



**PREQUALIFICATION OF CONTRACTORS
FOR SUPPLY, INSTALLATION, TESTING
AND COMMISSIONING OF LED STREET
LIGHTS AT SUNDAR INDUSTRIAL ESTATE
LAHORE**

PRE-QUALIFICATION DOCUMENTS

May, 2016

BOARD OF MANAGEMENT SUNDAR INDUSTRIAL ESTATE (BOM-SIE)

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1. INTRODUCTION

1.1 PROJECT INTRODUCTION

The Client Board of Management under industrial estate (BOM-SIE) working under "Punjab Industrial Estate Development & Management Company" (PIEDMC) has been established by Government of Punjab.

Board of Management (BOM-SIE) planned to replace existing sodium street lights with LED Street light on poles.

Total No of poles are 1028 and interconnected with existing electrical network control by STP (Photo cell type control).

BOM-SIE require to replace (supply and Services) sodium lamps with LED lights on already installed poles

BOM-SIE

Pre-Qualification Documents

3. INSTRUCTIONS TO APPLICANTS

3.1 SUBMISSION OF APPLICATIONS

- 3.1.1 Applications for pre-qualification one (1 No.) original and two (2 Nos.) copies must be received in sealed envelopes to be delivered by hand or through registered mail to:- Estate Manager, Board of Management (BOM-SIE), Sunder Industrial Estate, Raiwand Road, Lahore, not later than 20 June, 2016. And be clearly marked "Application for Pre-qualification of contractors" for **SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF LED STREET LIGHT SUNDAR INDUSTRIAL ESTATE LAHORE**. The Employer reserves the right to accept or reject the late applications.
- 3.1.2 The name and mailing address of the Applicant shall be clearly marked left hand on the envelope.
- 3.1.3 The applications shall be prepared in the English language. Information in any other language shall be accomplished by its translation in English. Employer reserves the rights for Pre-qualification in case of non-compliance of the above requirement.
- 3.1.4 The Applicants must respond to all questions and provide complete information as advised in this document. Any lapses to provide essential information may result in dis-qualification of the Applicant.
- 3.1.5 The clarification can be obtained from the office of Senior Manager/Deputy Manager (Electrical) in working hours in written and as well as verbally.

Location: Office of, Estate Manager, Board of Management (BOM-SIE), Sunder Industrial Estate, Gate # 2, Raiwind Road, Lahore

3.2 QUALIFICATION CRITERIA

3.2.1 General

Pre-qualification will be based on all the criteria given in succeeding paragraphs 3.2.2 to 3.2.6 regarding the Applicant's Financial Soundness, Experience Record, Personnel Capabilities and Equipment Capabilities as demonstrated by the Applicant's responses in the forms attached to this letter. The Employer reserves the right to waive minor deviations, if these don't materially affect the capability of an applicant to perform the contract. Sub-contractor's experience and resources shall not be taken into account in determining the Applicant's compliance with the qualifying criteria. However, Joint Venture experience & resources shall be

Considered. Consortium or Association of firms will be considered for similar treatment as in case of Joint Venture. The weight age /Marks for different categories will be followed as per table given below:

Sr. No.	Category	Weight age /Marks
1.	General Experience	30
2.	Personnel Capabilities(15)LED spec (20)	15+20
3.	Equipment Capabilities	20
4.	Financial Position	15
Total:		100

Note: Prequalification status shall be decided on the basis of Pass/Fail basis.

The applicant must secure at least 60% score in each category.

