete. Field verify that all dimensions are correct.

PART 4 – QUALITY ASSURANCE

4.1 MILL CERTIFICATION

Mill Certification of steel compliance with ASTM A 615 shall be submitted to the WRPE designee at the time of delivery. The certificate shall be signed by the Subcontractor, and shall include the project name and location, and the quantity and delivery date to which the certificate applies.

4.2 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

- A. Rebar Mill Certification.

*** * * END OF SECTION * * ***

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SCOPE

The Subcontractor shall provide the necessary materials, labor and equipment for the placement of concrete as specified herein and shown on project drawings.

1.2 APPLICABLE PUBLICATIONS

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

American Society for Testing and Materials (ASTM) Publications

ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM C 33	Specification for Concrete Aggregates
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 143	Slump of Hydraulic Cement Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 1107	Standard Specification for Packaged Dry Hydraulic Cement Grout (Non-shrink)

American Concrete Institute (ACI) Standards

ACI 211.1	Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
ACI 301	Structural Concrete for Buildings
ACI 301R	Hot Weather Concreting
ACI 306R	Cold Weather Concrete
ACI 318	Building Code Requirements for Reinforced Concrete.

PART 2 – MATERIAL

2.1 CONCRETE

Concrete shall be produced from a certified concrete mix design. It may be truck mixed or mixed on site from dry concrete premix. The Subcontractor shall submit mix certification prior to initial concrete placement.

2.2 CEMENT

Cement shall conform to ASTM C 150, Type IA or IIIA.

2.3 AGGREGATES

Aggregates shall conform to ASTM C 33. Maximum aggregate size shall be $\frac{3}{4}$ inch.

2.4 WATER

Water used in mixing and curing operations shall be clean, and free from oils, acids, organic matter and chemical suspensions which may adversely affect cure times, strength requirements, or service life of the concrete.

2.5 ADMIXTURES

Air entraining admixtures shall conform to ASTM C 260. Admixtures used for water-reducing and retarding shall conform to ASTM C 494, Type A or Type D.

2.6 ANCHOR BOLTS

All bolts and other hardware shall be hot-dipped galvanized in accordance with ASTM A 153. Expansion anchors shall be shell or flush type.

2.7 CONCRETE PROPERTIES

- A. Slump - The concrete shall have a maximum slump of 3 to 4 inches when tested in accordance with ASTM C 143.
- B. Strength - Concrete shall have a 28-day compressive strength of 3,000 psi.
- C. Air Content - Air entrained concrete shall have an air content of 5 to 7 percent.
- D. Proportions - Concrete materials shall be proportioned in accordance with ACI 211.1 for site mixed concrete and ASTM C 94 for ready mixed concrete.

2.8 NON-SHRINK GROUT

Non-shrink Grout shall be in accordance with ASTM C 1107, Grade A. Mixing and installation shall be as recommended by the manufacturer.

PART 3 – EXECUTION

3.1 EMBEDDED ITEMS

All concrete encased items shall be held rigidly in the correct position so they will not be displaced or moved during the concrete and/or grout placement. The Contractor, at no additional cost, will replace items that shift during concrete placement.

- A. Conduit - The Contractor shall take precautions to ensure the conduit is not damaged during placement and that concrete is not allowed to enter the conduit. All couplings shall be set level and plumb.
- B. Anchor Bolts - Anchor bolts shall be set plumb and shall be securely anchored prior to placing concrete. Field verify that all dimensions are correct.

3.2 SITE PREPARATION

Prior to placing concrete, all areas to receive concrete shall be inspected and approved by the Resident Engineer. Concrete shall not be deposited on muddy or frozen material. All surfaces to be in contact with the concrete shall be wetted.

3.3 MIXING

All mixers used for ready mix or site mix operations shall be cleaned prior to material recharge. The area of operation of the mixers shall be such as to not endanger existing structures or excavations. All concrete shall be mixed until there is a uniform distribution of materials. Concrete having attained initial set or having contained water for more than 90 minutes shall not be used. Tempering shall not be allowed. Adding mix water after batching shall be allowed at the Subcontractor's risk. Added water shall not cause the concrete to exceed the specified parameters for slump, air entrainment, and water to cement ratios. Slump tests shall be performed after the addition of any water to the mix.

3.4 CONVEYING

Concrete shall be conveyed from the mixer to the deposit site by equipment which will prevent separation or loss of material and which will ensure a nearly continuous flow of material at the deposit site.

3.5 DEPOSITING

Concrete shall be placed in such a manner as to prevent displacement of forms or reinforcement and segregation of aggregate. Placing shall be stopped if contamination due to sloughing occurs until the contaminant can be removed. In the case of form or reinforcement displacement, placing may be continued only if the displacement is corrected within specified tolerances. The placing of concrete shall be a continuous operation at each deposit site and shall be completed within 1½ hours after the addition of water. Under no circumstances shall fresh concrete be placed over concrete that has attained initial set. Time between placements at each deposit site shall not exceed one hour for regular mixes and two hours for retarded mixes.

