



**The Hashemite Kingdom of Jordan  
Ministry of Public Works and Housing**

إنارة الطرق في المحافظة / إنارة الشارع المؤدي من مبنى المحافظة وصولا الى اشارة مستشفى جرش  
ش ج /5/ 2026

**Part (1) : General & Special Specifications**

**2026**

**LIGHTING DEPARTMENT**  
Studies Division

## Part (1) : General & Special Specifications

## 1.0 General Requirements

### 1.01 Scope of Work

1. These Works shall consist of furnishing, installing, testing, and putting into service, commissioning and fully integrating with the Works all required lighting, and other electrical installations, including their associated civil works.
2. These Works shall also include preparation and submission by the Contractor of all necessary "working" drawings and 'as built' drawings and all calculations required by the Specifications and submission of all documentation and samples relevant to the proposed Works. All drawings and documents submitted by the Contractor shall be in the English language.
3. Materials supplied shall include all necessary items required for a complete installation which will operate in a satisfactory manner. Materials listed in the Specifications are therefore indicative only. All Works shall be carried out, so as to be readily accessible for operation, maintenance and repair and shall ensure that the true meaning and intent of the Specifications are fulfilled.
4. Specifications and Drawings shall be deemed to be documents enabling selection of materials having the general and specific characteristics detailed.

### 1.02 Regulations and Standards

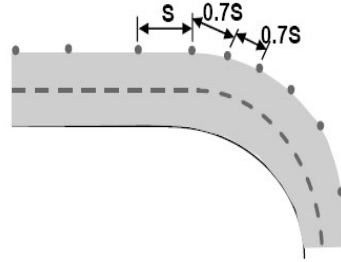
- a. The Works shall conform to all relevant Government Regulations, to the requirements of the Electricity Supply Authority and to the following:
  1. Relevant Standards and Specifications issued by the appropriate Authorities in the Kingdom.
  2. I.E.C. recommendations.
  3. Regulations of Electrical installations (UK) as published by the institution of Electrical Engineers.
  4. National electric Code (USA) as published by the National Fire Protection Association (NFPA).
- b. All equipment and materials supplied shall be manufactured in conformity with the latest relevant recommendations of the IEC, NEMA, BS or DIN, hereinafter referred to as Standards. Lighting calculations and luminaire lighting characteristics shall conform to the relevant requirements of the international Commission of Illumination (CIE).
- c. Acceptance tests shall conform to the above mentioned Regulations and Standards.

### 1.03 Lighting Design Criteria

#### a. Highway Lighting

إنارة الطرق في المحافظة / إنارة الشارع المؤدي من مبنى  
المحافظة وصولاً إلى إشارة مستشفى جرش  
ش ج / 6 / 2026

1. The installation shall be designed on the basis of selected luminaires to achieve the required illumination levels in accordance with CIE-140- 2000/European Norms or approved equal as follows :  
**Lave  $\geq 1.0$  cd/ sq.m,**  
**U0  $\geq 0.40$ ,**  
**UI  $\geq 0.7$ ,**  
**TI  $< 15\%$ ,**  
**SR  $\geq 0.5$**
2. Normal spacing between columns should be not less than (30)meter .
3. For curves & bends , spacing should be 70% of normal spacing.

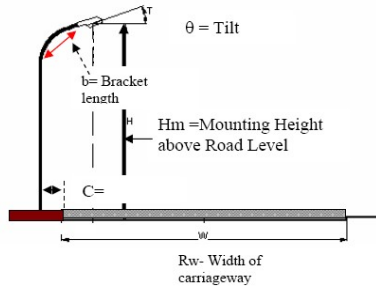


4. Surfaces on which lighting levels shall be measured shall include the full width of all traffic lanes .
5. For computer calculation purposes, the highway surface characteristic shall be taken as type R3 CIE Classification with  $Q0 = 0.07$  unless otherwise indicated.

**b. Design Basis**

Contractor shall submit computer aided lighting design calculations to substantiate lighting results .

