

# ELECTRICAL SERVICES



## Electrical Specification



# THE SCOTS SCHOOL - STAGE 1



# DOCUMENT REVISION

Stage	Revision	Revision Description	Author	Checked by	Issue Date
TI	00	For Tender	DW	AG	19.08.2024
TI	01	For Tender Refer separate notes for changes	DW	AG	30.08.2024

## Company information

BRT Consulting  
159 Victoria Parade  
Collingwood

ACN 006 041 989  
ABN 22 348 245 341  
+61 3 9417 2971

[www.brt.com.au](http://www.brt.com.au)

## Project Information

Job Number	12132
Job Name	The Scots School - Stage 1
Address	393 Perry Street Albury NSW 2640



# **1 TABLE OF CONTENTS**

1	TABLE OF CONTENTS .....	1
2	GENERAL .....	6
2.1	SCOPE .....	6
2.2	REGULATIONS .....	6
2.3	DDA COMPLIANCE .....	7
2.3.1	Security .....	7
2.3.2	Light Switches .....	7
2.3.3	GPO's .....	7
2.4	BUILDERS WORK .....	8
2.5	STRUCTURAL INTEGRITY .....	8
2.6	BUILDING PENETRATIONS .....	8
2.6.1	Fire And Smoke Rated Building Elements .....	8
2.7	SEISMIC RESTRAINT .....	8
2.8	UNDERGROUND SURVEYING OF EXISTING SERVICES .....	8
2.9	CO-ORDINATION OF SERVICES .....	8
2.9.1	Electrical Services Documents .....	9
2.9.2	Mechanical Services Documents .....	9
2.10	WORKMANSHIP .....	9
2.11	DEMOLITION WORK .....	9
2.12	STAGING .....	9
2.12.1	Stage 1A .....	10
2.12.2	Stage 1B .....	10
2.13	CLIENT TRAINING .....	10
2.14	ALTERNATIVE EQUIPMENT .....	10
2.14.1	Documentation Discrepancies .....	10
2.14.2	Superseded Equipment .....	10
2.14.3	Alternative Equipment – Tender Stage .....	10
2.14.4	Alternative Equipment – Construction Stage .....	10
2.15	CABLE COLOURS .....	11
2.16	ADDITIONAL GPOs, DIRECT CONNECTIONS & DATA .....	11
2.16.1	Schedule Of Additional Outlets .....	11
2.17	SHOP DRAWINGS .....	11
2.18	SAMPLES .....	12
3	ELECTRICITY SUPPLY .....	13
3.1	EXISTING ELECTRICAL SUPPLY .....	13
3.1.1	Authority Application .....	13
3.1.2	Costs .....	13

## ELECTRICAL SERVICES

3.2	SUPPLY AUTHORITY CO-ORDINATION .....	13
3.3	REVIEW BY ELECTRICAL INSPECTOR & SUPPLY AUTHORITY .....	13
3.4	CONDUITS .....	14
3.4.1	General .....	14
3.4.2	Conduit Supports .....	14
3.4.3	Buried Conduits .....	14
3.5	CABLE PITS .....	14
3.5.1	Drainage .....	15
3.6	SURVEY OF EXISTING SWITCHBOARDS AND CABLES .....	15
3.7	SWITCHBOARDS .....	16
3.7.1	Safety Services .....	16
3.7.2	Manufacture & Construction – MSB .....	17
3.7.3	Manufacture & Construction .....	22
3.7.4	Equipment List .....	22
3.8	METERS .....	24
3.8.1	Current Transformer (CT) Meter and Current Transformers (CTs) .....	24
3.9	DISCRIMINATION OF POWER CIRCUITS .....	24
3.10	EARTHING .....	24
3.10.1	Landscape .....	25
3.11	MAINS AND SUB-MAINS .....	25
3.11.1	Schedule of Mains and Sub-Mains .....	25
3.12	SUB-CIRCUIT WIRING .....	25
4	LIGHTING .....	27
4.1	SWITCHES .....	27
4.1.1	Schedule of Switches .....	27
4.2	LIGHT FITTINGS .....	28
4.2.1	Schedule of Light Fittings .....	29
4.3	LIGHTPOLES .....	29
4.4	LED LIGHTING .....	29
4.4.1	LED Flexible Lighting .....	29
4.5	WIRING OF LIGHT FITTINGS .....	30
4.5.1	General .....	30
4.5.2	Dimmed Lighting .....	30
4.5.3	LED Lighting .....	30
5	GENERAL POWER .....	31
5.1	POWER OUTLETS .....	31
5.1.1	Labelling of Outlets .....	31
5.1.2	Schedule of Power Outlets .....	31
5.2	CABLE TRAY .....	31
5.2.1	Schedule of Equipment .....	32

