

**BID SUBMITTAL
SPECIFICATIONS**

FOR

AIRFIELD LIGHTING UPGRADE

SHREVEPORT REGIONAL AIRPORT



**SHREVEPORT AIRPORT
AUTHORITY**
City of Shreveport



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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The articles and paragraphs of this Section represent supplements or additions to the Contract Provisions or the Special Provisions.

1.3 WORK UNDER OTHER CONTRACTS

- A. During the period of this Project, the Authority anticipates that other construction contracts may be underway at or near the site of work of this Contract. A list of adjacent construction activities follows:
 - 1. No work under other construction contracts is anticipated during the construction of this project.

1.4 PERMITTING

- A. Comply with all requirements set forth in the City of Shreveport's preferred building codes manual. This manual describes Building Codes organization, Building Code inspection process, Certificate of Occupancy requirements. The Contractor will file for and provide the construction permit.

1.5 MAINTENANCE OF PEDESTRIAN AND VEHICULAR TRAFFIC

- A. Maintain adequate pedestrian and vehicular traffic flow and safety along the service roads, sidewalks, parking lots and other roadways on Airport property. In addition, this requirement applies to crossroads, approaches, and entrances affected by or made necessary by the Work. Coordinate activities throughout the project in a manner that allows emergency access, without delays to emergency response vehicles, to all areas of the Project that are occupied by employees.
- B. Prior to starting construction operations affecting pedestrian, vehicular, or aircraft traffic movement, submit and obtain the SAA's written approval of a Traffic Maintenance Plan. Develop plan in accordance with the safety requirements of the FAA, Airport Operations, and the Louisiana Department of Transportation's "*Manual of Uniform Traffic Control Devices*". (MUTCD – <http://mutcd.fhwa.dot.gov/>)

- C. Provide and maintain temporary signage, and such other traffic control devices or personnel as required complying with approved Traffic Maintenance Plan.
- D. Maintain the construction operations affecting pedestrian, vehicular, or aircraft traffic movement from the beginning of construction operations until final acceptance of the project. The maintenance shall constitute continuous and effective work prosecuted day by day with adequate equipment and forces to the end of project to ensure that roadways and structures are maintained in satisfactory condition at all times, including barricades and warning signs as necessary for performance of the work.
- E. Keep the portions of the project being used by pedestrian, aircraft, and vehicular traffic, in such condition that traffic will be adequately accommodated. Remove snow and control all ice within the project boundaries. Removal of snow and ice for the benefit of the traveling public will be performed by the SAA. Bear all cost of maintenance work during construction and before the project receives a Certificate of Occupancy for constructing and maintaining approaches, crossings, intersections and other features as may be necessary.
- F. Keep the portions of the road and aircraft pavement surfaces being used by others free from irregularities, obstructions, mud, dirt, snow, ice, and any characteristic that might present a hazard or annoyance to traffic in such condition that traffic will be adequately accommodated. Maintain a vacuum/sweeper and flusher truck at the site at all times to clean roadway and aircraft surfaces affected by construction traffic at the request of Airport Operations or the SAA .

1.6 AIRFIELD OPERATIONAL REQUIREMENTS

- A. The Work, or a portion thereof, will be performed in proximity to the Air Operations Area (AOA), including, active runways, taxiways, and aprons. Normal airport operations will continue adjacent to the Work during all phases of the Project. These activities include:
 - 1. Aircraft movement on runways, taxiways, aprons; aircraft landing and takeoff operations.
 - 2. Apron maintenance, snow removal and ice control.
- B. Phase construction activities as necessary to accommodate all airport operations without disruption. Adhere to all current Airport Orders and Instructions (O & Is), Airport Bulletins, and Airport Advisories. The SAA will provide relevant Orders and Instructions to Offerors in the Solicitation Package. Bulletins and Advisories will be provided to the offeror by the SAA as they are issued.

1.7 ENVIRONMENTAL PROTECTION

- A. Comply with all Federal, state and local laws and regulations controlling pollution of the environment. Take necessary precautions to prevent pollution of streams, rivers, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

- B. Notify SAA immediately in the event that abnormalities, discolorations, odors, oil, or other signs of potential contamination by hazardous materials are encountered during excavation or other construction activities. Follow with written notice within 24 hours, indicating date, time, and location of potential contaminants encountered. The SAA will provide further direction to Contractor regarding disposition of materials encountered.
- C. All painted surfaces are assumed to contain lead-based paint. The Contractor shall maintain the necessary health and safety requirements for all personnel in accordance with OSHA regulations to work in these conditions. The removal and disposal of lead-based paint is part of this contract.
- D. Aircraft deicing fluids will be encountered in the water (including utility manholes) and in the soils. Concentrations of aircraft deicing fluids in water and soils will range from non-detect to saturation. Aircraft deicing fluids are propylene based Type I and Type IV fluids. The fluids emit an unpleasant odor when the breakdown (biodegradation) is occurring. Follow OSHA requirements while working in aircraft deicing impacted areas. Coordinate with the SAA for obtaining Material Safety Data Sheet (MSDS) for aircraft deicing fluids.
- E. Petroleum contaminated soils and water may be encountered during the construction of this project. Petroleum impacted soils range from saturated to 1.0 ppm. Petroleum impacted water ranges from free product to “non - detect.” Maintain the necessary health and safety requirements for all personnel in accordance with OSHA regulations.
 - 1. Do not use petroleum-contaminated soils as backfill around new piping or utilities. Transport petroleum contaminated soils to a location identified by the SAA. Place the contaminated soils on two layers of reinforced 6 mil plastic sheeting, install and maintain sediment and erosion controls, and adequately cover the stockpile to prevent water infiltration.

1.8 ARCHAEOLOGICAL AND HISTORICAL FINDINGS

- A. Notify the Authority immediately on any Archaeology/Historic findings. Preservation Coordinator if subsurface structural features, concentrations of artifacts, rubble, bone/shell, or burnt material are uncovered or otherwise discovered. Prompt reporting will avoid potentially severe problems resulting from the destruction of significant resources and may limit the impact on construction operations and schedules.

1.9 DAMAGES AND PRE-EXISTING CONDITIONS

- A. Contractor shall be responsible for all damages caused by his construction activities. Provide all labor, materials, etc. to return any damaged areas, systems or equipment to their original condition at no additional cost to the SAA.
- B. Perform a survey of pre-existing conditions in the vicinity of Contractor’s construction activities, utilizing photographs and other means as necessary to document existing damage or conditions. Submit two copies of this survey to the SAA within 21 calendar days after Notice-to-Proceed. This survey will assist in resolving any damage claims against the Contractor during and after construction.

- C. Preserve all roadways, pedestrian and directional signage. Deliver all signs removed and not required for reinstallation to the Authority as directed.
- D. Replace or repair lost or damaged signs at no cost to the Authority.

1.10 SECURITY DURING CONSTRUCTION

- A. Maintain the integrity of the Airport Security fence. Maintain the integrity of doors and walls between public areas and Air Operations Area (AOA) at all times. Comply with Title 49 Code of Federal Regulations, Parts 1500, 1540, 1542 and 1544.
- B. Possession of and display of a proper and current Airport Identification Badge, issued by Airport Operations is required for all Contractor personnel passing into the AOA. Refer to "Airport Orders and Instructions" attached as part of the Contract for specific requirements. Offerors shall become intimately familiar with all TSA and Authority security requirements. No increase in contract price will be provided to the Contractor should the contractor not be aware of any security procedure in place at time of submitting their offer that leads to increased time and inconvenience to accomplish the work.
- C. Pay all fines levied by the Transportation Security Administration for penalties resulting from security infractions perpetrated by or caused by Contractor's personnel or work forces of Contractor's subcontractors or suppliers.
- D. Establish and maintain the security of Contractor's staging areas, equipment and materials.
- E. Provide escort for delivery vehicles transporting materials and supplies to or from the Contractor's staging or work areas into the AOA, in accordance with requirements stated in "Airport Orders and Instructions" attached as part of the Contract.
- F. No firearms or weapons of any type are allowed on the airport.
- G. No cartridge style nail guns, nor any tools that use a cartridge or any explosive charge, are allowed without prior written notification of the SAA. Obtain written approval from the SAA before bringing such tools on the project.

1.11 MATERIAL HAULING

- A. Restrict deliveries and removal of bulk materials, supplies, waste soils and equipment to and from the Project site to the Authority-designated roads and haul routes indicated on the Drawings.
- B. Access and egress to and from the Airport for hauling operations shall be through the entrances indicated. Conduct hauling operations 24 hours per day, 7 days per week.

- C. The designated haul routes for hauling operations will not require vehicles crossing and/or utilizing existing taxiways. Under no conditions shall the Contractor plan use of taxiways for hauling equipment. Haul routes for this project are as indicated.
- D. Schedule, phase, and sequence work operations to minimize the number and duration of taxiway closures. Submit a detailed Work Plan for Contractor's entire operations to the SAA for approval prior to commencing work. Obtain written approval from the SAA of the Work Plan. Identify clearly on Work Plan each operation requiring coordination with Airport Operations.
 - 1. For taxiway closures of short duration, provide flagmen, with radio contact with the FAA Airport Traffic Control Tower and the SAA, at taxiway crossing intersections the SAA will determine the number of flagmen required.
 - 2. For long-term taxiway closures, clearly mark, light, and barricade the taxiway closures and haul routes in accordance with FAA and Airport Operations requirements.
- E. Notify the SAA at least 72 hours in advance of his requirement for scheduled taxiway or roadway closures. Obtain the written approval of the SAA prior to closing or crossing a taxiway, taxi lane or roadway.
- F. Bear all costs associated with establishing, maintaining, signing, lighting and marking haul routes and taxiway crossings. These costs are considered incidental to the pay items of this Contract.
- G. Use load covers on all dump trucks. Load dump trucks so that no spillage occurs during transit on the State, municipal, or Airport roadways, taxiways, and aprons. Clean wheels of trucks leaving the Project construction site of all soil and rocks. Provide a truck washing rack on the Project site to minimize the tracking of soil onto paved surfaces.
- H. Be responsible for the cost of the immediate cleaning of earth tracking and spills on paved surfaces resulting from the Contractor's operations. Because of the potential for extreme damage to aircraft engines due to the ingestion of foreign objects, maintain on the project mechanical sweeper/vacuum (wet/dry) equipment with nylon brushes complete with operators. Maintain a water truck on site at all times in order to effectively control dust rising from construction activities.
- I. Provide sweeper/vacuum equipment with a usable hopper capacity of 6 cubic yards and with a regenerative air capacity of 15,000 CFM. Provide equipment with gutter brooms of poly brush material so as not to damage airfield pavement markings; a dust control system that includes an external spray system with front mounted spray bar, nozzles located at each gutter broom; and an internal spray system with nozzles in the internal air stream. Maintain the equipment in good working order throughout the project and replace the brooms and or spray systems, as necessary, to ensure proper sweeping and vacuuming of paved surfaces.

1.12 PORTABLE LIGHTING

- A. Portable lighting: If used for Contractor operations, aim and shield portable lighting at all times to eliminate glare that could impair runway, taxiway, apron, ground operations, and Airport Traffic Control Tower operations. Equip portable lighting with reflectors and glare shields to prevent spillover of light into operational areas.

1.13 RADIO COMMUNICATIONS

- A. Provide two-way radio communication between certain of the Contractor's personnel on the job site. Provide radios with a minimum of 5 watts transmitting power. Select the frequency utilized for these transmissions. Submit proposed frequencies to the SAA for approval in writing. Frequencies shall not conflict with or overlay any of the Airports radio frequencies.
- B. Provide, at a minimum, the following with radio equipment: The Project Superintendent, Foreman of all work groups physically separated from the general vicinity of the Project Superintendent, gate guards, and others who may be working in a separate and remote area. Provide two additional radios with the same frequencies to the Authority and the Lead Inspector.
- C. Provide two-way radios capable of operating on both the "Ground" and "Ramp" frequencies for work adjacent to or affecting taxiways. Such radios shall be either a handheld programmable type capable of operating off of vehicle power and antenna or a vehicle-mounted type, which operates solely off of the vehicle's power, and antenna. Provide radios that provide a minimum of 3 watts transmitting power. Provide radios of sufficient power to communicate with the appropriate controller.

1.14 SPECIAL AUTHORITY CONSULTANT

- A. All other contract management is the sole responsibility of the Authority.

1.15 SAFETY

- A. Comply with comply with all local, State and Federal requirements. Where conflicts or discrepancies exist between requirements, the more stringent requirement shall govern. For additional information see Division 01 Section "Quality Requirements".
- B. Submit Site-Specific Safety and Health Plans to SAA within 15 calendar days of Notice to Proceed and prior to the start of any construction activities.

- C. Be responsible for the safe operation of all job site motor vehicles. Provide a “spotter” or flagman for all backing operations of construction vehicles with restricted rear vision.
- D. All motorized equipment and vehicles working on or entering SHV construction project work areas shall be equipped with functional audible backup alarms.
- E. Crane Operators. On Airports Authority projects, Crane Operators shall be certified to operate the equipment by an approved independent certifying agency.
- F. For all airside projects attach a Safety Plan to the Safety Program. Include in the Safety Plan, to the extent applicable, provisions for the following:
 - 1. Scope of work performed by Contractor, including proposed duration of work.
 - 2. Possible safety problems (job hazard analysis program).
 - 3. Work control measures.
 - 4. Limitations on equipment height.
 - 5. Location of airport operational areas.
 - 6. Location of and access to stockpiled construction materials and equipment.
 - 7. Inspection requirements.
 - 8. Trenches and excavations, and cover requirements.
 - 9. Threshold marking and lighting.
 - 10. Closed runway marking.
 - 11. Vehicle operation and pedestrian access in airport movement areas.
 - 12. Construction site access and haul roads, includes maintenance of and keeping open ARFF access routes.
 - 13. Limitations on construction.
 - 14. Radio communications.
 - 15. Foreign object debris (FOD) control provisions.
 - 16. Hazardous materials (HAZMAT) management.
 - 17. Wildlife abatement.
 - 18. NOTAM issuance.
 - 19. Vehicle identification.
 - 20. Vehicle parking.
 - 21. Use of temporary visual aids.
 - 22. Obstacle-free zones (OFZ).

23. Approach clearance to runways.
24. Runway and taxiway safety areas.
25. Procedures and equipment, such as barricades (identify type) for closing portions of the movement area.
26. Required compliance of contractor personnel.
27. Procedures for notification of aircraft rescue firefighting (ARFF) if deactivating water lines or fire hydrants, or if emergency access routes are rerouted or blocked.
28. Emergency notification for fire, medical, and police response.
29. Coordination of plan with an FAA airport certification safety inspector.

1.16 HEIGHT LIMITATION

- A. For all demolition and construction within the Airport, limit the height of Contractor's equipment to a maximum height as shown on the Construction Phasing Plans.
- B. Prior to beginning any work coordinate with the SAA the height of all cranes, boom trucks, scaffolds or similar vehicles of construction. Properly mark all construction equipment with safety flags and warning lights in accordance with current FAA and Airport Operations requirements. Submit FAA Form 7460, provided by SAA , for all variations on approved crane heights.

1.17 NOISE CONTROL

- A. The SAA recognizes and can tolerate a normal level of noise created by a majority of construction activity. However, in the interest of the SAA's neighbors, the maximum acceptable noise level for sustained or repetitive noises is 72 decibels. Measure the noise level using an "A" scale at a point 4'-0" above ground at property line nearest noise source.
- B. Secure advance written approval from the SAA prior to scheduling any activity that is anticipated to produce a sustained or repetitive noise level higher than the decibel limits indicated above.

1.18 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE OF WORK

- A. The offeror is expected to examine carefully the site of the proposed work, the proposal, plans, specifications, solicitation provisions, contract provisions, special provisions and contract forms before submitting a proposal. The submission of a proposal will be considered conclusive evidence that the offeror has made such examination and is satisfied as to the conditions to be encountered in performing the work as to the requirements of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 007300

SECTION 011000 -

SUMMARY PART 1 -

GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Work phases.
4. Work under other contracts.
5. Products ordered in advance.
6. Authority-furnished products.
7. Use of premises.
8. The Authority's occupancy requirements.
9. Work restrictions.
10. Specification formats and

conventions. B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of the Authority's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Project consists of the following:

1. Extension of electrical airfield infrastructure including duct bank and junction structures from existing Infrastructure to area south of Runway 6-24 as shown on area plans.
 2. Installation of new Taxiway Edge Lighting on Taxiway A South. All existing stake mounted lights will be installed on new can and conduit infrastructure. All existing lights on can and conduit system will be reinstalled with new materials according to specifications and area plans.
 3. Installation of new Isolation Transformers on all Taxiway A Centerline Light Fixtures. Installation of new L-824 Cable serving Taxiway A Centerline circuit.
 4. Installation of new Fiber connection between ATCT and Electrical Vault, according to Area Plans. Including in Fiber replacement is replacement of the Touch Screen in the Air Traffic Control Tower.
 5. Replacement of Computers Serving ALCMS in the ATCT, Operations Center, and Electrical Vault.
 6. Replacement of ALCMS Touchscreen Control in ATCT.
 7. **Add Alternate:** Installation of ALCMS Wireless Communication network between the Operations Center and ATCT.
1. Project Location: Shreveport Regional Airport
 - B. Architect/Engineer Identification: The Contract Documents, dated June 8, 2016, were prepared by Burns Engineering Inc., Two Commerce Square, 2001 Market Street, Suite 600 Philadelphia, PA 19103
 - C. Construction Manager: Burns Engineering, Inc.
 1. For additional functions of Burns Engineering, see "Supplementary Conditions."
 - D. The Work consists of Installation of new Can and Conduit Systems, Infrastructure, Fiber Connections, and a Touch Screen:
 1. The Work includes, Portland cement and bituminous concrete pavements, electrical and communications ductbank, and FAA-approved lighting fixtures, transformers, and electrical cables.
 2. For additional requirements for the examination of plans, specifications, and Project site see Section "Supplementary Conditions."
- 1.4 TYPE OF CONTRACT

- A. Project will be constructed under a general construction contract.

1.5 WORK AREAS

- A. Conduct the Construction in 4 separate areas (WORK AREAS) of construction. Sub-Areas are included with the scope of work. Contractor shall receive an overall Construction Notice to Proceed (CNTP). The total duration of the construction time shall not exceed 217

Calendar days after CNTP. Construction activities during the winter months must be approved by the SAA. Contractor shall have the flexibility to initiate individual work areas simultaneously but will be required to complete them within the duration specified below. Each Work Area will have the following duration and requirement for completion.

Work Duration: 217 Calendar Days

Work Phase 0 (Mobilization) – Complete 14 Calendar days after CNTP

Contract Duration: 14 Calendar Days after start in this Work Area

Work Phase 1 – Complete 56 Calendar days after CNTP

Contract Duration: 42 Calendar Days after start in this Work Area

Work Area 2 – Complete 183 Calendar days after CNTP

Contract Duration: 127 Calendar Days after start in this Work Area

Work Area 3 – Complete 210 Calendar Days after CNTP

Contract Duration: 27 Calendar days after start in this Work Area

Work Area 4 – Complete 225 Calendar Days after CNTP

Contract Duration: 15 Calendar days after start in this Work Area

Project Completion: 225 Calendar days after CNTP

- B. Work phasing indicated above is not intended to restrict Contractor to this specific phasing.
Contractor may submit its own phasing schedule to the SAA for review and written approval.
- C. Schedule the execution of the Work according to the phasing sequence indicated and to avoid interference with normal functions of the Airport.
- D. Before commencing Work of each phase, submit a schedule to the SAA showing the sequence, the commencement and completion dates, and the move-out and move-in dates of personnel for the various phases of the Work
- E. On completion, each phase of the Work shall be fully operational.

1.6 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to the following areas.
 - a. For Infrastructure Installation: Confine Operations from Electrical Vault, through existing infrastructure installation, to south of Runway 6-24 according to Area Plans.

- b. For Taxiway A South: Confine Operations to Taxiway A South. This area is bounded by Runway 6-24 to the north edge, and Runway 14-32 to the West Edge.
 - c. For Taxiway A North: Confine operations to Taxiway A North Centerline. This area is bounded by Runway 6-24 to the south edge, and Runway 14-32 to the West Edge.
 - d. For Fiber Connection: Confine operations to fiber run shown on area plans.
2. Authority Occupancy: Allow for Authority occupancy of site and day-to-day use by tenants, air carriers, and the public.
 3. Contractor shall have full use of premises for construction operations within the Contract Limit Lines indicated during construction period, during the hours indicated, and as directed by the SAA. Contractor's use of premises is limited only by the Authority's right to perform work or to retain other contractors on portions of Project.
 4. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to the Authority, the Authority's employees, tenants, air carriers, and emergency vehicles at all times. Do not use driveways and entrances for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Utilize areas designated for Contractor staging, storage, and parking, as indicated. For additional requirements, see Section "Supplementary Conditions."

1.8 OCCUPANCY REQUIREMENTS

- A. Full Authority Occupancy: The Authority and/or its tenants will occupy site and existing building during entire construction period. Cooperate with SAA during construction operations to minimize conflicts and facilitate Authority usage, and perform the Work so as not to interfere with day-to-day Airport operations.
- B. Partial Authority Occupancy: The Authority reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work. Partial Authority occupancy requirements are as follows:
 1. SAA will prepare and obtain a Certificate of Substantial Completion for each specific portion of the Work to be occupied before SAA occupancy.
 2. Before partial SAA occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, the SAA will operate and maintain mechanical and electrical systems serving occupied portions of building.

3. On occupancy, the SAA will assume responsibility for maintenance and custodial service for occupied portions of building.

1.9 CONTRACTOR HOURS OF OPERATION

- A. Contractor Working Hours: The Authority anticipates that the Contractor may be required to work multiple shifts to accomplish the work of this Contract within the established schedule. Contractor will be allowed and may be required by the nature of the Project to work 24 hours a day, seven days a week in the performance of the Work. Work is subject to restrictions of the Airport operational requirements. Notify the SAA 24-hours in advance of any change to the work schedule. Specific Working Hours are as follows:

1.10 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: With the exception of Federal Aviation Administration (FAA) standard specifications and Louisiana Department of Transportation standard specifications the Specifications are organized into Divisions and Sections using the 33-Division format using the CSI/CSC's "MasterFormat 2004" numbering system.

1. Section Identification: The Specifications use Section titles to help with cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete as all available Sections and Section numbers are not used and the CSI numbering system is not sequentially complete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Interpret words and meanings as appropriate. Infer words implied, but not stated, as the sense requires. Interpret singular words as plural, and plural words as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are used in these Specifications. This imperative language is directed to the Contractor, unless specifically noted otherwise. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

- a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.11 MARKING UTILITY SERVICES

- A. Employ underground utilities location subcontractor to locate and mark the horizontal location of all utility lines that might be impacted by construction activities, including, but not limited to, the following:
 1. Electric power lines.
 2. Natural gas lines.
 3. Sanitary Sewers.
 4. Storm Sewers.
 5. FAA communications, signal, and security lines.
 6. Runway lighting lines
 7. Water supply piping.
 8. Fuel Lines.
 9. Telephone lines.
 10. Data lines.
 11. Underground Storage Tanks.
- B. Contact the one call at 811 to locate all utilities prior to beginning operations that include but are not limited to excavating, boring, digging or planting. Utility Location is the responsibility of the Contractor's underground utilities location subcontractor.
- C. The information in the Contract Documents concerning the type and location of underground utilities is neither guaranteed nor inclusive. The Contractor is responsible for determining the type and location of underground utilities, regardless of whether such utilities are indicated or not, so as to avoid damage thereto.
- D. Check and verify the horizontal and vertical location (coordinates and elevation) of all utility lines that may exist within the limits of new work, regardless of whether such utilities are indicated or not, by use of a Subsurface Utility Engineering company. Reconfirm such locations and verification of utilities discovered, regardless of whether such utilities are indicated or not, and submit to the SAA a dimensional survey with such notations.
- E. Dig test pits by hand shovel in the vicinity of the discovered utilities. Excavate test holes utilizing a vacuum excavator.

- F. Repair any damage to discovered utility lines due to construction operations at no expense to the SAA. The SAA will assist the Contractor by making available any known information.
- G. Submit to the SAA, for written approval, the name of the independent subsurface utility engineering company to be used.
- H. The individual who performs the utility detection and location work shall have as a minimum five (5) years of similar experience in the area of subsurface utility detection and location engineering.
- I. Submit to the SAA the following:
 - 1. List of utility detection equipment along with product information and data sheets that will be used specifically for this contract.
 - 2. List of employee qualifications and résumés of those individuals who will be assigned specifically to this contract.
 - 3. Within 60 calendar days of Notice to Proceed, a survey of all subsurface utility engineering results indicating the horizontal and vertical location, coordinates and elevation of all utilities.

1.12 UTILITY OUTAGES

- A. Prior to any utility outage/interruption, prepare a schedule of such outage. Include in outage schedule duration, identification of the service affected, temporary utility service to be provided, identification of available service alternative, and the action to be taken in any emergency. Apply for all outages of utility systems in writing. Fully coordinate outage requests with the SAA. Obtain approval in writing by the SAA. Schedule all outages at least three (3) weeks in advance with a 96-hour notification provided by the Contractor confirming date, time, and duration. Outages will normally be scheduled to occur between hours approved by the SAA.

PART 2 - PRODUCTS (Not Used) PART 3 - EXECUTION (Not Used) END OF SECTION 011000

SECTION 012210 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing methods of measurement and computations to be used in determination of quantities of material furnished and unit amount of Work performed under the Contract in order for Contractor to receive payment according to pre-established unit prices.
- B. At the discretion of the SAA, payment may be reduced for any Work which is not in full compliance with the Contract Documents or which has been damaged or repaired by Contractor. Such action may be used when the end product may have a reduced service life or less than desirable aesthetic characteristics.

1.3 MEASUREMENT OF QUANTITIES

- A. All volumes or quantities used to determine unit-price payment will be measured by the Authority, or by Authority's authorized representatives, using methods generally recognized as conforming to good engineering practice. Unless otherwise indicated, measurement shall be in U.S. Customary Units of Measurement.
- B. Unless otherwise indicated, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 sq. ft. or less. Unless otherwise indicated, transverse measurements for area computations will be the neat dimensions shown on Drawings.
 - 1. Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.
 - 2. Measure all Contract items measured by the linear foot, such as electrical ducts, conduits, pipe culverts, under drains, and similar items, parallel to the base of foundation on which such items are placed, unless otherwise indicated.
 - 3. In computing volumes of excavation, use the average end area method or other acceptable method.

- C. Haul materials, to be measured by volume in the hauling vehicle, in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable to and approved in advance by SAA, provided that the body is of such shape that the actual contents may be readily and accurately determined. Load all vehicles to at least their water-level capacity. Level loads when the vehicles arrive at the point of delivery.
1. When requested by Contractor and approved by SAA in writing, material specified to be measured by the cubic yard may be weighed, and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by SAA and agreed to by Contractor before such method of measurement of pay quantities is used.
 2. The term "ton" will mean the short ton consisting of 2000-lb avoirdupois. Weigh all materials, which are measured or proportioned by weights, on accurate, approved scales by competent, qualified personnel at locations designated by SAA.
 - a. If material is shipped by rail, the car weight may be accepted, provided that only the actual weight of material will be paid for. However, car weights will not be acceptable for material to be passed through mixing plants.
 - b. Weigh trucks used to haul material being paid for by weight empty daily at such times as SAA directs. Each truck shall bear a plainly legible identification mark.
- E. Measure bituminous materials by the gallon or ton. When measured by volume, measure such volumes at 60 deg F or measure corrected to the volume at 60 deg F, using ASTM D 1250 for asphalts or ASTM D 633 for tars.
1. Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated into the Work.
 2. When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.
- F. Concrete will be measured by the cubic yard in place, unless otherwise indicated.
- G. The term "each" when used as an item of payment shall mean complete payment for the work described in the Contract.
1. When a complete structure or structural unit is to be provided, and "each" is specified, as the unit of measurement, the unit will be construed to include all necessary fitting, accessories, and work incidental to the work item.
- H. Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the Work. Special equipment ordered by SAA in connection with "force account work" will be measured as agreed in Contract Modification authorizing such force account work as provided in the Contract Documents.

- I. When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited Specifications, manufacturing tolerances established by the industries involved will be accepted.
- J. When estimated quantities for a specific portion of the Work are designated as the pay quantities in the Contract, they shall be the final quantities for which payment for such specific portion of the Work will be made, unless the dimensions of said portions of the Work shown on Drawings are revised by Contract Modification signed by the SAA.
 - 1. If revised dimensions result in an increase or decrease in quantities of such Work, final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

1.4 SCALES

- A. Scales for weighing materials, which are required to be proportioned or measured and paid for by weight, shall be furnished, erected, and maintained by Contractor or be certified permanently installed commercial scales.
- B. Scales shall be accurate within one-half percent of the current weight throughout the range of use. Contractor shall have scales checked under the observation of the inspector before beginning Work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of 1 percent of the nominal rated capacity of the scale, but not less than 1 lb. The use of spring balances will not be permitted.
 - 1. Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the inspector can safely and conveniently view them.
 - 2. Scale installations shall have available 10 standard 50-lb weights for testing the weighing equipment or suitable weights and devices for other approved equipment.
 - 3. Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.
 - 4. Scales "overweighing" (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighing-accuracy test will be reduced by the percentage of error in excess of one-half of 1 percent.
 - 5. In the event inspection reveals the scales have been "under-weighing" (indicating less than correct weight), they shall be adjusted, and no additional payment to Contractor will be allowed for materials previously weighted and recorded.
- C. All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this Section for the weighing of materials for proportioning or payment shall be included in the unit Contract prices for the various items of Project.

1.5 PAYMENT FOR MATERIALS ON HAND

- A. Partial payments may be made to the extent of the delivered cost of materials to be incorporated into the Work, provided that such materials meet the requirements of the Contract, Drawings, and Specifications and are delivered to acceptable sites on the Airport property or at other sites in the vicinity that are acceptable to Engineer. Such delivered costs of stored or stockpiled materials may be included in the next partial payment application.
- B. It is understood and agreed that the transfer of title and the Authority's payment for such stored or stockpiled materials shall in no way relieve Contractor of responsibilities for furnishing and placing such materials according to the requirements of the Contract Documents.
- C. In no case will the amount of partial payments of materials on hand exceed the Contract price for the materials or the Contract price for the Contract item in which the material is intended to be used.
- D. No partial payment will be made for living or perishable plant materials.
- E. Contractor bears all costs associated with the partial payment of stored or stockpiled materials according to the provisions of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01221

SECTION 012900 – APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
 - 1. Coordinate the Schedule of Values and Applications for Payment with Contract CPM Schedule, List of Subcontracts, and Submittal Log.
- B. Related Sections include the following:

- 1. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
- 2. Division 01 Section "Measurement and Payment" for administrative requirements governing methods of measurement and determination of quantities of materials for use with unit prices.
- 3. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.
- 4. Division 01 Section "Project Closeout" for submittal of items required before final payment.
- 5. Division 01 Section "Project Record Documents" for procedural requirements governing the submission of Project Record Documents.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Price to various portions of the Work and once accepted, to be used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - c. Subcontractor Payment Form
 - d. List of products.
 - e. List of principal suppliers and fabricators.
 2. Submit the Schedule of Values to the Authority at earliest possible date, but no later than 21 calendar days after the date of the Notice to Proceed.
 3. Sub schedules: Where the Work is separated into phases requiring separately phased payments, provide sub schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Project Manager from the Authority.
 - c. Name of Architect/Engineer.
 - d. The Authority's Project number.
 - e. Contractor's name and address.
 - f. Date of submittal.
 2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Contract Modifications (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Price to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Price in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items under required principal subcontracts for the following items. The value assigned to the total of these line items shall be 5 percent of the Contract Price:
 - a. Testing and commissioning activities.
 - b. Punch list activities.
 - c. Project Record Documents.
 - d. Bonds and warranties.
4. Round amounts to nearest whole dollar. Total shall equal the Contract Price.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Application for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between potential items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the Schedule of Values and Application for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. At the Authority's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense.
8. Schedule Updating: Update and resubmit the Schedule of Values with the next Applications for Payment when Contract Modifications result in a change in the Contract Price.

1.5 APPLICATION FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Contracting Officer and paid for by the Authority.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Application for Payment shall coincide with schedule monthly update, or as otherwise indicated in the Agreement between the Authority and Contractor. The period covered by each Application for Payment starts on the day following the end of the preceding period and shall not exceed one calendar month, unless otherwise approved by Authority.

- C. Payment Application Forms: Use standard G-707 or G-703 form for application of payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The Authority will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Contract Modifications issued before last day of construction period covered by application.
- E. Transmittal: Submit one original and four copies of Application for Payment to the address indicated in the City's front end specifications.
 - 1. Transmit Applications for Payment with a transmittal form listing attachments and recording appropriate information about application in a manner acceptable to the Authority.
- F. Waivers of Mechanic's Lien: With Final Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers.
 - 1. The Authority reserves the right to designate which entities involved in the Work must submit waivers.
 - 2. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to the Authority.
- G. Initial Application for Payment: Administrative actions and submittals that shall precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of Values.
 - 3. Contractor's Construction Schedule (preliminary if not final).
 - 4. Products List
 - 5. Schedule of unit prices.
 - 6. Submittals Schedule (preliminary if not final).
 - 7. List of Contractor's staff assignments.
 - 8. List of Contractor's principal consultants.
 - 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - 10. Initial progress report.
 - 11. Report of pre-construction conference.
 - 12. Initial settlement survey and damage report if required.

13. Submittal and approval of Contractor Quality Control Plan.
 14. Submittal and approval of Contractor Safety Plan.
 15. Subcontractor Payment Form.
- H. Monthly Application for Payment: Administrative actions and submittals that shall accompany the submittal of Contractor's monthly Application for Payment include the following:
1. Subcontractor Payment Form.
 2. Monthly Progress Report, prepared according to requirements specified in Division 01 Section "Construction Progress Documentation."
 3. Evidence of payment for material on-site if reimbursement for such material is being requested.
 4. Quality Control inspection checklists covering the work activities for which payment is being requested. Checklists must be complete per Division 1 Section "Quality Requirements" of this Contract.
 5. An updated copy of the Quality Control Deficiency Log as of the date of Application for Payment.
 6. Update of Contract Record Documents.
- I. Application for Payment at Substantial Completion: After issuance of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Price.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Authority occupancy of designated portions of the Work, if applicable.
 3. Advise the Authority of change-over in security provisions.
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Price.
 4. Evidence that claims have been settled.
 5. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when the Authority took possession of and assumed responsibility for corresponding elements of the Work.
 6. Final, liquidated damages settlement statement.
 7. Return of all Airport identification badges and keys.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination drawings.
4. Administrative and supervisory personnel.
5. Project meetings.
 - a. Pre-award conference.
 - b. Pre-construction conference.
 - c. Pre-installation conference.
 - d. Progress meetings.

- B. Related Sections include the following:

1. Division 01 Section: "Execution" for the coordination of general installation and field-engineering services, including establishment of benchmarks and control points.
2. Division 01 Section "Project Closeout" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 3. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, mechanical, electrical, and otherwise. Contractor is cautioned that, where specific dimensions are not indicated or where Drawings are schematic in nature, as with most Electrical and Mechanical Drawings, Contractor shall have sole responsibility to coordinate the work to meet this requirement. Prepare and submit Coordination Drawings to the SAA for review and approval as provided in "Coordination Drawings" Paragraph in "Submittals" Article of this Section.
 4. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for the SAA and separate contractors if coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work and completion within the specified Contract duration. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Pre-installation conferences.
 7. Start-up, check-out, and final acceptance of systems.
 8. Project closeout activities.
 9. Protection of existing and new work.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other sections for disposition of salvaged materials that are designated as the Authority's property.
- E. Temporary Utility Outages: Comply with requirements in Division 01 Section "Summary."

1.4 SUBMITTALS

- A. Key Personnel Names: At the pre-construction meeting, submit a list of Contractor's key personnel assignments. Key personnel shall include but not necessarily be limited to Project Manager, Project Superintendent, Safety Manager, Safety Engineer, Quality Control Manager, Project Scheduler, Soil Excavation Engineers, and other personnel in attendance at Project site along with alternates. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep the list current at all times.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Contract Name
 2. Contract Number
 3. Date.
 4. Name of Contractor.
 5. Name of Resident Engineer
 6. Name of Task Manager
 7. RFI number, numbered sequentially.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include drawings, descriptions, measurements, color photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

- a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs:
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
 2. RFI must be signed and scanned for electronic transmission.
 3. Hard-Copy RFI shall follow Software-Generated RFI for the record.
- E. Engineer's Action: Engineer will review each RFI, determine action required, and return it. Allow seven calendar days for Engineers response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Engineer's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Engineer's action may include a request for additional information, in which case Engineer's time for response will start again.
 3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer and SAA in writing within 10 days of receipt of the RFI response.
- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly prior to progress meeting for inclusion in progress meeting minutes. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name of Engineer .

4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Engineer's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

- A. Pre-award Conference:

1. General: At the request of the SAA, a pre-award conference with Contractor may be held before actual award of the Contract. The meeting will review Contractor's understanding of the Contract Documents, cost and pricing data, contractual requirements, and Contractor's capabilities, financial standing, and past experience prior to award.
 - a. Minutes: The SAA will record and distribute meeting minutes to all attendees and all relevant parties.
2. Attendees: SAA, Design Project Manager, Architect/Engineer, Contractor and its key personnel nominated for assignment to the Contract, and major subcontractors if so requested by the Contracting Officer. Concerned parties shall each be represented by persons thoroughly familiar with and authorized to conclude matters relating to the work described in the Contract Documents. The SAA will chair the pre-award meeting.
3. Agenda: Significant discussion items that could affect award include, but are not limited to, the following:
 - a. Provision and acceptability of payment and performance bonds.
 - b. LDBE/MBE/WBE/DBE participation.
 - c. Qualifications of key individuals.
 - d. Quality-control experience.
 - e. Percentage of work performed by own forces.
 - f. Contractor's experience with similar work, including previous Authority contracts.
 - g. Scheduling capabilities of Contractor.
 - h. Financial standing of Contractor.

- i. Mobilization plan.
 - j. Understanding of work described in the Contract Documents and the physical constraints associated with work at the Airport.
 - k. Equipment and manpower availability.
 - l. Cost and pricing data.
4. Representations and commitments made by Contractor or its subcontractors shall be construed as binding to the Contract.

B. Pre-construction Conference:

1. General: The SAA will schedule pre-construction conference and organizational meeting with Contractor after the SAA issues a notice of intent to award, or actually awards the Contract. The meeting will review the parties' responsibilities and personnel assignments.
 - a. Minutes: The SAA will record and distribute meeting minutes to all attendees and relevant parties.
2. Attendees: The SAA and the Architect/Engineer, and their sub-consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Airport security.
 - b. LBDE/MBE/WBE/DBE participation and certifications.
 - c. Authority-controlled wrap-up insurance program.
 - d. Airport Operations coordination.
 - e. Preliminary construction schedule.
 - f. Phasing.
 - g. Critical work sequencing.
 - h. Designation of key personnel.
 - i. Procedures for processing field decisions and Contract Modifications.
 - j. Procedures for processing Applications for Payment.
 - k. Distribution of the Contract Documents.
 - l. Authority Construction guidelines.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises.

- p. Responsibility for temporary facilities and controls.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. Equipment deliveries and priorities.
 - t. Safety procedures.
 - u. Quality-control requirements.
 - v. First aid.
 - w. Progress cleaning.
 - x. Working hours.
 - y. Building Code requirements/permits.
4. Refer to Contract Provision "Pre-construction Requirements" for required submittals due at the pre-construction conference.
- C. Pre-installation Conferences:
- 1. General: The SAA will conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
 - a. Minutes: The SAA will record and distribute meeting minutes.
 - 2. Attendees: Contractor, Installer, and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have proceeded, or will follow.
 - 3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Contract Modifications.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's written recommendations.
 - l. Warranty requirements.
 - m. Compatibility of materials.

- n. Acceptability of substrates.
 - o. Temporary facilities and controls.
 - p. Space and access limitations.
 - q. Governing regulations and permits.
 - r. Safety.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Recording requirements.
 - v. Protection of construction and personnel.
 - w. Review material selection.
 - x. Fabrication and installation procedures.
 - y. Coordination of involved trades.
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Construction Manager, Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for demonstration and training.
 - f. Preparation of Contractor's punch list.
 - g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - h. Submittal procedures.

