

PART E

TECHNICAL REQUIREMENTS

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PART E

TECHNICAL REQUIREMENTS

1.0 GENERALLY

This Part E – Technical Requirements is for the construction of new internal staff toilets at Hornsby, Sutherland and Marrickville Railway Stations. The location of the proposed work is at Platform No. 4 of Hornsby Railway Station, Platform 2 & 3 of Sutherland Railway Station & Platform 2 of Marrickville Railway Station.

The Scope of Work under this contract generally comprises the provision of new toilets for Internal Staff working at the railway stations. The toilets will be constructed utilising available space on the Platforms and at the existing toilet facilities.

The works under this RFT comprises the supply of all plant, labor and materials to undertake and complete the following works:

- Conduct a services search of the building site before demolishing walls and other items.
- Demolish items indicated on Drawings; including steel framing and associated concrete plinth. Also scabble existing platform surface and associated coping to receive floor tiling.
- Construct new wall & ceiling framing and install in all wall and ceiling cavities, mineral wool blanket insulation.
- Line walls and ceiling with compressed fibre cement sheet.
- Applies polyurethane liquid membrane waterproofing (equal to Emer-Proof 750PF) to toilet floors and upturns.
- Supply and install glazed ceramic tiles on walls and floors as per Drawings.
- New doors installed to be waterproof, external grade solid core and are to receive paint finish.
- Fixtures to be installed as per drawing which includes soap dispensers and paper holders.
- Supply and install screen printed signs fabricated from 1.6mm stainless steel adhesive fixed to and above doors.
- Paint internal and external surfaces. For interiors, the ceilings, doors & door frames. Exterior; new fibre cement ceiling & wall surfaces, doors & door frames, existing fibre cement cladding facing the platform.
- Supply and install electrical and lighting services in toilets as per Drawings including lights, switches, dimmers, outlets, isolators and accessories, circuit wiring and accessories. Power supplies to all mechanical equipment are to be installed and any modifications required to existing electrical distribution board as shown on the drawings.
- Hydraulic services as per Drawings including water supply pipe work and fittings, drainage pipe work and fittings.
- Supply and install air conditioning unit and ducting to all new rooms as per Drawing
- Remove and dispose of, in an approved manner, all hazardous materials found in the course of the works.
- The Contractor is to make good to any surfaces damaged during construction. The Contractor is to remove and dispose of building refuse from the site and leave the new accommodation clean and ready for use.
- The existing toilets on the Hornsby and Sutherland stations shall be decommissioned carefully to allow their possible use in the future. The fittings, pipes and other equipment associated with the toilets shall be cleaned, repaired and reserved.

1.1 AUTHORITIES AND APPROVALS

The Works are internal and will not be submitted to the local Council. The Contractor shall pay all fees and charges associated with services inspections required by other authorities.

1.2 SITE PREPARATION & RESTRICTIONS

PROTECTION OF PERSONS

The Contractor shall secure the area of work from unauthorised entry at all times. Determine the location of existing services and provide all necessary protection. Provide min 2400 high plywood barrier with man access door. Display all appropriate signage.

PROTECTION OF PROPERTY

Hornsby Station is of heritage significance. The surrounding ceiling, floor and wall finishes, fittings and services shall be protected against damage for the duration of the Works.

TEMPORARY SERVICES & AMENITIES

The Contractor shall liaise with RailCorp in the supply of temporary power, lighting, water & toilet facilities.

DUST, NOISE CONTROL

The Contractor shall inform the RailCorp's Representative when the use of equipment or tools resulting in noise, dust or vibration is proposed. Provide absolute protection against the travel of dust by installing fully sealed full height drop curtains.

1.3 MATERIALS & WORKS

MATERIALS AND WORKMANSHIP

Materials used in the Works and standards of workmanship shall be in conformity with the relevant Australian Standard.

All materials shall be new and of first quality.

PLANT & EQUIPMENT

The Contractor shall provide all plant and equipment essential to the completion of the works.

1.4 COMMENCEMENT, PROGRESS AND COMPLETION

Contractor shall commence the works within 2 weeks of date of Letter of Acceptance.

All the Works shall be carried out in the proper trade sequence and at such time as may be necessary, so as to cause minimum interference and disturbance to RailCorp and the public.

2.0 DEMOLITION AND DECOMMISSIONING

STANDARD

Demolition to AS 2601

DEMOLISHED MATERIAL

Unless otherwise directed, all demolished material shall become the property of the Contractor and shall be removed from the Station.

SCOPE OF WORK

The Contractor shall review demolition plans with the RailCorp's Representative prior to demolition of the wall between the Area manager's office and the Female WC. The RailCorp's Representative should also be consulted before removal of fixtures at Sutherland Station.

DECOMMISSIONING

The existing female toilet on the platform level in Sutherland station shall be decommissioned carefully to allow its possible use in the future. The fittings, pipes and other equipment associated with the toilets shall be cleaned, repaired and reserved.

3.0 STRUCTURE

WALLS

Construct new walls for Internal Staff toilet at Sydenham station in accordance to AS 3700.

Build wall for separation of existing Female WC with new Internal Staff Toilet in accordance to AS 3700.

In tiled walls, provide an extra row of noggings immediately above wall to floor flashings. Brace all corners as required. Co-ordinate ceiling joists with light and exhaust fittings.

INSULATION

Install in all wall and ceiling cavities, mineral wool blanket of rating R2.5 to fit tightly between framing members.

MASONARY

Conformance: Conform to AS 3700 Table 11.1.

BRICKS AND BLOCKS

Standard: To AS/NZS 4455.

Minimum age of clay bricks: 7 days.

