

TERMS OF REFERENCE

Lighting Audits and Technical Specifications for LED Lighting Retrofits at 51 Public Facilities in Jamaica

Ministry of Energy, Transport and Telecommunications (METT)

Energy Management and Efficiency Programme (EMEP)

1. Background

The Government of Jamaica, GOJ, through the Ministry of Energy, Transport and Telecommunications (METT), is implementing the Energy Management and Efficiency Programme (EMEP). The programme supports energy efficiency and conservation measures in public facilities, with the aim of reducing electricity consumption, lowering operating costs, improving energy performance, and reducing greenhouse gas emissions.

EMEP is supported by loan financing from the Inter-American Development Bank (IDB), together with grant support from the European Union Caribbean Investment Facility (EU-CIF). The programme includes energy-efficiency interventions in public buildings, institutional strengthening, and related measures to support improved energy management across the public sector.

The current assignment relates to the proposed lighting retrofit of 51 public facilities across Jamaica. These facilities include schools, hospitals, and public offices. Some public facilities continue to use inefficient lighting technologies, including fluorescent lamps, compact fluorescent lamps, incandescent lamps, high-intensity discharge lamps, halogen lamps, non-LED floodlights, and inefficient perimeter lighting.

Before the retrofit works can be procured and implemented, METT requires facility-level lighting audits, verified equipment quantities, technical specifications, bills of quantities, cost estimates, and energy savings estimates. This Terms of Reference (TOR) defines the scope of services for an independent engineer who will conduct the required audits and prepare technical inputs for the future LED lighting retrofit procurement.

2. Objective of the Assignment

The objective of the assignment is to engage independent engineers to:

- Conduct facility-based lighting audits across approximately 10 public facilities (schools, hospitals, and public offices) included in Appendix 1.
- Verify existing inefficient lighting systems, including quantities, wattages, fixture condition, switching arrangements, and outdoor/perimeter lighting.
- Identify technically appropriate and cost-effective LED replacements, lighting controls (occupancy sensors, daylight-responsive controls, timers), and solar-powered perimeter lighting.
- Prepare detailed Bills of Quantities (BoQs), cost estimates, and energy savings estimates.
- Develop technical specifications suitable for use in a future public procurement process for LED retrofit installation works.

This assignment is limited to lighting audit, specification development, BoQs, cost estimates, and savings estimates. The independent engineers will not supervise the retrofit works.

One engineer for each lot included in Appendix I will be engaged.

3. Scope of Services

3.1. Inception and Planning

The independent engineer for each lot shall attend a kickoff meeting with employer before fieldwork begins. The engineer shall complete the following inception activities.

1. Review of the facility list of the corresponding lot provided by employer (Appendix 1).
2. Confirm the assigned facilities.
3. Prepare a site visit schedule.
4. Prepare standard data collection templates using the draft template provided by employer.
5. Confirm reporting requirements, submission dates, and review arrangements with employer.
6. Clarify reporting deadlines and approval milestones with employer.

The Employer will provide the facility list and an interactive map showing the indicative locations of the facilities. The interactive map is provided for reference only. The engineer shall independently verify the facility locations, site access, and other relevant site information as part of the assignment., which the engineer must verify. Existing drawings, previous audit reports, electricity bills, and operating schedules may not be available. The engineer shall determine operating schedules during the audits through interviews with facility personnel and direct observation.

3.2. Site Verification and Lighting Audit

The engineer shall conduct a room-by-room and area-by-area lighting audit for each assigned facility.

The audit shall cover interior lighting, exterior lighting, and existing perimeter lighting systems. The engineer shall identify existing inefficient lighting technologies and determine the recommended LED replacement or control intervention. The audit shall record, at minimum, the following data.

