*{Modify the items in brackets and italics according to your industry and specific job requirements}*

**ITEM L-150 MOBILE PHOTOMETRIC TESTING COMMISSIONING SERVICE**

**150-1.1 MOBILE PHOTOMETRIC TESTING SYSTEM DESCRIPTION**

This item shall consist of performing Mobile Photometric Testing as part of commissioning the airfield lighting systems in accordance with these specifications. Equipment shall be able to measure the main beam average intensity outlined in FAA AC 150/5340-26 *{ICAO Annex 14 Aerodrome Maintenance, Visual Aids} {Transport Canada AC 302-010 Mobile Photometric Measuring Unit}*.

The Contractor shall furnish all required testing equipment, materials, vehicles, vehicle mounts and labor for completing the photometric testing. The Contractor shall provide all electrical testing to confirm that lighting system installations associated with this project are acceptable. The Owner may engage an independent agency to verify that the Contractor has performed all repairs deemed necessary by the Engineer to meet the photometric testing criteria specified in the contract documents. The Contractor shall provide all testing support and assistance, all specified photometric testing and associated work shall be made at the Contractor’s expense.

**150-2.1 PHOTOMETRIC TESTING GENERAL**

1. **General.** Photometric testing of all the airfield lighting fixtures, except taxiway edge lights and signs, installed under this contract shall be performed by a firm with demonstrated capability for field measurement of photometric performance of airfield lighting fixtures. The Contractor shall retain the services of a firm that shall have experience in evaluating the test results against FAA standards {ICAO standards} and manufacturers performance criteria.
2. **Experience**. The Photometric testing of all airfield lighting installed as a part of this project shall be completed by a company with greater than 5 years’ experience in the aviation photometric industry with previous photometric testing at a Part 139 airport and at no less than five (5) international air carrier airports.

Because of the correlation between the electrical performance of airfield lighting circuits and the photometric performance of the airfield lighting fixtures, all work shall be done by a single firm. The firm shall be subject to the Engineer’s approval. Suggested contacts for this service include the following or an approved equal:

ADB SAFEGATE

977 Gahanna Pkwy

Columbus, OH 43230

Tel: (614) 861-1304

1. **Compliance.** Materials and equipment covered by this item shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer. All equipment, materials, methods and photometric test report examples shall be submitted to the Engineer for review.
2. **Calibration.** All test equipment proposed for use shall have a current calibration. Calibration certifications are current for 1 year from date of calibration.
3. **Site Readiness Preparation**. The Contractor is responsible for preparing the site prior to starting the photometric testing. The Contractor shall…
   1. Organize and validate that all photometric testing equipment is ready for testing
   2. Clean and align all the light fixtures to assure that the system is ready for the photometric testing
   3. Verify series circuit cabling insulation resistance meets minimum criteria specified by the FAA for new installations or equal to or greater than the insulation resistance readings recorded prior to project work (if circuit cabling is not new)
   4. Verify calibration of constant current regulator output current using a true RMS ammeter prior to photometric testing.
4. **Testing Coordination.** The Contractor is responsible for the coordination and organization with the airport during the testing. The Contractor shall…
   1. Requirements under this item shall be coordinated with the Engineer.
   2. The Engineer shall be notified by the Contractor forty-eight (48) hours in advance of photometric testing.
   3. Coordinate with the airport access to runway and taxiway locations as needed for testing.
   4. Coordinate with the airport ability to turn on and off all the required airfield lighting circuits.
   5. Available to correct any deficiencies until the system has successfully passed photometric testing.
   6. Perform all testing at night with minimum interference with airport operations.
5. **Testing Corrective Action**: The Contractor shall be responsible for correcting any deficient condition identified as a result of the photometric testing. Corrective actions include:
6. Failed lights that do not meet photometric testing requirements, shall be repaired by the Contractor at their expense. This may include cleaning, re-lamping (incandescent type lights), correcting alignment or toeing, correcting installation and leveling
7. Contractor may need to grind the pavement around the light fixture. The grinding of the pavement shall be at the Contractor’s expense and incidental to the installation of the light.
8. **Spares:** The Contractor shall furnish spare lamps, lenses, and fixtures for use in correcting any deficiencies at no additional cost to the contract.
9. **Retesting:** Retesting of the light fixtures shall be at the Contractor’s expense. If satisfactory corrective actions cannot be completed within the originally scheduled test period, necessary additional site visits by the testing firm shall be at the Contractor’s expense.

**150-3.1 PHOTOMETRIC TEST SYSTEM EQUIPMENT**

1. **Test System**. The photometric test system shall be comprised of:
2. An array of accurate measurement sensors configured to measure light from each light source as system moves toward and away from that light source. There shall be no loss of accuracy at speeds up to at least 35mph.
3. To minimize the impact on airport operations and testing time, the light sensor shall have dual reading capabilities capable of taking simultaneous photometric readings of bi-directional fixtures in a single measurement pass.
4. The capability (including additional sensors) to accurately track the position of each measurement sensor relative to the specified main beam area of each light source being measured.
5. The capability to automatically calculate the average intensity (in candela) in the main beam area and estimate vertical and horizontal beam alignment (in degrees) by identifying the position of the brightest part of the light beam measured.
6. The capability to log data during surveys, display results, and identify locations where the average main beam intensity is below FAA minimum output of 70% at full intensity *{ICAO minimum output of 50% at full intensity}* and/or the beam is misaligned either vertically or horizontally.
7. **Fixture Compatibility:** The photometric test system shall be able to test the following fixtures:

L-804 Runway Guard Lights

L-850A Runway Centerline and LAHSO Lights

L-850B Touchdown Zone Lights

L-850C Runway Edge Lights

L-850D Runway End Lights

L-850E Runway Threshold Lights

L-852A Taxiway Centerline straight, CAT I/II

L-852B Taxiway Centerline curved, CAT I/II

L-852C Taxiway Centerline straight, CAT III

L-852D Taxiway Centerline curved, CAT III

L-852G Inpavement Runway Guard Lights

L-852GS Inpavement Runway Guard Light / Stop Bar

L-852J Taxiway Centerline curved Cat I/II

L-852K Taxiway Centerline curved Cat III

L-852S Inpavement Stop Bar Lights

L-861 Medium Intensity Runway Elevated Edge Lights

L-861E Medium Intensity Runway Threshold/End Lights

L-861SE Medium Intensity Runway Threshold/End Lights

L-862 High Intensity Runway Elevated Edge Lights

L-862E High Intensity Runway Threshold/End Lights

L-862S Elevated Stop Bar Light

**150-4.1 PHOTOMETRIC TESTING REQUIREMENTS**

Photometric testing shall be performed at night with minimum interference to Airport Operations. The photometric test equipment shall have an array of sensors capable of taking simultaneous readings along the horizontal axis of the light output. Photometric testing shall include the measurement at each light fixture of the light distribution along the horizontal axis. The measurement results shall be compared with FAA minimum output standards presented in FAA AC 150/5345-46 (latest revision) {ICAO minimum output standard}.

1. **Testing Software.** The software shall be capable of recording the data and analyzing that data to calculate:
2. The average photometric output of the main beam of the fixture
3. The location of the maximum reading
4. The location of the minimum reading
5. The ratio of the maximum reading to the minimum reading
6. Display a high resolution iso-candela curve diagram of each light fixture reading
7. Compare measurement values with FAA specified values

All sensor readings for the light fixture being evaluated shall be displayed simultaneously for operator and Engineer review and evaluation. The system shall provide in real-time (directly following the measurement) to the operator and Engineer review the FAA average value {ICAO average value}, the pass / fail criteria and the iso-candela diagram of each light fixture measured to inform immediately the operator and Engineer if one particular fixture requires immediate action while measurements are being continued. All sensor readings shall be recorded automatically through the computer and shall be printed out via a computer-controlled printer. Handwritten data will not be accepted.

**150-5.1 PHOTOMETRIC TEST REPORT**

1. **Interim Test Report.** Interim reports will be submitted periodically during the progress of the work so that corrective measures may be taken as necessary. If the corrective measures are made promptly, the circuits and fixtures involved will be retested during the scheduled period of field testing to assure that proper performance has been achieved. If the retesting cannot be done within this period, additional time and costs shall be borne by the Contractor.
2. **Final Test Report.** Final test results shall be documented in a Final Test Report of which two (2) copies shall be submitted to the Engineer. The Final Report shall document the photometric testing and shall include the following:
3. **Tabular Lights List:** Documents the Light ID, Average performance (in candela), percentage of the FAA {IACO} standard, Pass/Fail based on FAA {ICAO} criteria, GPS coordinates of the light and color at each location.
4. **Candela Bar Chart:** Provides a visual indication of overall performance for each light as an average of the candela output (brightness). Color coded bars representing each light lens color. Green = green lights (i.e. taxiway), yellow = yellow lights (i.e. lead off), white= white light (i.e. rwy centerline), red = red lights (i.e. stopbar)
5. **Performance Bar Chart:** Provides a visual indication of overall performance for each light as a percentage of the FAA {IACO} standard. Color coded bars representing each light fixture. Green = compliant and > maintenance level (custom % set by the airport), orange = < maintenance level but greater than minimum (FAA=70%, ICAO=50%), red =< minimum % level
6. **Isocandela Curves Report:** A detailed isocandela color-coded graph for each individual light showing average candela, % compliance, vertical and horizontal position (in degrees) of the maximum point in the main beam which can be used to determine proper alignment and installations of the light.
7. **Test Report Data.** Each photometric test report shall be uniquely identified using a combination of the following information:
8. Runway or Taxiway Reference
9. Date and Time of Service
10. Tester (Person who performed the measurements)
11. Light Fixture Name (Identification number)
12. Light Fixture Location (Based on GPS Coordinates)
13. Max candela output in appoint along the main beam
14. Average candela output of the main beam
15. Percentage (%) level compared to FAA {ICAO} requirements
16. Lens Color of the fixture being tested

**150-6.1 METHOD OF MEASUREMENT**

The method of measurement is for the service to complete the photometric testing of the airfield lighting systems (not for delivery of a photometric test system) and will be made on a lump sum basis. This measurement shall include all labor, services, and assistance provided by the Contractor to complete photometric testing of all light fixtures installed as part of this project. This measurement also includes furnishing all equipment, materials and appliances necessary for photometric testing of the airfield lighting systems.

**150-7.1 BASIS FOR PAYMENT**

Payment will be made at the contract lump sum price for photometric testing of airfield lighting systems. This price shall be full compensation for furnishing all materials and for all preparation, testing, and for all labor, equipment, tools, and incidentals necessary to complete this item to the satisfaction of the Engineer.

Payment will be made under:

Item L-150-1 Photometric Testing of the Lighting System – per lump sum

**END OF ITEM L-150**