MORTAR MATERIALS

Admixtures:

- Admixtures: To AS 3700 clause 10.4.2.4.

Lime: To AS 1672.1.

Portland cement: To AS 3972.

- Type: GP.

Sand: To be fine aggregate with low clay content and free from efflorescing salts, selected for colour and grading.

Water: To be clean and free from any deleterious matter.

White cement: To have iron salts content $\leq 1\%$.

Pigment: To BS EN 12878, and as follows:

- Quantity: Less than 10% of the mass of cement in the mix.

For light colours: Use off-white cement in the mix.

WALL TILES

Standard: To AS/NZS 2699.1.

Type: A

Strength classification:

- Masonry veneer: Light duty.
- Normal cavity construction and at abutments: Medium duty.
- Cavities > 60 and < 200 mm wide: Heavy duty.

4.0 WALL & CEILING LININGS

MATERIAL

Compressed fibre cement sheet.

STANDARDS

AS/NZS 2908.2

AS 3991: 1992

AS 3740

INSTALLATION

Applies to part wall facing platform, roof, ceiling and all faces of new stud walls to toilets.

Galvanize screw fix compressed fibre cement sheet to steel studs. Run sheets across framing members and stagger joints. Use whole sheets to minimize joints. Set and sand joints to receive either ceramic tiles or paint finish.

Finish wall and ceiling joint with standard trim equal to Gyprok 'shadowline' P50.

Sheet thickness to match existing on platform wall and be minimum 6mm elsewhere.

5.0 WATERPROOFING

MATERIAL

Polyurethane liquid membrane equal to Emer-Proof 750PF.

STANDARDS

AS 3740

INSTALLATION

Applies to toilet floors and upturns.

Use suitably qualified applicators. Turn membrane down into floor wastes and up at wall junctions and brass angles beneath door openings. Provide written certification of application on completion.

6.0 WALL FINISHES

MATERIAL

Glazed ceramic tile with high mould resistance equal to Purcell Tiles 200 x 200 Vitreous Le Cromie Series JMP 2060.

STANDARDS

AS 3958.2 1992

AS 4459

INSTALLATION

Applies to all toilet internal walls.

Fix wall tiles before floor tiles. Tiles to be laid full height to all walls. Set-out points to be as indicated on the drawings. Cut neatly around fixtures and fittings. Laying pattern to be stack bond. Adhesive fix tiles to give uniform joint widths within 1.5 – 3 mm.

Finish tiles with white grout. Allow extra 1 SM of wall tiles to be stored by Railcorp.

7.0 FLOOR FINISHES

MATERIAL

Vitrified non-slip ceramic tile equal to Purcell 200 X 200 Vitreous Le Cromie Series JMP 2070. Skirting tile Purcell 200 X 100 Vitreous Le Cromie Series JMP 2370.

STANDARDS

AS 3661-1 (1993)

AS 3958.2 1992

AS 4459

AS/NZ 4586 1999.

INSTALLATION

Applies to all toilet floors.

Tiles to be laid set to falls evenly graded to floor wastes. Minimum fall 1:100. Laying pattern to be stack bond with uniform joint widths within 1.5 – 3 mm. Cove at walls using matching coving tile. Finish tiles with grey grout. Allow extra 1 m² of floor tiles to be delivered to the RailCorp's Representative on completion of tiling.

SKIRTINGS

Applies to new fibre cement clad wall facing platform.

Supply and fix skirting to match that existing in profile, material & colour.

8.0 DOORS

DOOR FRAMES

Coated steel sheet to AS 1397. Double rebated steel sections with all necessary accessories such as strike plates, buffers, fixing ties etc width to suit doors. Equal to Taylor's Doors and Frames Pty Ltd series NR4P. Applies to door nos 1 to 5.

DOORS

All doors new waterproof external grade solid core to receive paint finish.

DOOR FURNITURE. Lockwood 2800 series with Lever No 90. Centre of lever to be 950 mm from finished floor.

9.0 MISCELLANEOUS FIXTURES

Supply & install the following:-

Soap dispenser: Equal to Bradley Model No 683.
 Paper holder: Equal to Bradley Model No 5124. (Accessible toilet only)
 Equal to Bradley Model No 5443

Wash basins
 Standard: To AS/NZS 1730

SANITARY FIXTURES SCHEDULES

BASINS SCHEDULE

Description	Type or location		
	A	B	C
Brand	Caroma		
Catalogue number or model			
Material	VC		
Colour	White		
Bowl size (nominal)			
Soap recesses			
Sides			
Supports			
Overflow			
Taps and spouts			
Trap			
Location			
Rim height from floor			

WC PANS SCHEDULE

Description	Type or location		
	A	B	C
Type			
Brand	Caroma	Caroma	
Catalogue number or model			
Material	VC		
Colour	White		
Seat form			
Trap			
Water efficiency rating to AS/NZS 6400			

SANITARY FIXTURES SCHEDULE

Fixture	Description	Accessories and Tapware	Colour/Finish
WC Unisex	Caroma Leda 2000		White
WC Cisterns	Water Wafer	Dual Flush	N/A
Basin	Caroma Concorde 500	Enware TFC 745P anti-vandal button pillar push	CP
Cleaners Sink	Caroma with CP grate	Enware VPN 315 anti-vandal tapware school pattern	

WATER EFFICIENCY

Shower heads: To AS/NZS 3662.

Water efficient tapware: Tested and labelled with their water efficiency rating to AS/NZS 6400.

10.0 SIGNAGE

Supply and install screen printed signs fabricated from 1.6mm stainless steel adhesive fixed to and above doors. Signs shall comply with Clause 14, AS 1428.1 – 2001.