5.3	EQUIPMENT WIRING.....	32
5.3.1	Hot Water Services.....	32
5.3.2	Stoves and Wall Ovens .....	32
5.3.3	Microwave Ovens .....	32
5.3.4	Hand Dryers.....	32
5.3.5	Exhaust Fans.....	32
5.3.6	Ceiling Fans.....	32
5.3.7	Airconditioning Units .....	32
5.3.8	Dishwasher .....	33
5.3.9	Freezer & Fridges .....	33
5.3.10	Boiling Water Unit .....	33
5.3.11	Boiling Water Unit with Inbuilt Timeclock.....	33
5.3.12	Power Supply.....	33
5.3.13	Dimmers.....	33
5.3.14	Auto-Doors.....	33
5.3.15	FDCIE System .....	33
5.3.16	TV and Audio .....	33
5.4	MOTORISED WINDOW SYSTEM.....	33
5.4.1	Schedule of Motorised Window System .....	33
6	AUDIO VISUAL SYSTEMS.....	35
7	TELECOMMUNICATIONS.....	36
7.1	SCOPE .....	36
7.1.1	Class E Performance Testing on Cat 6 Installations .....	36
7.1.2	Schedule of Equipment & System Performance .....	36
7.1.3	Communication Enclosures .....	37
7.1.4	Communication Rack Equipment .....	37
7.1.5	Cable Distribution .....	37
7.1.6	Trace Wire: .....	38
7.1.7	Cabling Specification .....	38
7.1.8	Patch Leads.....	38
7.2	NBN SERVICES.....	38
7.2.1	National Broadband Network (NBN) Infrastructure .....	38
7.2.2	Schedule of Equipment & System Performance .....	39
8	FIRE DETECTION AND ALARM SYSTEM .....	40
8.1	FIRE DETECTION AND ALARM SYSTEM .....	40
8.1.1	Building Description and FDAS Requirements.....	40
8.1.2	Fire Detection and Alarm System Scope of Works .....	40
8.1.3	Schedule of Equipment.....	40
8.2	AUDIBLE AND VISUAL ALARM .....	41
8.3	PROVISIONAL HEADS.....	41

