



Electrical Services Minor Works in the Public Realm Specification

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ELECTRICAL AND LIGHTING SERVICES

Introduction

Intent

This document is intended for use without modification for the following:

- Period contracts for the provision of minor project works
- Period contracts for the provision of goods/materials
- Period contracts for the provision of labour

The information included is generic covering the range of possible goods and services that could be applicable to the works.

Comply with each part of this document as it relates to works applicable to the project or provision of goods and services.

City of Adelaide will generally provide a separate project brief or works description to define the scope of work applicable to the project or each part thereof in relation to provisions under a period contract.

Interpretation and Definitions

Consumer Mains	Electrical conductors, owned and maintained by the customer, connecting the Consumer Terminals to the Main Distribution or Switchboard which form part of the customer(s) installation.
Council	Refers to the Corporation of the City of Adelaide, 25 Pirie Street, Adelaide.
Documentation	The whole Contract package, in its entirety whether provided complete or as separate components e.g., drawings, specification, tender conditions, contract conditions, etc.
Provision	"Provides", and similar expressions mean "Supply, install, test, commission into service and maintain throughout the Contractors Defect Liability Period".
Replacement	Decommissioning, disconnection, removal of existing services and goods and provision of new services and goods according to documented details. If details are not documented, according to the current Australian Standards.
Supply	Supply, furnish and similar expressions mean "supply only" to the nominated storage or construction site.
Practical Completion	Practical Completion refers to the phase of a Construction Contract when the works are determined to be fit for use and have been constructed in accordance with the issued or agreed design and associated specifications. The Project Manager appointed from the CoA to oversee a Project will determine and issue a Certificate of Practical Completion.
Contractor Defect Liability Period	The Defects Liability Period is the time period specified in the Contract during which the Contractor is legally required to return to a construction site to repair any omissions or defects which have been identified in the Contractors work since the date of Practical Completion.



Final Completion	Final Completion refers to the phase of a Construction Contract when the works are determined to have achieved all the technical and performance requirements set out in the construction Contract. Final Completion Certificates are issued only after the expiration of the Defect Liability Period.
Possession of Site	Exclusive possession of the site by the City of Adelaide to the Contractor. The Contractor is responsible for the management of all WHS, after-care, security, insurance of materials etc while in Possession of the Site.
Consumer Terminals	The junction at which City of Adelaide electrical infrastructure interfaces with that of the Distribution Network Service Provider (e.g. SA Power Networks). This may be via a Point of Attachment, Fused or Unfused Pit etc.
London Road Depot	The London Road Depot refers to the City of Adelaide Maintenance and Operations Facility located at 10-24 London Road, Mile End South, SA, 5031 (08 8203 7203).
Public Realm	Relates to all parts of the built environment where the public has access.
Private Property	Relates to all assets not owned by the Corporation of the City of Adelaide.
Project	Refers to wholistic Works, including Contracted Works being undertaken by a Contractor for the Corporation of the City of Adelaide, from the award of Contract through to dispensation of Contract via a Certificate of Final Completion.
Site	Refers to the Contract Site and means the location specified in the Schedule where the Contract Works are carried out.
GAP Water	Refers specifically to water being used for irrigation purposes on Council Land supplied by SA Water under the Glenelg to Adelaide Parklands Recycled Water Project.

For additional definitions– Refer [Service & Installation Rules - SA Power Networks](#) and the Conditions of Contract between the Contractor and City of Adelaide.

Abbreviations

AS/NZS	Australian/New Zealand Standard
CCTV	Closed Circuit Television
CoA	City of Adelaide
e.C.o.C.	Electronic Certificate of Compliance
CST	Common Service Trench
DIA	Dedicated Internet Access
DIT	Government of South Australia Department for Infrastructure and Transport
DLP	Contractor's Defect Liability Period
ECC	Earth Continuity Conductor
EWP	Elevated Work Platform
GIS	Geographical Information System
HD	Heavy Duty
HV	High Voltage (>1001VAC)
IP	Ingress Protection
LV	Low Voltage (>50VAC, <1000VAC)
MCCB	Moulded Case Circuit Breaker
MEN	Multiple Earthed Neutral System
MIMS	Mineral Insulated Metal Sheath
MSB	Main Switchboard
PVC	Polyvinyl chloride
POA	Point of Attachment. Refer SA Power Networks "Services and Installation Rules"
RCBO	Residual Current Breaker with Over-Current
RCD	Residual current device
SAPN	SA Power Networks
UPVC	Unplasticized polyvinyl chloride
ACA	Australasian Corrosion Association
DFT	Dry Film Thickness
WFT	Wet Film Thickness
MSDS	Material Safety data Sheet
NACE	National Association of Corrosion engineers
TDS	Technical Data Sheet
GAP	Glenelg to Adelaide Park Lands Recycled Water Project

Standards, Regulations and Referenced Documents

Contractors are required to comply with all relevant and applicable Australian Acts and Standards including the following documents :

Electricity Act of SA	Electricity Act 1996 (legislation.sa.gov.au)
Environmental Protection Act	Environment Protection Act 1993 (legislation.sa.gov.au)
Road Traffic Act	Road Traffic Act 1961 (legislation.sa.gov.au)
WHS Act	Work Health and Safety Act 2012 (legislation.sa.gov.au)
WHS Regulation	Work Health and Safety Regulations 2012 South Australian Legislation
CoA Construction Standard Drawings	City of Adelaide's requirements for how construction drawings compiled by the Contractor are to be presented and supplied to City of Adelaide (Construction standards and guidelines – City of Adelaide).

Australian Standards

AS/NZS3000 - Wiring Rules

AS3008 - Electrical Installations - Selection of Cables Part 1 -
Cables for alternating voltages up to and including 0.6-1KV

AS61386 – Conduit Systems for cable management, Part 1:
General Requirements

AS1742 – Manual of Uniform Traffic Control Devices

AS2053 – Conduits and fitting for electrical installations

AS2648 – Underground marking tape Non-detectable tape

AS1074 – Steel tubes and tubulars for ordinary service

AS3996 – Access covers and grates

AS1939 - Degrees of protection provided by enclosures for
electrical equipment (IP Code)

AS60529 - Degrees of protection provided by enclosures (IP Code)
(Reconfirmed 2018)

AS3947 - Low-voltage switchgear and control gear - General rules

AS2184 - Low voltage switchgear and control gear - Moulded-case
circuit-breakers for rated voltages up to and including 600 VAC
and 250 VDC

AS3111 - Approval and test specification - Miniature overcurrent
circuit-breakers (Reconfirmed 2020)

AS3190 - Approval and test specification - Residual current
devices (current-operated earth-leakage devices)

AS1289 - Methods of testing soils for engineering purposes

AS2150 – Hot mix asphalt – A guide to good practice

AS2891 – Methods of sampling and testing asphalt

AS3972 - General purpose and blended cements

AS4970 – Protection of trees on development sites (Reconfirmed
2020)

AS1742 - Mapping Comparison: Guide to Temporary Traffic
Management

AS3600 – Concrete structures

AS1158 - Lighting for roads and public spaces

AS1026 - Electric cables - Impregnated paper insulated - For
working voltages up to and including 19/33 (36) kV

AS4000 – General Conditions of Contract

AS2124 – General Conditions of Contract

AS3017 – Electrical Installations – Testing

AS2312.1 – Guide to the Protection of Steel Against Atmospheric
Corrosion

AS1627 – Metal Finishing – Preparation and pre-treatment of
Surfaces

AS3894 – Site Testing of protective Coatings

SPCC-VIS 5 – Guide and Reference Photographs for Steel Surfaces
Prepared by Wet Abrasive Blast Cleaning



City of Adelaide

	Includes the City Works Guidelines, Urban Elements Framework and any other guidelines City of Adelaide identifies in writing to the Contractor from time to time as being applicable to the work activities being carried out.
City of Adelaide's Guidelines	Refer CoA website for : Construction standards & guidelines City of Adelaide
SAPN	Service and Installation Rules (Service and Installation Rules; (sapowernetworks.com.au))
City Works Guidelines	City Works Guidelines for work activities carried out in the public realm as identified in the Conditions of Contract between the Contractor and City of Adelaide.
Adelaide Design Manual	Adelaide Design Manual includes design standards and requirements of the use and provision of City of Adelaide assets.
City of Adelaide Urban Elements Catalogue	Urban Design Framework which includes the Urban Elements Catalogue (Technical Notes) and Adelaide Design Manual which is a catalogue of approved design and construction standards for use in the public realm in the City of Adelaide.

Note: Contractors are required to reference the CoA web site to obtain the current versions of CoA standard documentation prior to construction and comply with the current documentation requirements.

Documents for Information

Where the CoA Project Brief does not include site specific details, the Contractor may be required to source additional supporting information as follows:

- *Current Before You Dig Australia Referral Details (Source direct from Before-You-Dig-Australia ([Home | Before You Dig Australia \(BYDA\)](#)))*
- *GIS map illustrating the geographic location of the work site (Source from CoA – Capital Works).*
- *Survey drawings showing existing street services where available (Source from CoA – Capital Works).*
- *An accurate and up to date sub-terranean survey, identifying buried services and infrastructure.*

Any such information or opinion provided does not form part of the Contract, and the Tenderer agrees that the information shall not be a representation by the Corporation to the Tenderer.

Scope

General Requirements

The Works covered in this specification and the accompanying drawings for individual Contracts may include :

- Electrical devices in the public realm including but not limited to ticket machines, bus shelters, power bollards, barbeques.
- Lighting in the public realm including but not limited to streetlighting, floodlighting, veranda lighting, pole mounted, decorative lighting, wall or in-ground mounted.
- Consumer mains to private properties.
- Electrical maintenance work generally in the public realm.

The Scope of Work generally comprises the provision of a detailed design and supporting documentation, services, materials, equipment and installations, testing, commissioning, defect liability and maintenance during the DLP unless specified otherwise. The Works also includes, the removal of existing equipment and materials made redundant by the works, and the make good of all existing substrates and finishes.

Traffic Signals and CCTV are considered outside of the Scope of this Specification unless included in the package of works.

The Contractor shall be responsible for the technical and physical requirements of the system, any accompanying drawings, relevant National Standard Specifications, instructions issued by manufacturers of plant and equipment, instructions issued by Local Statutory Authorities, all other instructions issued by City of Adelaide's Representative in writing during the Work and as obtained by the Contractor by their own inspection and verification on site. No consideration will be given to any claim made arising from neglect of this provision. All existing infrastructure under City of Adelaide ownership remains the property of City of Adelaide unless otherwise specified in writing. In irrigated areas such as Park Lands additional specific protective paint applications are required. Confirm final details with CoA Representative prior to submitting Tender proposal. Refer to the Protective Coatings section of this Specification for more information.

NOTE: City of Adelaide may seek to retain items for maintenance purposes. Confirm with CoA prior to disposing of any removed items. Seek information from Project Manager prior to removals of CoA equipment as CoA Operations may seek these for spare parts etc.

Project Brief

The CoA may provide a Project Brief which would include the Scope of Works required and how project goals will be met. This brief may include drawings, sketch plans or other information to describe the Scope of Works and will usually form part of the Request for Tender (or other procurement) documentation.

Existing Services

Locations of the Existing Services on Site

It is the Contractor's responsibility to attend and identify on site, all the existing services before the commencement of any excavation. These existing services shall be identified by the relevant authorities or their nominated representatives. The Contractor shall pay all fees associated with the location and mark up of the existing services.

Before You Dig Australia

It is the Contractor's responsibility to contact Before You Dig Australia prior to commencing work on site. Documentation obtained from this service, considers existing services in the vicinity of the work site. The Contractor shall include the relevant information obtained from "Before You Dig Australia" within the "As Constructed" documentation set.

For details of underground Private Consumer Mains, the Contractor must consult with SAPN.