Supply and install the following:-

<u>Sign</u>	<u>Location</u>	<u>Size</u>
Staff Only	Entrance to Toilets	500 X 130

11.0 PAINTING

STANDARDS

General: AS 2311 Sections 3,6 & 7.

NEW SURFACES

Prepare substrate, fill as required, clean and sand. Paint finish to be a 3 coat application using Bristol Paints.

EXISTING SURFACES

Clean surface and apply a 2 coat application using Bristol Paints.

SCOPE OF WORK

Interior: Ceilings, doors & door frames.

Exterior: New fibre cement ceiling & wall surfaces, doors & door frames, existing fibre cement cladding facing the platform.

PAINT COLOURS

Ceilings: Bristol Ceiling White

External walls: Match existing colour on cladding facing platform. Satin enamel finish.

Doors / Frames: Bristol Brunswick Heritage 1075. Gloss Enamel finish.

12.0 COMPLETION

REMOVAL OF PLANT AND MATERIAL.

Remove all surplus material from the site. Remove all waste and rubbish.

FINAL CLEANING

Prior to handover, clean all interior and exterior surfaces affected by the works. Vacuum soft surfaces. Clean all glass.

CERTIFICATES

Submit any certificates for items of work performed and warranties for appliances.

APPENDIX EA1

Electrical Building Services Specification

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SECTION 1 GENERAL REQUIREMENTS

1.01 Extent of Work

It is intended that this RFT shall include all work obviously required to complete the installation in accordance with the Wiring Rules (AS/NZS 3000) and all other relevant standards and to the satisfaction of the Supply Authority, all other relevant authorities and the RailCorp's Representative, whether mentioned in detail or not within the RFT.

The work included within this RFT to be supplied and installed by this contract comprises:

Electrical

- Modifications to existing electrical distribution board as shown on the drawings
- Switches, dimmers, outlets, isolators and accessories.
- Circuit wiring and accessories.
- Earthing systems.
- Luminaires.
- Conduits, ducts and supports.
- Access Control System
- Power supplies to all mechanical equipment

General

- As-built drawings and manuals
- 12-month defect and maintenance period
- Training for the proprietor
- Testing and commissioning

1.02 Electrical Characteristics

The equipment and installation shall be capable of operating satisfactorily when connected to a 415 Volt 3 Phase/240 Volt 1 Phase 50 Hz power supply system.

1.03 Contract Documentation

In particular the joinery details shall be read and understood in regard to the lighting, power and skirting duct locations and mounting.

Layouts of equipment, conduits, ducting, outlets, light fittings etc shown on the drawings shall be taken as reasonably accurate. Note that final locations of all outlets shall be confirmed on site with the RailCorp's Representative prior to installation.

1.04 Supply Of Equipment

All equipment must comply with the requirements of the RFT. If equipment is offered as complying with the RFT and at a later date this is found not to be so then the particular item of

equipment will be rejected by RailCorp. Replacement and/or rectification costs will be borne by the Contractor. Non-complying equipment may be offered as an alternative only.

Where alternatives of equipment are permitted under this RFT and more than one (1) item shall be supplied, all similar items shall be of the same manufacture and type.

1.05 Quality

All materials, equipment, components and devices shall be new and unused, of current manufacture and first quality. The manufacture shall be approved where this has not been specified.

All materials and equipment shall be clearly marked and suitable for the supply system to which they will be connected.

Unless specified otherwise the manufacturers recommendations shall be followed with regard to workmanship and associated materials, equipment, components and devices, whether or not the particular manufacturer has been specified.

All materials, equipment, components and devices shall be rated for the maximum average temperature over any 8-hour period within its immediate enclosure. This temperature will be commonly above the room ambient temperature.

All materials, equipment, components and devices shall be rated for use on the voltage and frequency specified.

Where vibration is present, all materials, equipment, components and devices, which could be affected by vibration, shall be selected and installed to ensure satisfactory operation. Vibration isolation shall be provided where necessary.

It shall be the Contractor's sole responsibility to check with RailCorp initially and during the contract installation stages to ensure that his program of equipment ordering and work scheduling complies with RailCorp's program of work on site.

1.06 Positioning

The layout of equipment shown on the drawings is diagrammatic only, and exact positions shall be determined on site.

Outlets shall be spaced accurately and symmetrically within rooms.

Positions of all GPO's wall switches and wall fittings shall be chalked up in areas where the outlets are adjacent to tiles or other architectural dados. Approval shall be obtained before placing any final conduits or wiring for these outlets.

The position of outlets and switches shown on the drawings is assumed to be correct, however, variations of positions of all outlets, lighting switches and wall brackets of up to 2000mm shall be able to be effected without cost variation if the change is advised before the outlet or switch is installed.

Where outlets are in close proximity they shall be aligned horizontally and/or vertically as the case may be.

Equipment shall be symmetrically located in relation to other equipment and devices, the building module and general aesthetic treatment.

1.07 Chasing, Core Holes Saw Cutting

Make allowance for chasing and saw cutting of existing walls and floors for new electrical services as required. Obtain the approval of the prior to chasing. Determine if existing in-floor/wall services will be affected by chasing prior to proceeding.

All under-slab electrical cabling to be in the heavy duty PVC conduit labelled every 1m with the circuit source and level.

Make allowance for all core holes required for installation of cabling associated with this contract. Obtain approval from the building manager for all core holes. Pay all fees associated with approval including structural certification.

1.08 Electromagnetic Compatibility

All equipment and/or appliances provided under this RFT shall be designed and installed to:

- a) not interfere with other equipment in the building or its immediate surrounds; and
- b) be able to withstand likely interference levels present in the vicinity.

