MOSTA BASILICA

EXTERNAL ARCHITECTURAL LIGHTING

(part of) TENDER DOCUMENT

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1. PROJECT DESCRIPTION, SCOPE OF SUPPLY & BRIEF.

Project Description

The Mosta Basilica is strategically located in the center of Malta, situated directly within The Mosta Square.

The scope of the works of this contract is to Design, Supply, Deliver, Install and Commission an Architectural Lighting Installation for the Basilica, complete with ancillary services, to enhance the liveability of the nightscape of this magnificent monument, and its surrounding.

The works include the installation of a new lighting system with DMX controls for the external facades of the Basilica. This document describes the materials requirements for the architectural dynamic lighting of The Church.

Bidders are advised to visit the site of works to determine a safe method of works that they shall need to employ. This could include, but not limited to, the use of abseiling, scaffoldings, hoists, cranes, etc.

The scope of works includes the following activities.

- Design & Engineering for the lighting control system.
- Supply & Delivery
- Site Installation, Coordination, QA/QC Supervision.
- On Site Lighting Tests and setting up of scenes.
- Testing and Commissioning.
- Training & Handing Over.
- O&M and AS Fitted drawings & Documentation
- Maintenance & Extended Warranty

The Contractor shall include for all specialist hardware and systems to be designed, detailed, and commissioned by suitably qualified and experienced specialist vendors and suppliers for systems. The Contractor shall ensure that all works carried out by the Specialist Vendors, Suppliers and Installers are coordinated with each other prior to commencing the installation and that all specification requirements are allowed for in the coordinated final designs.

Scope of works

Note:
Where in this tender document a standard, label or brand is quoted, it shall be understood that the Client, will accept equivalent standards. However, it will be the responsibility of the respective bidders to prove that the standard, label or brand they quoted are equivalent to the standards, labels or brands requested in this Document.

The works include the installation of a new lighting system with Ethernet/DMX controls for the Mosta Basilica including the installation of new poles light within the surrounding Square and in the playground behind the church. This document describes the materials requirements for the exterior architectural dynamic lighting, including:

- Facades, Dome, Lantern, Portico, Sculptures at façades and square of the Church.
- Hardware that is located in the Square that is ancillary to the architectural lighting system.

Location of the light fittings:

Facades and columns: light fittings type F03B - F05 - F12B – F03
Towers: light fittings type F01 – F02 – F04 – F07
Façade large windows at Rotonda: light fittings type F06 – F06B
Rotonda roof: light fittings type F09 – F10 – F14
Lantern: light fittings type F11
Portico: Light fittings type F19 – F17A
Terrace level: light fittings type F07 – F08
Pole (existing historical) type MTE: light fittings type F17 -F18
New pole type MT1: light fitting type F13
New poles type MT2: light fittings type F13-F15-F16-F17
New pole type MT5: light fittings type: F20 – F21 -F22
New poles type MT6: light fittings type F15-F20
New poles type MT6a: light fittings type F15-F20-F18
New pole type MT6b: light fittings type F15-F20-F22
Third party roof: light fitting type F13A

The works include the removal and carting away of old light fittings, fixtures and wiring that will not be reused.

Appendices attached outlines the specialist lighting areas of scope, followed by detailed performance, technical and quality requirements.

The works also include the electrical distribution, communication and Ethernet/Data supply/DMX infrastructure required for a complete working system. Works will also include RGBA to create the required sunset effects with artificial lighting.

The foregoing summary of project scope is intended for general guidance only and no omission from this description shall relieve the Contractor from his obligations to carry out the whole of the works hereinafter described or indicated in the drawings.

Notwithstanding those parts of the project may be easily accessible, tenderers are advised to visit the site of works to determine a safe method of works that they will need to employ to carry out the works. This could include, but not limited to, the use of abseiling, scaffolding, hoists, cranes, etc. Prior to the commencement of any works, a H&S plan as well as a Risk Assessment would need to be in place.

Additionally, because the area is subject to harsh ambient conditions, great care should be given to selecting the materials, brackets and fittings as specified such as to provide the requested guarantee requested in the tender document.

The Tenderer may visit the site before tendering and shall make allowances in his tender prices for the existing structure, local conditions, the nature and accessibility of the site, the nature and extent of operations, conditions affecting labour, storage space for materials and any other elements to fully ascertain the scope of work, and to determine any restrictions likely to affect the execution of the Works.

Note: The tenderer is responsible and shall ensure that all material and equipment selected, supplied, and installed is adequate and appropriately selected for the system and light fitting selected as well as the environment in which they are installed. The bidder shall also ensure ease of maintenance and mitigate any vandalism risks.

1.1. LIGHT LUMINAIRES

Specifications for each light fitting are given in Lighting Designer Appendix.

1.1.1. This section of the document describes the specific detailed requirements of the proposed light fittings., The work as detailed in this Specification shall comprise the whole of the labour and all materials necessary to provide the complete Lighting Luminaires, fixings, accessories and control system for:

-Surface mounted luminaires at cornices, facades, walls, and roof levels
- Luminaires fixed to existing or new poles
- Development of specific box, mounting details and brackets (full details of these are to be given in the bid document) - where fittings need new poles and/or support structure, details of these are to be provided by the bidder

1.1.2. **Custom luminaires- No bespoke or custom luminaires are required or acceptable.**

1.1.1. Where existing poles or structures will be used, it is the contractor's responsibility to confirm that these poles/structures are adequate for the new and extended use. (Type MTE for example).

1.1.2. The Contractor shall provide all accessories and design features described herein, or necessary in order to provide a complete installation, regardless of whether such features are included in the catalogue reference, including, mounting hardware, louvres, lenses filters, transformers, drivers, control DMX systems, cables, support, brackets, fixings etc.

1.1.3. Luminaires shall be manufactured in strict conformance with the contract drawings and specifications. Specifications and scale drawings are intended to convey the salient features, function and character of the luminaires only, and do not undertake to illustrate or set forth every item or detail necessary for the work. Minor details, not usually indicated on the drawings, or specified, but that are necessary for the proper installation, manufacture and completion of the luminaires, shall be included, the same as if they were herein specified or indicated on the drawings.

1.1.4. Where components of a luminaire are replaceable, including but not limited to control gear, LED modules, LED replacement lamps, and

drivers, it should be clearly noted within the Operation and Maintenance manuals that exact replacements should be used. Should alternative components be used, it should be clearly noted that additional EMC and CE certifications may be required.

1.1.5. The Employer shall not be held responsible for the omission or absence of any detail, construction feature, etc which may be required in the manufacture and installation of the luminaires. The responsibility of accurately fabricating and installing the luminaires to the fulfilment of this specification rests with the Contractor.