The further detailed criteria for each category may be developed as given under the each head as follows:

3.2.2 General Experience

Credit Marks for experience shall be awarded on the basis of following qualifications:

Sr. No.	Description	Maximum Points
i)	Projects of similar nature and complexity completed over latest 5 years.(3 Marks Against Each Project) No marks will be awarded If Completion Certificates and Performance Certificates not attached	15
ii)	Projects of similar nature and complexity in hand. (2 Marks Against Each Project) No marks will be awarded If Contract Agreements/Work Orders not attached	10
iii)	Experience of Works related to project but not basic part.	3
iv)	Status of enlistment with Government Organizations and other agencies.	2
Sub-Total:		30

3.2.3 Personnel Capabilities

Credit Marks shall be awarded under this category using the following criteria:

Sr. No.	Category	Weightage / Marks
i.	Project Manager should be graduate in electrical engineering with minimum 15 years' experience in relevant field (01 No's)	05
ii.	Electrical Engineer , must be graduate in Civil engineering with minimum 10-15 years' experience in relevant field (01 No's)	04
III	Rigger DAE/B-Tech Civil with minimum 10-15 years experience in relevant field (01 No's)	03
IV	Electrical Supervisors , DAE/B-Tech Electrical with minimum 10-15 years experience in relevant field (02 No's)	03
TOTAL		15

Note:-For Engineers and Staff, Marks will be as under;

- i. Qualification – 20%
- ii. Experience – 70%
- iii. Association – 10%(Minimum 1 year association & Firm)

LED Light brand and data

Sr. No	Requirement	marks
1	Approved LED and Drivers types (brand should be tested from international lab (KEMA, CE, or equalient standards approved lab	20

Note: Approved LED and drivers mean Punjab energy board standards. Shortlisted firm will be offer bidding TOR for submission of finical bid along with Technical bid.

3.2.4 Equipment Capabilities

Credit Marks shall be granted on the basis of the following criteria for various kinds of equipment relevant for the Project:

Sr. No.	Equipment Type	Maximum Marks
1.	Portable Diesel Generator	2
2.	Insulation Tester	2
3.	LUX Meter	2
4.	Welding Plant	2
5.	Cable Cutter	2
6.	Safety belt and helmet	2
7.	Digital tong tester and P.F meter	2
8	Drill machine, hydraulic press, earth resistance tester	02 each

6.	Electrician Tool Box	2
7.	Safety Belt and Helmet	2
9.	Digital Tong Tester & P.F meter	2
10.	Drill Machine	1
11.	Hydraulic Punch Machine	1
12.	Earth Resistance Tester	2
Sub-Total		20

3.2.5 Financial Position

Credit Marks shall be awarded on the basis of the following criteria:

Sr. No.	Description	Maximum Marks
i)	Fresh Bank Letters showing Financial Soundness.	3
ii)	Registration with FBR for Income & Sale Tax.	2
iii)	Under Taking of Non-Blacklisting from any agency on Legal Paper	2
iv)	Audit Statement for last 3 years.(2013-2015)	6
v)	Valid License of PEC in concerned Category	2
Sub-Total		15

3.3 JOINT VENTURE (JV)

3.3.1 Joint Venture must comply with the following requirements: -

- a) Following are minimum qualification requirements: -
- i) The lead partner shall meet not less than 51 percent of all qualifying criteria given in paras 3.2 and 3.5 heretofore.
 - ii) Each of the partners shall meet not less than 40 percent of all the qualifying criteria given in paras 3.2 and 3.5 heretofore.
 - iii) The joint venture must individually satisfy the criteria of paras 3.2, 3.3 and 3.4, for which purpose the relevant figures for each of the partners shall be added together to arrive at the JV's total capacity. Individual members must satisfy each of the requirements of paras 3.5 and 3.6 heretofore.

- b) Any change in a prequalified JV after prequalification, shall be subject to the written approval of the Engineer/Employer prior to the deadline for submission of bids. Such approval may be denied if:-
 - i) Partner(s) withdraw from a JV and remaining partners do not meet the qualifying requirements;
 - ii) The new partners to a JV are not qualified individually or as another JV; or
 - iii) In the opinion of the Employer, a substantial reduction in competition would result.
- c) Bid shall be signed by all members in the JV so as to legally bind all partners, jointly and severally, and any bid shall be submitted with a copy of the JV agreement providing the joint and several liabilities with respect to the contract.