All equipment shall be manufactured to comply with the relevant Australian standards for emission and immunity to electromagnetic interference and shall be certified with “C tick” compliance.

In the event of the inherent characteristics of the electrical installation being such that interference is possible, efficient devices capable of eliminating such interference shall be provided.

Define the areas susceptible to interference prior to the purchase of equipment and appliances and advise the RailCorp’s Representative of the methods to be adopted to reduce the interference.

1.09 Certificates And Approvals

The Contractor shall obtain design Compliance Certificates as required for building occupation.

The Contractor shall complete certificates of ownership when required.

Copies of all approvals and certificates shall be forwarded to the RailCorp’s Representative.

1.10 Clean Up and Finish

The Contractor shall remove all packing and waste associated with his own work as the job progresses.

On completion, he shall ensure that all fittings and equipment installed under this Contract are clean and left in a workmanlike condition to the complete satisfaction of RailCorp.

1.11 As Installed Drawings, Operation and Maintenance Manual

The Contractor shall submit for approval not later than one month after Practical Completion, three (3) copies of a Maintenance Manual that shall include instructions to cover every action necessary for the efficient operation and maintenance of the plant and equipment supplied by the Contractor. A preliminary submission of the Manual shall previously have been made in sufficient time to permit adequate checking and, if necessary, correction.

- (a) **Title Page** shall state name of Project, The Contractor, and telephone numbers for normal and after hour's service. Also state expiry date of service by the Contractor.
- (b) **Index** allowing a reader to find items by most commonly used title and page number. A reasonable degree of cross-referencing shall be provided.
- (c) **General Description** providing an easy to read description of the installation covering all systems and their functions. Reference shall be made to later and more detailed description of plant or systems.
- (d) **List of Light Fittings & Equipment** containing each item installed with maker's name and address, serial number and nameplate data.
- (e) **Not Used**
- (f) **Electrical Distribution Board** Description of all modifications
- (g) **Operating Instructions** for the correct starting, operation, etc. for each system. Instructions for adjusting all controls and cut out settings. These shall include instructions for actions to be taken in event of abnormal or emergency conditions.
- (h) **Maintenance Instructions** setting out in detail all requirements for preventative maintenance of the equipment supplied. This shall be arranged in sections and recommended daily, weekly, monthly and annual maintenance. Provide for each section a check sheet for recording maintenance done.
- (i) **Drawings.** The drawings submitted shall be of no less a standard than that provided by the RailCorp's consulting engineer with respect to printing and setting out.

Where practical each drawing shall be folded and provided under a cover of a separate manual. Where the number of drawings exceeds 5 per set, they shall be supplied as an open 'flat' set with a hard cardboard cover with the Contractors name and relevant information.

SECTION 2 ELECTRICAL SERVICES

2.01 General

2.01.01 Standards

Materials and standards of workmanship shall fully comply with the relevant documents of the Standards Association of Australia, or, where no Australian Standard exists, the British Standard as published by the British Standards Institute including subsequent amendments applicable to any part or item forming part of the installation or with the best current practice.

All work shall comply with the Supply Authority Regulations, Building Code of Australia, Austel, Insurance Council of Australia requirements and Workplace Health and Safety Act and Regulations Act.

AS 1044	Limits of electromagnetic interference for electrical appliances and equipment.
AS 1125	Conductors in insulated electric cables and flexible cords
AS 3439	Low voltage switchgear and control gear assemblies.
AS 1201	Tubular fluorescent lamps for general lighting service
AS 1345	Identification of the contents of piping, conduits and ducts
AS 1367	Multiple Outlet Distribution Systems – Sound and Vision
AS 1680	Interior Lighting
AS 3947	Low voltage switchgear and control gear
AS 1795	Sheets and boards for electrical purposes.
AS 1882	Earth and bonding clamps
AS 1930	Circuit-breakers for distribution circuits (up to and including 1000 V a/c. and 1200 V D.C.)
AS 1939	Classification of degrees of protection provided by enclosures for electrical equipment.
AS 1670	Automatic fire detection and alarm systems – System design, installation and commissioning
AS 2005	Low voltage fuses - Fuses with enclosed fuses-links
AS 2052	Metallic conduits and fittings
AS 2053	Non-metallic conduits and fittings
AS 2184	Low voltage switchgear and control gear - Moulded-case circuit breakers for rated voltages up to and including 600 V a/c. and 250 V D.C.
AS 2220	Emergency warning and intercommunication systems in buildings
AS 2293	Emergency evacuation lighting in buildings
AS 2325	Tungsten filament lamps for general service – Performance Requirements
AS 2481	All-or-nothing electrical relays (instantaneous and timing relays).
AS 2643	Fluorescent lamp ballasts of reactive type - Performance requirements
AS 2644	Capacitors for use in discharge lamp circuits
AS 2946	Suspended ceilings, recessed luminaires and air diffusers - Interface requirements for physical compatibility
AS 3000	Wiring Rules
AS 3008	Electrical installations - Selection of cables
AS 3080	Integrated communications cabling systems for commercial premises

AS 3084	Telecommunications installations – telecommunications pathways and spaces for commercial buildings.
AS 3111	Approval and test specification for miniature over-current circuit breakers.
AS 3112	Plugs and plug sockets
AS 3168	Approval and test specification for fluorescent lamp ballasts
AS 3178	Silicone rubber insulated electric cables and flexible cables for working voltages of 0.6/1 kV
AS 3190	Approval and test specification – residual current devices
AS 3191	Approval and test specification Electric flexible cords
AS 3198	Approval and test specification - XLPE insulated electric cables for working voltages of 0.6/1 kV
AS4251	Electromagnetic compatibility (EMC) – Generic Emission Standard
AS6100	Electromagnetic compatibility (EMC)

2.01.02 Voltage drop

Ensure that the completed installation has a voltage drop that does not exceed 5% measured from the point of entry of low voltage consumer's mains to the terminals of the installed load.