1.1.6. It is the responsibility of the Contractor to bring to the attention of the Lighting Consultant and the Electrical Engineer any discrepancies or installation issues before proceeding with work.

1.1.7. All equipment supplied shall be capable of installation in accordance with the manufacturers' instructions (which shall be sought by the Contractor prior to commencement of the installation works).

1.1.8. The installation of non-approved luminaires will not be approved and is not acceptable.

1.1.9. LED luminaires (general)

The following requirements apply to all LED luminaires:

• Unless specified otherwise, minimum luminaire lifetime shall be 60,000 hours at L80/F10. Note this is the complete luminaire, not the LED source.

• Unless specified otherwise, the maximum failure fraction of LED luminaires at the end of luminaire lifetime shall be 10%, F10.

• All LED luminaires shall have lumen maintenance code 9 according to IEC/PAS 62717, where maintained luminous flux at 6,000 hours shall be in excess of 90% of initial luminaire lumens.

1.1.10. LED luminaires (white light) - The following requirements apply:

• Light output power at 400nm and below shall be 0 (zero).

• Unless specified otherwise, LED luminaires shall have a power factor >0.9.

• Refer to luminaire specification sheets for colour temperature and colour consistency requirements for LED luminaire types.

• The specified colour temperature variation applies to the initial colour temperature variation and at any time prior to the end of the warranty period. If not specified, this shall be 3-step MacAdam ellipse.

1.1.11. LED luminaires (multi-colour)- The following requirements apply to multi-colour LED luminaires RGBA:

• Unless specified otherwise, multi-colour LED luminaires shall have a power factor > 0.5.

1.1.12. LED Drivers - LED drivers shall comply with the following:
• LED driver lifetime shall match or exceed the LED luminaire lifetime.
• LED drivers shall be RoHS compliant.
• LED drivers shall have a minimum efficiency of 85%.
• LED drivers shall have a total individual luminaire Harmonic Distortion (THD) of < 20%.
• The Contractor shall ensure complete system compatibility where different manufacturers of drivers and LED sources are used.
• Unless specified otherwise, where dimming is specified the LED luminaire shall dim smoothly to 1% or less of full lumen output.
• The Contractor shall ensure the LED driver is fully compatible with the lighting control system and dimming protocol defined by the Electrical Engineer (refer to DMX circuits, plans, diagrams and schematics).

1.1.13. Flicker
Visible blinking, flickering or strobing shall not be acceptable at full lumen output, nor at any dimming level should dimming be specified.

1.1.14. The requirements of IEEE 1789–2015 shall apply to all LED drivers, where unless specified otherwise drivers shall aim to limit other biological effects of flicker.

1.1.15. For basic PWM (where percent flicker is 100%) minimum frequency shall be 1,250 Hz.

1.1.16. Relationship between percent flicker and minimum frequency shall be as defined within IEEE 1789-2015.

1.1.17. Product Variations
If any variants of standard luminaires are required, these shall be developed by the manufacturer of the standard luminaire, unless otherwise specifically stated and approved, and shall be manufactured to the same standards as the equivalent standard luminaire.

Two copies of all working drawings of proposed variants, dimensioned in mm, shall be supplied to the Lighting Consultant for approval prior to fabrication.

Notwithstanding the above, the manufacturer shall remain responsible for ensuring compliance with relevant standards, the accuracy of the information shown on his drawings at all times and for ensuring that the equipment shown fulfils the requirements of this specification.

1.1.18. Custom Luminaires (light fittings)
No custom luminaires are acceptable.

1.1.19. Electrical Supply
The electrical fittings shall be suitable for operation on:
230V ±10%
50 Hz ±1%
with separate neutral and earth.
Light fittings marked for other voltages shall not be accepted.

1.2. LIGHTING CONTROL SYSTEM

The following is a brief description of how the lighting control system is to be designed and engineered by the contractor.

All DMX and Data supply equipment installed outdoors, shall be Outdoor-rated for use in damp and wet and humid Environments and have an IP66-rated enclosure.

The Tenderer shall design and engineer the system as required to deliver an optimum system. It is up to the tenderer to determine the quantities and location of data supplies and associated equipment required for the operation of the lighting control system. The tenderer offer shall include a detailed design overall system schematic showing the components which are being offered, location of data supplies and data switches as well all cable types and details.

Because it is not subject to DMX addressing limitations, Ethernet is the preferred environment for this system. The preferred media for ethernet connectivity is Fibre Optic links due to having no length limitations and furthermore are not subject to damages due to lightning for which High Buildings such as the Basilica are always at a risk of being hit by lightning strikes.

A system of central master control should also be included. The intention is to provide for a fully automated remote central control station whereby, the end user will have the facility to change timings and sequences or particular occasions. The system should also serve to report the status of the individual concentration data nodes and status of all lamps and any failing condition of the power and/or control systems. This will facilitate the maintenance and ensure that at all times it is kept operating in the most cost-efficient manner practically possible.

It is proposed that the Central Master Control of the lighting system will be located within the EAST Bell Tower and will comprise of:

- Lighting master controller / System Manager
- A PC based station with the required OS and System software Licenses
- Ethernet network active devices and data supplies
- Media converters
- Online UPS to provide emergency backup power to DMX equipment for at least 30mins
- Remote internet connection to allow users to control and monitor the systems through a secure connection
- Required routers, firewalls, modems for a complete remote capable and secure solution
- Surge arrestors both on the communication lines and power supplies

All housed in lockage rack enclosure.

The lighting controls software package shall include the following tools (as a minimum):

1. Management Tool
2. Show/Scene Designer
3. Configuration Maker
4. Playback Control (show triggering from a computer)

1.3. Functional Narrative of Lighting control system

1.3.1. Description –

All lighting must be controlled by a centralised lighting control system. The system shall allow for reconfiguration of lighting control using a web-based interface.

All lighting shall be connected to addressable DMX dimming or relay panels linked to the central control system. A robust PC server will be connected to the control system which will enable the system to be programmed and will provide functionality such as scheduling, time clocks, readdressing of fixture groups and zones and error feedback.

1.3.2. System functionality

The lighting control system shall provide the following:

• Assigning and editing of lighting control zones using graphical interface.

• Feedback indicating the current state of each luminaire, luminaire control zone or relay group.

• Control DMX and On/Off luminaires.
• Astronomical timeclock / schedule control, programmable with a minimum per day per zone, and with a 365-day calendar function. (see narrative for the scenes).
- The master control system will be in the Basilica Office.
• Provide an alarm when a fault on the system is detected.
• Interface to indicate a fault of the lighting or lighting control system.