3.3.2 The prequalification of a JV does not necessarily prequalify any of its partners individually or as a partner in any other JV or association. In case of dissolution of a JV, each one of the constituent firms may prequalify if they meet all the prequalification requirements and any partner of J.V has requested/shall request for the same and then his prequalification shall be subject to the written approval of the Employer.

3.4 CONFLICT OF INTEREST

3.4.1 The Applicant (including all members of a JV) must not be associated, nor have been associated in the past, with the consultant or any other entity that has prepared the design, specifications, and other prequalification and bidding documents for the project, or was proposed as Engineer for the contract, over the last five years. Any such association may result in disqualification of the Applicant.

3.5 UPDATING PREQUALIFICATION INFORMATION

3.5.1 Bidders shall be required to update the financial, personnel and equipment information used for prequalification at the time of submitting their bids, to confirm their continued compliance with the qualification criteria and verification of the information provided at the time of prequalification. A bid shall be rejected if the Applicant's qualification thresholds are no longer met at the time of bidding.

3.6 OTHER FACTORS

3.6.1 Only firms and JVs that have been prequalified under this procedure shall be invited to bid. A qualified firm or a member of a qualified JV may participate only in one bid for the contract. If a firm submits more than one bid, singly or as a JV, all

bids including that bidder will be rejected. This rule will not apply in respect of bids which include specialist sub-contractors who are used by more than one bidder.

3.6.2 The Employer reserves the right to:-

- a) Amend the scope and value of any contract(s) to be bid, in which event the bidder(s) will only bid among those prequalified bidders who meet the requirements of the contract(s) as amended. However the Employer has to review the disqualified bids who originally do not meet the specified criteria for Pre-qualification.
- b) Reject or accept any application; and
- c) Cancel the prequalification process and reject all applications.

The Employer shall neither be liable for any such actions nor be under any obligation to inform the Applicant of the grounds for rejection, however, may be debriefed if solicited.

3.6.3 Applicants will be informed in writing by fax or mail within 45 days of the date for submission of applications.

4. EVALUATION CRITERIA

- Valid enlistment in C-4 and above with PEC with Specialization codes EE03, EE04 and EE06.
- Detail of Organization with office address and experience record.
- List of key personnel / Staff available and capabilities.
- Financial soundness duly verified by the Bank.
- Complete detail of similar projects executed during the last five years and similar project in hand also. The detail must include location, cost and details about the employers along with performance certificates.
- List of Equipment Capabilities of the firm.
- List of engineering personal with their experiences.
- Enlistment certificates with the govt. departments.
- Certificate to the effect that the firm / company is not involved in litigation with any department nor has ever been black listed by any department.
- LED lights Driver detail, LED Details with all features and technical specifications

LETTER OF APPLICATION

Date:

Contract No:

To:
Estate Manager,
Board of Management (BOM-SIE), Sunder Industrial
Estate, Raiwind Road, Lahore.

Sir,

1. Being duly authorized to represent and act on behalf of ("the Applicant"), and having reviewed and fully understood all the prequalification information provided, the undersigned hereby apply to be prequalified as a bidder for the following contract under the supply and installation of Electrical LED street light of Sunder Industrial Estate Lahore, projects completed are as under:

Contract No.	Description of Contract
1.	
2.	
3.	
4.	
5.	

2. Attached to this letter are copies of original documents defining:
 - (a) the Applicant's legal status;
 - (b) the principal place of business; and
 - (c) the place of incorporation (for applicants who are corporations); or the place of registration and the nationality of the owners (for applicants who are partnerships or individually-owned firms).

- 3. The Client and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents, and information submitted in connection with this application, and to seek clarification from our bankers and clients regarding any financial and technical aspects. This Letter of Application will also serve as authorization to any individual or authorized representative of any institution referred to in the supporting information, to provide such information deemed necessary and requested by yourselves or the authorized representative to verify statements and information provided in this application, or with regard to the resources, experience, and competence of the Applicant.
- 4. The Client and its authorized representatives may contact the following persons for further information, if needed.