2.01.03 Balance of load

Balance the loads between the phases at each distribution board to the satisfaction of the RailCorp's consulting engineer. Loads shall be balanced to within $\pm 5\%$.

2.01.04 Power factor correction

All fluorescent and discharge luminaires shall be fitted with power factor correction capacitors to correct the power factor of each luminaire to 0.9 lagging or better.

2.01.05 Operating instruction

The components of the electrical system shall be suited to and shall be capable of operating under all aspects of their environmental location and ambient conditions.

2.01.06 Additional capacity

Allowance shall be made for the following;

- 2 off light fitting type 'A'

And it shall include all wiring and connection to existing circuits.

2.02 Earthing

2.02.01 Requirements

Supply, install and terminate a complete earthing system for the entire works.

2.02.02 Earthing equipment

Provide and connect to each and every outlet (including lighting outlets), permanently connected appliance or luminaire, switchboard enclosure, metallic wiring enclosure (including conduits, trays, ladders and ducts), metallic cable sheath (including armour, screening, braiding or MICS sheath), metallic cable supports (where they are in an earthed situation) an earthing conductor of a size not less than that required by AS 3000, shown on the drawings or specified herein, whichever is the greater requirement.

2.02.03 Structural Metalwork, Cladding & Conductive Building

All exposed structural metalwork, cladding and other conductive building materials (whether internal or external) where they are in an earthed situation (or are electrically continuous with other metalwork, cladding, conductive building material or appliance in an earthed situation) shall be earthed. This clause shall apply comprehensively and shall specifically include:

- Metallic equipment mounting frames
- All stainless steel benches, hoods and cupboards and the like
- Metallic sheeting to acoustic lining or treatments
- Metallic sinks

2.02.04 Minimum Resistance

Where additional earth conductors need to be installed to maintain the minimum resistance requirements laid down in AS 3000, then such additional earth conductors shall each be equal in size to the minimum specified in AS 3000.

2.02.05 Equipotential Bonding

Provide equipotential bonding conductors as required by AS 3000, as specified herein or as shown on the drawings, whichever is the greater requirement

WATER PIPING: Metallic water piping shall be bonded at the point of entry to the building(s) and at additional points where such piping leaves the building(s) and re-enters the building(s) if the piping between these points is metallic or encased in conductive sheathing. The minimum size of bonding conductor shall be 6mm² Cu PVC.

Where the piping is isolated for galvanic corrosion control by the insertion of isolating spacers at the point(s) of entry, supply and install an approved surge arrestor across the spacer(s).

WATER HEATERS: All water heaters, including gas water heaters, shall have equipotential bonds installed between the inlet and outlet piping. The minimum size of bonding conductor shall be 6mm² Cu PVC.

2.03 Distribution Boards

2.03.01 General

Allow for supply and install new circuit breakers and equipment and make modifications as required to the existing floor distribution board (DB-G) to accommodate new circuits for new lighting and power as required

Provide new machine typed circuit schedules and labels as required.

2.03.02 Circuit Breakers

Circuit breakers shall be of the clip-on type and interconnected with a three-phase busbar system, which must not rely on the circuit breaker terminals for support.

Circuit breakers shall be thermal magnetic in operation.

Construction shall allow for complete inter-changeability of single or multi-pole breakers without alteration to busbar connection or breaker mounting fixtures. A separate lift-out tray assembly shall be provided to mount breakers and busbar supports.

Circuit breakers shall comply with AS3111 and AS2184 and shall have a minimum fault current capacity of 6000 amps and shall be capable of withstanding the let through energy interrupted by the backup fuses indicated on the drawings, in any case no less than 160 amps.

2.03.03 Earth Leakage Units

Supply and install the earth leakage units to cleaner power circuits. i.e power points positioned at open locations 300mm AFFL.

The units shall be type II unit operating at 30 mA as required under the Australian Standard AS3190

2.03.04 Contactors

Supply and install contactors controlling the lighting as indicated on the drawings.

The contactors selected shall be coordinated with the circuit breakers protecting the contactors to Type 'C' category.

All contactors shall be fitted with 20AMP contacts to AC3 rating.

Where necessary the distribution circuit breakers may be of a higher fault rating capacity than the general distribution breakers.

2.03.05 Schedule

A machine typed schedule of circuits shall be provided at all distribution boards.

2.03.06 Terminals

Where distribution includes one or more contactors the circuit breakers and contactors shall be pre-wired to terminal strips.

The terminal strips shall be suitably marked and shall be Utilux rail mounted allowing 100% spare capacity on the rail

2.03.07 Submission Of Construction Drawings

Construction Drawings shall be submitted for all new distribution boards for approval prior to construction.

Due care should be taken to ensure that the switchboard designed fits neatly into the space allocated or ensure that the space allocated is closely coordinated with the construction drawings of the switchboard by advising RailCorp of the space required.

Ducts above and below the switchboard shall be manufactured of similar material and painted in the same colour as the switchboard.

2.04 General Light And Power

2.04.01 Conduits

All conduits shall comply with all the requirements of the relevant Australian Standard RFTs. No conduit less than 20 mm. diameter shall be used without prior approval.

Flexible conduit shall be used to connect conduit runs to free standing equipment and equipment subject to vibration.

Arrange the building-in of conduits and inserts as the work proceeds.

All conduits shall be high impact PVC conduit or metal where specifically indicated. Conduits shall be laid straight and symmetrical lines with easy sets or bends. Bends or sets must be made without altering the section of the conduit. Where it is not practicable to set the conduit, spring bends shall be used. PVC conduit shall be joined using the Manufacturer's recommended solvent and following closely his printed instructions.

Conduits installed in screeds and chases shall be secured at intervals not exceeding 1.5 m. with approved fixings. Obtain approval to run surface mounted conduit.

Surface mounted conduits, if approved, shall be fastened at intervals not exceeding 1.0 m. Where conduits enter distribution boards and accessories of any kind, the conduit shall be secured at each side of the entry.

The conduits, particularly in cavity walls etc., shall be arranged such that, under no circumstances, will they aid the passage of moisture into the building.

The wiring of a particular section shall not be carried out until the completion and final fixing of conduits in that section.

All conduit systems shall be installed to form a "draw-in" type wiring installation.

Conduits and accessories shall be fully assembled complete with draw-in wires before the drawing in of cables.

Corrugated conduit will be permitted in awkward bends and corners where elbows cannot be used. Corrugated conduit will not be permitted in straight sections where rigid conduit may be used.

2.04.02 Cabling

General

The cabling indicated on the drawings have been calculated with due consideration given to the Standard AS3008.

The cables shall run in the most direct manner as practically possible.

Due consideration to voltage drop shall be given if alternative methods are chosen due to restraints in building construction imposing longer runs than expected.

Capacity

As a check to the design, the Contractor shall, prior to running any cable to equipment such as stoves, hot water units, air conditioning units, etc. obtain the capacities from RailCorp, Mechanical Contractor or Supplier of the equipment and ensure that the cable specified is adequate for the equipment installed.

Variations will be considered for upgrading cables from the original sizes if capacities are inadequate.

Variations will not be considered for removal of cables due to incorrect sizing of equipment or voltage drops.

Voltage Drop

Every effort must be made to run in a direct method to the equipment to avoid long lengths of cable and voltage drops.

Variations will not be paid to upgrade cables due to the inaction by the Contractor during the construction phase.

Upgrading of any cable shall be referred to the RailCorp's consulting engineer prior to upgrading.

2.04.03 Cable Ducting

Supply and install cable ducting above, below or to the side of Main Switchboards and Distribution Board as necessary or as specifically detailed on the drawings.

The ducting shall be finished in the same material as the Distribution Boards and shall be used for mechanical protection for mains, sub-mains and sub-circuits.

Furthermore provide ducting wherever multiple cables are exposed when traversing between areas.

2.04.04 Switches

Supply and install switches as indicated on the drawings. The switches shall be single pole, toggle action mechanism; flush mounted and shall match the power outlets.

The flush plates shall be impact resistant polycarbonate and mounted generally as indicated on the drawings.

Where security switches control Security Lighting they shall be coloured red.

Colour samples and type of switches (and GPO's) shall be submitted for approval.

2.04.05 General Purpose Outlets

All general-purpose outlets shall be of the combination of 10 AMP three flat pin type, fitted with flush polycarbonate impact resistant cover plates.

The units shall be installed where indicated on the drawings and shall match the switches. All to be white except where indicated stainless steel, black or otherwise.

Stainless steel outlets to be equal to the 'MS' series from HPM.

2.04.06 Permanently Connected Equipment

Supply and install wiring for permanently connected equipment - refrigeration, fans, urns, ovens, dishwashers, and etc. - as detailed on the drawings.

Each item of equipment shall be wired by the use of flexible PVC conduit fitted with standard termination fittings at both ends.

Provide an isolating switch adjacent to each item of equipment.

Connect and test all equipment.

The capacities of all equipment shall be verified with RailCorp prior to installation of all cables.

2.04.07 Light Fittings

General

Supply and install light fittings as scheduled on the drawings.

All fittings shall be of a standard manufacture and shall comply with the latest Codes and their amendments.

The light fittings indicated by catalogue numbers are the preferred manufacture, however alternatives may be submitted for consideration.

All fittings shall be supplied complete with lamps and/or tubes and their associated control equipment ready for installation.

Ballasts shall be low loss (7.5-8 watts) to the latest standard and all capacitors shall achieve a power correction of 0.9 lagging.

The installation of all light fittings shall be carried out in a workmanlike manner, so that they may be removed without undue difficulty for the purpose of maintenance and servicing.

2.05 Installation Requirements

2.05.01 Method Of Wiring

All wiring shall be concealed in the walls, floors or ceilings unless otherwise specified or shown on the drawings.

Wiring within stud walls, roof and ceiling spaces shall be in T.P.S. conductors as scheduled on the drawings and specified herein.

Carry out wiring on the loop-in system. Jointing of cables and use of connectors will only be permitted at outlets.

Wiring shall not be run through light fittings and the like; wiring shall enter and leave at the one point.

In false ceiling spaces light fittings shall be connected using the plug and socket system using a loom wiring system such as those from Clipsal.

All lighting fittings shall be switched and arranged as indicated on the drawings.

The circuit zones for wiring the lighting fittings associated with each distribution board shall be as indicated on the drawings.

Accessories shall be squarely fixed to wall boxes, skirtings, and architraves etc. using approved screws with plastic heads or covers or chrome-plated screws to suit the fittings concerned.

Due consideration shall be given to the height of tiling, brick course, or other special wall finishes and outlets shall not be mounted across the junction of different finishes.

Where practicable, switches at the one location shall be grouped under the one plate.

The locations of light and power outlets shown on the Contract Drawings are diagrammatic and shall be confirmed with the Architect prior to installation.

Light switches shall be installed at a height of approximately 950mm above floor level unless otherwise indicated on the Architectural Detail Drawings.

Common neutrals shall not be used on single-phase circuits unless otherwise specified.