The system shall be capable of applying any of the above functionality to any of the luminaire control groups within the project.

1.3.3. Lighting Control Strategy

Lighting control scenes by area (Combination of Dimming, Colour Changing and On/Off)

The lighting concept is based on the assumption that in order to experience the authenticity of the Mosta Basilica, we need to provide authentic lighting. Light is « invisible or immaterial », coloured surface of the facades and dome to provide authentic lighting will be based on the changing of natural daylight and sunlight effects. (From orange, warm white to cool white light).

Our intend by using scenography as a framework is to capture the beauty of the natural light and focus the architectural lighting and dynamic light as an « actor » in the setting of the nightscape.

Lighting events or scenes will be based on time and control for every single DMX light fitting or/and defined circuits:

• Groups of luminaires
• Scenes
• Dynamic sequences

SCENES - SEQUENCES (Perimeter) DMX

SCENE 1. 100%

SCENE 2. 0% (OFF)

SCENE 3. BEFORE NIGHTFALL AND UNTIL SUNDOWN (summer)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 4. BEFORE NIGHTFALL AND UNTIL SUNDOWN (autumn)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 5. BEFORE NIGHTFALL AND UNTIL SUNDOWN (winter)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 6. BEFORE NIGHTFALL AND UNTIL SUNDOWN (spring)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 7. FROM SUNSET TO MIDNIGHT (summer)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 8. FROM SUNSET TO MIDNIGHT (autumn)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 9. FROM SUNSET TO MIDNIGHT (winter)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 10. FROM SUNSET TO MIDNIGHT (spring)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 11. FROM MIDNIGHT TO EXTINCTION (summer)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 12. FROM MIDNIGHT TO EXTINCTION (autumn)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 13. FROM MIDNIGHT TO EXTINCTION (winter)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 14. FROM MIDNIGHT TO EXTINCTION (spring)
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 15. CHRISTMAS
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design
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SCENE 16. NEW YEAR
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 17. RELIGIOUS CELEBRATIONS
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 18 MUSIC FESTIVAL
Range – Diming – Time to define during Commitment Phase and will be based on the Lighting Designer design

SCENE 19. EVENT (open scenario)

1.3.4. SUMMARY

DMX SCENES/SEQUENCES* (perimeter): quantity 19

The scenes/sequences are composed of several separated DMX circuits whose luminaires must be controlled separately and individually with different intensities, temperature of colour, and dynamic effects in the same scene or sequence

1.4. Tolerances for specified items are as follows:

The Luminaires:
The Optical distribution / beam angle can vary by +/-10%
The luminaire lifetime specified is a minimum requirement
The lifetime basis specified is a minimum requirement
The light source colour is important to be maintained as is. No tolerance is required with the colour temperature.
The Light Source Rendering (CRI) can vary by +/-10%
The Rated luminous Flux (Lumen) can vary by +/-10%
The power consumption can vary by +/-10%
The dimensions included in the technical specifications are indicative and can vary up to +/- 10% on those indicated
The weight is only indicative

DMX Supply data controller
The dimensions and colour of the DMX supply data controller are only indicative.

The DMX Compact show storage and playback device:
has a minimum of 340 unique light addresses

All pictures shown are for illustration purpose only. Similar products that meet the below technical specifications will be accepted.

1.5. Lighting Performance Verification

The scope of verifying the performance of a lighting installation is to assess the new Lighting System and compare the results to the design criteria and standards. Discrepancies between the design and reality can indicate problems with the design process or with the data used in the design.

Three stages of verification are being requested (assuming that there are no discrepancies with the design and standards). The first is during the night trials, the second on the certification of the area and the third for **each year of the warranty period**. A full grid of measurements should be used for the purpose of verification and detailed reports shall be submitted for each area and stage clearly highlighting the discrepancies, pass or fail status.

The Tenderer will submit with the Tender a method statement clearly describing in detail the process of performance verification to be adopted throughout the implementation of the Lighting System.

1.6. Electrical Installation:

The scope of works includes the supply of all materials and installation as per specific concept drawings and schematics of this tender. This includes the intrinsic properties including materials and workmanship required of an electrical installation carried out.

The electrical installation shall comply in every respect with this specification.

The main infrastructure distribution network should be carried out using cables as specified in section 2.

The installation will be installed to conform with the IEE Wiring Regulations, & Enemalta local regulations and other applicable and relevant international standards and code of practice.

1.7. Voltage covered by this Specification.

All apparatus, equipment, materials, and wiring shall be suitable for use with a three phase and neutral 4-wire 400 volts 50Hz system TT systems as per Enemalta and REWS regulations.

1.8. Surge Protection and Equipotential Bonding

THE CONTRACTOR SHALL INLCUDE FOR SURGE PROTECTION on BOTH ELECTRICAL AND COMMUNICATION NETWORKS

EQUIPOTENTIAL BONDING

The low voltage (LV) distribution system will consist of the main LV distribution board, LV distribution cables, isolating switchgear. Transient surge protection units and over/under voltage protection shall be installed.

General arrangement and connecting of proper earthing mechanism and lightning protection shall be allowed for. It shall be the responsibility of the contractor to include all equipment for a complete installation to cover surge protection on both electrical and communication and controls network/infrastructure, lightning protection and equipotential bonding in the unit price for this work. Request for Variation orders in this respect will not be accepted.

Electrical equipotential bonding.
All earthing requirements shall comply with the 18th Edition of the I.E.T. regulations, and the ERS. All copper earthing material shall be BS approved and intended for use in earthing installations.

1.9. Compliance to Regulations

All equipment supplied shall comply with all relevant EU/CE and Maltese codes standards, regulations and legislation in Force at Time of closing of the Tender submittal.

The electrical installations shall comply with all the relevant statutory instruments and regulations current at the date of Tender, and in particular with the REWS/Enemalta local Electricity Supply Regulations (ESR).

The equipment and material shall be of high quality and shall comply with EN, BS international standards.

All installations and materials used in the works shall conform to the requisites set out in:

- the technical specifications,
- to the IET Regulations 18th Edition published by the Institution of Engineering and Technology (BS 7671),
- British Standards Institution or IEC equivalents

The definitive specification is binding for the Contractor.

The materials used shall also conform to the following:

- All materials and equipment used for the systems in the Permanent Object shall be suitable for the ambient working conditions in which they are installed, and able to withstand the mechanical wear and corrosive effects resulting from exposure to heat or humidity during operation;
- Radio Interference: BS EN 550141:2006+A1:2009
- All the materials used in the works shall have the characteristics and dimensions mandated by the regulations in force.