For details of any of City of Adelaide's underground services including public lighting, electrical, CCTV and Traffic Signal assets, requests should be made to the CoA via telephone on 08 8203 7203 as City of Adelaide's infrastructure may not be available using Before You Dig Australia's services.

Approval for Equipment Final Locations

It is the Contractor's responsibility to seek approval and confirm the final locations of underground switchboard pits, service and distribution pits, fuse pits, lighting columns, wall mounted items and consumer mains prior to installation on site.

Where the works involve construction within Private Property, the Contractor must prepare detailed plans of the installation for individual consumers, as described in following sections of the Specification. These shall be prepared by the Contractor to obtain the written approval of the affected parties before commencement.

Submissions

Tender Submissions

Refer Special Conditions of Tendering for City of Adelaide projects.

Contract Submissions

The Contractor shall provide at a minimum to City of Adelaide's Representative as part of Tender the following for each individual project or component of the works:

- Safe Work Method Statement for construction works and maintenance during the DLP.
- Traffic Management Plan
- Works Programme (unless provided by CoA in the RFT)
- Stakeholder engagement activities (if relevant).
- Inspection and Test Plan.
- Electronic Certificate/s of Compliance for any and/or all electrical works carried out.
- Operating Manuals and other supporting maintenance documentation.
- 'As Constructed' Drawings. Auto Cad and PDF format.
- Copies of any written communications seeking approvals from DIT or any other regulatory authority.
- Project Handover – including a site inspection with an electrician present with CoA representatives to inspect the final installation.

Testing and Commissioning

General Requirements

This part of the Specification outlines the requirements for the performance testing of the installation, commissioning, transfer to the City of Adelaide and subsequent maintenance during the DLP.

Testing

Undertake Mandatory Testing as required to verify that the installation meets the specified requirements within by the applicable Australian Standards and regulatory authorities during and on completion of the works.

Commissioning

On completion of all installation works and testing to the satisfaction of City of Adelaide's Representative, the Contractor shall commission the installation into service where applicable and prepare the installation for 'hand over' to the City of Adelaide.

The Contractor shall be required to confirm to City of Adelaide's Representative the stable, safe, reliable operation of the installed equipment for a period of at least seven days before the Certificate of Completion is issued.

Maintenance During the Contractor Defect Liability Period (DLP)

Maintenance Period

The Contractor will be subject to a Defects Liability Period of 52 weeks from issue of the Certificate of Practical Completion.

Requirement to Inspect and Maintain

Carry out scheduled inspections and perform maintenance work as per the manufacturer's specifications for the supplied equipment.

Rectification of Faults

Replace faulty materials and equipment, as necessary and advise the CoA in writing of same.

Personnel

The Contractor is to provide the details of the qualified and experienced persons to be responsible for Work Health and Safety for the life of the project.

Procedures

The Contractor is to produce a detailed and comprehensive site-specific SWMS applicable to the project, articulating the procedures what will be employed to manage WHS risks including how access to members of the public through a construction site will be restricted, the provision of danger notices on faulty equipment, isolation lock-out devices for use during the life of the Project and the like.

The Contractor shall be responsible for all maintenance and servicing of the whole of the work covered by the Contract from establishment of site until Final Completion.

The Contractor shall not repair, maintain, or operate the installation at any time after commissioning without prior written approval of the City of Adelaide. The contractor shall supply all labour, instruments, tools, and materials necessary for the whole of the inspection and maintenance program.

Service Reports

The Contractor shall submit a written service report to City of Adelaide's Representative not later than seven (7) days following scheduled attendances to investigate abnormalities. The report shall include details of the technician including PGE Number where applicable, date, diagnosis of fault, repairs or adjustments made, photographs and details of the replacement parts and materials used. An appointed representative from City of Adelaide shall co-sign the reports.

Maintenance Manuals and "As Constructed" Drawings

The Contractor shall, during the work, mark up the contract drawings with the approved changes to fully represent the 'As Constructed' drawings. At least two (2) weeks before the Date for Completion, the Contractor shall seek from City of Adelaide's Representative a copy of the tender drawings in AutoCAD format for the Contractor to update the contract drawings with the 'As Constructed' changes.

The Contractor shall be responsible for accurate recording and documentation of the identified existing services and all changes. In particular, the conduit routes, sizes, locations of electrical pits and fuse enclosures etc. installed and identified during the contract works. For underground services depth of installation shall also be recorded including bore logs. For wall mounted services accurate height and installation details shall be recorded.

A Certificate of Practical Completion will not be issued, until the Contractor provides 'As Constructed' drawings and wiring diagrams in the specified format stated in the Contract.

Existing Services

Services Subject to Modifications

The Contractor may be required to (subject to written approval from the CoA) modify any existing services as necessary under the works including but not limited to :

- Street Lighting
- Consumer Mains
- Switchboards
- Underground wiring

Other Existing Services

In addition to the above, the Contractor may also be required to Identify and co-ordinate the requirements of other services existing in the street as necessary under the works including but not limited to: -

- HV and LV SAPN Utilities power lines
- Communications Services (private and licensed telecommunication carriers, cable TV, etc.)
- Water
- Sewer
- Gas
- Irrigation
- Stormwater

New Services and Extent of Modifications to Existing Services

The Scope of Work for any Project may include but not limited to the following:

- Design documentation.
- Installation or replacement of electrical devices including ticket machines, bus shelters, barbeques.
- Replacement of the existing street/footpath lighting and associated wiring (luminaires, lamps and lighting poles may be provided by the City of Adelaide if detailed within the contract documentation).
- Replacement of the existing overhead consumer mains with underground consumer mains (to the existing POA or the existing meter box).
- Redirection of Consumers Mains (from SAPN service poles to the new underground service pits).
- Ordering, making arrangement for delivery to the site, storage and insurance of materials and equipment provided by the City of Adelaide.
- Assembly of components, equipment and materials provided by the City of Adelaide before installation.
- Cutting of road/footpath bitumen/concrete surfaces, removing paving, excavations or drilling, backfilling and compaction of trenches for undergrounded services.
- Provision of 40mm or greater DIA conduits as specified for undergrounded and/or modified services by this Contractor according to standard CoA drawings.
- Provision of 100/125mm Ø conduits for services undergrounded by SAPN in accordance with SAPN Technical Standards.
- Provision of 80mm Ø spare conduits according to standard CoA drawing.



- For all projects where spare conduits are installed, provide and install suitable draw cord and end caps and ensure free of blockages to enable future access for cabling installations.
- Provision of fully equipped underground power supply pits, services pits, underground switchboard pits, underground distribution pits, fuse pits, etc. required for implementation of the undergrounding according to the relevant standards and typical drawings. Ensure all IP ratings are maintained at or above the manufacturer's specification.
- Provision of access and joint pits for spare conduits at every change of direction, at street crossing/intersection and at least at every 75m on straight runs.
- Provision within parklands for above ground concrete cable directional markers to comply with AS/NZS3000 Wiring Rules.
- Removal of the dismantled street lighting luminaires not belonging to SAPN and delivery to location nominated by the City of Adelaide or its representative.
- Coordination with the Telecommunications Service Providers for installation of their conduits within CST's.
- Coordination with SAPN for provision of conduits and pits required for their underground services (where required).
- Coordination with SAPN of the replacement of the existing HV and LV lines and stobie poles with underground lines (where required).
- Reinstatement of infrastructure affected by undergrounding or modifications to cabling within the Public Realm or within private property.
- Insurance for the duration of the Contract for all materials.
- Practical Completion inspections, testing and commissioning.
- DLP and associated processes required to achieve Final Completion
- "As Constructed" drawings, Operational Manuals and other supporting documentation.
- Workzone Traffic Management (including the production of a Traffic Management Plan and Traffic Impact Statement) and provision of after-care as required.

Materials and Equipment

General

Except where stated otherwise, all materials shall be new and fit for purpose.

All materials selected and provided by the Contractor shall be fit for their intended purpose.

Types of Items that may be supplied by The City of Adelaide

Unless specifically noted on the Projects specific contract documentation, the following items may be issued to the Contractor free of charge on the Contractor's order. The Contractor is to consult with the City of Adelaide's appointed representative prior to Tender submission.

Lighting Poles

Lighting poles required under the works may be issued by the City of Adelaide to the Contractor free of charge unless otherwise provided for in the relevant project specification. Where provided, the Contractor shall collect the lighting poles from City of Adelaide's London Road Depot. These lighting poles are to be assembled by the Contractor. All materials and labour shall be provided by the Contractor as required to ready these for installation.



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The Contractor shall arrange for the collection and delivery including any required lifting facilities for supplied items from the CoA.

The Contractor shall accept all liability and associated risks for equipment and materials issued by the City of Adelaide from the instance of receipt to the execution of a Certificate of Final Completion, unless otherwise specified in other parts of the Contract documentation. In irrigated areas such as Park Lands additional specific protective paint applications are required. Confirm final details with CoA Representative prior to submitting Tender proposal. Refer to the Protective Coatings section of this Specification for more information.

Luminaires

Luminaires and associated lamps required under the works may be issued by the City of Adelaide to the Contractor free of charge unless otherwise provided for in the relevant project specification. The Contractor must collect the luminaires from City of Adelaide's London Road Depot. Luminaires supplied for installation may have photo electric cells provided as integral parts of the luminaires, unless otherwise noted on the Construction Documentation. These luminaires are to be assembled, installed on the lighting poles, and terminated by the Contractor. All materials and labour shall be provided by the Contractor as necessary for making these luminaires ready for installation.

The Contractor shall accept all liability and associated risks for equipment and materials issued by the City of Adelaide from the instance of receipt to the execution of a Certificate of Final Completion, unless otherwise specified in other parts of the Contract documentation. Final details shall be confirmed with CoA's representative prior to submission of a Tender proposal.

MIMS cable

MIMS cable required under the works may be issued by the City of Adelaide to the Contractor unless otherwise provided for in the relevant project specification. The Contractor shall collect the MIMS cable from City of Adelaide's London Road Depot where required.

The Contractor shall arrange for the pickup, collection, deliver including any required lifting facilities for these materials from the CoA, at the Contractor's cost, to their nominated secure point for storage.

The Contractor shall accept all liability and associated risks for equipment and materials issued by the City of Adelaide from the instance of receipt to the execution of a Certificate of Final Completion, unless otherwise specified in other parts of the Contract documentation.

Labelling

Wall Mounted Public Lighting and Fuse Enclosures - Provide engraved 'Brady' all weather vinyl label marker on fuse enclosure and luminaires indicating point of supply.

Under Canopy/Veranda Public Lighting and Fuse Enclosures - Provide engraved 'Brady' all weather vinyl label marker on fuse enclosure and luminaires indicating point of supply.

In Pole Wiring - Provide engraved 'Brady' all weather vinyl label marker for each Protective Device on fuse enclosure and luminaires indicating point of supply.

Underground MSB/Fuse Pods - Provide engraved metal or stamped aluminium tag identifying supply point fixed to handle.

External Socket Outlets - Provide engraved 'Brady' all weather vinyl label marker identifying Phase, Circuit and Switchboard ID.



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Cable Support and Duct Systems

General

Rigid Heavy Duty UPVC orange conduit complying with Standards AS/NZS 2053.3, AS/NZS 61386.1, AS/NZS 61386.21, AS/NZS 61386.22 and AS/NZS 61386.23.

- Solar radiation protection (mechanical protection, paint systems, served conduits etc) is required for conduits, fittings and fixings where appropriate, that are exposed to sunlight.
- Sizes range from 40mm \geq 125 mm.
- Conduit Joining Cement must be used on all joints. Where wiring enclosures are mounted on surfaces above ground, clear cement should be used.
- All Inspection-type fittings to be used only in accessible locations and where exposed to view.
- All underground conduits shall have an orange-coloured plastic marker tape (to AS 2648.1) minimum 150 mm. wide, installed backfilling accordance with the relevant Trenching Detail found in the Construction Standard for Lighting and Electrical, above the conduit for the whole length of underground route. Refer the CoA Standard Drawings if additional detail is required.
- For pit sizes Type P4/P5 and larger, all conduits shall be installed with permanent bell mouths on conduit ends to assist in cable pulling and prevent cable damage during installation.