Field	Required Information
Facility information	Facility name, location, facility type, assigned engineer, audit date
Building information	Building name, block, floor, area, room number where available
Space information	Room or area name, room or area use, occupancy pattern
Existing lighting	Fixture type, lamp type, lamps per fixture, number of fixtures, wattage, lamp length, estimated ballast allowance where applicable, voltage, etc.
Existing controls	Switch type, switching arrangement, sensor or timer if present
Visual condition	Fixture condition, lamp condition, diffuser or lens condition, visible corrosion, moisture, damage, flicker, failed lamps, poor lighting, glare, dark areas

Field	Required Information
Switch condition	Observed physical condition of switches, damaged switches, loose plates, missing covers, accessibility concerns
Installation condition	Mounting type, approximate mounting height where practical, visible conduit or wiring defects where observable
Operating schedule	Estimated daily operating hours, weekly operating pattern, seasonal or special-use conditions
Retrofit recommendation	Proposed LED replacement, proposed controls, replacement priority, remarks
Evidence	Photographs, photo reference number, field notes

3.3. Identification of Inefficient Lighting Equipment

The engineer shall identify all inefficient lighting devices observed during the audit. These may include:

- Fluorescent tubes (T12, T8, T5) and CFLs.
- Incandescent and halogen lamps.
- High-intensity discharge (HID) lamps (metal halide, high-pressure sodium, mercury vapour).
- Non-LED floodlights and non-LED perimeter lights.
- Damaged, obsolete, or non-functional fixtures.

3.4. LED Replacement Schedule

For each facility, the engineer shall prepare a proposed LED replacement schedule.

The schedule shall include:

- Existing lighting type.
- Existing quantity.
- Existing wattage.
- Estimated ballast allowance where applicable.
- Existing connected load.
- Proposed LED replacement type.
- Proposed LED wattage.
- Proposed quantity.
- Mounting arrangement.
- Proposed control method.
- Estimated operating hours.
- Estimated baseline annual energy use.
- Estimated proposed annual energy use.
- Estimated annual energy savings.

- Remarks and implementation notes.

The LED replacement schedule shall be traceable to the room-by-room or area-by-area audit inventory.

3.5. Lighting Controls

The engineer shall assess the suitability of lighting controls for each facility.

Recommended controls may include:

1. Occupancy sensors.
2. Daylight-responsive controls.
3. Photocells.
4. Timers.

Controls shall be recommended **only** where practical, maintainable by public facility staff, and where savings exceed incremental cost. Priority spaces: toilets, storerooms, corridors, meeting rooms, staff rooms, classrooms (where daylight is significant), and intermittently used offices.

3.6. Outdoor and Solar-Powered Perimeter Lighting

The engineer shall assess existing outdoor and perimeter lighting systems. Solar-powered perimeter lighting shall be considered as a replacement for existing inefficient perimeter lighting systems. It shall not be treated as a general requirement for every outdoor area unless existing inefficient perimeter lighting is present or employer instructs otherwise.

The engineer shall identify suitable locations for solar-powered perimeter lighting and prepare preliminary technical specifications covering:

- LED luminaire wattage and luminous flux
- Battery type, capacity, and autonomy (minimum 2 overcast days)
- Solar PV module capacity and tilt/orientation requirements
- Charge controller type (MPPT preferred)
- Pole height, material, and foundation requirements
- Ingress protection (IP) rating (minimum IP65 for tropical, coastal exposure)
- Corrosion resistance (marine-grade where applicable)
- Motion sensor or dimming profile (e.g., 30% then 100% on detection)
- Lighting distribution (Type II, III, or V as appropriate)
- Anti-theft provisions (locking mechanisms, tamper-resistant fasteners)
- Wind exposure considerations.
- Maintenance access and component replacement strategy

The engineer shall clearly identify whether each recommended solar-powered perimeter light replaces an existing inefficient perimeter light or addresses a critical perimeter lighting deficiency identified during the audit.

3.7. Technical Specifications

The engineer shall prepare technical specifications for all proposed lighting equipment and controls, and for all the items included in the BOQ.

The specifications for lighting equipment and controls shall include, where applicable:

1. Luminaire type and application
2. Nominal wattage and input voltage/frequency
3. Luminous flux (lumens) and luminaire efficacy (lm/W)
4. Correlated colour temperature (CCT) (e.g., 4000K, 5000K)
5. Colour rendering index (CRI) – minimum 80 for general areas, 90 for clinical/patient areas
6. Beam angle or distribution type
7. IP rating and impact protection (IK rating)
8. Power factor (≥ 0.90) and total harmonic distortion (THD $\leq 20\%$)
9. Operating temperature range (suitable for Jamaican tropical conditions)
10. Rated life (L70 $\geq 50,000$ hours)
11. Warranty period (minimum 5 years)
12. Driver specifications (constant current, dimming compatibility if applicable)
13. Surge protection (minimum 10kV common mode)
14. Corrosion resistance for outdoor/coastal locations
15. Compliance with recognized local and international standards.