All luminaires shall be subject to EMC emission and immunity testing and provided with EMC compliance certification. The whole of the work and materials to be supplied shall fully comply with the relevant Standards and Regulations of the Local Authorities having jurisdiction.

All light fittings shall conform to the following standards

Subject	European Standard
Luminaire – Safety	EN 60598
Luminaire – IK Code (Impact Resistance)	EN 62262
Photobiological Safety – Lamps	EN 62471
Control gear – Safety	EN 61347
Quality Management Systems	EN 9001
Environmental Management Systems	EN 14001
Photometric Measurements / Data	EN 13032

Luminaire performance – Part 2-1: Particular requirements for LED luminaires	IEC 62722-2-1:2011
Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions	EN 61000-3-2:2009
Equipment for general lighting purposes – EMC immunity requirements	EN 61547:2009
Assessment of lighting equipment related to human exposure to electromagnetic fields	EN 62493:2010

All LED light fittings shall comply with the following specifications

LED Luminaire	EN 60598-2-1
OLED Panels	EN 62868
LED Modules	EN 62031
LED Connectors	EN 60838-2-2
LED Drivers	EN 61347-1 (Safety)
	EN 61347-2-13 (Safety)
	EN62384 (Performance)
LED Lamps	EN 62663-1 (Safety)
	EN 62663-2 (Performance)

In the event of a contradiction between this Specification and any applicable Standards and Regulations, the most stringent requirements shall be deemed to apply, and the Lighting Designer and Electrical Engineer shall be notified immediately for confirmation

Special care shall be taken to choose the equipment with a view to guaranteeing continuous duty operation and ease of maintenance.

1.10. Authority Approvals, Permits and Fees

The Contractor shall obtain all necessary permits from the Local Authorities to complete the works. Submissions shall be lodged in a timely fashion with due regard for the Construction Programme.
Perform all tests required by the Authorities having jurisdiction and submit a copy of the final approved inspection certificates. All costs for testing shall be borne by the Contractor.
Where the requirements of any Authority call for the submission to them of any component of the works for approval, testing, stamping or certifying, the Contractor shall, at their own expense, submit and deliver any such component.

1.11. Service conditions

It is important to note that this is a heritage protected site and all installations must be carried out with utmost care and coordination, so as to preserve the site integrity. No works will be allowed to be carried out before getting the approval of the architect-in-charge/Engineer and Mosta Parish. All installations shall be carried out with the utmost care to keep the installation discreet and un intrusive.

All external lighting equipment shall have a minimum guaranteed lifetime of 5 years, with an extended guarantee of 10 years, to withstand abrasion from intense sunlight with high infra-red and UV content, high ambient temperature/humidity or similar. Light poles must have 25 years warranty for preventing corrosion.

These requirements are in addition to those identified elsewhere within the project drawings and specifications. If conflicts occur the most onerous requirements shall apply. The following applies to all components of the system, including but not limited to the light sources, electrical components, drivers and control gear:

The following service conditions shall apply:

a. Malta Climate Summer tropical.
b. Ambient temperature 0C to +50C
c. Relative humidity 99%
d. Marine spray related conditions.

1.12. Selection of equipment

Where items of equipment are interconnected to form an integral part of the complete electrical installation, their characteristic of performance and capabilities shall be so matched as to give safe, reliable and efficient economical operation of the complete electrical installation.

1.13. Space of Equipment

The Contractor shall ensure that all the equipment supplied can be installed in the available space and that there is adequate access to place all equipment into its position and for maintenance. All location of hardware that is not indicated in the tender drawings or where changes are proposed must be specifically approved by the Client.

1.14. Other Information

The tenderer shall submit with the tender all manufacturer's technical data giving full information as to dimensions, materials, performance and all information pertinent to the adequacy of the equipment proposed by itself for the approval of the Engineer.

Name, sizes, catalogue numbers and references shall be clearly marked to indicate the particular item.

1.15. Design and Engineering

1.15.1. General

Unless otherwise indicated, the Contractor shall provide the following drawings to the satisfaction of the Engineer and in accordance with the Engineer's Requirements:

1.15.2. Two sets of proposed layouts, indicating general description of the service, and showing routing of services, location of equipment, capacities and type of equipment proposed, size and type of cables, distribution system and any other detail which would clarify the intent of works the contractor is tendering for. The set shall comprise of the following drawings:

- Detailed workshop drawings plans coordinated with all trades and sub suppliers
- Lighting and Power infrastructure installation layouts.

- Electrical Distribution and circuit protection schematics.
- Installation, mounting and fixing details
- Detailed installation, Testing and commissioning and maintenance method statements
- Communications and DMX system infrastructure schematic showing the main system components, part numbers, cable types, communication lines and modes
- Detailed functional description on how the lighting control system will function and be operated

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1.15.3. Design Responsibility:

The contractor shall ascertain the adequacy and safety of the lighting system design, installation methodology, testing methods and commissioning. Any design changes deemed necessary by the bidder are to be communicated to the Engineer within 7 working days from the closing of the tender date, accompanied by the relevant reasons and financial implications. Claims for additional payment due to changes in design not arising due to a change in the scope of works requested by the client will thus not be accepted after the award of the contract.

1.15.4. Endorsement by Warranted Engineers and DMX specialist. For all contract stages all design documents, drawings, details, calculations, commissioning reports, et... are to be endorsed and stamped by the relevant contractor's Warranted Engineer and DMX specialist.

1.16. Submittals

The contractor shall submit applications for approvals in time to have enough time for the procurement and delivery of all equipment. This time is deemed to be a 2-week period to allow sufficient time to review such applications.

The Contractor shall submit shop drawings, samples and prototypes as specifically instructed below. Shop drawings shall include but not be limited to:

- Manufacturer's dimensioned scale drawings showing in complete detail the fabrication of all lighting luminaires including overall and detail dimensions, finishes, metal thickness, glass thickness, type, fabrication methods, support method, ballasts, transformers, sockets, type of shielding, reflectors, trims, hinges, gaskets, provisions for re-lamping when required in

specifications and all other information to show compliance with the contract documents.

- Certified laboratory test data and reports including photometric data measured in accordance with EU and Maltese standards.
- Technical datasheets for all luminaire components:
  o Luminaire.
  o Light sources.
  o Control gear / drivers / ballasts.
  o Installation instructions.
- Maintenance and operating instructions, including tools required, details of cleaning methods and types / specification of appropriate materials, replacement parts identification list, and final as-built shop drawing.
- All drawings shall clearly indicate the contract drawing number used as a reference in the development of the shop drawings, the name of the project, Lighting Consultant and Electrical Engineer,~~.~~ and the Client.