Conduits and conduit fittings used for the mechanical protection of all cabling above ground shall be appropriately sized and installed to comply with either :

- Medium duty galvanised water pipe, in accordance with AS 1074 "Steel tubes and tubular threaded or suitable for threading with pipe threads of Whitworth form (British Standard Whitworth) or
- Fitted with a suitable preformed hat section of galvanised steel section securely fixed to the wall to a height of at least 3.0 metres above ground level. Council will advise the preferred method for providing mechanical protection with respect to the above, on a case-by-case basis.

All mechanical protection shall be painted to match existing surface colour with suitable external paint. In irrigated areas such as Park Lands additional specific protective paint applications are required. Confirm final details with CoA Representative prior to submitting Tender proposal. Refer to the Protective Coatings section of this Specification for more information.

Bends, Sockets, and Fixings

Bends and changes in direction of conduit installation must be kept to a minimum. The bending radius shall not restrict the installation of cabling. The bend radius shall not be less than the typical bending radius recommended by the cable or conduit manufacturer.

All bends, sockets and fittings used on HD UPVC conduits shall be of the same manufacture and standard as the conduit.

Rigid Conduits - Install in straight long runs, smooth and free from rags, burrs and sharp edges. Set conduits to minimise the number of fittings.

Draw Cords - Provide 6 mm² polypropylene draw cord (i.e "Telstra Rope") in conduits not in use, minimum braking strain of 500kg.

Expansion - Allow for thermal expansion/contraction of conduits and fittings due to changes in ambient temperature conditions. Provide expansion couplings as required.

Sweep Bends – Corrugated conduit is prohibited from use unless deemed necessary on a case-by-case basis by the CoA's Representative. All bends should be made using manufactured sweep bends where possible. Smaller conduits can be spring-formed in consultation with Council Representative.

Proving of Conduits

It shall be assumed if not documented specifically in the Contract, that a Hold Point is required prior to backfilling of a trench, and before installing any cable into conduits. The conduit's integrity and suitability shall be inspected and verified with the work being witnessed by a Representative from the City of Adelaide. This work shall comply with the following:

- A solid mandrel of diameter 12mm less than the internal diameter of the conduit and 230mm in length shall be pulled through every conduit.

Conduits in Concrete Slabs

It shall be assumed if not documented specifically in the Contract, that a Hold Point is required prior to concreting over underground wiring systems, and before installing any cable into conduits.

The conduit's route should be positioned avoid crossovers and minimise the number of conduits in any location.

Conduits should maintain a parallel spacing of at least 50 mm.

The minimum cover required over conduits is to be the greater of the conduit diameter and 20 mm unless specified elsewhere in the Contract in engineering drawings.

Construction joints: Provide sleeving over conduit to allow movement of the conduit across the joint due to any slab movement.

Fixing: Fix directly to the top of the bottom layer of reinforcing.

Cable Pits

- Pit installation to be in accordance with the Manufacturer's Specifications for the applicable load rating.
- Provide cable pits as required for the project works and in accordance with this specification.
- Types of cable pits to be either Concrete or polymer moulded pits.
- Where required Cable Pits are to be constructed in-situ with walls and bottoms in rendered brickwork or 75 mm thick reinforced concrete. A waterproofing agent shall be incorporated.
- Pit covers to seat flush with the top of the pit and finished surface. Complying with Standard AS 3996.
- Provide drainage from the bottom of cable pits, either to soakage trenches filled with rubble or to the stormwater drainage system.
- Provide separate communications pits for the terminating of spare 2x100 diameter Communications conduits.

Pit Types

Non trafficable pits must meet a minimum Class B load rating.

CoA may accept the use of standard concrete "Square and "Rectangular" pits installed in trafficable areas. Trafficable pits must meet a minimum Class D load rating.

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Pit Sizes

Refer to the below Table for typically used pit sizes:

Phases	Non-Trafficable Area	Trafficable Areas
Electrical Pit	Fuse Pit	450 x 900 Concrete
	Type 5 Polyethylene	500 x 500 Concrete
	Type 7 Polyethylene	600 x 600 Concrete
		900 x 900 Concrete
Communications Pits	Type 5 Polyethylene	450 x 900 Concrete
	Type 8 Polyethylene	Type 8 Concrete

Note: Provide pit lid risers to achieve required depths of cover.

Pit Lids

The Contractor is to provide unless otherwise specified in the Contract documentation, suitable pit lids matching the load rating of the installation. The following non-slip pit lids are generally accepted by CoA:

- Concrete
- Composite
- Cast-iron
- Paver infill

Provide secured or lockable pit lids for Communication pits in non-trafficable areas. Class D lids are not required to be lockable.

Final pit lid weights to be permanently labelled with stainless steel engraved plate fixed to the exterior of the lid.

All CoA pit lids to be permanently labelled with stainless steel engraved plate fixed to lids. The following designations are accepted by CoA.

- "CoA Elec"
- "CoA Comms"
- "CoA TS"

Protective Coatings

Scope:

The Protective Coating Specification defines the minimum requirements for the protective coating of Public Lighting and Electrical assets (i.e. light posts and switchboard enclosures) at the City of Adelaide. It will cover the requirements for the selection and application for both the new and maintenance protective coatings for both the Glenelg to Adelaide Parklands (GAP) irrigated areas and non-GAP areas.

Codes and Standards:

All protective coating works shall comply with the current edition of the relevant Standard or code of practice (including amendments) specified in this Specification.

Exclusions:

The following surfaces and materials shall not be blasted or coated as part of this Specification:

- Stainless Steel

- Non-metallic surfaces
- Electrical cabling and instrumentation
- Name Plates
- Spigots for the attachment of luminaires to poles.

Products and Materials

- a) All coating materials shall be of the type and quality as described in this Specification. All materials used for the specific protective coating system being applied, shall be products supplied by one manufacturer and be where practical, from the same batch.
- b) All materials shall be stored and used in accordance with the manufacturer's recommendations, specifications, Technical Data Sheet (TDS) and Material Safety Data Sheet (MSDS).
- c) All coating materials shall be supplied in unopened, adequately stored containers, and mixed, thinned and applied in accordance with the manufacturer's recommendation. Paint shall be stored in accordance with the manufacturer's instructions and AS 1940: Rules for the Storage and Handling of Flammable and Combustible Liquids. Surface Preparation – New Assets
- a) Surface preparation of areas or items to be coated shall comply with the surface preparation method, coating system requirements and relevant Australian Standards and Technical data sheets as nominated in this Specification.
- b) All substrate defects or surface contamination such as weld spatter, slag, burrs, fins, sharp edges, cracks, laminations, deep pitting, perforations, and corrosion products shall be removed or repaired before abrasive blasting using a suitable solvent, alkaline degreaser or other approved product in accordance with AS 1627 Part 1.
- c) All sharp edges and corners shall be ground to a minimum 3mm radius to ensure paint thickness is achieved.
- d) All steel surfaces shall be cleaned in accordance with the dry abrasive blasting procedure outlined in AS 1627 to a minimum Class 2.5 unless otherwise stated.
- e) Surfaces which have been abrasive blasted shall be primed or coated within four (4) hours after completion of blasting or cleaning or prior to any substrate wetting, contamination or visible rusting occurring. If the protection coating cannot be applied within the required time, the surface shall be re-blasted prior to the protective coating being applied.
- f) Where manufacturers' recommendations demand a more stringent surface preparation, then the manufacturers' recommendations shall be followed.
- g) Testing of the prepared surface, prior to coating application, shall be carried out in accordance with AS 3894 Part 6. If contamination levels are found to be higher than acceptable limits, the surface shall be cleaned until the acceptable contamination level is achieved as per AS 3894 Part 6.

Surface preparation of Existing Assets

- a) Where there exists a prior coating or the surface is in a corroded state, the asset shall be temporarily removed to enable the surface to be pre-blasted sufficiently to remove all corrosion products and/or prior coated areas.
- b) When blasting of localised corrosion or deteriorated coating areas is required, the steel surface profile of the blasted area shall be suitable for the specified coating system. The perimeter of the spot blasted area from where the original coating system is sound shall be feathered to a 100mm overlap width.

- c) Where required for spot repair and overcoats, sweep dry blasting shall be carried out using:
- A fine garnet abrasive, nominally 150 to 200µm
 - A 10 to 13mm venturi nozzle
 - A blast pressure at the nozzle of 275 kPa (40psi) maximum, and
 - A distance of 350mm to 400mm from the painted surface, directed at an angle of no greater than 45° to the surface.
- d) Where required for spot repair and overcoats, sweet wet dry blasting shall be carried out using equipment, materials and techniques which minimise the reduction in film thickness of the existing paint whilst providing a surface texture suitable for the over-coating.
- e) After spot blasting, the generally sound coating surface shall be whip blasted to provide an adequate key for the coating system being applied.
- f) Hand and power tool cleaning, where required, shall be in accordance with AS1627 Part 2.
- g) All other surface preparation shall be in accordance with Section c) Surface Preparation – New Assets.

Application

- The protective coating system shall be applied in accordance with the manufacturer's recommendations and this Specification.
- Adhesion of the coating shall be sound throughout and in accordance with AS 1580.
- Coatings with inadequate adhesion (i.e. < 3 MPa) shall be removed and the surface prepared again and recoated.
- Humidity, ambient and surface temperature conditions at the time of paint application and for the period of the drying time shall be in accordance with the paint manufacturer's material data sheet.
- Painting shall NOT be carried out under the following weather conditions:
 - Ambient air temperature is less than 10 degrees C or greater than 40 degrees Celsius.
 - Relative humidity is less than 5% or greater than 85%.
 - Prepared surface is not completely dry.
 - Surface temperature of steel is greater than 55 degrees C.
 - The temperature of the air or the steel is less than 3 degrees C above the dew point.
 - Wet, windy or dusty conditions
 - Failing or inadequate light.

Inspection, Testing and Hold Points

Hold Points shall be as per the table below.

HOLD POINT	RESPONSE TIME
Approval of any repair work, surface finish or pre-coating	7 Days
Approval of coating system information	7 Days


Authorisation of deviations from the manufacturer's datasheet	24 hours
Approval of test documentation and results	7 Days

Inspection and Testing

- a) The Inspection and Test Plan shown in Table 4 shall be considered as the minimum requirement.
- b) The Contractor shall maintain written records of the Inspection and Tests documented in the table below.
- c) A certified coating inspector shall be nominated by the Contractor prior to the commencement of work, to inspect and test the protective coating systems. The coating inspector shall be certified in accordance with ACA, NACE or approved alternative.