Technical Inquiries	
Contact 1	Telephone 1
Contact 2	Telephone 2

Financial Inquiries	
Contact 1	Telephone 1
Contact 2	Telephone 2

- 5. This application is made with the full understanding that:
 - (a) bids by prequalified applicants will be subject to verification of all information submitted for prequalification at the time of bidding;
 - (b) The Client reserves the right to: demand the scope and value of any contract under this project; in such event bids will only be called from prequalified bidders who meet the revised requirements; and project or accept any application, cancel the prequalification process, and reject applications; and
 - (c) The Client shall not be liable for any such actions and shall be under no obligation to inform the Applicant of the grounds for actions at 5(b) here above.
 - (d) The Client shall not be liable for consequence of, and shall be under no obligation to inform the applicant of the grounds for, actions taken under Para 5(b) here above.

Applicants who are not joint ventures should delete Para 6&7 and initial the deletions.

Annex - A

6. Appended to this application, we give details of the participation of each party, including capital contribution and profit/loss agreements, to the joint venture or association. We also specify the financial commitment in terms of the percentage of the value of the (each) contract, and the responsibilities for execution of the (each) contract.
7. We confirm that in the event that we bid, that bid as well as any resulting contract will be.
- (a) Signed so as to legally bind all partners, jointly and severally; and
 - (b) Submitted with a Joint Venture agreement providing the joint and several liability of all partners in the event the contract is awarded to us.
8. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail.

Signed: _____	Signed _____
Name: _____	Name _____
For and on behalf of	For and on behalf of
(Name of Applicant or lead partner of a joint venture)	(Name and signature of other partners of the joint venture)

GENERAL INFORMATION

1.	Name of Firm:	
2.	Head Office Address:	
3.	Telephone	Contact Person: Name: Title:
4.	Fax	Telex:
5.	Place of Incorporation/Registration	Year of incorporation/registration

NATIONALITY OF OWNERS

	NAME	NATIONALITY
1.		
2.		
3.		
4.		
5.		

GENERAL EXPERIENCE

Name of Applicant or partner of a joint venture

Use a separate sheet for each partner of a joint venture.

Annual Turnover (Construction only)

Year	Turnover (in PKR)	Equivalent Rupees in Millions. PKR
1.		
2.		
3.		
4.		
5.		

JOINT VENTURE SUMMARY

Names of all Partners of a Joint Venture	
1.	Lead Partner
2.	Partner
3.	Partner
4.	Partner
5.	Partner
6.	Partner

Total value of annual construction turnover, in terms of work billed to clients,

Annual Turnover Data (Construction only; Equivalent in Pak Rupees, Millions)							
Partner	Form A-2	Year 1	Year 2	Year 3	Year 4	Year 5	
1. Lead Partner							
2. Partner							
3. Partner							
4. Partner							
5. Partner							
6. Partner							
Total:							

PARTICULAR EXPERIENCE

Name of Applicant or partner of a joint venture

1.	Name of Contract
	Country
2.	Name of Employer
3.	Employer Address
4.	Nature of works and special features relevant to the contract for which the Applicant wishes to prequalify
5.	Contract Role (Tick One) (a) Sole Contractor (b) Sub- Contractor (c) Partner in a Joint Venture
6.	Value of the total contract (in specified currencies) at completion, or at date of award for current contract Currency..... Currency..... Currency.....
7.	Equivalent in Pak/Rs.
8.	Date of Award
9.	Date of Completion
10.	Contract Duration (Years and Months) _____ Years _____ Months
11.	Specified Requirements