The following reports, listings and information shall be completed by the manufacturer and submitted for review and approval by the Lighting Consultant prior to order:

- LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products. Provide test report and certificate.
- LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources. Provide test report and certificate.
- IESNA TM-21-11, IES Approved Method: Making Useful LED Lifetime Projections. Provide test report and certificate.
- Lumen depreciation curve of the LED luminaire.
- Photometric Intensity Distribution using absolute photometry.
- Datasheets for LED light source, detailing manufacturer and product reference.
- Datasheets for LED driver, detailing manufacturer, product reference, power factor, efficiency and dimming type (DMX).
- Light source spectral power distribution data at 10nm increments from 380nm to 780nm.
- Colour rendering index data R1 to R15.
- TM-30-15 colour data, including but not limited to Rf, Rg, colour vector graphic and colour saturation graphic.
- Colour variation test data, identifying colour temperature and chromaticity coordinates at start of life (initial) and at 6,000 hours.
- Total luminaire wattage, including driver.

- Ambient temperature at which the LED luminaire performance is rated.
- Submit information on how at least three ambient temperatures will affect the performance and lifetime of the LED luminaire.
- LED luminaire warranty documentation.

1.17. Samples

The Contractor is to provide working samples, with a cord and plug and specified light source(s), of all luminaires for approval by the Lighting Consultant

Manufacturers of custom brackets shall submit a prototype sample(s) of each for review by, Lighting Consultant, and Clients Engineer/s.

Prototype samples shall be sufficiently detailed and operational to allow evaluation of compliance with the salient features of the specification.

Preliminary designs or shop drawings shall not be accepted in place of prototype samples. The Contractor shall allow for a minimum of 2 prototype iterations for the development of custom box and brackets.

The Contractor shall provide samples of all material finishes for testing with the light sources or provide access to the site where the materials are available for inspection.

Luminaires under the contract shall be identical with the approved sample. No luminaire used as a sample shall be allowed to be installed on the project.

All charges for sample shipments, including returns, are to be prepaid by the Contractor.

1.18. Spares and Accessories

The Contractor shall order spare equipment as per Mosta Parish requirements.

Spare equipment shall be ordered at the same time of ordering the installed equipment.

All special tools required for the operation, maintenance and repair of the equipment shall be identified, included in the Tender and handed over to the Employer upon completion of the commissioning.

1.19. Works Execution

Before proceeding with installation, all points are to be marked on site and their position to be approved by the lighting designer/engineer.

1.19.1. The installation must be carried out in accordance with the terms of the specification and appropriate drawings. Allowance shall be made for the installation of all equipment illustrated on the drawings, whether described in detail in the specifications or not.

1.19.2. Temporary Power Supply and Lighting
The Contractor shall be responsible to make available for own use and provide all the necessary temporary power supplies including perimeter security lighting throughout all the phases of the project. Temporary installations shall conform with local regulations and codes of practice. **The contractor shall provide for adequate temporary lighting whilst the changeover is being done from the present installation to the new one so as not to leave areas in darkness.**

1.19.3. Temporary Storage / Personnel Requirements
The Contractor shall provide own (portable) accommodations during the tenure of the project. This includes stores, toilets, and offices.

1.19.4. Electrical Installation Co-ordination Study
The bidders shall carry out a complete protection grading and setting calculation of the complete electrical distribution system, including all connected equipment.

1.19.5. Provide fault (short circuit) calculations for the distribution system and a protective device co-ordination study to ensure that all protective devices are co- ordinated. Base the study on the actual devices and cable lengths installed.

1.19.6. Electrical power, lighting and water during installation: Utilities required on site for light, tools, hoist, etc. during installation is to be included in the installation, testing and commissioning tender prices.

1.19.7. Any deviations from the specifications, as well as valid reasons, must be clearly indicated at tendering stage, with a “Deviation from

Specification" form provided for each nonconformance. Acceptance of such deviations will have deemed to be accepted only if the "Deviation from Specification" form is signed by the Clients Engineers.

1.19.8. The Contractor shall ensure that all the work is carried out in the most diligent, competent and professional manner to ensure a high standard of workmanship. The contractor shall ensure compliance with all the relevant local legislation in particular Health and Safety and the current Electrical Supply Regulations.

1.19.9. Certifications: All items which are required to be certified by Law or by any Legal Notice shall be certified by a Warranted Engineer competent in the field of certification. Such certification shall be forwarded to the Engineer with other contract drawings and information.

1.19.10. Retightening of electrical equipment: At least one time annually, as well as once, one month before the expiry of the warranty period the contractor shall inspect and tighten all terminal bolts in all electrical switchgear and equipment. The contractor shall forward to the Engineer a certificate issued by a Warranted Electrical Engineer, certifying that listed electrical switchgear and equipment was inspected and that all terminal bolts are tight. Notwithstanding the successful completion of the Defect's Liability Period, the retention will not be released by the Engineer unless such certification is presented.

1.20. Workmanship

All electrical works shall be carried out by electricians with an REWS license A and under the direct supervision of a licensed electrician with an REWS license B.

All tradesmen shall be competent in the trade and the work carried out shall be consistent with good practice and to the satisfaction of Engineer, Lighting Designer or Project Manager.

1.21. Safety on site

Works shall be carried out in such a manner as to comply with all the ordinances and regulations together to any amendments made there to.

1.22. Commissioning and Testing

When the contract works, or parts thereof are ready for testing and commissioning, the Engineer and the Client should be notified in writing of the

holding of the tests at least three days in advance for them to witness the tests if so desired.

Once the lighting control system has been procured and installed, the Contractor shall make sure that the system can communicate with all the light fittings and control them. The Contractor has to commission and make available to the lighting designer a DMX programming expert for the entire duration of the tests, until the effects of lighting desired are obtained and satisfactory for the lighting designer.

All necessary facilities shall be provided to enable tests to be witnessed and inspections carried out including all necessary instruments and recorders to monitor systems during commissioning system proving and environmental testing.

Prior to witnessing and inspection by the Engineer the contract works shall be fully tested, commissioned and be fully operational.

Where portions of the work are required to be commissioned and tested separately, then upon final completion, demonstrate to the Engineer that all the several portions are capable of proper simultaneous operation in accordance with the requirements of the specification.

If testing demonstrates that equipment / system is not properly installed and/or not functioning correctly carry out such remedial measures and adjustments as may be necessary and repeat the commissioning and testing procedure to the satisfaction of the Engineer.

Complete all tests before services are concealed.

Ensure all requirements such as cleanliness, protection from harmful external and internal elements are provided prior to commencement of commissioning

1.23. Completion and Handover

This section details the requirements and procedures for completion and handover.