Inspection and Test Plan Summary

ITEM	PROCEDURE	FREQUENCY	REQUIREMENT
Sample and Testing – Abrasive	AS1627.4	All batches before use	Dry abrasive must be <125µS/cm Must deliver profile height.
Water	Not Applicable	Before Use	Conductivity ≤100µS/cm
Preliminary Cleaning Defects	AS1627.1	All surfaces	No surface defects
Preliminary Cleaning – Oil and grease	AS1627.1	All surfaces	No oil or grease
Preliminary Cleaning – Bird droppings	Not Applicable	All surfaces	No loose contaminants
Preliminary Cleaning – Sweep Dry Blasting	As per Application section	All surfaces	Clean profiled surface
Preliminary Cleaning - Sweep Wet Blasting	As per Application section	All surfaces	Clean profiled surface
Final Cleaning - Hand or Power Tool	AS 1627.2 AS 1627.9	For Existing Paint For Corroded Areas	Remove loose and flaking paint Sa2 ½
Final Cleaning - Dry Abrasive Blast	AS 1627.4 AS 1627.9	For Corroded Areas	Class Sa2½
Final Cleaning - Dry Abrasive Blast	AS 1627.4 AS 1627.9	All surfaces	Class Sa2½



Final Cleaning - Wet Abrasive Blast	SSPC VIS5	Corroded areas	WAB-10
Final Cleaning - Wet Abrasive Blast	SSPC VIS5	All surfaces	WAB-10
Surface Salt Contamination	AS 3894.6	As per AS 3894.6	Maximum 10 µg/cm ² of Cl ⁻
Surface Profile Height	AS 3894.5	5 locations minimum	Paint manufacturer's specified range
Paint Film Thickness	AS 3894.3	All surfaces	Thickness range as per AS 3894.3
Paint Application Conditions	AS 3894.3 AS 3894.10	Prior to and during application	As per Clause 2.4
Coating Continuity	AS 3894.1 AS 3894.2	After final application and cure	Shall be no holidays

Handling, Storage and Transport

- a) All coated items shall be handled and stored with due care and attention in the best practical way to preserve the integrity of the coating system.
- b) Coated items shall not be handled or transported prior to full cure of the coating system in accordance with the manufacturer's recommendation
- c) During transportation, craning and storage, coated items shall not be stacked directly on the ground. Ensure items are not stacked on top of other items without protection between touching surfaces.

Defects

- a) Any defects noted in anyone coating shall be repaired before the application of any subsequent coatings.
- b) The following defects may constitute reasons for rejection due to defects:
 - i. Embedded dust and other contaminants.
 - ii. Excessive overspray, dry overspray.
 - iii. Excessive thicknesses runs or sags, voids, or shadows.
 - iv. Slow or improper cure time, solvent entrapment, pinholes, mud cracking.
 - v. Inadequate coverage of the surface, rust bleed through, blushing, streaking.
 - vi. Voids in the coating, blisters.
 - vii. Failure to apply protective treatment as required by this Specification.



c) Any defects that are repaired shall be reinstated as per the original coating system. The completed repair shall have the same properties (including colour, thickness, and finish) as the specified coating system.

d) Coatings shall be free of mud cracking, pinholes, voids, bubbles, blisters, runs, sags and other defects or damage. Before application of any further coats, all defects to previous coats shall be repaired. Surfaces where the paint coating has been damaged or marked in any way shall be repainted to the approval of the Superintendent and in accordance with the paint manufacturer's recommendations. Multiple coatings of brush applied paint may be required to achieve required DFT.



Protective Coating System 1 – New Assets (Galvanised Carbon Steel Substrate)

PROTECTIVE COATING SYSTEM #PC1 NEW ASSETS (GALVANISED CARBON STEEL SUBSTRATE)

Scope: For new Public Lighting and Electrical Assets with galvanised substrate subject to GAP water in the City of Adelaide Parklands

Surface Preparation: Abrasive sweep blast clean

Colour: AS 2700 N64 Graphite Grey / RAL2704 Graphite Grey
Or approved equivalent (CoA to specify upon procurement)

Notes:

1. This coating system forms part of, and should be read in conjunction with, the CoA Public Lighting and Electrical Assets Protective Coating Specification.
2. For Dry Film Thickness requirements and additional notes, refer manufacturer's specification.

SUPPLIER		1 st COAT	2 nd COAT	3 rd COAT
Dulux	Product	Durebid STE MIO	Durebid STE MIO	Quantum V90
	DFT	125µm	125µm	75µm
International	Product	Intergard 269	Interzone 954	Interthane 990
	DFT	40µm	300µm	75µm
Jotun	Product	Penguard Special	Jotamastic 90	Hardtop AX
	DFT	75µm	225µm	100µm
Wattyl	Product	Epinamel PR250	Epinamel DTM985	Poly U750
	DFT	75µm	225µm	100µm



Protective Coating System 2 – New Assets (Carbon Steel Substrate)

PROTECTIVE COATING SYSTEM #PC2 NEW ASSETS (CARBON STEEL SUBSTRATE)


Scope:

For new Public Lighting and Electrical Assets with carbon steel substrate subject to GAP water in the City of Adelaide Parklands

Surface Preparation:

Abrasive blast clean to AS 1627 Class 2.5

Colour:

AS 2700 N64 Graphite Grey / RAL2704 Graphite Grey
Or approved equivalent (CoA to specify upon procurement)

Notes:

1. This coating system forms part of, and should be read in conjunction with, the CoA Public Lighting and Electrical Assets Protective Coating Specification.
2. For Dry Film Thickness requirements and additional notes, refer manufacturer's specification.

SUPPLIER	1 st COAT		2 nd COAT		3 rd COAT	
	Product		Product		Product	
Dulux	DFT	Durebild STE MIO	125µm	Durebild STE MIO	125µm	Quantum V90
	Product	Intergard 269		Interzone 954		Interthane 990
International	DFT	40µm		300µm		75µm
	Product	Penguard Special		Jotamastic 90		Hardtop AX
Jotun	DFT	75µm		225µm		100µm
	Product	Galvit EP100		Epimamel DTM985		Poly U400
Wattyl	DFT	75µm		200µm		50µm
	Product					



Protective Coating System 3 – Existing Assets (Galvanised Carbon Steel Substrate)

PROTECTIVE COATING SYSTEM #PC3 EXISTING ASSETS (GALVANISED CARBON STEEL SUBSTRATE)

Scope:

For existing Public Lighting and Electrical Assets with galvanised substrate subject to GAP water in the City of Adelaide Parklands

Surface Preparation:

Spot abrasive blast clean defect areas to AS 1627 Class 2.5
Abrasive sweep blast clean existing surface/coating

Colour:

AS 2700 N64 Graphite Grey / RAL2704 Graphite Grey
Or approved equivalent (CoA to specify upon procurement)

Notes:

1. This coating system forms part of, and should be read in conjunction with, the CoA Public Lighting and Electrical Assets Protective Coating Specification.
2. For Dry Film Thickness requirements and additional notes, refer manufacturer's specification.

SUPPLIER	SPOT PRIME	1 st COAT	2 nd COAT	3 rd COAT
Dulux	Product	Durebild STE MIO	Durebild STE MIO	Quantum V90
	DFT	125µm	125µm	75µm
International	Product	Interzinc 52	Intergard 269	Interthane 990
	DFT	50µm	40µm	75µm
Jotun	Product	Jotamastic 90	Jotamastic 90	Hardtop XP
	DFT	200µm	200µm	75µm
Wattyl	Product	Epimamel PR250	Epimamel DTM985	Poly U750
	DFT	75µm	200µm	100µm



PROTECTIVE COATING SYSTEM #PC4 EXISTING ASSETS (CARBON STEEL SUBSTRATE)

Scope:

For existing Public Lighting and Electrical Assets with carbon steel substrate subject to GAP water in the City of Adelaide Parklands

Surface Preparation:

Spot abrasive blast clean defect areas to AS 1627 Class 2.5
Abrasive sweep blast clean existing surface/coating

Colour:

AS 2700 N64 Graphite Grey / RAL2704 Graphite Grey
Or approved equivalent (CoA to specify upon procurement)

Notes:

1. This coating system forms part of, and should be read in conjunction with, the CoA Public Lighting and Electrical Assets Protective Coating Specification.
2. For Dry Film Thickness requirements and additional notes, refer manufacturer's specification.

SUPPLIER		SPOT PRIME	1 st COAT	2 nd COAT	3 rd COAT
Dulux	Product	Durebild STE MIO	Durebild STE MIO	Durebild STE MIO	Quantum V90
	DFT	125µm	125µm	125µm	75µm
International	Product	Interzinc 52	Interzone 954	Interthane 990	
	DFT	50µm	300µm	75µm	
Jotun	Product	Jotamastic 90	Jotamastic 90	Hardtop XP	
	DFT	200µm	200µm	75µm	
Wattyl	Product	Epinaamel PR250	Epinaamel DTM985	Poly U750	
	DFT	75µm	200µm	100µm	

For further information relating to the product specified for use on City of Adelaide infrastructure, please refer to CoA Construction Standard Drawings and or request a copy be provided by CoA.

Cables in Trenches – Installation

Sand bed and Surround - Provide at least 150 mm clean sand around cables and conduits installed underground.

Sealing Ducts and Conduits - Seal buried entries to ducts and conduits with waterproof seals as follows:

- Spare ducts and conduits: Immediately after installation.
- Other ducts and conduits: After cable installation.

Cables

SAPN HV - 11kV underground cables

The Contractor may be required to provide SAPN approved conduits and pits for SAPN to install their infrastructure. In such cases as this work is required, SAPN fees and charges will be paid by City of Adelaide.

SAPN LV Cables

LV cables for the replacement of the existing SAPN overhead lines will be supplied by SAPN and installed by SAPN in conduits and pits provided by the Contractor. SAPN will seek recompense for any fees or charges from the City of Adelaide directly.

Other Cables

The Contractor must provide all other cables required for completion of the works. These may include, but are not limited to, the following major components:

- Consumer Mains (to all kind of customers, ie. the residents, businesses, local lighting/floodlighting, ticket machines, telephone boxes, etc.)
- Street and footpath lighting, floodlighting, up-lighting etc.
- Irrigation, CCTV, traffic signals etc

Street and Footpath Lighting, Floodlighting, Up-Lighting etc.

Cables shall be stranded copper conductors PVC insulated, PVC sheathed, 1kV grade V90 to AS3147 and as specified on CoA Standard Drawings.

Cables shall be colour coded, in accordance with AS/NZS3000, to indicate, phase, neutral, earth or other function – i.e. Control, Signal etc

Ratings

Unless otherwise specified, use AS 3008.1 for the determination and calculation of current ratings, fault loop impedance, de-rating factors and voltage drop.

Conductors

Unless otherwise specified use multi-stranded copper conductors. Minimum size:

- 2c 2.5 mm² + E Cu PVC/PVC orange circular cables within the lighting poles.
- 2x 1c 6.0 mm² Cu PVC/PVC SDI+ 6 mm² PVC ECC for underground lighting circuits (increase sizes where required to meet AS3000 and specification compliance criteria).
- 2c 6.0 mm² Cu + E Cu XLPE/TPE (Submersible) for underground lighting circuits where ground water is

- encountered (increase sizes where required to meet AS3000 and specification compliance criteria).
- 2c 4.0 mm² + E Cu PVC/PVC orange circular for underground single-phase power circuits (increase sizes where required to meet AS3000 and specification compliance criteria).
 - 4c 6.0 mm² + E Cu PVC/PVC orange circular for underground three phase power circuits (increase sizes where required to meet AS3000 and specification compliance criteria).

The use of TPS (Thermoplastic-sheathed) cabling is specifically prohibited by the CoA for installation in the Public Realm.

Cable De-Rating

Where cable sizes are indicated on the drawings, they are intended to be ran in a manner that does not lower their rating below the circuit protection scheduled for them. If the method of installation of the cabling increases the de-rating factor, the Contractor must provide a cable size which once de-rated, exceeds the current carrying capacity of the circuits Protective Device as specified in the drawings or by calculation and assessment. In such cases, the CoA's Representative shall be consulted prior.

SAPN Cables, Conduits and Pits

SAPN cables, conduits and pits may be supplied and installed by SAPN unless otherwise stated.

SAPN will seek recompense for any fees or charges from the City of Adelaide directly.

Other Cables

The Contractor must provide all cables required for completion of the works and any other cabling documented on the drawings unless the supply of any cable is listed as being supplied by the CoA's Request for Tender documentation.