- i. Owner's partial occupancy requirements.
 - j. Installation of Owner's furniture, fixtures, and equipment.
 - k. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings:
 1. General: The SAA will conduct progress meetings at to be determined times convenient for all parties involved. Progress meetings are in addition to specific meetings held for other purposes, such as coordination and special pre-installation meetings. Additionally, discussions will address administrative and technical issues of concern, determining resolutions, and development of deadlines for resolution within allowable time frames.
 - a. Minutes: The Engineer or Sub-Consultant will record and distribute meeting minutes.
 2. Attendees: As may be required by the SAA, in addition to representatives of the Authority and Contractor, each subcontractor, supplier, Contractor's Project Scheduler, and other entities concerned with current progress or involved in planning, coordination, or performance of future activities. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Safety and Security.
 - 2) Interface requirements.
 - 3) Time.
 - 4) Sequence of operations.
 - 5) Status of submittals.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Storage Areas
 - 9) Access.
 - 10) Site utilization.
 - 11) Requests for information.

- 12) Submittals.
 - 13) Noncompliance notices.
 - 14) Temporary facilities and controls.
 - 15) Work hours.
 - 16) Resource allocation.
 - 17) Hazards and risks.
 - 18) Progress cleaning.
 - 19) Quality and work standards.
 - 20) Contract Modifications.
 - 21) Documentation of information for payment requests.
 - 22) Preparation of Record Documents.
4. Submit at the progress meeting, a look-ahead schedule. This schedule shall include a three-week period, one week showing actual progress from the previous week and two weeks showing planned work for the two weeks after the meeting date. Include in the schedule all activities in sufficient detail as approved by the SAA. A two-week look-ahead schedule form will be distributed at the pre-construction conference. Submit a list of subcontractors identifying dates of when subcontractors will be on-site or off-site. A form for this information will be provided by the SAA.
 5. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Closeout" for submitting warranties.
 - 2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Divisions 02 through 33 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires SAA's responsive action.
- B. Informational Submittals: Written information that does not require SAA's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. General: S A A will provide electronic copies of CADD electronic files of the drawings for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that requires sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Without change to the Contract Duration, SAA reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Contractor's Responsibilities: Contractor is responsible for the scheduling and submission of all submittals. Submit to the SAA all required Submittals. The SAA will forward submittals to the appropriate parties for review.
- E. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on SAA's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.
1. Initial Review: Allow 15 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. SAA will advise Contractor when a submittal processed must be delayed for coordination. Allow an additional 45 calendar days for submittals related to fire-protection systems.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Re-submittal Review: Allow 15 calendar days for review of each re-submittal.
 4. No extension of the Contract Time will be authorized because of failure to transmit submittals to the SAA enough in advance of the Work to permit processing. Processing of incomplete or unacceptable submissions by SAA shall not reduce the number of calendar days specified above for the SAA review. Resubmissions shall be treated the same as initial submissions relative to review time.
 5. Notations on submittals that increase the Contract cost or time of completion shall be brought to the SAA's attention before proceeding with the Work.
- F. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by the SAA and Engineer.
 3. Include the following information on label for processing and recording action taken:
 - a. Contract name and number.
 - b. Date.
 - c. Name and address of Architect/Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor, if applicable.
 - f. Name and address of supplier, if applicable.
 - g. Name of manufacturer, if applicable.

- h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a dash and then a sequential number (e.g., 061000-001 or 070150.19-001). Re-submittals shall include an alphabetic suffix after another dash (e.g., 061000-001-A or 070150.19-001-A).
 - i. Alphanumeric project Identifier. Identifier is shown on the Project Drawings cover sheet.
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Transmittal number.
 - n. Allow 15 calendar days for processing each re-submittal.
- G. Resubmissions: Re-submittal procedure shall follow the same procedures and same number as the initial submittal with the following exceptions:
- 1. Transmittal shall contain the same information as the first transmittal and the submission number shall indicate second, third, etc., submission. The drawing number/description shall be identical to the initial submission and the date shall be the revised date for that submission.
 - 2. No new material shall be included on the same transmittal for a resubmission.
 - 3. The SAA's rejection shall not warrant a claim by Contractor for additional time or cost.
- H. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals. Where significant deviations from the Contract requirements exist, follow the guidelines set forth in Division 01 Section "Product Requirements" for substitutions.
- I. Additional Copies: Unless additional copies are required for final submittal, and unless the SAA observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
- 1. Additional copies submitted for Operations and Maintenance manuals will be marked with action taken and will be returned.
- J. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal from Contractor to the SAA using the approved transmittal form provided by the SAA. The SAA will return submittals, without review, received from sources other than Contractor.
- 1. Transmittal Form: Use transmittal forms and follow other submittal procedures according to information provided to Contractor at the preconstruction meeting.
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

1. Bear all costs incurred for such reproduction and distribution. Prints of all reviewed Shop Drawings may be made from transparencies that carry the appropriate review stamps.
- L. Use for Construction: Use only final submittals with mark indicating “approved” by the SAA and Engineer in connection with construction.

1.5 SUBMITTAL LOG

- A. Prepare a log that contains a complete listing of all submittals required by Contract. Submit the log at the preconstruction meeting along with Contractor's 90-day preliminary schedule specified in Division 01 Section "Construction Progress Documentation." Organize the submittal log by Section number. Assign each submittal a sequential number for identification and tracking purposes.
 1. Coordinate the submittal log with Division 01 Section "Construction Progress Documentation." The submittal log shall be submitted to the SAA for review.

Include the following information:

- a. Title of submittal/description.
- b. Submittal number (sequential).
- c. Scheduled date for the first submittal.
- d. Drawing number, if applicable.
- e. Applicable Section number.
- f. Name of subcontractor/vendor.
- g. Scheduled date of SAA final release/approval

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.

- e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Mill reports.
 - i. Standard product operating and maintenance manuals.
 - j. Compliance with recognized trade association standards.
 - k. Compliance with recognized testing agency standards.
 - l. Application of testing agency labels and seals.
 - m. Notation of coordination requirements.
4. Submit Product Data before or concurrent with Samples.
 5. Number of Copies: Submit six copies, in addition to the number of copies to be returned to Contractor. Provide one additional copy for submittals related to fire-protection system.
 6. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit one (1) reproducible transparency and two (2) black-line prints of each submittal. The SAA will return the marked up reproducible transparency for Contractor's distribution.
 - a. Both the reproducible transparency and the prints shall bear Contractor's approval stamp on each sheet.
- D. Coordination Drawings:
1. Coordination Drawings are Shop Drawings prepared by Contractor that detail the relationship and integration of different construction elements that require careful coordination during fabrication or installation. Preparation of Coordination Drawings is specified in Division 01 Section "Project Management and Coordination."
 2. Submit Coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
 4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. The SAA will return two copies.
 - a. Mark up and retain one returned copy as a Project Record Document.
- F. Submittals Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements in Division 01 Section "Application for Payment."
- H. Schedule of Values: Comply with requirements in Division 01 Section "Application for Payment."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.

- J. Contractor Warranty Letter: Comply with requirements in Contract Provision "Warranty of Construction." Provide the dates of warranty coverage and provide point of contact information for warranty service.
- K. Special Warranty Letters: Provide dates of warranty coverage and provide point of contact information for warranty service for special warranties required in Division 02 through 33 Sections.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit four copies of each submittal, unless otherwise indicated. The SAA will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. An officer shall sign certificates and certifications or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements in Division 01 Section "Quality Requirements."
- B. Contractor's Construction Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation."
- C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

- J. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- K. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- M. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- N. Research/Evaluation Reports: Prepare written evidence from a model code organization acceptable to the Authority that product complies with USBC. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 01 Section "Operation and Maintenance Data."
- P. Design Data: Prepare written and graphic information, including, but are not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- Q. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.

3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- R. **Manufacturer's Field Reports:** Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement on whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- S. **Bonds:** Prepare written information indicating current status of bonding coverage. Include name of entity covered by insurance or bond, limits of the coverage, amounts of deductibles, if any and term of coverage.
- T. **Manufacturers' warranties.**
- U. **Construction Photographs:** Comply with requirements in Division 01 Section "Photographic Documentation."
- V. **Safety Data Sheets:** Submit information directly to the SAA.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to the SAA.
1. In checking Shop Drawings and Product Data, verify all dimensions and field conditions and check and coordinate Shop Drawings and Product Data of any Section or trade with the requirements of other sections or trades as related thereto, as required for proper and complete installation of the Work.
- B. **Approval Stamp:** Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for

compliance with the Contract Documents, which shall include dimensions, clearances, compatibility, and coordination with Shop Drawings and Product Data submitted for other work.

- C. If Contractor has not checked the submittals carefully, even though stamped as checked and approved, submittals shall be returned to Contractor for proper checking before further processing or review by the SAA regardless of any urgency claimed by Contractor. In such a situation, Contractor will be responsible for any resulting delays to the scheduled Contract completion. Furthermore, Contracting Officer may hold Contractor responsible for increased Authority costs resulting from Contractor's failure to comply with the requirements set forth herein.

3.2 SAA's ACTION

- A. General: The SAA will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. SAA's Responsibilities: The review of Shop Drawings and other submittals by the SAA will be for general conformance with the Contract only, and the review shall not be interpreted as a checking of detailed dimensions, quantities, or approval of deviations from the Contract Documents. The SAA's review shall not relieve Contractor of its responsibility for accuracy of Shop Drawings nor for the furnishing and installation of materials or equipment according to the Contract requirements.
 - 1. Approval of Shop Drawings or other submittals is not to be interpreted as approval of a substitute material. Approval of substitutions will be accomplished according to requirements set forth in Division 01 Section "Product Requirements."
- C. Action Submittals: The SAA's representative will review each submittal, make marks to indicate corrections or modifications required, and return it. The SAA's representative will return all submittals within 10 working days. The SAA's representative will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows. Do not permit submittals marked "Revise and Resubmit" or "Rejected" to be used at Project site, or elsewhere where Work is in progress.
 - 1. Approved: Means fabrication/installation may be undertaken. Approval does not authorize changes to the Contract Price or the Contract Time.
 - 2. Approved as Corrected: Same as "Approved," providing Contractor complies with corrections noted on submittal. Resubmission required only if Contractor is unable to comply with noted corrections.
 - 3. Revise and Resubmit: Fabrication and/or installation may not be undertaken. Make appropriate revisions and resubmit, limiting corrections to items marked.
 - 4. Rejected: Submittal does not comply with requirements. Fabrication and/or installation may not be undertaken. Prepare a new submittal according to requirements and submit without delay.
- D. Informational Submittals: The SAA will review each submittal and will not return it, or will reject and return it, if it does not comply with requirements. The SAA will forward each submittal to appropriate party.

- E. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- F. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.
- B. Related Sections:
 - 1. Division 01 Section "Submittals" for process required to submit the Contractor's Quality Control Plan.
 - 2. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 3. Division 01 "Project Management and Coordination"
 - 4. Division 01 Section "Operation And Maintenance Data"
 - 5. Division 01 Section "Project Closeout"
 - 6. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 7. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Administrative and procedural requirements for Contractor to provide and maintain an effective Quality-Control Program that complies with this Section and with requirements of the "Contract Provisions," Section VII, "Inspection of Construction and Final Inspection and Acceptance."
 - 2. Establish a QC Program that consists of the following:
 - a. QC Organization
 - b. QC Plan
 - c. QC Plan Meeting
 - d. Coordination and Mutual Understanding Meeting
 - e. QC meetings
 - f. Phases of Control
 - g. Submittal review and approval
 - h. Operation & Maintenance data and Warranty receipt verification prior to product delivery

- i. Material verification at delivery
 - j. Testing, completion inspections, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations that comply with the requirements of this Contract.
5. Specific quality-control requirements for individual construction activities are specified in the Sections that require those activities. Requirements in those Sections may also cover production of standard products.
6. Schedule of Values: Contractor shall include all test and inspection activities in its CPM and establish a Schedule of Values for all quality test and inspection activities; and all required reports, and procedures required in the Contract on a Section-by-Section basis. Additionally, Contractor shall include a pay line item specifically for CQC activities and QCM position(s) required by the General Conditions. CQC activities shall be reported per Division 01 Section "Applications for Payment."
7. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of its responsibilities for compliance with the Contract Document requirements.
8. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
9. The provisions of this Section shall not limit requirements for Contractor to provide quality-control services required by the Authority or other agencies having jurisdiction.

1.3 REFERENCES

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

1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- a. ASTM C 1077 Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation latest edition.

- b. ASTM D 3666 Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials latest edition.
- c. ASTM D 3740 Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction latest edition.
- d. ASTM E 329 Agencies engaged in the Testing and/or Inspection of Materials Used in Construction latest edition. ASTM E 543 Agencies Performing Nondestructive Testing latest edition.
- e. ASTM E 543 Agencies performing Nondestructive Testing latest edition.

1.4 DEFINITIONS

- A. Quality: Conformance to the requirements established by the contract specifications and drawings.
- B. Control: To guide and have influence over.
- C. Contractor Quality Control (CQC): The construction contractor's system to manage, control, and document their own, their supplier's, and their subcontractor's activities to comply with the contract requirements.
- D. Quality-Assurance Services: Activities, actions, and procedures performed by the Authority before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirement. Additionally, the Authority fulfills its responsibility to be certain that the CQC is functioning and the specified end product is achieved.
- E. Definable Feature of Work: A definable feature of work (DFOW) is a task, which is separate and distinct from other tasks, has the same control requirements and work crews.
- G. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of 10 projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction. Specific experience requirements enumerated in these specifications supersede this requirement.

1.5 CONFLICTING REQUIREMENTS

- A. General: If compliance with two standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most

stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the SAA for a decision before proceeding. This paragraph refers to industry and government standards. In case of a difference between drawings and the specifications, the specifications shall govern.

1.6 SUBMITTALS

- A. Submit the following in accordance with Division 01 Section, "Submittals."
 - 1. Action Submittals.
 - a. Quality Control (QC) Plan.
- B. NOTE: Coordinate the submittal requirement dates with the submittal dates in Division 01 Section "Construction Progress Documentation".
- C. Submit a QC plan within 20 calendar days after receipt of Notice to Proceed. The QC Plan shall include a preliminary submittal of the list of definable features of work that shall cover the first 90 calendar days of construction.
 - 1. Submit at this time résumés of key personnel to be assigned to this contract and the limits of their authority. Show how this project management structure fits into the Contractor's corporate management structure.
- D. Any approval by the SAA of the QC Plan shall be treated as "accepted, predicated upon successful implementation." Stop work if the QC Plan becomes disapproved. The exception is the work authorized in the paragraph entitled "Preliminary Work Authorized Prior to Approval," shall stop.

1.7 INFORMATION FOR THE CONTRACTING AGENCY

- A. Provide a sample copy set of report forms to the contracting agent during the Pre-Construction Conference. The report forms shall consist of the Quality Control Daily Report, Preparatory Phase Report, Initial Phase Report, and Project Quality Control Monthly Summary. These forms may be edited to support the project. Other reports referenced below may be in formats customarily used by the Contractor, Testing Laboratories, etc. and shall contain the information required by this specification.
- B. Deliver the following listed items to the COTR at the times specified:
 - 1. Quality Control Daily Report: 1 original electronic or hard copy, turned in by the next calendar day after work is performed.
 - 2. Superintendent's Daily Report: 1 original electronic or hard copy, turned in by the next calendar day after work is performed, do not attach to the Quality Control Daily Report.
 - 3. Material Receiving Inspection Report: 1 original electronic or hard copy, turned in by the next calendar day after work is performed, do not attach to the Quality Control Daily Report.
 - 4. Preparatory Phase Report: 1 original electronic or hard copy, turned in by the next calendar day after work is performed, do not attach to the Quality Control Daily Report.

5. Initial Phase Report: 1 original electronic or hard copy, turned in by the next calendar day after work is performed, do not attach to the Quality Control Daily Report.
6. QC specialist Reports: 1 original electronic or hard copy, turned in by the next calendar day after work is performed, do not attach to the Quality Control Daily Report.
7. Field Test Reports: 1 original electronic or hard copy, within 2 working days after the test is performed, do not attach to the Quality Control Daily Report.
8. Monthly Summary Report of Tests: 1 original electronic or hard copy, do not attach to a Quality Control Daily Report.
9. Project Quality Control Monthly Summary Report: 1 original electronic or hard copy, do not attach to a Quality Control Daily Report.
10. Inspection Log and Signoff Sheets: one copy, submitted daily within 1 day of the inspection.
11. Testing Plan and Log: 1 original electronic or hard copy, submitted within 2 working days of the end of the month.
12. Deficiency List: 1 original electronic or hard copy, submitted to the Authority weekly.
13. Monthly Deficiency Report: 1 original electronic or hard copy, within two working days of the end of the month.
14. QC Meeting Minutes: 1 original electronic or hard copy, within 2 working days after the meeting.
15. QC Certifications: As required by paragraph entitled "QC Certifications."

1.8 QC PROGRAM REQUIREMENTS

- A. Establish and maintain a QC Program as described in this Section. The QC Program consists of but is not limited to the following:
 1. QC Organization.
 2. QC Plan.
 3. QC Plan Meeting.
 4. Coordination and Mutual Understanding Meeting
 5. QC meetings.
 6. Phases of Control.
 7. Submittal review and approval.
 8. Operations and Maintenance data.
 9. Warranty receipt verification prior to product delivery.
 10. Material verification at delivery.
 11. Testing.
 12. Completion inspections.

13. QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations that comply with the requirements of this Contract.
14. The QC Program shall cover on-site and off-site work and shall be keyed to the work sequence.
15. No work or testing may be performed unless the QCM or a pre-approved alternate is on the work site.
16. The QCM shall report to an officer of the firm and shall not be subordinate to the Project Superintendent or the Project Manager.
17. Quality Control Manager is the primary individual responsible for quality control. The QCM, Project Superintendent and Project Manager shall be responsible for the quality of work on the job. Project Superintendent shall be held responsible for the quality of production.

B. Preliminary Work Authorized Prior to Approval

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

C. Approval

1. Approval of the QC Plan is required prior to the start of any construction. The Contracting Agency reserves the right to require changes in the QC Plan and operations as necessary, including but not limited to removal of personnel, to ensure the specified quality of work. The Contracting Agency reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel shall be subject to acceptance by the Contracting Officer. The Contracting Officer may require the removal of any individual for non-compliance with quality requirements specified in the contract.

D. Notification of Changes

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

1.9 QC ORGANIZATION

A. Staffing Levels: Provide sufficient qualified quality-control personnel to monitor each work activity at all times. Scheduling and coordinating of all inspections and testing shall match the type and pace of work activity.

1. In cases where multiple trades, disciplines, or subcontractors are on site at same time, each activity shall be tested and inspected by personnel skilled in that portion of the work.
2. In cases where multiple shifts are employed, the quality-control staff shall be increased as required to monitor the work on each shift.

B. The following positions are key personnel as defined by the Authority in this and other Division 01 Specification Sections.

1. Project Manager

- a. To enhance the effectiveness of the Quality Control Organization Project Manager shall be intimately involved in Quality Control. To this end, the Project manager shall have successfully completed the Army Corps of Engineers/NAVFAC Contractor Quality Control Course (details in Paragraph "Construction Quality Management Training" below).
- b. Qualifications: Fifteen years of experience, with six years of project management experience on major underground projects of similar size, type, and complexity to this Project in which the individual had overall project responsibility.

2. Project Superintendent

- a. Qualifications: Fifteen years of experience, with five years experience in a supervisory role coordinating various trades at multiple work areas.

3. Quality Control Manager (QCM)

a. Duties

- 1) Provide a QCM at the work site to implement and manage the QC Program. In addition to implementing and managing the QC Program, the QCM may perform the duties of project superintendent. The QCM is required to attend the QC Plan Meeting, attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the Phases Control, perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this contract. The QCM is responsible for managing and coordinating the Phases Control and documentation performed by Testing Laboratory personnel and any other inspection and testing personnel required by this Contract.

b. Qualifications

- 1) An individual with a minimum of 5 years experience as a superintendent, inspector, QCM, project manager, project engineer or construction manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual shall be familiar with the requirements of the Construction Safety Manual, and have experience in the areas of hazard identification and safety compliance. The QCM shall be interviewed by PMC QA Department and the COTR. The COTR will approve the QC Manager.

c. Construction Quality Management Training

- 1) In addition to the above experience and education requirements, the QCM shall have completed the course entitled "Construction Quality Management

for Contractors." If the QCM does not have a current certification, they shall obtain the CQM course certification within 60 calendar days of award.

4. Alternate QCM Duties and Qualifications

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

5. Assistant QCM Duties and Qualifications

Qualification/Experience in Area of Responsibility	Area of Responsibility
Graduate Engineer/5 years	Concrete Testing
Graduate Engineer/5 years	Asphalt Testing
Land Surveyor/5 years	Land Surveying Services

6. Submittal Reviewer(s) Duties and Qualifications

- a. Provide one Submittal Reviewer(s), other than the QCM, qualified in the discipline(s) being reviewed, to review and certify that the submittals meet the requirements of this Contract prior to certification or approval by the QCM.
- b. Each submittal shall be reviewed by a professional engineer.

7. QC Assistant

- a. Provide a full time Administrative Assistant at the work site whose primary duty shall be to assist the QCM in processing and maintaining files for submittals, preparing and publishing reports and meeting minutes. After primary duties are accomplished, other duties may be assigned provided the duties do not interfere with primary duties.

8. Erosion and Sediment Control Inspector

- a. The Erosion and Sediment Control Inspector shall be responsible for inspecting the erosion and sediment controls, reporting requirements, and for ensuring

conformance with the approved Storm Water Pollution Prevention Plan (SPPP). The Erosion and Sediment Control Inspector may have other duties, however, the designated individual shall be familiar with the requirements set forth by the state of Louisiana with regards to erosion and sediment control.

9. Project Engineer/Scheduler

- a. Qualifications: Refer to Division 01 Section "Construction Progress Documentation".

1.10 QC PLAN MEETING

- A. Within 10 calendar days of notice of award and prior to submission of the QC plan, meet with the SAA to discuss the QC plan requirements of this Contract. The purpose of this meeting is to communicate expectations and facilitate understanding of the QC plan requirements prior to plan development and submission.

1.11 QUALITY CONTROL (QC) PLAN

- A. Provide, for approval by the SAA, a QC plan submitted in a 3-ring binder with pages numbered sequentially that covers both on-site and off-site work and includes but may not necessarily be limited to the following:

- B. A table of contents listing the major sections identified with tabs in the following order:

1. QC ORGANIZATION
2. PERSONNEL MATRIX
3. NAMES AND QUALIFICATIONS
4. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
5. APPOINTMENT LETTERS
6. OUTSIDE ORGANIZATIONS INCLUDING BOCA INSPECTION COMPANIES
7. TESTING LABORATORY INFORMATION AND CERTIFICATIONS
8. TESTING PLAN AND LOG
9. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER
10. LIST OF DEFINABLE FEATURES
11. PROCEDURES FOR PERFORMING THE PHASES OF CONTROL
12. SPECIAL INSPECTIONS
13. DOCUMENTATION PROCEDURES
14. PROCEDURES TO COMPLETE REWORK ITEMS
15. PROCEDURES FOR COMPLETION INSPECTION
16. FORMS
17. ATTACHMENTS

- C. A chart showing the QC organizational structure.
- D. A personnel matrix showing for each Section of the specification who shall review and approve submittals, who shall perform and document the Phases Control, and who shall perform and document the testing.
- E. Names and qualifications, in résumé format, for each person in the QC organization. Include the CQM course certifications for the QCM and Alternate QCM as required by the paragraphs entitled "Construction Quality Management Training" and "Alternate QCM Duties and Qualifications".
- F. Duties, responsibilities and authority of each person in the QC organization.
- G. Letters signed by an officer of the firm appointing the QCM and Alternate QCM and stating that they are responsible for implementing and managing the QC Program as described in this contract. Include in this letter the responsibility of the QCM and Alternate QCM to implement and manage the three phases of quality control, and their authority to stop work that is not in compliance with the contract. Copies of the letters shall be included in the QC plan.
- H. A listing of outside organizations such as, architectural and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.
- I. Testing laboratory information required by the paragraphs entitled "Accreditation Requirements" or "Construction Materials Testing Laboratory Requirements", as applicable.
- J. A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, the desired results and the person responsible for each test and shall be identified as a scheduled activity.
- K. Procedures for reviewing, approving and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal of the Submittal Register as specified in Section entitled "Submittals."
- L. List of definable features of work. The list shall be cross-referenced to the contractor's Construction Schedule and the specification sections. For projects requiring a Progress Chart, the list of definable features of work shall include but not be limited to all items of work on the schedule. For projects requiring a Network Analysis Schedule, the list of definable features of work shall include but not be limited to all critical path activities. Include a chart of common deficiencies for the Definable Feature of work. Detail the control procedures that shall be employed to eliminate this common deficiency.
- M. Procedures for Performing the Phases of Control. The contractor shall develop a plan for incorporating each of the control phases into the work. The plan shall detail who shall be responsible for scheduling the phases, conducting the phase as well as documenting the phase. The use of project specific forms may be helpful. However, the entire plans and specifications establish the quality and not just the checklists. The Preparatory and Initial Phases and meetings shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems for each definable feature of work.

- N. Include all activities for which this specification requires QC specialists or Specialty Inspection Personnel, and for any specific definable features of work as identified in the QC Plan.
- O. Documentation procedures, including proposed report formats.
- P. Procedures to identify, record, track and complete rework items.
- Q. Procedures for Identifying and Documenting the Completion Inspection process. Include in these procedures the responsible party for punch out inspection, pre-final inspection, and final acceptance inspection.
- R. A complete set of report forms to be utilized on this project.
- S. All applicable subcontractors and suppliers Quality Control Plans complete with Contactor's CQC planned involvement.

1.12 COORDINATION AND MUTUAL UNDERSTANDING MEETING

- A. After submission of the QC Plan, and prior to the start of any physical construction, meet with the SAA to present the QC Program required by this Contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, and the coordination of the Contractor's management, production and QC personnel. At the meeting, the Contractor shall be required to explain in detail how Phases Control shall be implemented for each definable feature of work. As a minimum, the Contractor's personnel required to attend shall include an officer of the firm, the project manager, project superintendent, QCM, Alternate QCM and subcontractor representatives. Each subcontractor who shall be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting shall be prepared by the QCM and signed by the Contractor. The Contractor shall provide a copy of the signed minutes to all attendees.

1.13 QC MEETINGS

- A. After the start of construction, the QCM shall conduct weekly QC meetings at the work site with the project superintendent. The QCM shall prepare the minutes of the meeting and provide a copy to the SAA within 2 working days after the meeting. The SAA may attend these meetings. The QCM shall notify the at least 48 hours in advance of each meeting. These meetings shall be scheduled to precede or follow the regular weekly progress meeting. As a minimum, the following shall be accomplished at each meeting:
 - 1. Review the minutes of the previous meeting
 - 2. Review the schedule and the status of work:
 - a. Work or testing accomplished since last meeting
 - b. Rework items identified since last meeting
 - c. Rework items completed since last meeting;
 - 3. Review the status of submittals, O & M data and Warranty Manuals:
 - a. Submittals reviewed and approved since last meeting

- b. Submittals required in the near future;
4. Review the work to be accomplished in the next 2 week(s) and documentation required:
 - a. Establish completion dates for rework items
 - b. Update the schedule showing planned and actual dates of the preparatory, initial and follow-up phases, including testing and any other inspection required by this contract
 - c. Discuss construction methods and the approach that shall be used to provide quality construction by planning ahead and identifying potential problems for each definable feature of work
 - d. Discuss status of off-site work or testing
 - e. Documentation required;
 - f. Discuss upcoming Activity Hazard Analyses.
 5. Resolve QC and production problems, assist in resolving Request for Information issues;
 6. Address items that may require revising the QC plan:
 - a. Changes in QC organization personnel
 - b. Changes in procedures.
 7. Review health and safety plan

1.14 PHASES OF CONTROL

- A. The Phases of Control shall adequately cover both on-site and off-site work and shall include the following for each definable feature of work.
- B. Material Receiving Inspection: Contractor shall establish a formal material receiving inspection program to verify material compliance to approved Shop Drawings, approved submittals, and the contract plans and specifications.
- C. Preparatory Phase: Notify the SAA at least 2 workdays in advance of each preparatory phase. This phase shall include a meeting conducted by the QCM and attended by the superintendent, and the foreman responsible for the definable feature. Document the results of the preparatory phase actions in the daily Quality Control Daily Report and in the Preparatory Phase Report. As a minimum the following should be covered prior to beginning work on each definable feature of work:
 1. Review each paragraph of the applicable specification sections.
 2. Review the project drawings.
 3. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.
 4. Establish control to be utilized to assure work complies with the contract plans and specifications.

5. Review the testing plan and ensure that provisions have been made to provide the required QC testing.
 6. Examine the work area to ensure that the required preliminary work has been completed.
 7. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data.
 8. Discuss construction methods, construction tolerances, workmanship standards, and the approach that shall be used to provide quality construction by planning ahead and identifying potential problems for each definable feature of work.
 9. Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.
- D. Initial Phase: Notify the SAA at least 2 workdays in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the superintendent, and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily Quality Control Daily Report and in the Initial Phase Report. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. As a minimum the following should be covered for each definable feature of work:
1. Ensure controls established during Preparatory Phase are adequate to allow work to proceed in compliance with the plans and specifications.
 2. Establish the quality of workmanship required.
 3. Resolve conflicts.
 4. Ensure that testing is performed by the approved laboratory.
 5. Check work procedures for compliance with the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met.
- E. Follow-Up Phase: Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Quality Control Daily Report:
1. Ensure the work is in compliance with Contract requirements.
 2. Maintain the quality of workmanship required.
 3. Ensure that testing is performed by the approved laboratory.
 4. Ensure that rework items are being corrected.
 5. Perform safety inspections.
- F. Code-Required Inspections:
1. All inspections shall comply with applicable City of Shreveport Building Codes. Special Inspections are to be performed by the Authority's agent or 3rd part inspector. Perform and document all tests, inspections, notifications to the Authority, coordination with the Authority's agent and other activities listed in the USBC or other agencies having jurisdiction.

2. Notice to SAA: Notify the SAA, in writing, at least 48 hours in advance of all code-required inspections. The SAA should be apprised in advance of every preparatory and initial inspection. All preparatory, initial, and follow-up inspections shall be made a matter of record in Contractor's quality-control documentation.

G. Additional Preparatory and Initial Phases

1. Additional Preparatory and Initial Phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a definable feature is resumed after substantial period of inactivity, or if other problems develop as directed by the SAA in writing.

H. Notification of Phases of Control for Off-Site Work

1. On determination by the SAA that an item shall require surveillance by the Authority at the point of production, manufacture, or shipment, Contractor shall be notified, in writing, of such determination. Contractor shall furnish to the SAA three copies of all purchase orders or subcontracts, for all tiers of subcontractors or suppliers for each item. In addition, copies of documented quality-control operations, tests, and inspections shall be made available to the Authority's representative at the point of production, manufacture, or shipment. The CQC shall notify the SAA at least two weeks prior to the start of the preparatory and initial phases.

1.15 SUBMITTAL REVIEW AND APPROVAL

- A. Procedures for submission, review and approval of submittals are described in Division 01 Section "Submittals".

1.16 TESTING

- A. Except as stated otherwise in the technical specification sections, perform sampling and testing required under this Contract.
- B. Independent Testing Laboratory: When tests are required by civil, electrical, USBC and other codes in effect, a corporately and financially independent testing organization that can function as an unbiased testing authority, professionally independent of manufacturers, suppliers, and installers of equipment, or systems evaluated by the testing organization shall be contracted by the Contractor to perform the contractually required tests. The various types of independent laboratories and their requirements are listed below:
- C. Accreditation Requirements: Construction materials testing laboratories performing work for Authority construction contracts shall be accredited by one of the laboratory accreditation authorities. The laboratory's scope of accreditation shall include the ASTM standards listed in the paragraph titled "Construction Materials Testing Laboratory Requirements" as appropriate to the testing field. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office".

- D. Electrical testing of components, equipment and systems: The testing firm shall be regularly engaged in the testing of electrical equipment, devices, installations, and systems. The testing firm shall have at least five years experience in the testing of electrical equipment of the type, rating, and voltage used on this Project. The testing laboratories shall be a current full-member company of the International Electrical Testing Association (<http://www.neta.org/>). This independent testing firm shall perform duties as required under the terms of this Contract.
- E. Structural and Pipe Welding: An independent testing firm shall perform all structural and pipe welding examinations as required by this Contract. The inspectors employed by the firm shall hold current certification as an AWS Certified Welding Inspector (CWI) for visual weld examinations and ASNT-TC-1A Certification for nondestructive examination of welds. ASNT-TC-1A certifications shall be by an ASNT-TC-1A ACCP Level III.
- F. Construction Materials Testing Laboratory Requirements: Provide an independent construction material testing laboratory accredited by an acceptable laboratory accreditation authority to perform sampling and tests required by this Contract. Testing laboratories that have obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" submit with the Quality Control Plan, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract. On-site testing facilities shall submit a certified statement by the Supervising Professional Engineer, licensed in the Commonwealth of Virginia, as meeting the requirements of the following minimum ASTM standards listed below as appropriate to the testing field.
1. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E 329.
 2. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.
 3. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.
 4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.
 5. Laboratories engaged in nondestructive testing (NDT) shall meet the requirements of ASTM E 543.
 6. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.
- G. Laboratory Accreditation Authorities: Laboratory Accreditation Authorities are the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO) program, ICBO Evaluation Service, Inc. (ICBO ES), and the American Association for Laboratory Accreditation (A2LA) program and the Washington Area Council of Engineering Laboratories (WACEL). Furnish to the SAA a copy of the current Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract.
- H. Capability Check: The SAA retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

- I. Capability Recheck: If non-conformities are discovered during the capability check or any succeeding recheck, Contractor shall be assessed a charge of \$750.00 to reimburse the Authority for each recheck of the laboratory or the checking of a subsequently selected laboratory. These charges shall be deducted from the total amount due Contractor. **See if they want this section.**
 - J. Test Results: Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify SAA immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. A testing laboratory representative authorized to sign certified test reports shall sign test results. Furnish the signed reports, certifications, and other documentation to the SAA via the QCM. Furnish a summary report of field tests at the end of each month All Monthly Summary Test Reports shall be reviewed and signed by a professional engineer, licensed in the State of Louisiana.
 - K. Test Reports and Monthly Summary Report of Tests:
 1. The QCM shall furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the SAA.
 - L. Control and Verification Tests: Control tests are those tests made for Contractor under the Quality Control Plan to assist Contractor in maintaining control of his operations. As described above, Contractor shall procure the services of an independent commercial laboratory to perform the required control tests. The Specifications contain the minimum of the following:
 1. Testing criteria
 2. Frequency of testing
 3. Procedures
 4. Methods of construction
 5. Number of control tests to be made for each phase of the Work.
 6. Notify SAA a minimum of 24 hours in advance of the time samples shall be taken by Contractor for quality control testing. SAA shall then notify its own testing laboratory contractor so that verification test samples may be taken.
 - M. Check Tests: Contractor shall furnish to SAA the quantities of materials to be used for check testing as required in the Specifications. Check testing shall be performed by the Authority at an independent laboratory at no cost to Contractor. No direct payment shall be made to Contractor for the furnishing of materials used for check testing.
 - N. Staffing: All laboratory personnel shall work under the supervision of a Professional Engineer licensed in the Commonwealth of Virginia.
- 1.17 QC CERTIFICATIONS
- A. Quality Control Daily Report Certification
 1. Each Quality Control Daily Report shall contain the following statement:

- a. "On behalf of (Name of Contractor), I certify that this report and the Inspector's Daily Reports are complete and correct, and that all materials and equipment used, as well as work performed during this reporting period are in compliance with Drawings, Specifications, and Contract provisions, except as noted in this report or attached reports."
- B. Application for Payment Certification
 1. Refer to Division 01 Section "Application for Payment" for address to which the Applications shall be sent.
- C. Completion Certification:
 1. Upon completion of work under this Contract, the QCM shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract."

1.18 COMPLETION INSPECTIONS

- A. Punch-Out Inspection: Near the completion of all work or any increment thereof established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QCM shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Include in the punch list any remaining items on the "Rework Items List" which were not corrected prior to the Punch-Out Inspection. The punch list shall include the estimated date by which the deficiencies will be corrected. A copy of the punch list shall be provided to the SAA. The QCM or staff shall make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished the Contractor shall notify the COTR that the facility is ready for the Authority "Pre-Final Inspection."
- B. Pre-Final Inspection: The Authority will perform this inspection to verify that the facility is complete and ready to be occupied. An Authority "Pre-Final Punch List" may be developed as a result of this inspection. The QCM shall ensure that all items on this list are corrected prior to notifying the Authority that a "Final" inspection with the customer can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in timely manner and shall be accomplished before the contract completion date for the work or any particular increment thereof if the project is divided into increments by separate completion dates.
- C. Final Acceptance Inspection: The QCM, the QC specialists, the superintendent or other primary contractor management personnel shall be in attendance at this inspection. The SAA will be in attendance at this inspection. Additional Authority personnel may be in attendance. The Contracting Officer based upon results of the "Pre-Final" inspection will formally schedule the final acceptance inspection. Notice shall be given to the SAA at least 14 calendar days prior to the final inspection stating that all specific items previously identified to the Contractor, as being unacceptable, along with all the remaining work performed under the contract, shall be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection shall be cause for the Contracting Agency to bill the Contractor for the Authority's additional inspection cost in accordance with the clause in the Contract Provisions entitled "Inspection of Construction." When the Contracting Agency takes possession of partially completed work, it shall be in

accordance with clause in the Contract Provisions entitled "Use and Possession Prior to Completion".

1.19 DOCUMENTATION

- A. Contractor shall maintain current quality control records, on approved forms, of all control activities, production, tests and inspections performed. These records shall include factual evidence that required tests or inspections have been performed, including type and number of tests or inspections involved; results of tests or inspections; nature of defects, causes for rejection, etc.; proposed remedial action; and corrective actions taken. These records shall cover both conforming and defective or deficient features (non-conforming) and shall include a statement that all supplies and materials incorporated into the Work are in full compliance with terms of the Contract. Legible copies of these records shall be furnished to SAA daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified by Contractor's QCM. Contractor shall document tests and inspections as specified in the technical provisions of the Specifications, and these records shall be available for review by the SAA throughout the life of the Contract.
- B. Maintain current and complete records of on-site and off-site QC Program operations and activities. Establish and maintain the following in a series of 3 ring binders. Binders shall be divided and tabbed as shown below. These binders shall be readily available to the Authority's Quality Assurance Team during normal business hours.
1. All completed Preparatory and Initial Phase Reports, arranged by specification Section.
 2. All milestone inspections, arranged by Activity/Event Number.
 3. A current up-to-date copy of the Testing Plan and Log with supporting field test reports, arranged by specification section.
 4. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.
 5. A current, up-to-date copy, of the Deficiency List.
- C. Report Forms - The contractor shall design all forms to be used in the Quality Control Program. A copy of all forms shall be included with the Quality Control Plan. The forms shall be designed to assist in the control of the quality. The following minimum requirements are listed for specific reports:
1. Quality Control Daily Report: Reports are required for each day that work is performed and for every seven consecutive calendar days of no work and on the last day of a no-work period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Quality Control Daily Reports are to be prepared, signed and dated by the QCM and shall contain the following information:
 - a. Date of report, report number, Contract Number, and Contract Title.
 - b. Identify Schedule Activity No., Submittal # and list equipment/material received each day that is incorporated into the job.
 - c. Indicate if Preparatory Phase work was performed today (Yes/No checkboxes).

