

3. Specification

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Specification

1. INTRODUCTION

The Port Phillip City Council (“the Council”) seeks an experienced contractor to carry out electrical works associated with the construction of a new substation at the South Melbourne Market.

The main activity will be the delivery, installation and setting to work of electrical services and switchboards as described in the scope of works of the specifications for the electrical services and switchboards.

2. PROJECT BACKGROUND

The South Melbourne Market currently has an existing substation located on Cecil Street which has been identified as requiring upgrading to meet the market’s current and future electrical demands.

Council proposes to construct a new substation within the York Street carpark and decommission the existing substation located on Cecil Street. Refer to the aerial photograph below for the site environs.



CitiPower is the electrical supply authority for the area. Council has already negotiated with CitiPower regarding the proposed location of the new substation within the York Street carpark and the electrical demands for the market. Based on this information, CitiPower has prepared a proposal to provide a 2 kVA substation with high voltage supply coming from Coventry Street.

As there are a number of interlinked activities involved in the project, contractors will be required to coordinate works with South Melbourne Market operations, CitiPower, the substation enclosure building works, and the new electrical works.

3. KEY PROJECT ACTIVITIES

The overall project will consist of the following:

- i. the construction of a new substation enclosure within the York Street carpark, to be carried out by the appointed building contractor;
- ii. the installation of new high voltage and low voltage cabling from existing CitiPower assets on Coventry Street to the new substation enclosure, to be carried out by CitiPower;
- iii. the installation of a new 2 kVA transformer within the substation enclosure, to be carried out by CitiPower;
- iv. electrical works within the York Street carpark from the existing market building to the new substation enclosure, to be carried out by the appointed electrical contractor; and
- v. electrical works within the existing market building and new substation enclosure, to be carried out by the appointed electrical contractor.

Note: This contract will only be for the works outlined in parts (iv & v) above.

4. PROPOSED PROJECT COMMENCEMENT

The Council's preference is for the project to commence as soon as possible. Contractors are required to submit their proposed start and finish dates.

Note: This contract will only be for the works outlined in parts (iv & v) under the Key Project Activities above.

Refer to the plans and specifications for all technical and other construction requirements regarding the works to be delivered for this project.

5. PARTICULAR REQUIREMENTS FOR ELECTRICAL WORKS CONTRACTOR

This contract will only be for the works outlined in parts iv and v under Key Project Activities above.

Refer to the specification and drawings for all technical and other construction requirements regarding the works to be delivered for the contract.

6. ELECTRICAL SERVICES

6.1 General Conditions

Co-ordinate the location of all items for minimal impact on existing underground services. Co-ordinate all work procedures, safety barriers, signage and other items with the Market to ensure no opportunity for injury throughout all of the contract works.

6.2 Inspection

Become fully informed of the contract work by inspection of the site and by other means considered necessary. Unforeseen difficulties due to neglect of this precaution shall not relieve the electrical contractor from responsibility for the full and proper execution of the works. Dimensions must be checked on site as no claims will be allowed for errors due to scaling off the drawings.

6.3 Codes, Rules, Permits, Fees

All materials, supplies, and all work installed shall comply with the codes, standards, rules and regulations of all statutory authorities including, but not necessarily limited to:

- AS 3000, AS/NZS 3008, (LV power reticulation);
- AS/NZS 4836 (Safe Working on Low Voltage Electrical Installations); and
- Victorian Service and Installation Rules.

Make all applications and pay all fees required to comply with relevant authority requirements, including certification costs for electrical inspection. Allow for completion of all South Melbourne Market and Council safety records, permits and inductions prior to commencing works on site.

6.4 Defects Liability Period

Guarantee all work and materials as to quality, workmanship and against defects, for a period of twelve (12) months from the date of issue of the 'Certificate of Practical Completion'. During this period, promptly replace all defective equipment, fixtures and materials at no additional cost. Also during this period, carry out routine maintenance and servicing as detailed by the manufacturers of the various equipment and systems.

6.5. Scope Of Work

The scope of work includes the delivery, installation and setting to work of the following systems and equipment and as shown on the electrical drawings E001 to E005 inclusive. Supply all the required materials unless otherwise specified.

6.5.1 New Main Switchroom

- Provide a new, modular main switchboard (MSB) as detailed on the drawings and Switchboards Specification.

- Relocate existing metering facilities into new main switchroom. Apply for export enabled metering in readiness for future photovoltaic system installation.
- Liaise with the Supply Authority (Citipower, Mr. Steve Truman, ph. 9297 6065) for all works associated with the new indoor substation, consumer mains connections and service disconnect device. Pay all fees and charges.
- Relocate existing power factor correction equipment into new main switchroom and connect to new MSB.
- Provide generator connection facility for connection of future mobile generator, as indicated on the drawings.
- Provide a local load centre, lighting and general power outlets in the main switchroom, as detailed on the drawings.

6.5.2 Low Voltage Power Reticulation Works

- Provide new submains cabling from the new MSB to each of the existing distribution boards and group metering panels.
- Provide T-off boxes at high level for feeds to switchboards and panels in the case of riser type submains cables. T-off boxes shall consist of steel enclosures with suitable din-rail mounted terminals to facilitate loop through connection of riser submains.
- Provide a new distribution board to replace existing distribution boards 'Sub board- D', 'Sub-board A' and 'DB1/A'. Transfer all existing circuits from these three switch boards into the new distribution board. Demolish the three existing switchboards and associated submains cabling. Refer Switchboard Specification for further requirements.
- Provide new cable ladder/ tray, conduit, pits and other appropriate cable carrier systems and accessories as required to suit the new submains cabling. Provide additional mechanical protection around sections of cabling within 2.5m of ground level, i.e. steel covers over cable risers.
- Provide trenching, backfill and surface reinstatement works. Engage a specialist underground services tracking firm to locate the existing underground services in the York St carpark. Allow for manual excavation around the existing underground services.
- Cable pits provided shall be of the reinforced concrete type either pre-fabricated (off site) or cast in-situ type. It is the responsibility of the Contractor to select the appropriate size pit to suit the number and size of conduits entering the pit. Pits shall be ACO Cablemate Polymer Concrete or approved equivalent.
 - The pits and pit covers shall be heavy duty (suitable for vehicular traffic). Covers shall be waterproof (IP65) access type. Provide locking bolts to pit covers. Plastic plugs shall be provided in all lifting holes.
 - All pits shall have drainage via a penetration in the base of the pit and either a pipe to a suitable soakaway or a sufficient layer of crushed rock forming the base of the pit. Pits shall generally not be located at the bottom of valleys, dips, etc. which could become flooded during periods of high rainfall.
 - Pit covers shall have indented, or approved equivalent, identification to

identify that the contained service is , i.e. “ELECTRICAL - LOW VOLTAGE”

- Only rigid PVC Category A conduits complying with AS2053 shall be used for underground power cabling.
 - All underground reticulation routes shall be marked out and approved before commencing excavation.
 - Trenches shall be located to permit changes of direction in easy stages eliminating strain on cables.
 - Wherever possible all underground conduits which connect to a cable pit shall be graded to drain to the pit.
 - Provide clean sand around conduits installed underground. Unless otherwise specified, backfill trenches using excavated material with no stones retained on a 25mm sieve occurring within 150mm of the service.
 - Where service excavations occur in topsoil areas, complete backfilling with 100mm thick topsoil, reinstate existing surface and assets disturbed or removed as a result of the excavation or trenching, to the approval of the engineer.
 - Where trenching occurs under buildings or in car parks or other paved areas, trenches shall be backfilled with 3% cement stabilised sand to the approval of the Superintendent.

6.5.3 Building Management System

- Provide a building management system (BMS) for control of all public lighting circuits and control of various power circuits, as detailed on the drawings. Provide suitable, lockable steel enclosures above every existing Public Light & Power distribution board for housing of BMS equipment, including DIN rail, terminal strips and accessories. Provide a typed circuit schedule on the inside of the door and permanent labels to all cables within the enclosure to facilitate identification of all circuits within the BMS enclosure.
- Provide a high level link to the new main switchboard power quality meters.
- Allow for a low level interface to the existing market security system (Concept 3000, headend located near Administration area), to enable BMS functions in response to various programmable security events. Engage the Market security service provider (National Protective Services, Mr. Darren Shield, ph: 9674 6811) to connect the low level interface to the security headend panel and program spare security contacts to change state in the event of the following:
 - Intruder detected;
 - General fire alarm;
 - System armed/ disarmed.Allow for a different lighting and power presets for each of the above events. Exact preset details to be advised at commissioning phase.
- Provide a monochrome, LCD touch screen, wall recessed in the Market Office for control and monitoring of the market. Allow for the following pages:
 - General information page, displaying time, date, indoor ambient temperature of the market area, error and status messages as applicable;
 - Lighting control page, with four lighting presets (i.e. Business Hours,

After Hours, Cleaning, Security, etc.), exterior lighting controls (i.e. OFF, MANUAL, AUTO) and timer adjustment tools;

- Energy monitoring page, displaying voltage, current, power (real time and maximum values of kW and KVA), power factor, frequency and total harmonic distortion information from the MSB power quality meter;

- Allow 2 x 5 hour service visits during the defects liability period to make adjustments to the system and interfaces based on user feedback.
- Preferred BMS make is the Lightmoves 'Dynamite' system.

6.5.4 Demolition Works

- Demolish existing main switchboard and redundant distribution boards. Clear the existing main switchroom to make way for future retail tenancy.
- Remove all redundant power cabling and sell to an off-site copper recycling company. Return all proceeds of the sale, including transaction records, to the Superintendent.
- Disposal off-site of all waste materials, packaging, pallets, etc

6.5.5 Miscellaneous Works

- Reinststate all surfaces damaged by the installation works, including patching and painting, to the approval of the Superintendent.
- Refer to Legend and Notes on drawings for further requirements.

6.5.6 Circuiting Requirements

Support all cabling in ceiling space on approved cable tray and/or catenary wire. Support all cabling in void spaces and/or underfloor on approved cable tray. Segregate LV power cabling from communications & control cabling to AS/NZS 3000 and AS/ACIF S009.

6.5.7 Staging Of Works

All contract works shall only be carried out during 'Market Closed' days (Monday, Tuesday and Thursday) and/or after hours unless written authority is obtained from the Superintendent.

The new substation, main switchboard, new conduit and cable tray, new submains cabling to existing distribution boards, building management equipment, etc. shall be installed, tested and commissioned without interruption to the Market operations.

Cutover works shall be arranged with the Superintendent as scheduled, commencing on the Sunday afternoon after Market closing and completed by the following Tuesday night (i.e. 2.5 days total). The new Distribution Board DB-D shall also be installed and existing circuits transferred during this cutover period. During this cutover period, power to refrigeration equipment shall not be shutdown for periods longer than 4 hours, unless otherwise agreed in writing by the Superintendent.

Demolition works on redundant cabling and equipment may be carried during or after the cutover works (i.e. during Market closed times).

TESTING AND COMMISSIONING

- Supply all necessary labour and assistance for testing, operating and adjusting the system and equipment, and for fully instructing the proprietor or his representative in the operation of the system and equipment. Provide full operator's manuals.
- Test electrical systems in accordance with AS/NZS 3000 & AS/NZS 3017. Provide a signed certificate at project completion stating that these systems have been installed and tested to the listed Australian Standards.

6.7 AS BUILT DRAWINGS AND MAINTENANCE MANUALS

Provide two full sets of hard copies and a softcopy on CD (Autocad 2007 or later) of as-built drawings, to the satisfaction of the Superintendent, within 7 days of practical completion. The as built drawings shall comprehensively reflect details of all installed systems and components, including schematic drawings, as detailed in the above Scope of Work.

Provide two sets of operation and maintenance manuals, the aim these being to provide a detailed understanding of the plant and its operation, an aid for training of operators, a reference for fault diagnosis and a framework for preventive and breakdown maintenance. The manuals shall include as a minimum:

- name, address and telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers. Also include such details for all consultants and contractors involved in the design and construction phases;
- technical description and modes of operation of the systems installed;
- product literature for the systems installed and contact details for suppliers and manufacturers of these systems;
- control and switching sequences and flow diagrams for systems installed, including safety features. Also procedures for operating and adjusting control systems;
- copies of final switchboard circuit schedules;
- manufacturer's operational and safety literature, as appropriate;
- emergency maintenance procedures, including telephone numbers for emergency services, and after hours contacts for suppliers and contractors and procedures for fault finding;
- statutory Certificates of Compliance for all electrical work, copies of manufacturers' warranties, certificates from authorities and utilities, product certification, copies of test certificates, etc;
- copies of all approved shop drawings, as-built drawings, system schematics etc; and
- commissioning records.

7. SPECIFICATION FOR SWITCHBOARDS

7.1 GENERAL

Supply, install, test, and commission new main switchboard and distribution boards, etc., required for the installation, as shown on the drawings and as detailed in this Specification.

Switchboards etc. shall comprise all switchgear, control and protection devices and power sources and shall be designed and constructed in accordance with AS/NZS 3439.1. Connect all mains, sub-mains, final sub-circuits, etc., to the appropriate switch, circuit breaker or fuse.

The extent of equipment required on each switchboard shall be taken from the single line diagram(s) shown on the drawings and from the specification.

The new main switchboard shall be a type tested assembly (TTA)

The new main switchboard and distribution boards shall be type tested assemblies (TTA) all built by an approved specialist switchboard manufacturer. The type test assemblies shall use a type tested arrangement for busbars and main switch and for all other switchgear, control gear and other equipment with associated busbar for which a Type Test Certificate is held. Verification of the achievement of temperature rise limits for the assemblies either by test or by calculation based on similar type-tested assemblies shall be carried out.

Current type test certificates conducted by a NATA approved testing authority shall be submitted by the Contractor on request by the Superintendent.

Design and construction of the switchboards shall conform to the manufacturer's type test certificate. The manufacturer of the switchboards shall have in place an approved quality assurance program certified by Standards Australia or another comparable certifying body. The program shall ensure that the construction process for switchboards follows the assembly process for the switchboards which have been type tested.

Switchboards shall contain equipment from the one manufacturer/supplier. A mixture of equipment and switchboards will not be accepted.

The design and construction of switchboards, associated components and connections shall give satisfactory performance under all variations of load conditions as may be met within the service, including short time overloads and short circuits.

7.2 SCOPE OF WORKS

7.2.1 Main Switchboard

Supply and install a new main switchboard in the location shown on the drawings.

The main switchboard shall be free standing, top entry/ bottom exit (except for PFC and Generator submains which will be top exit), front connected, of totally enclosed sheet metal construction with hinged,

internal escutcheon panels and hinged, gasketed, external doors. The minimum degree of protection shall be IP54 to AS1939.

The new main switchboard shall be of Form 3bhi construction in accordance with AS/NZS 3439.1. Maximum switchboard height shall be 2.4m. Maximum depth shall be 0.6m. The switchboard shall be constructed in at least four sections to facilitate delivery into the new main switchroom.

The new main switchboard shall be of compact design, of NHP Cubic or Elsteel Modular or Custom built manufacture. The following are the preferred switchboard builders for this project:

- a) Nilsen Electric Pty Ltd (Contact: Wayne Walker, ph: 03 9450 1300).
- b) MV Manufacturing Group (Contact: Mr. Malcolm Coulston, ph: 03 9357 6077);
- c) Sage Automation Pty Ltd (Contact: Mr. Jonathan Taylour, ph: 08 8276 0700);

7.2.2 Distribution Board

Supply and install new distribution board DB-D as shown on the drawing(s). The distribution board shall be suitable for both top and bottom cable entry/exit, front connected arranged for complete front access, of totally enclosed metal clad construction with hinged escutcheon panels. Distribution boards shall be of Form 1 construction in accordance with AS/NZS 3439.1.

The distribution boards shall be provided with lockable hinged front panel doors.

The fault level of switchgear at each distribution switchboard and load centres shall be a minimum of 6kA or as shown on the drawing.

Unless noted otherwise, provide a minimum of 20% spare spaces, in each section of each board for future circuit breakers. Spaces shall be fitted with individual covers. Circuit breakers shall be combined thermal and magnetic operation. Circuit breakers shall also be provided with an integral residual current device as shown on the drawings.

Distribution boards shall be NHP, Merlin Gerin or ABB manufacture

7.3 CONSTRUCTION & DOCUMENTATION

7.3.1 General

- a) Switchboards and auxiliary panels unless otherwise detailed shall be of the sheet metal construction forming a rigid frame, vermin proof cubicle enclosure. Sheet and structural members shall be of commercial quality drawn bright mild steel machine bent and folded, flat, smooth and free from warps, twists or other distortion.
- b) The switchboards shall be constructed to withstand the minimum fault level indicated on the drawings.

- c) The maximum temperature rise of any component shall not exceed 60 degrees Centigrade or lower temperature rise limits where such are set by the manufacturer of individual components. Temperature rise calculations to be submitted for approval.
- d) Hinged doors, escutcheon panels and lift off panels shall be fitted with dust proof rubber or neoprene gaskets. Door hinges shall be of the chrome plated pintle type with staggered length hinge pins. Hinged doors and escutcheon panels shall open a minimum of 110 deg. with restraints at the fully open position. Internal hinged escutcheons shall be hinged on the same side as the outer door by chrome-plated pintle or piano type hinges. Hinged escutcheon plates, and lift-off panels shall be secured by large captive chrome plated knurled head machine screws. Lift-off panels shall be located with guide pins top and bottom mounted on the frame of the assembly and fitted with chrome plated handles. Escutcheon plates over miniature circuit breakers (MCB) etc. shall be hinged.
- e) Equipment shall be mounted on the switchboards in readily accessible and maintainable compartments.
- f) Cable zones shall have cable trays, ducts and supports arranged for access to and removal of any cable without disturbing adjacent cables.
- g) Cable entry provisions shall be via removable non ferrous gland plates or pre-punched conduit knockouts.
- h) Bolts and machine screws shall be zinc or cadmium plated complete with hexagon nuts and washers with excess threaded sections cut and filed. Nuts, bolts and machine screws exposed to view shall be chrome plated.
- i) Fit an engraved label to identify each switchboard with 12 mm high lettering.
- j) Fix an "as installed" circuit schedule behind perspex cover on the inside of each switchboard door. Type the schedules neatly with full details of the outgoing circuits and submains and associated circuit breaker controls.
- k) Full-length earth and neutral bars of adequate mechanical and electrical capacity shall be provided. Size of each bar shall be suitable for future expansion i.e. one termination hole per submain or sub-circuit.
- l) Spare spaces provided for miniature circuit breakers shall be covered using purpose made plastic inserts.

All holes on each respective bar shall be numbered, for submain and sub-circuit cabling, with clearly legible stamped numbers corresponding to the protective device number.

Earth and neutral bars shall be adjacent to each other in the cabling zones.

General light and power distribution switchboards shall be fitted with screw terminal neutral and earth bars. Connecting devices shall consist of tunnel connectors of 4.8mm diameter with provision for lug or stud connections for all cables greater than 10m².

7.3.2 Painting and Finishing

The exterior colour shall be in accordance with AS 2700. Confirm the colour of each switchboard/load centre prior to manufacture.

The inner equipment chassis shall be finished in gloss white enamel.

7.3.3 Delivery and Assembly

Care shall be taken, during delivery of the switchboards to site, to avoid damage which could result in the switchboard(s) being rejected.

Allow to fully assemble the switchboard on site, in the new main switchroom.

7.3.4 Drawings and Diagrams

Workshop drawings for all switchboards shall be provided for approval by the Superintendent within one (1) month after signing of the Contract and shall include the proposed construction, physical dimensions, weight, details of equipment, labelling, etc. The shop drawings shall include schematic diagrams showing the rating of all busbars, switches, switch fuses, circuit breakers, mains, submains, etc. A schedule of proposed labelling shall also be provided as further outlined above.

At the completion of the project, the Contractor shall provide a schematic diagram of the main switchboard to indicate the size and rating of isolating switches, circuit breakers, switch fuses, busbars, etc., plus each switchboard/distribution board it serves and the size of incoming mains and outgoing submains.

All drawings shall be CAD in AutoCAD Version 2000 or later.

7.3.5 Protection Co-ordination

Co-ordinate all protection devices with the upstream protection, from the main switchboard to the final sub-circuit protection devices, for compliance with AS/NZS 3000:2007. The responsibility for final selection of fuses, circuit breaker chassis sizes, trip units (rating and type, i.e. thermal magnetic or electronic) and settings of all adjustable parameters rests completely with the contractor, regardless of what may be indicated on the design documentation. Provision of a signed Certificate of Electrical Safety at project completion implies that the

contractor has complied with all the AS/NZS 3000 selectivity requirements.

Provide evidence for the full discrimination of protection devices, consisting typically of printouts from circuit breaker manufacturer's proprietary software (i.e. Terasaki 'TemCurve', Merlin Gerin 'Ecodial', etc.). As a minimum, provide evidence of total discrimination for the highest rated final sub-circuit protection device in each switchboard. The evidence documentation shall also include all settings on every air and moulded case circuit breaker to achieve total selectivity.

Ensure that adjustable settings on all circuit breakers are setup as per the selectivity study results during the commissioning phase of the project.