DETAILS OF CONTRACTS OF SIMILAR NATURE AND COMPLEXITY

Name of Applicant or partner of a joint venture

1.	Name of Contract Country
2.	Name of Employer
3.	Employer Address
4.	Nature of works and special features relevant to the contract for which the Applicant wishes to prequalify
5.	Contract Role (Tick One) (a) Sole Contractor (b) Sub- Contractor (c) Partner in a Joint Venture
6.	Value of the total contract (in specified currencies) at completion, or at date of award for current contract Currency..... Currency..... Currency.....
7.	Equivalent in Pak/Rs.
8.	Date of Award
9.	Date of Completion
10.	Contract Duration (Years and Months) _____ Years _____ Months
11.	Specified Requirements1

**CURRENT CONTRACT COMMITMENTS / WORKS IN
PROGRESS**

Name of Applicant or partner of a joint venture

Name of Contract	Project Value (Pak Rs.) (Millions)	Estimated Completion Date
1.		
2.		
3.		
4.		
5.		
6.		

PERSONNEL CAPABILITIES

Name of Applicant

1.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate
2.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate
3.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate
4.	Title of Position
	Name of Prime Candidate
	Name of Alternate Candidate

CANDIDATE SUMMARY

Name of Applicant

Position	Candidate [Tick appropriate one] <input type="checkbox"/> Prime <input type="checkbox"/> Alternate	
Candidate information	1. Name of Candidate	2. Date of Birth
	3. <u>Professional Qualification</u>	
Present employment	4. Name of employer	
	<u>Address of employer</u>	
	Telephone	Contact (manager/personnel officer)
	Fax	Telex
	Job title of candidate	Years with present employer

Month / Dates / Years		Company / Project / Position / Relevant technical and management experience
From	To	

EQUIPMENT CAPABILITIES

Name of Applicant

Item of Equipment

Equipment information	1. Name of manufacturer	2. Model and power rating
	3. Capacity	4. Year of manufacture
Current status	5. Current location	
	6. Details of current commitments	
Source	7. Indicate source of the equipment	
	<input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased	

Omit the following information if it is owned by the Applicant or partner.

Owner	8. Name of owner	
	9. Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreement	Details of rental/lease specific to the Project.	

FINANCIAL CAPABILITY

Name of Applicant or Partner of a Joint Venture

Banker	Name of banker	
	Address of banker	
	Telephone	Contact name and title
	Fax	

Financial information in Pak Rs. or equivalent	Actual: previous three years			Projected: Next two years	
	1	2	3	4	5
1. Total assets					
2. Current assets					
3. Total liabilities					
4. Current liabilities					
5. Profits before taxes					
6. Profits after taxes					

Source of Financing	Amount (Pak Rs.)
1.	
2.	
3.	
4.	

Attach audited financial statements for the last five years (for individual applicant or each partner of joint venture).

LITIGATION HISTORY

Name of Applicant or Partner of a Joint Venture

Year	Award FOR or AGAINST Applicant	Name of client, cause of litigation, and matter in dispute	Disputed amount (current value Pak Rs. or equivalent)

Form A-12

LED Lights complete specification which will offer for bid with supporting documents

Note: - Punjab Energy board recommendations for LED Lights will be is bench mark for procurement of LED Lights.

Sr #	Description	Factory results	Certification standards IEC, KEMA etc
1	LED type		
2	Driver type		
3	Body material		
4	Rated current, P.F, voltage, wattage and surge protection		
5	Lux details		
6	Color temperature availability		
7	Reflector and glass material		
8	Protection class (IP)		
9	Voltage variation details		
10	Warranty local & procedure		

Note:-

Applicant should attach product leaflet compliance Punjab Energy Board requirements, Details are given on page no-27 and onward.

Subject: **REVISION OF SPECIFICATION OF LED LIGHTS DULY APPROVED
BY ENERGY DEPARTMENT GOVERNMENT OF PUNJAB**

A. General Requirement

1. Housing

The fixture shall have a full die cast aluminum housing providing adequate rigidity, strength and heat dissipation.

The housing shall have integrated driver and LED compartments for better heat dissipation and convenience in maintenance at the site, and shall feature highly reflective components and films to increase light output.

