SAMPLE SPECIFICATION
AIRPORT LIGHTING CONTROL & MONITORING SYSTEM L-890 ALCMS

Note: Modify the items in italics according to your specific job requirements.

ITEM L-109 INSTALLATION OF AIRPORT LIGHTING CONTROL & MONITORING SYSTEM L-890 ALCMS

DESCRIPTION

109-1.1 This item shall consist of installing a new PLC-based ALCMS. This item shall also provide training for air traffic controllers, maintenance personnel, and airport operations staff on the new system.
This item shall include all patch panels, conduit, cables, junction boxes, and all incidentals necessary to complete the ALCMS to the satisfaction of the Engineer. This ALCMS shall meet all requirements of FAA Advisory Circular 150/5345-56, current version, this specification, and the project plans.
This ALCMS shall be type L-890-

{A- Control Only}
{B- Basic Monitoring}
{C- Advanced Monitoring}
{D- SMGCS-Individual Lamps Out Monitoring}

with Failsafe method-

{A- Preset Failsafe}
{B- Last State-Latching}

The ALCMS shall include a touch screen human-machine interface (HMI) for each control station within the system, not limited to the vault and air traffic control tower (ATCT).

EQUIPMENT AND MATERIALS

109-2.1 General

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per 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 Engineer.
c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the Engineer) and replaced with materials that comply with these specifications at the Contractor's cost.
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.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. Defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.
f. The ALCMS shall be as manufactured by AIRPORT LIGHTING COMPANY (www.airportlightingcompany.com) or approved equal.

109-2.2 Circuits Controlled
The L-890 ALCMS shall control and monitor the following airport circuits and visual aids:

{Runway xx-yy}
{Runway zz-aa}
{Taxiway A}
{Taxiway B}
{Beacon}
{Windcone}
{Generator/ATS}
{L-854 Radio}
{Photocell}
{…}

109-2.3 ALCMS Communication Network
The ALCMS shall consist of the following stations:

Vault
ATCT Cab
{ATCT Subjunction}
{Maintenance Garage/Operations}
{Airport Operations}
{…}

The ALCMS stations shall be connected on a wholly dedicated ALCMS Network. The ALCMS Network shall consist of a {redundant} {single-mode fiber} connection. Fiber optic cables shall be a minimum of {2} pairs to support airport expansion.
Contractor shall furnish and install all associated equipment for a complete fiber connection, including fiber patch panels with LC connectors, couplings, and fiber patch cables as needed.

{Additionally, there shall be a backup wireless communication link between the [vault] and [ATCT]}

109-2.4 ALCMS Control Equipment
The ALCMS shall employ a Programmable Logic Controller (PLC) for all system control and monitoring.

Interface computers shall be fanless and of industrial nature. They shall ensure that the HMI runs without interruption and with no noticeable lag. The computers shall meet the following minimum requirements:

- Dual core processor, originally released within last 4 years of this project date
- No moving components shall be allowed (ie: HDDs)
- At least 8GB of RAM
- At least 128GB of SSD storage to support ALCMS interface software and local database

All station computers shall be the same model. Computers shall support 120VAC or 24VDC input power to support flexibility of installation.

{A roaming laptop computer shall be included with the ALCMS. Laptop shall be supplied with a power adapter to support being powered from inside a maintenance truck. The laptop shall communicate with the ALCMS on [airport wireless] or [cellular connection].
Laptop shall be of industrial nature and support the minimum requirements indicated above.}

109-2.5 Human Machine Interface (HMI)

HMIs for the ALCMS shall consist of an integrated full-color touchscreen with the minimum requirements:

- Must be liquid crystal display (LCD) or equivalent technology
- The HMI must support a resolution of at least 1024 x 768
- The viewing surface must be non-glare
- {17” screen size}

The ATCT Cab HMI shall be mounted

{in the cabinetry of the tower cab. Contractor to coordinate the installation of the HMI with airport operations. Existing cutout dimensions are yy” x zz”}

{to a steel faceplate or flush-mounted electrical enclosure which shall be installed within the cabinetry of the tower cab. Contractor to coordinate the installation of the HMI with airport operations. Existing cutout dimensions are yy” x zz”}

{to a [movable] mounting arm or yoke which shall be mounted to the cabinetry of the tower cab. Contractor to coordinate the installation of the HMI with airport operations.}

109-2.6 Panel PCs

All-in-one Panel PCs are acceptable for ALCMS interface provided they comply with the previously-identified requirements for ALCMS Control Equipment and Human Machine Interface.

109-2.7 Vault Network

The ALCMS shall connect to lighting elements through

{Redundant Vault Network:
The Redundant Vault Network shall be build on industry-standard Ethernet. All connections shall be made using CAT5 or CAT6 cabling as directed by the ALCMS manufacturer.
Vault communication cabling shall be run in a star topology; each CCR shall have two home-run communication cables to the ALCMS equipment enclosure to support the redundant connection.
Contractor is responsible for installation and test verification of all communication cabling.
No communication cabling shall be run alongside line voltage.}

{Direct wiring – Parallel Inputs:
The ALCMS shall support independent equipment manufacturers with no on-site modifications necessary to change vital equipment such as a CCR.
The ALCMS shall be supplied with all interface relays needed to support hard-wire direct signal outputs to airport lighting elements. The ALCMS must be able to support both 'internal' and 'external' supply-voltage CCRs.
Control wiring may be multi-conductor cabling, providing it complies with all project & FAA specifications as needed.}

109-2.8 Distributed Control & Monitoring Units (DCMU)

DCMUs shall be used to extend the wiring interface of the ALCMS. In systems with redundant vault networks, a DCMU is required for each CCR. CCRs with integrated DCMUs may be used if available at the airport or pursuant to this project.
The DCMUs shall support:

- Communication via a redundant Ethernet connection
- Redundant 24VDC backup power input
- Dedicated HMI

All DCMUs within the system shall get a {redundant} 24VDC backup power connection. The 24VDC connection may be configured in star or daisy-chain topology.