1. An Overall Maintenance factor of 0.80 to take into account pollution Level, Line Voltage Drop Maximum of 4%, product Tolerances etc.
2. Detailed designing for individual sections shall be done by the contractor depending on site situations. However, pole heights, brackets, tilt angles shall be strictly adhered to, so that the overall harmony is maintained on the road. Lighting levels and other technical parameters need to be complied to.



## 2.0 Lighting Columns

### 2.01 Tubular Poles:

a) Tubular Poles shall be made of cold swaged joints of steel Tubes , which are linked together by shrinking one end of the larger tube and swaged to the end of the smaller tube, which overlap to form a firm grip that can sustain the required static and dynamic loads on the pole with minimum overlap 2X Larger Tube diameter .

b) Tubular Poles shall be in accordance with DIN 17100-ST 52 requirements or equal approved and of the height and Thickness specified in Drawings.

c) Poles and Arms shall be hot dip galvanized after fabrication with Galvanizing thickness 500-520 g/m<sup>2</sup>.

### 2.02 Treatment of Metal Work

a) All welds shall be smooth with spatter removed. The interior and exterior surfaces of the columns shall be cleaned by pickling or blasting and shall be free of any grease.

b) All components shall be hot dipped galvanized by total immersion in a tank of molten zinc after fabrication. No further leveling up, finishing or modifications shall be carried out after galvanizing. The minimum average coating weight of zinc coating shall be 65 micron on the inside and outside faces of the column.

c) Any damage to the galvanizing shall be properly rectified during erection, by wire brushing the affected area and treating with an approved rust converter.

d) Galvanizing shall be in accordance with BS 729, ASTM A123, BS 5493 or approved equal.

### 2.03 LED Luminaries of Lighting Columns

The LED luminaries shall be manufactured and tested to comply fully with the requirements of IEC/BS EN -1 & 2-3 and shall be CE or UL certified, or comply

with equivalent international standards with all certification made available. The luminaires shall have class-1 insulation in accordance with above IEC/BS EN with provision of earthing.

- a) **LED Luminaires** shall be with a minimum protection degree of IP66 ,and it shall have a minimum mechanical strength of (IK08 rating or higher).
- b) Optical compartment or unit shall be protected by a clear, toughened, heat resistant UV stabilized glass with 4 mm thickness.
- c) **LED Luminaires** shall include 10Kv surge protection device and the luminaires shall have protection against electric shock and provision shall be made for connection of a protective earth conductor to which all non conductive accessible metal parts shall be connected.
- d) **LED Luminaires** shall be made of non-corrosive high pressure die-cast aluminum and shall be of minimum thickness 2.0mm.
- e) **The LED Luminaires** system efficacy shall be greater than 140 lumens/watt at ambient temperature of 50C.
- f) **The LED Luminaires** must have a serial numbers.
- g) Useful Life requirements: The useful life of the **LED Luminaires** in terms of lumen output must be specified by a minimum of 50000 Hr before reaching L70 Lumen output degradation point with no catastrophic failure , LM-80-08 and TM-21-11 calculation shall be submitted.
- h) Thermal Management: Substantial heavy duty heat sinks shall be provided for mounting the LED modules to ensure excellent heat dissipation the thermal.
- i) **LED Luminaires** for street lighting pole must include a base for receptical 7-pin NEMA Socket capped with shorting cap.
- j) shall be compliant with the Restriction of Hazardous Substances Directive (RoHS)

#### **Light Source**

The light source shall be high power SMD white light emitting Diodes (LEDs) shall provide color temperature 4000K with color rendering index of not less than 70.

Lens shall be made of polycarbonate or toughened glass.

LEDs Module shall be connected by terminals (welding not accepted).

#### **LED Drivers for Luminaires:**

The LED drivers shall be an integral part in the fixtures and arranged in a separate compartment with independant cover of the LED luminaires , The driver unit shall be highly reliable on driver compartment conditions. and shall meet the following requirements:

- a) Drivers shall be IP 65 encapsulated type
- b) Drivers shall be 1-10v dimmable and have a minimum efficiency of 90%.
- c) Case (Tco °C) Temperature rating -20 C to minimum +50C .
- d) Input voltage: 230V ± 10%, single phase, 50 Hz.
- e) Surge protection: Must be tested for 10 KV in accordance to the IEC 61000-4-5.
- f) Drivers shall have a Power Factor (PF) ≥ 0.90.
- g) Drivers shall comply with BS EN 55015 and IEC/BS EN 61000-3-2, 3-3 with regard to the RFI and EMC compliances.
- h) Drivers shall have a total individual luminaire Harmonic Distortion (THD) of: ≤ 20% in accordance with IEC/BS EN 61000-3-2 or ANSI C82.77 (2002).

