ENGINEERING GUIDE

Solar Street Light Simulation & Standards

A Technical Reference for EPC Contractors & Tender Submissions

Purpose: Help contractors submit defensible tenders by clarifying photometric files (IES), simulation inputs (DIALux/Relux), and the standards commonly referenced in roadway lighting.

Key takeaway: *An IES file defines how light leaves the luminaire (photometric distribution). Lux/uniformity on the road is the result of* ***Optics + Geometry (height/spacing/aiming) + System output****.*

1. Photometric File Formats (Understanding the Data)

ANSI/IES LM-63 (LM-63-19)
The industry-standard .ies format. It contains candela distribution data and the angle grid used by lighting software.

ANSI/IES TM-33 (IESXML)
A newer XML-based photometric format with improved structure and extensibility (software support varies).

Engineering note: *A photometric file is a data source, not a performance guarantee. "Brightness on the road" depends on optics selection, pole geometry, and design assumptions.*

2. Roadway Lighting Criteria (Standards Compliance)

A defensible proposal should reference a standard and class, then attach a simulation report showing results against those targets.

EN 13201 (Europe / widely used globally): road classes and measurable targets (luminance or illuminance, uniformity, glare control).

IES RP-8 (North America): roadway lighting practice focusing on luminance, uniformity, and glare-related metrics.

CIE 115: terminology and recommendations for motor and pedestrian traffic lighting.

Recommended tender wording:
"Lighting targets are designed to meet [Standard] Class [X], verified by the attached DIALux/Relux simulation report."

3. Luminaire Verification (Backing Up the Data)

IES LM-79 testing validates photometric and electrical performance of the actual luminaire (lumens, watts, distribution used to generate IES).

IES LM-80 + TM-21 support LED lumen maintenance and lifetime projections (chip/package level).

Practical note: *Project reliability also depends on driver thermal design and the solar system (battery, controller, charging strategy) - not only LED lifetime.*

4. Simulation Workflow: Required Inputs Checklist

Missing inputs are the #1 reason for dark zones, glare, and expensive rework. Use this checklist to collect inputs before running DIALux/Relux.

Input Category	Parameters to Define	Why It Matters (Engineering Impact)
Geometry (Required)	• Road width • Pole height • Pole spacing	These three factors determine physical coverage. Without them, lux/uniformity results are not defensible.
Layout & Aiming (Accuracy)	• Setback to curb • Boom/arm length • Tilt angle (0-15°) • Arrangement (one-side / both-side / staggered / median)	Misalignment wastes light (backlight) or increases glare. Layout drives uniformity between poles.
System Factors	• Maintenance Factor (MF) • Road surface / reflectance model (if luminance-based)	MF accounts for lumen depreciation and dirt. Typical MF for outdoor solar projects is 0.80-0.90; MF=1.00 is unrealistic.
Targets	• Average illuminance (Eavg) • Minimum illuminance (Emin) • Uniformity (U0 = Emin/Eavg) • Glare requirement (if specified)	Converts “bright” into measurable acceptance criteria and reduces disputes at handover.
Solar Operation	• Autonomy nights (rainy days) • Dimming profile (hours & levels) • Motion sensor (if used)	Defines battery sizing and operating strategy to maintain target lighting through rainy seasons.

5. Tender Deliverables Structure (What to Submit)

A professional engineering submittal typically includes:

• Lighting Simulation Report (PDF): isolux map + calculation summary (Eavg, U0, key notes/assumptions).

• Photometric files: IES files for the specific optics used (and LDT if requested by the consultant).

• Layout recommendations: spacing/height/arm notes based on simulation results.

6. Common Pitfalls & Mitigation

• **Dark zones / poor uniformity:** often caused by the wrong optics for the spacing ratio. Mitigation: select Type II/III (or equivalent) via simulation before final BOQ.

• **CCT inconsistency (“zebra effect”):** mixed LED bins look messy on roads. Mitigation: specify tight CCT binning (e.g., 3-step) and add CCT consistency checks in QA/QC.

• **Foundation mismatch:** base plate holes not matching anchor bolts. Mitigation: request the anchor bolt template and define bolt projection length before pouring concrete.

• **Over-optimistic assumptions:** MF=1.00 or ignoring rainy-season autonomy. Mitigation: state MF and dimming profile explicitly in the report.

Need Engineering Support?

Send your road width, pole height and pole spacing. Our team can generate a tender-ready DIALux simulation report (PDF) within

Contact: info@sunlurio.com | sunlurio.com