As a pre-requisite to Practical Completion in respect of the contract works or part thereof, demonstrate to the satisfaction of the Engineer that:

- All the contract works are complete.
- With the exception of minor snags or limited defects as agreed with the Engineer that could be reasonably completed within an agreed

programme without causing disruption to the Employer's use of the Lighting System or part thereof.

- All spare items, keys for lockable cabinets, tools and other consumables as stated elsewhere have been supplied and handed over to the Employer.
- The instruction of the Employer's representative in the use and correct operation of the installation has been completed satisfactorily. In particular, safety devices and controls demonstration.
- All commissioning and testing completed including the issue of a final commissioning report signed by an approved competent person.
- A complete demonstration of the contract works with fully functional operational controls tested has been undertaken in the presence and to the satisfaction of the Engineer/Lighting designer.
- All necessary certification by the Employer's insurers has been completed.
- All approved record documentation including record drawings, operation and maintenance manuals, etc… is issued.
- All information required for the health and safety file is issued to the satisfaction of the Employer.
- Record drawings and schedules must include, but are not limited to: location, including level if buried, of utility service connections, including those provided by the appropriate Authority, indicating points of origin and termination, size and material of service, emergency isolation locations and/or other relevant information.

1.24. On site test

The Contractor shall include in the tender submission the method statements and requirements for lighting test as specified by the Lighting Designer. Where required, the Contractor shall allow for all necessary installation, access, provision of temporary power supply and attendance for on-site mock-ups of luminaires.

On site tests and preliminary setting tests will be required for areas indicated below:

1.25. Warranty

The entire installation, including fixtures, fittings, brackets, electrical ancillary equipment and cabling shall be guaranteed for a period of 5 years (with the additional costs for a further 5 year extended warranty), for all materials and labour, including against rust. The LED components shall on the other hand carry a guarantee as specified in the luminaire’s specifications. Within the 5-year

period the contractor is to maintain the system (Preventative and reactive). The Bidders shall offer an extension to this guarantee (for a further 5 years – total of 10 years)

The Contractor shall warrant the luminaire, its finishes and all of its component parts, including On/Off drivers, DMX drivers and controllers, lighting control systems to be free of defects. The warranty shall be provided by the luminaire manufacturer as the sole source of service.

Replacement of faulty materials and the cost of labour required to remove and replace faulty luminaires shall be the responsibility of the Contractor. This shall include all necessary access, builders work and making good.

An LED Luminaire is deemed to be faulty should any of the following conditions apply. These conditions are based on the warranty period required.

For warranty periods in excess of 5 years the requirements below shall be incorporated accordingly.

• An LED luminaire, including all associated components and drivers, has catastrophically failed resulting full loss of light output at any time prior to the end of the warranty period.
• More than 0.2% per 1000 burning hours of individual LED devices within an LED luminaire have catastrophically failed at any time prior to the end of the warranty period.
• An LED luminaire has experienced lumen depreciation in excess of 0.6% per 1,000 burning hours at any time prior to the end of the warranty period.
• Colour variation, from results recorded initially and submitted, at any time before the end of the warranty period in excess of n-step MacAdam ellipse, where n is defined within the luminaire specification sheets for each luminaire.
• An LED luminaire experiences visible flicker or blinking at any time prior to the end of the warranty period.
• An LED luminaire produces audible noise at any time prior to the end of the warranty period. This applies at full output and at any dimming level should dimming be specified.

1.26. Other Information

1.26.1. Deviation from specifications
The tenderers are to fill out a “Deviation from Specification” notification form for each item not conforming to specifications. Unless any deviation is specifically accepted and countersigned by the Engineer on a specific “Deviation from Specification” notification form even though such deviation may have been indicated elsewhere in the tender documents including the covering letter, the Engineer reserves the right to request that items will comply fully to the specifications including the removal of nonconforming material, equipment or installation and commissioning methods. Should such a request for compliance arise, the contractor shall also bear the costs of consequential remedial work including but not limited to opening and closing of builder’s work, remedying pointing works, project management costs, administration and engineering costs, additional delay penalties.

1.26.2. Quoted prices must include for coordination with all other contractors on site.

1.26.3. Quoted prices must include for craneage of all equipment as necessary.

1.26.4. The bidder must allow for the presence of a technical qualified personnel throughout the execution of the project with respect to procurement, installation, commissioning and handing over.

1.26.5. All prices quoted in the attached bills of quantities are to exclude VAT but are to include any other taxes and levies as might apply. VAT shall only be entered in the tender summary page.

1.26.6. Verification
Where the listed criteria for a product are included in a relevant harmonised European standard, under the Construction Products Directive (89/10/EEC), for CE marking, the supplier must provide the information accompanying the required CE marking to demonstrate compliance with the listed criteria. Where the listed criteria for a product are not included in the accompanying information to CE marking under the Construction Products Directive (89/10/EEC), products holding a relevant Type 1 ecolabel fulfilling the listed criteria will be deemed to

comply. Other appropriate means of proof or a signed declaration will also be accepted.

The bidder must provide appropriate proof that this criterion is met.

1.27. Cable Routing and colour

The routing of the cable shall be discussed with and agreed to with the Architect-in-Charge/Engineer. Any existing cable ways could be used provided this is approved by the Architect-in-Charge/Engineer.

Any new cable ways/routing which will be required for this installation are to be included in the bidder price.

Any necessary perforations, penetrations, the sealing and making good, etc… shall be included and should be carried out in accordance to restoration principles as directed by the Architect-in-Charge/Engineer and approval of Mosta Parish.

In view of the sensitivity of the site, it is important that the colour of the cable used blends with the underlying colour tones, particularly when this is not passing through concealed containment or non-visible shafts. A sample of the colour for approval by the Architect-in-Charge/Engineer shall also be provided prior to ordering.

2. Particular/Technical Specifications for Electrical Works

The church has an existing network of electrical cables installed on the Portico, Dome, Bell Towers, and top Lantern. These electrical points are marked on the tender drawings, and The Contractor shall be allowed to connect to these existing points to provide power to the specified light fittings. There are also areas such as the low-level lights where new electrical wiring shall need to be installed.

Lighting Control System

All DMX equipment installed outdoors shall be OUTDOOR-RATED for use in damp and wet environments and have an IP66-rated enclosure.

Ethernet/DMX hardwired field wiring communication cable is the preferred connectivity between the Master controller/System manager and the light fittings, although the bidder may also propose an option for other modes including DMX over power line, should this prove to be economical and also offer the same robustness and reliability.