8.4	FIRE DETECTION AND ALARM SYSTEM TESTING AND COMMISSIONING .....	42
8.4.1	COMMISSIONING REQUIREMENTS.....	42
8.4.2	COMMISSIONING DOCUMENTATION.....	42
9	SECURITY SYSTEMS.....	43
9.1	EXTENSION TO EXISTING SECURITY SYSTEM.....	43
9.1.1	Schedule of Performance .....	43
9.1.2	Security Power Supplies.....	43
9.1.3	Security Management Software on Client Supplied Server .....	43
9.1.4	Confirmation of Room/Area Naming Convention .....	44
9.2	EXTENSION TO EXISTING ACCESS CONTROL SYSTEM .....	44
9.3	EXTENSION TO EXISTING INTRUDER DETECTION SYSTEM .....	44
9.4	SECURITY CABLE SPECIFICATION.....	45
10	PAINTING & EQUIPMENT IDENTIFICATION.....	46
10.1	SCOPE.....	46
10.2	IDENTIFICATION.....	46
10.3	PAINTWORK .....	46
11	MAINTENANCE & SERVICING .....	47
11.1	GENERAL .....	47
11.2	DEFECT RECTIFICATION .....	47
11.3	PREVENTATIVE MAINTENANCE .....	47
11.4	MAINTENANCE OF FIRE PROTECTION EQUIPMENT .....	47
11.5	MAINTENANCE RECORDS.....	48
11.5.1	Availability of manuals and records .....	48
11.5.2	Emergency Lighting and Exit Signage.....	48
11.6	CONTRACTOR AVAILABILITY AND RESPONSE TIME.....	48
12	TESTING AND COMMISSIONING .....	49
12.1	SCOPE.....	49
12.2	INSTRUCTION OF OPERATORS.....	49
12.3	COMMISSIONING .....	49
12.4	COMMISSIONING REPORT .....	49
12.5	CERTIFICATION.....	49
13	CONTRACT COMPLETION DOCUMENTATION.....	51
13.1	CERTIFICATE OF COMPLIANCE.....	51
13.2	MAINTENANCE MANUALS & AS BUILTS.....	51
13.2.1	Objectives .....	51
13.2.2	Maintenance Manual Format.....	51
13.2.3	Maintenance Manual Sections.....	51
13.2.4	Submission of Manuals.....	52
13.2.5	As-Built Drawings .....	52
13.2.6	Compliance with Laws, Standards and Specifications .....	52

13.2.7	Preparation of Manuals.....	52
13.3	THERMAL IMAGING .....	53
14	WARRANTY PERIOD .....	54
15	MONETARY SUMS AND TENDER SCHEDULE .....	55
15.1	TENDER SCHEDULE .....	55
15.1.1	Section Costs Stage 1A.....	55
15.1.2	Section Costs Stage 1B.....	56
15.1.3	Unit Rates for Additional Works.....	57
15.1.4	Electrical Contractor Details .....	57



## **2**            **GENERAL**

This Specification is generally written in the plural. Where only one item is scheduled or nominated then the singular shall be inferred.

### **2.1**            **SCOPE**

Supply and install the complete electrical installation and associated services for the project, including but not limited to the following:

- removal of redundant electrical wiring, equipment, fixtures and fittings;
- negotiation as necessary with local Electricity Supply Authority;
- underground consumer mains;
- meter panel;
- underground conduits and pits;
- main switchboard;
- switchboards;
- mains and sub mains;
- lighting;
- emergency lighting and exit signs;
- switching;
- dimmer systems;
- general power;
- wiring of equipment;
- power supplies;
- telecommunication systems;
- public address system;
- intruder detection system;
- access control system;
- fire detection system;
- fans;
- hand dryers;
- as-built drawings;
- operation and maintenance manuals;
- testing, commissioning and putting into service.
- Certificate of Compliance for all systems and electrical work.
- maintenance during Defects Liability Period.

### **2.2**            **REGULATIONS**

Supply and install all works described for this project in accordance with all the relevant authorities having jurisdiction over the works, including the following:

- Building Code of Australia.
- Local Electricity Supply Authority.
- Current relevant Australian Standards, especially;
- AS 3000 - Wiring Rules.
- AS 3008 - Electrical Installation - Selection of Cables.
- AS 4836 - Safe Working on low-voltage electrical installations.
- AS NZS 61439 Low-voltage switchgear and control gear assemblies
- AS 1428 – Design for Access and Mobility.
- NSW Service and Installation Rules.
- AS 3003 - Electrical Installations - Patient Treatment Areas.
- AS 3811 - Hard Wired Patient Alarm Systems
- AS 4607 - Personal Response Systems.
- AS 3010 – Electrical Installation – Generating sets

- AS 3013 - Electrical Installations - Classification of the Fire and Mechanical Performance of Wiring Systems.
- AS/ACIF S009 - Installation Requirements for Customer Cabling (Wiring Rules)
- AS/NZS 3084 - Commercial Building Standard for Telecommunications Pathways and Spaces
- AS/NZS 3080:2003 Telecommunications installations – Generic cabling for commercial premises.
- AS/NZS 3085.1 - Administration of Communications Cabling Systems – Basic Requirements
- AS/NZS 4117 - