A5
Public Domain Lighting Design

Contents

A5 PUBLIC DOMAIN LIGHTING DESIGN

5.1 SCOPE

This specification sets out the Lighting & Electrical design brief, technical requirements, Design Review and approval process and installation requirements for carrying out designs for the Public Domain Lighting including shared pathways, main roads, plazas and parks throughout the City Of Sydney's (the City's) LGA.

This specification shall be applied for all Public Domain Lighting and associated Electrical design required to be carried out for the City.

5.1.1 AUSTRALIAN STANDARDS

Lighting and Electrical design specifications are not to be limited to this document but also need to comply with all relevant Australian standards as well as the City's standard, B8 Public Domain Lighting Construction.

Standard	Description
AS/NZS 1158.0:2005	Lighting for roads and public spaces Part 0: Introduction
AS/NZS 1158.1.1:2005	Lighting for roads and public spaces - Vehicular traffic (Category V) lighting - Performance and design requirements (Under review)
AS/NZS 1158.1.2:2010	Lighting for roads and public spaces Part 1.2: Vehicular traffic (Category V) lighting – Guide to design, installation, operation and maintenance
AS/NZS 1158.2:2005	Lighting for roads and public spaces Part 2: Computer Procedures for the calculation of light technical parameters for Category V and Category P lighting
AS/NZS 1158.3.1:2005	Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements (Under review)
AS/NZS 1158.4:2015	Lighting for roads and public spaces Part 4: Lighting for roads and public spaces - Lighting of pedestrian crossings
AS/NZS 4282:1997	Control of the obtrusive effects of outdoor lighting
SA/SNZ TS 1158.6:2015/ Amdt 1:2018	Lighting for roads and public spaces - Luminaires – Performance
IES TM-21-11	Projecting Long Term Lumen Maintenance of LED Light Sources
IES LM-79-08	IESNA Approved Method for the Electrical and Photometric Measurements ofSolid-State Lighting Products
IES LM-80-15	IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources
IES LM-84-14	Measuring luminous flux and colour maintenance of LED lamps, lighting engines and luminaires
IES TM-28-14	Projecting Long-Term luminous flux Maintenance of LED lamps and luminaires
IEC 61347-2-13	Particular requirements for D.C. or A.C. supplied electronic control gear for LED modules
IEC 61547:2009	Equipment for general lighting purposes - EMC immunity requirements
IEC 62386 version 2	Digital Addressable Lighting Interface (DALI) standard
AS 3100:2017	Approval and test specification - General requirements for electrical equipment
AS/NZS 60598.1:2017	Luminaires - General requirements and tests
AS/NZS 60598.2.3:2015	Luminaire Particular Requirements – Luminaires for road and street lighting

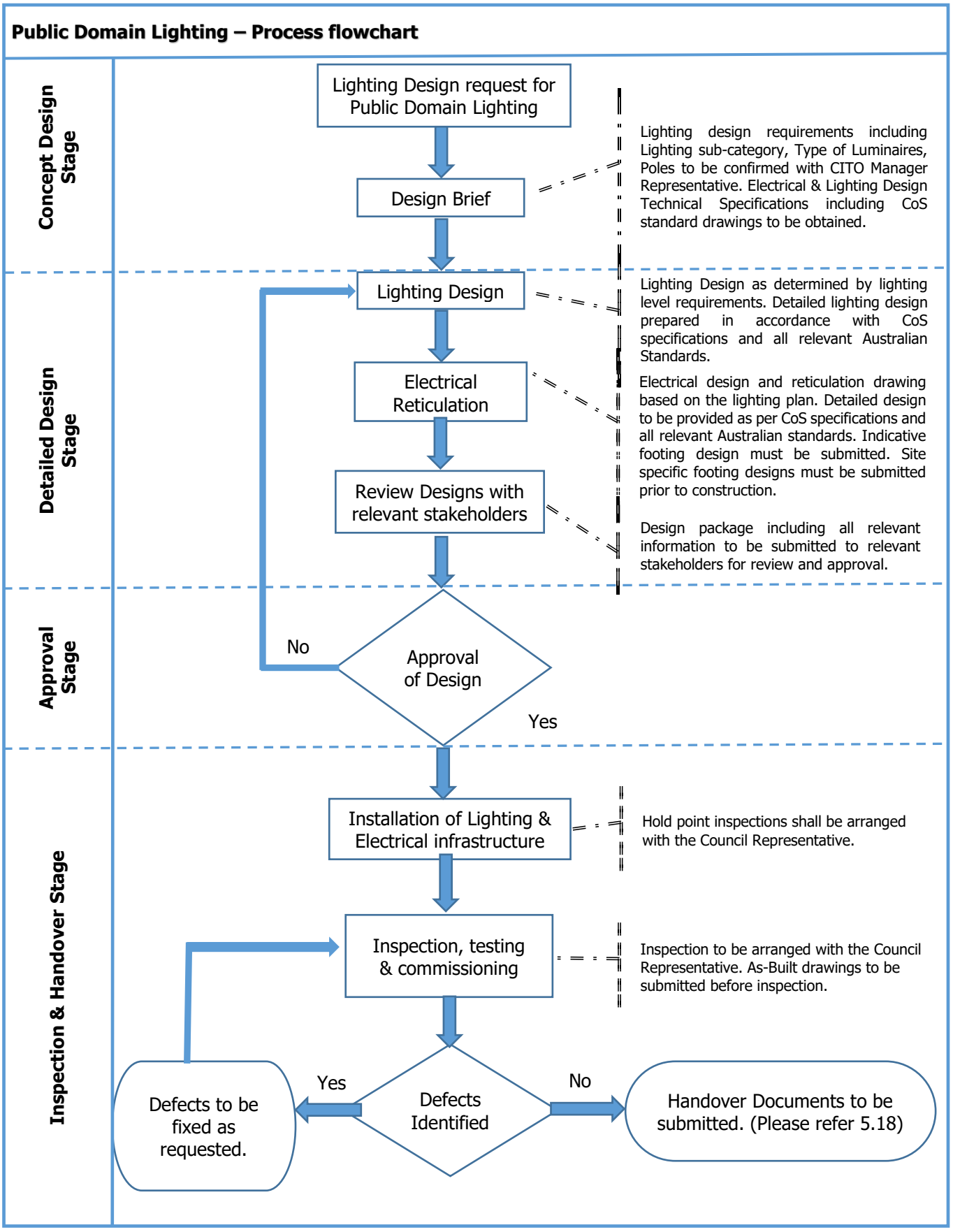
Standard	Description
AS CISPR 15:2017	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
IEC 61643-11:2011	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
ANSI C136.2-2018	American National Standard for Roadway and Area Lighting Equipment – Dielectric Withstand and Electrical Transient Immunity Requirements
ANSI C136.41	Dimming Receptacles
Zhaga Interface Specification: Book 18Edition 1.0, July 2018	Luminaire Extension Module & Receptacle
RoHS 2 (2011/65/EU)	Restriction of the use of certain hazardous substances
AS/NZS 3000: 2018	Wiring Rules
AS/NZS 3017:2007	Electrical installations – Verification guidelines
AS/NZS 3008.1.2017	Electrical installations – selection of Cables for alternating voltages up to and including 0.6/1kV – Typical Australian installation conditions.
AS/NZS 3100: 2017	Approval and test specification – General requirements for electrical equipment's.
AS/NZS 3439.1.2002	Low-voltage switchgear and controlgear assemblies – Type-tested and partially type-tested assemblies
Service and Installation Rules of New South Wales, Nov 2018	The electricity industry standard of best practice for customer connection services and installations

5.1.2 ACCEPTABLE LIGHTING DESIGN PROGRAM

The City Of Sydney shall accept lighting design submissions, using these lighting programs:

- AGi32
- Perfect Lite – Road & Outdoor Lighting Design Software

5.2 PUBLIC DOMAIN LIGHTING – PROCESS FLOWCHART



5.3 LIGHTING DESIGN

5.3.1 GENERAL

Lighting schemes must be designed and installed such as to avoid any unwanted light spill and light pollution. The overall lighting scheme must provide maximum safety and shall not be overdesigned. AS/NZS 1158 clearly specifies the choice of whether to install a road lighting scheme in compliance with relevant Australian standards and, if so, the choice of appropriate subcategory of lighting rests with the road controlling authority. The lighting designer shall confirm the lighting level requirements with the City before commencing any lighting design.

5.3.2 LIGHTING DESIGNER

Lighting designs shall be undertaken by a suitably qualified and a competent practising lighting designer.

The designer must be conversant with Australian local codes for outdoor lighting. The designer must provide a lighting design and statement confirming that design complies with the requirements of the specified standards and signed off. It will be the designer's responsibility to ensure that the lighting scheme meets all the relevant City of Sydney and Australian standards requirements.

5.3.3 LUMINAIRES

Luminaires that are owned and maintained by the City shall be as per the City's approved standard suite ofLED luminaires. For more information, refer to the City's Sydney Lights Design Code:

http://www.cityofsydney.nsw.gov.au/development/planning-controls/development-policies/public-domain- design-codes

If non-standard luminaires are proposed, approval must be obtained from the City. The designer must submit the details as per Annexure 11 of this specification.

5.3.4 LIGHTING CATEGORY

Applicable Lighting sub-categories shall be confirmed with the City before commencing any lighting design.

5.3.5 CATEGORY V LIGHTING

This lighting category is applicable to roads on which the visual requirements of motorists are predominant,

e.g. traffic routes. It includes subcategories V1 to V5. Includes provisions for motorways, arterial, sub-arterial and main roads.

The design is to comply with the Light Technical Parameters (LTP) of AS/NZS1158.1 Road Lighting – Vehicular traffic (Category V) lighting. The design should provide a lit environment conducive to the safe and comfortable movement of vehicular and pedestrian traffic at night and discourage illegal acts.

5.3.6 CATEGORY P LIGHTING – LOCAL ROADS, CYCLEWAYS, PATHWAYS AND PLAZAS

This lighting category is applicable to roads on which the visual requirements of pedestrians are dominant

e.g. local roads and to local area traffic management devices. It provides a lit environment to help pedestrians orientate themselves, detect potential hazards, discourage fear of crime and crime against the person. Also, it includes lighting which is applicable to outdoor public areas, other than roads, where the visual requirements of pedestrians are dominant, e.g. plazas, parks and shopping precincts. Subcategories range from P1 to P12.

The design is to comply with the LTP of AS/NZS1158.3 Road Lighting – Pedestrian area (Category P) lighting. The principles of "Crime Prevention through Environmental Design" shall be considered.

5.3.7 PEDESTRIAN (ZEBRA) CROSSINGS

The principal objective is to provide advanced warning to motorists of the presence of the crossing, associated signs and markings. Enhanced pedestrian visibility shall be provided by direct illumination of the pedestrians. The lighting scheme involves both vertical and horizontal illuminance over the designated area.

Lighting requirements shall comply with the LTP as specified in AS/NZS 1158.4:2015. Light spill and glare must be minimized. Supplementary flood lighting on pedestrian crossings shall comply with PX1 or PX2 Sub-category unless otherwise specified.

5.4 LIGHTING DESIGN REVIEW

A Lighting design certified by a suitably qualified practising lighting engineer, shall be submitted to the City for review and approval, prior to commencing any installation work. The lighting design and layout shall be as per the requirements specified for the below lighting design documents and design drawings.

5.4.1 LIGHTING DESIGN DOCUMENTS

The following lighting design documents shall be submitted for review and approval:

- Lighting design drawing
- Records of any non-compliant design elements
- Alternative compliant lighting design
- Lighting design brief and certificate signed-off.by the consultant. Refer to **Annexure 1** of this document.
- Name of the computer program used
- Luminaire intensity distribution tables in IES/CIE format and the origin of photometric data
- Details of the road surface reflection assumed in Category V design calculations, if any.

5.4.2 LIGHTING DESIGN DRAWING

- The luminaire schedule and description shall be provided with the details below:
- Manufacturer, name of luminaire, power consumption (watts), distribution (optics) type, colour temperature, outreach arm dimensions, pole type, mounting height to luminaire optical centre, pole offset, lamp/luminaire lumens, light loss factor (LLF) and luminaire/pole colour.
- The calculation summary shall indicate all relevant LTP and compliance as per AS/NZS 1158 for Category V & P lighting respectively.
- In case of Category V straight sections of road lighting, Perfectlite pole spacing table confirming compliance for the relevant category V shall be submitted along with the lighting layout. The lighting layout shall indicate pole spacing as a reference point.
- Lighting calculation points for horizontal and vertical illuminance shall comply with the requirements as specified in AS/NZS1158.2.
- Luminaire labels with mounting height should be shown.
- Obtrusive lighting calculations on adjacent residential properties as per relevant Australian standards must be provided.
- Luminaire orientation where it is not shown by symbol.
- Highlight all areas of non-compliance.