Installation of Lighting Poles

The Contractor shall paint the base of the light pole with a non-drying, non-hardening saturated hydrocarboneous (petrolatum) primer and then spirally wrap petrolatum saturated reinforcement tape or self-adhesive aluminium folia tape around the base of the pole from 50 mm above ground level to 150mm below ground level.

3rd Party Equipment (5G Antennae, Radio Equipment etc)

For any 3rd Party equipment proposed to be mounted to CoA lighting columns, the 3rd party must provide the following to Council for Council approval prior to installation :

1. Provide a drawing indicating the proposed placement of equipment. Drawing to include attachment height, weight, sizing's and site location(s). Equipment can only be installed onto straight vertical component of lighting column, not to curved or outreach arm.
2. The method of fixing to the column shall not affect the structural integrity of the lighting column or luminaire – 3rd party is to confirm and verify. Equipment shall not be larger in size that an A4 standard size sheet, weight should also be provided to City of Adelaide for our records.
3. Permanent labelling affixed to the equipment for identification. No power shall be sourced from CoA equipment without the installation of separate protective devices.
4. Lighting columns and luminaires shall not be modified in any way to support items.
5. Metal fixings shall not be used due to close proximity to electricity and electrical components.
6. Fixings/ attachments to the luminaire are not permitted.
7. Attachment shall be fit for purpose and safe in the proposed location. It shall also not impede or impact road or footpath movement of pedestrians or vehicles.
8. Equipment shall not interfere with the light output of the lighting. Ensure a min clear distance of 0.5m is provided from the base of luminaire downwards to any equipment.
9. The access panel(s) on the lighting column shall not be covered.

10. Installation, maintenance and removal costs will be borne directly by the applicant. The City of Adelaide may request the equipment to be removed at any time into the future.
11. A per item fee associated with 3rd party equipment installed onto City of Adelaide assets to be paid by the applicant to City of Adelaide.
12. Copies of final 'as-constructed' drawings and e.C.O.C.'s shall also be provided to City of Adelaide for its records.
13. Notification in writing to the City of Adelaide's Maintenance and Operations team of an impending requirement to access by way of a Facilities Access Agreement.

Accessories

Fuse Pits (PODs)

The Contractor must provide CoA Fuse pits / enclosures as detailed on CoA Construction Standard Drawings. The Contractor must provide a Neoprene seal between the bolted sections of the enclosure bell housing to provide a perfect seal against the ingress of moisture by ensuring the compression between the seal and housing.

The Contractor must use non-conductive bolts to secure the bell housing and non-conductive screws to attach equipment to the bell housing.

The City of Adelaide may provide these pods for use at a cost to the contractor. Details are to be confirmed by the Contractor with Councils representative prior to submitting Tender.

Photocells/Timeclocks

Photo-electric cells/Timeclocks may be provided to the Contractor as detailed in the relevant Project documentation. These photo-electric cells shall be assembled by the Contractor in any instances where they are not integral to luminaires supplied.

Service Fuse Enclosures for Consumer Mains

The Contractor must provide service fuse boxes to standard SAPN design fitted with a cylinder lock keyed to SAPN requirements. Refer SAPN's and CoA Construction Standard Drawings for details. The Contractor must paint the fuse boxes to suit CoA colour and paint finish requirements.

Fuse Pits

The Contractor must provide CoA Fuse pits / enclosures as detailed on CoA Construction Standard Drawings. The Contractor must provide an "O" ring seal between the bolted sections of the enclosure bell housing to provide a perfect seal against the ingress of moisture by ensuring the compression between "O" ring and the fuse pod's housing.

Fixings - The Contractor shall provide all fixings for equipment that is supplied under this Contract.

Finishes

The above ground protective galvanised water pipe (GWP), steel hat sections, cabling and accessories shall be painted with a suitable primer and topcoat(s) in accordance with the paint Manufacturer's Specifications, suitable for use on exterior applications. In irrigated areas such as Park Lands additional specific protective paint applications are required. Confirm final details with CoA Representative prior to submitting Tender proposal. Refer to the Protective Coatings section of this Specification for more information.

- The fuse box/enclosures shall be provided galvanised or zinc annealed as per SAPN's specification and then painted with a suitable primer and 2 coats of finish coat in accordance with the paint Manufacturer's Specifications.
- The colour of painted items shall match the structure to which they are attached.

Installations and Methods of work

Standards and Regulations

The work shall comply with the Electricity Act of South Australia, City of Adelaide's Guidelines and the latest revision of all relevant Standards and Codes of the Standards Association of Australia, Local Statutory Authorities and the Office of the Industry Regulator and any other relevant regulation.

In the event that there are no applicable Australian Standards, the requirements of the British Standards Institution shall be followed. In any case, approval should be sought in writing from a representative from the City of Adelaide prior to proceeding.

Existing Services and Equipment

- Any work involving new connections and alterations to existing services and equipment shall be carried out creating minimum disruption and inconvenience to the customer. The Contractor shall carry out disconnection, decommissioning and removal of existing services according to the program approved by City of Adelaide's Representative. Any works involving SAPN infrastructure is to be arranged with SAPN by the Contractor in consultation with the CoA.
- Where drawings are provided showing underground services, these shall be used as a guide only. The Contractor shall locate and mark-up existing underground services before commencement any excavation works. All charges associated with identification and marking-up of the existing services shall be borne by the Contractor. Where information is available or is otherwise obtained, include this detail onto project drawings to indicate cable routes and locations of the existing services.
- The Contractor and/or Applicant shall carry out test excavations (pot holing) to expose the existing marked-up services. These test excavations shall be carried out by hand or water excavation where the existing services change directions, T-off's and at distances not greater than 50m apart on straight lines of the existing services. Accurately record locations and depths of exposed existing services. Keep on site a copy of the drawing with recorded existing services.
- To minimise any inconvenience to the consumer the Contractor shall carry out all possible related new work prior to interruption to supply or altering the position of services or equipment. The Contractor shall allow for work to be carried out during normal working hours unless otherwise stated in the Tender documentation.
- The Contractor shall support or relocate any service that is likely to be damaged during the progress of the Contract Works in accordance with the requirements of the relevant asset owner. Where a service is to be abandoned it shall be completely removed from service. If complete removal is not possible then subject to approval and written confirmation by City of Adelaide's Representative, the Contractor may make the service safe, disconnect, cut off and seal at both ends at the appropriate time.

Sizing and Location of Equipment

General

The Contractor shall firstly confirm the location of all existing services, as previously specified, and check all dimensions on site prior to laying out the installation.

In laying out the installation, the Contractor shall ensure that all items are readily accessible and sufficient space is provided for installation, to facilitate operation, overhaul and maintenance of all plant and equipment.

Installation of lighting components (lighting poles, luminaires, pits, etc.) shall consider the documented requirements, site conditions and programmed sequence of works at the time of implementation of the works. The Contractor shall obtain City of Adelaide's Representative's approval of proposed details of installation works before commencement of the works.

Installation points for individual lighting poles and pits shall be marked up on site by the Contractor and approved by City of Adelaide's Representative or nominated representative before commencement of any excavation works.

Minimum Sizes of Consumer Mains

The Contractor shall check and confirm the size and rating of the existing consumer mains, the rating of the service fuse(s) and, from a site inspection, determine the route length of the new consumer mains cables. The minimum size of the new replacement consumer mains shall satisfy the specific site conditions and requirements of relevant rules and standards.

- The new consumer mains shall be soft drawn flexible copper and sized appropriately using the following table below as a guide only.
- Minimum sizes of Consumer Mains identified in the table below shall be assumed for tendering purposes where the nominal route length of the service does not exceed 25m.
- For route length greater than 25m the Contractor shall identify in the submitted Quote individual cases with the assumed route length and cable sizes.

Phases	Number of Conductors	Current Rating	Minimum Cable Sizes
Single phase	2	Not exceeding 63A	16mm ²
Three phase	4	Not exceeding 63A per phase	16mm ²
Three phase	4	Not exceeding 80A per phase	25mm ²
Three phase	4	Not exceeding 100A per phase	35mm ²

- Where existing installations exceed the minimum consumer mains size the contractor is to advise City of Adelaide's Representative and record the variances prior to beginning work on that installation.

List of Consumers

The Contractor may be required to produce a list of consumers' details as part of the design work component of the Project.

CITY OF
ADELAIDE

Above Ground Switchboards

Technical Design Criteria

Designs to comply with the CoA's technical Drawings including the following minimum criteria:

Distributions Boards		
Designation(s)	–	MSB
Rating	–	100Amps, 250 or 400 Amps, 3 phase, 400 Volts
Degree of Protection	–	IP56
Installation	–	Outdoor, free standing
Fault Rating	–	25 kA for 1 second
Form Factor	–	Form 1 (100Amps) or 3bi&h (250Amps & 400Amps)
Chassis Size	–	36 Way or as nominated by CoA
Connection	–	Front connected
Cable Entry / Exit	–	Below via gland plates and cable bushes
Cable Reticulation Below Switchboard	–	Underground via conduit/cable tray.
Paint Colour	–	Colour to be approved by CoA Representative
Rating/ Nameplates	–	To front door of all distribution boards (Traffolyte as standard)
Doors	–	Overall operational sections ensure 600mm clearance around door swing in accordance with AS/NZS3000 requirements. Provide barn door arrangement as required.
Roof	-	Not to be flat, to be slightly angled to allow water to run off
Internal Base Plate	–	Sealed vermin proof base plate with single glands around each cable

External Design

Contractor to provide powder coated marine grade aluminium enclosure comprising panels, doors and the like, giving the enclosure segregation and degree of protection as required unless otherwise specified in Contract documentation.

Irrigated areas such as Park Lands may require additional protective paint applications as required. Final details shall be confirmed with CoA's representative prior to submission of a Tender proposal.

- Minimum design and construction shall meet the requirements of AS/NZS 3439
- Minimum design and construction shall meet the requirements of AS/NZS 1939 & AS/NZS 60529

Contractor to ensure supporting structure is fabricated from rolled, cold formed or extruded metal sections, with joints fully welded and ground smooth. Contractor is to provide concealed fixing or brackets located to allow the assembly to be mounted and fixed in the specified location without removal of equipment.

Panels: Machine fold sheet metal angles, corners and edges with a minimum return of 25mm around the edges of front and rear panels, and 13mm minimum return edge around doors. Provide additional strengthening via bracing or gussets to panels and doors where necessary to prevent distortion.

Contractor to provide equipment mounting panels fixed to captive threaded metal inserts located inside the enclosure at the rear of the mounting panels.

Contractor to provide fixings in the supporting structure, and removable attachments, for lifting switchboard assemblies where floor mounted. Switchboards should be provided in sections as required to enable installation to their final location.

For wall mounted, flush or semi-flush switchboards, the Contractor shall provide a facing flange, of the same material and finish as the enclosure, and of a section which incorporates a return allowing the outside edge to

fit neatly against the wall. For switchboards located on external walls, Contractor shall provide an angled top to prevent water from pooling.

Minimum flange width shall be no less than 32mm.

Cable Entries

Provide sufficient clear space within each enclosure, adjacent to the cable entries, to allow the incoming cables and wiring to be neatly ran and terminated, allowing sufficient separation to avoid further de-rating.

For cable entry and internal distribution, provide cable entries of not less than 100mm depth by the full width of cubicle space which is unrestricted by equipment or internal wiring.

Provide to each entry a removable gland plate fitted with a gasket to maintain the specified degree of protection.

Cable glands for all entering and exiting cables to provide a secure fit around cabling in accordance with the requirements of AS/NZS 3000. Seal cable entries to provide a close fit in all instances and to maintain the switchboard protection rating.

Doors

Contractor to ensure boards installed maintain a 600mm clearance with equipment racked out and doors open. The Contractor may need to provide barn door arrangement and/or bi-folding doors to enclosures as required to achieve this requirement. Alternative door construction shall not compromise the fit and finish or degree of protection of the switchboard.