A system of central master control should also be included, to provide for a fully automated system for the end user to achieve the facility to change timings, light output intensity (Dimming), Colour Temperatures and Colour Changing for RGBA fittings.

It is proposed that the Central Master Control of the lighting system shall be located within the Bell Tower, and shall comprise of

- Lighting Master Control/System Manager
- A PC based station with the required OS and System software Licences.
- Astronomical Timeclock/Schedule control programmer.
- Online UPS for the Control System.
- Surge arrestors both on the communication lines and power supplies.

Lighting events or scenes shall be based on time and control for each single DMX light fitting or grouping of light fittings to create light events and scenes.

Besides light fittings installed within the Basilica area, there are also a number of poles required for projector lighting, on to features both on the front and the back facades of the church.

- MTE: Being existing historical lighting poles which shall be refurbished and controlled though Wireless transmitter and receivers
- MT1-MT2-MT3. These poles of the front shall be provided with supplies from the public lighting system, and light fittings controlled though Wireless transmitter and receivers
- A Fitting F13A installed on an adjacent property, with power supplied from the electrical installation of the same property and light fittings controlled though Wireless transmitter and receivers
- MT5-MT6- MT6a-MT6a-MT6-MT6. These poles are located at the back of the Basilica, with power supplied from the public lighting system, and Hardwired DMX controls installed though a trench crossing the road. This trench shall be carried out by third parties and any required

The quote for the DMX control system shall comprise of all the required DMX/Data cables, Data controllers, splitters, terminators, hardware & software. Furthermore, the Contractor shall also provide the design engineering of the required universes required to provide the most commercially economic field wiring.

It is the preference to opt for conventional hardwired Fibre-Data/DMX system, however Contractors are free to submit alternative systems, such as DMS over power lines, if they feel that this can be more time and cost effective, while still offering the reliability and robustness of conventional DMX wiring. Shall offers shall be provided as an alternative to the main offer.

General

All work shall be carried out in accordance with the IEE Regulations, British or European Standards, as agreed with the Engineer's Authorised Person, relevant Code of Practice and the Local authorities' relevant safety and fire precaution regulations. The materials shall moreover be CE marked, of first-quality new manufacture, and sourced from a primary supplier. All installations and materials used in the works shall conform to the requisites set out in:

1. The Technical Specifications,
2. BS 7671 (Latest edition)- requirements for electrical installations, IEE.
3. Document B of the Building Regulations (UK), BS 9999:2017,
4. The LPC Design Guide for the Fire Protection of Buildings (2000),
5. Earthing system is to be to BS 7430:2011.
6. HTM 06 – Electrical Services: Supply & Distribution.
7. Enemalta Supply Regulations
8. OHSA Act and related regulations.
9. National Building Regulations
10. Standards and Mandatory Orders issued by the Malta Standards Authority.

Special care shall be taken to choose the equipment with a view to guaranteeing continuous duty operation and ease of maintenance. All materials and equipment used for the systems shall be suitable for the ambient working conditions in which they are installed, and able to withstand the mechanical wear and corrosive effects resulting from exposure to heat or humidity during operation; all electrical supplies specified shall be checked by tenderer to see that they can safely cater for the connection of his proposed equipment. If the Tenderer's equipment requires a larger electrical supply, this should be highlighted at Tender stage by the Tenderer. Unless otherwise indicated, all apparatus and wiring related to the electrical supply shall be suitable for use with a 3 phase, 4 wire, 400/230 Volt 50Hz system.

11. It shall be the responsibility of the Contractor to highlight any deviations or non-conformances with respect to the contents of this document and the associated standards. It shall be assumed that all materials and equipment are fully compliant if such deviations or non-conformances are not indicated at submittal stage.

12. Installation/workshop drawings: Provide schematic drawings and detailed plan layout drawings of the entire installation, these are to be coordinated with the church structure and other services within the Basilica.
13. All test results (typed), and associated record 'as-fitted' drawings and documentation are to be signed off by a *warranted electrical engineer, appointed by the Contractor*

Fixing

Screw fixings in brickwork, concrete or similar structural substances, on external face or in damp situations and which necessitate plugging, are to be made with plastic plugs or other approved materials. Screws used in exposed conditions or in damp situations shall be of brass or other approved non-rusting materials. The Engineer must approve alternative fixing methods. Heavy apparatus shall be secured by anchor bolts securely grouted in or by an equal and approved method. Equipment fixed to parts of the structure shall be fixed in accordance with the instructions of the Architect, so that the load bearing of the structure members or the efficiency of waterproofing will not be affected.

Protection of Works

It is the contractor's responsibility to ensure that all the installed equipment, and wiring will remain undamaged, even by third parties, during all the phases of the execution of this project. It is thus recommended that all conduits, laid on the ground, are suitably protected against damage or breakage by a cover of cement and sand mortar. Any damages incurred to such installations shall be made good by the contractor. The cost of the above is to be incorporated in the respective installation rates.

Electrical Supply

All electrical supplied equipment, accessories, switchgear and current carrying conductors shall be suitable for operation on the current IEE/IEC new harmonised voltages 230/400 volts 50Hz, -10%, +10%. The incoming electrical supply shall be a three-phase, four wires, earthed neutral system.

Testing & Certification

All the necessary tests and testing equipment as prescribed in the latest current Edition of the I.E.E. regulations and current Enemalta Regulations shall be carried out by the contractor and the satisfactory results passed on to the Engineer in charge for his approval. All test certificates are to be signed of by a warranted electrical engineer appointed by the contractor.

Labelling, Literature & Drawings

All switchgear, distribution boards and isolators shall be labelled in an approved manner as requested by the trade. Also, each distribution board shall be internally labelled with all circuits identified separately such that the circuit references shall comply with the “As fitted” drawings. The cost of the above is to be incorporated in the respective installation rates.

The contractor shall upon completion hand-over all the works carried out and shall present all necessary “As-fitted” drawings and operational and maintenance manuals as required and requested.

Cleats and Cable Ties

Cleats and Cable Ties used to for containment for both power & communication cables shall be **stainless steel 316** with stainless steel screws and plastic plugs. Care should be taken to avoid any form of damages to the structure.

Distribution Boards

(A) Enclosures of distribution boards shall be of the Sheet Metal modular type, as per schedules provided with this document.

(B) Miniature circuit breakers shall comply with IEC 947-2, and BS4649, type 3 with a fault rating of 6kA unless otherwise stated.

(C) Distribution boards shall be supplied with high conductivity copper busbars, and suitably rated according to the current rating required.

(D) Miniature circuit breakers & RCBOs shall be supplied from the same manufacturer of the enclosures.

(E) Incoming isolators shall meet the requirements for isolation as given in the IEE regulations and shall comply with BS5419.

