ITEM L-123 AIRFIELD SIGNAGE SYSTEMS

DESCRIPTION

123-1.1 GENERAL. This item shall consist of airport lighting systems furnished and installed in accordance with this specification, any referenced specifications, and the applicable Federal Aviation Administration Advisory Circulars. The systems shall be installed at the location and in accordance with the dimensions, layout, design, and details shown in the plans. This item shall include furnishing and installing all signs, transformers, base cans, mounting assemblies, base plates, adapter rings, concrete work, cable connections, all lamps, testing of the installation and all incidentals and appurtenances necessary to place the systems in operation as completed units to the satisfaction of the Engineer. All work shall be constructed and installed in accordance with the drawings and specifications. The work shall include all cable, conduit, raceway, terminations, accessories and all incidentals required to provide a complete and operational system to the satisfaction of the Owner and Engineer.

123-1.2 REFERENCED MATERIALS. Additional details pertaining to specific systems covered in this section are contained in the Federal Aviation Administration (FAA) Advisory Circulars (AC's), latest edition, listed below:

150/5340-1	Standards for Airport Markings
150/5340-30	Design and Installation Details for Airport Visual Aids
150/5340-18	Standards for Airport Sign Systems
150/5340-26	Maintenance of Airport Visual Aid Facilities
150/5345-1	Approved Airport Equipment
150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
150/5345-26	FAA Specification for L-823 Plug and Receptacle, Cable Connectors
150/5345-42	Specification for Airport Light Bases, Transformer Houses, Junction Boxes and Accessories
150/5345-47	Isolation Transformers for Airport Lighting Systems
150/5345-53	Airport Lighting Equipment Certification Program
150/5370-2	Operational Safety on Airports During Construction
150/5370-10	Standards for Specifying Construction of Airports

The Contractor is responsible for obtaining and using the latest edition of the referenced FAA Advisory Circulars. This is not all inclusive but is offered as a convenience to the Contractor.

123-1.3 SUBMITTALS. Shop drawings of each airfield lighting component, indicating FAA approval, shall be submitted to the Engineer for review and approval and be approved prior to ordering any materials for this item. This submittal shall include the proposed method of installation for all airfield lighting components. The submittal shall include data on all component parts of the item or system, and shall include the manufacturers list of recommended spare parts for one years use. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the contract documents. The Contractor's submittals shall be in accordance with Item L-106, Submittals, Record Documents and Maintenance Manuals.

123-1.4 QUALIFICATIONS. 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.

123-1.5 SPARE PARTS. The Manufacturer/Contractor by submitting a bid assures the Owner that it will sell to the Owner or any of the Owner's designated representatives any and all parts for materials furnished under this contract at the lowest price the Contractor or its subcontractors, or suppliers furnish them to any second party. This pricing requirement shall apply for five (5) years from the date of final

acceptance of the contract. In furnishing parts at this price, the Contractor shall provide the parts within one week of an approved purchase agreement. The Owner shall have the right to verify that the prices the Owner pays for the parts are the lowest and if they are determined not to be, then the Owner shall receive a payment from the Manufacturer/Contractor in the amount of one and one-half (1.5) times the difference. The Contractor is responsible to coordinate and obtain this agreement, in writing, from the manufacturer.

MATERIALS

123-2.1 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, latest edition.

All other equipment and materials covered by other referenced specification shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification. The Contractor shall submit the manufacturer's certificate of compliance and the applicable specification sections to the Engineer for approval before the equipment and material are ordered.

Manufacturers certifications shall not relieve the Contractor of his 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.

All items required per this section are for use on a 6.6 amp primary series circuit unless specifically noted otherwise.

123-2.2 GUARANTEES.

a. Except as modified below, all equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of twelve (12) months or the manufacturer's standard guarantee period which ever is greater, 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.

b. The lamp life, as rated by the manufacturer (not the supplier), shall be warranted for the specified number of hours. Should ten percent (10%) of the lamps fail prior to the rated life of the lamp, then the entire system using the failing lamp type shall be relamped, at the Contractor's expense, and the warranty time shall start over. At the Owner's option, with written permission of the Engineer, the Contractor may elect to supply 100% spare lamps at the time of Owner's acceptance of the lighting system.

c. The lamp prices shall be furnished to the Owner in the bid and the prices shall be guaranteed for a period of five (5) years.

123-2.3 BASIS OF DESIGN. The airfield lighting systems are designed using the below listed maximum fixture wattages. Approved airfield lighting fixtures with higher wattages are permissible provided the Contractor assumes all costs for the redesign of the airfield lighting and necessary power distribution systems and all costs incurred furnishing and installing any additional equipment. In no case shall the Contractor be allowed to reduce the size of the constant current regulators or the power distribution systems.

~~L-858B Distance Remaining Sign 400VA~~ 145VA

			Style 2/Style 3
L-858Y R, L	Location, Information, Boundary, Destination Mandatory Sign	1 Module	100 VA 84 VA / 83 VA
		2 Module	200 VA 92 VA / 118 VA
		3 Module	300 VA 165 VA / 170 VA
		4 Module	400 VA 198 VA / 197 VA

123-2.4 L-858 SIGNS. The signs shall be L-858Y, R, L and B and shall be internally lighted as indicated on the plans. The size of the units shall be size 2 for the L-858Y, L and R and size 4 for the L-858B. The signs shall be furnished with light emitting diode (LED) quartz T-10 incandescent lamps installed. The L-858B, Y, R, L units shall be Style 2 or 3 as required by the circuit the respective sign is connected to. All units shall be Class 1. All signs shall be furnished with tethers on a minimum of two legs per module. The tethers shall be fabricated from 3/16" stainless steel aircraft cable with a formed eye on both ends and shall be of ample length to attach the sign (min. of 6" of slack) to the flange plate and allow the frangible coupling and disconnect plug to function properly. The bolting pattern, method of anchoring, etc., shall be per the sign manufacturer's recommendation. The sign manufacturer shall submit to the Engineer calculations showing the sign and anchoring methods will withstand a 200 MPH jet blast in accordance with Paragraph 4.1.2 of AC 150/5345-44F, latest edition. The signs shall be supplied with the messages as shown on the sign schedule.

Each sign shall be furnished with an on-off toggle switch with weatherproof cover. The switch shall be used by maintenance personnel to de-energize the sign so maintenance work can be performed. The switch shall be located immediately adjacent to the load side of the L-823 disconnect plug. The weatherproof cover shall provide protection from driving rain and shall have a spring operated closing device. The weatherproof cover shall also provide physical protection for the switch handle.

The nameplate required by 150/5345-44F shall be made of metal with the data stamped into the metal nameplate.

Provide 3-M Scotch-Lite or approved equivalent 6 inch high, die cut labels for each sign, labels shall be reflective film, with pressure-sensitive adhesive backing, suitable for exterior applications. Labels shall be UV resistant. Labels shall be yellow for installation on black surface, black for installation on other surfaces. Text shall be: number and letter style; Helvetica medium, upper case, 6” in height.

The quantity of sign modules is based on two (2) characters per module. Payment shall be made on the basis of a module consisting of two characters, regardless of the manufacturing methods or techniques.

123-2.5 LIGHT BASES. All light bases (base cans) shall meet the requirements of FAA AC 150/5345-42C, latest edition. The light bases shall be L-867 type for the non-load bearing units and L-868 for the load bearing units. The sizes of the units shall be as shown in the Plans and in this specification. Telescoping base cans may be used for the L-867 non-load bearing base cans. Two piece base cans, may be used, where paving interferences require their use. All light bases, transformer houses and junction boxes shall be Class 1, galvanized steel.

123-2.6 CABLES. Cables shall comply with specification L-108, Installation of Underground Cable for Airports and L-111 Section 16120, Wire and Cables.

123-2.7 L-823 CONNECTORS. Connectors shall comply with specification L-108, Installation of Underground Cable for Airports.

123-2.8 ISOLATION TRANSFORMER. The isolation transformers shall be L-830, 6.6 amp primary to 6.6 amp secondary, sized per the fixture manufacturer's recommendations and conforming to AC 150/5345-47A, latest edition.

123-2.9 FRANGIBLE COUPLINGS. All elevated items shall be installed on frangible couplings in accordance with the respective Federal Aviation Administration Advisory Circular. Frangible couplings shall be metallic and provide an electrical grounding path between the fixture/sign and the base can.