Minimum Door Swing allowable is to be 135° minimum or 180° where located in corridors.

Doors are to be hung on heavy-duty chromium-plated block hinges to allow the easy removal of the doors when in the open position.

Contractor to ensure the smooth operation of all doors without sticking or creaking and close/latch with nominal clearances.

Contractor to provide a pad lockable chromium plated lever-type handle to each door, operating a latching system with latching bar and guides. The Contractor shall supply a padlock keyed to Councils 888 or MTR Key System to this board.

Contractor to provide roller rods to all boards incorporating a 3-point locking system.

Smoke Seals: Provide a resilient strip seal, of foamed neoprene or the like, around each door, housed in a suitable channel or housing and fixed with an approved industrial adhesive.

Contractor to provide door strengthens to each door with diagonal length greater than 900mm.

Escutcheon Plates

The Contractor shall provide hinged removable escutcheon plates with the front of the circuit breakers protruding through neat cut-outs. Provide cut-outs for all spare space allowances and install insulated clip-in

infill panels to each spare pole space. This escutcheon plate shall provide a flush surface between the edges of the distribution board case. Fit chromium plated lifting handles to each escutcheon plate.

The escutcheon panel shall be not less than 1.6mm thick and must be rigid. Contractor is required to brace the panel as necessary to achieve this rigidity.

Cable Duct

Contractor to provide internal cable ducting sufficient to house cables for maximum board capacity without restricting closure to duct cover.

Minimum size: Cable duct to be a minimum of 70mm wide for all boards and minimum of 100mm for boards with a total capacity greater than 60 poles.

Busbars

Contractor to allow for a three (3) phase busbar assembly with high conductivity electro tinned copper busbars designed for a maximum current density of 1.5 A/sq.mm from the termination of the incoming unit to the line side of the protective equipment for outgoing circuits.

The Contractor shall provide each distribution switchboard segment with a busbar assembly suitable for a minimum 100A take-off at any point.

Bus Bar shall be pre-drilled for future extension and extended to spare locations. Drill each dropper to suit connection of future equipment of the same type as that specified.

The Contractor shall radius edges and corners to prevent damage to insulation.

Support: Provide support sufficient to withstand without damage the maximum prospective fault currents. Busbars shall not be supported from circuit breaker terminals.

Contractor to ensure busbar joints with high tensile bolts and nuts, are locked in position with lock nuts or locking tabs. Contractor to verify bolts have been torqued to the manufacturer's recommendation with a tension wrench.

Active and neutral busbars shall be Fully insulated with suitable plastic insulation of the appropriate colours to designate phases. Busbar assemblies shall be red, white, blue phases from left to right when viewed from the front of the switchboard. Maintain phase colours (and rotation) throughout the installation.

Where cables are required to be extended inside a switchboard, crimp sleeves and heat shrink should be preferred ahead of single or double screw connectors.

The Contractor shall locate neutral and earth links within 600mm of each cable entry unless written approval of greater spacing is obtained.

Contractor to ensure all terminals are clearly marked and numbered. Numbers on circuit breakers, neutral link and earth link for each circuit shall correspond.

Contractor to provide a separate dual screw neutral terminal and earth terminal for each protective device on each switchboard section. An allowance should be provided for additional terminals for future circuits.

Contractor to provide 100mm (minimum) wiring channel between neutral and earth links and switchboard sheet metal enclosure. Provide adequate clearance or insulating barrier between links and all live conductors.

Moulded Case Circuit Breakers (MCCBs)

Moulded Case Circuit Breakers shall comply with AS3947-2 and IEC947-2 International Electrotechnical Commission.

The short circuit interrupting capacity of the circuit breakers shall be at least equal to the prospective fault level at the point of the distribution system where the breakers are installed unless the limitation capacity of an upstream breaker allows cascading. Nominally, C Curve 10kA devices shall be used unless for engineering considerations other ratings have been specified.

The rated service breaking capacity (Ics) shall be a minimum of 50% of the ultimate breaking capacity (Icu). The rated withstand of the breaker shall be equal to the rated service capacity.

Moulded Case Circuit Breakers shall be fixed, plug-in or withdrawable models and in 3 pole or 4 pole versions as required.

The breakers shall have a rated operational voltage of 690V AC (50/60Hz) and rated insulation voltage of the circuit breakers shall be 750V AC (50/60Hz).

The Moulded Case Circuit Breakers shall provide Class II insulation (to IEC 664) between the front and internal power circuits.

The Contractor is responsible for setting of all adjustable fault current limiters on site.

All protection devices shall be selected to enhance discrimination and avoid cascading between upstream and downstream devices. It shall be arranged so that only the protection device immediately upstream of the fault shall operate to clear the fault.

It shall be possible to lock the circuit breaker in the “isolated” position only with the use of a locking device and padlocks.

Miniature Circuit Breakers

Contractor shall refer to AS 2184 for fault capacities of 10 kA or more and AS/NZS 3111 for miniature overcurrent circuit breakers up to 1000 A current rating and less than 10 kA fault capacity.

Provide combined MCB/RCD circuit breakers where nominated, having a tripping current imbalance of 30mA within 300ms complying with AS/NZS 3190. Where RCD protection is required, single module RCBOs should be the preference to conserve pole space (alternatively increase pole spaces within distribution boards to suit).

Excavations, Backfilling, Compaction

Introduction

This specification outlines the City of Adelaide’s Guidelines for excavation work carried out by contractors in public roads and footpaths within the City of Adelaide and the Park Lands. All costs associated with the compliance with the requirements outlined in this Specification shall be borne by the Contractor.

Prior to commencement of any work in the public realm, written authorisation to the City of Adelaide is required in accordance with Section 221 of the Local Government Act 1999. The Contractor shall comply with requirements detailed in the City of Adelaide’s Guidelines and Special Conditions of Contract

Any works on roadways or footpaths will require approval via a City Works Permit. This permit request is to be lodged by the Contractor, all fees to be waived by City of Adelaide. This will approval request will require details of Workzone Traffic Management Plans and Safe Work Method Statements.

City of Adelaide may on a case-by-case basis, excavate, backfill and/or reinstate the surface of trenches at the Contractor's cost but such arrangements must be made in writing and approved prior to commencement of Project.

Excavations should generally be carried out in the middle row of flagstones of the existing footpath on both sides of the street unless existing services do not permit this. to the City of Adelaide's Representative shall be notified in writing if the existing underground services identified on site before commencement of works necessitate a change to the documented location of the excavations.

Note where identified on a specific project due to the proximity of services to valuable parkland trees, no open trenching may be permitted without the prior written permission of City of Adelaide's Representative. Horizontal boring methods shall be used in lieu of open trenching for the installation of all services unless specified.

Protection of Existing Buildings, Structures, Trees and other City of Adelaide Infrastructure

The Contractor shall take all precautions necessary to avoid causing any damage to buildings, structures and property while carrying out Works. The Contractor shall be responsible for any damage and resulting claims that may be caused by the Contractor's operations. Damage to City of Adelaide property shall be repaired either by the City of Adelaide and all costs recovered from the Contractor.

If there is a risk that damage may occur as a result of the existing poor condition of buildings, structures and other properties, the Contractor shall arrange for photographic evidence of the initial status of the considered element at the pre-construction stage and submit to City of Adelaide's Representative for written confirmation before commencement of works.

Lifting of Concrete Flags, Bricks, Block Paving, Slate or Granite

No saw cutting of concrete flag, brick or block paved footpaths is permitted. Pavers are to be removed along the line of the trench and for 300 mm (minimum) width on both sides of the trench to prevent undermining of the edges.

Concrete flags, brick or block paving removed must be contained within a suitable marked off work area complying with Work Health and Safety Act SA and the associated regulations that is secure and inaccessible to the public. In the event that an area cannot be located the Contractor is responsible for providing offsite storage at the Contractors cost.

Appropriate barricading, with "t-top" bollards shall be placed around the stockpiled concrete flags or other pavers to the satisfaction of the City of Adelaide.

Saw-Cutting of Trenches in Bitumen/Concrete Paving

All trench excavations in bitumen/concrete paving must be saw cut on both sides. Saw cuts should be spaced wider apart than the necessary trench width by 100 mm on either side. This is to prevent the excavation from undermining the bitumen/concrete edge. Care should be taken so as not to damage the bitumen/concrete paved surface during excavation.

All cutting of bitumen/concrete is to be carried out by a masonry saw in straight lines. Note that no saw cutting of concrete flag or brick/block paved footpath is permitted.

Residue from saw cutting is to be contained and collected and is not permitted to enter the storm water system. The Contractor must ensure that all *Environment Protection Act (SA) 1993* and Environment Protection Authority requirements are to be strictly adhered to.

Inspection

In the absence of formal contractual hold points, advanced notice shall be provided to Councils representative so that inspection may be made at the following stages:

- Service trenches excavated before laying the service.
- Services laid in trenches and ready for backfilling.

Existing Services Locations

Before commencing service trenching, locate and mark existing underground services in the areas which will be affected by the service trenching operations.

Note: Before You Dig Australia service may not be available for City of Adelaide services. Known services may be identified by reference to the GIS plan to identify location of underground utility service infrastructure.

Removal of Excavated Material

Excavated material must not be used to backfill trenches unless approved by City of Adelaide's Representative. The Contractor shall remove all excavated material from the site and maintain the site in a clean and tidy condition at their own expense. The cleaning of the site shall be carried out at the end of every day's work. All rubbish, off-cuts, waste and surplus materials shall be promptly removed from the site.

Backfilling and Re-instatements

All excavated material must be removed from site.

Prior to backfilling the Contractor must take photographic evidence of the location of all ducts, pipes and cables and provide photos to the City of Adelaide as part of Completion of the Contract Works.

Sand backfill shall conform to the requirement of the CoA's Technical Drawings for the relevant trench, unless otherwise specified by the relevant service authority. Sand should be placed around ducts, pipes or cables and compacted by mechanical means or by watering-in. The sand should be provided to minimum thickness layer around the duct, pipe or cable as shown on standard City of Adelaide drawings. The sand shall comply with DIT specification PM63 (Type C) and be a product from the crushing of approved stone normally acceptable for road making purposes or for use as a concrete aggregate.

Refer to the City of Adelaide website for roads and footpaths reinstatement details.

If the standard of the backfilling and reinstatement is unacceptable to the City of Adelaide, and if the Contractor does not remedy the fault within a reasonable period, additional reinstatement work required for compliance with this specification shall be carried out by the City of Adelaide at the cost of the Contractor.

The Contractor is responsible for the cost of maintenance of the reinstated trench for a period of 12 months to a standard that is acceptable to the City of Adelaide. Any remedial work required during the maintenance period must be carried out by the Contractor to the satisfaction of City of Adelaide. If the remedial work is not undertaken satisfactorily or in a timely manner, City of Adelaide may carry out the remedial works at the cost of the Contractor. This does not limit the Contractor's continuing legal liability for personal injury (including death) or damage to property arising as a result of poor or faulty workmanship leading to subsidence or failure which may be attributable to the failure to meet appropriate standards of work or material.

Backfilling of Parklands / Nature Strip Trench

All excavated material must be removed from site.

Quarry sand shall be placed in layers 300 mm (maximum) thick and compacted to 90% of maximum modified dry density (MMDD). The top 100 mm shall be backfilled using approved topsoil.

If the standard of backfilling is unacceptable to the City of Adelaide and if the Contractor does not remedy the fault within a reasonable period, then the additional backfilling work required for compliance with this specification shall be carried out by the City of Adelaide at the Contractor's expense.

The City of Adelaide will undertake any work required, such as seeding / turfing etc. to reinstate the trench to a standard which is acceptable to the City of Adelaide and at the cost of the Contractor.