- d. If Preparatory Phase work was performed today (including on-site and off-site work), identify its Schedule Activity Number and Definable Feature of Work. The Index number is a cross reference to the Preparatory Phase Checklist. An example of the Index number is: 0025-P01, where "0025" is the Quality Control Daily Report Number, "P" indicates Preparatory Phase, and "01" is the Preparatory Phase Checklist number(s) for this date. Each entry in this Section shall be accompanied with a corresponding Preparatory Phase Checklist.
 - e. Indicate if Initial Phase work was performed today (Yes/No checkboxes).
 - f. If Initial Phase work was performed today (including on-site and off-site work), identify its Schedule Activity Number and Definable Feature of Work. The Index Number is a cross reference to the Initial Phase Checklist. An example of the Index Number is: 0025-I01, where "0025" is the Quality Control Daily Report Number, "I" indicates Initial Phase, and "01" is the Initial Phase Checklist number(s) for this date. Each entry in this Section shall be accompanied with a corresponding Initial Phase Checklist.
 - g. Results of the Follow-up Phase inspections held today (including on-site and off-site work), including Schedule Activity Number, location of definable feature of work, Specification Sections, etc. Indicate in the report for this definable feature of work that the work complies with the Contract as approved in the Initial Phase, work complies with safety requirements, and that required testing has been performed. Include a list of who performed the tests.
 - h. List the rework items identified, but not corrected by close of business, along with its associated Schedule Activity Number.
 - i. List the rework items corrected from the rework items list along with the corrective action taken and its associated Schedule Activity Number.
 - j. Include a "remarks" section in this report that shall contain pertinent information including but not limited to:
 - 1) Directions received.
 - 2) Quality control problem areas.
 - 3) Deviations from the QC plan.
 - 4) Construction deficiencies encountered.
 - 5) QC meetings held,.
 - 6) Acknowledgement that record drawings, specifications, O & M data, and Warranty Manuals, have been updated.
 - 7) Corrective direction given by the QC Organization and corrective action taken by the Contractor.
 - 8) For each remark given, identify the Schedule Activity Number that is associated with the remark.
 - k. Quality Control Daily Report certification, signature and date.
2. Preparatory Phase Report: Each Definable Feature of Work that is in the Preparatory Phase shall have this report filled out for it. The report shall be identified by terminology

consistent with the construction schedule. Attach this report to the Quality Control Daily Report of the same date.

- a. Specification Section, date of report, and Contract number shall be filled out. Duplicate this information in the header of the second page of the report.
 - b. Definable Feature of Work, Schedule Activity Number and Index Number entry and format shall match entry in the Preparatory Phase section of the Quality Control Daily Report. Duplicate this information in the header of the second page of the report.
 - c. Personnel Present: Indicate the number of hours of advance notice that was given to the SAA and indicate (Yes/No checkboxes) whether or not the SAA was notified. Indicate the Names of Preparatory Phase Meeting attendees, their position and their company affiliation.
 - d. Submittals: Indicate if submittals have been approved (Yes/No checkboxes), if no indicate what has not been submitted. Are materials on hand (Yes/No checkboxes) and if not, what items are missing. Check delivered material/equipment against approved submittals and comment as required.
 - e. Material Storage: Indicate if materials/equipment is stored properly (Yes/No checkboxes) and if not, what action is/was taken.
 - f. Specifications: Review and comment on Specification Paragraphs that describe the material/equipment, procedure for accomplishing the work and clarify any differences.
 - g. Preliminary Work & Permits: Ensure preliminary work is in accordance with the contract documents and necessary permits are on file, if not, describe the action taken.
 - h. Testing: Identify who performs tests, the frequency, and where tests are to occur. Review the testing plan, report abnormalities, and if the test facilities have been approved.
 - i. Discuss Control Procedures that shall be employed to consistently obtain the required specified quality.
 - j. Safety: Indicate if the activity hazard analysis has been approved (Yes/No checkboxes) and comment on the review of the applicable portions of the Construction Safety Manual.
 - k. Meeting Comments: Note comments and remarks during the Preparatory Phase Meeting that was not addressed in previous sections of this checklist.
 - l. Other Items or Remarks: Note any other remarks or items that were a result of the Preparatory Phase.
 - m. QCM shall sign and date the report.
3. Initial Phase Report: Complete this report for each Definable Feature of Work that is in the Initial Phase. The report shall be identified by terminology consistent with the construction schedule. Do not attach to the Quality Control Daily Report.
- a. Specification Section, date of report, and Contract number shall be entered.

- b. Definable Feature of Work, Schedule Activity Number and Index Number entry and format shall match entry in the Initial Phase section of the Quality Control Daily Report.
 - c. Personnel Present: Indicate the number of hours of advance notice that was given to the SAA and indicate (Yes/No checkboxes) whether or not the SAA was notified. Indicate the Names of Initial Phase Meeting attendees, their position and company/Authority they are with.
 - d. Control Procedures: Comment on control procedures identified at Preparatory Phase of Control and assurance that work is in accordance with plans, specifications and submittals. Control procedures not producing the required compliance shall be adjusted until the procedures consistently obtain the required quality.
 - e. Preliminary Work: Ensure preliminary work being placed is in compliance and if not, what action is/was taken.
 - f. Workmanship: Identify where initial work is located; if a sample panel is required (Yes/No checkboxes); is the initial work the sample (Yes/No checkboxes); and if Yes, describe the panel location and precautions taken to preserve the sample.
 - g. Resolution: Comment on any differences and the resolutions reached.
 - h. Check Safety: Comment on the safety review of the job conditions.
 - i. Other: Note any other remarks or items that were a result of the Initial Phase.
 - j. QCM shall sign and date the report.
- D. Testing Log: As tests are performed, the QCM shall record on the "Testing Log" the date the test was conducted, the date the test results were forwarded to the SAA, remarks and acknowledgement that an accredited or Contracting Officer approved testing laboratory was used. Forward a copy of the updated "Testing Plan and Log" on the last day of each month. Do not attach to the Quality Control Daily Report.
- E. Deficiency Log: The QCM shall maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item shall be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Provide a copy of the deficiency log to the SAA at the weekly progress meeting. The Contractor shall be responsible for including on this list items needing rework including those identified by the SAA.
- F. Special Inspection Control Log: Contractor shall maintain a Special Inspection Control Log chronologically recording each Special test and inspection performed under the USBC, or other agencies having jurisdiction on-site, including the nature of the test or inspection, the date performed, the results, causes for rejection, corrective action taken, and dates of subsequent tests and final acceptance.
- G. Test Reports: Contractor shall be responsible for establishing a system that shall record all tests results. Information on test designation, location, date of test, specification requirements, results and retest results, causes for rejection and recommended remedial actions shall be documented. A copy of the test results shall be sent directly from the Agency performing the testing services to the SAA. A copy of any failing report shall be sent immediately.

All test reports shall be reviewed and signed by a professional engineer, licensed in the State of Louisiana.

- H. Signoff Sheets: Contractor shall be responsible for establishing a system of signoff sheets certifying that all work required before the construction or startup of critical work elements has been constructed and installed according to the plans and specifications.
- I. Monthly Deficiency Report: Contractor shall submit a monthly deficiency report to the SAA identifying all substandard tests and inspections taken during the month including the nature of the test or inspection, location and nature of defects, causes for rejection, and remedial actions taken or proposed for any open items on prior deficiency reports including the date scheduled for resolution of the item.
- J. Record Drawings: The QCM is required to ensure the record drawings, required by Division 01 Section "Project Record Documents," are kept current on a daily basis and marked to show deviations which have been made from the construction drawings. Ensure each deviation has been identified with the appropriate modifying documentation (e.g. CN No., Modification No., Request for Information No., etc.). The QCM shall initial each deviation and each revision. Upon completion of work, the QCM shall furnish a certificate attesting to the accuracy of the record drawings prior to submission to the SAA.
- K. Operation, Maintenance, and Warranty Manuals: The QCM shall ensure that the Operation and Maintenance data required by Division 01 Section "Operation and Maintenance Data" and the Warranties specified in Division 01 Section "Project Closeout" are inserted on a daily basis in the appropriate sections of the approved formatted manuals after they have been approved by the SAA.
- L. Materials Receiving Inspection Report: Contractor shall establish a formal materials receiving inspection program to verify material compliance to approved Shop Drawings, approved submittals, and the contract plans and specifications.

1.20 NOTIFICATION ON NON-COMPLIANCE

- A. The SAA will notify the Contractor of any detected non-compliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may:
 - 1. Issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall make no part of the time lost due to such stop orders the subject of a claim for extension of time for excess costs or damages.
 - 2. Repair, replace or otherwise remedy the defective work at the Contractor's expense. Cost incurred by the Authority to correct defective work shall be deducted from the total amount due the Contractor.
 - 3. Withhold an amount from the payment due the Contractor as may be deemed necessary at the discretion of the Contracting Officer.
 - 4. Terminate the Contractor's right to proceed for Default after providing required notice.

- B. In cases where implementation of the Quality Control Program does not comply with the Contractor's Quality Control Plan or the contract provisions. Or Contractor fails to properly operate and maintain an effective Quality Control Program, the Contracting Officer may:
1. Order the Contractor to replace ineffective or unqualified Quality Control Personnel or subcontractors.
 2. Issue an order stopping all or part of the work until acceptable personnel are on site and a new Quality Control Plan is approved by the SAA. The Contractor shall make no part of the time lost due to such stop orders the subject of claim for extension of time for excess costs or damages.
 3. Take a credit from the contract for Quality Control Activities not performed.
 4. Terminate the Contractors right to proceed for Default after providing required notice.
- C. The Contractor shall maintain a detailed record of every non-compliance and corrective action taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section defines many of the terms used elsewhere in the Construction Documents and lists complete names and telephone numbers for many of the associations and agencies identified elsewhere in the Construction Documents by their acronym.
- B. Abbreviations, where not defined in the Contract Documents, will be interpreted by the Contracting Officer to mean the normal construction industry terminology.
- C. Plural words will be interpreted as singular and singular words will be interpreted as plural where applicable for context of the Contract Documents.

1.3 DEFINITIONS

- A. General: Basic Contract definitions are included in Sections I and II of the Authority Solicitation Offer and Award. Certain terms used in the Contract Documents are defined generally in this Article. Definitions and explanations contained in this Section are not necessarily either complete or exclusive, but are general for the Work to the extent that they may not be stated more explicitly in another element of the Contract Documents.
- B. Approve: The term "approved," where used in regard to the SAA's action on Contractor's submittals, applications, and requests, is limited to the SAA's duties and responsibilities as delegated by the Contracting Agency in the Contract and Special Provisions.
- C. Architect/Engineer: For the purpose of this Project, the "Design Professional of Record." To distinguish from the Contracting Officer and the SAA's Representative
- D. Authority: Shreveport Airport Authority (SAA)
- E. Award: The acceptance, by the Authority, of the successful offeror's proposal.
- F. Award Date: The date on which the Authority gives notice of acceptance to the successful offeror.
- G. AOA (or A.O.A.): Air Operations Area. The area of the Airport used or intended to be used for landing, taking off, surface maneuvering, loading, unloading, or servicing aircraft. This security

area requires security badging. Workers in this area are required to obtain and display an AOA photo I.D. credential. Drivers in this area are required to undergo driver's training as conducted by the SAA.

- H. Beneficial Use: Use by the Authority prior to 100 percent completion and final acceptance.
- I. Contract Documents: Documents containing requirements of the Work. These include all Contract provisions and attachments made thereto or referenced therein.
- J. Contract Provisions: The administrative and procedural requirements starting at Award Date and ending at Final Acceptance, as provided for in Section VII, "Contract Provisions."
- K. Contract Time or Duration (Time Limit): The number of calendar days established in Section III, "Schedule," indicating the time allowed for the completion of all physical and administrative work contemplated in the Contract, including any authorized extensions thereto.
- L. Contracting Officer's Technical Representative (COTR): The Contracting Officer's designated representative, as defined in Section VII, "Contract Provisions."
- M. Contractor: Individual, partnership, corporation or joint venture under Contract to the Authority for performance of prescribed Work.
- N. Drawings: Erection/installation/construction plans, or any other supplementary plans or similar graphic data, illustrating work to be performed that are provided to Contractor as part of the Contract Documents.
- O. Directed: A command or instruction by the Authority. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- P. Final Acceptance: Refer to Division 01 Section "Project Closeout."
- Q. "Indicated": Requirements expressed by graphic representations or in written form on drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- R. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- S. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- T. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- U. "Provide": Furnish and install, complete and ready for the intended use.
- V. "Installer": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
 - W. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of ten previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
 - X. "Project Site": Space available for performing construction activities. The extent of Project site is shown on the contract drawings.
 - Y. Punch list Work: Minor corrective actions required to achieve "Final Acceptance." Occurs after "Substantial Completion" of the Work in strict compliance with quality-control requirements.
 - Z. Roadway: General term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
 - AA. Special Provisions: For the purpose of this Contract, the directions and requirements provided for in Section VI of the Contract Documents.
 - BB. Shop Drawings: Refer to Division 01 Section "Submittals."
 - CC. Specifications: General term comprising all directions, provisions and requirements contained herein, together with any other contractual requirements such as may be added or adopted as the Contract Provisions, Special Provisions, or Supplementary Conditions, all of which are necessary for the proper performance of the Contract.
 - DD. Substantial Completion: Refer to Division 01 Section "Project Closeout."
 - EE. Factory-Authorized Service Representative: An authorized representative of a manufacturer who is trained and approved by the manufacturer to inspect and approve the installation of manufacturer's products and that are similar in material, design, and extent to those indicated for this Project and who is authorized by the manufacturer to confirm the issuance of appropriate warranties.
- 1.4 INDUSTRY STANDARDS
- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
 - B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
 - C. Conflicting Requirements: Refer to Division 01 Section "Quality Requirements" for additional information regarding conflicting requirements.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the SAA's for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project shall be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.
- E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up- to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	(601) 634-2355
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point www.dodssp.daps.mil	(215) 697-6257
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point. www.dodssp.daps.mil	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov	(202) 501-1021

	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587
MIL	See MILSPEC	
MS MIL	See MILSPEC	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point www.dodssp.daps.mil	(215) 697-6257
MUTCD	Manual on Uniform Traffic Control Devices Department of Transportation Federal Highway Administration (See FHA. Located in Paragraph Federal Government Agencies").	
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

1.5 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AASHTO	American Association of State Highway and Transportation Officials http://www.transportation.org	(202) 624-5800
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org	(972) 506-7216
AGA	American Gas Association www.aga.org	(202) 824-7000

AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AI	Asphalt Institute http://www.asphaltinstitute.org	(859) 288-4960
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
API	American Petroleum Institute www.api.org	(202) 682-8000
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
NECA	National Electrical Contractors Association http://www.necanet.org/	(301) 657-3110
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NFPA	NFPA www.nfpa.org	(800) 344-3555 (617) 770-3000

UL Underwriters Laboratories Inc. (800) 285-4476
www.ul.com (847) 272-8800

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

City of Shreveport - Office of Permits (318) 673-6100
www.shreveportla.gov

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE Army Corps of Engineers
www.usace.army.mil

EPA Environmental Protection Agency (202) 260-2090
www.epa.gov

FAA Federal Aviation Administration (202) 366-4000
www.faa.gov

FHA Federal Highway Administration (410) 962-0093
www.fhwa.dot.gov

NIST National Institute of Standards and Technology (301) 975-6478
www.nist.gov

OSHA Occupational Safety & Health Administration (800) 321-6742
www.osha.gov (202) 693-1999

TRB Transportation Research Board (202) 334-2934
www.nas.edu/trb

TSA Transportation Security Administration 1(866)-289-9673
www.tsa.gov/public/index.jsp

D. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DNR Louisiana Department of Natural Resources (225) 342-4500
<http://www.dnr.louisiana.gov/>

DHH	Louisiana Department of Health and Hospitals http://www.dhh.louisiana.gov/	(225) 342-9500
DOTD	Louisiana Department of Transportation and Development http://www.dotd.la.gov/	(225) 379-1232
DEQ	Louisiana Department of Environmental Quality http://www.deq.louisiana.gov/	(225) 219-5337

1.6 GOVERNING REGULATIONS/AUTHORITIES

- A. Contact authorities having jurisdiction directly for information and decisions having a bearing on the work. Names and addresses are subject to change; they are believed to be but are not assured to be accurate and up to date as of the date of the Contract Documents.
- B. Codes: The contractor shall adhere to all applicable portions of code standards and specifications in the construction of the work. Unless otherwise noted (reference Division 01 Section “Quality Requirements”), the Authority will review the Contractor’s submittals and construction of the work for code compliance. The Authority’s acceptance of completed construction does not relieve the Contractor from strict compliance with all applicable regulations and codes.
1. Definition: The Shreveport Airport Authority, Where the words “code official”, “department having jurisdiction” or “agency having jurisdiction” is referenced in any code, including any adopted model codes (ICC), those terms shall mean the Building Official and/or his designated representative.
 2. Standards that influence the construction of the project include, but are not limited to, all applicable federal and local laws, all applicable codes, rules, regulations and standards applicable to this project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, security, and protection facilities for Contractor staging area.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Sewers and drainage.
 - 2. Water service and distribution.
 - 3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 4. Heating and cooling facilities.
 - 5. Ventilation.
 - 6. Electric power service.
 - 7. Telephone and other communication services.
 - 8. Airfield Lighting
- C. Support facilities include, but are not limited to, the following:

1. Temporary roads and paving.
2. Dewatering facilities and drains.
3. Project identification and temporary signs.
4. Waste disposal facilities.
5. Field offices.
6. Storage and fabrication sheds.
7. Lifts and hoists.
8. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Storm water control.
3. Site enclosure fence.
4. Security enclosure and lockup.
5. Barricades, warning signs, and lights.

E. Related Sections include the following:

1. Division 01 Section "Submittals" for procedures for submitting copies of implementation and termination schedule and utility reports.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by the SAA, permanent or temporary roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

- A. General: Temporary utilities are available from the SAA at no charge unless otherwise noted. Provide necessary labor and materials to connect to the Authority's utilities at points designated by the SAA and extend utilities to trailers, offices, sheds, etc.
 - 1. Provide The Authority approved meters for water, natural gas, electricity, and each other utility used for Project. Supply utilities to Subcontractors' temporary facilities through Contractor's meters. The requirement to provide meters for utilities does not imply that the Contractor will be charged for these utilities, except under provisions outlined in this and other Sections. **See if this is required**
 - 2. Report consumption of each utility to the Authority each month. Contractor is expected to consume reasonable amounts of each utility. Should Contractor, in the Authority's opinion, use excessive amounts of any utility or waste a utility, Contractor may be required to pay for temporary utilities. **See if this is required**
- B. Allow other entities to use temporary services and facilities without cost, including, but are not limited to, the following:
 - 1. The Authority's construction forces.
 - 2. Occupants of Project.
 - 3. Architect/Engineer.
 - 4. Testing agencies.
 - 5. Personnel of authorities having jurisdiction.

1.5 SUBMITTALS

- A. Shop Drawings: Submit to the SAA, for the Authority's review and approval, site plans indicating all temporary facilities, support and security; utility connections and traffic flows. Provide detailed drawings of utility connections and special facilities.
- B. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities at both staging area and the Project site. Make all structures weather proof when heated and air-conditioned. Should Contractor, in the Authority's opinion fail to keep the heated and cooled structures sealed and weather proof, Contractor may be required to pay for temporary utilities.
- C. Implementation and Termination Schedule: Within 15 calendar days of date established for submittal of Contractor's first Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

1.6 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, that include but are not limited to, the following:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Police and Fire Department regulations.
 - 4. Environmental protection regulations.
 - 5. ADA Compliance: All temporary facilities shall be ADA compliant.
- B. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
 2. Electrical Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electrical service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for the Authority's Building Codes/Environmental Department to test and inspect each temporary utility before use. Coordinate with the Building Codes/Environmental Department for requirements for certifications, permits, and inspections.
1. Obtain permits from the Building Codes/Environmental Department for temporary construction and temporary utilities.

1.7 PROJECT CONDITIONS

- A. Temporary Utilities: At earliest feasible time, when acceptable to the SAA, change over from use of temporary service to use of permanent service.
1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before the SAA's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: The following conditions apply to use of temporary services, permanent services, and facilities by all parties engaged in the Work:
1. Keep temporary services and facilities clean and neat.
 2. Relocate temporary services and facilities as required by progress of the Work.
 3. Take necessary fire-prevention measures.
 4. Do not overload facilities.

5. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

1.8 CONTRACTOR PERSONNEL PARKING

- A. The Contractor's personnel will be allowed to park their personal vehicles in staging areas or in areas designated by the SAA. Such designated parking areas are not necessarily fenced or otherwise protected, and temporary fencing for such parking areas is a requirement of this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by the SAA. Provide materials suitable for use intended.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.
- C. Tarpaulins: Fire-resistive labeled with flame-spread index of 15 or less.
- D. Water: Potable.
- E. Temporary Fuel Tanks: For requirements for temporary fuel tanks see Division 31 Section "Storm Water Pollution Protection Plan." Comply with applicable safety and environmental regulations for temporary surface fuel tanks. Location and installation of tanks will be subject to review and approval of Authority and the Authority's Fire Marshal.

2.2 EQUIPMENT

- A. General: Provide new equipment suitable for use intended. If acceptable to the SAA, undamaged, previously used equipment in serviceable condition may be used.
- B. Field Offices: Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading, and provided with proper tie-downs.
- C. Self-Contained Toilet Units: Single-occupant units of chemical, aerated re-circulation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
 - 1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.
- E. Heating Equipment: Unless the SAA authorizes use of permanent heating system, provide temporary heating units with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.
- F. Electrical Outlets: Properly configured, NEMA-polarized outlets that will prevent insertion of 110v or 120v plugs into higher-voltage outlets, and equipped with ground-fault circuit interrupters with reset button.
- G. Power Distribution System Circuits: Where permitted, overhead, and visible wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic-sheathed cable.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 CONTRACTOR STAGING AREA - GENERAL

- A. Contractor will be allowed to store and stage his materials in a staging area located on Airport property as indicated or as designated by the SAA for such purposes. Space is limited to area indicated. The SAA and Contractor will make a joint site visit to document condition of staging area prior to occupancy. Take photos for the record.
- B. Upon completion of Construction, remove all temporary staging area facilities and return the areas to their original condition.
- C. Park construction equipment in the storage site or storage area identified by the SAA when equipment is not engaged in construction activity.
- D. Do not stockpile construction materials, spoils, debris or refuse in any area other than that specifically approved for such purpose by the SAA.
- E. Constrain stockpiled material in a manner to prevent its movement by wind, jet blast or propeller wash.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Provide temporary service for each utility required. Comply with requirements of the Building Codes, the Authority's Construction Safety Manual, and the requirements of all Sections of these specifications.
1. Arrange with the SAA for time when service can be interrupted, if necessary, to make connections for temporary services. For additional information on utility outages see Division 01 Section, "Summary."
 2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
 3. Perform work associated with utilities owned by the Authority as approved by the Authority.
 4. See additional information in Contract Provisions entitled "Availability and Use of Utility Service."
- B. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
- C. When using SAA sewers:
1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
 2. Connect temporary sewers to the Authority's system as directed by SAA
 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.

4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.
- D. **Water Service:** Provide temporary water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use. Provide Badger Recordall, Turbo II Utility type water meter to meter all water usage for 2-inch water feed lines and above. Provide Badger Recordall bronze disc water meter for to meter all water usage for water feed lines under 2-inche. The SAA will approve water meters, in writing prior to installation of water meters. Do not install water meters until written approval has been received from the SAA. Provide Watts Model 909, Type RPZ backflow preventers. Do not install backflow preventers until written approval of backflow preventers has been received from the SAA.
- E. **Sanitary Facilities:** Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
1. **Disposable Supplies:** Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. **Toilets:** Install self-contained toilet units, located as approved by the SAA. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel. Use of the Authority's existing toilet facilities will not be permitted.
 3. **Wash Facilities:** Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
 - a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
 4. **Drinking-Water Facilities:** Provide bottled-water, drinking-water units.
 - a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

5. Locate toilets and drinking-water fixtures so personnel need not walk more than 200 feet horizontally to facilities.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that would not have a harmful effect on completed installations or elements being installed.
1. Maintain a minimum temperature of 50 degrees F in permanently enclosed portions of building for normal construction activities, and 65 degrees F for finishing activities and areas where finished Work has been installed.
- G. Ventilation and Humidity Control: Provide temporary ventilation and humidity control required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that would not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Provide and operate either exhaust or supply fans/blowers, or both, sufficient to ventilate work areas adequately.
- H. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear. Provide kilowatt-hour meters with demand capability.
1. Install electric power service underground, unless overhead service is authorized by the SAA.
 2. Connect temporary service to the Authority's existing power source, as directed by the SAA.
 3. Install power distribution wiring overhead and rise vertically where least exposed to damage
- I. Electrical Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 2. Provide warning signs at power outlets other than 110 to 120 V.
 3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
 4. Provide metal conduit enclosures or boxes for wiring devices.
 5. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
1. Provide and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Provide exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed. Provide exterior yard and site lighting aligned as directed by the SAA. Provide lighting so as not to interfere with ground, air traffic and air traffic control.
 3. Install lighting for Project identification signs.

- K. Telephone Service: Provide temporary telephone service for key personnel engaged in construction activities, throughout the construction period. Install telephones on separate lines for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.
1. At each telephone, post a list of emergency telephone numbers approved by the SAA.
 2. Provide a portable cellular telephone for superintendent's use in making and receiving telephone calls when away from field office.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241 and USBC.
- B. Dewatering Facilities and Drains: Comply with requirements in applicable Division 31 and Division 32 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
 2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
 3. Remove snow and ice as required to minimize accumulations.

- C. **Project Identification and Temporary Signs:** Prepare Project identification and other signs in sizes indicated. Install signs where indicated or where directed by the SAA to inform public and persons seeking entrance to Project. Provide two Project signs.
1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
 2. Prepare temporary signs to provide directional information to construction personnel and visitors.
 3. Construct signs of exterior-type, Grade B-B, high-density concrete form overlay plywood in sizes and thickness indicated. Support on nominal 4-inch-by-4-inch-by-10-foot-long posts or framing of preservative-treated wood or steel.
 4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
 5. The following signs will be allowed on the Project:
 - a. Identifying captions over offices.
 - b. Other signs as required by the Contract Documents.
 6. Take necessary steps to prevent installation of unauthorized signs and, should any appear, remove them immediately. Repair and repaint damage caused thereby at no additional cost to the Authority.
 7. No more than two Project Identification Signs will be permitted. Project identification signs are the only signs on which the Contractors name and logo will be permitted.
- D. **Waste Disposal Facilities:** Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 01 Section "Execution " for progress cleaning requirements.
1. If required by the SAA, provide separate containers, clearly labeled, for each type of waste material to be deposited.
 2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type.

Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

- E. **Janitorial Services:** Provide janitorial services on a daily basis for temporary offices, first-aid stations, toilets, wash facilities, lunchrooms, and similar areas.

- F. **Storage and Fabrication Sheds:** Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or, if permitted by the SAA, fully enclosed spaces within building or elsewhere on-site subject to approval of the SAA.
 - 1. Construct framing, sheathing, and siding using fire-retardant-treated lumber and plywood.
 - 2. Paint exposed lumber and plywood with exterior-grade acrylic-latex emulsion over exterior primer.
 - 3. Submit the design of storage structures of more than 150 sq. ft. to the SAA for review and approval by the Building Codes/Environmental Department.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. **Environmental Protection:** Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours of 11:00 p.m. to 5:00 a.m., unless directed otherwise by the SAA, which will minimize complaints from persons or firms near Project site.

- B. **Storm water Control:** Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

- C. **Security Fencing:**

1. Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 3 galvanized barbed-wire top strands, unless otherwise indicated.
- D. Site Enclosure Fence: Before construction operations begin, provide portable chain-link site enclosure fence. Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts. Contractor is responsible for providing support to protect against wind damage and meeting safety requirements.
1. Entrance into the site: Only through the lockable entrance gates.
 2. Set fence posts in concrete bases.
 3. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
 4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide the SAA with three set of keys.
- E. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights. See the Authority's Construction Safety Manual for additional requirements.
- F. Storage: Where materials and equipment are stored, and are of value or attractive for theft, provide secure lockup. Enforce discipline in connection with installation and release of material to minimize opportunity for theft and vandalism.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Operate Project-identification-sign lighting daily any time from dusk until dawn when personnel are on the site. Should no personnel be on the site after 12:00 midnight the project – identification lighting may be turned off at 12:00 midnight.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Properly recondition and restore those portions of the site occupied by temporary facilities and controls to condition acceptable to the SAA, at least equal to condition at time of start of Work, unless otherwise authorized in writing by the SAA.
 - 2. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 3. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace roadway paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 4. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 01

Section "Project Closeout."

PART 4 - CONTRACTOR'S QUALITY CONTROL

4.1 FIELD QUALITY CONTROL

- A. Conform to all applicable provisions of Division 01 Section "Quality Requirements".

END OF SECTION 015000

SECTION 015516 - HAUL ROADS AND STAGING AREAS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This item shall consist of restoration of all areas disturbed by these activities, restoration of staging areas, and improvement and restoration of existing roads used as haul roads during construction.

PART 2 – EXECUTION

2.1 IMPROVING AND RESTORING EXISTING ROADS.

- A. Existing roads designated to be improved for haul road use shall be constructed as shown and detailed on the plans. Existing roads to be used as haul roads, but not designated for improvements, shall be photographed by the Contractor prior to the start of construction to document the existing conditions. At the conclusion of the project, the existing roads that were used as haul routes shall be restored to their original condition as detailed on the plans and to the satisfaction of the SAA.

2.2 MAINTAINING HAUL ROADS.

- A. Haul roads as shown on the Construction Phasing Plans are to be maintained during construction to such condition that they are passable by a standard passenger vehicle. All maintenance of the haul roads during construction is incidental to this Item.

PART 3 - CONTRACTOR QUALITY CONTROL

- A. **QUALITY CONTROL PROGRAM.** The Contractor shall develop a Quality Control Program in accordance with Section 01 40 00 “Quality Requirements.” The program shall address all elements which effect the quality of the work including, but not limited to:
 - 1. Quality and gradation of the material

PART 4 - MEASUREMENT

- A. No separate measurement will be made for maintenance of the haul roads. Also, no separate measurement will be made for the construction, maintenance, removal, and restoration of staging area(s)
- B. The improvements to and restoration of the existing airport roads used as haul roads shall be measured per square yard. No separate measurement will be made for incidentals necessary to maintain the haul roads throughout the project.

PART 5 - PAYMENT

- A. No separate payment will be made for the construction, maintenance, removal and restoration of the staging areas. These roads and staging areas shall be considered incidental to the various items of construction.

- B. No separate payment for the restoration of existing airport roads used as haul roads will be made. These roads shall be considered incidental to the various items of construction

END OF SECTION 015516

SECTION 017113 - MOBILIZATION/DEMOBILIZATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This work shall consist of the performance of construction preparatory operations, including the movement of personnel, equipment, and materials to the project site, and for establishment and maintenance of the Contractor's offices and other facilities necessary to begin and sustain work on the Contract. In addition, the following items are to be included in the cost of mobilization:
 - (1) Obtaining personnel identification and other items as necessary to facilitate work.
 - (2) Stabilizing Contractor's access routes as shown on the plans. Stabilization of the existing haul roads shall be as outlined in Section 01 55 16.
 - (3) Other work items necessary to begin construction, as shown in the plans.
 - (4) Demobilization efforts at completion of the Project.

PART 2 - PRODUCTS

2.1 BARRICADES

- A. Barricades shall be furnished as discussed in Section 01 71 14.

2.2 PERSONNEL

- A. Security guards, flagmen, radios and other items necessary to facilitate work shall be furnished as discussed in Section 01 71 14 and other specification sections.

PART 3 - EXECUTION (Not Used)

PART 4 - CONTRACTOR'S QUALITY CONTROL

4.1 Field Quality Control

- A. Conform to all applicable provisions of Division 01 Section 01 40 00 "Quality Requirements".

PART 5 – MEASUREMENT

- A. Mobilization/Demobilization will be measured on a lump sum basis.

PART 6 - PAYMENT

- A. This item will be paid for at the Contract lump sum price, which shall be full compensation for performing the work specified and the furnishing of all materials, labor, tools, equipment, and incidentals necessary to mobilize and subsequently demobilize the construction operations.
- B. Payment for this item will be made in six (6) installments, the sum of which shall not exceed 5 percent of the total Contract Amount, excluding the amount of this item. The first payment of 40 percent of the lump sum price item will be made on the first estimate following partial mobilization and the initiation of construction work including the placement or erection of all Contractor's offices. Payments of 10 percent of the lump sum price item will be made on the four (4) subsequent estimates following the completion of substantial mobilization. The final 20 percent of the lump sum price will be made after demobilization has been completed and the site has been cleared to the satisfaction of the Authority.

END OF SECTION 017113

SECTION 017114 - AIRPORT SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Contractor shall be required to carry out his operations in a manner that will cause a minimum of interference with aircraft traffic, and shall be required to cooperate with the FAA, the Authority, the airlines, and other contractors working in the area. All work shall be completed in accordance with the General Requirements and Technical Specifications, the Construction Phasing Plans, and the Shreveport Regional Airport's Construction Safety Manual, latest edition.
- B. The Contractor shall be required to supply medium and low level barricades with red lights, flashers.
- C. The Contractor shall be required to supply, place, maintain, move and store the items listed herein, as appropriate, to facilitate construction and protect air traffic. Keep on site an adequate extra supply of these items. Open excavations shall not be allowed adjacent to active runways or taxiways unless specifically coordinated and approved with the SAA and lighted and barricaded per FAA standards.

PART 2 - MATERIAL

2.1 OMNIDIRECTIONAL RED WARNING LIGHTS

- A. Hazard Lighting must be steady burning or flashing red and meet the requirements of the "Manual on Uniform Traffic Control Devices for Streets and Highways" for Type A and Type B flashers. Lights must be mounted on barricades and spaced at no more than 10 feet apart.

2.3 LOW AND MEDIUM LEVEL BARRICADES

- A. Low level barricades shall be the Airport Runway Safety Barricade Model AR-2 Multi-Barrier, as manufactured by Off The Wall Products, LLC, or approved equal. Sections shall be interlocking and shall be ballasted to prevent damage from jet blast. Each barricade section shall be equipped with a Model: SL-H867R red lens safety light, as manufactured by Leotek Electronics USA Corp., or approved equal.

2.4 VACUUM SWEEPER

- A. Vacuum Sweeper shall be Tymco, Model HSP-600 or Elgin Model crosswind, or approved equal.

PART 3 - EXECUTION

3.1 CONTROL REQUIREMENTS

- A. The Contractor's responsibilities for work areas are as follows:
 - (1) The Contractor shall be held responsible for controlling his employees, subcontractors, and their employees with regard to traffic movement. Contractor shall confirm all provisions and safety procedures comply with FAA AC 150/5370-2F Operational Safety on Airports During Construction. Any deviation must be approved in writing by the SAA prior to activities.
 - (2) The Contractor shall rebuild, repair, restore, and make good at his own expense all damages to any portion of the work occasioned by his use of these facilities before completion and acceptance of his work.
 - (3) The Contractor shall submit to the SAA in writing a detailed work plan for each construction phase. The work plan shall include, but not be limited to, installation sequence of traffic control items, installation sequence of temporary electrical and NAVAID items, installation sequence of electrical items, maintenance of airfield electrical and NAVAID power and control circuits. This plan shall be submitted 14 calendar days prior to the start of each construction phase. No work within the construction phase may commence until the phase work plan is approved.
 - (4) The Contractor shall submit to the SAA in writing a plan, by construction phase, for controlling construction equipment and vehicular movements in the Air Operations Area (AOA). This plan shall be submitted at the Pre-Construction Meeting. No work may commence until this plan is approved. The Plan must include material haul roads.
 - (5) The Contractor shall provide a responsible Traffic Manager whose duty shall be to direct all traffic on or near active runways, taxiways, haul roads, and highways. Paved surfaces shall be kept clean at all times and specifically must be kept free from all debris that might damage aircraft.
 - (6) The Contractor shall prepare a security badge control plan for review by the SAA. The plan shall be submitted prior to or at the Pre-Construction Meeting. No work may commence until this plan is approved. The plan shall be prepared on the Contractor's company letterhead and signed by the company representative who is authorized to sign the badge applications. The plan shall describe in detail the Contractor's and/or subcontractor's plan to control badges.

3.2 VEHICLE AND PEDESTRIAN CONTROL

- A. Vehicle and access routes for airport construction shall be controlled as necessary to prevent inadvertent or unauthorized entry of persons, vehicles or animals onto air operations areas (AOA). No vehicle shall enter the air operations area except at predetermined locations. The single point of entry to the AOA for this project will be as directed by the SAA. The amount

of construction traffic may require that a security guard be present at the access point at all times during construction activity..

- B. The use of any other gate for access to the AOA must be approved in writing by the SAA prior to its use as an entry point. The use of alternative gates for AOA access will require all the elements described in Paragraph 2.5. The use of alternative or additional gates for AOA access will be at no additional cost to the Authority.

3.3 CONTROL AND WARNING DEVICES

- A. During construction operations near active taxiways or runways the Contractor shall furnish and maintain medium and low level barricades, as shown on the plans or as directed by the SAA.
- B. The Contractor shall have a designated person on call 24 hours a day for emergency maintenance of airport barricades and warning devices.
- C. All airport barricades and warning devices shall be removed from the site upon completion of the project and shall become the property of the Contractor.

3.4 VEHICLE MARKING AND IDENTIFICATION

- A. All permitted vehicles operating in the AOA shall display in full view above the vehicle a 3-foot by 3-foot (or larger) orange and white checkerboard flag, each checkerboard color being 1-foot square. Any vehicle operating in the AOA shall be equipped with a flashing yellow dome-type light, mounted on top of the vehicle and of such intensity to conform to local codes for maintenance and emergency vehicles.
- B. Vehicles making only occasional visits to the job site are exempt from the identification requirements contained above, provided that a properly identified vehicle escorts them into, through, and out of the AOA. These and other vehicles needing intermittent identification may be marked with tape or with magnetically attached markers that are commercially available.

3.5 VEHICLE TRAFFIC AND OPERATIONS

- A. When any vehicle other than those approved for use in the AOA is required to travel to or from the work area or over any portion of the work area, it shall be provided with a flag on a staff attached to the vehicle and shall be escorted by a vehicle properly identified to operate in the area. All construction vehicles/equipment shall have automatic signaling devices to sound an alarm when moving in reverse. All equipment shall be operated within the approved speed limit(s).

3.6 EMERGENCY CONTACT PERSONNEL

- A. The Contractor shall provide the phone numbers of three (3) personnel, including the project superintendent, who may be contacted in an emergency. Personnel shall be on call 24 hours per day for maintaining construction hazard lighting and barricades. The Contractor shall employ watchmen to maintain and service all traffic control equipment

3.7 RADIO COMMUNICATIONS

- A. The control of vehicular activity on the AOA is of the highest importance and requires coordination with the airport users and the Air Traffic Control Tower (ATCT). The Contractor shall have no direct contact with ATCT Ground Control. All communications with ATCT shall be coordinated through the SAA. However, the Contractor shall properly train his/her personnel, particularly flagpersons, on the proper procedures for monitoring radio frequencies.
- B. All vehicles and/or construction equipment operating inside the active AOA, but outside of the designated haul roads, shall be escorted by the Authority, who will maintain radio contact with the ATCT. Crossing the active runway shall not be permitted. Aircraft always have the right-of-way and construction equipment must always yield to aircraft.

3.8 AIRPORT SECURITY REQUIREMENTS

- A. The airport is operated in strict compliance with Federal Aviation Regulation – Part 107, which prohibits unauthorized persons or vehicles in the Air Operations Area. Equipment and personnel will be restricted to the work area defined on the plans. Any violations by Contractor’s personnel will subject the Contractor to penalties imposed by the FAA and the Authority’s Airport Security Office.
- B. Security Check Point guards will be provided by the SAA. The Contractor shall provide the guards with direct and/or indirect methods of communications to contact the SAA and Airport Operations. Direct access is defined as a guard having immediate access to a telephone, while indirect access is defined as the guard having a radio that communicates with an individual who has direct access. The Security Check Point guards provided by the Airport are fully knowledgeable of the requirements of the Transportation Security Administration (TSA) and the rules of performance with regard to AOA Security. TSA requirements can be obtained from Airport Operations. Entrance to the airfield is subject to strict security regulations. All personnel entering the airfield must obtain and display security identification badges and all vehicles must have and display special permits which are available through the Airport. All vehicles are subject to inspection upon entering the AOA. All vehicles may be searched each time prior to passing the security checkpoints and may be subject to random searches while operating in the AOA.
- C. The Contractor shall maintain the security integrity between the public and AOA. All barrier designs and their phasing shall be submitted to the SAA and approved in writing prior to erection.
- D. All construction personnel assigned to the project, except for escorted in-transit material suppliers, shall make application for and wear personnel security badges. All construction vehicles routinely entering the AOA shall be required to obtain a vehicle security badge. The prime contractor and each subcontractor can make application for these items. The Contractor shall be responsible for assuring that all of his employees have background checks performed in accordance with SAA security badging procedures. In addition, finger printing will also be required. Photo identification badges will be made for each employee. A fee, as established by SHV security and badging office, is required for federal fingerprinting and an additional fee is required for each personnel badge. Badges must be surrendered upon termination of the employee or contract.