The technical specifications shall be performance-based where practical, and shall avoid naming specific brands unless employer or IDB instructs otherwise.

3.8. Standards and Codes

The independent engineer shall prepare recommendations and specifications consistent with recognized local and international standards.

The applicable standards may include Bureau of Standards Jamaica (BSJ) requirements where applicable, and recognized international standards for LED luminaires, lighting controls, outdoor luminaires, solar lighting systems, product quality, electrical safety, environmental handling of spent lamps, and safe installation practices.

3.9. Energy Savings Estimates

The engineer shall estimate baseline and proposed energy use for each assigned facility.

The calculation shall include:

1. Existing fixture quantity.

2. Existing lamp or fixture wattage.
3. Ballast allowance where applicable.
4. Estimated annual operating hours.
5. Annual baseline energy use in kWh.
6. Proposed LED fixture quantity.
7. Proposed LED wattage.
8. Existing connected lighting load.
9. Proposed connected lighting load
10. Annual proposed energy use in kWh.
11. Annual kWh savings.
12. Percentage energy savings.
13. Estimated annual cost savings.

Operating hours shall be determined through interviews with facility personnel and site observations. Where operating hours are uncertain, the engineer shall state the assumption used and provide the basis for the assumption.

3.10. Bills of Quantities and Cost Estimates

The engineer shall prepare facility-level BOQs and cost estimates for each assigned facility.

The BoQs shall include:

1. LED luminaires and lamps.
2. Lighting controls.
3. Outdoor lighting.
4. Solar-powered perimeter lighting.
5. Mounting accessories.
6. Switches and control accessories where required.
7. Minor electrical installation items.
8. Testing and commissioning.
9. Labelling.
10. Removal of existing lamps and fixtures.
11. Waste handling and disposal.
12. Contingency.

Cost estimates shall include supply, installation, disposal, preliminaries, testing, commissioning, and contingency. Costs shall be presented in Jamaican dollars and costs may also be presented in United States dollars if required by employer.

The BOQ shall be traceable to the audit inventory and proposed replacement schedule. Each BOQ item shall reference the relevant facility, building, room or area, and fixture type where practical and be correlated with the technical specifications defined in section 3.7 of these Terms of Reference.

3.11. Waste Management and ESHS Requirements

The engineer shall prepare recommendations for the safe removal, handling, storage, transport, and disposal of replaced lighting equipment.

This shall include, where applicable:

1. Fluorescent lamps.
2. Compact fluorescent lamps.
3. High-intensity discharge lamps.
4. Ballasts.
5. Damaged fixtures.
6. Packaging.
7. Recyclable metal components.

The engineer shall identify environmental, social, health, and safety, ESHS, considerations relevant to the future retrofit works. The recommendations shall be practical and suitable for inclusion in the future retrofit procurement package.

4. Deliverables

The engineer shall submit the following deliverables for review and approval by employer.

No.	Deliverable	Minimum Content	Format	Review and Approval
1	Inception Report	Assigned facilities, work plan, site visit schedule, audit template, access plan, health and safety approach.	Word, Excel, PDF	Employer approval
2	Site Visit Schedule	Dates, facility contacts, name of engineer, planned audit sequence. The list and map attached to this TOR document, can be used by the engineer to define the audit sequence.	Excel, Word, PDF	Employer review
3	Standard Audit Template	Room inventory format, fixture coding, photo log, savings worksheet, BOQ template.	Excel, PDF	Employer approval
4	Facility Lighting Audit Report	Facility overview, audit findings, inefficient lighting inventory, fixture and switch condition observations, operating schedule assumptions.	Word, Excel, PDF	Employer review