The optical LED compartment shall have thermally hardened (tempered) glass cover and high quality silicon gaskets. The glass shall be extra-white for maximum light transmission. The glass cover shall be tightly secured with the housing.

The fixture shall be rated for ingress protection class IP66.

2. Optics

The fixture for Group-I and Group-II shall have flexible optical systems for the wattage range in the respective group.

The fixture shall use high efficiency (greater than or equal to 90%) LED and optics system.

The light output ratio (LOR) shall not be less than 85%.

The fixture shall offer a composite system efficiency above 130 lumen/Watt.

The lens system design and high efficiency LED shall facilitate maximum spacing between the road lighting poles and coverage of wider roads (according to Centre/Centre pole distance (in meters) and height (in meters)) (to be filled in by procuring agency))

The multilayer optics design shall ensure adequate luminance and illuminance uniformity in the unlikely event of an individual LED failure.

The fixture shall offer choice of narrow, medium and wider beam light distribution.

The optical lens system shall feature long life with no discoloration (I/V protection), highest possible light.

3. Surge protection

The lighting fixture shall have separate surge protection to protect the electronic driver and LED system. Minimum surge protection rating shall be 10KV

4. IP Protection/ Impact Resistance

The fixture shall have ingress protection class IP66 for long reliable performance and minimal maintenance requirement and an impact resistance of IK08 or above. No chemical glue shall be used as that may cause breakdown of water-proof and dust-proof seal. All synthetic materials shall be 100% UV Stable and scratch resistant.

5. Maintenance

Both the driver and LED compartments shall be designed to be easily accessible for maintenance. Whatever method of securing/assembly of fixture used screws/ clamps, it is to be ensured that the fixtures are manufactured so that frequent opening/closing at site during maintenance does not compromise its ingress protection (IP) rating and the various components like terminal blocks, LED drivers etc are not dislocated from their designated position.

Gas Kets are to be properly secured in special grooves made for the same and must not be fixed to the body by any adhesive material.

The components like LED drivers, terminal blocks etc must be easily detachable by using plug and play connectors/ terminals to ensure ease of replacement at site and to be secured in the body of the fixture making special mounting arrangements so that the same are not dislodged / dislocated from their designated position.

6. Mounting

The mounting of the fixture shall be in axial orientation through suitable sized sidearm. The means for attaching the luminaire or external part to its support shall be appropriate to the weight of the luminaire of external part. The connection shall be designed to with stand wind speeds of 160km/h on the project surface of the assembly without undue deflection.

7. Future compatibility

The fixture shall be fully compatible with future LED upgrades when they become available. It shall have a modular design to upgrade/replace with new LED modules or LED drivers at site conveniently with minimum effort. All electronic components/drivers shall be mounted on a separate tool-less gear-tray. LED compartment shall have a easy access for opening the glass cover.

B. LED Driver/ Electronic Control Gear for LED modules

The LED driver shall be designed to operate large array of high powered LED's through current controlled output. The driver shall be suitable for 100V to 300V, 50Hz, single phase mains AC supply.

The LED driver shall have an efficiency of at least 85%.

The LED driver shall have energy saving/dimming options. So, that the driver can be easily programmed at site in a manner that different output wastages are available from the same fixture as per requirements. In the late night mode the fixture can thus be operated at various reduced wattages as per traffic conditions to have an energy efficient use.

The LED driver shall be Harvard, TCI, Phillips, Lumotech, VOSSLOH Schwabe or Lighttech Make or equivalent (duly type tested as specified and full in conformance to the technical requirements/specifications).

The driver shall be rated for ingress protection class IP65.