- E. All Contractor's employees who are designated to have unescorted access to any area on the airport for security reasons shall have an employment history check in accordance with SAA security badging procedures. Each employee background check requires the following:
- (1) Employee completes an employment history form and submits form to the Contractor/Employer. History must explain any gaps in employment of more than 12 months. Employer is responsible for documenting and verifying the employment history and maintaining the information in a file (may use a company form, or 10-year employment history form).
 - (2) Employee is required to complete a "Disqualifying Crimes List" Form. All questions must be answered "yes" or "no". Applicants may be subject to a criminal history records check and fingerprinting. Completed form must be submitted to the Security Badging office along with the employee's Security Badge Application Form (form available in Security Badging Office).
 - (3) Badging applicant must submit two (2) forms of current identification, at least one (1) of which must bear the individual's photograph.
 - (4) Company official/officials listed on the company application for Air Operations Area Access must sign each individual employee badge application form stating company is in compliance with the 10-year history verification, and state why the individual badge is required.
- F. The Contractor shall maintain an up-to-date record of all badge holders showing name, address, sex, height, weight, eye color and badge number. The Contractor will be required to furnish this information to the Airport upon request.
- G. The Contractor shall restrict passage into the Security Area to badged persons, vehicles and equipment displaying their identification or that of the Airport. Should the Contractor wish to allow visitors, vendors or delivery through his access point, he shall provide for the following:
- (1) A method, acceptable to the Authority, of temporarily placing the Contractor's identification on each person or vehicle. (An acceptable alternate will be to provide an escort for each person or vehicle).
 - (2) Each person or vehicle entering the Security Area displaying the Contractor's identification or under its escort shall carry the full coverage of its liability and property damage.
- H. The Contractor is required to submit a plan on how he/she will safely operate within the AOA. This plan shall be submitted and approved by the Authority before the commencement of any construction activity.

3.9 SAFETY REQUIREMENTS

- A. Before entering upon or crossing any active airfield pavements, the Contractor shall receive proper clearance. Emergencies and airfield operating conditions may necessitate sudden changes, both in Airport operations and in the operations of the Contractor. Aircraft operations shall always have priority over any and all of the Contractor's operations. Should runways or taxiways be required for the use of aircraft and should Airport operations, the ATCT, or the SAA deem the Contractor to be too close to active runways or taxiways the Contractor shall suspend its operations, remove its personnel, plant, equipment, and materials to a safe distance and stand by until the runways and taxiways are no longer

required for use by aircraft. There will be no compensation for delays or inefficiencies resulting from such actions.

B. Throughout the duration of the job, any practice or situation that the SAA determines to be unsafe or a hindrance to regular Airport operations shall be immediately rectified.

C. The standard terms defined below pertain to airfield safety requirements and are referenced throughout the Contract Documents:

(1) Runway Safety Area (RSA) - The defined surface surrounding the runway over which aircraft should, in dry weather, be able to cross at normal operating speeds without incurring significant damage. A safety area is graded, drained and compacted. It is free of any holes, trenches, humps or other significant surface variations or objects, other than those that must be there because of their essential aeronautical function. The safety area requires the capability of supporting maintenance, firefighting, and rescue vehicles under normal (dry) conditions.

(2) Object Free Area (OFA) – An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

(3) Obstacle Free Zone (OFZ) – The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDS that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches. The OFZ is subdivided as follows:

a. Runway OFZ. The airspace above a surface centered on the runway centerline.

b. Inner-approach OFZ. The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system.

c. Inner-approach OFZ. The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to runways with approach visibility minimums lower than $\frac{3}{4}$ -statute mile.

(4) Taxiway Safety Area (TSA) – A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

If additional information is desired, it can be obtained from the FAA website at www.faa.gov/circind.htm.

D. The Contractor shall acquaint his supervisors and employees with the airport and operations that are inherent to Shreveport Regional Airport and shall conduct his/her construction activities to conform to all routine and emergency air traffic requirements and guidelines for safety specified herein. The Contractor shall be responsible for providing all safety devices as required for the protection of his personnel.

- E. Protection of all persons shall be provided throughout the progress of the work. The work shall proceed in such a manner as to provide safe conditions for all workers and personnel. The sequence of operations shall be such that maximum protection is afforded to ensure that personnel and workers in the work area are not subject to any dangerous conditions. The Contractor must provide safety measures to guard against injury.
- F. During the performance of this contract, the airport facility shall remain in use to the maximum extent possible. Use of areas near the Contractor's work will be controlled to minimize disturbance to the Airport's operation. The contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized persons to enter or remain in any airport area that would be hazardous to persons.
- G. All work to be performed that is too close to an active runway or taxiway under operational conditions shall be performed when the runway or taxiway is not in use. Such work shall not be accomplished without prior permission from the SAA. Requested closings shall be directed to the SAA in writing at least 72 hours in advance.
- H. The Contractor shall be aware of the following types of safety problems and/or hazards. These problems or hazards shall not be permitted. Should any of these problems or hazards arise during construction, the Contractor shall immediately rectify/correct the problem or hazard to the satisfaction of the SAA and Operations Personnel:
- (1) Trenches, holes, or excavations on or adjacent to any open runway, taxiway, or in safety areas.
 - (2) Unmarked/unlighted holes or excavation in any open runway, open taxiway, or related safety area.
 - (3) Mounds or piles of earth, construction materials, temporary structures, or other objects in the vicinity of any open runway, open taxiway, or related safety, approach, or departure area.
 - (4) Vehicles or equipment (whether operating or idle) on any open runway, open taxiway, or related safety, approach, or departure area.
 - (5) Vehicles, equipment, excavations, stockpiles, or other materials which could degrade or otherwise interfere with electronic signals from radios or electronic navigational aids (NAVAIDS).
 - (6) Runway paving projects resulting in excessive lips greater than 1 inch for runways and exceeding 3 inches for edges between the existing shoulder and new surfaces at runway edges and ends.
 - (7) Unmarked utility, NAVAID, weather service, runway lighting, or other power or signal cables that could be damaged during construction.
 - (8) Objects (whether or not marked or flagged) or activities anywhere on or in the vicinity of the airport which could be distracting, confusing, or alarming to pilots during aircraft operations.
 - (9) Unflagged/unlighted low visibility items (such as tall cranes, drills, and the like)

anywhere in the vicinity of active runways, or in any approach or departure area.

- (10) Misleading or malfunctioning obstruction lights or unlighted/unmarked obstructions in an approach to any open runway.
 - (11) Inadequate approach/departure surfaces needed to assure adequate landing/takeoff clearance over obstructions or work or storage areas.
 - (12) Inadequate, confusing or misleading (to user pilots) marking/lighting of runways or taxiways, including displaced or relocated thresholds.
 - (13) Water, dirt, debris, or other transient accumulation which temporarily obscures pavement marking, pavement edges, or derogates visibility of runway/taxiway marking or lighting.
 - (14) Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of airport operations area.
 - (15) Trash or other materials with foreign object damage (FOD) potential, whether on runways, taxiways, or in related safety areas.
 - (16) Inadequate barricading or other marking which is placed to separate construction or maintenance areas from open aircraft operating areas.
 - (17) Failure to control vehicle and human access to open aircraft operating areas.
 - (18) Failure to maintain radio communication between construction/maintenance vehicles and ATCT.
 - (19) Construction/maintenance activities or materials which could hamper the response of aircraft rescue and firefighting (ARFF) equipment from reaching all aircraft or any part of the runway/taxiway system, runway approach and departure areas, and aircraft parking locations.
 - (20) Bird attractants on airport, such as edibles (food scraps, etc.), miscellaneous trash, or ponded water.
- I. The Contractor shall conduct activities so as not to violate any safety standards contained herein. The Contractor shall inspect all construction and storage areas as often as necessary and promptly take all steps needed to prevent/remedy any unsafe or potentially unsafe conditions/activities discovered.
- J. Before actual commencement of construction activity, the Contractor shall notify in writing, at least 72 hours in advance, Airport Operations and the Authority of his intentions to begin construction, stating the proposed time, date, and area in which commencement is to occur in order for the appropriate Notice-to-Airmen (NOTAM) to be issued. Upon completion of work and return of all related areas to standard conditions, the Contractor shall again notify Airport Operations and the Authority in writing, and describe the area that is complete and available for normal airport operations.
- K. Debris. Debris, waste and loose material or any other FOD (including dust and dirt) capable of causing damage to aircraft landing gear, propellers or being ingested in jet engines shall not be allowed on active aircraft movement areas or adjacent infield areas. Materials observed to be within these areas shall be removed immediately and/or continuously by the

Contractor. The Contractor shall be required to have a sweeping machines and operators on site and operating continuously at all times during construction activity. Where travel on or across runways or taxiways is required, the Contractor shall provide adequate personnel and equipment to keep such surfaces clear of debris at the discretion of the Authority. Closed pavements shall be swept clean prior to reopening to aircraft traffic. Exposed earth in excavation areas within 75 feet of the centerline immediately adjacent to active taxiways shall be covered to prevent dust from jet blast. Cover material shall be weighted to prevent movement from jet blast.

- L. Flaggers. In accordance with the specifications, the Contractor shall furnish, at his own expense, flaggers as necessary to control his traffic unless otherwise directed by the Authority.
- M. Trenches, Excavations and Stockpiled Material. Open trenches or excavations exceeding 3 inches in depth and 3 inches in width or stockpiled material will not be permitted within the limits of restricted areas of operational runways or taxiways. Covering for open trenches or excavations shall be of sufficient strength to support the weight of the heaviest aircraft operating on the runway or taxiway.
- N. Construction in Proximity to Active Runways.
 - (1) Runway Sides. If appropriate construction/maintenance NOTAM has been issued, construction is permissible as close as 250 feet from the centerline of the active runway, provided that Airport Operations and FAA criteria are met. The permissible location is indicated on the plans and shall be clearly marked in the infield areas with safety area markers placed at 50-foot intervals.
 - (2) Runway Ends. No work will be permitted within 1,000 feet of the active runway threshold. No equipment or materials may be stored or stockpiled within 1,000 feet of the active runway threshold.
- O. Equipment Height Restrictions. Maximum equipment height requirements are indicated on the Construction Phasing Plans and shall not be exceeded unless prior written approval is obtained from the SAA. Atop all equipment booms shall be mounted the white and orange checkered flag described in Paragraph 3.4. The top 10 feet of these booms shall be painted fluorescent orange and they shall be equipped with a red obstruction light. Any crane erections shall be coordinated with Airport Operations and during every shift.
- P. Miscellaneous.
 - (1) Open flame, welding, or torch cutting operations are prohibited unless adequate fire and safety precautions have been taken and the procedure has been approved in accordance with Paragraph 007300-1.15. Under no circumstances will flare pots be permitted near aircraft turning areas.
 - (2) All materials and equipment when not in use shall be placed in approved staging areas where they will not constitute a hazard to aircraft operations and not penetrate clearance height restrictions as discussed on the Construction Phasing Plan(s).
 - (3) The Contractor shall provide the Authority with a current list of all employees working on the project. The list shall be maintained current by the Contractor and Subcontractors.

3.10 CLOSED RUNWAY AND TAXIWAY MARKING AND LIGHTING

- A. Closed runway and taxiway markings shall be as shown on the plans. Closed runway and taxiway marking and lighting materials shall be approved by the SAA prior to placement. Construction activities shall not begin until the layout of such marking and lighting has been approved by the SAA.

3.11 CONSTRUCTION NEAR NAVIGATIONAL AIDS

- A. Construction materials and equipment shall not be placed or parked where they may interfere with the line-of-sight of the ATCT and navigational aids in operation.

3.12 CONSTRUCTION SITE ACCESS AND HAUL ROADS

- A. The Contractor will not be permitted to use any access or haul roads other than those designated on the contract drawings. The Contractor should submit specific proposed ingress and egress routes associated with specific construction activities to the Authority for evaluation and approval prior to commencing construction activities. Aircraft Rescue and Firefighting (ARFF) right-of-way on access roads, haul roads, taxiways, and runways shall not be impeded at any time.

3.13 CONSTRUCTION MATERIALS STOCKPILING AND EQUIPMENT STORAGE

- A. Stockpiling of construction materials and equipment storage is not permitted within 400 feet of the runway centerline and 160 feet of the taxiway centerline. The Contractor should ensure that stockpiled construction materials and equipment do not cause degraded or hazardous conditions to airport operational safety. This includes determining and verifying that stockpiled materials and equipment are stored or parked at an approved location, that they are properly stowed to prevent foreign object debris (FOD), attraction by wildlife, or obstruction of air operations, either by their proximity to NAVAIDs or to aircraft movement areas.

3.14 WORK SCHEDULING AND ACCOMPLISHMENT

- A. The Contractor shall contact the SAA each day before beginning work to coordinate the status and nature of work to be done that day. The Contractor shall also report to the SAA at the end of each day to schedule the work planned for the following day.

3.15 VIOLATION OF RESPONSIBILITIES

- A. Any violation of paragraphs 3.1 through 3.10 shall be considered a violation of the Contract itself and shall be sufficient cause for halting the work without extending the time limit of the contract.

PART 4 - CONTRACTOR'S QUALITY CONTROL

4.1 Field Quality Control

- A. Conform to all applicable provisions of Division 01 Section 01 40 00 "Quality

Requirements".

END OF SECTION 017114

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work, including all site utility systems.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location sanitary sewer, storm sewer, and water-service piping; and underground electrical and communication services.
2. For additional requirements for locating and marking existing utilities, see Division 01 Section "Summary."

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to the SAA that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information (RFI) to the SAA. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify the SAA promptly.
- B. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by the SAA.

3.4 FIELD ENGINEERING

- A. Identification: Existing control points and property line corner stakes are as identified on the Contract Documents.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 1. Do not change or relocate existing benchmarks or control points without prior written approval of the SAA. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to the SAA before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly with the approval of the SAA. Base replacements on the original survey control points.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Remove combustible debris from the site daily.
 3. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees F.
 4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- E. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- F. Waste Disposal: Burying or burning waste materials on-airport property will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Limiting Exposures: Supervise construction operations to ensure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- I. Grass Mowing: Mow grass areas contained in Project site, or made inaccessible to the Authority's mowing contractors.

3.6 STARTING AND ADJUSTING

- A. Follow equipment manufacturer's startup procedures, unless otherwise directed by the SAA.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure that installed Work is without damage or deterioration at time of Substantial Completion.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 02 through 03 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal, requesting approval from the SAA to proceed, describing procedures at least 10 days before the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Products: List products to be used and firms or entities that will perform the Work.
 - 3. Dates: Indicate when cutting and patching will be performed.
 - 4. Utility Services: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted. Approval for such shall be obtained from the SAA two (2) weeks before interruptions.
 - 5. Obtain the SAA's approval in writing of cutting and patching proposal before cutting and patching. Approval does not waive the SAA's right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Obtain SAA's written approval of the cutting and patching of the following operating elements or safety related items:
 - 1. Control systems.
 - 2. Communication systems.
 - 3. Electrical wiring systems.
 - 4. Shoring, bracing, and sheeting.
- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Existing Utility Services: Where existing services/systems are required to be removed, relocated, or abandoned; bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 3. Excavating and Backfilling: Should excavating and backfilling be required by cutting and patching operations comply with requirements in applicable Division **XX** Sections.
 - 4. Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting. Remove conductors back to source of supply.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

END OF SECTION 017329

SECTION 017700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Final cleaning.
 - 3. Final Acceptance
- B. Related Sections include the following:
 - 1. Division 01 Section "Photographic Documentation" for submitting Final Acceptance construction photographs and negatives.
 - 2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, Record Product Data, and other Record Documents.
 - 3. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for products of those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Definition: "Substantial Completion" is the stage in the progress of the work when the SAA determines that all the Work, or a designated portion thereof, is sufficiently complete and functional according to the Contract Documents so that the Authority can occupy or utilize the Work for its intended use. The only remaining physical work shall be the completion of punch list work prior to Final Acceptance.
- B. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, reasons why the Work is not complete, and a schedule for completing punch list work according to Section III of the Contract.
 - 2. Ensure previously outstanding technical submittals and Shop Drawings have been submitted and approved.
 - 3. Advise the SAA of pending insurance changeover requirements.

4. Submit warranties required by Contract Documents, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - a. Submit Contractor Warranty Letter, for review and approval, a minimum of 60 days before requesting inspection for determining date of Substantial Completion. After date of Substantial Completion has been determined revise the Contractor's Warranty Letter to include that date as start of Warranty period.
 5. Obtain and submit releases permitting the Authority unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 6. Prepare and submit Project Record Documents except Record Contract CPM Schedule; also prepare and submit Operation and Maintenance manuals, Final Completion construction photographs and photographic negatives, damage or settlement surveys, and similar final record information.
 7. Prepare and submit proof that specified testing and code inspections have been completed, accepted and certified, including, but not limited to, structural work, sprinkler piping systems, fire alarm and FPS systems, bacteriological testing of domestic lines, back-flow prevention, electrical system testing, and hydrostatic pressure testing of sanitary lines. Submit approvals of Health Department or the FDA as applicable.
 8. Deliver tools, spare parts, extra materials, and similar items to location designated by The SAA. Label with manufacturer's name and model number where applicable.
 9. Make final changeover of permanent locks and deliver keys to the SAA. Advise the Authority's personnel of changeover in security provisions.
 10. Complete startup testing of systems.
 11. Submit test/adjust/balance records.
 12. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 13. Advise the Authority of changeover in utilities.
 14. Submit changeover information related to the Authority's occupancy, use, operation, and maintenance.
 15. Instruct the Authority's personnel in operation, adjustment, and maintenance of products, equipment, and systems, as required by Division 01 Section "Demonstration and Training
 16. Complete final cleaning requirements, including touchup painting.
 17. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- C. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, the SAA will either proceed with inspection or notify Contractor of unfulfilled requirements. The Authority will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by the SAA, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Punch list work must be completed within the duration specified in Section III, "Schedule." Failure to complete the punch list work within the duration specified may result in the Contracting Agency ordering the work to be completed by others at the cost to Contractor.
3. Results of completed inspection will form the basis of requirements for Final Acceptance.

1.4 FINAL COMPLETION AND ACCEPTANCE

- A. Definition: "Final Completion" is the stage in the Contract when the Contracting Agency determines that all Work has been 100 percent completed according to the terms and conditions of the Contract Documents, including administrative obligations. The date of Final Acceptance is the date of execution by the Contracting Agency of a Certificate of Final Acceptance.
- B. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 1. Submit a final Application for Payment according to Division 01 Section "Application for Payment."
 2. Submit certified copy of Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by the SAA. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit a Contractor statement evidencing that all Record Documents, Operation and Maintenance Manuals, warranties, and similar required submittals have been approved.
 4. Complete demobilization and removal of temporary facilities from the site including construction equipment and facilities, mockups, and other similar elements. Restore areas to previously existing condition, if applicable.
 5. Execute final Contract Modification and submit final Subcontractor Payment Form.
 6. Return all AOA badging and all Authority IDs.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 8. Submit Record Contract CPM Schedule.
 9. Submit warranty book.
- C. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, the SAA will either proceed with inspection or notify Contractor of unfulfilled requirements. The SAA will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit four (4) copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Include the following information at the top of each page:
 - a. Contract name and number.
 - b. Date.
 - c. Name of Architect/Engineer. e. Name of Contractor.
 - d. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit one (1) draft copy of proposed Warranty Manual Specified below within 90 days of Notice to Proceed. The Authority will return comments to the Contractor no later than 30 calendar days after receipt.
1. Provide Manufacturer's Standard Warranties, made out to the Authority, and statement of willingness to provide any applicable Special Warranties required by the Contract Documents 14 calendar days prior to shipping of materials and equipment. Products and Equipment shall not be considered delivered (for payment purposes) until the approved warranties have been received.
 2. Submit written warranties on request of the Authority for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by the Authority during construction period by separate agreement with Contractor.
- C. Warranty Manual: Organize warranty documents into an orderly sequence based on the table of contents of the Contract Specifications. Warranty documents include Contractor and major subcontractors warranty letters, special warranty documents, and manufacturer's warranties.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents. Binders shall not be filled beyond 75 percent of their rated capacity. Binders shall also have boomerang plastic sheet lifters, metal backbone, concealed rivet construction, and three-trigger position locking mechanism (lock, unlock, open) on top and bottom. Binder color shall be black unless another color is selected by the Authority.
 - a. Provide maximum 3-inch binder thickness.

- b. Identify each binder on front and spine, with printed title "PROJECT WARRANTIES," Contract number and name, and subject matter of contents. If identification cannot be attached to the front include it as the first page in the manual. Indicate volume number for multiple-volume sets. The use of business labels is prohibited.
 2. Dividers: Provide three-hole, heavyweight, plastic tabbed dividers, (, or as approved by the Authority) for each separate section. Provide laser printed description for each tabbed section on the front and back of tabs. Tabs shall indicate the appropriate Specification Section. Provide a description of the warranty or heading for sub tabs using the same laser printed format on the dividers. Provide an index of the contents in each section on the first page behind each section divider. The index shall be generated using a word processor and printed on a laser printer. Include a matching master table of contents for each volume using the same indexing system. Install a colored sheet between each different warranty within a tabbed section.
- D. Provide additional copies of each warranty that shall be included in Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: For final cleaning, use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with Authority requirements, local laws and ordinances and Federal and local environmental and antipollution regulations. General cleaning during construction is included in Division 01 Section "Execution."
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Leave Project clean and ready for occupancy.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Authority's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.
- 1. Where extra materials of value remaining after completion of associated Work have become the Authority's property, arrange for disposition of these materials as directed by COTR.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Provisions, Special Provisions, Supplementary Conditions, and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and Maintenance Documentation Directory and formatting.
 - 2. Manuals, General and formatting
 - 3. Emergency Information Manuals and formatting.
 - 4. Operation Information Manuals and formatting for systems, subsystems, and equipment.
 - 5. Maintenance Information Manuals and formatting for the care and maintenance of products, materials, finishes, systems, and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Application for Payment" for values assigned to Operation and Maintenance Manuals
 - 2. Division 01 Section "Quality Requirements" for ensuring the development and continuing update of the Operation and Maintenance Documentation Directory and Operation and Maintenance Manual.
 - 3. Division 01 Section "Submittals" for submitting copies of submittals for operation and maintenance manuals.
 - 4. Division 01 Section "Project Closeout" for submitting operation and maintenance manuals.
 - 5. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 6. Divisions 02 through XX Sections for specific operation and maintenance manual requirements for products in those Sections.
- C. For purposes of payment, O & M and Material and Finishes Manuals are to be valued at 3% of Contract.
- D. Payment for materials and equipment will be withheld if complete O & M manual material is not received from the contractor at time of material or equipment delivery. Namely, instruction sheets, operation manuals, installation instructions, and other documents received from the manufacturer at the time of delivery.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.
- C. Equipment: An instrument or appliance designed for a specific operation.
- D. Product: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- E. Location: A defined area such as roof, room, hallway, ceiling, pavement, wall, or floor that has special maintenance requirements that are documented in the Operation and Maintenance Data.

1.4 SUBMITTALS

- A. Operation and Maintenance Manual Format: Submit to Authority within 90 calendar days of Notice to Proceed one draft copy of the proposed Operation and Maintenance Manual Format. Format shall include a table of contents and be as specified in Part 2 of this Section. The Authority will return comments regarding the Operation and Maintenance Manual Format and planned contents of the completed manual within 30 calendar days of receipt. Throughout the construction period of the project, Operation and Maintenance data shall be continually inserted in the appropriate sections/parts of the Manual as it is approved.
- B. Operation and Maintenance Manuals Revised Submittals: Submit 4 revised copies of each manual in final form, including one CD containing electronic O & M documentation, at least 45 calendar days before substantial completion or training, whichever occurs first. The Authority will return a copy with comments within 15 calendar days after receipt.
- C. Operation and Maintenance Manuals Final Submittal: Correct or modify each manual to comply with Authority's comments. Submit 6 copies of the Document Directory and each corrected manual at least 15 calendar days before substantial completion or training whichever occurs first.
 - 1. Provide four copies of all Operation and Maintenance Data in electronic format on CD-ROM consistent with the organization and format in the "Manuals, General" section. All electronic files shall be in Adobe PDF format and limited to 10 megabytes in size per file.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, the General Contractor shall assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Provide the Operation and Maintenance Documentation Directory in separate binder from operation and maintenance information. Binders, dividers and all portions of the Directory shall comply with requirements of “Manuals, General” as applicable. Size of binder for directory shall be appropriate for quantity of contents. Information in O & M Directory shall be in alphabetical order with references to contract Division and Specification Section.
- B. Organization: Include a section in the directory for each of the following:
 - 1. General Information.
 - 2. List of systems and subsystems.
 - 3. List of equipment.
 - 4. List of Products
 - 5. Table of contents.
- C. General Information: Include documents that are pertinent to the project, including, but not limited to, a detailed description of the facility or project, general safety information and a users guide to the project operation and maintenance manuals.
- D. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- E. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list. Include references to operation and maintenance manuals that contain information about each system.
- F. List of Products: List products alphabetically to include all products not part of a system, subsystem, or component of equipment. Include references to operation and maintenance manuals that contain information about each product.
- G. Tables of Contents: Include a complete table of contents for each volume of the Operation and Maintenance Manuals.
- H. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment and products with the same designation used by the Authority. If no designation is provided for equipment, systems, subsystems, or equipment assign a designation according to ASHRAE Guideline 4, “Preparation of Operating and Maintenance Documentation for Building Systems.”
- I. Provide a draft of the proposed “Operation and Maintenance Documentation Directory” at least 90 calendar days before requesting inspection for Substantial Completion. Submit draft to The Authority for approval in writing.

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize information by Division and then into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information on the title page:
1. Specific subject matter included in manual such as Division number and title, Specification Section number and title, equipment, systems and subsystems.
 2. Name and number of the Contract.
 3. Date of submittal.
 4. Name, address, telephone number, and contact person of Contractor, Subcontractor, and supplier.
 5. Name and address of Architect/Engineer.
 6. Cross-reference to related systems in other portions of the Operation and Maintenance Manuals.
- C. Table of Contents: Include a printed, printed by a laser printer, table of contents for each volume, arranged according to the specification format. List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in the Contract Documents.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents by Division then by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring thermoplastic loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents. Binders shall not be filled beyond 75 percent of their rated capacity. Binders shall also have boomerang plastic sheet lifters, concealed rivet construction, and three-trigger position Dublock mechanism (lock, unlock, open) on top and bottom of binders. Binder color shall be black unless another color is selected by the Authority.
 - a. Provide maximum 3 inch binder thickness. Smaller binders are acceptable as long as 75 percent rated binder capacity is not exceeded.

- b. If two or more binders are necessary to accommodate data for a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - c. Identify each binder on front (If Identification cannot be placed on the front provide as the first page) and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Contract number and name, and specific subject matter of contents, such as "Division 23 Heating Ventilating and Air Conditioning," to include Specification Section. Indicate volume number for multiple-volume sets. The use of business labels is prohibited.
 2. Dividers: Provide three-hole, heavyweight, plastic tabbed dividers, for each separate section. Provide laser printed description for each tab section (front and back of tabs), to indicate the appropriate Specification Section. Provide a description of the product or heading for sub tabs using the same laser printed format on the dividers.
 3. Provide a typed index describing each product, equipment, and subject addressed in each section on the first page behind each section divider. Include a matching master table of contents for each volume using the same indexing system. Install a colored sheet between major topics and each different device within a tabbed section.
 4. Protective Plastic Sleeves: Provide protective transparent plastic sheet protectors to enclose the Title Page, all Table of Content pages, and photographs.
 - a. For CD-ROMs, provide transparent plastic three-ring sleeves designed to accommodate CD-ROMs.
 5. Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. white bond paper. Copies of faxed materials may be rejected. Two-sided text shall be provided on 24-lb/sq. ft. white bond paper to eliminate "bleed through" of text with a minimum brightness of 96.
 6. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in transparent envelopes and bind envelopes with text. Insert typewritten pages indicating drawing titles, descriptions of contents, in the transparent envelopes along with drawings. Drawings shall cross-reference the appropriate manual volume and Specification Section. Drawing holding envelopes are not acceptable.
 - c. Provide operation and maintenance material on CD-ROM.
- E. Transfer Cases: Manuals shall be submitted in durable, multiple thickness fiberboard transfer boxes (legal-size boxes, 15 inches wide by 24 inches long by 10 inches high) with plastic tote handles string and button closures, reinforced poly edge, and a large labeling area that accurately describes the contents. Banker box, Fast Hold Liberty Plus P-12112 or as approved by the Authority.

2.3 OPERATION INFORMATION MANUAL

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information. Organize manuals into separate and distinct volumes by Division.
1. System, subsystem, and equipment descriptions.
 2. Safety instruction and related issues.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Precautions against improper use.
 7. Material Safety Data Sheets.
- B. Operating Procedures: Include the following, as applicable:
1. Routine and normal operating instructions.
 2. Regulation and control procedures.
 3. Procedures or operations that may void warranty.
 4. Copies of equipment warranties.
- C. Provide a draft of the proposed Operation Information Manual. Submit draft at least 90 calendar days before requesting inspection for Substantial Completion to the Authority for approval in writing.

2.4 PRODUCT MAINTENANCE INFORMATION MANUAL

- A. This Section shall contain information for all products with the exception of Systems and Equipment, which shall be provided as indicated elsewhere in this Section.
- B. Content: Organize information into a separate section for each product, material, and finish. Provide one section for architectural products, including applied materials and finishes, and a second for products designed for moisture protection and products exposed to the weather. Include source information, product information, maintenance procedures, repair materials and sources, schedule of products, location of products and warranties and bonds, as described below.
- C. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- D. Product Information: Include the following, as applicable:
1. Product name and model number.

2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.
6. Fire/flammability test certificates.
7. Material Safety Data Sheets.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Schedule of Products and Locations: Provide complete information, including reference drawings, in the materials and finishes manual on all products specified in Divisions 02 through XX.

H. Warranties and Bonds: Provide copies of all applicable warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.
2. Clearly indicate commencement and expiration dates.

I. Provide a draft of the proposed Product Maintenance Information Manual. Submit draft at least 90 calendar days before requesting inspection for Substantial Completion to the Authority for approval in writing.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE INFORMATION MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, preventative maintenance program, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below. Organize information into separate and distinct volumes by Division, and further divided into separate volumes by system (for example, HVAC systems and plumbing systems).

B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Descriptions: Include the following:

1. Product name, model number, and location.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Complete nomenclature and number of replacement parts.
- D. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Safety information.
 2. Standard printed maintenance instructions and bulletins.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Preventative Maintenance Plan: Provide an annual preventative maintenance plan indicating when maintenance tasks should be performed, such that work is spread evenly as possible throughout the year. Preventative Maintenance should not be misconstrued as reconditioning, or major repairs or replacement of components, but designed to reveal through certain procedures and inspection the need for such actions in time to prevent malfunctions during operation.
- F. Preventative Maintenance and Maintenance and Repair Procedures: Include the following information and items that detail essential preventative maintenance and maintenance and repair procedures:
1. Preventative Maintenance:
 - a. Provide instructions and location diagrams for the following:
 - 1) Checking general condition of System and Components.
 - 2) Inspecting for accumulation of dust, dirt or any foreign matter, and clean as needed.
 - 3) Cleaning or replacing all filters and screens.
 - 4) Specific procedures applicable to specialized equipment and systems.
 2. Maintenance and Repairs:
 - a. Include information and detailed diagnostic testing and inspection instructions, and procedures that detail essential system and equipment maintenance procedures including but not limited to:
 - 1) Examination of shaft seal for excessive leakage.
 - 2) Monitoring of systems for excessive bearing noise.

- 3) Verifying lubrication requirements.
- 4) Realignment of shaft coupling.
- 5) Inspection of internal equipment components for unusual wear or failure.
- 6) Procedures for maintenance including precautions against improper maintenance.

b. Include the following information and items that detail essential system and equipment repair procedures:

- 1) Complete troubleshooting guide.
- 2) Complete repair instructions including equipment and component removal, disassembly, repair, and replacement; and reassembly instructions.
- 3) Aligning, adjusting, and checking instructions including noise, vibration and efficiency adjustments.

G. Maintenance Service Schedules

1. Provide recommended frequencies, inspections, service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and maintenance and service with standard time allotment.

- a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
- b. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

H. Spare Parts List, Recommended Inventory Requirements and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

I. Schedule of Products and Locations: Provide complete information, including reference drawings if necessary, in the Equipment and Systems manual on all products specified in Divisions 02 through **XX**.

J. Warranties and Bonds: Include copies of all applicable warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.
2. Clearly indicate commencement and expiration dates.

K. Provide a draft of the proposed Product Maintenance Information Manual. Submit draft at least 90 calendar days before requesting inspection for Substantial Completion to the Authority for approval in writing.

2.6 WARRANTY INFORMATION MANUAL

- A. Organize warranty documents into an orderly sequence based on the table of contents of the Contract Specifications. Warranty documents include Contractor and Major Subcontractors warranty letters, special warranty documents, and manufacturer's warranties.
- B. Binders: Heavy-duty, 3-ring thermoplastic loose-leaf binders in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents. Binders shall not be filled beyond 75 percent of their rated capacity. Binders shall also have boomerang plastic sheet lifters, metal backbone, concealed rivet construction, and three-trigger position DublLock mechanism (lock, unlock, open) on top and bottom. Binder color shall be black unless another color is selected by the Authority.
- C. Identify each binder on front (If identification can not be attached to the front include it as the first page in the manual) and spine, with printed title "PROJECT WARRANTIES," Contract number and name. The use of business labels is prohibited.
- D. Dividers: Provide three-hole, heavyweight, tabbed dividers, for each separate section. Provide laser printed description front and back of tabs, to indicate the appropriate Specification Section. Provide a typed index of the contents in each section on the first page behind each section divider. Include a matching master table of contents for the manual using the same indexing system. Install a colored sheet between each different warranty within a tabbed section.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.
- F. Provide a draft of the proposed Warranty Manual. Submit draft at least 90 calendar days before requesting inspection for Substantial Completion to the Authority for approval in writing.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Compile all required information, as it is approved, into volumes grouped first by specification Division and then by Section in accordance with the information requirements outlined in Part 2 of this specification section and the approved Operation and Maintenance Manual Format.
- B. Product Maintenance Information: Assemble a complete set of maintenance data indicating manufacturer's product information, part numbers, description and care and maintenance instructions for each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Information: Assemble a complete set of operation and maintenance and repair data providing complete information for each system, subsystem and piece of equipment. Include complete operation, preventative maintenance, maintenance and repair instructions, and parts listing with sources indicated; recommended parts inventory listing, and similar information. Include all diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by the Authority's operating personnel.
- D. **Manufacturers' Data:** Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet with black arrows to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Provide supplementary text if manufacturers' standard printed data are not provided by the manufacturer. Provide supplementary text where the information is necessary for proper operation and maintenance of equipment or systems.
- E. **Drawings:** Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams and their relation to the structure or facility. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of Operation and Maintenance Manuals.
 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."
- F. Comply with Division 01 Section "Project Closeout" for a schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

ITEM P-152 - EXCAVATION AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work in accordance with these specifications and in conformity to the plans.

152-1.2 CLASSIFICATION. All material excavated shall be classified as defined below:

- a. **Unclassified Excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature, which is not otherwise classified and paid for under the following items.
- b. **Borrow Excavation.** Borrow excavation shall consist of approved material required for the construction of embankment or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport.
- c. **Pavement Removal.** Pavement Removal shall include saw cutting, removal and disposal of various depths of Portland cement concrete (PCC) and bituminous concrete pavements within the project limits. In addition to the pavements defined above, Pavement Removal shall include aggregate and stabilized base and subbase materials and any soil materials located above the proposed subgrade elevation.

152-1.3 UNSUITABLE EXCAVATION. Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, when approved by the Engineer as suitable to support vegetation, may be used on the embankment slope.

CONSTRUCTION METHODS

152-2.1 GENERAL.

The suitability of material to be placed in embankments shall be subject to approval by the Authority. All unsuitable material shall be disposed of in waste areas shown on the plans. All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of adjacent usable areas of the airport, unless specified on the plans or approved by the Authority.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued. At the direction of the Authority, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Those areas outside of the pavement areas in which the top layer of soil material has become compacted, by hauling or other activities of the Contractor shall be scarified and disked to a depth of 4 in in order to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Authority, who shall arrange for their removal if necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

152-2.2 EXCAVATION. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be used to grade the areas of ultimate development or disposed of as directed. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the deficiency shall be obtained from borrow areas.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work.

- a. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, shoulders, or any areas intended for turfing shall be excavated to the depth specified by the Authority, below the subgrade. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. The excavated area shall be refilled with suitable material obtained from the grading operations and thoroughly compacted by rolling.
- b. Bituminous Pavement Removal. Bituminous pavement designated for removal shall be milled or excavated using equipment designed and built for this type of work.
The existing pavement shall be removed to the depth specified on the plans and shall produce the specified cross slope.

The pavement removal equipment shall be operated to effectively minimize the amount of dust being emitted from the machine. Pre-wetting of the pavement may be required.

After removal of surface or base course materials, sweeping of the exposed surface with an approved vacuum power broom will be required prior to placing the new pavement material or tack coat.

The Contractor shall use care to remove the existing bituminous material around all utility facilities within the work area. Utility facilities that are damaged by the pavement removal operation shall be repaired to the satisfaction of the COTR.

After removal, the surface shall have a reasonably uniform texture and shall be within 1/4 inch of a true profile grade and shall have no deviation in excess of 1/4 inch from a straight edge applied to the pavement perpendicular to the centerline. Areas varying from a true

surface in excess of the above stated tolerance may be accepted without correction if the COTR determines that they were caused by a pre-existing condition that could not have reasonably been corrected by the pavement removal operations. Any texture or profile that the COTR deems unsuitable shall be corrected by the Contractor at no additional compensation.

- c. Overbreak. Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Authority. The Engineer shall determine if the displacement of such material was unavoidable and his/her decision shall be final. All overbreak shall be graded or removed by the Contractor and disposed of as directed; however, payment will not be made for the removal and disposal of overbreak that the Authority determines as avoidable. Unavoidable overbreak will be classified as "Unclassified Excavation."
- d. Compaction Requirements. The subgrade under areas to be paved shall be compacted to a depth of 12 inches and to a density of not less than 95 percent of the maximum dry density for cohesive soils and 100 percent of the maximum density for non-cohesive soils as determined by ASTM1557. The material to be compacted shall be within +/- 2 percent of optimum moisture content before rolled to obtain the prescribed compaction (except for expansive soils).

Non-cohesive materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as non-cohesive only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope.

Blasting will not be permitted.

The Contractor shall maintain ditches constructed on the project to the required cross section and shall keep them free of debris or obstructions until the project is accepted.

152-2.3 FINISHING AND PROTECTION OF SUBGRADE. After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unstable material that will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade.

152-2.4 HAUL. All hauling will be considered a necessary and incidental part of the work. Its cost shall be considered by the Contractor and included in the contract price. No payment will be made separately or directly for hauling on any part of the work.

CONTRACTOR QUALITY
CONTROL

152-3.1 QUALITY CONTROL PROGRAM. The Contractor shall develop a Quality Control Program in accordance with Section 01 40 00 "Quality Requirements." The program shall address all elements which effect the quality of the work including, but not limited to:

1. Field Density Testing
2. Surface Smoothness
3. Finishing

TESTING REQUIREMENTS

ASTM D 698	Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5- pound Rammer and 12 in Drop
ASTM D 1556	Test for Density of Soil In Place by the Sand-Cone Method
ASTM D 1557	Test for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D 2167	Test for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods

END OF ITEM P-152

ITEM P-606 ADHESIVE COMPOUNDS, TWO-COMPONENT FOR SEALING WIRE AND LIGHTS IN PAVEMENT

DESCRIPTION

606-1.1. This specification covers two types of material; a liquid suitable for sealing electrical wire in saw cuts in pavement and for sealing light fixtures or bases in pavement, and a paste suitable for embedding light fixtures in the pavement. Both types of material are two-component filled formulas with the characteristics specified in paragraph 606-2.4. Materials supplied for use with bituminous concrete pavements must be formulated so they are compatible with the bituminous concrete.