### 3.0 Electricity Supply

#### 3.01 General

- a. All the electrical works included in the specifications shall be suitable for operation at either, 400V/3phase, 4 wire 50Hz supply Or 230V, single phase 50Hz supply as application.
- b. The contractor shall ensure that all equipment and material shall be suitable for use on the appropriate voltage.
- c. The contractor shall obtain from the local electrical authority all relevant information and data pertaining to his part of the work. He shall allow for a suitable cable termination for the incoming supply cables on the main switchboards, (400V/3 phase-4wire).

#### 3.02: FEEDER OF PILLARS (F.P)

- a) F.P shall be fully self-contained, having a dust tight and weatherproof enclosure (IP65) conforming to IEC 144 and suitable for mounting outdoors exposed to dust, rain and direct sunlight.
- b) F.P shall be a reinforced free standing structure manufactured from 2 mm nominal thickness steel with a bolted reinforcement corner construction and shall be of dwarf type with a bolting down root for mounting on a preformed concrete base. It shall be suitable for all incoming and outgoing cables from below ground level within the duct system. Cabinets shall have two hinged lockable doors to provide full front access to the cabinet which shall be sized according to the equipment being installed. The roof of the cabinet shall be slanted and shall have water drip edges provided.
- c) F.P shall be complete, with all equipment and fittings incorporating molded case circuit breakers (MCCBs) controlling the incoming supply and the outgoing circuits. Each F.p shall have the following characteristics:

إنارة الطرق في المحافظة / إنارة الشارع المؤدي من مبنى  
المحافظة وصولاً إلى إشارة مستشفى جرش  
ش ج / 6 / 2026

1. Voltage: 400/230 Volts
  2. MCCBs: triple pole, with neutral link, rated as shown on the drawings, MCCBs shall conform to IEC 157-1 and be complete with thermal and magnetic protection against overloads and short circuits.
  3. Copper bus bar with insulators for neutral termination with sufficient number of terminals for incoming and outgoing cables.
  4. Copper bus bar for earthing termination with sufficient number of terminals for incoming and outgoing earth conductors.
  5. Contactor: Triple pole conforming to IEC 158-1 and rated as shown on the Drawings.
  6. digital metering unit shall be furnished in feeder pillar with ability to measure voltage and current (line to line) (line to neutral) also measure the power on each phase .
  7. Control Equipment: To comprise 24-hour time switch, photo-electric control device and on-off-auto selector switch.
  8. Internal cabling: Single core PVC insulated 600/1000 volt with copper conductors. Cables shall be rated taking into account manufacturers recommended temperature and de-rating factors. All internal wiring shall be laced. Terminal blocks for proper connection of incoming and outgoing cables shall be provided.
- d)** All equipment, bus bars, conductors, etc, within the pillar shall be fully insulated such that there are no live parts or connections exposed.
- e)** A 13A, 230V socket outlet to BS 1363 complete with fused 3-pin plug and an 8 Watt self contained, no maintained emergency lighting fitting shall be pre-wired at the factory and shall be mounted within the F.P.
- f)** A distribution diagram showing all circuit connections, MCCB ratings, cable sizes and references shall be permanently fixed to the inside of the door.
- g)** Each pillar shall be equipped with an led lighting fitting with a door operated micro switch.
- h)** Each pillar shall be secured against unauthorized access by means of wedge locks protected by brass plugs and operated by an approved key.
- i)** Each pillar shall be treated internally and externally, as follows:
1. De – rust
  2. De – grease
  3. One coat of sprayed zinc chromate red oxide primer
  4. Two coats of exterior paint, dark grey conforming to BS 381C- shade
- j)** The physical size and configuration of the pillars and equipment may be varied to suit the manufacturer's standard design, provided the intended functions are accomplished. Any change in size or configuration must be so noted on the submittal.

- k) In general electrical components, bus-bars and MCCB's shall be from approved manufacturers and shall be suitable for operation under full load condition at the ambient temperature of 50°C and relative humidity 80%.
- l) The pillars shall comprise of copper bus-bars, MCCB's and shall be complete with all necessary instruments, meters, relays, protective devices outgoing cabling, appropriate sized cable glands earthing facilities etc...as required and as indicated in the L.V distribution schematic diagram.
- m) The arrangement of the L.V main pillar shall be as indicated in the appropriate schematic diagram, F.P drawings and schedules, provided on the drawings and the specification, it is the responsibility of the Contractor to furnish, with his tender drawings, the proposed arrangement and physical layout of the board together with full technical details of the proposed equipment, for approval by the Engineer. The feeder pillar offered shall be suitable layout and dimension for the location specified.
- The circuit breakers and bus-bars shall generally be separately compartmentalized. The voltage and current transformers shall be in separate compartments.
  - All F.P doors shall be mechanically interlocked to prevent opening before the gear is isolated and shall be fitted with approved type of locks provided with keys.
  - Unless otherwise specified, all switchgear shall be designed to withstand R.M.S symmetrical short circuit current of 25 KA for 1 second.
  - The contactor shall be rated for uninterrupted duty with a utilization category of AC4 in accordance with IEC 158-FT 1.
  - All switchgear shall be designed to facilitate ease of cabling, maintenance inspection and testing and to ensure maximum safety to operators and to maintenance and testing engineers.
  - All items shall be arranged for cabling all necessary cable boxes, glands and clamps shall be provided.
  - The Board shall be installed complete in all respects, cables, wired, labeled and handed over in satisfactory working condition.

### 3.03 Molded Case Circuit breakers (MCCB):

General: The contractor has to provide complete data including the time current characteristics for the circuit breakers he intends to use. They shall be in complete compliance with the IEE regulations concerning earth fault current and tripping characteristics.

Unless specified otherwise, all branches MCCB's shall have a breaking capacity of not less than 18 KA and shall be designed and constructed to withstand the onerous fault conditions and shall conform to the requirements of BS 4752: part 1, IEC 157-1.

MCCB's shall be thermal magnetic, auto trip and manual reset type rated as shown in the drawings, these shall provide positive trip-free operation on abnormal overloads with quick break contact under both manual and automatic operation. Stationary and movable contacts shall be adequately protected with effective and rapid arc interruption devices; each pole of the breakers shall be equipped with an inverse time delay thermal over-current trip element and magnetic instantaneous over-current trip element for common tripping of all poles for multiple pole breakers. Multiple pole breakers shall have single handle mechanism. An individual detachable neutral link attached to the neutral bar shall be provided for each MCCB.

### 3.04 Bus-Bars:

Bus-bars of adequate current carrying shall be of highest conductivity hard drawn electrical copper complying with BS 159, adequately braced and supported to withstand the thermal and mechanical stresses of short circuit current. Unless specified otherwise the bus-bars shall be certified (ASTA or equivalent) for short time current capacities of 50 KA for 1 second. The bus-bars shall be all insulated air spaced, fully shielded with barriers and seals between adjacent cubicle compartments.

All connections on the bus-bars shall be made from hard drawn highest conductivity electrical copper. All joints shall be carefully prepared, cleaned and treated to prevent oxide formation. All joints and connections shall be fully shrouded and insulated.

### 3.05 Current Transformers:

Metering current transformers shall conform to BS 81 and protection current transformers to BS 2046. They shall be of adequate rating to meet the burden imposed by the instruments or relays respectively to which they will be connected.

Metering C.T's shall be of class "CM" accuracy and protection CT's of class "S" accuracy. All CT's shall be insulated with the best available materials to ensure continuous and prolonged service without deterioration.

The windings shall be designed and constructed to be able to withstand the effects of thermal and mechanical forces of short circuit.

### 3.06 Instruments and Meters :

Digital monitoring device shall be panel mounted .Flush pattern moving modern type ,suitably sealed and fuse protected and complete with phase selector switch.