~~**123-2.10 LAMPS.** Airfield lighting fixture lamps shall be incandescent or quartz of size and type to provide distribution and minimum output requirements of isocandela curves shown for each size in AC 150/5345-46B, (latest edition). All airfield lighting fixtures shall be installed with lamps.~~

~~Airfield sign lamps shall be~~ LED ~~quartz or high pressure sodium or incandescent T-10 lamps of size and type to provide distribution and minimum output requirements as detailed in FAA AC 150/5345-44F, latest edition. All airfield signs shall be installed with lamps.~~

~~Lamps shall be a generic, standard design manufactured by at least two of the following manufacturers:~~

~~**a.** G.E. Lighting.~~
~~**b.** Sylvania.~~
~~**c.** Phillips.~~

~~Proprietary lamps, that is lamps intended to be used only for one manufacturer's product(s) and that are manufactured for this sole purpose, are not acceptable.~~

~~LED Lamps assemblies shall be readily available from local commercial electrical supply dealers for assured availability and supply to the airport.~~

123-2.20 TAPE. Plastic electrical tapes shall be Scotch Electrical Tape number 88 as manufactured by the Minnesota Mining and Manufacturing Company, or an approved equal. Electrical coating shall be Scotchkote as manufactured by the Minnesota Mining and Manufacturing Company, or approved equal.

123-2.11 CONCRETE. Concrete for backfill shall comply with Specification P-610, Structural Portland Cement Concrete and have a maximum size coarse aggregate of 1 inch and shall have a 28-day comprehensive strength of not less than ~~4,000~~ 3,500 PSI and increasing with age.

123-2.12 CONDUIT. Conduit shall comply with specification L-110,

123-2.13 HEAT SHRINK KIT. Heat shrinkable tubing with integral sealant for waterproofing L-823 connectors shall be Sigmaform Corporation Type APL, or Raychem Corporation Type ADL, or Crouse Hinds Type HSK or approved equal.

123-2.14 REINFORCING STEEL. All reinforcing steel shall be ASTM A 615, Grade 60.

123-2.15 BOLTING HARDWARE. All airfield bolting hardware shall be stainless steel and shall meet FAA requirements. All bolts 1/4" and larger shall be hex head type. All bolts smaller than 1/4" trade size shall be recessed allen type. All bolted connections shall utilize an anti-rotational locking type device. The base can cover and fixture mounting bolts shall extend through the base can mounting flange into the base can a minimum of 0.5". The bolts shall have enough thread length so they do not shoulder out before the fixture is securely tightened.

123-2.16 ANTI-SEIZE COMPOUND. The anti-seize compound shall be Ideal "Noalox" or approval equal. Use Dow Corning Compound III valve lubricant curing sealant to seal between sections of base cans, spacer rings, adaptor rings or fixtures.

123-2.17 FILLERS AND ADHESIVES. Joint sealing filler shall comply with Specification P-605, Joint Sealing Filler and adhesive compounds shall comply with Specification P-606, Adhesive Compounds, Two-Component, For Sealing Wire and Lights and Pavement. The P-605 and P-606 compounds shall be formulated so they are compatible with the pavement type with which they are to be used.

123-2.18 STRAIN RELIEF CONNECTORS. Strain relief connectors shall be Liquid Tight Thomas & Betts 2500 series with WMG-PG wire mesh cable grip or approved equal.

123-2.19 DELIVERY, STORAGE AND HANDLING. Ship materials and equipment disassembled only to the extent necessary for reasons of shipping limitations, handling facilities, and to avoid damage during shipment. Maintain materials and equipment in new condition. This shall include the use of heat lamps, suitable coverings, indoor storage, etc. to properly protect the equipment and materials. Any equipment or materials, in the opinion of the Owner or Engineer, damaged during construction or storage periods shall be replaced by and at the expense of the Contractor.

125-2.20 IDENTIFICATION MARKERS. Fixture, manhole and sign identification markers shall be brass bench markers by Surv-Kap of Tucson, Arizona model number M/M-B2 with flat top or approved equal.

~~**123-2.21 SIGN LEGENDS.** Furnish sign legends to be installed on existing airfield signs. Legends shall be compatible with existing sign. Manufacturer model number and size of existing signs are scheduled in the Plans along with a revised legend text.~~

~~The new legends shall not affect the lumen output of the existing sign. New legends shall secure to existing signs in the same manner as the original legends. Legend text size and style shall be in accordance with FAA Advisory Circular 150/5345-44F, latest edition.~~

~~Legends provided for existing signs that are to remain shall be by original manufacturer of those signs. Provide letter of certification from the manufacturer that the legend replacement does not change any of the performance parameters under which the sign was FAA certified.~~

~~Sign legend panels shall include all incidentals required for a complete and operational unit to the satisfaction of the Engineer. Each replacement sign panel shall be one or two characters in length.~~

123-2.22 SPARE PARTS. The following table lists the electrical spare parts required to be furnished by the Contractor. All spare parts shall be identical to the same parts approved and installed in the project.

SPARE PARTS LIST

Category	Description	Quantity
~~Lamps~~	~~Provide 2 12 spare LED lamps assemblies for each sign lamp assembly installed as a part of this contract.~~	

CONSTRUCTION METHODS

123-3.1 INSTALLATION

123-3.1.1 Signs, Base Cans. All signs, base cans, etc. shall be installed as shown in the plans or approved shop drawings and in accordance with the applicable FAA Advisory Circulars and manufacturers' recommendations. Survey instruments shall be used to position all items to insure precise orientation. Tolerances given in the FAA Advisory Circulars, these specifications, and the plans shall not be exceeded. Where no tolerance is given, no deviation is permitted. Items not installed in accordance with the FAA Advisory Circulars, these specifications and plans shall be removed and replaced by and at

the expense of the Contractor.

Signs shall be oriented at 90 degrees to the direction of the taxing path from which it is viewed unless noted otherwise.

For all signs, the concrete pad shall extend to not less than eighteen (18) inches out from the edge of the sign all around. The concrete pad shall be a minimum of six (6) inches thick. The concrete pad shall be poured in place and rest on undisturbed soil. The pad shall be reinforced with steel bars formed and placed as indicated in the Plans. Exposed concrete surface shall be finished smooth with a steel trowel or rubbed to a smooth finish. All horizontal edges to be chamfered one (1) inch at 45 degrees.

During construction of the pad, the transformer base shall be adjusted and firmly held in place so that machined upper surface of base flange will be level within -2 degrees and not more than 1/4 inch above the surface of pad. All other bearing areas for additional flange supports shall be in the same horizontal plane as the transformer base flange.

The Contractor shall completely survey and stake out each areas signage layout prior to starting any installation. Should any irregularities occur in the layout, the Engineer shall be notified immediately. The bid item price shall include the necessary surveyed layout for each item and the cost for any additional adjustment or resurvey of the location of the items due to the existing geometric conditions. The new signage installation shall be coordinated with and blend into the signage installation.

All loose material shall be removed from all excavations for electrical equipment, raceways, manholes, pads, etc. The bottom of the excavation shall be compacted to 95% compaction in accordance with ASTM D 1557 prior to the installation of the electrical item and backfill.

~~Install new legends on existing signs at locations and with designations as indicated in the Plans. Installation of new sign legends on existing signs shall be done in accordance with construction sequencing as indicated in the Plans.~~

The Contractor shall be responsible for final calibration and adjustments of the signs.

~~In new or existing pavement all conduits, duct banks, counterpoise, base cans, etc. shall be installed prior to the placement of the final lift of pavement.~~

Before paving may proceed, the Contractor shall demonstrate to the Engineer that the base cans are at the correct elevation, azimuth and rotation and that the proper clearance exists between the base can and the paving train.

The finished pavement surface shall be protected from foreign substances which could cause staining, i.e., oil, P-605, Joint Sealing Filler, etc. The Contractor shall immediately clean all spills and correct/clean any stained surfaces at the Contractor's expense.

Assemble units and connect to the system in accordance with the manufacturer's recommendations and instructions.

An identification tag shall be installed with each fixture, sign, etc. as shown in the plans. Brass circuit identification tags identifying each circuit shall be attached to each circuit as shown in the plans.

Provide six feet (6') of slack in each end of each cable in each base can. All connections shall be able to be made above ground.

Painted and galvanized surfaces that are damaged shall be repaired according to the manufacturer's recommendations, to the satisfaction of the Owner and Engineer. Use LPS-1G cold galvanizing compound or approved equal to repair galvanized surfaces. Obtain paint and primer, of same batch

number, from the equipment manufacturer to repair painted surfaces.

Dow Corning Compound III valve lubricant non-curing sealant or approved equal shall be used to seal between sections of base cans, spacer rings, adapter rings or fixtures.

Where three (3) or more conduits enter a L-867-B base can, a L-867D base can shall be used. Drain connections are excluded from the conduit count.

All threaded portions of frangible couplings, etc., shall be coated with Ideal "Noalox" compound or approved equal before being assembled.

~~If a light can is installed incorrectly or the duct/conduit is plugged/broken or the concrete joints are installed incorrectly or the light base can is sawed by the concrete saw, the concrete slabs on both sides of the light base can and the light shall be removed and replaced at the Contractor's expense.~~

Dewatering necessary to construct L-123 Items and related erosion and turbidity control shall be in accordance with federal, state, and local requirements and is incidental to its respective pay item as a part of L-123. The cost of all excavation regardless of type of material encountered, shall be included in the unit price bid for the L-123 Item.