EQUIPMENT AND MATERIALS

606-2.1 Curing. When pre-warmed to 77°F (25°C), mixed, and placed in accordance with manufacturer's directions, the materials shall cure at temperatures of 45°F (7°C) or above without the application of external heat.

606-2.2 Storage. The adhesive components shall not be stored at temperatures over 86°F (30°C).

606-2.3 Caution. Installation and use shall be in accordance with the manufacturer's recommended procedures. Avoid prolonged or repeated contact with skin. In case of contact, wash with soap and flush with water. If taken internally, call doctor. Keep away from heat or flame. Avoid vapor. Use in well-ventilated areas. Keep in cool place. Keep away from children.

606-2.4 Characteristics. When mixed and cured in accordance with the manufacturer's directions, the materials shall have the following properties shown in Table 1.

SAMPLING, INSPECTION, AND TEST PROCEDURES

606-3.1 Tensile properties. Tests for tensile strength and elongation shall be conducted in accordance with ASTM D638.

606-3.2 Expansion. Tests for coefficients of linear and cubical expansion shall be conducted in accordance with ASTM D1168, Method B, except that mercury shall be used instead of glycerine. The test specimen shall be mixed in the proportions specified by the manufacturer, and cured in a glass tub approximately 2 inch (50 mm) long by 3/8 inch (9 mm) in diameter. The interior of the tube shall be precoated with a silicone mold release agent. The hardened sample shall be removed from the tube and aged at room temperature for one (1) week before conducting the test. The test temperature range shall be from 35°F (2°C) to 140°F (60°C).

606-3.3 Test for dielectric strength. Test for dielectric strength shall be conducted in accordance with ASTM D149 for sealing compounds to be furnished for sealing electrical wires in pavement.

Table 1. Property Requirements

Physical or Electrical Property	Minimum	Maximum	ASTM Method
Tensile			
Portland cement concrete	1,000 psi (70 kg/sq cm)		D 638
Bituminous concrete	500 psi (35 kg/sq cm)		
Elongation			
Portland cement concrete		See note ¹	D 638
Bituminous concrete	50%		D 638
Coef. of cub. exp. cu. cm/cu. cm/°C	0.00090	0.00120	D 1168
Coef. of lin. exp. cm/cm/°C	0.000030	0.000040	D 1168
Dielectric strength, short time test	350 volts/mil.		D 149
Arc resistance	125 sec		
Pull-off			
Adhesion to steel	1,000 psi (70 kg/sq cm)		
Adhesion to Portland cement concrete	200 psi (14 kg/sq cm)		
Adhesion to asphalt concrete	No test available.		
Adhesion to aluminum	250 psi		

¹ 20% or more (without filler) for formulations to be supplied for areas subject to freezing.

606-3.4 Test for arc resistance. Test for arc resistance shall be conducted for sealing compounds to be furnished for sealing electrical wires in pavement.

606-3.5 Test for adhesion to steel. The ends of two smooth, clean, steel specimens of convenient size (1 inch by 1 inch by 6 inch) (25 mm by 25 mm by 150 mm) would be satisfactory when bonded together with adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure on a Riehle (or similar) tensile tester. The thickness of adhesive to be tested shall be 1/4 inch (6 mm).

606-3.6 Adhesion to Portland cement concrete

a. Concrete test block preparation. The aggregate grading shall be as shown in Table 2.

The coarse aggregate shall consist of crushed rock having a minimum of 75% of the particles with at least one fractured face and having a water absorption of not more than 1.5%. The fine aggregate shall consist of crushed sand manufactured from the same parent rock as the coarse aggregate. The concrete shall have a water-cement ratio of 5.5 gallons (21 liters) of water per bag of cement, a cement factor of 6,

±0.5, bags of cement per cubic yard (0.76 cubic meter) of concrete, and a slump of 2-1/2 inch (60 mm), ±1/2 inch (60 mm ±12 mm). The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0%, ±0.5%, and it shall be obtained by the addition to the batch of an air-entraining admixture such as Vinsol® resin. The mold shall be of metal and shall be provided with a metal base plate.

Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be watertight and shall be oiled with mineral oil before use. The inside measurement of the mold shall be such that several one inch (25 mm) by 2 inch (75 mm) by 3 inch (25 mm by 50 mm by 75 mm) test blocks can be cut from the specimen with a concrete saw having a diamond blade. The concrete shall be prepared and cured in accordance with ASTM C192.

Table 2. Aggregate For Bond Test Blocks

Type	Sieve Size	Percent Passing
Coarse Aggregate	3/4 inch (19 mm)	97 to 100
	1/2 inch (12 mm)	63 to 69
	3/8 inch (9 mm)	30 to 36
	No. 4 (4.75 mm)	0 to 3
Fine Aggregate	No. 4 (4.75 mm)	100
	No. 8 (2.36 mm)	82 to 88
	No. 16 (1.18 mm)	60 to 70
	No. 30 (600 µm)	40 to 50
	No. 50 (300 µm)	16 to 26
	No. 100 (150 µm)	5 to 9

b. Bond test. Prior to use, oven-dry the test blocks to constant weight at a temperature of 220°F to 230°F (104°C to 110°C), cool to room temperature, 73.4°F ±3°F (23°C ±1.6°C), in a desiccator, and clean the surface of the blocks of film or powder by vigorous brushing with a stiff-bristled fiber brush. Two test blocks shall be bonded together on the one inch by 3 inch (25 mm by 75 mm) sawed face with the adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure in a Riehle (or similar) tensile tester. The thickness of the adhesive to be tested shall be 1/4 inch (6 mm).

606-3.7 Compatibility with asphalt concrete. Test for compatibility with asphalt in accordance with ASTM D5329.

606-3.8 Adhesive compounds - Contractor’s responsibility. The Contractor shall furnish the vendor’s certified test reports for each batch of material delivered to the project. The report shall certify that the material meets specification requirements and is suitable for use with bituminous concrete pavements. The report shall be delivered to the Authority before permission is granted for use of the material. In addition the Contractor shall obtain a statement from the supplier or manufacturer that guarantees the material for one year. The supplier or manufacturer shall furnish evidence that the material has performed satisfactorily on other projects.

606-3.9 Application. Adhesive shall be applied on a dry, clean surface, free of grease, dust, and other loose particles. The method of mixing and application shall be in strict accordance with the manufacturer's recommendations.

METHOD OF MEASUREMENT

606-4.1 For new light base installations, P-606 sealant shall not be measured separately but shall be incidental to the light can installation with no separate payment made for adhesive compounds and joint sealing material.

TESTING REQUIREMENTS

ASTM C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM D149	Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D1168	Standard Test Method for Hydrocarbon Waxes Used for Electrical Insulation
ASTM D5329	Standard Test Methods for Sealants and Fillers, Hot-applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements

END OF ITEM P-606

ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

DESCRIPTION

610-1.1 This item shall consist of plain and reinforced structural portland cement concrete (PCC), prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans. This specification shall be used for all structural and miscellaneous concrete including signage bases.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Engineer before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

a. Reactivity. Fine and Coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with both ASTM C1260 and C1567. Aggregate and mix proportion reactivity tests shall be performed for each project.

(1) Coarse and fine aggregate shall be tested separately in accordance with ASTM C1260. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.10% at 28 days (30 days from casting).

(2) Combined coarse and fine aggregate shall be tested in accordance with ASTM C1567, modified for combined aggregates, using the proposed mixture design proportions of aggregates, cementitious materials, and/or specific reactivity reducing chemicals. If lithium nitrate is proposed for use with or without supplementary cementitious materials, the aggregates shall be tested in accordance with Corps of Engineers (COE) CRD C662. If lithium nitrate admixture is used, it shall be nominal 30% \pm 0.5% weight lithium nitrate in water.

(3) If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C1567, modified for combined aggregates, or COE CRD C662, does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion of the proposed combined materials test specimens is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

610-2.2 Coarse aggregate. NOT USED.

610-2.3 Fine aggregate. The fine aggregate for concrete shall meet the requirements of ASTM C33.

The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of the table below when tested in accordance with ASTM C136:

Gradation For Fine Aggregate

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3/8 inch (9 mm)	100
No. 4 (4.75 mm)	95-100
No. 16 (1.18 mm)	45-80
No. 30 (0.60 mm)	25-55
No. 50 (0.30 mm)	10-30
No. 100 (0.15 mm)	2-10

Blending will be permitted, if necessary, to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, if the deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than Portland cement, as specified in paragraph 610-2.6, Admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 Cement. Cement shall conform to the requirements of **ASTM C150 Type Type I or II.**

The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before use of the cement is granted. All test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 Water. The water used in concrete shall be fresh, clean and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials or other substances deleterious to concrete. If water is of questionable quality, it shall be tested in accordance with AASHTO T26.

610-2.6 Admixtures and supplementary cementitious material. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

Pozzolanic admixtures shall be flyash or raw or calcined natural pozzolans meeting the requirements of ASTM C 618, Class F or N with the exception of loss of ignition, where the maximum shall be less than 6 percent. Class F or N flyash for use in mitigating alkali-silica reactivity shall have a Calcium Oxide (CaO) content of less than 13 percent and a total equivalent alkali content less than 3 percent.

Air-entraining admixtures shall meet the requirements of ASTM C260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C494, Type A, water reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.

610-2.7 Premolded joint material. Premolded joint material for expansion joints shall meet the requirements of ASTM D1751.

610-2.8 Joint filler. The filler for joints shall meet the requirements of Item P-606, unless otherwise specified.

610-2.9 Steel reinforcement. Reinforcing shall consist of ASTM A1064 and Grade 60 billet steel] conforming to the requirements of ASTM A615.

610-2.10 Materials for curing concrete. Curing materials shall be clear or white polyethylene sheeting, conforming to ASTM C171.

CONSTRUCTION METHODS

610-3.1 General. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the Engineer.

610-3.2 Concrete composition. The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cement per cubic yard (280 kg per cubic meter). The concrete shall contain 5% of entrained air, $\pm 1\%$, as determined by ASTM C231 and shall have a slump of not more than 4 inches (100 mm) as determined by ASTM C143.

For high early strength (HES) concrete, minimum compressive strengths are 2000 psi and 3000 psi at three hour and one day, respectively with a minimum compressive strength of 4000 psi at 28 days is required. Materials to be incorporated and methods of construction to be employed under this item shall be governed by the applicable sections of the SHA Standards including all current supplements.

610-3.3 Acceptance sampling and testing. Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The concrete shall be sampled in accordance with

ASTM C172. Concrete cylindrical compressive strength specimens shall be made in accordance with ASTM C31 and tested in accordance with ASTM C39 at the Contractor's expense.

610-3.4 Qualifications for concrete testing service. Perform concrete testing by an approved laboratory and inspection service experienced in sampling and testing concrete. Testing agency must meet the requirements of ASTM C1077 or ASTM E329.

610-3.5 Proportioning and measuring devices. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so the required, exact weight of aggregates is obtained.

610-3.6 Consistency. The consistency of the concrete shall be determined by the slump test specified in ASTM C143.

610-3.7 Mixing. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94.

610-3.8 Mixing conditions. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.9 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface. The forms shall not be removed until at least 30 hours after concrete placement for vertical faces, walls, slender columns, and similar structures. Forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate the concrete has developed at least 60% of the design strength.

610-3.10 Placing reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.11 Embedded items. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.12 Placing concrete. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the Engineer. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet (1.5 m). Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.13 Vibration. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309, Guide for Consolidation of Concrete. Where bars meeting ASTM A775 or A934 are used, the vibrators shall be equipped with rubber or non-metallic vibrator heads. Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches (100 mm) in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches (100 mm) or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 cycles per minute when submerged. Do not use vibrators to transport the concrete in the forms. Penetrate the previously placed lift with the vibrator when more than one lift is required. Use external vibrators on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete. Vibrators shall be manipulated to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any point shall be of sufficient duration to accomplish compaction but shall not be prolonged to where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie or other approved method and shall not be disturbed after placement.

610-3.14 Construction joints. If the placement of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, provisions shall be made for grooves, steps, reinforcing bars or other devices as specified. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete that has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610-3.15 Expansion joints. Expansion joints shall be constructed at such points and dimensions as indicated on the drawings. The premolded filler shall be cut to the same shape as the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place so that it will not be displaced when concrete is deposited against it.

610-3.16 Defective work. Any defective work discovered after the forms have been removed, which in the opinion of the Engineer cannot be repaired satisfactorily, shall be immediately removed and replaced at the expense of the Contractor. Defective work shall include deficient dimensions, or bulged, uneven, or honeycomb on the surface of the concrete.

610-3.17 Surface finish. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

The surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a finishing machine.

610-3.18 Curing and protection. All concrete shall be properly cured and protected by the Contractor. The concrete shall be protected from the weather, flowing water, and from defacement of any nature during the project. The concrete shall be cured by covering with an approved material as soon as it has sufficiently hardened. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for at least three (3) days following concrete placement. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to air currents. Wooden forms shall be kept wet at all times until removed to prevent opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for seven (7) days after the concrete has been placed.

610-3.19 Drains or ducts. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.20 Cold weather placing. When concrete is placed at temperatures below 40°F (4°C), the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated to place the concrete at temperatures between 50°F and 100°F (10°C and 38°C).

Calcium chloride may be incorporated in the mixing water when directed by the Engineer. Not more than pounds (908 grams) of Type 1 nor more than 1.6 pounds (726 grams) of Type 2 shall be added per bag of cement. After the concrete has been placed, the Contractor shall provide sufficient protection such as cover, canvas, framework, heating apparatus, etc., to enclose and protect the structure and maintain the temperature of the mix at not less than 50°F (10°C) until at least 60% of the designed strength has been attained.

610-3.21 Hot weather placing. When hot weather conditions existing that would impair quality and strength of the concrete, place concrete complying with ACI 305. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 degrees F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse conditions, as acceptable to the Authority.

610-3.22 Filling joints. All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not start until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be done with proper equipment to obtain a neat looking joint free from excess filler.

METHOD OF MEASUREMENT

610-4.1 Portland cement concrete shall be measured by the number of cubic yards (cubic meters) of concrete complete in place and accepted. In computing the yardage of concrete for payment, the dimensions used shall be those shown on the plans or ordered by the Engineer. No measurements or other allowances shall be made for forms, falsework, cofferdams, pumping, bracing, expansion joints, or finishing of the concrete. No deductions in yardage shall be made for the volumes of reinforcing steel or embedded items.

610-4.2 Reinforcing steel shall be measured by the calculated theoretical number of pounds (kg) placed, as shown on the plans, complete in place and accepted. The unit weight used for deformed bars shall be the weight of plain square or round bars of equal nominal size. If so indicated on the plans, the poundage to be paid for shall include the weight of metal pipes and drains, metal conduits and ducts, or similar materials indicated and included.

BASIS OF PAYMENT

610-5.1 1 Payment shall not be measured separately for structural Portland cement concrete and for reinforcing steel, but shall be incidental to the installation requiring such with no separate payment made for furnishing all materials and for all preparation, delivery and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

TESTING REQUIREMENTS

ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1064	Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregates (Accelerated Mortar-Bar Method)
ASTM E329	Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
U.S. Army Corps of Engineers (USACE) Concrete Research Division (CRD) C662	Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)

MATERIAL REQUIREMENTS

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A185	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement

Item P-610 Structural Portland Cement Concrete

Technical Specifications

ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 309R	Guide for Consolidation of Concrete

END OF ITEM P-610

ITEM L-100 GENERAL PROVISIONS AND REQUIREMENTS FOR ELECTRICAL WORK

DESCRIPTION

100-1.1 GENERAL

The electrical portions of the project includes all supervision, labor, materials, tools, equipment, workmanship, transportation and shop services required for complete installations, ready for continuous and satisfactory service as shown on the drawings and specified herein. The various Airport and FAA facilities affected include:

- a. Remove existing stake mounted airfield light fixtures and isolation transformers and install new airfield light fixtures with new light base, isolation transformers, and concrete pad where shown on the plans
- b. Remove existing cabling from conduit and replace with new cabling where shown on the plans. Provide L-823 connectors, Amerace 54Superkit in all light base and junction points.
- c. Remove and Replace Existing Isolation Transformer, L-823 connectors, and associated L-824 Cable where shown on plans.
- d. Existing direct buried cable to be abandoned in place shall be cut back to the horizontal lateral routing.
- e. Provide new conduits, duct banks, handholes, junction cans, manholes, and connections as shown on the plans.
- f. Repair existing (conduits, etc.) that are damaged by construction.
- g. Installation of new duct bank, hand holes, and fiber optic cable for replacement of existing FAA fiber optic control cable.
- h. Replace existing ALCMS computers with ALCMS computers running windows 7.
- i. Replace existing ALCMS touchscreen in ATCT
- j. Provide temporary lighting and power during construction.
- k. **Alternate Bid 1:** Install wireless communication network between Operations Center and ATCT.

100-1.2 RELATED DOCUMENTS

Work shall be in accordance with Federal Aviation Administration Advisory Circular No. 150-5370-10, "Standards for Specifying Construction of Airports," as modified herein, other FAA Advisory Circulars and Specifications referred to herein and other requirements as specified herein.

- a.** Drawings and general provisions of the Contract apply to this Section.

Additional details pertaining to a specific system covered in this item are contained in the FAA Order and Advisory Circulars listed below. Copies of the FAA Order may be obtained from:

Subsequent Distribution Section M-494.3 or	Document Inspection Facility, APA-220
Department of Transportation	U.S. Department of Transportation
400 Seventh Street, S.W.	Federal Aviation Administration
Washington, D.C. 20590	Washington, D.C. 20591

Or www.faa.gov

- b.** FAA Order 6560.10C (or latest edition), Runway Visual Range (RVR).
- c.** FAA Order 6750.16D (or latest edition), Siting Criteria for Instrument Landing Systems
- d.** FAA Order 6750.24D (or latest edition), ILS and Ancillary Electronic Component Configuration and Performance Requirements.
- e.** FAA Order 6850.2B (or latest edition), Visual Guidance Lighting Systems.
- f.** Advisory Circular 70/7460-1K (or latest edition), Obstruction Marking and Lighting.
- g.** Advisory Circular 150/5345-7E (or latest edition), Specification for L-824 Underground Electrical Cable for airport Circuits.
- h.** Advisory Circular 150/5345-26D (or latest edition), Specification for L-823 Plug and Receptacle, Cable Connectors.
- i.** Advisory Circular 150/5345-42F (or latest edition), Specification for Airport Light Base and Transformer Housings, Junction Boxes, and Accessories.
- j.** Advisory Circular 150/5345-45C (or latest edition), Low-Impact Resistant (LIR) Structures
- k.** Advisory Circular 150/5345-46D (or latest edition), Specification for Runway and Taxiway Lighting system
- l.** Advisory Circular 150/5345-53D (or latest edition), Airport Lighting Equipment Certification Program
- m.** Advisory Circular 150/5220-23 (or latest edition), Frangible Connections
- n.** FAA-STD-19e (or latest edition), Specifications for Lightning Protection, Grounding, Bonding, and Shielding Requirements for Facilities.
- o.** N JO 3900.73, Lockout/Tagout Procedures- New Equipment Installation and major modifications
- p.** FAA-C-1391b (or latest edition), Installation and Splicing of Underground Cables

- q. ANSI C2, National Electrical Safety Code
- r. NEC, National Electric Code (NFPA 70)
- s. NECA, Standard for Installation
- t. NEMA, Standard for Materials and Products
- u. NFPA, No. 101, Life Safety Code
- v. UL, Underwriters Laboratories

100-1.3 DEFINITIONS

- a. **Authority/Owner:** Shreveport Airport Authority.
- b. **Contractor:** The Individual or Company awarded the Contract to perform the construction work described in the Contract Documents.
- c. **EES:** Earth electrode System.
- d. **Engineer:** The organization or individual employed to oversee the Project as the Specifically Authorized Representative or Agent of the Owner.
- e. **Handhole/Manhole** Throughout the specifications, the term, manhole, or handhole is used to represent all below grade electrical chambers.
- f. **Light Bar.** Threshold bars, typically associated with Approach Light Systems.
- g. **Precision Approach Path Indicator (PAPI).** The PAPI system provides visual approach slope information thru 4-Box Light Housing assemblies (LHA) controlled from a Power Control Unit (PCU).
- h. **Directive Verbs:** The information in these Specifications contains requirement criteria, recommended practices, and other guidance instructions which require the use of certain directive verbs such as: **SHALL, SHOULD, MAY, MUST, WILL FURNISH, and PROVIDE.** In these specifications, the explicit meaning of each verb is as follows:
 - (1) **SHALL:** The action is mandatory.
 - (2) **SHOULD:** The action is desirable or recommended.
 - (3) **MAY:** The action is permissible.
 - (4) **MUST:** The action is required in support of a mandatory action.
 - (5) **WILL:** The action is to be undertaken at some point in the future.

- (6) **FURNISH:** To supply or make available whatever is needed.
- (7) **PROVIDE:** Furnish, install, and connect up complete.

100-1.3 QUALIFICATIONS

All work shall be performed in strict accordance with these contract specifications, drawings, and any instructions that may be furnished by the Engineer during execution of the work to aid in interpretations of said drawings and specifications. The Contractor shall keep these and all applicable specifications on file at his airport construction office. Electrical work shall be performed by an Electrical Contractor licensed in the State of Louisiana with at least five (5) years experience in airfield lighting (in-pavement as well as elevated lighting) and signage installation. Proof of experience shall be submitted with bid. Workmen installing electrical systems shall have a current Apprentice license. Apprentices shall have a minimum of three (3) years experience installing electrical systems.

All material furnished for this project shall be listed by Underwriters Laboratories wherever UL has a listing standard for that material.

100-1.4 VERIFICATION OF RUNWAY AND TAXIWAY LIGHTING

Contractor shall verify at the end of every work shift that all required lights, which may have been affected by his work, and all lighting associated with the circuits involved in the scope but are outside scope limits are functioning properly.

Per the testing requirements of Paragraph L-100-3.12, the Contractor shall secure the services of an independent testing service to test the installed airfield lighting and miscellaneous power cables prior to the start of and at the completion of this project.

100-1.5 CONFLICTS BETWEEN DOCUMENTS

Prospective contractors shall, as part of their proposals, enumerate, identify and list conflicts that they discover to exist within the contract documents and/or between those documents and the rules, regulations, standards and codes of local utility companies and local, county or state governing bodies.

100-1.6 TEMPORARY LIGHTING AND CIRCUITS

- a. Contractor shall coordinate with Operations and Maintenance at the end of each work shift to verify that all temporary airfield lighting circuits are operational. Contractor shall provide all labor and material for this work.
- b. Contractor shall provide and maintain, on hand, sufficient equipment required to provide temporary lighting and circuit extensions. This includes, but is not limited to, fixtures, transformers, bases, two-inch conduit, L-824 cable and L-823 connectors.

EQUIPMENT AND MATERIALS

100-2.1 GENERAL

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified and listed under Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the Engineer.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

f. The data submitted shall show physical size, mounting, characteristics of components, electrical and photometric data, reinforcing, manhole and handhole load bearing capabilities, etc., all as may be required to provide the Engineer with sufficient information to allow him to ascertain compliance with the drawings, specifications and installation requirements.

g. All equipment and materials furnished and installed under this specification shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

h. The Contractor shall submit six (6) copies each of shop drawings to include, but not limited to, the following items of equipment in accordance with the General Provisions.

Airfield lighting items including:

(1) L-823 Connectors, Cable

(2) L-824 Cables, Underground Electrical, 5kV Cables, 600V Cables, and Control Cables

- (3) L-830 Transformers, Isolation
- (4) L-867 Light base
- (5) Ground Rods, Grounding Accessories, and Lightning Protection Equipment
- (6) Handholes, Manholes and Junction Can Plazas
- (7) Concrete Mix
- (8) Heat Shrinkable Tubing
- (9) Exothermic Welds.
- (10) Detectable, Marking Warning Tape
- (11) Conduit and Fittings, all types
- (12) Conduit Sealing Bushings
- (13) Fiber Optic Cable
- (14) ALCMS Touchscreen
- (15) ALCMS Computers
- (16) **Alternate Bid 1:** All ALCMS Wireless Communication Accessories.

Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

i. The Contractor must take notice of all materials which he will be required to furnish under this contract. He must identify items, which have a long lead-time from a manufacturer or distributor, and order these items soon after contract award. These items will require Shop Drawing submittals and Resident Engineer approval before procurement. Contractor shall submit these Shop Drawings within four weeks after notice to proceed.

CONSTRUCTION METHODS

100-3.1 COORDINATION OF WORK

Work under Items L-108, L-110, L-115, L-125, L-128, and L-190 shall be carefully coordinated with work under other items of the specifications so that all work will be complementary and not require excessive cutting and patching. It is the responsibility of the Contractor for this section to see that necessary information, materials, etc., are turned over to the Contractor(s) for other work in time to be incorporated in their work. This shall include mounting bolts, templates, inserts, etc.

Continuation of work from one trade to another is indicated or specified as accurately as possible, but in the case of interference or conflicts, it shall be the responsibility of the Contractor to decide and direct.

100-3.2 CONFINED SPACES

Work for this project requires the presence of personnel in confined spaces which have the potential to contain hazardous atmospheres. All such work shall be done in compliance with Federal Occupational Safety and Health Administration, 29 CFR Parts 1910 "Permit-Required Confined Spaces."

100-3.3 PERMITS AND INSPECTIONS

The Contractor shall obtain and pay for all construction permits, inspections and certificates required by governmental authorities having jurisdiction.

100-3.4 CODES AND STANDARDS

All workmanship and material shall be in accordance with applicable provisions of the National Electrical Code current edition as minimum standard, larger sizes and capacities as indicated shall be provided.

FAA Advisory Circulars, FAA Orders, Standards and Specifications, NEMA Standards and Federal Specifications as referenced shall apply. All equipment and material of a type listed by the Underwriters' Laboratories (UL) shall be so listed.

All excavations shall be performed in accordance with requirements of the Occupational Safety and Health Administration (OSHA) standards as applicable.

100-3.5 EXISTING UTILITIES

Prior to any excavation or trenching, locate any existing cables and utilities that will be crossed by the trench. The Contractor shall inform SAA that utility conflicts exist in work area prior to commencing work. Ensure these utilities are permanently disconnected if they are going to be demolished. The existing service lines shall be exposed by hand excavation in those areas that will be crossed and shall be protected from any possible damage. If any damage occurs, it shall be the Contractor's responsibility to immediately repair such damage with materials and methods approved by the Owner and in compliance with applicable codes and standards, at no additional cost to the Owner. Existing utilities are to be abandoned or removed at the point of crossing as shown on the drawings and as field directed by the Federal Aviation Administration or Owner.

100-3.6 DEMOLITION AND REMOVAL

Demolition and Removal shall be specified in Section L-128 and as directed in the drawings.

100-3.7 TEMPORARY AIRFIELD LIGHTING

Provide all cables, conduits, and fixtures, and temporary connections to provide temporary airfield lighting required to maintain the function of the airfield during all stages of reconstruction.

100-3.8 CABLE INSTALLATION

This Section includes the underground installation of all power and control cables. Contractor shall provide all materials. All runs shall be as continuous as possible with no splices permitted between terminations except where noted in the drawings and except where required by lengths supplied (normally 2,000 feet maximum). Locations of splices shall be approved by the Owner. The Contractor, in pulling cables through ducts and/or conduits, shall not exceed the maximum allowable tension values for the cables as specified by the manufacturer.

A cable slack loop of 5 feet, ± 6 inches shall be left on each end of cable runs and at all points where cable connections are brought above ground. The slack loop shall be installed at the same minimum depth as the cable run. Loops shall have no bends with an inner radius less than twelve times the outside diameter of the cable. Also see Section L-108 for installation of airfield lighting cables.

100-3.9 CABLE SPLICES

Cable splicing materials shall be as shown on the project drawings or as specified in Section L-108. All splicing methods shall be as recommended by the manufacturer of the splicing material for the particular type of cable being spliced and shall be approved by the Owner prior to installation.

100-3.10 POWER CABLE AND WIRING

- a. 600 Volt and Less (for Electrical Service Equipment). Conductors shall be joined with crimp-type insulated connectors as manufactured by Thomas & Betts, General Electric, 3M Company, or equal. These connectors shall be used for both above and below ground splices. Splice shall be constructed of electrical tapes and pressure epoxy resin. Tapes shall be "Scotch 88" brand and resin shall be "Scotch-Cast" brand, or equal, as manufactured by 3M Company. Cable armor continuity shall be maintained within splice with "Scotchlok" #4460 connectors and #6 AWG stranded, bare copper wire or equal. Wire termination lugs and bus bars marked "CU-AL" shall be protected from corrosion with an anti-oxidation paste such as "NOALOX" or equal. Apply paste to wire at termination point within lug and between lug and any other conductive surface.
- b. Above 600 Volt. See Section L-108, Installation of Underground Power Cable for Airports, for airfield lighting cable.

100-3.11 GROUNDING

All metal support structures and metal enclosures shall be grounded in accordance with the requirements of FAA-STD-019 and as indicated on the drawings.

100-3.12 GROUND RODS

Grounding rods shall be 3/4-inch diameter by 10 feet long copper-clad steel. Grounding connections shall be by the exothermic weld process, Cadweld or equal. Extruded, drawn or stamped-type ground clamps will not be acceptable. The resistance to ground shall not exceed 25 ohms.

100-3.13 CONDUCTORS

Installation of underground 5 kV and 600 V conductors is specified in Section L-108 of these specifications.

100-3.14 GROUND CONDUCTORS

Equipment grounding conductors shall be insulated copper, except where shown on the project drawings to be bare, and sized as shown on the contract drawings; and all grounds will be shown in accordance with Article 250 of the National Electrical Code and with FAA-STD-019. Attachment of wire to supports, boxes, etc., shall be accomplished using approved ground lug attached with a separate stainless steel screw, lock washer and nut. Screws used for support of the electrical enclosure shall not be used for connection of the ground wire. Pipe straps shall not be used for ground purposes.

COLOR CODING OF GROUND CONDUCTORS	
TYPE OF GROUND CONDUCTOR	COLOR OF INSULATION
Grounding Electrode Conductor	Bare - No Insulation
Equipment Grounding Conductor (Safety)	Green (safety)

Each of these separate ground conductors is insulated in order to keep it distinct and not allow contact with any other conductor.

Electrical continuity of cable armor or shield shall be maintained. Grounding of the cable armor or shield shall be required at all terminations and shall be accomplished by connecting a #6 AWG solid bare copper wire to the cable armor or shield by means of a compression-type ground clamp installed within the terminating enclosure. Armor or shield ground wire shall be connected to the ground electrode conductor using split bolt connector, Burndy or equal.

100-3.15 TESTING AND SUBMITTALS

Equipment and materials list and shop drawings shall be submitted as per FAA-C-1217, Section 5.1. Testing shall be required and performed as per FAA-C-1217, Section 5.3 and FAA-C-1391, Section 4. The Contractor shall be responsible for repairs or replacement of any cable found defective after installation.

For new airfield lighting cable installed on existing circuits (installed with existing cable) the Contractor shall procure the services of an independent testing agency that shall measure and certify the insulation resistance of (1) the new cable from a handhole, or light base in the field, (2) the insulation resistance of the existing circuit (as measured in the vault), and (3) the insulation resistance of the modified or new circuit at the completion of the project (as measured in the vault). The results shall be provided to the Engineer in writing for review.

Photometric testing of the installed new or re-installed airfield lighting fixtures shall be performed by an

independent vendor qualified to test airfield lighting using equipment designed to test and evaluate airfield lighting. The results of this testing shall be provided to the Engineer in writing for review.

Installation tests in addition to all tests contained in other L-Series Sections shall be provided as follows:

Item	Test Required	Manufacturer's Rep. Present?
5 kV Rated Airfield Lighting and Power Cables (Installed in This Project)	Megger check at 1000 volts at the completion and start of the installation. Test every circuit for conductor-to-ground and conductor-to-conductor (between circuits) insulation resistance. Test results shall be tabulated and given to the Owner for acceptance.	No
5 kV Rated Airfield Lighting and Power Cables (All Circuits Emanating from any Lighting Vault Modified in This Project)	Megger check at 1000 volts prior to the start of and at the completion of installation. Test every circuit for conductor-to-ground and conductor-to-conductor (between circuits) insulation resistance. Test results shall be tabulated and given to the Owner for acceptance.	No
5 kV Rated Airfield Lighting and Power Cables (Not Including Equipment)	Megger check to 2.0 times nominal system rated voltage prior to and after installation. Values of resistance of conductor-to-conductor and conductor-to-ground shall be noted and given to the Owner for approval. It is expected that the readings will be greater than 500 megohms. No readings of less than 500 megohms will be accepted; remedial measures to attain the 500 megohm reading shall be made at no additional expense to the owner. Continuous-tape pull tension readings for each section of cable shall be provided to the Owner for review.	No
Regulators (Existing affected by work)	The regulators shall be tested and certified to ensure correct operation of all output and alarm functions. The output current for each intensity stage of the modified/completed lighting circuit shall be noted and forwarded with the certificate to the Engineer.	No
Bases	All lighting bases shall be fitted in accordance with FAA Advisory Circulars such that the base of the fitting, when installed, shall be level. Alignment jigs as supplied by Jacquith Industries, Inc. (or equal) shall be used to ensure the base is installed to a depth and aligned in such a way that fixture height will be appropriate with the	Yes, minimum of first three (3) days of installation

Item	Test Required	Manufacturer's Rep. Present?
	surrounding surface and the base is geometrically positioned such that when the fixture is installed, the light beam will be directed in accordance with the appropriate advisory circulars for that type of fixture and its location.	
Airfield Light Fixture	Each light fixture will be tested prior to installation to ensure that lenses, where required, have been fitted, no signs of physical damage to the fittings exist and the lamps are working by connecting the fittings' electrical leads to a DC voltage source not exceeding 6 volts, such as a motorcycle battery. Any failures are to be reported to the Engineer / Owner. The fittings, when installed, shall be torqued to manufacturer's and FAA requirements and noted.	No

EQUIPMENT AND INSTALLATION DATA: The Contractor shall submit the following information to the Engineer upon completion of the project:

**FEDERAL AVIATION ADMINISTRATION
AIRPORT LIGHTING EQUIPMENT AND INSTALLATION DATA**

AIRPORT

DATE

LOCATION

DATA BY

PROJECT NO.

WITNESSED BY

DESCRIPTION OF PROJECT ELECTRICAL WORK:

NOTES:

Equipment "Type" as used on form above should include L-800 series, size, type or style.

Cable "Type" as used should include "L-824. A, B, or C" Size, number of conductors, and voltage rating.

Voltage Readings should be made with facility operating.

	RUNWAY DESIGNATION		TAXIWAY DESIGNATION	
RE: L-800 Series				
Light Fixture Type				
Light Fixture Manufacturer				
Light Fixture Lamp Type & Wattage				
Isolation Trans. Manufacturer.				
Cable Type				
Cable Connector Type & Size				
Connector Manufacturer				
<u>CCR Regulator</u> - Mfg. - Size (KW) - Regulator Input Voltage. - Output Current Rating (Measured) a. Step 1 b. Step 2 c. Step 3 - Insulation Resistance (Ohm)				

100-3.16 GUARANTEE

All equipment furnished and work performed under the Contract Documents shall be guaranteed against defects in materials or workmanship for a period of one (1) year from the date of final acceptance. This guarantee does not replace any responsibility for errors or omissions as set forth in state law. The guarantee shall be listed as owner purchaser. Any long-term warranties issued or offered by manufacturers for items of equipment shall be turned over to the Airport Authorities.

Any failure of equipment or work due to defects in materials or workmanship shall be corrected by the Contractor at no cost to the Owner.

100-3.17 CLEAN-UP

The Contractor shall remove all debris resulting from the work together with all tools, equipment, etc., from the site upon completion of this Contract. All equipment, including lighting fixtures and glass shall be clean and free from dirt, grease, insects, finger marks, etc., satisfactory to Engineer and Owner before final acceptance. The Contractor shall also conform to other clean-up requirements in the Contract Documents.

METHOD OF MEASUREMENT

100-4.1 No separate measurement of this item will be made.

BASIS OF PAYMENT

100-5.1 No separate payment will be made for this item. Measurement and payment for this item shall be made under the appropriate item requiring the use of electrical work as specified at the unit or lump sum prices for these items, including furnishing all materials and for all preparation, delivering and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

END OF ITEM L-100

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables within conduit or duct banks in accordance with these specifications at the locations shown on the plans. It also includes the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the Authority. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of any cable for FAA facilities. Requirements and payment for trenching and backfilling for the installation of underground conduit and duct banks are covered under Item L-110 "Airport Underground Electrical Duct Banks and Conduits."

EQUIPMENT AND MATERIALS

108-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be approved under the Airport Lighting Equipment Certification Program described in Advisory Circular (AC) 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the Authority.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Authority. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Authority and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Authority for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Authority, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Authority reserves the right to reject any and all equipment, materials or procedures, which, in the Authority's opinion, does not meet the system design and the standards and codes, specified herein.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by

the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. For 5kV airfield lighting circuits the Contractor shall be responsible to maintain an insulation resistance of 200 megohms minima, (1000 V megger) with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period.

108-2.2 CABLE. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall be Type C, No. 8 (or as specified on the Drawings) AWG, copper, 7 strand, single conductor cable with 5,000 volt ethylene propylene (EPR) insulation with a chlorinated polyethylene (CPE) non-shielded jacket and shall conform to the requirements of AC 150/5345-7(latest edition), Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Federal Specification J-C-30 and shall be type XHHW-2.

108-2.3 BARE COPPER WIRE (COUNTERPOISE, EQUIPMENT GROUND WIRE AND GROUND RODS). Wire for counterpoise installations for airfield lighting systems shall be No. 6 AWG solid bare copper wire. Safety equipment ground wire for airfield lighting systems shall be No.6 AWG stranded, green jacket insulated copper wire.

Bare copper wire shall conform to the requirements of ASTM D 33. Stranded copper wire shall conform to the requirements of ASTM B 3 and ASTM B 8. Insulated wire shall be XHHW-2 green jacketed.

Ground rods shall be copper or copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 10-feet long nor less than 3/4-inch in diameter.

108-2.4 CABLE CONNECTIONS. All cable splices shall be performed by a qualified and licensed electrician experienced with series circuit wiring. All splicing methods and material shall be of a type recommended by the manufacturer of the splicing material for the particular type of cable being spliced, and shall be approved of by the Authority prior to installation. All cable splice envelopes shall meet the requirements listed below. In-line connections of underground cables shall be of the type shown on the Drawings and shall be one of the types listed below.

All splices for airfield lighting cable shall be made using specifically designed mechanical tools to crimp No. 8, airfield L-824, Type C cable, and a cable end stripper/pencil (example, model #WS-49 Mfg. Ripley Tool Company). No exceptions will be made. Contractor shall have sufficient number of crimping and pencil tools as required to complete the work.

No separate payment will be made for cable connections.

a. Series Airfield Lighting Cable L-823 Primary Connectors. Figure 3 of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, Type I, Class B, employing connector kits, is acceptable for field attachment to single conductor cable. Connectors shall be "54 Super Kit", manufactured by Amerace Corp., Elastimold Division, or approved equal. It shall be the Contractor's responsibility to determine the outside diameter of the cable to be spliced and to furnish appropriately sized connector kits and/or adapters.

b. Preformed Splice Connectors. Preformed connectors may be used for cables and wire other than series lighting circuits. Preformed connectors shall be UL listed, and of a type recommended by the manufacturer of the splicing material for the particular type of cable being spliced, as approved of by the Authority prior to installation.

c. Taped or Heat-Shrunked Splice. Taped splices employing field-applied rubber, or synthetic

rubber tape covered with plastic tape is approved for power cable other than series lighting circuits is acceptable. The rubber tape should meet the requirements of ASTM D 4388 and the plastic tape should comply with Mil Spec. MIL-I-24391 or Fed. Spec. A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed.

All L-823/L-824 splices and terminations shall be made in accordance with the manufacturer's recommendations and listings.

All circuits shall be spliced in all junction structures including but not limited to light base plazas, handholes, and manholes.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except the base can ground clamp connector shall be used for attachment to the base can. All exothermic connections shall be made in accordance with the manufacturer's recommendations and listings. All exothermic connections shall be buried and encased. All other connections for the equipment safety ground shall be bolted and crimped.

Crimping connectors on wires #6 AWG and larger shall be by hexagonal concentric crimping, twelve tons minimum.