5.4.3 LIGHTING LAYOUT DRAWINGS

- All engineering drawings shall be legible, clear, readable and complete. They must clearly illustrate the proposal and enable both assessment of compliance with this document and accurate construction.
- Drawings showing pole locations, existing underground services and electrical reticulation must be included on the landscape layout.

- A locality diagram indicating the overall layout and location of works, with all street names must be shown.
- A North point symbol shall be provided on the drawing.
- A luminaire schedule must be included as specified in 5.4.2 above.
- The lighting design details shall include the lighting subcategory that the scheme has been designed to meet.
- Electronic drawings must be prepared in an industry standard format suitable for later addition of As-Built information.
- Drawings shall be supplied in electronic format as DWG (drawn to scale of 1:250@A1) and PDF formats.

5.4.4 LIGHT POLE, MOUNTING AND FOOTINGS

- Specifications for the poles e.g. pole type, colour; must be obtained from the City during the design stage.
- Certification of the structural design is required for all components of structures except manufactured components, which are part of the approved City lighting suite. The structural certificate shall be accompanied by the detailed design calculations for the structure.
- Footing designs and all associated mounting details must be certified by a competent practising structural engineer and shall be submitted to the City for review and approval. Supporting detailed design and calculations must also be submitted along with the certificate.
- Footing designs for frangible energy absorbing poles shall be undertaken in accordance with AS/NZS1158.1.2.
- All structures shall be designed to achieve 50 years of life expectancy and shall be designed in accordance with relevant Australian standards. Provisions for corrosion prevention shall be considered for all members, especially members which are in contact with the ground.
- All electrical conduits and embedded members shall be considered during the design to ensure constructability of the footing without any compromise to the structural integrity of the structure.
- Shop drawings of the poles must be submitted to the City for review and approval prior to manufacture.
- Mount type shall be Ragbolt Assembly with standard pole baseplate.
- Hold-Down (HD) bolts shall not be exposed above the ground including those on new poles to be owned by Ausgrid. Refer to **Annexure 6**, Section A-A for details.
- Certification of footing construction by a suitably qualified structural engineer as per site condition/ approved design, shall be submitted to the Council.

5.5 POLE SETBACK

Below specified pole setbacks shall be applicable to all new poles to be owned by the City and Ausgrid:

- Minimum pole setback shall be 600mm from the face of the kerb, unless otherwise specified.
- Minimum pole setback at intersections shall be 1000mm from the face of the kerb.

5.6 POLE ORIENTATION

Unless otherwise specified, pole outreach arms and luminaires shall:

- Be oriented at 90 degrees to the centreline of the road.
- Have an upcast angle of "0" degrees.

5.7 POLE LOCATIONS

- Pole locations shall be agreed upon before commencing landscape design.
- Pole locations shall be clear of all driveways, existing underground services, obstructions, existing utility pits, awnings etc.
- The location of existing street trees can be a significant constraint to lighting layouts and designs. Tree canopies may conflict with pole installations or light spill from luminaires, and excavation for pole footings and cable trenches can severely affect tree roots. Proper consideration of these constraints is necessary to ensure a viable design and mitigate the impact to trees. Advice should be sought from the City's tree management team.

5.8 TEMPORARY LIGHTING

- If the existing luminaires are to be removed for any construction activity, the designer must provide a temporary lighting design for review and approval by the City. Temporary lighting shall comply with the requirements of AS/NZS 1158.
- Unless temporary lights are operating, existing lights shall not be removed or decommissioned.
- Electrical installations for the construction and demolition sites (including hoardings), shall comply with AS/NZS 3012.

5.9 EXISTING AUSGRID LIGHTING

This section is only applicable, if the Council decides to retain existing Ausgrid lights.

- A suitably qualified practising lighting design engineer shall undertake lighting design to confirm if the existing Ausgrid lights comply with the City's nominated lighting subcategory requirements. Detailed lighting calculations and lighting layout must be submitted to the City for review and approval.
- If the existing street lighting does not comply with the City's nominated lighting subcategory, designers shall propose an alternative compliant lighting design. Detailed lighting calculations and lighting layout must be submitted to the City for review and approval.
- If the proposed alternative lighting layout requires removal, addition or relocation of any poles/luminaires, an ASP level 3 design consultant shall be engaged to undertake design works and to obtain approval from Ausgrid prior to construction.
- ASP level 3 design shall be submitted to the City for review and approval prior to obtaining certification from Ausgrid and before construction commences.
- A lighting consultant or ASP level 3 consultant shall be responsible for lodging applications with Ausgrid for all lighting upgrade-related works with the City's approval on the application form.
- Residual value charges associated with removal of existing Ausgrid assets shall be borne by thedeveloper through the City.

5.10 CBD AREA LIGHTING REQUIREMENTS

- Smartpoles shall be installed within the CBD area in accordance with the Sydney Lights Design Code.
- Intersection traffic lights shall be replaced with Smartpoles.
- Pole layout needs to be confirmed with the City.
- Removal of redundant Ausgrid lights must be arranged via ASP 3 level design process.
- ASP level 3 design shall be submitted to the City for review and approval prior to obtaining certification from Ausgrid and before removal of poles.
- A lighting consultant or ASP level 3 consultant shall be responsible for lodging applications with Ausgrid for all lighting.
- ASP 3 level design and associated Ausgrid charges shall be borne by the developer.

5.11 ELECTRICAL RETICULATION DESIGN

5.11.1 GENERAL

- Electrical designs shall be undertaken by a suitably qualified and a competent practising Electrical designer. The designer must be conversant with relevant Australian and the City of Sydney standards. The designer must provide a design statement confirming it complies with the requirements of the standard and signed off.
- It will be the designer's responsibility to ensure that the electrical design complies with AS/NZS 3000, Service and Installation Rules – NSW, Ausgrid and the City's requirements.
- Electrical design shall be submitted to the Council for review and approval before commencing any installation works on site.

5.11.2 POWER SUPPLY, ELECTRICAL CIRCUITS AND RETICULATION

- The point of power supply can be determined in consultation with the City to determine whether the lights can be powered from existing Main Switch Board (MSB) or whether a new electrical supply connection is required.
- If a new meter supply connection is required, the point of supply location shall be determined by application to Ausgrid.
- If an existing MSB exists, then the consultant must inspect the existing electrical infrastructure to identify the source of supply, and determine its suitability for installation of additional electrical load.
- If a three-phase power supply is adopted then circuits shall be designed to balance the load across all phases, so that adjacent luminaires are not on the same phase. GPOs shall be on a separate single-phase supply as indicated in Figure A below.
- In case of single phase power supply, adjacent lights shall not be connected on the same sub-circuit, separate circuit arrangement shall be used.
- The electrical consultant shall provide electrical schematics, for example:

Figure A

The electrical consultant shall provide the following information:

- Existing current maximum demand
- Maximum demand calculation
- Single line diagram of the MSB
- Electrical cable size and percentage voltage drop/fault loop impedance, calculations shall be provided using PowerPack or PowerCad software programs.
- Detailed electrical reticulation plan indicating conduit depth, pits, and cable size and cable type.
- Electrical supply reticulation design and footing designs shall be provided for approval prior to carrying out any construction activity. Footing designs shall be certified by a competent practising structural engineer.

- All cabling installed underground for public lighting reticulation shall be enclosed in a 63mm diameter Heavy Duty (HD) PVC rigid conduits, unless otherwise specified. No cables shall be directly buried. Electrical warning PVC marker tape shall be installed above all conduits used for reticulation. Use of flexible or corrugated conduits is not permissible.
- The layout and depth of electrical conduits shall comply with the requirements of Annexure 5 of this document.
- Electrical conduits must be installed clear of Tree Protection Zones (TPZ) and any existing underground services.

5.11.3 CABLE ROUTES

The designer shall undertake site investigation to assess the local conditions to decide the cable route.

- Accessibility – All cabling must be wholly within road reserves or public spaces or in the easement to be provided.
- The cable route selection shall aim to reduce sharp bends and lengths.
- There shall be no joints in LV cables.
- All LV cables shall be terminated in cabinets and terminal box at the base of pole.
- The surface layer shall be assessed for excavation and reinstatement – e.g. soil, road crossing and concrete.
- The underground layer shall be assessed for ease of excavation – potholing along the route as required confirming the full trench depth is achievable.
- Conduits shall be installed along the most direct route between columns and between the turret/cabinet and the column.
- Conduits shall cross under footpaths and roads at right angles where possible so that the reinstatement and length of cable is minimal.
- "Before You Dig Australia" information should be obtained to check clearances from other utility services (gas, electrical, water and communication reticulation).

5.11.4 CABLE TYPE, TERMINATIONS AND PROTECTION

- Main underground cables shall be single phase or three phase, 2C + Earth or 4C + Earth Cu/PVC/ XLPE, 0.6/1kV.
- Standard minimum cable size shall be 6 Sq.mm for wall mounted lights and 16 Sq.mm for Street lights and pedestrian lights, to comply with circuit requirements. Unless otherwise specified.
- All cables shall have type V75 or V90 insulation and shall have stranded copper conductors.
- All surface mounted cables shall be fire rated type.
- Main cables shall be terminated at the base of each pole. A dedicated 10 A MCB + 30mA RCD shall be installed at the base of each column for the luminaire supply. Refer to **Figure B** for details.

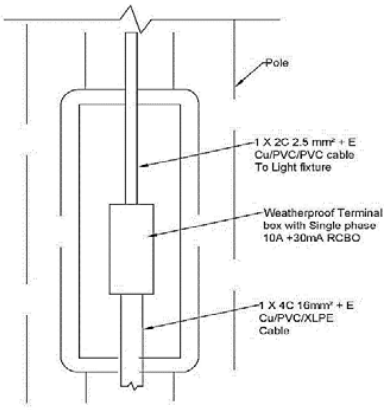


Figure B

- All the cables from the base of the poles to the luminaires shall be a minimum of 2C+Earth 2.5 Sq.mm Cu/PVC/PVC.
- Consultants shall provide detailed drawings indicating the above arrangement clearly.
- The number of circuits shall suit circuit loading and voltage drop calculations.
- All circuits shall be a loop in, loop out arrangement.
- The insulation of the cables shall be coloured as shown in the table below:

Circuit	Type	Colour
Three phase circuits	A Phase	Red
	B Phase	White
	C Phase	Blue
	Earth Conductors	Green and Yellow
	Neutral Conductors	Black

5.11.5 ELECTRICAL PITS

- Pits shall be located adjacent to each pole.
- Pits are required at every road crossing and horizontal/vertical changes of direction of conduits.
- A pit shall be installed adjacent to the MSB.
- Pits shall be located to minimise water ingress and must be finished flush to the Finished Floor Level (FFL).
- Refer to **Annexure 9** for details.

5.12 MAIN SWITCHBOARD (MSB)

- Refer to **Annexure 3.1 and 3.2** for the City's standard drawing for single/three-phase MSB size and details.
- Shop drawings for the MSB must be submitted for review and approval by the City before manufacture.
- If a non-standard MSB is required, shop drawings shall be provided for review; written approval must be obtained before manufacturing and installing the MSB.

5.13 MAIN EARTHING

- Refer to **Annexure 12** for main earthing schematics.
- Earthing shall be Multiple Earthed Neutral (MEN) type.
- Main earth electrode size and depth – Shall comply with AS/NZS 3000 requirements.
- All exposed earth electrodes and clamps shall be galvanised to prevent rusting.
- Suitable earth clamps shall be used for connection of earthing cable to the earth rod, with warning tags engraved with "Main Earthing conductor – Do Not Disconnect"
- Earth pits shall be used to access main earth electrode. To be installed adjacent to the MSB and shall be flushed with the FFL.
- Main earthing cable size shall be designed by an Electrical consultant based on fault levels.
- Main earthing cable shall be run in a PVC HD conduit between the earth pit and the base of the MSB.
- Above earthing arrangement shall be submitted along with the electrical reticulation design, for the City's review and approval.
- The depth of the earth rod and size shall comply with AS/NZS 3000 requirements.

5.14 LIGHTING CONTROL SYSTEM

- All functional lighting shall be supplied from its dedicated lighting circuit and controlled by a PE cell. The PE cell must be installed on a luminaire or pole closer to the MSB.
- No other type of control system apart from that specified above must be used for functional lighting.
- Dynamic/ Decorative lighting – the lighting control system must be approved by the City prior to progressing lighting design.
- Drawings shall be submitted showing mounting details for decorative luminaires and the location of all electronic drivers and control equipment.