3.6 CONSOLIDATION

Consolidation of concrete during and after placing shall be performed by thorough hand tamping or using an internal vibrator with a vibration frequency not less than 150 hertz. Each layer shall be consolidated so that concrete is thoroughly worked around reinforcement, embedded items, and forms. Vibrators shall penetrate about 6 inches into underlying layers to ensure proper union of the layers. Movement of the vibrator over the layer shall be such as to ensure uniform plasticity without pooling of cement.

3.7 FINISH

After the concrete has been placed and consolidated, the surface shall be tamped with suitable tools to force coarse aggregate down from the surface, screed with straight edges, and floated and troweled to the required finish level. New concrete surfaces shall be finished to match existing adjacent concrete. All exposed edges shall be chamfered 1 inch.

- A. Broomed - Use on surfaces of stairs, platforms, sidewalks, and ramps. Perform a floated finish then draw a broom or burlap belt across the surface to produce a coarse scored texture, permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.8 CURING

Concrete shall be maintained above 50° F and less than 120° F and in a moist condition during the cure period. The cure period shall be 3 days. Exposed surfaces shall be moist cured by use of mats (wet Burlap or other suitable material), impervious sheeting (polyethylene), or application of Liquid Membrane Forming Curing Compound (LMFCC) after surfaces have lost their water sheen. If air temperatures are expected to exceed 75° F, water curing shall be continuous and forms shall be loosened as soon as the concrete has set sufficiently to prevent damage. In conditions where air temperature may be expected to fall below 40° F, equipment and covering to maintain a 50° F concrete temperature shall be provided. Salt or other chemicals to prevent freezing shall not be permitted.

3.9 SURFACE DEFECTS

Upon removal of formwork, Subcontractor shall patch any areas containing unconsolidated concrete or honeycombing by removing all loose aggregate down to a solid substate and patching with an approved compatible patching compound

PART 4 – QUALITY ASSURANCE

4.1 CONCRETE CERTIFICATION

The Subcontractor shall provide the Resident Engineer a delivery ticket for ready mix concrete from the concrete supplier at the time of each delivery, which certifies compliance with material, and quality requirements specified herein. The tickets shall indicate the delivery date, time dispatched, name and location of project, name of Subcontractor, name of concrete producer, truck number, quantity, air content, admixtures and design strength of the concrete delivered.

4.2 TESTING

Testing of concrete for slump, air, and strength shall be arranged and paid for by the Contractor. If these tests show concrete strength less than specified, the Subcontractor shall correct the situation and be responsible for all additional testing costs.

- A. Slump Tests - Slump tests shall be completed as the concrete is placed from the mixer into the forms. Excessive slump shall be cause for rejection of the entire load or batch.

- B. Air Entrainment Tests - Tests for air content of the wet concrete shall be made at the time of concrete placement. Air content outside the limits specified shall be cause for rejection of the load or batch.
- C. Concrete Test Cylinders - For each concrete placement of 25 cubic yards or less and for each additional 50 cubic yards the Subcontractor's testing agency shall make one set of five cylinders for compressive strength tests, unless otherwise directed. Break two test cylinders at 7-days; break two test cylinders at 28-days, and keep an extra test cylinder. Concrete cylinders shall be marked with a unique identification number that corresponds to a log number. The log will include the concrete company, truck or ticket number; mix design, time of day, and temperature of ambient air and concrete temperature. The drawings will be marked with a colored mark that identifies the extent of concrete placed as represented by the test cylinder.

Concrete test cylinders made at the construction site shall be handled and protected in accordance with recognized test procedures.

D. Testing Waived

The tests can be waived when all of the conditions are met:

- a) Concrete placement of less than 10 cubic yards.
- b) The required 28-day compressive strength is 3000 psi or less.
- c) The concrete mix is a standard proven design for the ready-mix plant and has been reviewed and approved by FAA in advance. Delivery tickets as described above shall be provided.
- d) Visual inspection of the concrete as it is delivered and placed indicates that it has satisfactory slump, cement content and workability. Concrete that appears to fail any of these criteria shall be rejected and immediately removed from the site.

4.3 REPAIR OR REPLACEMENT

The Contractor shall restore concrete damaged by work under this contract to its original condition as directed by the Resident Engineer. The Resident Engineer may reject any and all concrete not meeting slump or air entrainment requirements. Any concrete not meeting strength requirements shall be removed and replaced by the Contractor at his expense. Any repair or replacement costs shall be paid by the Contractor.

4.4 SUBMITTALS

Submittals required include, but are not necessarily limited to, the following:

Concrete Mix Design Certification

Concrete Test Results - Slump, % Air, Strength Tests

***** END OF SECTION *****