108-2.5 SPLICER QUALIFICATIONS. Every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated above 5,000 volts AC. The Contractor shall submit to the Authority proof of the qualifications of each proposed cable splicer for the cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 CABLE IDENTIFICATION TAGS. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

For airfield lighting systems the cable tags shall be 2-inch circular plastic laminated tags with the circuit name engraved in 3/8-inch letters.

Identification tags shall be placed at each light base, pull box, handhole, manhole, or junction structure within 12" from entering and leaving the pull box, handhole, manhole, or junction structure, and in each light base. The identification tags shall be secured to all circuits in each location with a Thomas & Betts, or equal, nylon tie wrap designed to be exposed to the environment.

108-2.7 EXISTING CIRCUITS. Whenever the scope of work requires, connection to an existing circuit, the circuit's insulation resistance shall be tested, in the presence of the Authority. The test shall be performed in accordance with this item and prior to any activity affecting the respective circuit. The Contractor shall record the results on forms acceptable to the Authority. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the Authority. The Contractor shall record the results on forms acceptable to the Authority. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be

borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

CONSTRUCTION METHODS

108-3.1 GENERAL. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Wherever possible, cable shall be run without splices, from connection to connection.

Cable connections for 5kV airfield lighting circuits will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections except , unless otherwise authorized in writing by the Authority or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at all handhole and manhole structures, and at all locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed or at least once in each access point where L-823 connectors are not installed.

Provide not less than 3 feet of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment light bases. In handholes or manholes cable slack shall be 8 feet. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least 1 ft vertically above the top of the access structure. This requirement also applies where primary cable passes through empty base cans, junction and access structures to allow for future connections, or as designated by the Authority.

108-3.2 PHASING AND INTERRUPTIONS. The sequences of the installation of new cables shall be in accordance with the sequences of the phasing of work as shown on the Drawings.

Authority power and control cables shall be kept in operation at all times during construction and may only be out of service for a single 6-hour period for disconnecting and transferring the service, as required for the new construction. This 6-hour shutdown period and the splicing of cables for existing power and control cables shall be fully coordinated with the Airport Authority. The Contractor shall give the Authority written notice of the exact shutdown time at least 96 hours before the shutdown is to occur.

Airfield power and control cables shall be kept in service to maintain runway and taxiway lighting as required for airfield operations unless shutdown is authorized by the Authority. Temporary cable shall be run to maintain circuits to keep lighting operational. Temporary cable shall be run in steel conduit when above ground and shall be secured in place so as not to be displaced by the airfield and construction operations. As a minimum, the temporary conduit shall be secured in place using brackets spaced at maximum 10-foot intervals in paved areas (not acceptable in newly paved or surface treated areas), or at smaller spacing if indicated on the drawings, as approved by the Authority.

The use of temporary cable must be approved by the Authority prior to installation and shall be promptly removed when the permanent construction is able to be used.

108-3.3 INSTALLATION IN DUCT BANKS OR CONDUITS. This item includes the installation of the cable in duct banks or conduit as described below. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be in accordance with the latest National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and interferences are avoided.

Duct banks or conduits shall be installed as a separate item in accordance with Item L-110, "Airport Underground Electrical Duct Banks and Conduit." The Contractor shall run a mandrel through existing and new duct banks or conduit prior to installation of cable to insure that the duct bank or conduit is open, continuous and clear of debris. Mandrel size shall be compatible with conduit size. The Contractor shall swab out all conduits/ducts and clean base can, manhole, etc. interiors IMMEDIATELY prior to pulling cable. Once cleaned and swabbed the base cans and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc. is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Authority of any blockage in the existing ducts. The cable shall be installed in a manner to prevent harmful stretching of the conductor, injury to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall be governed by cable manufacturer's recommendations. A non-hardening lubricant recommended for the type of cable being installed shall be used where pulling lubricant is required.

Contractor shall submit pulling tension values to the Authority prior to any cable installation. If required by the Authority, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the Authority. Cable pull tensions shall be recorded by the Contractor and reviewed by the Authority. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or the NEC requirements whichever is more restrictive shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the Authority, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across light base cans or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.4 BARE COUNTERPOISE WIRE INSTALLATION FOR LIGHTNING PROTECTION AND GROUNDING. Bare counterpoise copper wire shall be installed for lightning protection for all of the underground cables and duct banks. Counterpoise wire shall be installed in the same trench for the entire length of buried conduits and duct banks that are installed to contain airfield cables. Where the duct/conduit trench runs parallel to the edge of pavement, the counterpoise shall be installed in a separate trench located half the distance between the pavement edge and the duct/conduit trench. In trenches not parallel to pavement edges, counterpoise wire shall be installed continuously a minimum of 4 in above the conduit or duct bank, or as shown on the plans if greater. Additionally, counterpoise wire shall be

installed at least 8 inches below the top of subgrade in paved areas and 10 inches below finished grade in un-paved areas. This dimension may be less than 4 inches where conduit is to be embedded in existing pavement. Counterpoise wire shall not be installed in conduit.

The counterpoise wire shall be connected to an exterior ground lug on all light bases and routed around to each junction/access structure. The counterpoise wire shall also be exothermically welded to ground rods installed not more than 500 feet apart around the entire circuit. The counterpoise grounds rods are in addition to the grounds rods dedicated at the light base cans. Light base can ground rods are not to be included in the count of counterpoise ground rods. Counterpoise ground rods are not to be installed adjacent to light fixture cans and are to be installed to maximize the distance from the light fixtures. Ground rods shall be installed a minimum of 6 inches deep to top of ground rod. Additionally the counterpoise shall be bonded to the rebar cage around each light base.

The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode grounding system. The connections shall be made as shown on the plans and in the specifications.

Counterpoise Wire Installation Requirements

Duct or Conduit Installation
 Method and Configuration

Counterpoise Wire
 Installation Requirements

Single conduit, all sizes, not adjacent to pavement edge

4” above line to be protected

Single conduit, all sizes, running beneath pavement (apron area, paved shoulders)

4” above line to be protected

Single conduit, all sizes, running adjacent to edge of pavement, in grass area

8” below grade and located half the distance from edge of pavement to the conduit run centerline

Multiple conduits and duct banks, all widths and depths

Height of Counterpoise wire above conduit(s) to be protected shall be within a 45-degree zone of protection below the counterpoise. Provide number of Counterpoise wires as required to meet protection zone criteria. Minimum cover over counterpoise shall be 12”

Directionally drilled conduit, single, double or in group of three

None – provide ground rod at each end of directionally drilled conduit and bond to counterpoise of circuit being placed in directionally drilled conduits

Group of 4 or more directionally drilled conduits

#6 AWG, Minimum, in separate directionally drilled sleeve, centrally located. Provide ground rod at each end of directionally drilled

	conduit and bond to counterpoise wire
Conduits in steel casing	None – Provide ground rod at each end of casing and bond with #6 counterpoise wire
Buried FAA cables	Refer to FAA Design Standard 19e or latest edition.

In addition to the counterpoise wire each light base can and junction/access structures shall be bonded to the equipment (safety) ground wire using the following method:

(1) A No. 6 AWG 600V, stranded, green conductor from the light fixture to the light base can internal ground lug and a No. 6 AWG 600V, stranded, green conductor from the light base can external ground lug to a ground rod installed at each light fixture base.

(2) A No. 6 AWG 600V, stranded, green conductor from to the internal ground lug/bus and a No. 6 AWG 600V, stranded, green conductor from internal ground lug/bus to a ground rod installed at each junction/access structures. Include a No. 6 AWG 600V, stranded, green conductor bonding all metal surfaces at junction/access structures to the internal ground lug/bus.

Item (1) above, the bare No.6 ground wire connection to ground rod and ground rod for each light fixture base shall be installed as part of the bid items in accordance with Item “L-125 Installation Of Airport Lighting Systems”.

Item (2) above, the bare No.6 ground wire connection to ground rod, ground rod, and bonding of all metal surfaces for each junction/access structure shall be installed as part of the bid items in accordance with Item L-115 “Electrical Manholes And Junction Structures”.

a. Counterpoise Installation Above Multiple Conduits and Duct Banks. Counterpoise wires shall be installed above duct banks for airfield lighting cables, with the intent being to provide a complete cone of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete cone of protection measured 22 ½ degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

b. Counterpoise Installation at Existing Duct Banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.5 EXOTHERMIC BONDING. Bonding of counterpoise wire shall be by the exothermic welding process. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the Authority, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer’s recommendations and the following:

a. All slag shall be removed from welds.

b. For welds at light fixture base cans, all galvanized coated surface areas and “melt” areas, both inside and outside of base cans, damaged by exothermic bond process shall be restored by coating with a liquid cold-galvanizing compound conforming to U.S. Navy galvanized repair coating meeting Mil. Spec.

MIL-P-21035. Surfaces to be coated shall be prepared and compound applied in accordance with manufacturer's recommendations.

c. All buried copper and weld material at weld connections shall be thoroughly coated 6 mil of 3M "Scotchkote," or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture. Counterpoise connections shall be UL listed for direct earth burial.

108-3.6 TESTING. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the Authority. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the Authority. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase and results meeting the specifications below must be maintained by the Contractor throughout the entire project as well as during the ensuing warranty period.

Earth resistance testing methods shall be submitted to the Authority for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the Authority. All such testing shall be at the sole expense of the Contractor.

Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The Authority shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test, demonstrate, and submit a report to the satisfaction of the Authority the following:

a. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

b. That all affected circuits (existing and new) are free from unspecified grounds.

c. That the insulation resistance to ground of all new non-grounded airfield lighting series circuits or cable segments is not less than 500 megohms.

d. That all affected circuits (existing and new) are properly connected in accordance with applicable wiring diagrams.

e. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

f. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by ANSI/IEEE Standard 81, to verify this requirement. If the resistance to ground of a ground rod exceeds 25 ohms, a supplemental ground rod shall be added at no additional cost.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the Authority. Where connecting new cable to existing cable, ground resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 Duct banks or conduits shall be installed as a separate item in accordance with Item L-110, "Airport Underground Electrical Duct Banks and Conduit."

108-4.2 Cabling installed in duct or conduit shall be measured by the number of linear feet measured in place, complete, ready for operation, and accepted as satisfactory by the Authority. Measurement shall be made for each 1-1/C (one conductor) installed in duct or conduit, including terminations, L-823 connectors, ground rods and grounding connectors. Measurements are point to point following conduit routing and do not include required cable slack. Cable slack shall be incidental to the Item cost.

108-4.3 Counterpoise installation includes all items incidental to counterpoise installation. Includes all connections to light base cages, ground rods, grounding connectors.

BASIS OF PAYMENT

108-5.1 Payment for all bid items will be made at the contract linear foot unit price for cable and equipment ground installed in existing and new duct bank or conduit and bare counterpoise wire installed in trench (direct-buried), tested by the Contractor, and accepted by the Authority. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1	1-1/C No. 8 AWG 5KV, L-824C Cable in Conduit or Duct Bank, Installed Complete in Place - per liner foot
Item L-108-5.2	1-1/C No. 6 AWG 5KV, L-824C Cable in Conduit or Duct Bank, Installed Complete in Place - per liner foot – NOT USED
Item L-108-5.3	1-1/C No. 6 AWG, Stranded Green Insulated Copper Safety Equipment Ground Conductor in Conduit or Duct Bank, Installed Complete in Place - per linear foot
Item L-108-5.4	1-1/C No. 6 AWG, Solid Bare Counterpoise Wire above Conduit or Duct Bank, Including $\frac{3}{4}$ " X 10' Ground Rods, Supplemental Ground Rods, and Ground Connectors, Installed Complete in Place - per linear foot

MATERIAL REQUIREMENTS

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle Cable Connectors
FED SPEC J-C-30	Cable and Wire, Electrical Power, Fixed Installation (cancelled; replaced by A-

	A-59544 Cable and Wire, Electrical (Power, Fixed Installation))
FED SPEC A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic
ASTM B 3	Soft or Annealed Copper Wire
ASTM D 4388	Rubber tapes, Nonmetallic Semiconducting and Electrically Insulating

REFERENCE DOCUMENTS

NFPA No. 70	National Electrical Code (NEC)
MIL-S-23586C	Sealing Compound, Electrical, Silicone Rubber
NN	Building Industry Consulting Service International (BICSI)
ANSI/IEEE Std 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

END OF ITEM L-108

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ITEM L-109 AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT

DESCRIPTION

109-1.1 This work includes the modifications to the existing Airfield Lighting Vault, which consists of furnishing and installation of Constant Current Regulators (CCRs), series circuit cutouts, all conduit and raceways, cabling and wiring, CCR reassignment, circuit breakers, wireways, cabinets and enclosures, the marking and labeling of equipment, the labeling and tagging of wires; the testing of the installation; and the furnishing of all incidentals necessary to place the systems in operating condition and complete, to the satisfaction of the Authority.

Included as a separate part under this item is the work associated with the existing ALCMS and its modification of airfield screens and control. This work shall be performed and completed to prevent interruption to airport operation and the Tower shall have operational control of the airfield lighting system at all times. This work shall also include the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Authority.

EQUIPMENT AND MATERIALS

109-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified and listed under Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Authority.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Authority. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Authority and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Authority for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Authority, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Authority reserves the right to reject any and all equipment, materials or procedures, which, in the Authority's opinion, does not meet the system design and the standards and codes, specified herein.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least [twelve (12) months] from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

109-2.2 CONCRETE. The concrete for the vault shall be proportioned, placed, and cured in accordance with Item P-610, Structural Portland Cement Concrete, using ¾ in (18 mm) maximum size coarse aggregate.

109-2.3 REINFORCING STEEL. Reinforcing steel bars shall be intermediate or structural grade deformed-type bars and shall meet the requirements of ASTM A 615.

109-2.4 CONDUIT. Raceways exposed and subject to physical damage shall be galvanized rigid steel (GRS) from slab up to 10 feet above finished floor and EMT above 10 feet above finished floor unless noted otherwise.

a. Rigid Steel Conduit. Rigid steel conduit and fittings shall comply with UL 6 and 514 and be galvanized by the hot-dip process. Fittings for rigid steel conduit shall be threaded Gaskets shall be solid. Covers shall have captive screws and be accessible after the work has been completed.

b. Electrical Metallic Tubing (EMT). EMT shall be in accordance with UL 797 and be zinc coated steel. Couplings and connectors shall be zinc-coated, raintight, gland compression with insulation throat. Crimp, spring, or setscrew type fittings are not acceptable.

c. Liquidtight Flexible Metallic Conduit. Liquidtight Flexible metallic conduit shall comply with UL 1 and be galvanized steel with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes. Fittings for liquidtight flexible metallic conduit shall be specifically designed for such conduit.

109-2.5 GROUND RODS. Ground rods shall be copper or copper-clad of the length and diameter specified in the plans.

109-2.6 GROUND BUS. Ground bus shall be 1/8 × 3/4 inch minimum copper bus bar.

109-2.7 WIREWAY. Wireway duct shall be of the dimensions indicated on the drawings. The entire front of the wireway on each section shall consist of hinged cover for ready access to the interior.

109-2.8 FAA-APPROVED EQUIPMENT. Certain items of airport lighting equipment installed in vaults are covered by individual FAA equipment specifications (latest revisions). The specifications are listed below:

AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits

AC 150/5345-10 Specification for Constant Current Regulators and Regulator Monitors

109-2.9 HINGED-COVER ENCLOSURES. NEMA 250, Type 3X, with continuous hinge cover and flush latch.

109-2.10 CONSTANT CURRENT REGULATOR. The Regulators shall be L-829 air-cooled Constant Current Regulators, ferroresonant and stackable, 480V single phase input, and shall meet all requirements of FAA AC 150/5345-10. The Regulators shall provide full FAA L-827 monitoring per FAA AC 150/5345-10 including the following:

- a. Loss of input power to the CCR.
- b. CCR shutdown by open-circuit / over-current protective devices.
- c. Drop of more than 10% in the CCR VA load.
- d. Failure of the CCR to deliver the selected output current.
- e. The number of burnt-out lamps in each series circuit.
- f. Remote / Local status of the CCR.
- g. Actual CCR output current
- h. Actual CCR output voltage
- i. Actual CCR output load (wattage)

Each Regulator shall have a digital output meter that displays current, voltage, wattage and VA. Regulator efficiency and power factor shall be in accordance with FAA AC 150/5345-10.

Each Regulator will have integral output lightning protection.

109-2.11 SERIES CIRCUIT CUTOFF. The S-1 plug cutout shall be used to prevent live wires. It shall be used in the airport lighting series circuits to isolate the runway loop from the current regulator. The S-1 cutout shall short the two terminals of the output circuit when it is pulled out. The S-1 plug cutout shall be installed in a NEMA-1 enclosure cabinet as indicated on the drawings. The main contacts of the S-1 plug cutout shall be rated for 20 amperes. The S-1 plug cutout shall be used for testing and isolating the field circuit from the regulators. Each cable and circuitry shall be identified with tags and labels inside the enclosure. Series plug cutout type S-1 with the following features:

- a. Shorts the airfield series lighting circuit.
- b. Shorts the constant current regulator secondary.
- c. The series plug cutout shall be protected against arcing
- d. Body and handle constructed of high strength plastic. Porcelain bodies are not acceptable.
- e. Suitable 20A airfield series lighting circuits.
- f. Four contacts that close the circuit between the regulator and the series lighting loop.
- g. Lockable, individually keyed with two keys. All keys shall be keyed differently and shall not duplicate the existing S-1 cutout keys.

109-2.12 OTHER ELECTRICAL EQUIPMENT. Relays, terminal blocks, transfer relays, circuit breakers, enclosures, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers or the National Electrical Manufacturers Association. When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first-grade product. This equipment shall be supplied

in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the proposal and plans.

109-2.13 WIRE. Wire in conduit rated up to 5,000 volts shall conform to AC 150/5345-7, Specification Item L-108 "Underground Power Cable For Airports". For ratings up to 600 volts, thermoplastic wire conforming to Fed. Spec. J-C-30, Type XHHW-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

a. Control Circuits. Unless otherwise indicated on the plans, wire shall be not less than No. 12 AWG and shall be insulated for 600 volts. If telephone control cable is specified, No. 19 AWG telephone cable conforming to ICEA S-85-625-1996 specifications shall be used.

b. Power Circuits. 600 volts maximum -- All conductors AWG No. 8 and larger, shall be stranded. All conductors smaller than AWG No. 8 shall be solid. Make all splices AWG No. 8 and smaller with approved insulated electrical type. Make all splices in AWG No. 6 and larger with indentor crimp-type connectors and compression tools or bolted clamp-type connectors. Joints shall be wrapped with an insulating tape. Insulating tape temperature and insulation rating shall be equivalent or higher to that of the conductor.

CONSTRUCTION METHODS

109-3.1 GENERAL. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to insure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction.

109-3.2 WIRING AND CONNECTIONS. The Contractor shall make all necessary electrical connections in the airfield lighting vault in accordance with the wiring diagrams furnished and as directed by the Authority. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place.

109-3.3 MARKING AND LABELING. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. Wire Identification. The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification -markings designated in the plans shall be followed. Tags, if used, shall be of fiber not less than $\frac{3}{4}$ in (13 mm) in diameter and not less than $\frac{1}{32}$ in (1 mm) thick. Identification markings designated in the plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. Labels. The Contractor shall stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the Authority. The letters and numerals shall be not less than 1 in (25 mm) in height and shall be of proportionate width. The Contractor

shall also mark the correct circuit designations in accordance with the wiring diagram on the terminal marking strips, which are a part of each terminal block.

METHOD OF MEASUREMENT

109-4.1 Work associated with Bid Item L-109-5.1, Existing Airfield Lighting Vault Work shall include conduits, enclosures, pul boxes; wireways; 5kV L-824C cabling and L-823 connectors, 600V conductors; communication cabling for ALCMS, ground bus, ground wire, series circuit cutouts; circuit breakers; identification including new labeling for new and reassigned CCRs; circuit directories for panelboards; labeling of all conductors at all termination points and junction boxes; tagging out equipment during construction; the testing of the installation; and all other miscellaneous required work items not covered in other Pay Items and required by the drawings and specifications. Payment will be made per lump sum for the entire existing airfield lighting vault work installed and approved by the Authority and shall be full compensation for furnishing all materials and for all preparation, assembly, incidentals, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to place it in operating condition (temporary and final) as a completed unit. The Authority shall have rights of first refusal on all reusable equipment, devices, and components. All other equipment, devices, components, and materials not required by Authority shall be removed and disposed of by the contractor at the contractor's expense at an approved disposal facility off of airport property. Contractor at the contractor's expense shall move all Authority claimed reusable equipment, devices, and components to a location deemed by the Authority.

109-4.2 Work associated with Bid Item L-109-5.2, Modification to Existing ALCMS shall include modifying the existing ALCMS airfield screens and control. Work includes the installation of new software and associated hardware. Payment will be made per lump sum for the entire modification to existing ALCMS installed and approved by the Authority and shall be full compensation for furnishing all materials and for all preparation, assembly, incidentals, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to place it in operating condition (temporary and final) as a completed unit.

109-4.3 Work associated with Bid Item L-109-5.3, New 10kW CCR shall be considered and paid for as a separate installation per each and shall include furnishing, installing, and testing the CCR and approved by the Authority. Full compensation shall be made for furnishing all materials and for all preparation, assembly, incidentals, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to place it in operating condition (temporary and final) as a completed unit. All wiring, conduit, raceways and other required appurtenances associated with the CCR shall be included in Bid Item L-109.5.1.

109-4.4 Work associated with Bid Item L-109-5.4, New 7.5kW CCR shall be considered and paid for as a separate installation per each and shall include furnishing, installing, and testing the CCR and approved by the Authority. Full compensation shall be made for furnishing all materials and for all preparation, assembly, incidentals, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to place it in operating condition (temporary and final) as a completed unit. All wiring, conduit, raceways and other required appurtenances associated with the CCR shall be included in Bid Item L-109.5.1.

109-4.5 Work associated with Bid Item L-109-5.5, New 4kW CCR shall be considered and paid for as a separate installation per each and shall include furnishing, installing, and testing the CCR and approved

by the Authority. Full compensation shall be made for furnishing all materials and for all preparation, assembly, incidentals, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to place it in operating condition (temporary and final) as a completed unit. All wiring, conduit, raceways and other required appurtenances associated with the CCR shall be included in Bid Item L-109.5.1.

BASIS OF PAYMENT

109-5.1 Payment will be made at the contract unit price for each completed and accepted vault equipment installation. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

L-109-5.1	Existing Airfield Lighting Vault Work - lump sum
L-109-5.2	Modification to Existing ALCMS - lump sum – NOT USED
L-109-5.3	New 10kW CCR – per each – NOT USED
L-109-5.4	New 7.5kW CCR – per each – NOT USED
L-109-5.5	New 4kW CCR – per each – NOT USED

MATERIAL REQUIREMENTS

AC 150/5345-3	Specification for L-821 Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Specification for Constant Current Regulators and Regulator Monitors
AC 150/5345-13A	Specification for L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits
ANSI/ICEA S-85-625-1996	Aircore, Polyethylene Insulated, Copper Conductor, Telecommunications Cable
ASTM A 615	Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
ASTM C 62	Specification for Building Brick (Solid Masonry Units Made from Clay or

	Shale)
ASTM C 90	Concrete Masonry Units, Loadbearing
ASTM D 2823	Asphalt Roof-Coating
FED SPEC J-C-30	Cable and Wire, Electrical (Power, Fixed Installation) (cancelled; replaced by AA-59544 Cable and Wire, Electrical (Power, Fixed Installation))
FED SPEC TT-E-487	Enamel, Floor and Deck
Master Painter's Institute	

END OF ITEM L-109

ITEM L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single conduits or multiple conduits direct buried in earth and concrete encased where installed under runways, taxiways, aprons, or other paved areas) to be installed in accordance with this specification at the locations and in accordance with the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground conduits and underground electrical duct banks. It shall also include all trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandreling, pulling lines, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables in accordance with the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 GENERAL.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Authority.

b. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Authority. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Authority and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used to construct this item shall be submitted to the Authority for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the Authority, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Authority reserves the right to reject any and all equipment, materials or procedures, which, in the Authority's opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by

the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

110-2.2 STEEL CONDUIT. Rigid galvanized steel conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standard 6, 514B, and 1242.

110-2.3 PLASTIC CONDUIT. Plastic conduit and fittings shall conform to the requirements of Fed. Spec. W--C-1094, Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

- a. Type II--Schedule 40 PVC suitable for either above ground or direct buried underground use.

All plastic conduit shall be from the same manufacturer. Plastic conduit from different manufacturers shall not be allowed.

The type of adhesive shall be as recommended by the conduit/fitting manufacturer.

110-2.4 SPLIT CONDUIT. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 CONDUIT SPACERS. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads, They shall be designed to accept No. 4 reinforcing bars installed vertically. Spacing between conduits in the conduit spacer shall be 2"; other conduit spacing shall not be allowed.

110-2.6 DETECTABLE WARNING TAPE. Plastic, detectable, color as noted magnetic tape shall be polyethylene film with a metalized foil core and shall be 4 - 6 inches wide. Detectable tape is incidental to the respective bid item. The tape base color shall be fade-resistant, bright red for electrical lines and bright orange for communication lines. Imprinted in black color, on the upper surface of the tape, on two lines, shall be the following message for the electrical lines (substitute "Communication" for "Electric" for communication lines):

**CAUTION CAUTION CAUTION
BURIED ELECTRIC LINE BELOW**

110-2.7 DUCT PLUGS. Duct plugs shall be suitable for the conduit size used. They shall be manufactured by Carlon, part number P258-T, or equal.

110-28 BARRICADES. For Barricade specifications, see specification section 017114-2.1-A. Barricades shall be used to block access on all sides of all drill pits or trenches no less than 10 feet out from edge of pit/trench. Barricades shall be used during periods where there is open pits/trenches but no work being performed in area (For example, weekends or nights).

CONSTRUCTION METHODS

110-3.1 GENERAL. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The Authority shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2-inch inside diameter or comply with the National

Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches per 100 feet. On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. No duct bank or underground conduit shall be less than 24 inches below finished grade. Where under pavement, the top of the duct bank shall not be less than 18 inches below the subgrade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc. interiors **IMMEDIATELY** prior to pulling cable. Once cleaned and swabbed the base cans, manhole, pull boxes, etc. and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc. is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Authority of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200 pound test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminate from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet.

Unless otherwise shown on the plans, all conduits shall be concrete encased.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3-inches below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4 inch sieve. Flowable backfill may alternatively be used. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All such rock removal shall be performed and paid for under Item P-152.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the Authority. If not shown on the plans, the warning tape shall be located 6- inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared in accordance with the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet.

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the Authority, the unsuitable material shall be removed in accordance with Item P-152 and replaced with suitable material. Alternatively, additional duct bank supports that are adequate and stable shall be installed, as approved by the Authority.

All excavation shall be unclassified and shall be considered incidental to the respective L-110 pay item of which it is a component part. Dewatering necessary for duct installation, erosion and turbidity control, in accordance with Federal, State, and Local requirements is incidental to its respective pay item as a part of Item L-110. The cost of all excavation regardless of type of material encountered, shall be included in the unit price bid for the L-110 Item.

Unless otherwise specified, excavated materials that are deemed by the Authority to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the Authority and compacted in accordance with item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall insure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

(2) Trenching, etc., in existing cable areas, the cables shall be carefully located and exposed by hand tools only, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

(3) Furnish and install split conduit and encase and protect existing direct buried cable prior to backfilling trench.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. All conduits in the same location and running in the same general direction shall be installed in the same trench.

Dewater all trenches and excavations before conduit installation and backfill. Trenches shall be in a dry condition approved of by the Authority before the conduit installation and backfill.

Coordinate trenching with existing site conditions and utilities. The Contractor shall control excavated materials to prevent runoff during rain and blow off from airplane engines.

All ducts shall be plugged until cables are installed.

No flexible conduit of any type shall be used.

110-3.2 DUCT BANKS. Unless otherwise shown in the plans, trenches for duct banks installed under runways, taxiways, aprons, or other paved areas shall be concrete-encased duct banks and shall be installed so that the top of the concrete envelope is not less than 18-inches below the bottom of the base or stabilized base course layers.

Trenches for duct banks installed under runways, taxiways, aprons, or other paved areas shall be opened the complete length before concrete is placed so that if any obstructions are encountered, proper provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3-inches thick prior to its initial set. Where two or more conduits in the duct bank are intended to carry conductors of equivalent voltage insulation rating, the Contractor shall space the conduits not less than 2- inches apart (measured from outside wall to outside wall). Where two or more conduits in the duct bank are intended to carry conductors of differing voltage insulation rating, the Contractor shall space the conduits not less than 3-inches apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3-inches thick unless otherwise shown on the plans. End bells or couplings shall be installed flush with the concrete encasement at access points.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6-inches to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5 foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Authority for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5 ft intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct. The pavement removed shall become property of the Contractor and shall be removed from Airport Property.

Install a plastic, detectable, color as noted, 4 - 6 inches wide tape 8-inches minimum below grade above all underground conduit or duct lines not installed under pavement.

When existing cables are to be placed in split duct, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the Authority shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the Authority.

110-3.3 CONDUITS WITHOUT CONCRETE ENCASEMENT. Trenches for single-conduit lines shall be not less than 6 inches nor more than 12 inches wide. Trenches for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a ¼-inch sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Authority for review prior to use.

110-3.4 BACKFILLING FOR CONDUITS AND DUCT BANKS. For conduits, 8-inches of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted in accordance with Item P-152 "Excavation and Embankment" except that material used for back fill shall be select material not larger than 4-inches in diameter.

Trenches shall not contain pools of water during back, filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface: except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of in accordance with instructions issued by the Authority.

110-3.7 RESTORATION. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include sodding, topsoiling, seeding, or mulching shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item.

Restore pavement to its original condition in compliance with specification Sections P-209, P-401 and P-610.

110-3.8 CONDUIT CONNECTIONS TO EXISTING LIGHT BASES AND JUNCTURE STRUCTURES. The Contractor shall penetrate the light base, pull box, handhole, manhole, and junction structure in a manner that will preserve their integrity and the integrity of connecting conduits, wires, and associated systems. Penetrations may be made by core drilling only. Coat any exposed edges and scratches with minimum two coats zinc rich, containing minimum 90% zinc paint or sealant. Seal interior conduit and light base, pull box, handhole, manhole, or junction structure wall with Dow Corning 3-6548 RTV silicone foam sealant and exterior with concrete grout.

110-3.9 PULL ROPE. The Contractor shall furnish and install a poly pull rope in each new conduit, including each new conduit in a duct bank for pulling wiring. Sufficient length shall be left in the boxes or light bases to prevent it from slipping back into the duct. Secure pull rope in such a fashion that it will not slip back through the conduit.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement under runways, taxiways, aprons, or other paved areas; locator tape; trenching and backfill, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment of Bid Items L-110-5.1 through L-110-5.7 shall be made at the contract unit price per linear foot for each type and size of conduit and duct bank installed, completed and accepted, including saw cutting, pavement removal, trenching, backfilling, and pavement restoration with the designated material. This price shall be full compensation for furnishing all materials, conduit, concrete encasement, detectable warning tape, pull rope, terminations, and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with the provisions and intent of the plans and specifications complete, in place, tested and accepted by Authority and ready for use. Counterpoise above conduit and/or duct bank is a separate pay item in Specification Section L-108.

110-5.2 Payment of Bid Items L-110-5.8 and L-110-5.9 shall be made at the contract unit price per linear foot for each type and size of direct buried conduit and duct bank installed, complete and accepted, including trenching, backfilling, and grading restoration with the designated material. This price shall be full compensation for furnishing all materials, conduit, detectable warning tape, pull rope, terminations, and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with the provisions and intent of the plans and specifications complete, in place, tested and accepted by Authority and ready for use. Counterpoise above conduit and/or duct bank is a separate pay item in Specification Item L-108 "Underground Power Cable for Airports".

110-5.3 Payment for Bid Item L-110-5.10, Connection to Existing Lighting Fixture, will be made at the contract price for all connections to existing light fixtures, existing signs, and existing conduits, completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, restoration, and all incidentals necessary to complete this item in accordance with the provisions and intent of the plans and specifications, complete, in place, tested and accepted by Authority and ready for use.

110-5.4 Payment for Bid Item L-110-5.11, Connection of new duct banks to existing junction structures shall be per each duct bank connection of any size and any type with the measurement made not distinguishing for the various types and sizes. Connection to existing junction structures will be made at the contract price for all connections to existing pull boxes, handhole and manhole structures, and junction structures, completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, restoration, and all incidentals necessary to complete this item in accordance with the

provisions and intent of the plans and specifications, complete, in place, tested and accepted by Authority and ready for use.

110-5.4 Payment for Bid Item L-110-5.12, Connection of new Conduits/Duct Banks to existing Conduits/Duct Banks shall be per each conduit connection of any size and any type with the measurement made not distinguishing for the various types and sizes. Connection to existing conduits/duct Banks will be made at the contract price for all connections to existing conduits/duct banks, completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, restoration, and all incidentals necessary to complete this item in accordance with the provisions and intent of the plans and specifications, complete, in place, tested and accepted by Authority and ready for use.

110-5.5 Payment of Bid Item L-110-5.13 shall be made at the contract unit price per linear foot for each type and size of conduit installed, completed and accepted, including saw cutting, pavement removal, trenching, backfilling, and pavement restoration with the designated material. This price shall be full compensation for furnishing all materials, conduit, concrete encasement, detectable warning tape, pull rope, terminations, and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with the provisions and intent of the plans and specifications complete, in place, tested and accepted by Authority and ready for use. Counterpoise above conduit and/or duct bank is a separate pay item in Specification Section L-108

Payment will be made under:

- | | |
|----------------|--|
| Item L-110-5.1 | Electrical Duct Bank, 6 Way, 2 Inch PVC Schedule 40, Concrete Encased Duct Bank in Paved Areas, Installed Complete in Place - per linear foot – NOT USED |
| Item L-110-5.2 | Electrical Duct Bank, 16 Way, 2 Inch PVC Schedule 40, Concrete Encased Duct Bank in Non-Paved Areas, Installed Complete in Place - per linear foot – NOT USED |
| Item L-110-5.3 | Electrical Duct Bank, 12 Way, 2 Inch PVC Schedule 40, Concrete Encased Duct Bank in Non-Paved Areas, Installed Complete in Place - per linear foot – NOT USED |
| Item L-110-5.4 | Electrical Duct Bank, 10 Way, 2 Inch PVC Schedule 40, Concrete Encased Duct Bank in Non-Paved Areas, Installed Complete in Place - per linear foot |
| Item L-110-5.5 | Electrical Duct Bank, 4 Way, 2 Inch PVC Schedule 40, Concrete Encased Duct Bank in Non-Paved Areas, Installed Complete in Place - per linear foot. – NOT USED |
| Item L-110-5.6 | Electrical Duct Bank, 2 Way, 3 Inch PVC Schedule 40, Concrete Encased Duct Bank in Non-Paved Areas, Installed Complete in Place – per linear foot. |
| Item L-110-5.7 | Electrical Duct Bank, 6 Way, 4 Inch PVC Schedule 40, Concrete Encased Duct Bank in Non-Paved Areas, Installed Complete in Place – per linear foot. – NOT USED |
| Item L-110-5.8 | Electrical Conduit, 2 Inch PVC Schedule 40, Direct Buried Conduit in Non-Paved Areas Installed Complete in Place - per linear foot |

- Item L-110-5.9 Electrical Conduit, 4 Inch PVC Schedule 40, Direct Buried Conduit in Non-Paved Areas Installed Complete in Place - per linear foot – **NOT USED**
- Item L-110-5.10 Connection to Existing Lighting Fixture – per each
- Item L-110-5.11 Connection to Existing Junction Structure – per each
- Item L-110-5.12 Connection to Existing Conduits/Duct banks – Per Each
- Item L-110-5.13 Electrical Conduit, 2 Inch PVC Schedule 40 in Saw Kerf, Concrete Encased in Paved Areas Installed Complete in Place - per linear foot

MATERIAL REQUIREMENTS

- Fed. Spec. W-C-1094 Conduit and Conduit Fittings; Plastic, Rigid (cancelled; replaced by UL 514 Boxes, Nonmetallic Outlet, Flush Device Boxes, & Covers, and UL 651 Standard for Conduit & Rigid PVC)
- Underwriters Laboratories Standard 6 Rigid Metal Conduit
- Underwriters Laboratories Standard 514B Fittings for Cable and Conduit
- Underwriters Laboratories Standard 1242 Intermediate Metal Conduit
- Underwriters Laboratories Standard 651 Schedule 40 and 80 Rigid PVC Conduit (for Direct Burial)
- Underwriters Laboratories Standard 651A Type EB and A Rigid PVC Conduit and HDPE Conduit (for concrete Encasement)

END OF ITEM L-110

ITEM 110A UTILITY HORIZONTAL DIRECTIONAL DRILLING

DESCRIPTION

110A-1.1 GENERAL. The work specified in this section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring. This work shall include all services, equipment, materials, testing, excavation, backfilling, sheeting and bracing, environmental protection, dewatering, restoration of surfaces, and labor for the complete and proper installation of polyethylene piping to the satisfaction of the Airport Authority.

110A-1.2 SUBMITTALS. The follow submittals shall be provided for review and approval prior to commencement of work:

a. WORK PLAN: Prior to beginning work, the Contractor shall submit to the Authority a general work plan outlining the procedure and schedule to be used to execute the project. Plan should document the thoughtful planning required to successfully complete the project.

b. EQUIPMENT: Contractor shall submit specifications on directional drilling equipment to be used to ensure that the equipment shall be adequate to complete the project.

c. MATERIALS: Specifications on material to be used shall be submitted to Authority. Material shall include the pipe, fittings and any other item which is to be an installed component of the project.

110A-1.3 QUALITY ASSURANCE.

a. Qualifications. Contractor and his field supervisor assigned to this project shall be experienced in work of this nature and have successfully completed similar projects of similar length, pipe type, pipe size, and soil type using directional drilling in the last three (3) years. As part of the bid submission, submit a description of such project(s) which include, at a minimum, a listing of the location(s), date of project(s), owner, pipe type and size installed, length of installation, type, and manufacturer of equipment used, and other information relevant to the successful completion of the project.

b. The requirements set forth in this document specify a wide range of procedural precautions necessary to insure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the Authority's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

EQUIPMENT AND MATERIALS

110A-2.1 EQUIPMENT. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring

operations and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

110A-2.2 DRILLING SYSTEM.

a. DRILLING RIG: The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations.

b. DRILL HEAD: The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.

c. MUD MOTORS (if required): Mud motors shall be of adequate power to turn the required drilling tools.

d. DRILL PIPE: Shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

110A-2.3 GUIDANCE SYSTEM. The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.

110A-2.4 DRILLING FLUID (MUD) SYSTEM.

a. MIXING SYSTEM: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be sized for adequate storage of the mud. Mixing system shall continually agitate the drilling fluid during drilling operations.

b. DRILLING FLUIDS: Drilling fluid shall be composed of clean water and an appropriate additive. Water shall be from a clean source with a pH of 8.5 – 10 and/or as per mixing requirements of the Manufacturer. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No hazardous additives may be used. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall.

c. DELIVERY SYSTEM: The mud pumping system shall have a minimum capacity to supply mud in accordance with the drilling equipment pull-back rating at a constant required pressure. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. A berm, minimum of 12" high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling

system (if used) to prevent spills into the surrounding environment. Pumps and or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage facilities.

110A-2.5 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS. SDR 11 of sizes and quantities indicated on the drawings.

110A-2.6 OTHER EQUIPMENT.

a. PIPE ROLLERS: Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall used to prevent excess sagging of pipe.

b. PIPE RAMMERS: Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Authority.

c. BARRICADES: For Barricade specifications, see specification section 017114-2.1-A. Barricades shall be used to block access on all sides of all drill pits no less than 10 feet out from edge of pit. Barricades shall be used during periods where there is open pits/trenches but no work being performed in area (For example, weekends or nights).

110A-2.8 RESTRICTIONS. Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Authority prior to commencement of the work. Consideration for approval shall be made on an individual basis for each specified location. The proposed device or system shall be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

CONSTRUCTION METHODS

110A-3.1 GENERAL. The Authority shall be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Authority is present at the job site and agrees that proper preparations for the operation have been made. The Authority approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.

110A-3.2 PERSONNEL REQUIREMENTS. All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.

110A-3.3 DRILLING PROCEDURE.

a. SITE PREPARATION:

1. Prior to any alterations to work-site, Contractor shall photograph or video tape entire work area, including entry and exit points. One copy of which shall be given to Authority and one copy to remain with Contractor for a period of one year following the completion of the project.