5.15 INSTALLATION, TESTING AND INSPECTION

- Installation of all Works shall be as per the drawings approved by the City.
- Any deviation from the approved drawings shall be reported back to the City and written approval must be obtained for any deviation before commencing any Works.
- At the practical completion of installation works, the contractor must organise a handover inspection to be attended by City lighting team representative.
- The City's representative will be available on site to carry out visual site inspections (post installation) of electrical and lighting assets.
- The electrical contractor must carry out all the electrical tests required as per AS/NZS 3017. The electrical contractor must organise and make available all relevant calibrated tools and equipment before commencing any electrical test on site. All electrical tests must be witnessed by the design consultant.
- The City's standard ABLOY padlocks (2) are to be installed to the MSB cabinet. Contact the City'ssecurity team at security@cityofsydney.nsw.gov.au.
- The contractor must supply and install asset ID labels. Refer to **Annexure 10** for details.
- A laminated copy of the As-Built drawing and Single Line Diagram (SLD) must be attached to the inner side of the MSB cabinet door.
- The Council will advise of the defects list, if any. Upon receiving it, the contractor must address the issues and arrange for final inspection.
- The contractor shall provide As-Built drawings before arranging a final inspection. Refer to section 5.17 of this document for As-Built drawing requirements.
- The contractor shall provide a signed copy of the City's "Details of new lighting installation inspection, test and completion certificate" as per **Annexure 2**.
- All lighting and electrical installation works, shall be certified by the design consultants on the project. The electrical consultant on the project must witness the electrical tests and sign off the certificate as per **Annexure 2**.

5.16 HOLD AND WITNESS POINTS

- Refer to Section 8.6 of these specifications in B8: Public Domain Lighting Construction.

5.17 AS-BUILT DRAWINGS REQUIREMENTS

The following information shall be provided on the As-Built drawings in AutoCAD and PDF format:

- Drawings in AutoCAD and PDF format stamped "AS-BUILT" showing pole locations with GPS coordinates and offset dimensions as per site reference points. Plans must be provided in hard copy and electronic format, based on Australian Height Datum (AHD) and Map Grid of Australia 2020 (MGA2020) orientation, Zone 56.
- The pole schedule, including footing type, Asset ID label numbers, pole height, pole offset, pole type, luminaire details, outreach arm length, luminaire mounting height, pole colour and luminaire colour.
- The drawing, indicating electrical conduits layout, pits and cable runs per conduit including depths, offset and circuit labels as installed on site for the complete installation. Cables and conduit size shall be specified on the drawing.
- Location of the MSB and Pillar number from where the MSB is fed from or the Ausgrid Pole number/ location in case of Special Small Services (SSS) supply.
- Footing drawings and designs as installed on site, certified by a suitably qualified practising structural consultant.

5.18 HANDOVER DOCUMENTS

Below documents need to be submitted as part of handover:

- As-built drawings as per the requirements specified in section 5.17 above.
- Certification by a suitably qualified practising structural consultant for footings, stating that the installation is fit for purpose and complies with the approved design and site-specific underground obstructions and soil conditions.
- Electrical contractors must issue a Certificate of Compliance for Electrical Work (CCEW) form for all electrical installation works. CCEW forms are available from NECA. It is essential that the installation work complies with AS/NZS3000 Wiring Rules and any other relevant standard and is tested as required andcertified as being safe.
- A copy of Notification Of Service Work (NOSW) must be provided.
- An electrical design and installation certification from the electrical consultant engaged on the project as per Annexure 2.
- A lighting engineers' certification confirming that the installed lighting complies with the design intent.
- Operation and maintenance manual including product manuals.
- Product warranties.

5.19 REVISION REGISTER

Revision	Clause	Description of Revision	Authorised By	Date
Rev. 6	5.17	Updated to MGA2020	SA	Aug-23
	Title	Titles revised from "A5 - Street Lighting Design" To A5 – Public Domain Lighting Design		

ANNEXURE 1: LIGHTING DESIGN BRIEF AND CERTIFICATE

City of Sydney Technical Services Use Only	
CoS Design Requirements:	Scheme:
DA Number:	Signed by City Infrastructure Lighting Representative:

Location	Lighting Category	Column Type	Lanten Type	Lamp Source

The following sections to be completed by the ACCREDITED LIGHTING DESIGNER and approved by the City of Sydney Council, City Infrastructure PRIOR to any work commencing:

Location				
Lighting Category				
Computer package used				
Mounting Height (m)				
Column arrangement				
Overhang (m)				
Effective Width (m)				
Lantern Type				
Lamp Type & Wattage (W)				
Lamp Design lumens				
Maintenance Factor				

ANNEXURE 1: LIGHTING DESIGN BRIEF AND CERTIFICATE

Location			
Required Maintained Ave			
Calculated Maintained Ave			
Required (Up maint) or (Uo)			
Calculated (Up maint) or (Uo)			
Required Min (Eh maint)			
Calculated (Eh maint)			
Required (Ev maint)			
Calculated (Ev maint)			
Required Min (UL)			
Calculated (UL)			
Required Max Ti			
Calculated (Ti)			
Required Min (Es)			
Calculated (Es)			

Underground Cable size:	mm^2	Cable Type:	
Calculated Volt drop:	V	Calculated Loop Impedance of each leg:	Ω
Overcurrent Protective Device of Outgoing Circuit:	AS	Rating:	A
Calculated Short Circuit current of each leg:	KA		
Maximum disconnection time 0.4 seconds:			

Mains Switch: AS	Type:	Rating:	A
Number of Poles:			
Contactor/Relay type:	Rating: A	No. of Poles:	

Electronic Time Clock:		Type:	
Power	Supply: V	Phases:	
Method of Earthing:			

ANNEXURE 1: LIGHTING DESIGN BRIEF AND CERTIFICATE, CON'T

NOTE: All calculations to be shown on a separate sheet.

I/we being the person(s) responsible (as indicated by my/our signatures below) for the design of the lighting/ electrical installation, particulars of which are described on Page 1 and 2 of this form certify that the said work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with the current Code of Practice for Lighting AS1158, City of Sydney current specification for the installation of public domain lighting and the Rules for Electrical Installations published in AS3000, except for the departures, if any, stated in this certificate. The extent of the liability of the signatory is limited to the work described above as the subject of this

For the design installation at:	
Name of Designer: (BLOCK Letters)	Position:
Company Name:	
Signature:	Date:
For and ON BEHALF of CLIENT:	
Address:	
City of Sydney Technical Services Use Only.	
Checked By: (Name in BLOCK letters)	Position:
Signature:	Date:

Note: LIGHTING DESIGN BRIEF CERTIFICATE TO BE COMPLETED, CERTIFIED AND RETURNEDALONG WITH THE LIGHTING/ELECTRICAL DESIGN

ANNEXURE 2: DETAILS OF NEW LIGHTING INSTALLATION INSPECTION TEST AND COMPLETION CERTIFICATE.

All commissioning and pre-handover inspections are to be carried out by the *contractor and witnessed by an accredited representative from City of Sydney, City Infrastructure. All completed forms are to be submitted to theCity of Sydney. All electrical tests shall be witnessed by the electrical design consultant.*

VISUAL INSPECTION

Location:
Contractor:
Type of Installation: (e.g. street lighting, Park lighting, Plaza lighting, wall lighting, illuminated sign, etc.)
Date of Inspection:

STRUCTURAL INSPECTION

Mark ☑ Satisfactory or ☒ Unsatisfactory On Completion:

☐	1.	Location of Lighting Equipment as per Drawing
☐	2.	Planting Depth/Footing size of Lighting Equipment as per Specification
☐	3.	Location of Cable as per Drawing
☐	4.	Depth of Cable as per Specification
☐	5.	Location of Road Crossing as per Drawing
☐	6.	Depth of Road Crossing as per Specification
☐	7.	Column footing as per Specification
☐	8.	Verticality Correct
☐	9.	Optical Orientation Correct

ANNEXURE 2:
DETAILS OF NEW LIGHTING INSTALLATION INSPECTION TEST AND COMPLETION CERTIFICATE, CON'T

Mark ☑ Satisfactory or ☒ Unsatisfactory On Completion:

1.	☐	Correct termination of cables in the column, lantern and control gear
2.	☐	Circuit conductors identified correctly
3.	☐	Conductor size correct for normal operation (or as specified)
4.	☐	Single pole or fuse in the phase conductor only
5.	☐	Method of Protection against Direct Contact
	☐	a) Insulation of live parts
	☐	b) Barrier or enclosure
	☐	c) Out of reach (overhead lines only)
6.	☐	Method of Protection against Indirect Contact
	☐	a) Presence of Protective Conductors
	☐	b) Presence of main equipotential bonding conductor
	☐	c) Presence of supplementary equipotential bonding conductor including doors of steel columns but excluding that of concrete columns
7.	☐	Presence of method of local isolation
8.	☐	Fuse ratings correctly rated for their purpose
9.	☐	Labelling in control pillar/switchboard enclosure of isolators and fuses
10.	☐	Prevention of mutual detrimental influence. Proximity of non-electrical services (e.g. fences or safety barriers)
11.	☐	Selection of equipment and protective measures appropriate to external influences
12.	☐	Adequate access to installed equipment
12.	☐	Presence of danger notices or other warning notices
14.	☐	Presence of circuit diagrams enclosed within control pillars/switchboard enclosure
15.	☐	Installation method of cables
16.	☐	Deviation from the materials listed in the specification
17.	☐	Other

ANNEXURE 2:
DETAILS OF NEW LIGHTING INSTALLATION INSPECTION TEST AND COMPLETION CERTIFICATE, CON'T

Details of new lighting installation inspection test and completion certificate.

(All entries recorded on this sheet to be determined by measurement. All instruments must bear a current calibration label).

Date of Test:___/_____/ _____

Instruments to be Used Date when calibrated

Voltmeter 240/415V

Ammeter 0–50 amp Megger 500V

Loop Impedance Meter Prospective Short Circuit Tester

Control Pillar

Installation de-energised (with all fuser carriers removed)

Continuity of Protective Conductors **Polarity** (Rph + Re):-

Mark ☑ Satisfactory or ☒ Unsatisfactory

Circuit 1	Ω	Circuit 1	☐
Circuit 2	Ω	Circuit 2	☐
Circuit 3	Ω	Circuit 3	☐
Circuit 4	Ω	Circuit 4	☐

Insulation Resistance
(Note: Remove neutral conductor from PME system)

Circuit 1	P-N	Ω	Circuit	Column No.	
	P-E	Ω		P-E	MΩ
	N-E	Ω		N-E	MΩ
Circuit 2	P-N	Ω	Circuit	Column No.	
	P-E	Ω		P-E	MΩ
	N-E	Ω		N-E	MΩ
Circuit 3	P-N	Ω	Circuit	Column No.	
	P-E	Ω		P-E	MΩ
	N-E	Ω		N-E	MΩ
Circuit 4	P-N	Ω	Circuit	Column No.	
	P-E	Ω		P-E	MΩ
	N-E	Ω		N-E	MΩ

Insulation Resistance (column wiring)
(All columns)

METHOD OF EARTHING: TN-C-S

ANNEXURE 2:
DETAILS OF NEW LIGHTING INSTALLATION INSPECTION TEST AND COMPLETION CERTIFICATE, CON'T

Installation Energised

(Measurements taken under load at cut-out incoming terminals)

Voltage at Origin _____ V

Prospective Short Circuit Current at Origin_____KA

Loop Impedance at Origin _____ Ω

No. of Phases _____

Load at Origin _____ A

Measured Load		**Voltage at end of circuit**	
Circuit 1	A	Circuit 1	V
Circuit 2	A	Circuit 2	V
Circuit 3	A	Circuit 3	V
Circuit 4	A	Circuit 4	V

Loop Impedance at end of each circuit		**Prosp. Short Circuit Current at end of Circuit**	
Circuit 1	Ω	Circuit 1	KA
Circuit 2	Ω	Circuit 2	KA
Circuit 3	Ω	Circuit 3	KA
Circuit 4	Ω	Circuit 4	KA

ANNEXURE 2:
DETAILS OF NEW LIGHTING INSTALLATION INSPECTION TEST AND COMPLETION CERTIFICATE, CON'T

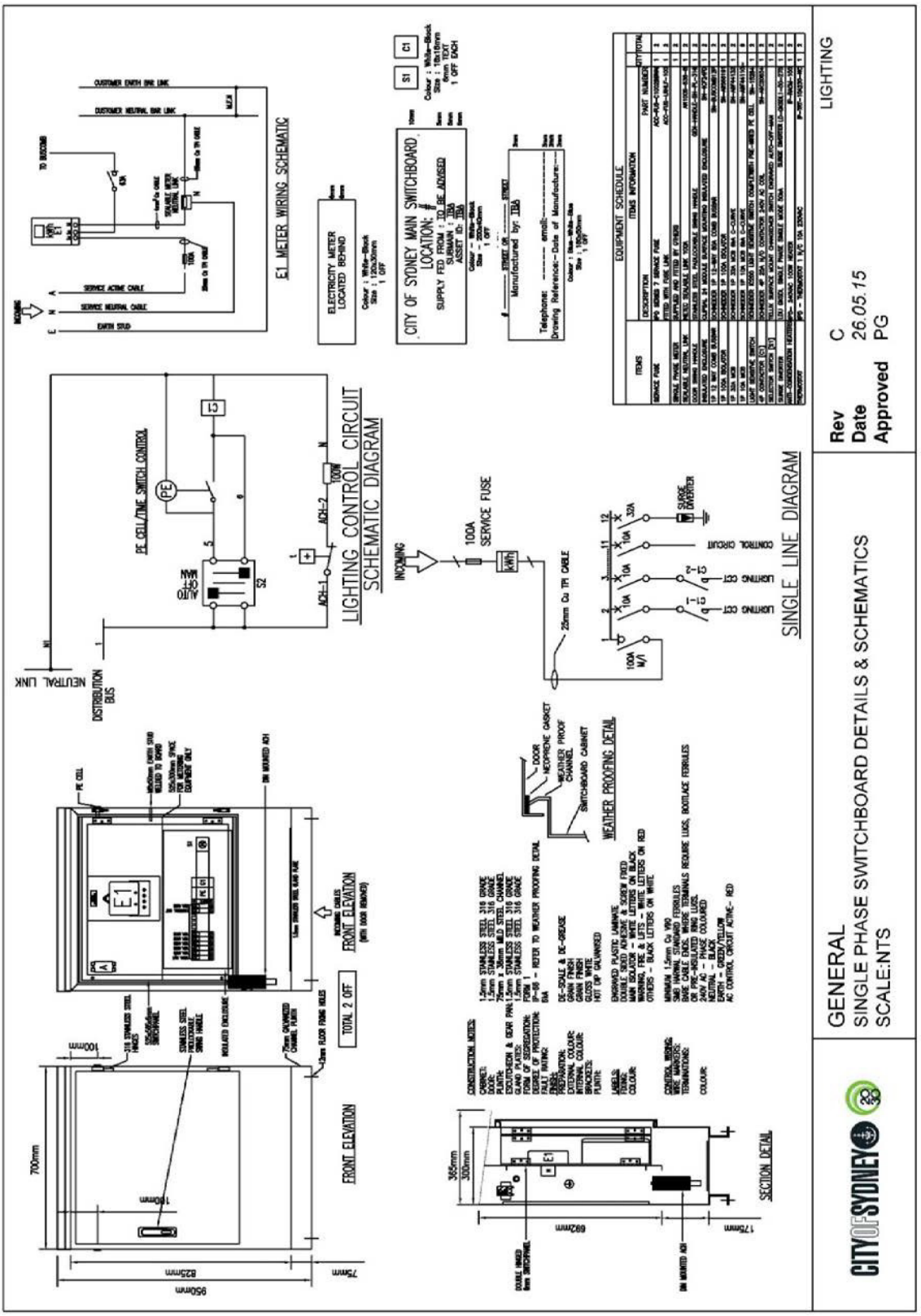
I/We being the person(s) responsible (as indicated by my/our signature(s) below) for the inspection and test of the street lighting and associated electrical installation particulars of which are described on the attached annexures of this form certify that the said work for which I/we have been responsible is to the best of my/ our knowledge and belief in accordance with City of Sydney current Specification for the Installation of Public Domain Lighting and the Rules for Electrical Installations (AS3000) except for departure, if any, stated in this certificate.

The extent of liability of the signatory is limited to the work described above as the subject of this certificate.

For the inspection and test of the installation at:	
Name: (BLOCK Letters)	Position:
Licence No.:	
Company Name:	
Signature: (of Contractor in BLOCK Letters)	Date:
For and ON Behalf of:	
Address:	
Witnessed by (Name) (Design consultant): (Name in BLOCK letters)	Position:
Signature:	Date:

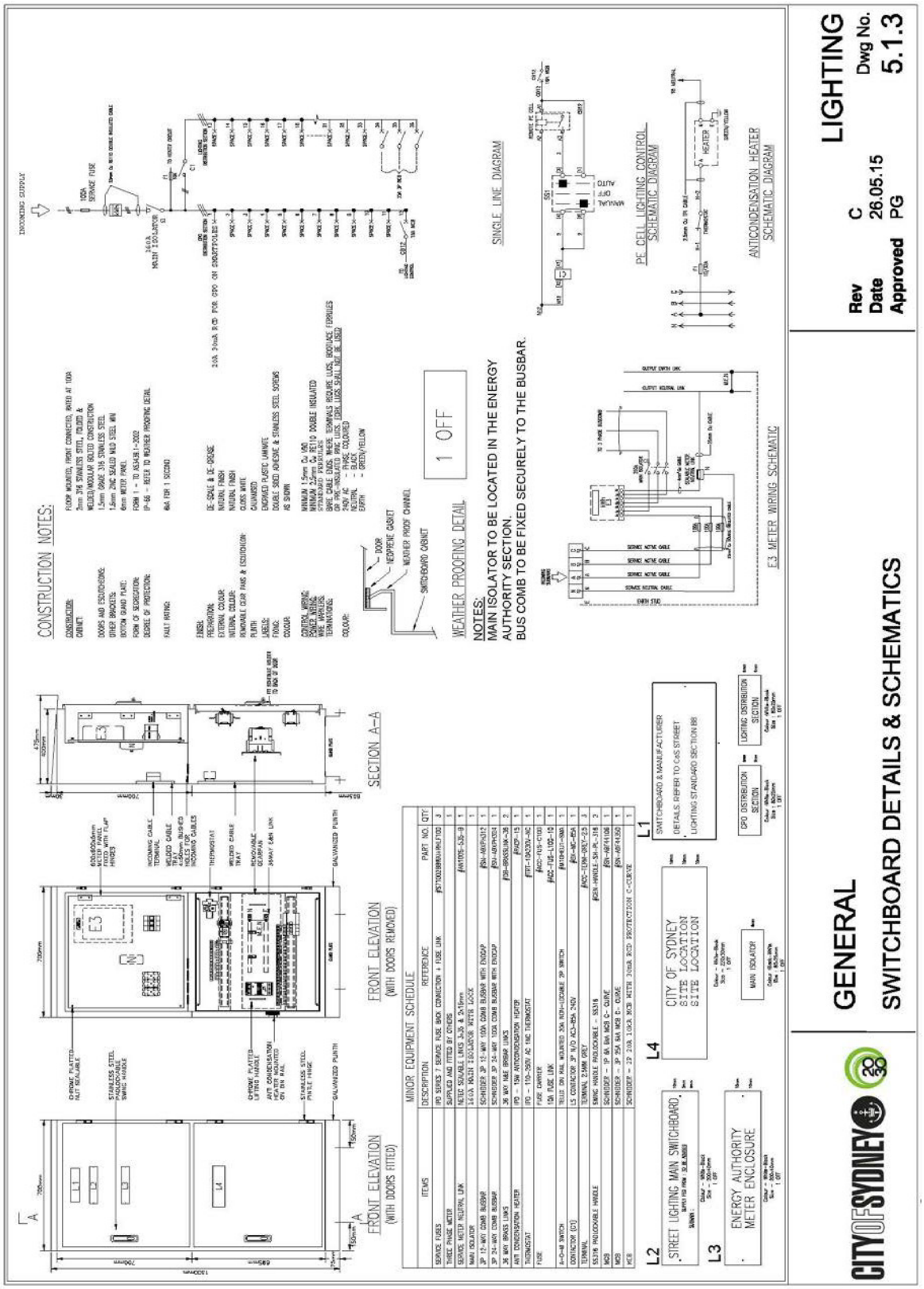
Comments:

ANNEXURE 3.1: STANDARD DRAWING FOR SINGLE PHASE MSB



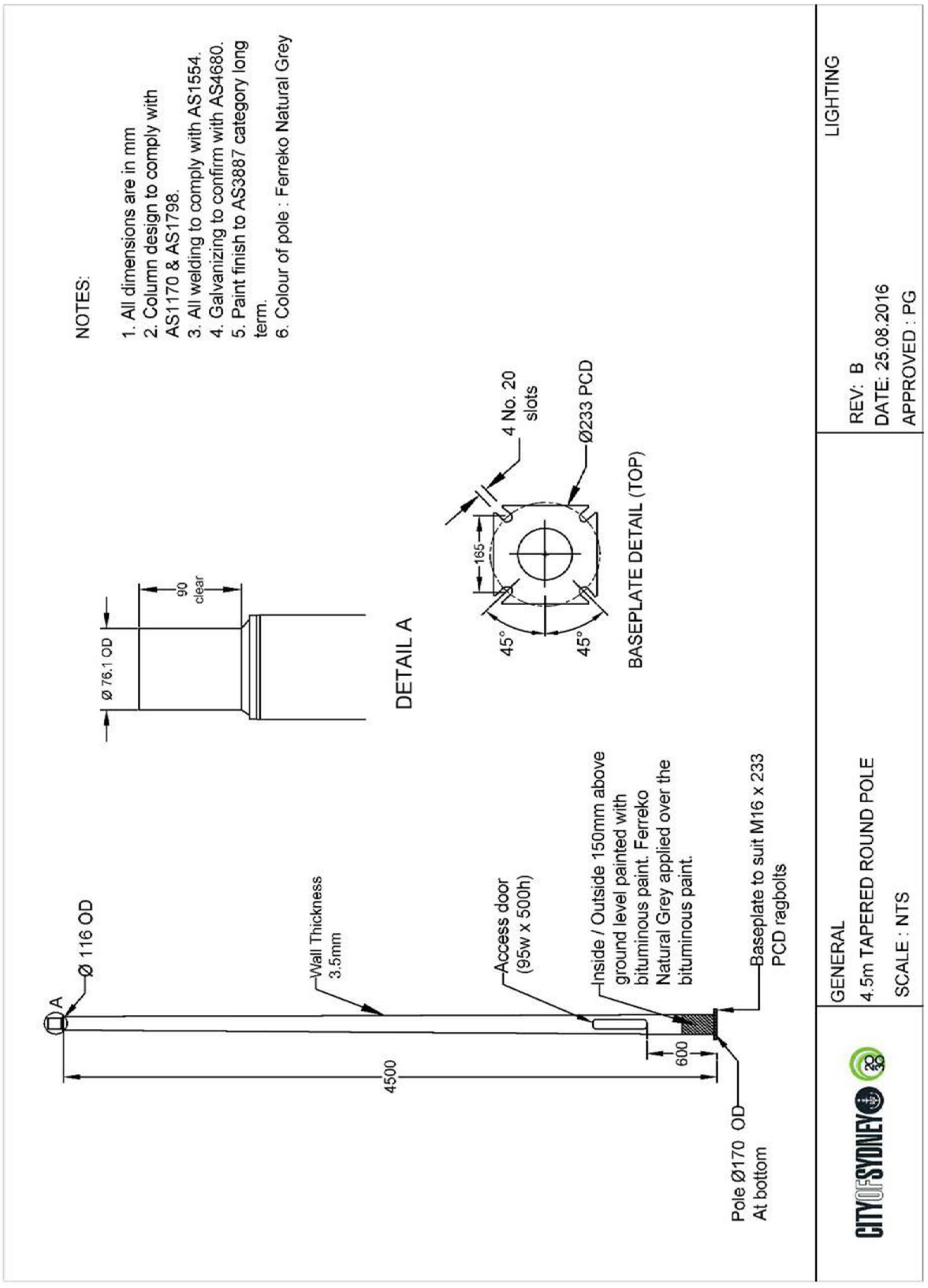
Note: Site-specific shop-floor drawings shall be submitted for approval prior to manufacturing.

ANNEXURE 3.2: STANDARD DRAWING FOR THREE PHASE MSB



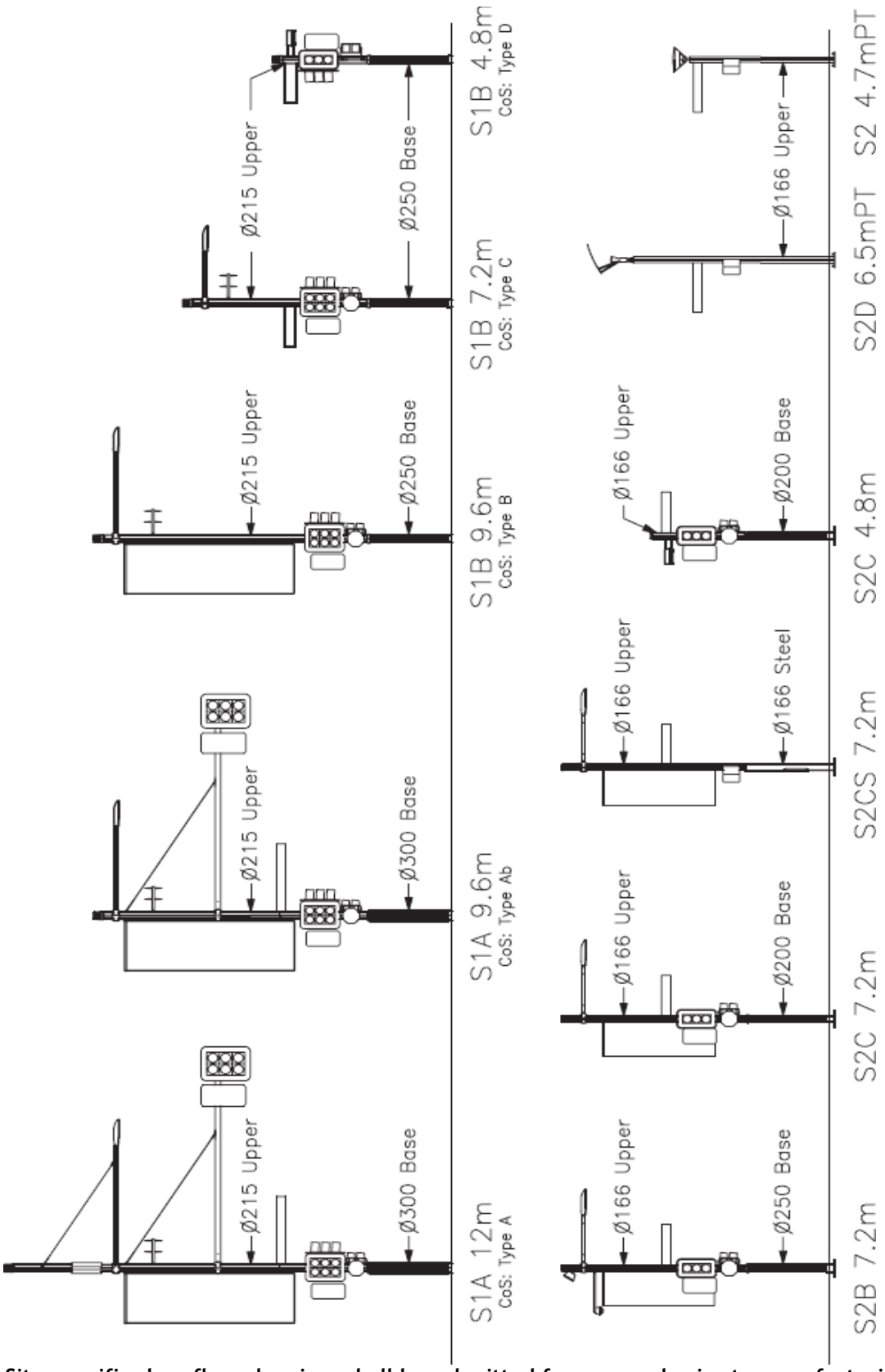
Note: Site-specific shop-floor drawings shall be submitted for approval prior to manufacturing.

ANNEXURE 4.1: STANDARD DRAWING FOR TAPERED PEDESTRIAN POLES (4.5M O)



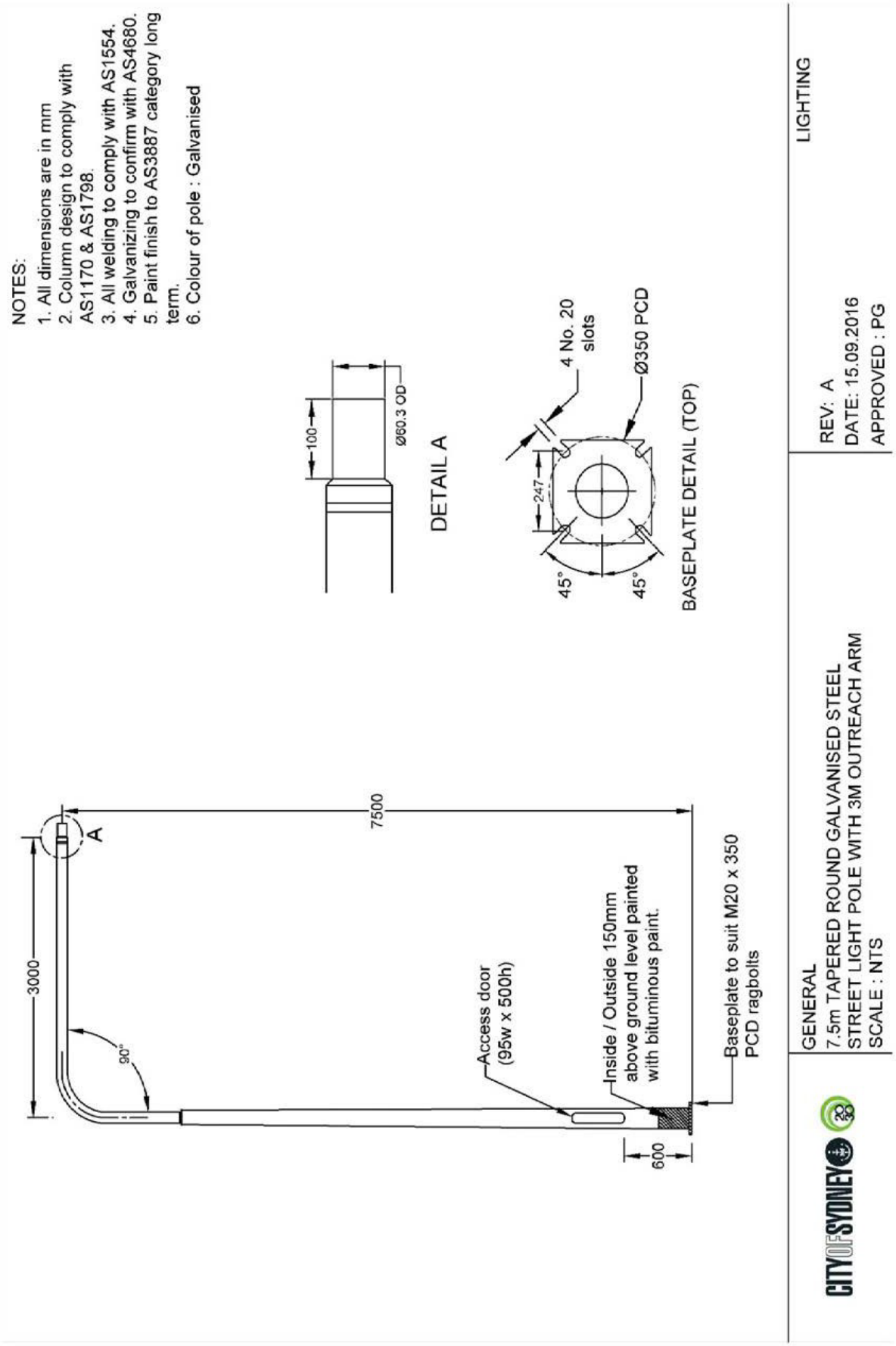
Note: Site-specific shop-floor drawings shall be submitted for approval prior to manufacturing.

ANNEXURE 4.2: STANDARD DRAWING FOR SMART POLES



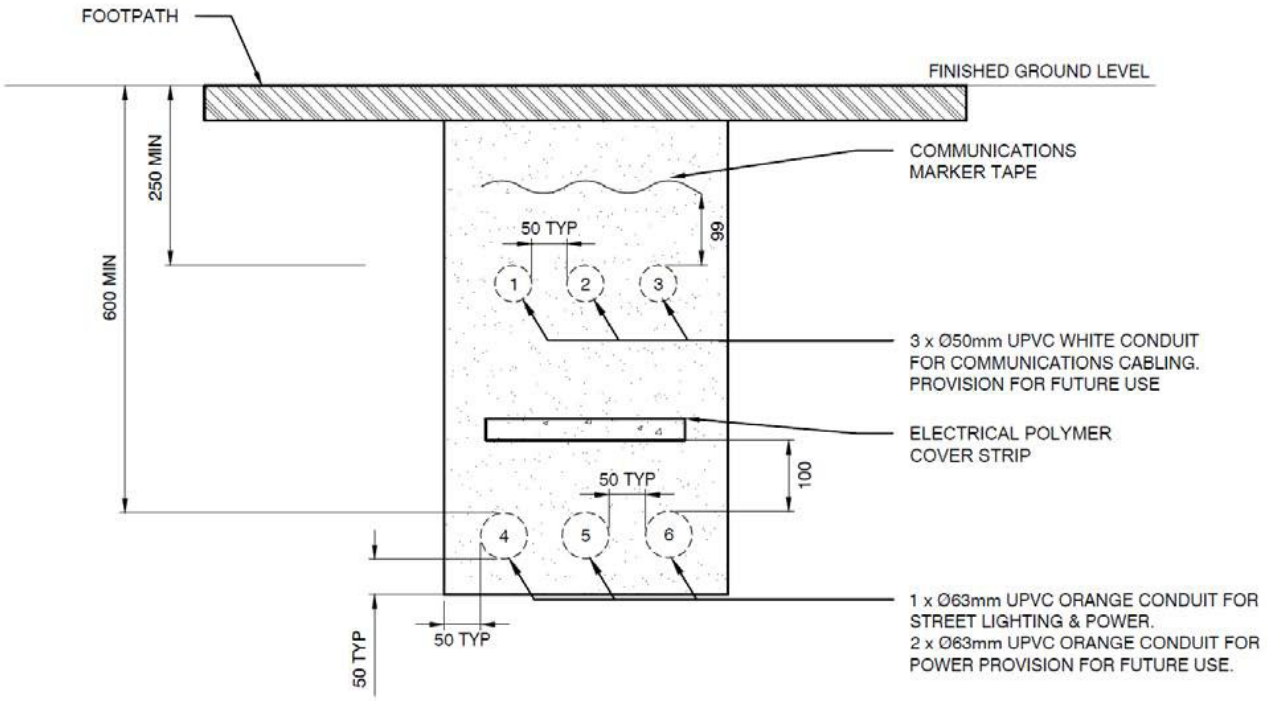
Note: Site-specific shop-floor drawings shall be submitted for approval prior to manufacturing.

ANNEXURE 4.3: STANDARD DRAWING FOR GALVANISED STEEL STREET LIGHT POLES

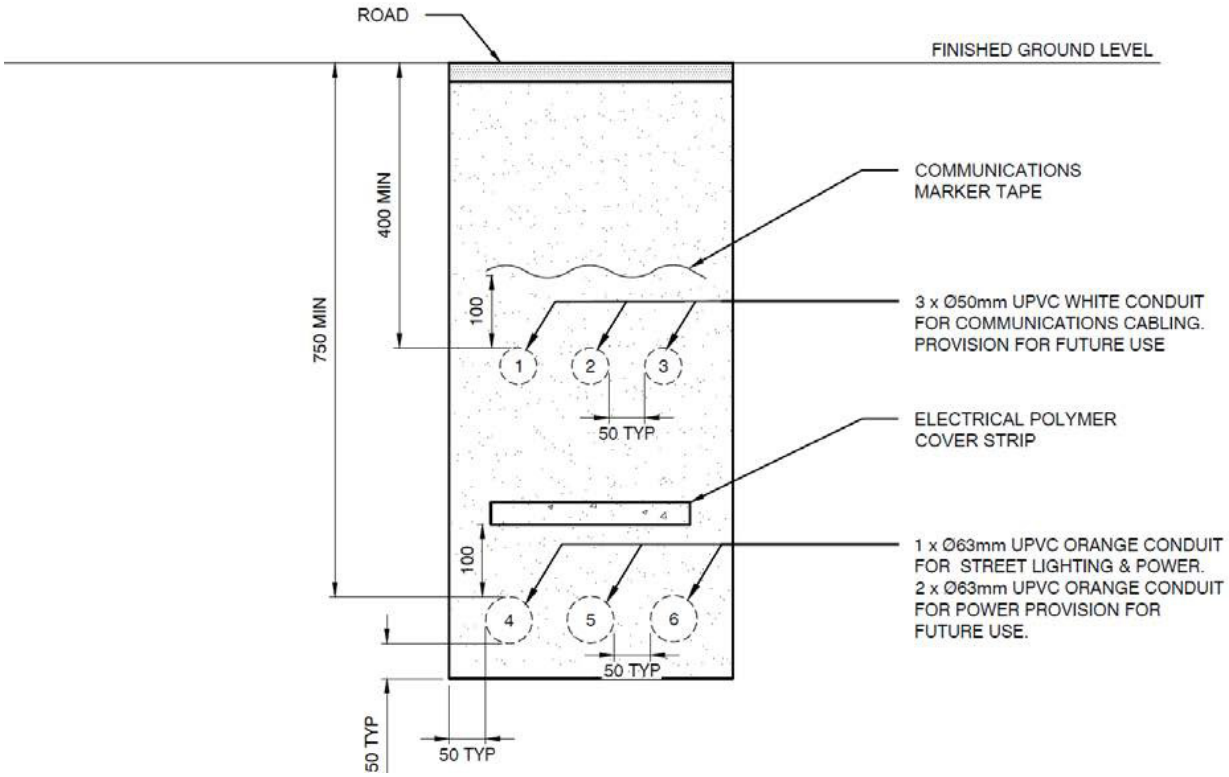


Note: Site-specific shop-floor drawings shall be submitted for approval prior to manufacturing.