(F) Residual current devices shall be two pole or four pole (single or three phase) and shall have a differential tripping current of 30/100/300mA as indicated in the schedules.

(G) RCBOs (Residual Current Operated Circuit Breakers with integral Overcurrent Protection) shall be two or four pole manufactured to IEC 1009..

Enclosures for RCBO units

The RCBO devices installed externally for supply of light fittings shall be robust UV protected Plexo Boxes with Transparent Cover IP65 rated and shall have at the back an omega rail to mount the devices.

All outgoing and incoming cables shall be terminated with IP65 Nylon compression glands terminating at the bottom on the enclosure. No glands shall be installed at the side, back or top of the enclosure.

Cables

Armoured cables shall be the XLPE insulation type, having galvanized steel wire armour, and to a 600/1000V voltage grade complying with BS 5467.

All final Circuits shall be wired with 3core PVC insulated flexible cables with an earthed shield screen

Cables for final lighting circuits shall be to the following minimum specification:

Conductor: Flexible copper (Class V), to BS EN 60228:2005 and UNI 60228

Insulation: Cross-linked polyethylene (XLPE)

Screen: Copper braid on polyester aluminium tape.

Sheath: Thermoplastic polyolefin sheath according to UNE 21123

Nominal Voltage: 0,6/1kV (Test Voltage 3.5kV ac)

Max Temperature: 90 Deg C.

Earth & Bonding.

All earthing requirements shall comply with the 17th Edition of the I.E.E. regulations, and current Enemalta requirements. All copper earthing material shall be BS approved and intended for use in earthing installations.

3. IMPACT ON THE BUILDING FABRIC / STRUCTURE.

Openings
No openings or perforations in masonry or cast member walls are to be made without prior approval. Timely notification must be given to the Engineer who shall liaise with and obtain approval from the Client. All approved openings in walls shall be marked, opened and made good by the Contractor.

Co-ordination of Services
The contractor shall co-ordinate all the services prior to issuing the workshop/installation drawings. The contractor is instructed to ensure his services utilise the structural penetrations provided by the Employer to accommodate the installations. The Contractor should clarify any queries in this respect to the Engineer and the Employer.

Damp Proof Membrane
Unless specifically authorized by the Architect (via the Engineer), there is no permission to puncture the damp proof membrane. Wherever the damp proof membrane is perforated, the contractor shall be responsible for repairing with materials approved by the project Architect for a waterproof installation.

Deliveries to site
The contractor is to allow for craneage and delivery in his rates of all equipment as necessary. Furthermore, any deliveries to site must be coordinated with the Engineer and the Client's team to avoid or minimise disruption to other ongoing works as well as public areas.
A traffic management plan as well as a review into loading, available area and logistics is required for any cranes which the successful Tenderer would bring to site.

4. Tender Submital.

The Tender shall submit the Tender Document in the Following Format

- Section 1: Covering letter
- Section 2: Priced BOQs (including the BOQ specifically issued for light fittings in ref B)
- Section 3A: Technical Literature Light Fittings
- Section 3B: Technical Literature Electrical Installation Works
- Section 3C: Technical Literature Lighting Control System (DMX & Data/Fibre)
- Section 4: Lighting Control Schematics and designs
- Section 5: List of deviations from specifications (If Applicable)
- Section 6: List of Lighting Projects (References) undertaken by the Tenderer, including contract Value in Euro.
- Section 7A: Warranty & Guarantee Terms & Conditions – Light Fittings
- Section 7B: Warranty & Guarantee Terms & Conditions – Electrical Installation Works
- Section 7C: Warranty & Guarantee Terms & Conditions – Lighting Control Equipment
- Section 8: Maintenance Schedules.

5 TESTING,COMMISSIONING & HANDING OVER

Commissioning

The contractor shall, test and commission all the engineering systems in such a manner to demonstrate their proper operation and performance of all systems and equipment, as intended and at the specified conditions, unless otherwise stated. All commissioning shall be to C.I.B.S.E. guidelines or approved equivalent.

Certification

All systems or equipment, which need to be certified by Law or by any Legal Notice, are to be so certified by a person/body as contemplated by the same law/legal notice. Such certification is to be forwarded to the Engineer with all the other contract drawings and information.

Testing Certificates

Final test certificates shall be in accordance to test procedures specified in the IEE wiring regulations and shall be signed by a warranted engineer.

Taking Over Certificate

The Contractor shall request for the Taking over Certificate when the Contractor has done all the works which the Works information (scope agreed under contract) states he is to do by the Completion Date and has corrected notified Defects which would have prevented The Employer using the works. The presence of a Defect will not preclude the issue of a certificate of completion if the Defects do not prevent The Employer from using the premises. The defect notification period shall start from the date of the Taking over Certificate

6 MAINTENANCE & WARRANTY PERIOD

Warranty

- Five years from Handing over.
- To provide costs for an additional 5 years of extended warranty.

Maintenance

Introduction.
Electrical installations, if not properly maintained, can kill, injure, and cause serious property damage. This Guidance-Note aims to assist the contractor to submit a suitable regime for periodic inspection and testing of the electrical installations to reduce the possibility of harm arising from the electrical installation in a workplace.

Cleaning & Visual Inspection. (Every 6 months)

A visual inspection should look for:
- breakages
- wear & deterioration
- signs of over heating
- missing parts (covers, screws) and
- loose fixings and confirm
- switchgear accessibility (no obstructions) and
- doors of enclosures
- equipment – switch on & off where equipment is not in regular use or where it is left off or on standby for long periods and
- residual current devices using test button. (It is recommended that, independent of any other inspection and test regime, residual current devices undergo a push-button test at least twice per year to ensure that they operate correctly when needed)

Inspection & Testing: (Once Annually)

Carry out the 6 monthly Cleaning & Visual Inspection and

The following non-exhaustive list indicates the types of inspection and tests that are necessary to complete the periodic annual inspection and testing of an installation.

- General appraisal of the installation by a competent person to assess the physical condition of the installation and its suitability for its environment
- Continuity of the protective conductors and of the main supplementary equipotential bonding.
- Insulation resistance of the electrical installation.
- Earth Fault Loop Impedance test.
- Verification of Operation of RCDs including the tripping times of all RCD protective devices.
- Check and tighten electrical terminations for any loose connections.
- Checking of Aiming angles of light fittings and inspection of any deterioration of the light output of the LEDs.

Tests are set out in more detail in the IEE wiring regulations.

The above list is not exhaustive and Tenderers are to submit a detailed preventive and maintenance schedule based on the above brief, and such works shall be priced in the summary of the BOQ.