Drivers shall have a Power Factor (PF) of $L : \geq 0.90$.

a. LEDs

The LED chip shall be Philips Lumiled, Cree, Nichia or Osram Make or Equivalent (duly type tested as specified and in full

conformance to the technical requirement/specifications)

The LEDs shall:

1. Be designed for lumen maintenance of L70 or 70% at the end of useful life at ambient temperature of 35 deg C.
2. Have a useful life of 50,000 burning hours at 50°C with certified by TM21 report. Have a minimum color rendering index (Ra) of 70(± 10) and a color temperature above 5000K and preferable 6500K.
3. Have a color consistency within 7SDCM (Standard deviation of color matching) as defined by Mac Adam.

The bidder shall submitted LED manufacturer authorization for the usage of its LED in the fixture manufactured by them.

b. Thermal Management

Managing thermal properties in LED fixture is most critical to ensure optimum performance of LEDs and reliability of the system. The housing under the circuit board shall be specially designed to ensure perfect contact between the board and the fixture housing for efficient heat dissipation.

Only metal core PCBs shall be used to maximize heat transfer process and to offer reinforced electrical insulation via dielectric layer. The metal core PCBs shall be mounted only housing using a highly efficient thermal interface material. Use of silicon glue is not acceptable.

The housing over the driver chamber shall have additional ribs to ensure direct contact with the drivers. The housing shall have adequate surface area to ensure fast heat dissipation.

c. Photometric

Fixture shall have illumination engineering society (IES) Type II or III distribution pattern, with short or medium longitudinal distribution.

LM-80 LED and photometric test reports and IES files from a third party testing laboratory shall be available.

d. Warranties

15. IESNA (Illumination Engineering Society of North America) - Lighting Handbook 10th Edition.
16. CIE (International Commission of Illumination)
17. IESNA RP-08 (reaffirmed 2005) – Roadway Lighting.
18. CIE 115-2010-Lighting of Roads for Motor and Pedestrian Traffic.
19. IESNA RP-19-01-Roadway Sign Lighting.
20. IESNA RP-20-92-Lighting for Parking Facilities.
21. CIE 129- Guide for Lighting Exterior Work Areas.
22. IESNA DG-19-08-Design Guide for Roundabout Lighting.
23. IESNA TM-16-05-Technical Memorandum on Light Emitting Diode (LED) Sources & Systems.
24. IESNA DG-04-03-Design Guide for Roadway Lighting Maintenance.
25. IESNA RP-16-10-Nomenclature & Definitions for Illuminating Engineering.
26. IEC 60529 or EN 60 529 (IP) and EN 50 102 (IK) – Degrees of Protection Provided by Enclosures (IP Code for Ingress protection and IK Code for Mechanical Strength)
27. ANSI/NEPA/ANSI/SG C78.377-2008-American National Standard for Chromatically of Solid State Lighting Products.
28. CIE 126-1997 Guidelines for Minimizing Sky Glow and IESNA TM-10 Addressing Obtrusive (Urban Sky Glow and Light Trespass) in conjunction with Urban Lighting.
29. JEDEC-Joint Electron Device Engineering Council.
30. ASTM – American Society for Testing of Materials.
31. ASTM B 117-07a – Standard Practice for Operating Salt Spray (Fog) Apparatus, 2007 or ISO International Organization for Standardization.

10. Photo- biological safety test report.

11. Customer testimonials.

12. Factory/ISO certificate.

13. Reports of other type test stipulated in the respective standards/codes

g. International Independent Laboratories.

For the specified requirement of type test and type test reports by an independent authority/independent laboratory (specific to their status/approval for performance of specific tests) on the fixtures as defined in the projects, the following laboratories shall be considered as independent laboratories.

1. KEMA Labs, Holland.

2. CESI Labs, Italy.

3. CRIEPI Labs, Japan.

4. Any other laboratory accredited by EA (European Co-Operation for Accreditation) or a member thereof.

5. Any other laboratory accredited by ILAC (International Laboratory Accreditation Co-Operation) or a member thereof.

6. Any other laboratory accredited by IAF (International Accreditation forum) or a member thereof.

7. Any other laboratory accredited by STL (Short-Circuit Testing Liaison) or a member thereof.