Separate earth wires shall be run for all circuits and shall originate at the switchboard concerned and run in same conduit or within the T.P.S. cable of the circuit.

All point-to-point wiring shall be undertaken using the Circuit Schedules.

Secure accessible T.P.S. cables by approved strap clips.

Run T.P.S. cables in a neat and regular manner, concealed except where otherwise noted.

Protect exposed T.P.S. cables liable to mechanical damage with approved metal cover strips or steel conduit.

2.05.02 Wiring

All wires and cables except where otherwise specified shall be TPI in conduit or TPS V75 grade stranded copper conductors. TPS wiring shall not be run where exposed to view throughout the installation.

All wiring to be concealed.

The minimum circuit wiring for lighting is 2.5mm² and for power is 2.5mm².

2.05.03 Brackets and Fixings

To allow implementation and installation of works, the Contractor shall supply and fix in position all brackets, troughs, trays, supporting racks as required for the running of wiring and equipment in general.

2.05.04 Labelling

All switchboard labels shall be engraved Traffolyte type, which shall be firmly fixed to the boards in an approved manner by means of chrome, plated metal thread screws.

All GPO's switches and permanently connected equipment shall be fitted with circuit identification. The identification shall indicate the circuit's origin as well as the circuit number.

This marking shall take the form of adhesive labels indicating the circuit number and switchboard origin. Labels shall be produced by a Brother label maker or approved equal.

Where switchbanks occur on stainless steel plates each switch shall be marked by the use of engraved paint infill under the switch on the stainless steel as directed.

All cables entering or leaving terminal blocks, contactors, relays, etc. shall be marked using the 'Grafoplast' system of marking.

2.05.05 Fixings

All nuts, screws, bolts, washers, clamps shall be cadmium or zinc plated.

Where plugs are necessary for the fixing of equipment, conduit and other fittings to floors, walls or ceilings approved metal plastic expansion devices shall be used.

2.05.06 Painting

All exposed metallic materials, wiring ducts, etc., including those mounted in service cupboards, riser ducts, ceiling spaces, shall, unless otherwise directed, be painted to approval after erection with two (2) coats of best quality enamel or lacquer of colours selected by the RailCorp's Representative.

All painting shall be done by an approved firm of Painting Contractors employing persons skilled in the Trade.

The paint finish on all fittings and equipment supplied under this Contract shall be left in a perfect condition. Any blemishes shall be repaired and, if necessary, the equipment repainted to the satisfaction of the RailCorp's Representative.

ACCESS CONTROL

The Access Control system will be “Concept 3000”.

Security Equipment shall be as follows:

- Electric strikes to be Padde 2000.
- Security reed switch to be from Sentrol.

SECTION 4 TESTING AND COMMISSIONING

4.01 Practical Completion

Acceptance of Practical Completion will be in accordance with Part C of this RFT and require at least the following:

- Certification of compliance with requirements of Statutory Authorities.
- Testing and Commissioning finalised. Signed off testing and commissioning schedules to confirm that systems operate in a stable and automatic manner under all conditions of full and partial load - full commissioning data.
- Certification that capacities and efficiencies of equipment and systems satisfy specified requirements.
- Authority approvals obtained as required.
- Stable operating conditions of all plant.
- Preliminary instruction of the building owner or representative in safe operation of the plant.
- Approved operating instruction manuals and 'as built' drawings provided.
- Submission of correctly and completely executed Inspection Test Plans including test results.
- Certification that works comply with the contract documents and with the Building Code of Australia and are ready for granting of Practical Completion.

4.02 Management of Inspection, Testing, Commissioning and Handover.

4.02.01 Inspection Test Plans (ITPs)

- Inspection test plans shall be prepared specifically for the Contract but may be based on or customised from generic ITPs. Submit ITPs at least 6 weeks prior to commencement of testing.
- List acceptance criteria for each element and sub-element of the electrical installation in ITPs. Acceptance criteria to include:
- Specification details and workshop drawings in regard to materials, construction methods, physical requirements, performance and operational requirements.
- Shop drawings.
- Control logic and diagrams.
- Authority inspection and testing requirements.
- Format ITPs as follows:-
 - A4 single sided.
 - Machine printed.
- Each page identified with Inspection and Test organisation's name, project name, ITP record no., electrical services element or sub-element, signature of inspector, date of sign off, page no. of total pages.
- Tick boxes and comment column for record purposes.
- Copies of ITPs to be supplied, 3 bound into Installation Manuals and 1 bound separately.

4.02.02 Commissioning Management

Commissioning shall be organised and managed so as to verify the operation of individual items of plant and equipment, sub-systems, systems and the overall installation including the interfaces with other building services systems.

Management of commissioning to include: -

- Programming and scheduling of commissioning and handover activities.
- Liaison with other services, trades and coordination of commissioning activities associated with system interfaces and interaction between systems.
- Liaison with and briefing of Authorities to ensure that the commissioning procedures and resultant data provided for their approval is consistent with their requirements and records.
- Taking a lead management role for the electrical commissioning including attending meetings with consultants and Authorities as necessary.
- Preparation of progress reports on commissioning.

4.03 Inspections

- As part of his Quality Assurance system, the Contractor shall provide inspections of work undertaken by electrical staff.
- Provide defects lists and follow up with notification of correction of defects.
- Provide notification of completion of remedial work in sufficient time to permit review before the intended date for re-testing.
- Inspections are deemed to be successfully complete when the installation is physically complete and free of defects in accordance with the specification and drawings.

4.03.01 Testing

Testing to begin once inspection of work and defects are complete.

4.03.02 Information Required.

Provide the following information prior to start of testing.