123-3.2 TESTING. This section describes the testing and demonstrations furnished by the Contractor. All items furnished and/or installed by the Contractor shall be tested and demonstrated in accordance with these specifications. All equipment and labor required for testing and demonstrations shall be furnished by the Contractor.

a. Fully test the installation by continuous operation for a period of not less than seventy-two (72) hours as a completed unit, prior to acceptance by the Owner.

b. Up to two (2) walk-throughs may be initiated by the Owner or the Engineer during which the signs ~~airfield lighting units~~ would be required to be in operation. Additional walk-throughs may be necessary depending upon the number of discrepancies found on the previous walk-throughs.

c. The Contractor is responsible for lamp replacements and necessary maintenance of airfield items during the testing, construction and walk-through periods.

d. Test cabling per specification L-108, Installation of Underground Cable for Airports.

e. Demonstrate all features and functions of all systems and instruct the Owner's personnel in the proper and safe operation of the systems.

f. The Contractor shall perform the necessary inspection and tests for some items concurrently with the installation because of subsequent inaccessibility of some components. The Engineer shall be notified by the Contractor forty-eight (48) hours in advance of any testing.

There are no approved "repair" procedures for items that have failed testing other than complete replacement. Any other corrective measures shall be approved in writing by the Engineer.

123-3.3 OPERATION AND MAINTENANCE MANUALS. The Contractor shall provide data for all equipment, material and components supplied or furnished under this section in the Operation and Maintenance Manuals. This data shall include cut sheets from the manufacturer and the manufacturer's installation, operation and maintenance manuals, recommended spare parts lists, any required test results, and other data as required by Section L-106, Submittals, Record Documents and Maintenance Manuals. The manuals shall be in accordance with Section L-106. Final payment for any contract amounts shall not be processed without proper submittal of these manuals and review and approval by the Engineer.

123-3.4 CONTRACT DRAWINGS. Where the electrical drawings indicate (diagrammatically or otherwise) the work intended and the functions to be performed, even though some minor details are not shown, the Contractor shall furnish all equipment, material, and labor to complete the installation work, and accomplish all the indicated functions of the electrical installation. Further, the Contractor shall be responsible for taking the necessary actions to ensure that all electrical work is coordinated and compatible with the civil plans.

123-3.5 MINOR DEPARTURES. Minor departures from exact dimensions shown in the electrical plans may be permitted where required to avoid conflict or unnecessary difficulty in placement of a dimensional item, provided contract requirements are met. The Contractor shall promptly obtain approval from the Owner and/or the FAA Resident Engineer prior to undertaking any such proposed departure.

METHOD OF MEASUREMENT

123-4.1 GENERAL. The quantity of airfield lighting units to be paid for under this item shall be the number of each type installed, complete and in place, ready for operation, and accepted by the Engineer. Each airfield lighting unit shall include the installation of an identification plate or tag as detailed in the plans.

BASIS OF PAYMENT

123-5.1 GENERAL. Payment will be made at the contract unit price for each item completed in accordance with the plans and specifications that is installed by the Contractor and accepted by the Engineer. 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, incidentals, and appurtenances necessary to complete these items.

Payment will be made under:

If any of the following bid items are not included in the bid, the quantity is hereby specified as zero.

Item L-123-5.1 L-858 AIRFIELD GUIDANCE SIGN AND BASE -- PER EACH.

~~Item L-123-5.1 L-858B Distance-Remaining Sign and Base - 1 Module -- Per Each.~~

~~Item L-123-5.1-AA1 L-858B Distance-Remaining Sign and Base - 1 Module -- Per Each.~~

~~Item L-123-5.1-AA2 L-858B Distance-Remaining Sign and Base - 1 Module -- Per Each.~~

~~Item L-123-5.2 L-858Y Directional Sign and Base - 1 Module -- Per Each.~~

~~Item L-123-5.2-AA2 L-858Y Directional Sign and Base - 1 Module -- Per Each.~~

~~Item L-123-5.3 L-858R Mandatory Sign and Base - 3 Module -- Per Each.~~

~~Item L-123-5.4-AA2 L-858R Mandatory Sign and Base - 4 Module -- Per Each.~~

~~Item L-123-5.4-AA3 L-858R Mandatory Sign and Base - 4 Module -- Per Each.~~

END OF ITEM L-123