2. Work site as indicated on drawings, within right-of-way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.

b. DRILL PATH SURVEY: Entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If Contractor is using a magnetic guidance system, drill path shall be surveyed for any surface geo-magnetic variations or anomalies.

d. ENVIRONMENTAL PROTECTION: Contractor shall place silt fence between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations. Fuel or oil may not be stored in bulk containers within 200' of any water-body or wetland.

e. SAFETY: Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner. Safety meetings shall be conducted at least weekly with a written record of attendance and topic submitted to Authority.

e. PIPE: Pipe shall be welded/fused together in one length, if space permits. Steel pipe welds shall be X-rayed prior to being placed in bore hole. Pipe shall be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

f. PILOT HOLE:

1. Pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over a length of 100'. In the event that pilot does deviate from bore path more than 5% of depth in 100', Contractor shall notify Authority and Authority may require Contractor to pull-back and re-drill from the location along bore path before the deviation.

2. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, Contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and then wait another 30 minutes. If mud fracture or returns loss continues, Contractor shall cease operations and notify Authority. Authority and Contractor shall discuss additional options and work shall then proceed accordingly.

g. REAMING: Upon successful completion of pilot hole, Contractor shall ream bore hole to a minimum of 25% greater than outside diameter of pipe using the appropriate tools. Contractor shall not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

h. PULL-BACK:

1. After successfully reaming bore hole to the required diameter, Contractor shall pull the pipe through the bore hole. In front of the pipe shall be a swivel. Once pull-back operations have commenced, operations shall continue without interruption until pipe is completely pulled into borehole. During pull-back operations Contractor shall not apply more than the maximum safe pipe pull pressure at any time.

2. In the event that pipe becomes stuck, Contractor shall cease pulling operations to allow any potential hydro-lock to subside and shall commence pulling operations. If pipe remains stuck, Contractor

shall notify Authority. Authority and Contractor shall discuss options and then work shall proceed accordingly.

110A-3.4 SITE RESTORATION. Following drilling operations, Contractor shall de-mobilize equipment and restore the work-site to original condition. All excavations shall be backfilled and compacted to 95% of original density. Landscaping shall be restored to original. All mud shall be disposed of by the CONTRACTOR.

110A-3.5 RECORD KEEPING. Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Authority at completion of project. As-built drawings shall be certified as to accuracy by the Authority.

METHOD OF MEASUREMENT

110A-4.1 Horizontal directional drilling shall be measured by the linear feet of conduits and duct banks installed under runways, taxiways, aprons, or other paved areas; all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes. This work shall include all services, equipment, materials, pull ropes, testing, excavation, backfilling, sheeting and bracing, environmental protection, dewatering, restoration of surfaces, labor, and all incidentals for the complete and proper installation of the high density polyethylene piping to the satisfaction of the Airport Authority.

BASIS OF PAYMENT

110A-5.1 Payment of Bid Items shall be made at the contract unit price per linear foot for each type and size of conduit and duct bank horizontally drilled and installed, completed and accepted by the Authority and ready for use.

Payment shall be made under:

Item L-110A-5.1	Horizontal Drill, 2 Way, 3 Inch, SDR 11, Installed Complete in Place - per linear foot – NOT USED
Item L-110A-5.2	Horizontal Drill, 10 Way, 2 Inch, SDR 11, Installed Complete in Place - per linear foot
Item L-110A-5.3	Horizontal Drill, 1 Way, 2 Inch, SDR 11, Installed Complete in Place - per linear foot

END OF SECTION

ITEM L-115 JUNCTION STRUCTURES

DESCRIPTION

115-1.1 This item shall consist of junction structures (junction light bases) installed in accordance with this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the Authority. This item shall include the installation of each electrical junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, appurtenances, testing, dewatering, and restoration of surfaces to the satisfaction of the Airport Authority.

EQUIPMENT AND MATERIALS

115-2.1 GENERAL.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Authority.

b. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Authority. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Authority and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used to construct this item shall be submitted to the Authority for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the Authority, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Authority reserves the right to reject any and all equipment, materials or procedures, which, in the Authority's opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

115-2.2 JUNCTION LIGHT BASES. Furnish and install the complete junction light base assembly including high early strength concrete foundation, reinforcing steel, connectors, conduit stub-outs, cover plate and incidentals required for each complete installation.

Junction Light Bases shall be L-867, Class 1A, Size E (non-load bearing, hot-dipped galvanized, 24-inch diameter by 24-inch deep). The junction light bases shall have a galvanized steel blank cover, gasket, and stainless steel hardware. Cover thickness shall be 1/2-inch.

Junction light bases shall be hot-dip galvanized per ASTM A123/A123M and applied per ASTM A385.

All conduit openings in the junction light bases shall be integral threaded hubs.

Junction light bases shall have internal and external ground stubs of the same material as the light base which shall be connected to copper ground clamps.

For single junction light base provide a 3/4" diameter by 10'-0" long ground rod installed internally and connected via a #6 AWG bare solid copper wire to the ground rod and the light base ground lug. For the junction light base plaza provide grounding as shown on the drawings.

Light base shall remain in place and be covered by a 3/4" galvanized steel mudplate, secured by temporary 3/8" – 16 stainless steel bolts, during construction. Note that the Contractor shall furnish and install new replacement 3/8" – 16 stainless steel bolts and stainless steel Nord-Lock washers for final installation.

115-2.3 PLASTIC CONDUIT. Plastic conduit shall conform to Item L-110, Installation of Airport Underground Duct.

115-2.4 CONCRETE. Concrete shall conform to Item P-610, Structural Portland Cement Concrete, as specified.

115-2.5 CONDUIT TERMINATORS. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.6 GROUND RODS. Ground rods shall be one piece, copper clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 10-feet long nor less than 3/4 inch in diameter.

CONSTRUCTION METHODS

115-3.1 UNCLASSIFIED EXCAVATION. It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the Authority without additional expense to the Owner.

The Contractor shall perform excavation for structures to the existing grades. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure shown.

All excavation shall be unclassified and shall be considered incidental to the respective L-115 pay item of which it is a component part. Dewatering necessary for L-115 structure installation, erosion and turbidity control, in accordance with Federal, State, and Local requirements is incidental to its respective pay item as a part of Item L-115. The cost of all excavation regardless of type of material encountered, shall be included in the unit price bid for the L-115 Item.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the Authority. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing and sheeting necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing and sheeting shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing and sheeting involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the Authority. Structures shall be placed after the Authority has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches of sand or a material approved by the Authority as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 REMOVAL OF SHEETING AND BRACING. In general, all sheeting and bracing used to support the sides of the open excavations shall be withdrawn as the open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than six (6) inches of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The Authority may order the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.3 BACKFILLING. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Authority.

Backfill shall not be placed against any structure until permission is given by the Authority. In the case of concrete, such permission shall not be given until tests made by the laboratory under supervision of the Authority establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the Authority may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.4 GROUNDING. Grounding shall be provided as indicated on the drawings. Hardware connections not in earth shall be mechanical, using a lug designed for that purpose. Hardware connections in earth shall be exothermic designed for that purpose.

115-3.5 CLEANUP. Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.6 RESTORATION. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or

better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.7 INSPECTION. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test as described by ANSI IEEE Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

METHOD OF MEASUREMENT

115-4.1 Single and plaza junction light base structures shall be measured by each single or plaza junction structure installed including all required materials installed separately or in combination as specified, and shall be measured per each completed in place, tested, and accepted by the Authority. The following additional items are specifically included in each unit.

All Required Excavation, Dewatering

Sheeting and Bracing

All Required Backfilling with On-Site Materials

Restoration of All Surfaces and Finished Grading, Sodding

All Required Connections

Dewatering If Required

Connections

Ground Rod Testing

BASIS OF PAYMENT

115-5.1 Payment will be made at the contract unit price for each completed and accepted installation. This price shall be full compensation for furnishing all materials and handling of existing equipment to be reused, as required by the Drawings and these Specifications, for all preparation, removals, assembly and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete each installation specified as below. The Contractor shall furnish all materials and equipment to be installed.

115-5.2 The accepted quantity of the single junction light base structures for Bid Items L-115-5.1 shall be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials. For installation of each single junction light base structure in turf provide new light base, concrete foundation and maintenance pad, blank mounting plate, mounting bolts, ground rods including supplemental ground rods, and all other associated accessories for a complete installation to the satisfaction of the Authority.

This bid item shall also include coring and soil removal for each single junction light base and grade restoration.

115-5.3 The accepted quantity of the plaza junction light base structures for Bid Items L-115-5.2 shall be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials. For installation of each plaza junction light base structure in turf provide new light bases, concrete foundation and maintenance pad, blank mounting plates, mounting bolts, ground loop and wire, ground rods including supplemental ground rods, conduit stub out, and all other associated accessories for a complete installation to the satisfaction of the Authority. This bid item shall also include coring and soil removal for each plaza junction light base and grade restoration.

Payment will be made under:

Item L-115-5.1	Junction Light Base- per each
Item L-115-5.2	Junction Light Base Plaza - per each

MATERIAL REQUIREMENTS

ANSI/IEEE Std 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle Cable Connectors
FED SPEC J-C-30	Cable and Wire, Electrical Power, Fixed Installation (cancelled; replaced by AA-59544 Cable and Wire, Electrical (Power, Fixed Installation))
ASTM B.3	Soft or Annealed Copper Wire
ASTM B.8	Concentric-Lay-Stranded Copper Conductor, Hard, Medium-Hard, or Soft

END OF ITEM L-115

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

DESCRIPTION

125-1.1 This item consists of modifying existing runway, taxiway and other visual aid system to accommodate Runway Safety Area pavement and grading improvements, in accordance with this specification, the referenced specification, and the applicable advisory circulars. The system shall be installed at the location and in accordance with the dimensions, design, and details shown in the plans. This item includes the furnishing of all equipment, materials, services, and incidentals necessary to place the lights in operation as completed units to the satisfaction of the Authority.

This item does not include the installation of underground electrical duct. This item is covered in Items L-110. Requirements for airfield lighting underground cable are specified in Item L-108.

125-1.2 APPROVAL.

Airport lighting equipment and materials covered by FAA specifications shall have prior approval of the Federal Aviation Administration, Airport Service, Washington, DC 20591, and shall be listed in the current edition of FAA Advisory Circular AC 150/5345-53, Airport Lighting Equipment Certification Program. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when required by the Authority. The Contractor shall verify that equipment to be reused or modified to be reused complies with applicable standards and is in good condition.

The following documents, of the issue in effect on the date of application for qualification, are applicable to the extent specified:

<u>Item</u>	<u>Specification</u>	<u>Circular Advisory</u>
Elevated Taxiway Edge Light	L-861T	AC 150/5345-46
Elevated Runway Edge Light	L-862	AC 150/5345-46
Semi-Flush Taxiway Edge Light	L-852T	AC 150/5345-46
Semi-Flush Runway Edge Light	L-850C	AC 150/5345-46
Semi-Flush Taxiway Centerline Light	L-852C/D	AC 150/5345-46
Semi-Flush Runway Centerline Light	L-850A	AC 150/5345-46
Semi-Flush Runway Touchdown Zone Lights	L-850B	AC 150/5345-47
Semi-flush Runway Guard Light	L-852G	AC 150/5345-47
Elevated Runway Guard Light	L-804	AC 150/5345-47
Elevated Runway Threshold/End Light	L-862E	AC 150/5345-46
Transformers, Isolation, 60 Hz	L-830	AC 150/5345-47
Light base, load bearing	L-868	AC 150/5345-42

Light base, non-load bearing	L-867	AC 150/5345-42
<i>Alternate No. 1</i>		
Elevated Taxiway Edge Lights	L-861T (L)	AC 150/5345-46
Semi-Flush Taxiway Edge Light	L-852T (L)	AC 150/5345-46

All FAA Advisory Circular referenced in this specification refer to the most recent edition in circulation.

125-1.3 LIGHT BASE AND LIGHT INSTALLATION AND ALIGNMENT TOOL

The tolerance requirements for location, elevation and orientation of all light fixtures are of critical importance and must be maintained. In order to do so, the light bases and lights shall be installed using an installation and alignment tool, as manufactured by Jaquith Manufacturing, Inc. or approved equal. This tool shall be capable of achieving the final alignment specified and shall be of sufficient strength to support the light base during placement and compaction of concrete around the base. The Contractor shall submit to the Authority the proposed installation and alignment tool for approval. Upon approval, the Contractor shall procure a sufficient number of these tools to use in the installation process. No light base or light shall be installed without using an approved installation and alignment tool.

EQUIPMENT AND MATERIALS

125-2.1 GENERAL. See Item L-100-2.1, General Requirements. Submit Shop Drawings conforming to the requirements of Item L-100-4.1

125-2.2 TAPE. Rubber and plastic electrical tapes shall be in accordance with Item L-108.

125-2.3 PLUG CONNECTORS. L-823 plug connectors shall conform to latest edition of Advisory Circular 150/5345-26C. Plug connectors shall be Amerace type 54Super Kit or approved equal.

125-2.4 LIGHT BASES. Light Base Transformer Housings and Junction Boxes shall be Type L-867, Class IA and Type L-868, Class IA and Class IB as shown on contract drawing conform to AC 150/5345-42F, or latest edition, Specification for Airport Light Base and Transformer Housings, Junction Boxes, and Accessories. Furnish and install the complete light base assembly including high early strength concrete foundation, connectors, conduit stub-outs, cover plate and incidentals required for each complete installation.

Class IA galvanized light base cans, hot-dip galvanized per ASTM A123/A123M and applied per ASTM A385, shall be used for all lighting fixtures.

Type L-867 bases, Class IA, Size B shall be provided for elevated light base installations which are subject to occasional vehicular loading but no aircraft. Type L-867 bases shall be single-piece for a total height of twenty-four (24) inches.

Type L-868 bases, Classes IA and IB, Size B shall be provided for in-pavement light base installations subject to aircraft or other heavy vehicular loading. Class IA shall be installed in AC pavement L-868 light base and Class IB shall be installed in PCC pavement. Type L-868 bases shall be single-piece for a total height of twenty-four (24) inches.

All conduit openings in the light bases shall be integral threaded hubs.

Light bases shall have internal and external ground stubs of the same material as the light base which shall be connected to copper ground clamps. A #6 AWG, 600V XHHW green ground shall be connected to the fixture's internal ground screw and the light base internal ground lug. A 3/4" diameter by 10'-0" long ground rod installed internally shall be connected via a #6 AWG bare solid copper wire to the ground rod and the light base ground lug. Light base shall remain in place and be covered by a 3/4" galvanized steel mudplate, secured by temporary 3/8" – 16 stainless steel bolts, during construction. Note that the Contractor shall furnish and install new replacement 3/8" – 16 stainless steel bolts and stainless steel Nord-Lock washers for final installation.

125-2.5 FLANGE RING AND SPACER RINGS. The flange ring with pavement dam shall be 3/4-inch thick, and maximum three (3) spacer rings totaling no more than 3/4-inch in thickness shall be used to achieve proper grade.

125-2.6 BLANK COVER PLATES. Blank cover plates for light base/transformer housings shall be A-36 galvanized steel checkerplate 3/4-inch thick, with recessed bolt holes. Diameter and bolt pattern shall be compatible with the light base/transformer housing to be covered

125-2.7 STEEL CONDUIT. Steel conduit shall conform to Item L-110, Installation of Airport Underground Duct

125-2.8 PLASTIC CONDUIT. Plastic conduit shall conform to Item L-110, Installation of Airport Underground Duct.

125-2.9 CONCRETE. Concrete shall conform to Item P-610, Structural Portland Cement Concrete, as specified.

125-2.10 FIXTURE HOLD DOWN BOLTS. Light fixture hold down bolts shall be 3/8" – 16 stainless steel bolts and galvanized steel Nord-Lock washers required for each complete installation. Provide new bolts for each existing fixture removed and reinstalled as well as for all new fixtures.

125-2.11 ELEVATED TAXIWAY EDGE LIGHT. Elevated taxiway edge lights shall be LED FAA L-861T, unidirectional with 30W quartz lamp, blue lens, and comply with the requirements of AC 150/5345-46 (latest edition). Edge light height shall be 14" from top of globe to base plate. For Alternate No. 1, elevated taxiway edge lights shall be LED FAA L-861T (L), unidirectional with 12VA lamp, blue lens, and comply with the requirements of AC 150/5345-46 (latest edition).

125-2.12 IN-PAVEMENT TAXIWAY EDGE LIGHT. In-pavement taxiway edge lights shall be FAA L-852T, unidirectional with 45W quartz lamp, blue lens, and comply with the requirements of AC 150/5345-46 (latest edition). For Alternate No. 1, in-pavement taxiway edge lights shall be LED FAA L-852T (L), unidirectional with 19.5VA lamp, blue lens, and comply with the requirements of AC 150/5345-46 (latest edition)

125-2.13 ELEVATED RUNWAY EDGE LIGHT. Elevated runway edge lights shall be FAA L-862, bidirectional with 1-150W quartz lamp, lens as indicated on the drawing, and comply with the requirements of AC 150/5345-46 (latest edition). Edge light height shall be 14" from top of globe to base plate.

125-2.14 IN-PAVEMENT RUNWAY EDGE LIGHT. In-pavement runway edge lights shall be FAA L-850C, bidirectional with 2-105W halogen lamps, lens as indicated on the drawing, and comply with the requirements of AC 150/5345-46 (latest edition).

CONSTRUCTION METHODS

125-3.1 GENERAL. The installation and testing details for the systems shall be as specified in the applicable advisory circulars.

125-3.2 REMOVALS. Removals of existing items shall be done carefully to prevent damage to existing equipment. Removed items not to be reinstalled shall be delivered and turned over to airport maintenance, unless otherwise directed by the Authority, in which case these items shall be disposed of at the Contractor's expense. This work shall be incidental to provisions necessary to isolation transformers and power adapters. Report in writing to the Authority any broken globes or other defects found at the time lights are removed.

Removed lighting fixtures consisting of the lighting fixture, lense, and the mounting stem shall be reinstalled at the indicated locations on the drawings. Prior to reinstallation the lighting fixture and lense shall be cleaned and subsequently relamped.

125-3.3 PHASING AND INTERRUPTIONS. All existing electrical equipment and lighting systems shall be kept in operation, unless prior approval of the Authority has been received and as otherwise specified below and on the Drawings. The Contractor may use salvaged materials for temporary construction where required. The permission for temporary work and using salvaged materials shall be obtained from the Authority. Lighting for active runway and taxiway surfaces shall be maintained.

Refer to the special provisions of the specifications for notification requirements and other information regarding work interruptions due to airport operational requirements or Contractor anticipation for exceeding the limitations described in the above paragraph.

125-3.4 LIGHT BASE AND TRANSFORMER HOUSING INSTALLATION. Bases for installing runway and taxiway lights shall be located as shown on the drawings, unless otherwise approved by the Authority. The location for each fixture base shall be determined by the use of survey instrumentation in order to ensure that all lights are properly located. Some adjustment may be made, if approved by the Authority or as indicated on the drawings, in order to provide a straight alignment, to correct an existing base not properly positioned, or to avoid a pavement joint. All concrete encasement of light bases shall be made with rapid set concrete having a minimum strength of 2500 psi within two (2) hours of placement.

Each light base shall be surveyed in place after installed so that it may be readily located. Installation procedures shall be as shown on the drawings. The annular space around the base shall then be filled with P-606 sealant intended for use with light bases in concrete pavement.

125-3.5 PLACING IN-PAVEMENT LIGHTS. The top elevation of the light base with respect to the runway or taxiway surface and azimuth alignment with respect to the runway or taxiway centerline is two parameters that must be met. The light beam must be aligned parallel to the centerline of the runway or taxiway with a tolerance of + or - 1/2 degree. The lighting fixture must be level. The top of the fixture edge must have a tolerance of +0 inch and minus 1/16 inch from the top of pavement.

A jig or fixture approved by the Authority is required to hold the base in position while the concrete anchor is being placed. The Authority must approve the light base azimuth alignment and elevation before the concrete anchor is placed and it is the electrical contractor's responsibility for maintaining correct alignment of the light base throughout construction operations. The jig must remain in place until the concrete has set. Care must be taken while placing the concrete anchor that neither the jig nor the light base be disturbed. The surface of the replacement pavement around the light fixture must be flush with the surrounding area.

125-3.6 PLACING ELEVATED LIGHTS. Edge light fixture locations shall be 10 feet from the defined runway and taxiway edge to center of base plus or minus 3 inches and within 1-foot of their indicated positions parallel to the runway or taxiway unless otherwise directed by the Authority. They shall be set within 2 degrees of plumb. Bases shall be set so that the top of the fixture base plate is at the elevation as indicated. All fixtures shall be equipped with an I.D. tag. The numbering system must be acceptable to airport maintenance.

125-3.7 CABLE AND CONDUIT INSTALLATION. New conduit shall be installed as shown on the Drawings. The new conduit shall connect to conduit from the last existing light base or junction box to remain at each location, as shown on the Drawing. Connection of new lights to existing circuits shall be carefully coordinated with the Authority and Airport Operations, and the Contractor shall schedule outages with the Airport Operations at least 96 hours in advance.

Carefully inspect all light bases to be re-used to ensure compliance with the requirements of Advisory Circular 150/5345-30, latest edition. Light bases that are collapsed, show signs of significant corrosion damage or manufactured of non-metallic materials shall be removed and replaced in kind with materials furnished and installed under the applicable bid item in Section 5 of this specification.

125-3.8 SAFETY GROUND. Each light base shall be exothermically bonded to a dedicated ground rod via 1/C #6 AWG bare stranded copper safety ground copper wire, unless directed otherwise by the Authority. The Light fixture shall also be bonded to the light base via a #6 AWG braided copper safety ground, unless directed otherwise by the Authority. All airfield lighting shall be accompanied by a counterpoise system that is installed as indicated on the contract drawings. Both safety grounding and counterpoise shall be in accordance with the latest version of FAA AC 150/5340-30.

125-3.9 TEMPORARY ELECTRICAL WORK. Temporary electrical work is defined in Specification "Item L-128 Electrical Demolition and Removals".

125-3.10 INSPECTION, TEST, AND WARRANTY

a. VISUAL EXAMINATION. The most important of all inspection and test procedures is thorough visual inspections. Visual inspections shall be made frequently during installation, at completion of installation, and before energizing the circuits. A careful visual inspection can reveal defects that can be corrected prior to acceptance tests and energization. Serious damage may occur if defects are subjected to electrical tests or energization. Visual inspections shall include appraisal of:

- (1) Correctness of external connections.
- (2) Good work performance.
- (3) Cleanliness.
- (4) Safety hazards.

(5) Specific requirements listed herein for individual items. While all equipment manufactured under specifications pass strict factory tests prior to shipment, it shall be inspected for shipping damage immediately upon receipt.

b. ELECTRICAL TESTS ON SERIES LIGHTING CIRCUITS. Before modifying any series circuit, verify the performance of the existing circuit by checking the supply voltage to the regulator and measuring the output current from the regulator on all brightness steps under existing load.

Check cable connections and perform electrical tests on cable as specified in Section L-108.

c. EARTH RESISTANCE TESTING ON LIGHT BASE GROUND RODS. Earth resistance testing methods shall be submitted to the Authority for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the Authority. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the Authority the following:

(1) That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by ANSI/IEEE Standard 81, to verify this requirement. If the resistance to ground of a ground rod exceeds 25 ohms, a supplemental ground rod shall be added at no additional cost.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the Authority.

d. MISCELLANEOUS COMPONENTS. All components being installed or modified shall be visually inspected for damage, correct connections, proper fuse and circuit breaker ratings, and compliance with codes.

e. FINAL ACCEPTANCE TESTS. After components and circuits have been inspected, as specified in the preceding paragraphs, the entire system shall be inspected and tested as follows:

(1) Per each lighting circuit shall be tested by operating it continuously at maximum brightness for at least 15 minutes, and at medium-intensity for 2 hours. Visual inspection shall be made at the beginning and end of this test to determine that the correct number of lights is operating at full brightness. Dimming of some or all of the lights in a circuit is an indication of grounded cables.

(2) Repeat the above test using the local control switches on the regulators.

(3) Per each lighting circuit shall be tested by operating it continuously at maximum brightness for at least 15 minutes and at medium brightness for 6 hours. Visual inspection shall be made at the beginning and end of this test to determine that the correct numbers of lights are operating at full brightness. Dimming of some or all of the lights in a circuit is an indication of grounded cables.

(4) In addition to the above, all equipment shall be subjected any and all performance tests specified in the manufacturer's instructions.

f. GUARANTEE. All equipment furnished and work performed under the Contract Documents shall be guaranteed against defects in materials or workmanship for a period of one (1) year from the date of final acceptance. This guarantee does not replace any responsibility for errors or omissions as set forth in state

law. Any long-term warranties issued or offered by manufacturers for items of equipment shall be turned over to the Airports Authority.

g. Any failure of equipment or work due to defects in materials or workmanship shall be corrected by the Contractor at no cost to the Authority.

h. The Contractor shall ascertain that all lighting system components furnished by him (including FAA approved equipment) are compatible in all respects with --per each other and the remainder of the new/existing system. Any incompatible components furnished by this Contractor shall be replaced by him at no additional cost to the Airports Authority with a similar unit approved by the Authority (different model or manufacturer) that is compatible with the remainder of the airport lighting system.

i. The Contractor-installed equipment (including FAA approved) shall not generate any electromagnetic interference in the existing and/or new communications, weather and air traffic control equipment. Any equipment generating such interference shall be replaced by the Contractor at no additional cost with the equipment meeting applicable specifications and not generating any interference.

METHOD OF MEASUREMENT

125-4.1 BASIS OF MEASUREMENT.

a. The quantity to be paid for under this item shall be the number of units installed including all required materials installed separately or in combination as specified, and shall be measured per each completed unit in place, tested and accepted by the Authority, and ready for operation.

BASIS OF PAYMENT

125-5.1 Payment will be made at the contract unit price for each completed and accepted installation. This price shall be full compensation for furnishing all materials and handling of existing equipment to be reused, as required by the Drawings and these Specifications, for all preparation, removals, assembly and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete each installation specified as below. The Contractor shall furnish all materials and equipment to be installed.

For isolation transformer replacement in existing airfield light fixture (light base to remain) provide new mounting bolts, new isolation transformer, L-823 connectors (54Superkit on primary cabling), and all other associated accessories for a complete installation to the satisfaction of the Authority. Bid Items shall include reinstalling the existing light fixture, lense, mounting stem, and mounting plate on existing light base. Existing light fixture cleaned prior to re-installation and subsequently relamped.

For re-installation of existing light fixture (stake-mounted), lense, and mounting stem provide new light base, concrete pad, flange and spacer rings, fixture mounting plate, mounting bolts, new isolation transformer, L-823 connectors (54Superkit on primary cabling), ground rods including supplemental ground rods, and all other associated accessories for a complete installation to the satisfaction of the Authority. This bid item shall also include coring and soil removal for light base and concrete pad installation and shall include grade restoration. Existing light fixture, stem, and lense shall be retrieved from storage, cleaned prior to re-installation, and subsequently relamped.

For installation of new light bases for Future Runway Edge Lights in turf provide new light bases, concrete pad, flange and spacer rings, blank mounting plate, mounting bolts, L-823 connectors (54Superkit on primary cabling), ground rods including supplemental ground rods, and all other associated accessories for a complete installation to the satisfaction of the Authority. This bid item shall also include coring and soil removal for light base and concrete pad installation and shall include grade restoration.

For installation of new light bases for Future Runway Edge Lights in existing pavement provide new light bases and accessories, flange and spacer rings, blank mounting plate, mounting bolts, L-823 connectors (54Superkit on primary cabling), ground rods including supplemental ground rods, and all other associated accessories for a complete installation to the satisfaction of the Authority. This bid item shall also include coring and pavement removal for light base and concrete pad installation and shall include backfilling with concrete and pavement restoration with the designated material.

Alternate No. 1

For installation of new LED light fixture on existing light base, provide new light fixture, mounting stem, mounting plate, mounting bolts, new isolation transformer, L-823 connectors (54Superkit on primary cabling), and all other associated accessories for a complete installation to the satisfaction of the Authority.

For installation of new LED light fixture in new concrete pad, provide new light fixture, light base, mounting stem, concrete pad, flange and spacer rings, fixture mounting plate, mounting bolts, new isolation transformer, L-823 connectors (54Superkit on primary cabling), ground rods including supplemental ground rods, and all other associated accessories for a complete installation to the satisfaction of the Authority.

Payment will be made under:

- | | |
|----------------|--|
| Item L-125-5.1 | Install Existing Elevated Runway Edge Light with New L-867B Class IA Light Base with Concrete Pad, Installed Complete in Place - per each – NOT USED |
| Item L-125-5.2 | Install New 150W Isolation Transformer for Existing Elevated Runway Edge Light in Existing Light Base, Installed Complete in Place - per each – NOT USED |
| Item L-125-5.3 | Install New 200W Isolation Transformer for Existing Elevated Runway Threshold Light in Existing Light Base, Installed Complete in Place – per each – NOT USED |
| Item L-125-5.4 | Install New 200W Isolation Transformer for Existing In-Pavement Runway Edge Light in Existing Light Base, Installed Complete in Place - per each – NOT USED |
| Item L-125-5.5 | Install New 100W Isolation Transformer for Existing Runway Centerline Light in Existing Light Base, Installed Complete in Place - per each – |

NOT USED

- Item L-125-5.6 Install New 65W Isolation Transformer for Existing Runway Touchdown Zone Light in Existing Light Base, Installed Complete in Place - per each – **NOT USED**
- Item L-125-5.7 Install Existing Elevated Taxiway Edge Light with New L-867B Class IA Light Base with Concrete Pad, Installed Complete in Place - per each
- Item L-125-5.8 Install New Isolation Transformer for Existing Elevated Taxiway Edge Light in Existing Light Base, Installed Complete in Place - per each
- Item L-125-5.9 Install New 100W Isolation Transformer for Existing In-Pavement Taxiway Centerline Light in Existing Light Base, Installed Complete in Place - per each
- Item L-125-5.10 Install New 200W Isolation Transformer for Existing Elevated Guard Light in Existing Light Base, Installed Complete in Place - per each – **NOT IN USE**
- Item L-125-5.11 Install New 150W Isolation Transformer for Existing In-Pavement Guard Light in Existing Light Base, Installed Complete in Place - per each – **NOT IN USE**
- Item L-125-5.12 Install New Isolation Transformer for Existing Sign, Installed Complete in Place - per each
- Item L-125-5.13 Install L-867, Class 1A Light Base for Future Elevated Runway Edge Light with Concrete Pad, Installed Complete in Place - per each – **NOT USED**
- Item L-125-5.14 Install L-868, Class 1A Light Base for Future Elevated Runway Edge Light in Existing AC Pavement, Installed Complete in Place - per each – **NOT USED**
- Item L-125-5.15 Install L-868, Class 1B Light Base for Future In-Pavement Runway Edge Light in Existing PCC Pavement, Installed Complete in Place - per each – **NOT USED**

Alternate No. 1

- L-125-5.1A New Elevated Taxiway Edge Light L-861T(L) with New L-867B Class IA

Light Base with Concrete Pad, Installed Complete in Place - per each

L-125-5.2A New Elevated Taxiway Edge Light L-861T(L) in Existing Light Base,
Installed Complete in Place - per each

L-125-5.3A New In-Pavement Taxiway Edge Light L-852T(L) in Existing Light Base,
Installed Complete in Place - per each

FEDERAL SPECIFICATIONS REFERENCED IN ITEM L-125

AC 150/5345-26 Specification for L-823 Plug and Receptacle, Cable Connectors

AC 150/5345-42 Specification for Airport Light Bases, Transformer Housings, Junction Boxes and
Accessories

AC 150/5345-44 Specifications for Runway and Taxiway Sign

AC 150/5345-46 Specification for Runway and Taxiway Light Fixtures

AC 150/5345-47 Isolation Transformers for Airport Lighting Systems

AC 150/5340-18 Standards for Airport Sign Systems

END OF ITEM L-125

ITEM L-128 ELECTRICAL DEMOLITION AND REMOVALS

DESCRIPTION

128-1.1 General. This item shall include the demolition and removals of existing electrical equipment and facilities for all areas within the limits of construction as provided in these specifications, as shown on the Contract Drawings, or as required by the Authority.

EQUIPMENT AND METHODS

128-2.1 General. Objects, surfaces and items including the underground utilities designated to remain shall be carefully avoided and left undisturbed. Any damage to these items shall be immediately corrected by the Contractor to the satisfaction of the Authority.

128-2.2 Equipment. Equipment used in conjunction with this work shall be in first class working condition and shall be capable of removing the material in an efficient manner.

128-2.3 Salvageable Items. Equipment, materials and components designated to be salvaged will remain the Department of Airport's property. These items shall be carefully removed and shall be delivered to the Airport's maintenance yard and stockpiled in a neat orderly fashion as directed by the Authority. If it is determined that through the Contractor's operations of removing and handling, these items are being damaged, the Authority reserves the right to withhold payment from the Contractor for compensation of these items.

128-2.4 Cable Removal. All the existing cables designated to be removed shall become the property of the Contractor and shall be promptly removed from the airport property. Temporary storage of these items on airport property shall be subject to the approval of the Authority.

128-2.5 Direct Buried Cable Abandonment. Existing direct buried cable shall be cut back to the horizontal lateral routing and abandoned in place.

128-2.6 Conduit Abandonment. Conduit designated to be abandoned in place shall be capped on each end as approved by the Authority. Where conduit comes to the surface, the conduit shall be cut back to minimum one (1) foot below ground, final grade, and capped.

128-2.7 Removal of Light Fixtures. Prior to performing any demolition work, the Contractor shall perform a visual inspection in conjunction with the Airport to determine if any of the runway and taxiway edge light fixtures are missing or damaged. This visual inspection shall be performed during the day and at night with the light fixtures powered on, and the Contractor shall provide the Authority with a written document detailing the deficiencies found. If any of the light fixtures are damaged or lost during the construction project, the Contractor shall replace the damaged or lost light fixture with a new, equal or approved equal light fixture at the Contractor's own expense.

- a) Existing Light Fixtures: Existing light fixtures indicated to be removed and re-installed shall be removed and placed in storage. The existing light fixture and mounting stem shall be reused and shall be stored by the Contractor at the Contractor's storage facility until re-installation. For these

fixtures, the Contractor shall protect the fixture leads by curling them and then taping them to the bottom side of the fixture housing. The fixture shall be placed inside a circular plastic tube that is the diameter (circumference) of the light and approximately 3” tall. The associated anchor stake, direct buried isolation transformer and cabling from the isolation transformer to the light fixture shall be removed from airport property and disposed of by the Contractor.

128-2.8 Temporary Airfield Lighting. Provide all cables, conduits, fixtures, and temporary CCR connections at the Airfield Lighting Vault to provide temporary airfield lighting required to maintain the function of the airfield during all stages of reconstruction. This shall include all necessary splices at manholes as shown on the drawings to ensure that the circuits are operational at other areas of the airfield during the entire construction period.

Temporary electrical work shall include circuit bypasses as required and as indicated on the drawings to maintain lighting for active traffic surfaces during construction, disconnection of portions of lighting for closed areas, cover of existing edge lights with 3’ traffic cones where permitted by Authority, removal of existing elevated runway and taxiway lighting and steel plating lights bases for protection in proximity of construction, cover and switch off guidance signs directing traffic into closed surfaces, and other measures approved by Authority.

Cable shall be of the same size and type as that of the circuit being temporarily modified, and connections shall be made with L-823 connectors. Cables shall be installed in conduit or shallow buried as allowed by drawings, and as approved by Authority. Secure, mark and protect from traffic all above ground conduits, and mark location of all direct buried cable.

Where edge light fixtures are temporarily removed for protection, bases shall be steel plated until fixtures are reinstalled with new isolation transformers and cable. Standard 3’ tall traffic cones may be used to “black-out” taxiway edge lights that are not taken off a circuit by jumper cables, as approved by Authority. Guidance signs (runway exit signs and direction signs) shall be shut off by disconnect switch (if entire sign will be taken out of service), and sign or a sign message in an array directing traffic into a closed area shall be covered using black felt or black plexiglass, as approved by the Authority. Any light fixtures to remain in place and not affected by this project, yet within the project limits, shall be surveyed by Contractor and Authority prior to the start of and at the completion of work. Any fixtures not working at the completion of work that were operational prior to the start of work shall be repaired at the Contractor’s expense.

When no longer required, the modified lighting circuit shall be restored to its original condition or to the condition required for the permanent work. All temporary installation shall be removed, including underground portions, and any damage to surfaces shall be repaired. The Contractor shall test all cabling as indicated in contract documents and furnish information to Authority. If results do not meet or exceed previous existing conditions, the Contractor shall repair circuiting at the sole expense of the Contractor. Temporary modifications to other electrical circuits or facilities shall be consistent with the existing installation and in compliance with all applicable Codes and standards, with completed restoration to original or final condition when temporary modification is no longer required.

128-2.9 Rerouting New Circuit Configurations and Opening Light Bases and Handholes. Prior to start of the demolition work, the Contractor shall open all necessary light bases, handholes, and manholes to ascertain and provide the Authority in writing a schematic wiring diagram showing the number of cables and circuits in existing light base, handhole, and manhole configuration. The Contractor shall assume that all manholes and handholes shown in the project area and layout drawings must be opened and pumped and removed of water to ensure circuit continuity. The Contractor shall assume the removed water is contaminated and the contractor

shall properly dispose of the water at the Contractor's expense. Existing to remain manholes and handholes entered shall additionally be cleaned, damaged walls patched, have all existing circuits retagged, have damaged racks replaced with non-metallic racks, and fold downs accomplished with all contents completely identified including circuits identified per each individual conduit in the duct bank on each wall of the manhole/handhole.

128-2.10 Other Items. Items to be removed not listed above shall be removed from airport property by the contractor unless otherwise directed by the Authority. Any questionable items shall be brought to the Authority's attention, which will direct the Contractor for final disposition of the item.

METHOD OF MEASUREMENT

128-3.1 Demolition and Removal of Electrical Items. Measurement for the demolition and removal of electrical items such as light fixtures, mounting stakes, transformers, cabling, conduit, and other associated items shall be included under these items of work.

Demolition and removal of cable from conduit shall be measured per linear foot of any size and quantity of cabling in conduit.

Existing light fixtures indicated on the drawings:

- 1) Stake Mounted Edge Lighting Fixtures: The light fixture and associated anchor stake, direct buried isolation transformer and cabling from the isolation transformer to the light fixture shall be removed from airport property and disposed of the by the Contractor. Existing direct buried cable shall be cut back to the horizontal lateral routing and abandoned in place and shall be incidental to the removal of stake mounted lighting fixtures.
- 2) Light Base Mounted Lighting Fixtures: The light fixtures shall be removed and reused for re-installation. Light Fixtures shall be placed in storage by the Contractor. Contractor shall protect the fixture leads by curling them and then taping them to the bottom side of the fixture housing. The fixture shall be placed inside a circular plastic tube that is the diameter (circumference) of the light and approximately 3 foot tall. The isolation transformer and primary cabling in the light base shall be removed from airport property and disposed of the by the Contractor. Light base shall be cleaned of all debris.

Existing lighted signs indicated on the drawings shall have the isolation transformers removed. This bid item shall included opening the sign light base, removing and disposing of the isolation transformer, and cleaning of all debris from the light base.

128-3.2 Temporary Electrical Work. Includes providing and installing temporary jumper cables to maintain circuit continuity; removing and steel plating bases for protection of taxiway edge light during construction, reinstalling taxiway edge lights fixtures when protection is no longer required, or covering edge lights with 3' traffic cones where approved; temporarily covering guidance signs; testing circuits before and after temporary modifications; and other temporary electrical work as required by phasing. Temporary work shall include furnishing temporary edge lights, temporary guard lights, cable, connectors, conduit, steel covers for existing bases, and other materials associated with the temporary work, labor and equipment required to accomplish the

temporary work; and associated removals and restoration to original or final condition when no longer required.

Temporary electrical work also includes the protection of existing airfield systems and lighting fixtures and the subsequent removal of the protection when no longer required.

Temporary electrical work also includes opening all necessary light bases, handholes, and manholes, dewatering and disposal, schematic wiring diagrams, patching damaged concrete handhole and manhole walls, replacing racks, and retagging all existing circuits.

Temporary electrical work shall include meggering all airfield circuits affected by the work and the submittal in a tabulated report of the results.