- Inspection and Test Plans.
- Testing plan and commissioning plan.
- Evidence of currency of calibration of equipment to be used in testing and commissioning procedures. Calibration to be in accordance with AS3912 (NATA Certified)
- Evidence of qualification of all personnel proposed for carrying out any commissioning related activities.
- Records of all pre-commissioning checks and commissioning data. All records/data to be certified as being conducted in accordance with agreed and approved procedures.
- Manufacturers' certificates for all proprietary items, eg circuit breakers, generator sets etc to confirm that the installation complies with their installation and maintenance requirements prior to start up of equipment. Certificates shall also

be provided at commencement of equipment installation to confirm their requirements with respect to installation are being provided for.

- Manufacturers' test certificates of all capacity/performance verification checks carried out at factory prior to dispatch to site.

4.03.03 Pre-Energisation Tests

General: Prior to energisation of Electrical Services, conduct the following tests and submit test results:

- Tightness of screwed and bolted connections
- Physical integrity
- Correct phasing. Check phase rotation is consistent throughout the project and is the same as the supply.
- Motor rotation
- Insulation resistance tests

4.03.04 Tests

- Test operation of all trips, interlocks, motor driven devices, contactors and control circuits and devices by instigating or simulating inputs.
- Test records: For designated tests, including pre-delivery tests, record results and submit reports or certificates in a form suitable for inclusion in operation and maintenance manuals.

4.04 Commissioning

Operate the installation to prove the performance, capacities and ability to provide the required service.

Undertake commissioning in 3 stages:

1. Major items of plant and equipment and components.
2. Systems and sub-systems.
3. Inter-system operation and interfaces.

Commissioning to include:

- Performance of individual plant items and components.
- Operating sequences, interlocks and safeties.
- Final controls calibration.
- System operation under all operating modes and under all conditions of load.
- Inter-system operation and correct interfacing connections under all operating conditions and under simulated fire conditions.
- Noise and vibration tests.
- Thermoscan survey of all switchboards.
- Environmental audit as required by Authorities.
- Rectification and correction of any defects and deficiencies.
- Continue commissioning until achievement of correct performance and operation.

4.05 Cleaning

At Practical Completion, clean the following:

- Luminaires.
- Exterior and Interior of switchgear and control gear assemblies.
- All outlets, switches, cable trays and equipment.
- Relamp luminaires used during construction.

4.06 Exit And Emergency Lighting

Before commissioning, ensure mains supply has been continuously connected for at least 24 hours.

Disconnect the mains supply to each general lighting final sub-circuit and verify the correct operation of luminaires and exit signs for a continuous period of 2 hours. Verify testing does not necessitate disconnection of supply to normal lights. Restore normal supply and verify the operation of the indicator lights on each luminaire.

SECTION 5 MAINTENANCE DURING DEFECTS LIABILITY PERIOD

5.01 General Scope

Routine maintenance and servicing shall be carried out on a monthly basis for a period of 12 months from the date of Practical Completion to the end of the Maintenance and Defects Liability Period.

Requirements:

- Monthly maintenance and servicing of equipment including lighting, access control panel and exhaust fan in accordance with maintenance schedules recommended by equipment manufacturers.
- Maintenance, testing and inspections in accordance with regulatory requirements and relevant Australian Standards.
- Operation and verification in conjunction with other services trades, of all fire and life safety systems, e.g. emergency and evacuation lighting in emergency mode. Such testing to be undertaken at 6 monthly intervals.
- Replacement of consumables at Contractor cost.
- Submission of monthly reports on maintenance activities performed including testing and reporting on all systems.
- Provision and filling out logbook, which must be kept on site, detailing all visits.
- Service personnel to be available for call out on a 24-hour per day, 7-day per week basis. Response time for emergency and corrective maintenance must not exceed 4 hours.

5.02 Minimum Requirements

As a minimum, carry out all maintenance and servicing recommended by the manufacturer of each piece of equipment.

5.02.01 Every Month

Test all earth leakage devices by activation of integral test button as.
Check operation of all lamps and replace any that are defective at the Installers expense.

5.02.02 Every Three Months

Check operation, setting and calibration of all controls.
Check all motors for temperature use, operating current and leakage.

5.02.03 Every Six Months

Test Emergency and Evacuation Lighting in accordance with AS2293. Provide a logbook on site to BCA requirements.
Check operation of all electrical switchgear including settings interlocks and operation of motor overloads.

5.02.04 End of Maintenance and Defects Liability Period

Immediately prior to the expiration of the Maintenance and Defects Liability Period carry out the following work:

- Give 7 days notice of the proposed work so that a representative may be present to review the work.
- Test all earth leakage devices in accordance with annual requirement for Workplace Health and Safety Regulations.
- Test and tag all equipment flexes provided as part of the contract and not protected by earth leakage protection in its normal operation.
- Visually inspect all distribution switchboards with escutcheon removed. Check tightness of main switch and busbar chassis connections.
- Thermoscan all switchboards and submit a report. Investigate, rectify and provide a report on any over-temperature components.
- Carry out 6 monthly procedures for Emergency and Evacuation Lighting.
- Check operation of all system safety.

APPENDIX EA2

DRAWING SCHEDULE

DRAWING SCHEDULE

Drawings Issued with this RFT are identified as follows:

- Drawing No. A.01 – Hornsby Station 1 of 2
- Drawing No. A.01 – Hornsby Station 2 of 2
- Drawing No. A 02 – Sutherland Station 1 of 2
- Drawing No. A 02 – Sutherland Station 2 of 2
- Drawing No. A.03 – Marrickville Station 1 of 2
- Drawing No. A.03 – Marrickville Station 2 of 2