The Contractor is responsible for the cost of maintenance of the reinstated trench for a period of 12 months to a standard that is acceptable to the Corporation. Any remedial work required during the maintenance period may be carried out by the City of Adelaide at the cost of the Contractor. This does not limit the Contractor's continuing legal liability for personal injury (including death) or damage to property arising because of poor or faulty workmanship leading to subsidence or failure which may be attributable to the failure to meet appropriate standards of work or material.

Compaction Testing

Where required under the Contract, the Contractor may be required to carry out compaction testing at locations agreed to with the Corporation's Representative in accordance with Australian Standard AS 1289.

Copies of test results shall be provided to the City of Adelaide if requested, prior to Practical Completion

Typical compaction testing requirements are as follows:

For trenches greater than 600mm in depth:

- One compaction test at half depth between top of pipe and top of backfill and second test at top of backfill, for up to 40 lineal metres of trench and every 40 lineal metres thereafter.

City of Adelaide may also undertake random compaction tests and excavate test holes to confirm the standard of backfilling. If the standard of backfilling is unacceptable to the City of Adelaide, then the remedial work required for compliance with this specification shall be carried out by the Contractor or may be carried out by the City of Adelaide at the cost of the Contractor.

Footpath Reinstatement

Refer to the City of Adelaide website for footpaths reinstatement details.

All works associated with the reinstatement of the footpath pavement will be carried out to the same specification as the existing footpath pavement.

If the standard of reinstatement is unacceptable to the City of Adelaide, and if the Contractor does not remedy the fault within a reasonable period, then the additional reinstatement work required for compliance with this specification shall be carried out by the City of Adelaide at the cost of the Contractor.

The Contractor is responsible for the cost of maintenance of the road reinstatement for a period of 12 months to a standard that is acceptable to the City of Adelaide. Any remedial work required during the maintenance period may be carried out by the City of Adelaide at the cost of the Contractor. This does not limit the contractor's continuing legal liability for personal injury (including death) or damage to property arising as a

result of poor or faulty workmanship leading to subsidence or failure which may be attributable to the failure to meet appropriate standards of work or material.

Road Reinstatement

Refer to the City of Adelaide website for roads reinstatement details
<https://d31atr86jnqrq2.cloudfront.net/docs/uec-paving-construction-standards.pdf?mtime=20210806151620&focal=none>.

All asphalt work associated with the reinstatement of the road surface shall comply with the requirements of AS 2150 1995, Hot Mix Asphalt.

The reinstatement of the asphalt pavement will be the same thickness and mix as the existing asphalt pavement where the existing asphalt is less than 50mm, City of Adelaide requires minimum of 50mm asphalt to be laid. All saw cuts and joints shall be crack sealed upon completion.

If the Contractor is required to carry out tests, they shall be in accordance with AS 2891.

If the standard of reinstatement is unacceptable to the City of Adelaide, and if the Contractor does not remedy the fault within a reasonable period, then the additional reinstatement work required for compliance with this specification shall be carried out by the City of Adelaide at the cost of the Contractor.

The Contractor is responsible for the cost of maintenance of the road reinstatement for a period of 12 months to a standard that is acceptable to the City of Adelaide. Any remedial work required during the maintenance period may be carried out by the City of Adelaide at the cost of the Contractor. This does not limit the Contractor's continuing legal liability for personal injury (including death) or damage to property arising as a result of poor or faulty workmanship leading to subsidence or failure which may be attributable to the failure to meet appropriate standards of work or material.

Existing Surfaces

Turf deemed suitable for re-use by the Contractor must be neatly cut and removed from the trench set-out lines. Turf to be taken up, maintained during the storage period. Approval shall be obtained by City of Adelaide representative prior to re-instatement.

Where the turf is not suitable for re-use and/or approval not given, turf is to be removed and disposed of off-site at the Contractors expense.

Small plants, shrubs and trees required for re-planting to be taken up and stored. Wrap the root ball in a hessian or plastic bag with drain holes and water during the storage period.

Unsuitable vegetation to be removed and disposed of off-site.

Underground Excavation

Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.
- Width tolerance: ± 50 mm, unless constrained by adjacent structures.

Trench widths to be kept to the minimum, consistent with the laying and bedding of the relevant service and construction of access chambers and pits.

Trench depths will vary depending on existing services and parklands. Refer to City of Adelaide urban elements. If excavation is necessary below the zone of influence of the underside of adjacent footings, give notice, and provide support for the footings as instructed.

Trenches are to be clear obstructions and any sharp projections. Trenches are to be kept free of water. Place bedding material, services, and backfilling on firm ground, free of surface water.

Tree protection to comply with AS 4970. Any tree roots encountered will require City of Adelaide Approval prior to proceeding, cut back or clear.

If trench excavation exceeds the correct depth, reinstate to the correct depth and bearing value using compacted bedding material or sand stabilised with 1 part of cement to 20 parts of sand by volume.

Stockpiles

Excavated material for backfill, if required, segregate the earth and rock material and stockpile, for re-use in backfilling operations.

Do not stockpile excavated material against tree trunks, buildings, fences or obstruct the free flow of water along gutters where stockpiling is permitted along the line of the trench excavation.

If stockpiling is permissible, the Contractor dispose of all site-won, spoil or excavated material off-site.

Contractor shall remove unsuitable material from the bottom of the trench or at foundation level and dispose of off-site. Replace with backfill material.

Trenching in Vicinity of the Trees

Trenching in vicinity of the existing trees shall be in accordance with the City Works Guidelines. Approval of CoA Arboriculturists for works within 5m from the existing trees shall be obtained before carrying out any excavations.

Traffic Control

All Workzone Traffic Management and Control is the responsibility of the Contractor. Traffic control shall be carried out in accordance with AS1742.3-1985, "Manual of Uniform Traffic Control Devices, Part 3 – Traffic Control Devices for Works on Roads" and to the approval of the City of Adelaide and City of Adelaide's Representative.

Mobile crane and EWP operations shall comply with the Work, Health and Safety Act (SA) and the associated regulations.

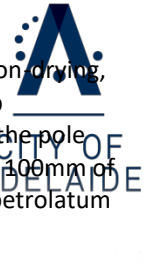
Employees working on or near a road must wear high visibility apparel as required under the Work Health and Safety Act (SA) and the associated Regulations.

Installation of Lighting Poles

Requirements

The Contractor shall where required :

- Arrange for collection of the lighting poles from City of Adelaide's London Road Depot.
- Report to City of Adelaide or nominated City of Adelaide representative in writing within 2 working days any defects of the delivered lighting poles.
- Provide insurance coverage for the lighting poles from the point of receipt to the execution of a Certificate of Practical Completion.



After assembly and prior to installation the Contractor shall paint the base of the light pole with a non-drying, non-hardening saturated hydrocarbons (petrolatum) primer and then in a neat fashion spirally wrap petrolatum saturated reinforcement tape or self-adhesive aluminium folia tape around the base of the pole from 50 mm above ground level to 150mm below ground level ensuring there are no gaps. The top 100mm of the tape shall be over wrapped with UV stabilised PVC tape to prevent the UV deterioration of the petrolatum paste and tape.

Lighting poles shall be installed at the depth according to CoA Construction Standard Drawings and as described hereunder.

The Contractor shall supply and install the light poles footings which shall consist of a circular section spirally wound PVC sleeve. Dimensions, depending on the height and type of the pole shall be in accordance with standard CoA drawings and as detailed in this specification.

The Contractor shall then install the lighting column centrally in the caisson and then fix the column in position by washing sand around the pole. The sand to be supplied by the Contractor shall be non-plastic with 100% passing a 600-micron sieve.

Lighting Pole Wiring

The Contractor shall supply and install a 32mm dia. Flexible HD UPVC orange conduit between each fuse pit and the lighting column sleeve to the location of column protective device, for cable protection. Supply and install a "CoA Type" fuse pit according to the current standard drawing at every lighting pole and at locations shown on the drawings. Provide protective devices and terminals as shown on the standard CoA drawings.

The Contractor shall install the public lighting cabling in the public lighting conduit laid in the CST where and if required as part of the Contract.

Unless otherwise directed by City of Adelaide's Representative, supply and install in the light poles, behind the access cover, an insulated terminal panel approx. 250mm x 50mm square fixed to a section of cable tray between column mounting blocks, install the appropriately sized protective device and enclosure with insulated neutral bar & earth connection. Install nominated footpath lighting luminaires on the 3.5m high lighting poles and at the "piggyback" mounted bracket fixed to the 9m (or 10.5m) street lighting pole. Wire and connect the footpath and street lighting luminaires via the column circuit breaker & terminal block to the adjacent fuse pit.

Provide a separate protective device for each light and wiring in the lighting poles according to the CoA Construction Standard Drawings. Protective devices shall be clearly labelled in a permanent method of identification approved by CoA.

For columns greater than 3.5m secure the vertical cable in column along its length to an approved PVC coated galvanised steel wire to provide cable strain relief. The support wire shall be securely fixed to the body of the streetlight. Leave approximately 300mm slack cable in pole. Refer to CoA Construction Standard Drawing.

The light columns shall be installed so that the lanterns are the specified height above finished ground level, and the bottom of the access cover 600mm above ground level. Locate the access cover on the opposite side to the roadway unless otherwise noted on drawings.

Pole Footings, Hole Sinking

Excavate all soil for the lighting pole footings.

Remove all ground, storm, or surface water, by pumping if required.

The use of formwork is not permitted. The holes are to be cut in the ground to the shapes required to avoid disturbing the surrounding earth unnecessarily. If, for any reason whatsoever, the final hole in the ground is

larger than is required, then backfilling outside of the required diameter of the footing sleeve and the ground (undisturbed soil) shall be in concrete to the satisfaction of Council.

In the event of difficult site conditions being encountered (loose sand, excessive ground water and the like), the design of the footings shall be reviewed by a Certified Structural Engineer. In these circumstances, formwork may only be permitted on advice of this engineer.

Concrete

Cement shall be General Purpose Cement (Normal Portland Cement) and comply with AS3972.

Aggregates shall have a nominal maximum size of 20mm.

Both fine and coarse aggregates shall be of such quality and so graded that, when combined and mixed with cement and water within the limits specified hereunder, they will produce plastic, workable concrete of the consistencies and characteristic strength required.

The minimum grade designation of concrete used in the works shall be 25 MPa.

Neither retempered concrete nor concrete which has partially hardened or been contaminated by foreign materials shall be deposited in the work.

During and immediately after placing, thoroughly agitate concrete.

After placing concrete protect all exposed surfaces against loss of moisture for at least 7 days, and against damage by rain until the concrete has hardened. Before concrete is placed, remove all debris and spoil from the holes.

Unless otherwise specified shown on drawings, the concrete supplied shall comply, with regard to both materials and workmanship, with the current Australian Standard AS 3600 "Concrete Structures".

Installation of Luminaires

Where required the Contractor shall arrange for collection of the luminaires from City of Adelaide's London Road Depot. The Contractor shall assemble supplied luminaires, install them on lighting poles and wire according to CoA Construction Standard Drawings and as detailed in this specification.

Installation of Conduits

Conduits shall be installed in straight lines and any required bends and changes in direction shall be smooth and the minimum bending radius shall be not less than 12 times the diameter of conduit.

Surface mounted conduits shall be fixed vertically and/or horizontally on the surface as inconspicuously as possible using galvanised full-saddle clamps and two secure fixings per clamp.

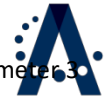
Conduits embedded in concrete shall be laid with a minimum concrete cover of 25 mm.

All joints at spigots, bends and sockets shall be prepared and jointed to form a watertight joint to the manufacturer's recommendation and to the satisfaction of City of Adelaide's Representative.

Conduits shall be clean and sealed immediately after installation to exclude dirt and water.