Digital monitoring device shall be for three -phase 4 wire load shall be panel mounted . Indicating KW meters shall be similar, suitably scaled and protected.

KW or KVA maximum demand meters shall be for three-phase, four wire unbalanced load and shall be complete with all accessories and wiring, reset time 20 or 30 minutes.

The switchboards must be supplied and installed complete with all necessary internal panel and auxiliary wiring.

All wiring must be protected against mechanical damage and excessive ambient temperature rise. Cables of minimum size 1.5mm and with 600/1000 volt grade of fire proof insulation shall be used throughout.

### 3.07 Photo Cell:

- a) LV distribution circuits supplying the lighting through a triple pole The contactor and neutral facility shall be photo-electrically controlled. An over-ride facility shall be provided for maintenance. The photo-electric control shall consist of 2 omni- directional cadmium cell thermal relays controls in series using solid state photo- variable conductance elements giving a 2:1 on / off ratio with adjustable sensitivity.
- b) The photo-cell control module shall be capable of adjustment to permit switching levels between 30 and 80 Lux. The exact settings between these limits be determined on site and approved.
- c) A combination of a 24- hour time switch and a photo cell shall be used in order to allow for more control options.

### 3.08 On - Off - Auto Selector Switches

An on-off-auto switch shall be installed in the F.P arranged so that in the "on" position the lighting is turned on and in the "auto" position the contactor can be energized by the photo-electric control module. The "off" position shall ensure that the contactor and hence the lighting remain de-energized whilst the control system remains functional.

## CONSTRUCTION

- a) The contractor shall verify with the manufacturer of the F.P details of the civil works required for installation of the equipment and construction details shall be approved before concrete is casted. All concrete bases shall be constructed  
  
cabling and connecting of the F.P, including cable pulling, shall then be carried out.
- b) The F.P unit shall be installed upon the Concrete base using appropriate lifting gear to ensure that no damage occurs. When correctly located, the unit shall be fixed in position and tested.

### 3.10 Compliance with Specifications :

The contractor shall include a full manufacturer's specification of the switchgear and all ancillaries included in the offer. The offer shall comply with the specifications and the contractor shall ensure that the offer includes all items, whether or not explicitly specified here, which are necessary for a complete and satisfactory installation.

### 3.11 Testing:

The contractor shall include for the complete testing and commissioning of the F.P after erection to the satisfaction of the Engineer.

### 3.12 Labeling:

Each piece of equipment shall be labeled in Arabic and English letter and/or numerals by means of approved engraved name plate, "Trifoliate" or similar, screw fixed to the cover plates and in addition, a schedule of circuit shall be provided and mounted in a lazed frame adjacent to the switchboard. Similarly, wires shall be labeled by engraved numerical sleeves, at any termination on any terminal boards or device, and shall be pointed out on the drawings. Head board label shall be 1" letters, while circuit labels shall be 1/4" letters.

## 4.0 CABLES AND ACCESSORIES

### 4.01 Cables

From the outgoing MCCB's on the main switchboards, sub-main distribution cables shall be installed and connected to the sub-main distribution panels and distribution boards.

Sub-main cables shall be generally as indicated on the schematic/riser drawings but the electrical contractor shall ensure that all cables conform to the requirements of the I.E.E regulations and the local electricity department after having determined the routes of any such cable.

Special attention shall be given to the installation of earthing cables, to the requirements of the local Electricity Department.

For the purpose of measuring the cable sums in the BOQ, the whole cable length from one end of the CB, to the other end of the load terminal shall be measured for payment.

#### 4.02 Cables and Wires General :

Types of cables required for this project and mentioned in the BOQ and in drawings, and accordingly their specification shall be as mentioned below:

- **XPLE or PVC Insulated, Armoured, sheathed aluminum cables.**
- XPLE, or PVC SWA<sub>2</sub> cables manufactured in strict accordance with BS 6724: 1986/IEC REGULATION shall be used wherever specified. All cables shall be of 600/ 1000 volt insulation grade.

Conductors shall be stranded of plain annealed high conductivity electrical aluminum complying with BS 6360-1969/IEC REGULATION. The conductors shall be insulated by XPLE or PVC compound and the core insulation shall be colored Red, Yellow, Blue and Black for identification.

All cables shall be of approved manufacture and from one manufacture. Unless and until authorized by the Engineer, no through joints or splices shall be allowed on main and sub-main feeders.

- **Aerial Bundled Cable (ABC) or Twisted Cable, XPLE**
- Aerial Bundled Cable (ABC) or Twisted Cable, XPLE manufactured in strict accordance with : NFC 33-209 Standard and shall be used wherever specified. All cables shall be of 600/ 1000 volt insulation grade.

cable shall be consists of four insulated cores of Aluminum conductors twisted around insulated Aluminum Alloy Conductor (Messenger) , all conductors shall be made of Hard Drawn Aluminum Conductor insulated by weather resistant polyethylene

#### 4.03 Cable Test:

Manufacture's tests shall be carried out to the requirements of appropriate British standard specification and test certifies submitted to the approval.

- a) Voltage tests applied gradually and maintained a full value for 15 minutes between conductors and sheath.
- b) Earth continuity and earth resistance tests.

#### 5.0 Earthing and Bonding of Electrical Installations :

- a) Earthing of electrical installation shall be carried out to the requirements of BS code of practice C.P 1013:1965
- b) The contractor shall make the necessary tests for soil resistivity in areas where earth electrodes are to be installed and advise the engineer of the results of these tests.
- c) Earth electrodes shall be driven to a minimum depth of 1.5m or as approved by the engineer.
- d) The overall resistance between any point of the earthing installations and the general mass of the earth shall not exceed 4 ohm. In order to achieve this value in areas of high soil resistivity it may be necessary to install several earth electrodes with the necessary couplers between them.
- e) The earth electrodes shall comprise of 16mm (minimum) diameter steel copper clad rod complete with hardened steel tip accordance to BS2874-C 101 or approved equal.
- f) The earth electrodes cables shall be stranded. Insulated and PVC sheathed. These cables shall be run from the earth electrode to the main earth bar in each location. The ends of each cable shall be seated into a lug and connected to the main earth bar with 16mm (minimum) brass bolts with 3 brass washers and two brass lockouts.
- g) Each earth electrode shall be connected to the main earth bar via a test clamp which shall be located 600mm above ground level.
- h) In accordance with requirements and recommendations of the current edition of the I.E.E regulations, all items in the system shall be effectively earthed and shall be continuously electrically conductive so that the electrical resistance at any point in the system to the main earthing electrode shall not exceed 1.0 ohm. Tests specified in the I.E.E Regulations shall be satisfied.

All electrical equipment must be earthed, including switchgear and distribution gear frames, cable sheaths, metal conduit, trunking and accessories, lighting fittings, switch plates, socket outlets etc.. Which are wholly and partly encased in metal.

## 6.0 Approval of Equipment :

Equipment shall not be ordered until approved in writing by the Engineer. All documentation submitted in respect of equipment shall be in the English language.

- a. Promptly upon signing the Contract, the Contractor shall submit to the Engineer 3 copies of the detailed characteristics of all equipment proposed for the installation, including catalogs (originals not copies) with identification reference. Particulars shall be given of any manufacturer's deviations from the Specifications. The Contractor shall also confirm that the

equipment proposed will provide lighting levels and uniformities at least equal to those specified.

- b. Luminaries shall have the light distribution characterizes require to achieve the threshold increment levels.
- c. Approval of proposed columns will be conditional upon the Engineer of detailed calculations and information to be provided by the Contractor.
- d. The Engineer may verify the performance and quality of any samples by arranging for such tests, as he deemed appropriate to be carried out at the contractor's expense.
- e. Approval of samples by the Engineer shall not relieve the contractor of his obligations in respect of the suitability of equipment or its final performance once installed, and coordination of elements into a fully operational installation. The Contractor shall not be entitles to any compensation in respect of rejection of any sample by the Engineer and shall be held responsible for any delay resulting from such rejection.