No.	Deliverable	Minimum Content	Format	Review and Approval
5	Room-by-Room Lighting Inventory	Existing fixtures, lamp types, wattages, quantities, controls, condition, recommended replacements.	Excel	Employer review
7	LED Replacement Schedule	Existing lighting, proposed LED replacement, quantities, wattages, controls, remarks.	Excel	Employer review
8	Lighting Controls Schedule	Recommended controls, applicable spaces, control type, operating logic, implementation notes.	Excel, PDF	Employer review
9	Outdoor and Solar-Powered Perimeter Lighting Schedule	Existing perimeter lighting, proposed replacement, solar lighting specifications, location notes.	Word, Excel, PDF	Employer review
10	Facility BOQ	Quantities, item descriptions, unit rates, total costs, installation items, disposal items, contingency	Excel	Employer approval
11	Facility Cost Estimate	Supply, installation, disposal, preliminaries, testing, commissioning, contingency	Excel, PDF	Employer approval
12	Facility Energy Savings Estimate	Baseline kWh, proposed kWh, annual savings, cost savings, emissions reduction	Excel, PDF	Employer review
13	Technical Specification Package	LED luminaires, controls, outdoor lighting, solar-powered perimeter lighting, quality requirements, warranty requirements	Word, PDF	Employer approval
14	Waste Management and ESHS Recommendations	Handling, storage, disposal, ESHS risks, mitigation recommendations	Word, PDF	Employer review
15	Consolidated Engineer Report	Summary of findings for assigned facilities, quantities, costs, savings, risks, implementation recommendations	Word, Excel, PDF	Employer approval

5. Reporting Format

All outputs shall be submitted in editable Microsoft Word, Microsoft Excel, and PDF formats. Excel files shall include formulas, summary tabs, facility codes, room codes, fixture codes, and clear traceability from audit inventory to BOQ.

Photographs shall be labelled by facility, building, room or area, date, and item reference. Reports shall be written in clear technical language and shall be suitable for use in a future procurement package.

6. Quality Assurance and Acceptance Criteria

Employer may reject deliverables if they contain:

1. Incomplete facility coverage.
2. Missing room or area inventories.
3. Unclear fixture quantities.
4. Weak or inconsistent specifications.
5. BOQs that cannot be traced to the audit inventory, or do not have technical specifications for each item.
6. Savings estimates that are not linked to fixture quantities and operating hours.
7. Inconsistent templates.
8. Missing cost elements.
9. Unclear recommendations.
10. Recommendations that are impractical for public sector implementation.

The engineer shall certify that submitted audit data are based on site verification. The engineer shall perform internal quality checks before submission to Employer.

7. Required Qualifications of Independent Engineer

The independent engineer shall meet the following minimum requirements.

1. Degree in electrical engineering, building services engineering, energy engineering, or related discipline.
2. At least 3 years of relevant professional experience.

The following shall be considered assets:

4. Demonstrated experience conducting lighting audits or energy audits.
5. Experience preparing technical specifications and BOQs.
6. Knowledge of LED lighting systems, lighting controls, and energy efficiency measures.
7. Knowledge of public building environments, including schools, hospitals, or government offices.
8. Ability to prepare clear technical reports and Excel-based audit schedules.

8. Duration of Assignment

- The assignment shall be completed remotely, and the duration shall be the following:
 - Lot 1 – 35 days
 - Lot 2 – 35 days
 - Lot 3 – 35 days
 - Lot 4 – 40 days
 - Lot 5 – 40 days
- The expected start date shall be: Monday, July 27, 2026.
- The expected completion date shall be: Friday, September 11, 2026.

The engineer shall complete site visits, audit reports, BOQs, cost estimates, energy savings estimates, and final technical specifications for approximately 10 assigned facilities within the approved timeframe.

9. Payment Schedule

Payments shall be linked to approved deliverables.

Suggested payment structure:

Payment Milestone	Deliverables	Days to delivery after start date		Basis for Payment	Percentage
		Lots 1, 2 and 3	Lots 4 and 5		
1	1,2 and 3	5	5	Approval of inception report, site visit schedule, and audit template	10 %
2	4, 5, 6, 7, 8 and 9.	20	25	Approval of completion of site audits and submission of audit inventories.	20 %
3	10, 11, 12, 13 and 14.	30	35	Approval of submission of draft facility reports, BOQs, cost estimates, specifications, waste management and ESHS recommendations and savings estimates.	50 %
4	15	35	40	Approval of final deliverable by employer.	20 %