ANNEXURE 5: TYPICAL ELECTRICAL AND COMMS CONDUIT ARRANGEMENTS

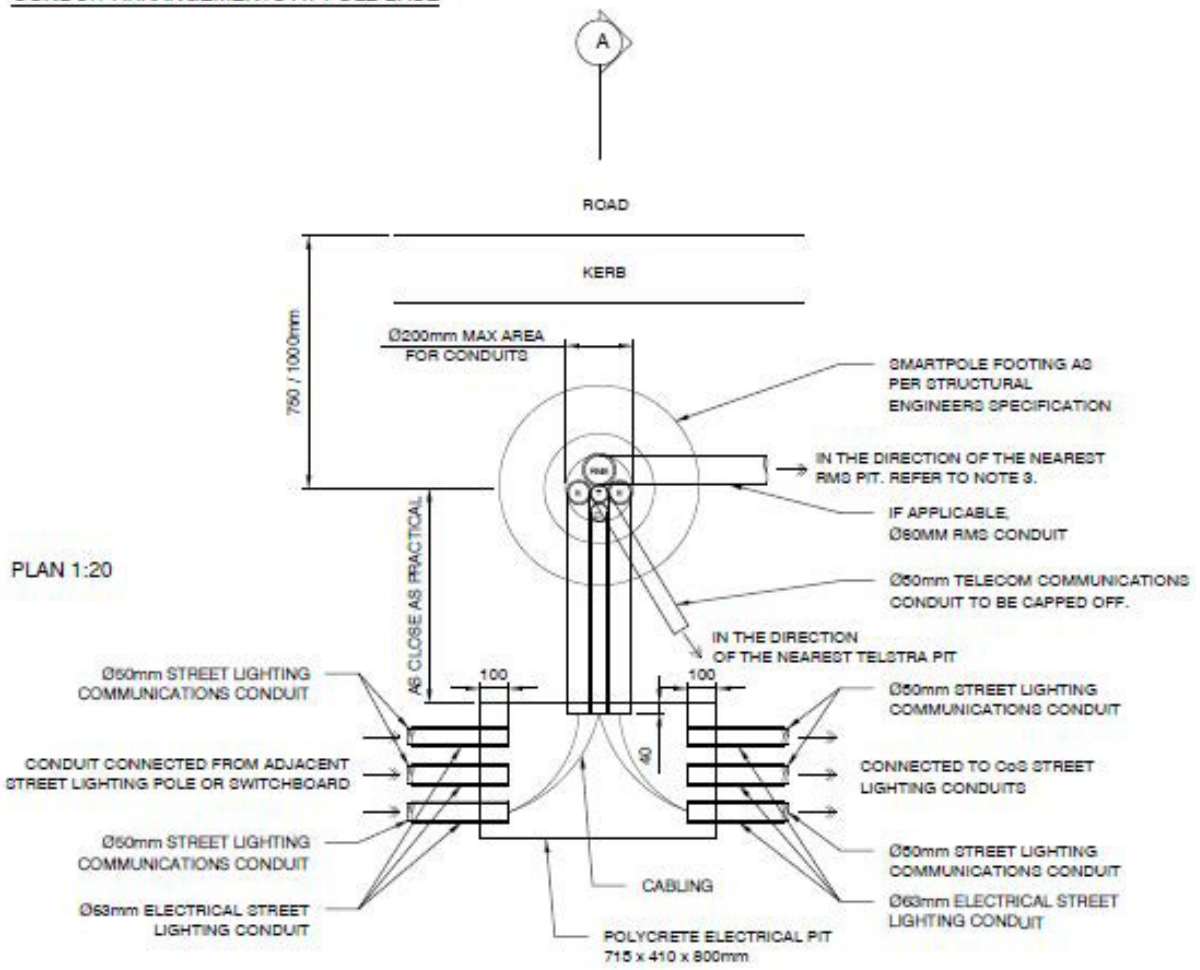


TYPICAL ELECTRICAL & COMMS CONDUIT ARRANGEMENT (ROAD)

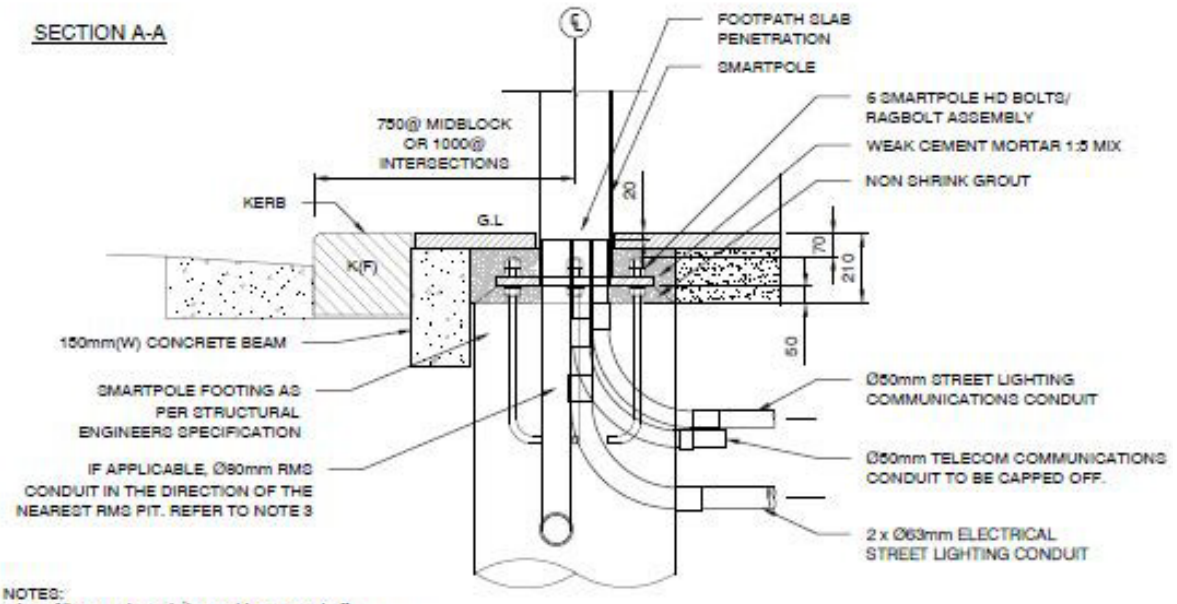


ANNEXURE 6: CONDUITS ARRANGEMENT AT THE BASE OF SMARTPOLES

CONDUIT ARRANGEMENTS AT POLE BASE



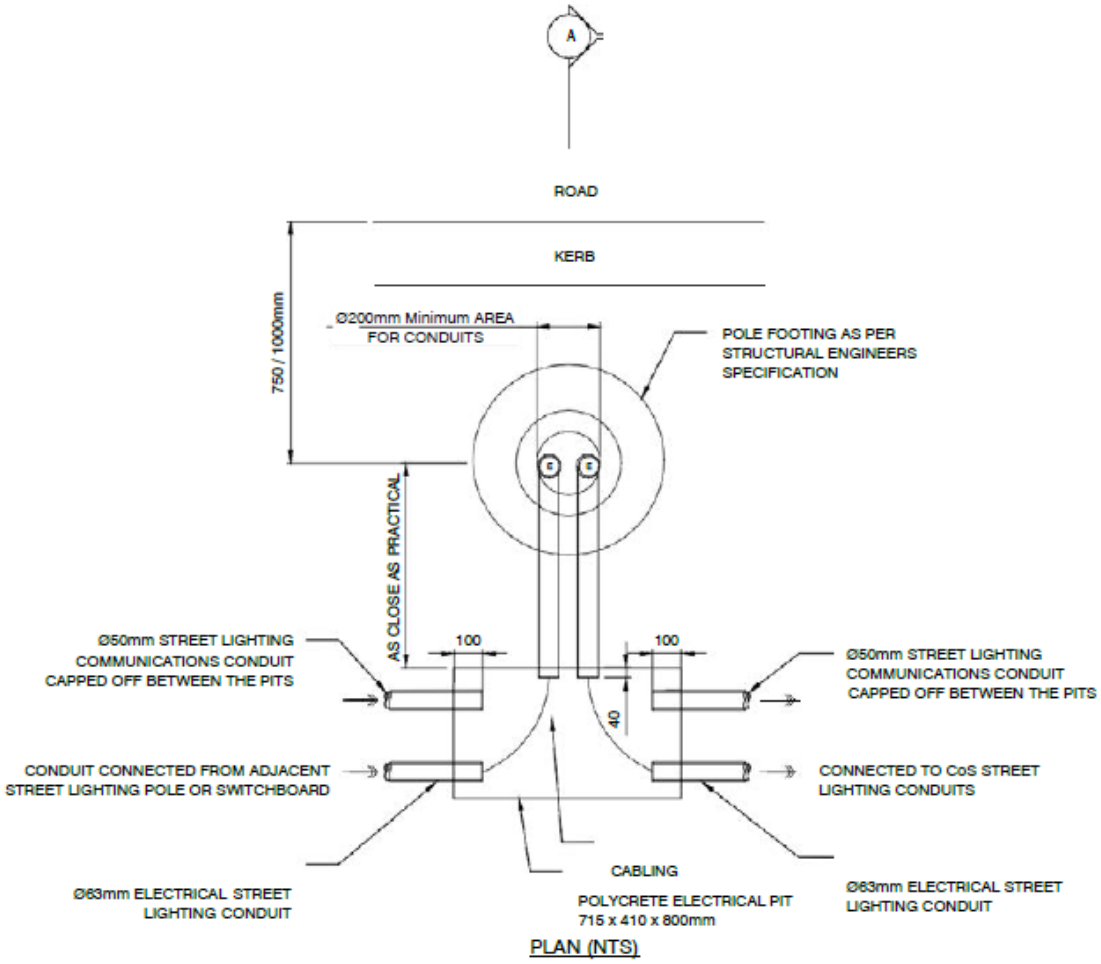
SECTION A-A



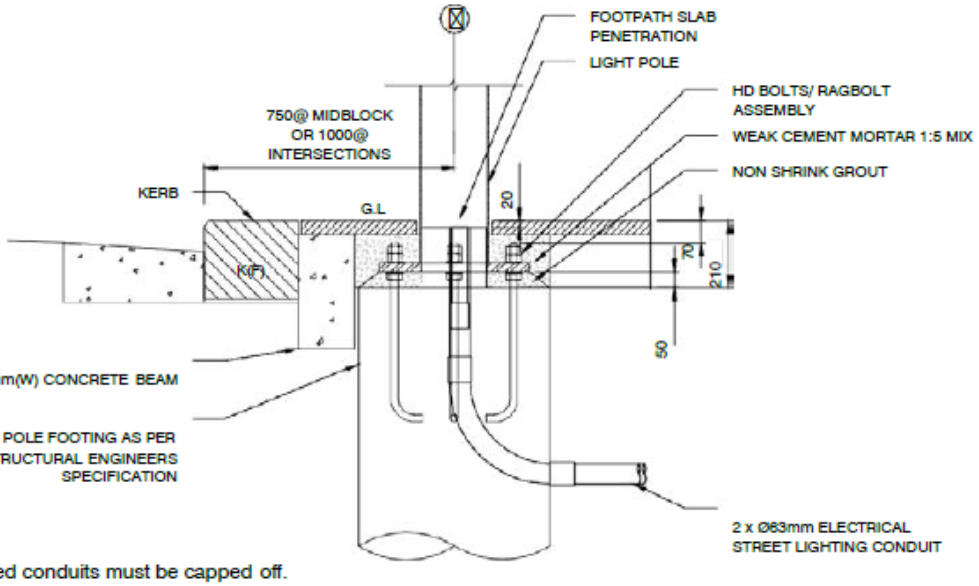
NOTES:
1. All unused conduits must be capped off.
2. Root barriers must be installed in trenches in close proximity to tree roots.
3. All dimensions are in mm.