#### 7.0 Working Drawings and "As Built Drawings:

- a. The Drawings are outlining design drawings, showing the installations deemed necessary to achieve the required performance.
- b. The Contractor shall submit for approval 3 sets of fully detailed Working drawings before commencing the works. These drawings shall conform with the requirements of the Drawings and shall show the physical layout of all requirement, exact locations of columns, construction and installation and details and wiring diagrams. Work shall not be commenced on site until all working drawings have been approved.
- c. Upon completion of the Works she contractor shall submit to the Engineer one transparency and 3 prints of each of the working drawings which shall have been fully updated and corrected to represent 'as built' drawings. The Contractor shall also submit all other relevant information and documentation concerning operation of the equipment.

#### 8.0 Technical Data for Propose Equipment :

##### 8.01 General

- a. Schedules containing full details of all principal items of the electrical installation shall be submitted by the contractor before installation for at least two weeks. The Contractor shall ensure conformity of the equipment with the requirements of the specifications. Additional information required by the Engineer shall be provided promptly by the Contractor.
- b. A summary of Equipment Manufacture, drawn up as follows, shall be included in the Contractor's submission:

Bills of Quantity Item No.	Description	Country Manufacturer of Origin	Catalog Reference
----------------------------------	-------------	--------------------------------------	----------------------

- c. The Contractor shall supply equipment from the manufacturers' lists with the characteristics indicated in his Tender unless otherwise agreed.
- d. Products of manufacturers having good reputé and standing will be considered by the Engineer on an equal basis. In this respect, the Engineer decision shall be final.
- e. Approval of a manufacturer does not necessarily constitute approval of his product as equal to that specified.
- f. The contractor shall ascertain that the approved manufacturers capable of supplying the required materials and/or equipment and shall ensure conformity with the Specifications in all respects.

#### 8.02 Data to be submitted (before installation for at least two weeks)

##### a. Lighting Columns :

1. Manufacturer.
2. Type, with manufacturer's catalog and descriptive leaflets.
3. Details to construction with specification of materials used for column and holding down bolts.
4. Calculations showing details of stresses under maximum wind loading.
5. Calculations and sizes for concrete support bases.

##### b. Cables (MV and LV)

1. Manufacturer.
2. Specification.
3. Standard to which it conforms.
4. Rated voltage.
5. Manufacturer's catalog reference, with indication of cables proposed.
6. Drop voltage calculation on cable.

##### c. LV switchboards:

1. Manufacturer.
2. Specification, with manufacturer's catalog.

3. Construction drawings'
4. Characteristics of each component
5. Foundation details.
6. General arrangement.

**d. other equipment:**

1. Manufacturer.
2. Type.
3. Catalog, with indication of equipment proposed.
4. Detailed specification.
5. Construction drawings and wiring diagram.

**e. Luminaries :**

1. Manufacturer
2. Type, with manufacturer's catalog and descriptive leaflets.
3. Details of construction with specification of materials used.
4. Total electrical load luminaries.
5. Lighting characteristics of luminaries:
  - 5.a Total luminaries output as % of output.
  - 5.b Iscandela diagrams in all azimuths.
  - 5.c Isolux Curves on a horizontal surface.
  - 5.d Coefficient of utilization
  - 5.e Photometric files (phillum ,IES,.....etc) to be used with standard lighting design software.
6. Weight of luminarie.
7. Luminarie dirt depreciation curves.

**f. LED DRIVER:**

- i. Manufacturer.
- ii. Topic with manufacturer's catalog and descriptive leaflets.
- iii. Variations of lumen output with voltage

- iv. Power factor.
- v. Wiring diagram and characteristics of each component

**In addition to the above, the supplier must submit the test report and test certificates for the luminaries and floodlights as following:**

- CB test for the unit according to IEC 60598-1 and IEC 60598-2-3 IEC
- CE or UL certificate for the unit.
- CB certificate for the driver according to IEC 61347-2-13
- EMC certificates from accredited laboratory .
- LM-79-08 test report for the units.
- LM-80-08 and TM-21-11 test report from accredited laboratory for the unit expected life .
- LM-82-12 test report on lumen dissipation for the complete fixture
- ISTMT test for the luminaire
- IK08 test report according to EN 62262
- RoHS certificate for the luminaire.

All test reports should be issued from internationally accredited laboratory and shall be verified and approved by Jordan Standards and Metrology Organization (JSMO).

**Warranty:**

7 years warranty .