{In lieu of dedicated 24VDC backup wiring, the DCMU shall support PoE (Power over Ethernet), which shall provide the DCMUs with backup power.}

109-2.9 Backup Power

All ALCMS components shall be powered by UPS (Uninterruptable Power Supply). All components shall run for at least {10 minutes} in the event of power failure.
System UPS may be for 120VAC and/or 24VDC powered components as necessary to ensure all system components have appropriate backup power.
All system UPS must support battery replacement by the end user.

109-2.10 Constant Current Regulators

The system CCRs are as follows (example shown, add rows as needed):

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CCR ID / #	Description	Size (kW)	Current Output	Steps	CCI Int/Ext	Mfr.	Model	Monitoring	Circuit Selector #	CSS Loop Descriptions
1	Runway xx-yy	30	6.6	5	120v Int	Airport Lighting Co	FR828-30A4E1-0N0	Current Sensing Relay	None	

109-2.11 Generator/ATS

The ALCMS shall monitor the generator and ATS to ensure continuous operation of the system. The ALCMS shall support the following control & monitoring of the generator & ATS (example shown, add or remove as needed):

Signal	Description	Voltage	Termination	ALCMS Designation
Generator Start	Source	120VAC	Generator TB x-y	START GENERATOR
Generator Start	Source Neutral	Neutral	Generator TB x-z	-
Utility Available	Feedback	12VDC	ATS TB x-y	UTIL AVAIL
Utility Available	Common	Gnd	ATS TB x-z	-
Utility Online	Feedback	12VDC	ATS TB x-y	UTIL ONLINE
Utility Online	Common	Gnd	ATS TB x-z	-
Generator Available	Feedback	12VDC	ATS TB x-y	GEN AVAIL
Generator Available	Common	Gnd	ATS TB x-z	-
Generator Online	Feedback	12VDC	ATS TB x-y	GEN ONLINE
Generator Online	Common	Gnd	ATS TB x-z	-

109-2.12 Radio & Photocell Control

The ALCMS shall monitor the inputs of L-854 Radio Control Equipment as well as a site photocell. The ALCMS shall not engage any automatic circuit control based on the L-854 or photocell inputs unless commanded by the controlling station. Automatic circuit control shall be engaged or disengaged by the controlling station via a button press on the HMI.

{The ALCMS shall include a “Night Mode” button which will engage a predefined set of commands for the airport circuits. Night mode shall enable response to L-854 radio and photocell inputs.}

The following table defines how the airport circuits shall respond to automatic control if enabled (example shown, add or remove as needed. Note numbers represent brightness step):

Circuit	L-854 3 Click	L-854 5 Click	L-854 7 Click	Photocell Day	Photocell Night
Runway xx-yy	1	3	5	N/U	0
Taxiway A	1	2	3	N/U	1
Beacon	On	On	On	N/U	On

109-2.13 VPN Router

A VPN Router shall be included in the ALCMS to allow the ALCMS manufacturer to provide remote access support over a dedicated Internet connection. The VPN Router shall be powered by a dedicated power line which can be turned off when not in use. Leaving the VPN Router unpowered will not affect the ALCMS in any way.

{The VPN Router shall include a SIM card and wireless antenna to support remote connections through cellular line. The airport shall be responsible for ensuring the SIM is appropriately activated and paid for.}

109-2.14 Training

The ALCMS manufacturer shall complete on-site training for the new system. Training shall be conducted when the system is installed and ready for cut-over, to allow site personnel to be trained on active equipment. Two groups of training shall be conducted:

Air Traffic Controller Training. Contractor shall work with ALCMS manufacturer to coordinate training of all air traffic controllers. To ensure all shifts shall receive training {two} {one hour} sessions will be required.

Maintenance Training. Airport maintenance personnel shall be trained on all ALCMS elements, documentation, and troubleshooting. To ensure staff has appropriate system knowledge {one} {full day} sessions will be required.

109-2.15 Documentation

The ALCMS shall be provided with {three} full sets of documentation, to include but limited to: system as-built drawings, block diagrams, and user manuals. The ALCMS manufacturer shall supply digital copies of as-installed drawings which include changes made during system startup (if required).
Additional copies shall be available upon request.

109-2.16 Spare Parts

To ensure continuous operation of the ALCMS, the following spare parts shall be provided as part of the Contractor's bid:

1 – HMI touch screen
1 – Computer
1 – DCMU

CONSTRUCTION METHODS

109-3.1 Installation

The contractor shall ensure continuous operation of airport lighting elements during installation of the ALCMS where possible. The new ALCMS shall be set up and tested in-place before final cut-over is conducted. ALCMS functionality shall be demonstrated to the satisfaction of the Owner's and Engineer's representatives during the setup phase.

METHOD OF MEASUREMENT

109-4.1 The quantity to be paid for shall be the number of ALCMS systems installed as completed units in place, accepted, and ready for operation.

BASIS FOR PAYMENT

109-5.1 Payment will be made at the contract unit price for the completed L-890 ALCMS installed, in place 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, and incidentals necessary to complete this item.

Payment will be made under:

Item L-109-5.1	L-890 ALCMS, in Place

END OF ITEM L-109