Provide an orange-coloured plastic marker tape (to AS 2648.1) minimum 150 mm. wide, installed in the backfill above the conduit for the whole length of underground route to meet AS/NZS3000 requirements.

Consumers' Mains conduit entry into the SAPN service pit shall be through an aperture or ducting system provided. Where there is no facility provided, a neat hole shall be made at a depth of 600 mm. below the final ground level. The conduit shall have a fall from the residence of not less than one in forty to enable adequate drainage. A seal which prevents the transmission of liquids, termites and vermin through the conduit or duct



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shall be provided within 900 mm of the entry into the SAPN service pit and a small drain hole of diameter 3 mm. shall be drilled in the underside of the conduit immediately uphill of the seal.

The electrical cable access / protection between each fuse pit and the lighting column sleeve to the location of column fuse shall be via a 32mm diameter sweep bends. The use of corrugated unless absolutely necessary is not permitted.

Installation of Pits

Install underground access and joint pits according to manufacturer's recommendation.

In all cases provide a concrete surrounding 'collar' around the top of the pit, minimum 50mm wide and 100mm deep with reinforcing mesh 25mm x 25mm in the centre of the concrete surrounding. This surrounding 'collar' shall be levelled with the finished level of the top of the footpath paving.

Provide CoA cast iron cover and frames (available from Beverly Industries Pty Ltd, PO BOX 162, KILKENNY SA 5013) with lettering "CoA" as applicable, unless documented otherwise. Refer CoA Construction Standard Drawings.

Seal conduit entries to the pits on both sides of the pit walls with waterproof sealant recommended by the conduit and pit manufacturer in accordance with the relevant Australian Standards.

Pits dedicated to power and communications cabling with special designation, such as ticket machines, bus stops, telephone boxes, etc. shall have appropriate lettering embedded in the lid of the pit. Identify all special cases and obtain City of Adelaide's Representative's approval for the embedded lettering prior to ordering the lids.

Installation of Cables

General

Install and adequately support fixed wiring as specified throughout the installation. For cabling routes not specified in detail, submit a proposed route layout for approval by the City of Adelaide.

Cabling shall be installed in continuous lengths without joints as far as practicable.

Verify cable lengths by site measurements before ordering the cable.

All cabling installed under this specification shall comply with the requirements of AS/NZS 3000 and SAPN Service and Installation Rules and shall be installed in accordance with the relevant Australian Standard.

The supply and installation of Consumers' Mains cables shall be in HD UPVC orange underground conduit at a minimum.

Public lighting circuit cables shall be sized to provide a voltage drop of less than 3.5% between the first and the last luminaire connected to the respective circuit.

Manufacturers' Recommendations

Install, terminate and joint cables in accordance with manufacturers' recommendations.

Cable Grip

Pull the cable by means of a steel wire stocking of sufficient length to grip the serving or armouring for a minimum length of 600 mm.

Rollers and Skids

During installation provide roller supports for runs not in ducts or pipes, with sufficient rollers to avoid damage to the cable. Adequately support the cable by rollers or skid plates around bends in the route, maintaining the minimum radii recommended in AS 1026 Table B1.

Power Cable Winch

Provide a means of smooth starting and fit an accurately calibrated dynamometer to indicate pulling tension.

Underground Ducts and Pipes

Prior to cable installation, ensure that the duct or pipe is of constant cross-section throughout and free from concrete, loose stones and the like. During installation, lubricate the cable according to manufacturer's recommendations to minimize friction during pulling.

Installation of Accessories

Fuse Boxes

Typically, wall/surface mounted according to SAPN Service and Installation Rules.

Undergrounding of electrical services

General

The Contractor shall carry out works to minimise the inconvenience to owners and occupiers, pedestrians, and road users. The Contractor shall maintain access to commercial premises during business hours and shall provide facilities to their passage using means and methods approved by City of Adelaide's Representative.

The Contractor shall maintain contact with the affected parties during the contract to ensure that any inconvenience created by the works is minimised.

Electricity Supply

The Contractor shall arrange for SAPN to make available 400/230V, 50 Hz supply for CoA public lighting at an underground service pit located within the power distribution easement. The minimum number of points of supply shall be determined and installed by the Contractor on the basis of the Calculated Maximum Demand (CMD) and voltage drop not exceeding 3.5% on the cables from the SAPN point of supply to the last luminaire connected to the circuit. This CMD shall be based on 500VA per lighting pole 9m (or 10.5m) high and 175VA for the 3.5m high footpath lighting poles.

Provide City of Adelaide underground switchboard containing Main Switch, Protective Devices, earth electrodes and terminals in accordance with the CoA Construction Standard Drawings.

Maximum length of individual public lighting circuit shall not exceed 250m.

Earthing System (MEN and Equipotential Bonding)

The M.E.N. (Multiple Earthed Neutral) system shall be employed. Earth all light fittings and parts of the installation as required by AS/NZS 3000. Supply and install proprietary 1200mm long x 12mm diameter, copper or stainless steel-clad solid rods as the earth electrodes. Install one earth electrode per CoA underground switchboard pit. Install and connect an earth bond between the earth electrode installed within the CoA switchboard pit and the Earth Terminal within the pit. Provide a MEN point within the pit and distribute wiring with an adequately sized earthing core from this point to all lighting poles. Refer standard CoA drawings for details.

Where required equipotential bonding is to be installed in appropriate cabling not less than 4mm².

The Contractor shall suitably protect the earth connections against corrosion and ensure that earth electrodes have been installed in a manner that will ensure they are kept moist in the ground (i.e. not surrounded in concrete or sand fill)

Specific Requirements for Consumer Mains

General

Where Consumers Mains to public properties are required to be provided, the Contractor shall supply, install and connect all conduits, cables and equipment necessary to provide new underground electricity supply to each property in accordance with the requirements of SAPN.

Service and Installation Rules and AS/NZS3000.

Where required, the Contractor shall supply, install and connect the new underground consumers' services to replace the existing overhead services from the service pits to the premises as shown.

or

Redirect and or extend as required Consumer Mains to new underground service pits.

Indicate proposed routes of underground cable/conduits, for consumers' mains on quotation drawings prepared. The Contractor shall undertake a site inspection to determine the cable route to be taken bearing in mind the existing facilities and finished surfaces within the consumer's property. The routes of underground Consumers Mains and other cables shall be determined on site with consideration to surface finishes, access, ease of maintenance and clearance from other services.

The Consumer Mains shall be installed at a depth not less than 600 mm below finished ground level and as required by SAPN Service and Installation Rules and AS/NZS3000 and to the agreement of City of Adelaide's Representative.

The Contractor shall extend, alter and / or relocate the existing service cabling external to the building and connect to the new service fuses as required by SAPN.

Note: Existing cabling located inside the building shall be retained and not disturbed. If, on inspection the existing cabling is unsuitable for alteration, advise City of Adelaide's Representative before proceeding.

As required, supply and install a new earth stake and earth conductor when providing new consumers service mains to the meter switchboard.

The Contractor shall coordinate and arrange the changeover of supply with CoA and SAPN. The Contractor shall advise in writing to individual consumers about intended changeovers. Refer Appendices for standard letters.

All equipment shall be suitable for operation on, and clearly marked for, its respective electrical supply. Unless otherwise specified, all equipment shall be suitable for 400V phase to phase or 230V phase to neutral, 50Hz supply.

Phase Rotation

Check the existing phase rotation of multiphase installations prior to the replacement of the existing consumer mains. On completion of the changeover of Consumer Mains and prior to energisation of any equipment the Contractor shall ensure that the phase rotation of multiphase supplies to properties is the same as the initial installation.

SAPN's Service Fuse Box/Enclosure

SAPN will supply and install service fuses for each private property. The Contractor is to negotiate the location of the service fuses with SAPN and to the approval of the City of Adelaide's Representative. The Contractor

shall supply and install, where required, a service fuse enclosure in accordance with SAPN's requirements for the service fuses.

Service fuses will generally be located either:

- In external meter panels where the meter panel is suitable. Where new fuses are installed on meter panels the earth bond shall be removed from the panel enclosure and replaced with a neutral bond using cable sized to match the new service

OR

- In a new service fuse box/enclosure at high level adjacent to the existing entry point of the consumers' mains into the building to an internal meter panel/switchboard unless otherwise noted on drawings. Earth the service fuse box/enclosure in accordance with AS/NZS3000.

Removal of existing Cabling

After the new underground Consumers Main service is connected, the Contractor is to remove all redundant service risers, SAPN fuses / fuse boxes, conduits, cables, fixtures and fittings associated with the redundant consumers service from the buildings. Remove from site and dispose of as necessary all the dismantled materials.

The Contractor shall make good as necessary all affected surfaces after removal of all redundant materials.

Continuity of Power Supply and Communications Services

The work included in this Contract involves connections and alterations to existing services and equipment. Existing services shall be maintained during the contract unless otherwise specified and the Contractor shall carry out such work at times acceptable to City of Adelaide's Representative.

To minimise any inconvenience to the consumer the Contractor shall carry out all possible related new work prior to interruption to supply or altering the position of services or equipment. The Contractor shall allow in the Quote price for work to be carried out during normal working hours.

Communications Cabling within private properties

The Telecommunications Service Provider may carry out the undergrounding of all telephone cabling in the street in conjunction with the works.

In such a case, the Telecommunications Service Provider may supply underground conduit for this Contractor to install in the CST within the private property.

The Contractor shall coordinate the works with the Telecommunications Service Provider to facilitate the installation of their services within CST's.

Other Installation Requirements

The Contractor shall allow for the following:

Provision of temporary power supply as required to carry out installation work.

Provision of City of Adelaide requirements as specified in following sections and clauses of this specification and/or CoA publications referred to in this specification (e.g., "traffic control", "protection of the public", etc. – refer publication "City Works Guidelines Booklet").

The Contractor shall be liable for payment of all applicable authority charges and fees.

Works by Others

During this Contract other Contractors may carry out undergrounding works and/or works associated with the undergrounding. These works may include the following:

- Installation and commissioning of the communications services within the common trenching provided under this contract.
- Installation of HV and LV power cables in conduits and pits provided as part of this contract.
- Removal of the redundant stobie poles, hardware and cabling belonging to SA Power Network.
- Removal of the dismantled street lighting luminaires belonging to SA Power Network.

The Contractor shall coordinate the works covered by this documentation with all other contractors to meet the requirements of the City of Adelaide.

As Constructed Drawings Guidelines

- Standard CoA title block – ‘As Constructed’.
- Lighting Design is limited to extent of new work and transitional only.
- Lighting classification to be clearly indicated on drawing (e.g. Public Lighting Complies with AS/NZS 1158.3.1 Path Category Pxx).
- All lights and pole types to be clearly identified on legend including manufacturer’s name to enable future maintenance.
- Location of all electrical trenches/ducts from property boundary lines and depth of cover to be clearly identified with dimensions on drawing. Provide depth log for bored ducting on plans or suitably referenced.
- Mounting details for wall mounted fixtures (e.g. fixings used for wall mounted luminaires, CCTV cameras etc).
- All electrical circuits to be clearly labelled.
- Ownership of any installed CoA underground ducts to be clearly labelled.
- All terminology to read as past tense – ‘As Constructed’.
- All project work to be in dark pen (other than text) to clearly define the scope of works.
- All redundant electrical and lighting assets to be clearly identified if they have not been removed as part of the works.
- Design Consultant to verify design ‘checked’ on drawings, signature boxes signed and completed.
- Contractor to sign off ‘as constructed’ details on drawing, signature boxes signed and completed.

CAD Drawing format

- CAD drawings electronic drawing format to be standalone (e.g. no external references required to view drawing).
- CAD drawings to be ‘purged’ to minimise storage size.
- Provide a PDF copy of drawing for CoA records.
- All Lighting Drawings to at a minimum include a copy represented using AGI32 Software.