ANNEXURE 7: CONDUITS ARRANGEMENT AT THE BASE OF STEEL OR PEDESTRIAN POLES

CONDUIT ARRANGEMENTS AT POLE BASE



PLAN (NTS)



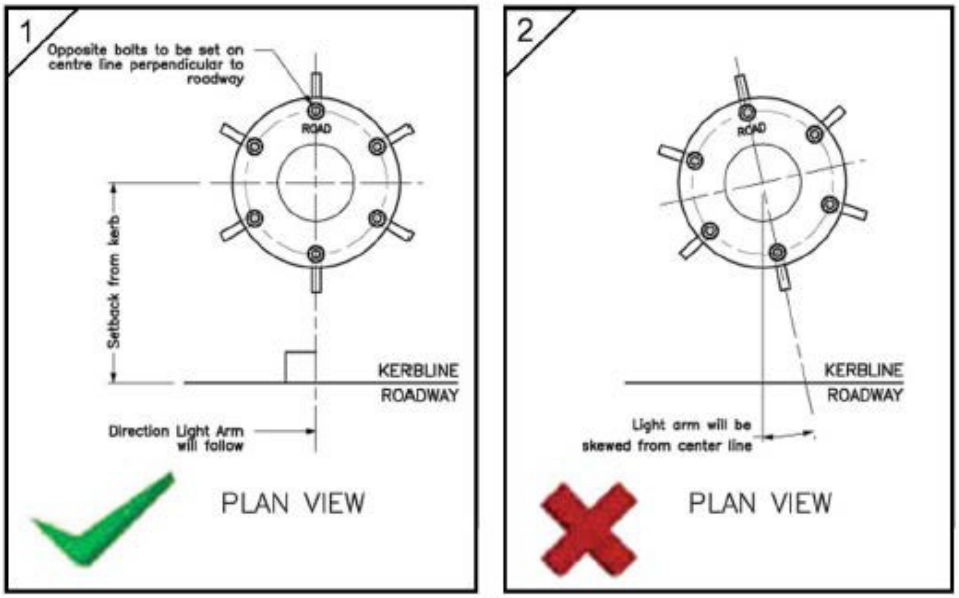
SECTION A-A

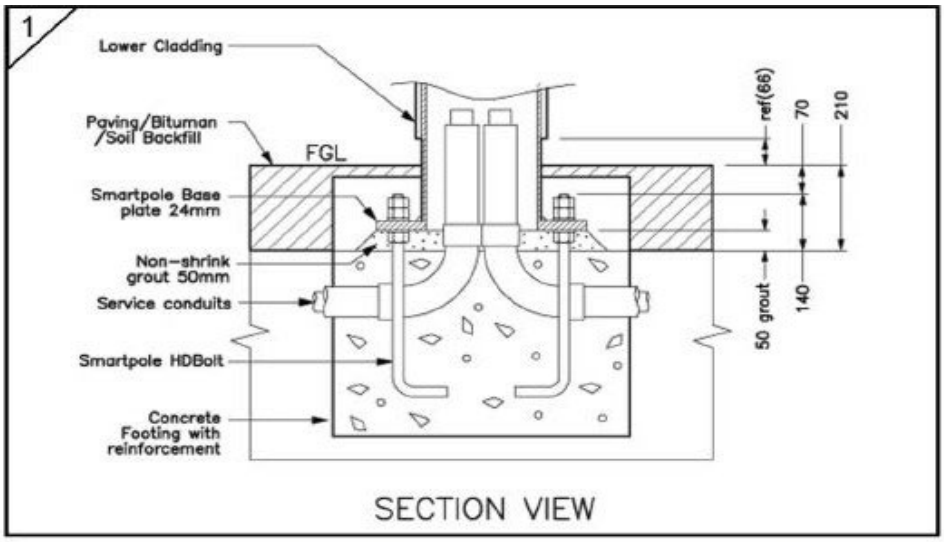
NTS

NOTES:

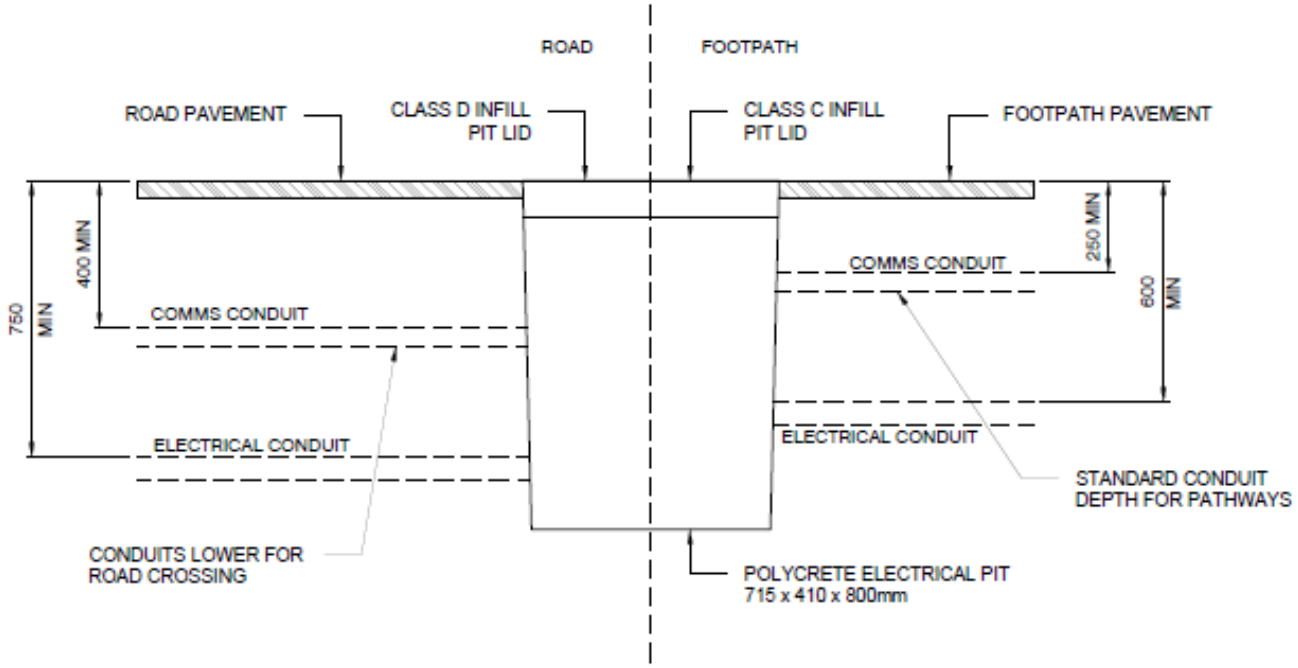
1. All unused conduits must be capped off.
2. Root barriers must be installed in trenches in close proximity to tree roots.
3. All dimensions are in mm.

ANNEXURE 8: SMART POLE HD BOLT SETUP

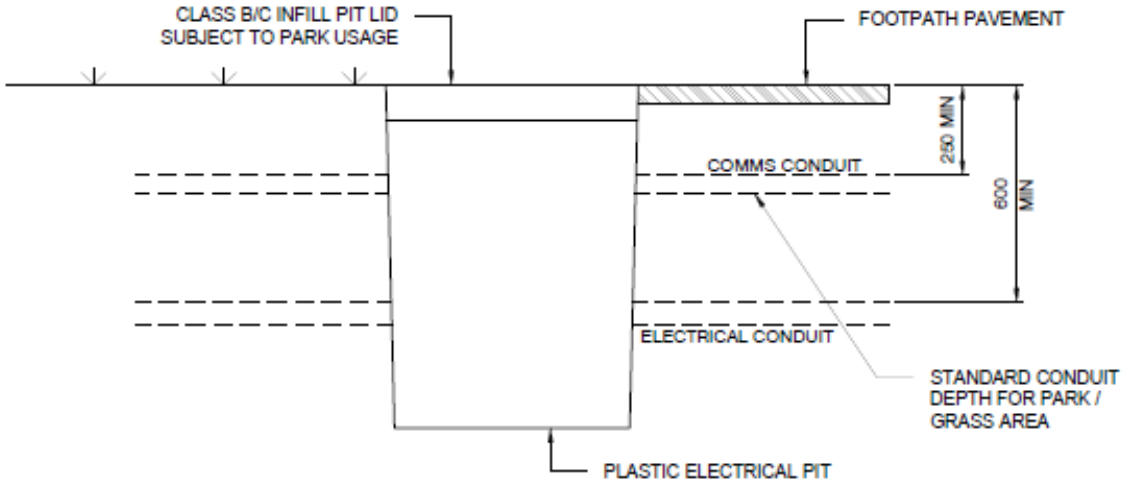




ANNEXURE 9: GENERAL ELECTRICAL PIT ARRANGEMENT



ELECTRICAL PIT ARRANGEMENT FOR ROAD / FOOTPATH

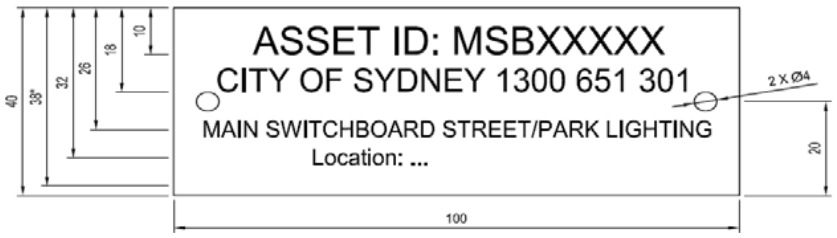


ELECTRICAL PIT ARRANGEMENT FOR PARKS

Pit lid is to have a 75mm diameter Stainless Steel disc engraved "CoS- Electrical" set flush with lid surface using epoxy adhesive.The disc should be slip resistant.

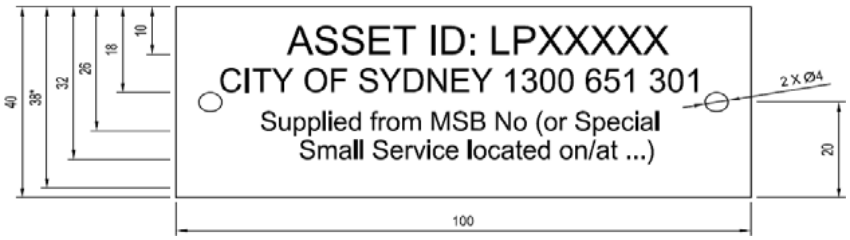
ANNEXURE 10: ASSET ID PLATE DETAILS

MSB ID PLATE



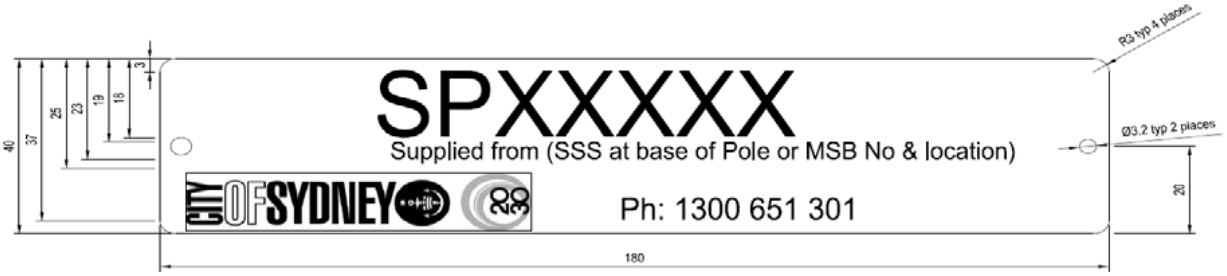
MSB ID PLATE DETAILS

POLE ID PLATE



POLE ID PLATE DETAILS

SMART POLE ID PLATE



SMART POLE ID PLATE DETAILS

NOTES:

- ARIAL NARROW 6mm HIGH FOR THE FIRST LINE OF TEXT
- ARIAL NARROW 5mm HIGH FOR THE SECOND LINE OF TEXT
- ARIAL NARROW 4mm HIGH FOR THE THIRD LINE OF TEXT
- DENOTES SPACE FOR THE 5TH LINE OF TEXT
- MATERIAL IS ALUMINUM 0.8mm THICK
- PLATE IS FITTED WITH 2 STAINLESS STEEL RIVETS OR SELF-DRILLING SCREWS
- TEXT TO BE ENGRAVED