128-3.2 Removal of Vault and ATCT Equipment. Includes removal of fiber optic cables, converters, patch panels, conduits, and other associated equipment. Also Includes protection of all existing vault and ATCT equipment. Includes all work associated with removal of all equipment.

BASIS OF PAYMENT

128-4.1 Electrical Demolition and Removals, Basis of Payment. Payment for the demolition and removal of electrical items such as light fixtures, light bases, conduit, transformers, and other associated items shall be as described below.

Payment will be made under:

Item L-128-5.1	Removal of Cable from Conduit - per linear foot
Item L-128-5.2	Removal and Storage of Stake Mounted Elevated Runway Edge Light Fixture - per each – NOT USED
Item L-128-5.3	Removal and Storage of Light Base Mounted Elevated Runway Edge Light Fixture - per each – NOT USED
Item L-128-5.4	Removal and Storage of Light Base Mounted In-Pavement Runway Edge Light Fixture - per each – NOT USED
Item L-128-5.5	Removal and Storage of Light Base Mounted In-Pavement Runway Centerline Light Fixture - per each – NOT USED
Item L-128-5.6	Removal and Storage of Light Base Mounted In-Pavement Runway Touchdown Zone Light Fixture - per each – NOT USED
Item L-128-5.7	Removal of Stake Mounted Elevated Taxiway Edge Light Fixture - per each

- Item L-128-5.8 Removal and Storage of Light Base Elevated Mounted Taxiway Edge Light Fixture - per each

- Item L-128-5.9 Removal and Storage of Light Base Mounted In-Pavement Taxiway Centerline Light Fixture - per each

- Item L-128-5.10 Removal and Storage of Light Base Mounted Elevated Guard Light Fixture - per each – **NOT USED**

- Item L-128-5.11 Removal and Storage of Light Base Mounted In-Pavement Guard Light Fixture - per each – **NOT USED**

- Item L-128-5.12 Removal of Sign Isolation Transformer - per each

- Item L-128-5.13 Temporary Electrical Work - per lump sum

- Item L-128-5.14 Removal and Storage of Light Base Mounted Elevated Runway Threshold Light Fixture - per each – **NOT USED**

- Item L-128-5.15 Removal of Vault and ATCT Equipment – per lump sum

END OF ITEM L-128

ITEM L-131 FIBER OPTIC CABLE AND HARDWARE

DESCRIPTION

131-1.1 GENERAL. This section includes the furnishing and installation of optical fiber cable and associated hardware in accordance with and at the locations shown on the Contract Documents. The Work shall include the installation of cable in conduit, terminations, cable marking, and testing of the cable, and all incidentals necessary to place the cable in an operational condition as a completed unit. The section shall also consist of intercepting existing fiber optic cables and routing cables as shown on the Contract Documents.

131-1.2 REFERENCES.

- a. Comply with National Electrical Code for components and installation.
- b. All cables shall be UL listed for application and service indicated in the Contract Documents.

131-1.3 SUBMITTALS. Submit the following:

- a. Product data for fiber optic cable, break-out kits, connectors, and terminations.
- b. Product data for fiber optic converter boxes and fiber optic patch panels to be installed.
- c. Fiber optic cable installation plan. Plan shall indicate setup points including intermediate pull points, methods for handling slack, methods of storing cable during off shift times, etc. pulling tension calculations shall be produced if the requested by the Authority. Information to demonstrate the capabilities and experience of the installer/testing agency. Include list of completed projects with project names, addresses, and other information specified.
- d. OTDR traces indicating and interpreting test results including date and time the test was performed. Current calibration data for any equipment used shall be included.
- e. Test data shall be entered into a project specific Excel spreadsheet, provided by the Contractor, which shall consist of testing points, span losses, connector losses, etc.

131-1.4 QUALITY ASSURANCE. The Contractor shall engage a certified installer with a minimum 5 years experience in installing optical fiber cables. All cable of each cable type shall be the product of a single manufacturer.

MATERIALS

131-2.1 MANUFACTURERS. Manufacturers of fiber optical cable and components that maybe incorporated in the Work include, but are not limited to, the following:

- a. Corning Corp.
- b. DRAKA Cableteq USA
- c. General Cable
- d. MRV

131-2.2 OPTICAL FIBER CABLES AND CONNECTORS. Cables shall be factory fabricated, low-loss, glass-type, loose tube, armored, optical fiber cables. Single-Mode graded-index outdoor/duct Type B (Indoor type where shown on Contract Drawings), 24 fibers.

- a. Cladding Diameter: $125.0 \pm 1.0 \mu\text{m}$. (non-circularity of cladding must not exceed 1.0%)
- b. Core-to-Cladding Offset: $\leq 0.8 \mu\text{m}$.
- c. Coating Diameter: $125 \pm 10 \mu\text{m}$.
- d. Colored Finer Diameter: nominal $250 \mu\text{m}$.
- e. Attenuation Uniformity: no point discontinuity greater than 0.10 dB at either 1310 nm or 1550 nm.
- f. Cutoff Wavelength: the cabled fiber cutoff wavelength shall be $< 1260 \text{ nm}$.
- g. Mode-Field Diameter: 8.8 to 9.3 μm as determined by either FOTP 164A or 167A.
- h. The coating shall be dual layered, UV-cured acrylate applied by the fiber manufacturer and mechanically strippable.
- i. Fiber Grade: The attenuation of each individual fiber shall not exceed 0.5 dB/km at 1310 nm and 0.3 dB/km at 1550 nm.
- j. Ratings: Maximum dispersion shall be $\leq 3.2 \text{ ps}/(\text{nm}*\text{km})$ from 1285 nm to 1330 nm and shall be $< 18\text{ps}/(\text{nm}*\text{km})$ at 1550 nm.
- k. Operating Temperature Range: Minus 40 to 75 degrees C.
- l. Requirements: The fiber manufacturer shall proof-test 100% of the optical fiber to a minimum load of 0.69 GN/m².
- m. Optical fibers shall be placed inside a loose buffer tube. Each buffer tube shall contain 1 to 12 fibers and the fibers shall not adhere to the inside of the buffer tube.
- n. Each fiber shall be distinguishable by means of color coding that meets TIA/EIA-598-A, "Optical Fiber Cable Coding".
- o. Buffer tubes containing the fibers shall be distinguishable by means of color coding that meets TIA/EIA-598-A, "Optical Fiber Cable Coding". Color coding shall be as follows:

1. Blue	5. Slate	9. Yellow
2. Orange	6. White	10. Violet
3. Green	7. Red	11. Rose
4. Brown	8. Black	12. Aqua

In buffer tubes containing the fibers, the colors shall be stable across the storage and operating temperature range and shall not be subject to fading or smearing onto each other. Colors shall not cause fibers to stick together.

Each buffer tube shall be dry, gel-free. The tube shall be free from dirt and foreign matter.

The buffer tubes shall be stranded around a central member using the reverse oscillation, or S-Z, stranding process. The central member shall consist of a glass reinforced plastic rod to prevent buckling of the cable.

The cable core shall contain water blocking material. The water blocking material shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.

Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, nonwicking and dielectric with low shrinkage.

The cable shall contain at least one ripcord under the sheath for easy removal.

Tensile strength shall be provided by a combination of high tensile strength dielectric yarns that shall be stranded evenly around the cable core and shall not be less than 0.69 GN/m².

Fiber optic cable for installation in field duct banks shall have an inner jacket that is continuous extruded polyethylene free of voids or inclusions. The inner jacket thickness at any point shall not be less than 0.4 millimeters. The inner jacket material shall be applied directly over the tensile strength members and water blocking material. The polyethylene shall contain materials to prevent the growth of fungus. Fiber optic cable shall also have an outer jacket that shall be continuous extruded nylon or polyvinylidene fluoride (PVDF) free of voids or inclusions that is impervious to hydro-carbons and provides ultraviolet light protection. The outer jacket shall have a nominal thickness of 1.15 millimeters (the average of thickness shall not be less than 1.00 millimeters, not greater than 1.30 millimeters and no spot shall be less than 0.80 millimeters thick). The outer jacket shall be smooth and free from holes, splits, blisters, or other surface flaws. The eccentricity of the finished cable including both the inner and outer jacket shall not exceed 40%. The carbon black contents for inner and outer jackets shall be 2.6 +/- 0.25% by weight to provide aging characteristics consistent with a 40-year cable life.

The cable jacket shall be marked every meter with manufacturer's name, sequential meter markings, and year of manufacturer. The actual length of the cable shall be within $\pm 1\%$ of the length markings. The markings shall be in contrasting color to the cable jacket. The height of the marking shall be approximately 2.5 mm.

- p. Optical Fiber Connectors: Precision SC-compatible connectors shall be used for all fiber optic cable. Connector shall be epoxy or hot melt composed of polymeric or stainless steel body, ceramic or stainless ferrule, and PVC bend relief boot. Maximum loss shall be 0.25dB. Durability shall be <0.2dB change after 5000 mating cycles.
- q. Optical Fiber Splices: None allowed, except where specifically shown on Contract Documents.
- r. Fiber Count: As identified on Contract Documents.
- s. Breakout Kits: Breakout kits shall be designed to integrate with the fiber optic cable and shall include PVC tubing to protect the individual fibers. Breakout kits shall provide positive strain relief between the fiber optic cable and the connector.
- t. Patch Panels: The fiber optic patch panels, installed as a demarcation at the base of the tower, shall be Corning-Landscape model WCH-04P or equal. Fiber optic patch panel shall consist of four 12 fiber panels with SC connectors.
- u. Innerduct: All fiber optic cable installed in field duct banks shall also be installed in 1" general purpose innerduct installed in the specified duct prior to installation of the fiber optic cable.

131-2.3 FIBER OPTIC TO COPPER CONVERTER. Fiber optic cabling shall be single-mode (OS1 type) control communication link for ALCMS system. Each fiber optic link comprised of a transmitter and receiver and capable of providing signal transmission for a minimum of 3,280 feet.

- a. All Transmitting and Receiving equipment shall be modular and shall be provided at both ends of the communications network. Provide all equipment and mounting hardware at both head-end and remote locations.
- b. Provide all required connectors as required in accordance with manufacturer's requirements.
- c. Fiber optic media converters shall be as manufactured by the following, or approved equal:
 - 1. COMNET
 - 2. GarrettCom
 - 3. Moxa

4. MRV

131-2.4 FIBER OPTIC PATCH PANELS. The fiber optic patch panels, installed as a demarcation at the base of the tower, shall be Corning–Landscape model WCH-04P or equal. Fiber optic patch panel shall consist of one 24 fiber panels with SC connectors.

131-2.5 QUALITY ASSURANCE. The basis of sampling and testing for quality control shall comply with the provisions of FAA standard FAA-E-2761c Section 4.

CONSTRUCTION METHODS

131-3.1 EXAMINATION. Examine raceways and other elements to receive cable for compliance with installation tolerances and other adverse conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

131-3.2 FIBER INSTALLATION. Install cables for communication and for control and monitoring, as shown on the Contract Documents, according to manufacturer's written instructions. Install transmission media without damaging conductors, shield, or jacket. Do not bend cable, in handling or installation, to smaller radii than minimum recommended by manufacturer. Pull cables without exceeding cable manufacturer's recommended pulling tensions. Pull cables simultaneously where more than one is being installed in same raceway or conduit. Use pulling compound or lubricant compound that shall not deteriorate conductor or insulation. Use pulling means, including rope and basket weave wire/cable grips that shall not damage media or raceway. All cable shall be installed in raceway. Place 20 feet of slack in handholes, looped and placed in saddle racks. Use connectors that are compatible with cable material. Connectors shall be installed in accordance with the manufacturer's recommended installation practices. No single pull shall have more than 180 degrees combined change of direction. Where it is not possible to pull cables continuously within this parameter, the Contractor shall employ back feeding and center-pulling techniques. When using these techniques, the "figure-eight" configuration shall be used to prevent kinks or twisting when the cable is unrolled or backfed. The ends of all cable shall be sealed with a moisture-seal tape before pulling into conduit or innerduct. It shall be left sealed until terminations or connections are made. All fibers shall be labeled as described in the Contract Documents.

131-3.3 CONVERTER INSTALLATION. Install fiber optic to copper conversion modules as shown on Contract Documents. Install modules according to manufacturer's written instructions. Install module chassis, if not included, according to manufacturer's written instructions. Provide and Install all modules, connectors, and chassis/enclosure fully operational fiber optic converter. All materials shall be rated for use with single mode fiber optic cable.

131-3.4 FIBER OPTIC PATCH PANEL INSTALLATION. Install fiber optic patch panel as shown on Contract Documents. Install panels according to manufacturer's written instructions. Provide and Install all panels and connections for fully operational Fiber Optic Patch Panel. All materials shall be rated for use with single mode fiber optic cable.

131-3.4 FIELD TESTING. The Contractor shall perform such on the reel tests as he feels necessary to assure that the material is acceptable prior to installation. These tests shall have no bearing on final acceptance and shall be performed solely for the contractor's benefit.

All other tests shall be performed after installation and termination.

Allowable Losses: The allowable losses for attenuation shall be as follows:

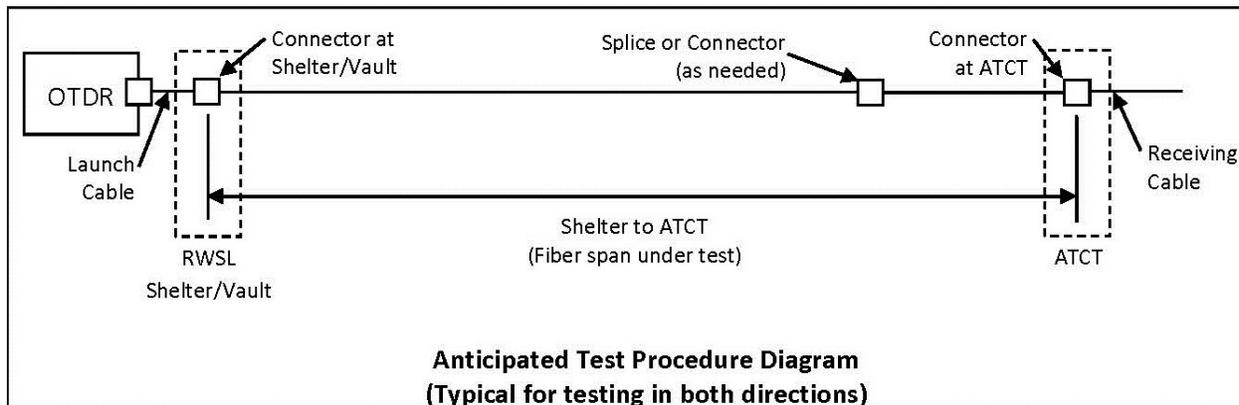
Span (fiber) losses – 0.5dB/km @ 1310nm and 0.3dB/km @ 1550nm
Connector losses – 0.5 dB / pair of connectors

Certify compliance with test parameters and manufacturer’s recommendations.

Each fiber shall be tested for end-to-end attenuation in both directions and shall be checked with an Optical Time Domain Reflectometer (OTDR). All fibers shall be tested and test results shall be documented in report form to the Authority as previously discussed. Any component of the link which does not meet minimum specified levels shall be brought to the attention of the Authority.

Prior to testing, ensure that test jumpers are of the same fiber core size and connector type as the cable system. Set all equipment to the same wavelength. Ensure that all connectors, sleeves and jumpers are properly cleaned.

Perform end-to-end attenuation testing in accordance with EIA/TIA-526-7, Method B, "Optical Power Loss Measurements of Installed Singlemode Fiber Cable Plant." This testing method shall be amended such that attenuation is captured for connectors at both ends during tests in both directions by utilizing an appropriate patch cord on the receiving end. Launch and receiving cables shall have a length of more than 100’ (~30 meters) and less than 330’ (~100 meters). See diagram below for example testing configuration.



Provide printed and electronic copies of OTDR traces (including source program if necessary to read), and documentation of all testing in report form to the Authority for review. Include wavelengths, fiber type, fiber identification, measurement direction, test equipment model and serial numbers, date, reference setup and operators.

Perform continuity test, cable length measurement and detect fiber fractures or other defects through analysis of the backscattering signal with an Optical Time Domain Reflectometer.

Perform attenuation measurement of the cable loss with a single mode optical test set.

Perform attenuation measurement to include the losses of each splice and connector. Perform tests on all new fibers between all patch panels or splices where connectors are used. In addition, perform tests on all fibers comprising the overall communications path, including any intermediate patch panels, splices

and/or existing fiber optic cable. Test data shall be summarized on the Contractor provided electronic spreadsheet.

131-3.5 DECOMMISSIONING OF EXISTING SYSTEM. Communication between the ATCT and the Electrical Vault is essential for airport operations. As such, all proposed systems shall be installed concurrently with the existing ALCMS system still in operation. When all systems covered by this specification are installed and tested to the satisfaction of the SAA, the contractor shall coordinate with the SAA (and, if applicable, ALCMS manufacturer) to remove the Existing ALCMS communication system as shown on the drawings.

METHOD OF MEASUREMENT

131-4.1 MEASUREMENT. Measurement for installation of single mode fiber optic cable shall be made at the contract unit price per linear foot installed in place by the Contractor and accepted by the Authority. No separate measurement shall be made for the patch panels, innerduct, connectors, breakout kits, labeling, termination, and testing of the fiber optic cable required for the field installation, as they shall be considered incidental.

131-4.2 Measurement for installation of fiber to copper conversion module and fiber optic patch panel shall be at the contract unit price per unit installed. Payment shall be made upon complete installation of fully functioning conversion module/patch panel replacement tested and accepted by authority. All connectors and chassis/enclosures necessary for a fully functioning fiber optic equipment shall also be included in base price. No separate measurement shall be made for labeling, termination, and testing of conversion module.

BASIS OF PAYMENT

131-5.1 PAYMENT. Payment for the furnishing and installation of fiber optic cable shall be made at the contract unit price per linear foot installed in place by the Contractor and accepted by the Authority. This price shall be full compensation for furnishing all labor, equipment, tools, materials, and all incidentals including but not limited to patch panels, innerducts, connectors, breakout kits, termination, labeling, and testing necessary to complete this item.

Bid Item L-131-5.1 "AFLC Outdoor Fiber Optic Cable" shall consist of single mode, at least 1310 NM wave length, single-mode fiber optic cable, 24 strand, armored, terminated with ST type connectors, installed in existing and new duct bank or conduit. Type OS2 fiber shall be used where outdoor installation is shown on plans.

Bid Item L-131-5.2 "AFLC Indoor Fiber Optic Cable" shall consist of single mode, at least 1310 NM wave length, single-mode fiber optic cable, 2 strand. Type OS1 fiber shall be used where indoor installation is shown on plans.

Bid Item L-131-5.3 "Fiber to Copper Converter" shall consist of replacement of the existing Copper to fiber conversion modules in both the Electrical Vault and the Aircraft control tower. Contractor shall coordinate with manufacturer of ALCMS system for purchase and install of new conversion modules.

Contractor shall be responsible for procurement, connections, powering, wiring, and testing necessary for conversion modules.

Bid Item L-131-5.4 “Fiber Optic Patch Panel” shall consist of installation of a new Fiber Optic Patch Panel inside of electrical vault. Contractor shall be responsible for procurement, connections, powering, wiring, and testing necessary for patch panel.

Payment for shall be made under:

- | | |
|----------------|---|
| Item L-131-5.1 | AFLC Outdoor Fiber Optic Cable – per linear foot. |
| Item L-131-5.2 | AFLC Indoor Fiber Optic Cable – per linear foot. |
| Item L-131-5.3 | Fiber to Copper Converter – lump sum. |
| Item L-131-5.4 | Fiber Optic Patch Panel – lump sum. |

REFERENCE DOCUMENTS

- | | |
|----------------------|---|
| ANSI/TIA/EIA-568-B.3 | Optical Fiber Cabling Components Standard |
| FAA-E-2761c | Cable, Fiber Optic, Multimode and Single-Mode, Multifiber |

END OF ITEM L-131

ITEM L-890 AIRFIELD LIGHTING CONTROL AND MONITORING SYSTEM (ALCMS)

DESCRIPTION

890-1.1 This item consists of upgrading the ALCMS computers and a touchscreen monitor to be furnished and installed in accordance with this specification, at the indicated locations on the drawings or as required by the authority. Contractor will be required to coordinate the portion of work in this specification with an FAA approved Manufacturer. The manufacturer must be listed in the FAA approved equipment list, AC 150/5345-53 (current Edition) as a FAA approved supplier of L-890 Airfield Lighting Computer and Monitoring systems in accordance with AC 150/5345-56 (current edition), and be a FAA approved supplier of L-827/L-829 Constant Current Regulator Monitors in accordance with AC 150/5345-10 (current edition).

GENERAL

890-2.1 GENERAL.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Authority.

b. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Authority. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Authority and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used to construct this item shall be submitted to the Authority for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the Authority, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Authority reserves the right to reject any and all equipment, materials or procedures, which, in the Authority's opinion, does not meet the system design and the standards and codes, specified herein.

890-2.2 PROJECT COORDINATION.

- A. The ALCMS Manufacturer shall provide an experienced and qualified Engineering, Sales and Service staff to support the contractor and airport throughout the installation and life of the system.
- B. The project shall follow this basic cycle of events:

	Milestone	Description
1.	Submittal	The ALCMS Manufacturer shall submit ALCMS specifications to the contractor.
2.	Submittal Review and Approval	Submittal is reviewed by the contractor, airport, and engineer(s).
3.	Production Release	The ALCMS Manufacturer shall release approved system to manufacturing.
5.	Production	System is manufactured.
6.	Production Testing	System is tested by the ALCMS Manufacturer.
7.	Factory Acceptance Testing	System is available for Factory Acceptance Testing (FAT) witnessed by airport/owner.
8.	Shipment of system	Approved system is shipped to installation site.
9.	Installation	Contractor installs equipment and completes external wiring.
10.	Commissioning	The ALCMS Manufacturer shall arrive at installation site to complete commissioning of system and verify contractor installation and wiring.
11.	System Readiness Check	The ALCMS Manufacturer shall perform a system readiness check to verify proper operation of all equipment prior to cut over.
12.	System Cut-over	The ALCMS Manufacturer and Contractor shall cut over the new system and bring it on-line and operational.

13.	System Acceptance Testing	System is available for System Acceptance Testing (SAT) which shall be witnessed the by airport/owner and/or engineer.
14.	Manuals / As-Built drawings	The ALCMS Manufacturer shall issue operator manuals, maintenance manuals and ATC manuals and final as-built drawings.
15.	On-Site Training	The ALCMS Manufacturer shall complete on-site training of maintenance, Operations, and ATC personnel.
16.	Final Owner Acceptance	Upon completion of all contractual requirements, system is accepted in writing by the airport/owner.
17.	Warranty and Support	The ALCMS Manufacturer shall provide warranty and support per the contractual requirements.

890-2.3 FACTORY ACCEPTANCE TEST (FAT).

- A. Before shipment, the ALCMS upgrade components shall be assembled assembled and tested at the ALCMS Manufacturer’s test facilities.
- B. The ALCMS Manufacturer shall make the FAT available for representative(s) of the airport/owner and engineer to witness the testing of the system.
- C. At a minimum, the FAT shall allow for one (1) day of testing and review, but may require additional time depending on the results of the testing.
- D. The ALCMS Manufacturer shall incur the costs of setting up and performing the test excluding airport/owner and engineer related travel and accommodations.
- E. The Contractor shall cover the airport/owner travel and expenses.
- F. During the FAT, minor software comments shall be finalized and incorporated into the final system.

890-2.4 CONTRACTOR INSTALLATION REQUIREMENTS.

- A. The installing contractor shall be responsible for the physical installation of all associated ALCMS components. At a minimum, this includes the computer cabinets, Touchscreen control stations and Distributed Control and Monitoring Equipment (DCME).
- B. The Contractor shall furnish, install, relocate, connect and test all equipment, equipment accessories, conduit cables, wires, buses, grounds and support necessary to insure a complete and operable electrical distribution facility for the airport lighting system as specified in the submittal package.
- C. The equipment installation and mounting shall comply with the requirements of the National Electrical Code and local code agency having jurisdiction.

890-2.4-1 WIRE AND CONNECTIONS

- A. The Contractor shall make all necessary electrical connections at each location in accordance with the ALCMS manufacturer's wiring diagrams.
- B. All wires called out in the drawings associated with equipment that is to be controlled or monitored should be pulled, terminated and dressed at the appropriate terminal blocks and at the associated equipment.
- C. The Contractor shall leave sufficient extra wire length on each control/monitoring lead to make future changes in connections at the terminal block.

890-2.4-2 MARKING AND LABELING

- A. All equipment, control wires, terminal blocks, etc., shall be tagged, marked or labeled as specified below:
 - 1. Wire Identification: The Contractor shall furnish and install labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks.
 - 2. Wire labels, if used, shall be of the self-sticking, pre-printed type and of the manufacturer's recommended size for the wire involved. Identification markings designated in the plans shall be followed.
 - 3. Tags, if used, shall be nonferrous metal or plastic. Each tag shall be securely tied to the proper wire by a nonmetallic cord or plastic wire tie.

890-2.5 INSTALLATION OF DATA CABLES

- A. Under this project, upgraded computers and a new touchscreen will be installed. As such, no new Data cables are anticipated outside of the Fiber Optic cables listed in Specification L-131, "Fiber Optic and Hardware."

890-2.6 CONTRACTOR FIBER OPTIC COMMUNICATION EQUIPMENT INSTALLATION.

- A. See specification L-131, “Fiber Optic Cable and Hardware.”

890-2.7 CONTRACTOR HARD-WIRE DATA CABLE INSTALLATION

- A. The Contractor shall install, terminate and test all hard-wire communications required for the project. This includes all of the following components:
1. ALCMS manufacturer specified data cable
 2. Data cable termination panels
 3. Data cable jumper cables
 4. Connectors / couplings
 5. Junction boxes
- B. Installation of the data cable shall be done by a trained and qualified specialist.
- C. All associated cabling, splices and jumper cable shall be tested upon completion of the cable installation and termination of connectors.
- D. Tests shall include verification that the signal strength loss is within acceptable limits versus the distance of the cable pull.
- E. All test data shall be recorded and included in a test report that shall be submitted to the airport / owner for approval.
- F. Commissioning of the system shall not begin until all test reports have been submitted and approved.

890-2.8 ALCMS MANUFACTURER COMMISSIONING.

- A. The ALCMS Manufacturer shall perform the following installation and commissioning tasks:
1. Verify Contractor connections including power, control and monitoring.
 2. Verify proper labeling of equipment.
 3. Verify communication connections.
 4. Perform system testing including control, monitoring and diagnostics.
 5. Perform System Acceptance Testing (SAT).

890-2.9 SYSTEM ACCEPTANCE TEST (SAT)

- A. Following the final installation and commissioning of the system, the ALCMS Manufacturer shall perform a demonstration of the system performance. This demonstration shall include the following:
 - 1. Lighting control functions
 - 2. Monitoring functions
 - 3. Alarm functions
 - 4. Print and Display functions
- B. The ALCMS Manufacturer shall develop a SAT test plan in accordance with the specifications and issue this to the contractor for approval from the airport engineer.
- C. The SAT shall be witnessed by owner representatives, the contractor and the engineer.

890-2.10 MANUALS

890-2.10.1 MAINTENANCE MANUALS

- A. The ALCMS Manufacturer shall provide six (6) hard copies of the operation and maintenance manuals that are hard-covered and suitable for daily operation and maintenance of the system. The manuals shall include the following information:
 - 1. Operational overview and system description
 - 2. Graphical User Interface (GUI) Screen operation
 - 3. System Block Diagram
 - 4. Detailed external wiring diagrams (Electrical Contractor wiring)
 - 5. Detailed input/output terminal diagrams
 - 6. Detailed assembly drawings and wiring diagrams
 - 7. Original Equipment Manufacturer (OEM) Manuals
- B. The manuals shall be spiral bound or supplied in 3-ring binders. The cover of each binder shall be labeled with all project-related information.

890-2.10.2 FAA AIR TRAFFIC CONTROL MANUALS

- A. The ALCMS Manufacturer shall provide six (6) hard copies of the operation manuals for Air Traffic Controller (ATC) use. The manuals shall be hard-covered and suitable for daily operation of the system. At a minimum, the manuals shall include the following information:
 - 1. Touchscreen operation (graphical user interface)
 - 2. Touchscreen maintenance (i.e. calibration)
- B. The manuals shall be spiral bound or supplied in 3-ring binders. The cover of each binder shall be labeled with all project-related information.

890-2.11 AS-INSTALLED DRAWINGS

- A. The ALCMS Manufacturer shall provide six (6) hard copies of As-Installed drawings after system acceptance. The As-Installed drawings shall include the following information:
 - 1. System Block Diagram (1-line drawings)
 - 2. System External Wiring Diagrams
 - 3. Assembly Drawings
 - 4. Assembly Wiring Diagrams

- B. The As-Installed drawings shall be 11” X 17” in size and shall be spiral bound or supplied in 3-ring binders. The cover of each binder shall be labeled with all project-related information.

890-2.12 ON-SITE TRAINING.

- A. Since the work required on the ALCMS only pertains to an upgrade of certain parts of the existing system, the layout of the ALCMS is not changing, and the airport staff is already trained and familiar with the existing ALCMS, on-site training will not be required for this portion of the project.

890-2.13 OWNER SYSTEM ACCEPTANCE AND WARRANTY START DATE.

- A. Upon successful completion of the SAT and on-site training the owner shall issue the ALCMS Manufacturer a written notice of system acceptance within five (5) working days.

- B. The date the final acceptance letter is received or five (5) days following successful completion of the SAT (whichever occurs first) represents the start of the warranty period. Please refer to the Warranty section for more information regarding the ALCMS warranty guarantee.

890-2.14 SYSTEM WARRANTY

- A. All new equipment shall be warranted against defects in workmanship, hardware and software for a period of one (1) year from initial operation of the system but not more than eighteen (18) months from the manufacturer’s shipment of the system.

- B. During this time period the ALCMS manufacturer shall provide all parts, labor and technical support with the following conditions:
 - 1. The manufacturer shall correct by repair or replacement, at its option, new equipment or parts which fail because of mechanical, electrical or physical defects, provided that the goods have been properly handled and stored prior to installation, properly installed and properly operated after installation, provided further that Buyer gives manufacturer written notice of such defects after delivery of the goods to Buyer.

2. The manufacturer may examine any goods upon which a claim is made in the same condition as when defect therein is discovered, and may require the return of the goods to establish any claim.
3. The manufacturer's liability under no circumstances shall exceed the contract price of goods claimed to be defective.
4. Any returns under this guarantee are to be on a transportation charge prepaid basis. For products not manufactured by, but sold by the manufacturer, warranty is limited to that extended by the original manufacturer.

890-2.15 SYSTEM SERVICE AND SUPPORT

- A. The ALCMS Manufacturer shall provide technical assistance and support during the warranty period.
- B. The ALCMS Manufacturer shall provide a 7 day a week / 24 hours a day support phone line.
- C. The ALCMS Manufacturer shall provide technical phone support within four (4) hours of the initial call.
- D. The ALCMS Manufacturer shall provide free phone consultation and technical support as required during the warranty period and if necessary shall be on-site within 24 hours.
- E. At the request of the airport/owner, the ALCMS Manufacturer shall provide information about preventative maintenance programs and extended warranty packages.

890-2.12 SPARE PARTS.

- A. A recommended spare parts list shall be included with the Submittal including part numbers and pricing. These prices shall be valid for (12) months from date of system acceptance.

EQUIPMENT AND MATERIALS

890-3.1 GENERAL.

- A. Certain ALCMS components are to be replaced under this scope of work. These systems include the Computers in the Vault, ATCT, and Operations building. The existing computers will be replaced with computers that operate in a Windows 7 operating environment. The ALCMS system shall be based on a network ready system that operates within a Windows XP™ operating environment.
- B. The existing touchscreen serving for control in the Aircraft Control Tower will also be replaced.
- C. The list of ALCMS components to be replaced that fall under this specification are as follows:
 1. One Touchscreen Monitor control station located in the Aircraft Control Tower cab.
 2. One ATCT computer subsystem consisting of an industrial tower computer.
 3. One Vault computer consisting of an industrial computer.

4. One Operations Center subsystem consisting of an industrial computer.
- D. For a list of communication fiber and equipment to be replaced under this project, see specification L-131, “Fiber Optic Cable and Hardware.”

890-3.2 VAULT COMPUTER.

- A. The vault computer shall be capable of independently carrying out the following functions:
 1. Decode all commands received and transfer them to the corresponding Distributed Control and Monitoring Equipment (DCME) unit for execution.
 2. Interrogate all the DCME units to determine the status of the Constant Current Regulators (CCRs) and other controllable items.
 3. Transfer the status of the CCRs and other controllable items to the control tower computer and maintenance center computer.
 4. Continuously check for proper operation of all the communication links connected to the computer.
 5. Continuously check for proper operation of the vault distributed control and monitoring network.
 6. Duplicate the tower control and graphical displays for allowing authorized control from the vaults.
 7. The vault shall also duplicate the maintenance center status information.
 8. Provide hard copies of real-time and historical information on the status of the airfield lighting systems and other controlled and monitored items.
 9. The vault computer application shall not be able to initiate lighting commands unless the control tower authorizes control to Vault.

890-3.3 TOWER COMPUTER.

- A. The Tower computer shall be capable of independently carrying out the following functions:
 1. Receive commands from the Touchscreen control station and transfer lighting control commands to the vault for execution.
 2. Receive the airfield lighting status information from the vault and transfer the status to the Touchscreen display.

890-3.4 OPERATIONS COMPUTER.

- A. The operations computer shall be capable of independently carrying out the following functions:
 1. Provide real-time and historical information on the status of the airfield lighting systems and other controlled and monitored items.
 2. Provide information as to the time, type, location and nature of system problems, alarms or warnings.
 3. Provide hard copies of real-time and historical information on the status of the airfield lighting systems and other controlled and monitored items.

890-3.5 TOUCHSCREEN CONTROL STATIONS.

- A. Replace existing touchscreen monitor in ATCT cab with new 20.1” touchscreen monitor, flushed mounted. Flush mount in existing cabinetry. Contractor shall make modifications to the cabinetry as required.

890-3.6 ADD ALTERNATE 1

- A. Add Alternate 1 shall consist of a wireless communication connection between the Operations Center and the ATCT to add control for operations.

B. CONTRACTOR INSTALLATION REQUIREMENTS FOR WIRELESS COMMUNICATION INSTALLATION:

- a. The antenna and lightning protection shall be provided by the ALCMS manufacturer.
- b. The antenna mast shall be provided and installed by the electrical contractor.
- c. The supply, installation and termination of the interconnecting cable (between the antenna and wireless communication equipment) and associated equipment including connectors and couplings shall be the responsibility of the electrical contractor.
- d. The Contractor shall install and terminate all wireless communication equipment required for the project. This includes all of the following components:
 - 1. Antenna(s)
 - 2. Antenna mast(s)
 - 3. RF cable
 - 4. RF connectors
 - 5. Antenna Lightning arrestors
 - 6. Ground connections
 - 7. Wireless Communication Module (Mounted in Tower near Antenna)
 - 8. CAT 5 Ethernet cable (Run between wireless communication module and Tower computer)
- e. Installation of the wireless communication equipment shall be done by a trained and qualified RF specialist.
- f. The qualifications of the company and specialist that installs the wireless communication equipment shall be submitted to the airport / owner for approval.
- g. All associated RF equipment, including antennas and RF cables, shall be tested upon completion of the cable installation and termination of connectors.
- h. The tests shall include an impedance check of the RF cable and a VSWR (Voltage Standing Wave Ratio) test.
- i. All test data shall be recorded and included in a test report that shall be submitted to the airport / owner for approval.
- j. Commissioning of the system shall not begin until all test reports have been submitted and approved by the ALCMS manufacturer.

C. EQUIPMENT SPECIFICATIONS FOR WIRELESS ETHERNET

- a. The antenna shall be provided by the ALCMS manufacturer.
- b. The antenna mast shall be provided and installed by the electrical contractor.
- c. The supply, installation and termination of the interconnecting cable (between the antenna and wireless communication equipment) and associated equipment including connectors and couplings shall be the responsibility of the electrical contractor.
- d. The wireless network shall use direct sequencing, spread spectrum radios.
- e. The wireless Ethernet network shall use the 2.4 GHz ISM band and allow license-free operation.
- f. If the airport / owner has not previously performed a site inspection and survey and indicated an exact frequency, the ALCMS manufacturer shall provide wireless equipment that has six (6) selectable sub-channels at the following frequencies:
 1. Channel 1: 2.412 GHz
 2. Channel 2: 2.422 GHz
 3. Channel 3: 2.432 GHz
 4. Channel 4: 2.442 GHz
 5. Channel 5: 2.452 GHz
 6. Channel 6: 2.462 GHz
- g. The ALCMS manufacturer's wireless communication system shall be based on direct line-of-site communication between all subsystems (unless otherwise indicated on the specification drawings).
- h. No repeaters shall be necessary (unless otherwise indicated on the specification drawings).
- i. The wireless system shall combine antenna diversity and digital signal processing to assure secure, reliable wireless communication.

D. ALCMS MANUFACTURER WIRELESS COMMUNICATION SITE INSPECTION AND SURVEY.

- a. If the airport / owner has not previously performed a site survey and indicated a specific frequency to use, the ALCMS manufacturer shall be informed prior to bid that they shall coordinate the RF site inspection and survey.
- b. The site inspection and survey shall be performed by a trained and qualified RF specialist to determine wireless communication equipment requirements and verify open frequencies that can be used for wireless communication.
- c. The cost of the site inspection and survey shall be included in the ALCMS manufacturer's price.
- d. The airport / owner shall be available during inspection and survey in order to coordinate locations of antennas and wireless communication equipment (if not indicated on specification drawings).
- e. The inspection shall include the following:
 1. Inspection of all locations which will require wireless communication
 2. Inspection of antenna installation locations
 3. Verification of line-of-site from each installation location
- f. The survey shall include the following:

1. Interference testing including a frequency sweep (using a spectrum analyzer) run over a 24 hour period.
 2. Usable frequency report.
- g. If the site inspection and survey results in any of the following items, the contractor will incur all costs necessary to complete a functional wireless communication network. Airport/Owner and Engineer shall work with contractor to resolve issues related to installation of wireless network.
1. Direct line-of-site communications between one or more subsystems is not possible.
 2. Obstructions within the direct line-of-site require larger antenna masts.
 3. Obstructions within the direct line-of-site require stronger/different antennas.
 4. RF interference at all wireless communication equipment selectable frequencies prevents the use of specified equipment.

METHOD OF MEASUREMENT

890-4.1 All replacement ALCMS equipment shall be measured lump sum including all required materials incidental to equipment replacement.

ADD ALTERNATE 1

890-4.2 All replacement wireless connection equipment shall be measured lump sum including all required materials incidental to equipment replacement.

BASIS OF PAYMENT

890-5.1 Payment will be made at the contract lump sum price for each completed and accepted installation. This price shall be full compensation for furnishing and installing all ALCMS computers and touchscreen monitor, as required by the Drawings and these Specifications. This work includes all preparation, removals, assembly, installation, and testing of these materials, and for all labor, equipment, tools and incidentals necessary to complete the installation. Bid Item 890-5.1 shall be paid for at the Contract lump sum for system, complete and in place. Payment will be made at conclusion of all testing and acceptance by manufacturer and SAA.

ADD ALTERNATE 1

890-5.2 Payment will be made at the contract lump sum price for each completed and accepted installation. This price shall be full compensation for furnishing and installing all wireless communication links, as required by the drawings and these specifications. This work includes all preparations, removals, assembly, installation, and testing of these materials. This work also includes all labor, equipment, tools and incidentals necessary to complete the installation. Bid Item 890-5.2 shall be paid for at the Contract lump sum for system, complete and in place. Payment will be made at conclusion of all testing and acceptance by manufacturer and SAA.

Payment will be made under:

Item L-890-5.1 ALCMS Upgrade - per each

ADD ALTERNATE 1

Item L-890-5.2 Wireless communication link between Operations Computer and ATCT

MATERIAL REQUIREMENTS

ANSI/TIA/EIA-568-B.3 Optical Fiber Cabling Components Standard

FAA-E-2761c Cable, Fiber Optic, Multimode and Single-Mode, Multifiber

FAA AC 150/5345-56 Specification for L-890 Airport Lighting Control and Monitoring System

END OF ITEM L-890