ANNEXURE 11: LUMINAIRE INFORMATION MINIMUM REQUIREMENTS

Item	Description	Minimum Requirement	Units/Format
1	Maximum spacing achievablein meeting lighting design specification	Lighting design calculations to AS/NZS1158 Part 3.1 & Part 1.1 (AGi32 or Perfect Lite) to provide evidence of luminaire performance declared (including for shielding options)	m
2	Luminaire – Brand, Type& Model No.	Luminaire brand, type and explicit model numbering to be provided	Description in text
3	Luminaire System Wattage	Total luminaire system Wattage to be provided	W
4	Luminaire Initial Lumen Output	Total luminaire initial lumen output to be provided	lm
5	Luminaire System Efficacy(As per LM-79)	Total luminaire system efficacy to be provided	lm/W
6	LED Module – Brand, Type & Model	LED model brand, type and explicit model numbering to be provided	Description in text
7	Rated Life of LED Module Hours at L70	LED model lifetime operating hours to 70% ofinitial lumen output	hrs@L70
8	Correlated Colour Temperature	4000K	K
9	Colour Rendering Index	75+ Ra	Ra
10	Chromaticity Tolerance - Average Chromaticity Shift(Δu'v') at 6,000 hours	As per SA/SNZ TS 1158.6 Table 5.3	Δu'v' and tolerance
11	Provide options for glare control devices including unit price	It is preferable to have extra glare control options available (e.g. to address front, rear, front & rear and all around shielding needs)	Y/N
12	Power Supply (Driver) Brand, Type, Model	Power supply brand, type and explicit model numbering to be provided	Description in text
13	Power Supply Dimming & Constant Light Output Capability	DALI 2.0 dimmable power supply required withconstant light output capability. 0-10V Zhaga Book 18 power supplies compatible withDALI 2.0	Y/N
14	Power Supply Programming	Is manufacturer willing to pre-program DALI2.0-enabled power supplies with asset management data to a pre-agreed format?	Y/N
15	Smart Controls and Smart CityReadiness	NEMA/ANSI 7-contact socket and, where Zhaga Book 18 compliant interfaces are provided, these should be wired such that both NEMA/ ANSI 7 and Zhaga devices can control LED module switching and dimming.	Y/N
16	Surge Protection Device	20kV / 10kA	kV / kA
17	Ambient Operating Temp Range	To be stated	-XºC & +YºC

ANNEXURE 11:
LUMINAIRE INFORMATION MINIMUM REQUIREMENTS, CON'T

Item	Description	Minimum Requirement	Units/Format
18	Rated Life of Power Supply	100,000 hours or more preferred	X hrs. with y% total failure rate
19	Predicated Power Supply Failure Rate	0.2% per 1000 operating hours	% failure expected per 1000 hours (Based on Telcordia SR-332)
20	LED Drive Current	To be stated	mA
22	Electrical Class	Class I (single insulated) Class II (double insulated)	Y / N Y / N
23	IP Rating – Optical Module	IP66 preferred, IP65 minimum	IPXX
24	IP Rating – Gear Chamber	IP65 minimum	IPXX
25	IP Rating – Power Supply	IP66 preferred, IP65 minimum unless power supply is located within a gear chamber that isIP65 or greater	IPXX
26	Luminaire Body - Aluminium Alloy – Max Copper Content	As per as per SA/SNZ TS 1158.6 2.3.1 If cast or extruded aluminium alloy, LM6 grade alloy or better shall be used unless the manufacturer can provide acceptable evidence of performance outcomes for a differing alloy composition.	%
27	Luminaire Body Finish	Luminaire to be unpainted, Have all stainless steel fittingspre-greased Have regard to the galvanic series and provide a full list of metal components used in the luminaire along with commentary on the corrosion susceptibility of these materialcombinations Composite materials that are exposed to sunlight UVb tested to a minimum of 2000 hours	Y/N Y/N Description in text Y/N
28	Luminaire Dimensions	Luminaire dimensions to be provided	L x W x H in mm
29	Luminaire IK Rating	Minimum impact resistance (IK) rating of IK08.	IK0X
30	Wiring connection chamber	Have control gear/wiring connection chamberaccessible without the use of tools. Have removable covers secured to fitting in open position and self-supporting during connection/maintenance	Y/N Y/N

ANNEXURE 11:
LUMINAIRE INFORMATION MINIMUM REQUIREMENTS, CON'T

Item	Description	Minimum Requirement	Units/Format
31	Smart Controls Readiness	Top or bottom mounting acceptable. Preference is for luminaires with both NEMA/ ANSI C136.41 compliant 7-contact and ZhagaBook 18 compliant interface	Description in text
32	ROHS 2 Environmental Compliance	ROHS 2 environmental compliance preferred Suppliers are required to comment on environmental soundness of design and materials used in the manufacture of itemsoffered. In particular, reference to: a) Management of waste reduction. b) The use of re-usable and/orrecyclable packing. c) Extended producer responsibility for safe recycling or disposal of materials at the endof their life.	Y/N
33	Does the luminaire have an existing approval under the NSW Energy Savings Scheme?	Approval or willingness to seek approval (ifrequired under ESS Rules)	Y/N (If N, state willingness to apply for approval)
34	Luminaire optic/lens UVstabilisation method	Substantiation that degradation is insignificantover useful lifetime	Description in text
35	No Moving Parts	All luminaires shall have no moving parts (for example fans for thermal management)	Indicate Y/N
36	Component Fixing Devices	Toggle latches, catches, clips and hinges shall be stainless steel of not less than grade 304. In order to avoid electrolysis corrosion, brass and other copper alloys shall not be used in contact with aluminium or aluminium alloy. Control gear/terminal block chamber shall be accessible without the use of tools. Where toggle latches are used to secure an external supplementary visor, they shall be capable of maintaining the IP rating of the optical chamber throughout the design life of the luminaire as well as being capable of resisting inadvertent opening by animals.	Indicate Y/N foreach item

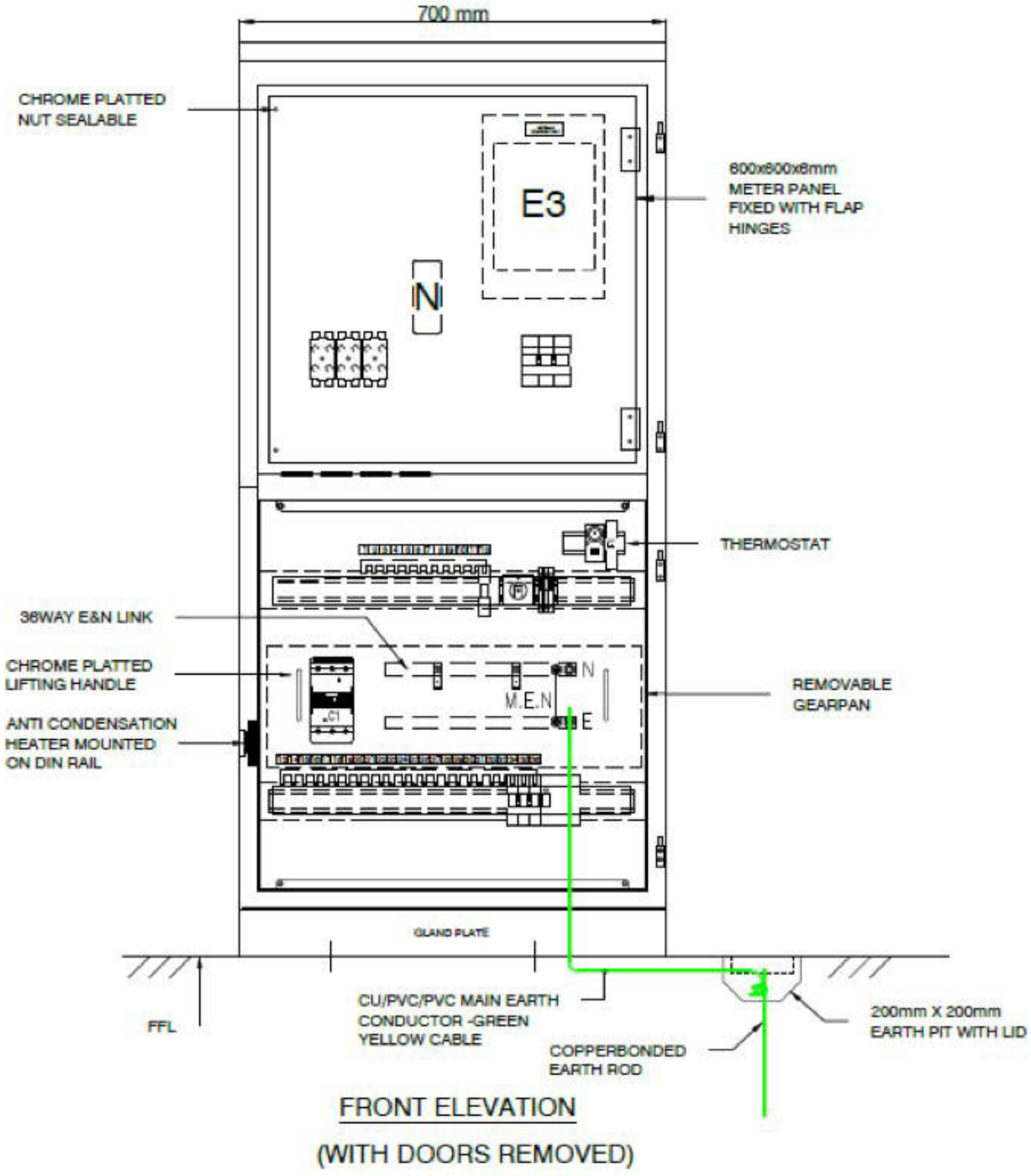
ANNEXURE 11:
LUMINAIRE INFORMATION MINIMUM REQUIREMENTS, CON'T

Item	Description	Minimum Requirement	Units/Format
37	Supporting Documentation (Provide ID number forrelevant file)	Confirm that the following documentation and supporting material (with test reports from a NATA-accredited laboratory or a laboratory whose accreditation is recognised by NATA under the mutual recognition scheme) is available if your product is short listed: 1. Product brochures, technical data sheets (excerpts only, as applicable to the specific product) and dimensioned drawings. Do not provide full range catalogue. 2. IESNA LM-79 test report 3. IESNA LM-80 and IES TM21 calculations and extrapolations 4. Test report or material batch evidenceof aluminium alloy copper content 5. Ingress protection test report as per the requirements of AS/NZS60598.1 6. Resistance to external mechanicalimpact as per AS/NZS 60598.2.3 7. Impulse voltage test as per Clause 5.5 of SA/SNZ TS 1158.6 8. Thermal endurance and thermal testing requirements as per Clause 5.6 of SA/ SNZ TS 1158.6 9. Lens material datasheets demonstrating UV stability 10. A luminous intensity distribution Table (I - Table) for the luminaire in CIE and IES file formats corresponding to the LM-79 report provided 11. Photometric file (IES or CIE) 12. Perfect Lite or AGi32 sampleinstallation analysis including a summary table for inputs todemonstrate conformance 13. A polar diagram clearly identifying peak intensity at 70, 75 and 80 in cd 15. ISTMT (In-SITU Temperature Measurement Test) report	Indicate Y/N for each item (and explanation for each negative response)

ANNEXURE 11:
LUMINAIRE INFORMATION MINIMUM REQUIREMENTS, CON'T

Item	Description	Minimum Requirement	Units/Format
37 Con't	Supporting Documentation (Provide ID number forrelevant file)	16. One operational demonstration sample luminaire of the exact specification tendered, wired in an electrically safe manner with 3m ofelectrical flex and 3-Pin mains plug 17. Supplier's current Quality Assurance accreditation certificate in conformity with AS/NZS ISO 9001 or equivalent international standard. 18. The supplier shall provide with theoffer information on: a. The period of service achieved by items offered within Australian service conditions. b. Customers who have a service history of the items offered. c. Contact names and phone numbers of relevant employees of those customers who can verify the service performance claimed. 19. Requirements beyond the scope of SA/SNZ TS 1158.6: a . Insulation Resistance Test – Clause 8.3.1 of AS 3100 b. Insulation resistance shall be measured at a voltage of 500 V d.c. c. The resistance between live parts and the external metallic body shall be not less than 1 MΩ d. High Voltage (Electric Strength Test) – Clause 8.4.2 of AS 3100 e. Test shall be applied as per clause 8.4.5 of AS 3100 and there shall be no disruptive discharges, that is, flashovers of insulation punctures during any high voltage test f. Spectral distribution graph	Indicate Y/N for each item (and explanation for each negative response)

ANNEXURE 12: MAIN EARTHING SCHEMATICS



FRONT ELEVATION

(WITH DOORS REMOVED)

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH 5.13 MAIN EARTHING REQUIREMENTS.
2. EARTH CABLE SHALL BE RUN IN DIA PVC RIGID HD CONDUIT.
3. EXPOSED EARTH ELECTRODE AND CLAMP TO BE GALVANISED.
4. MAIN EARTH CONDUCTOR SIZE TO BE CALCULATED BASED ON THE FAULT LEVEL
5. EXPOSED EARTH ELECTRODE TO BE INSTALLED IN A PVC CONDUIT

EARTH PIT PHOTO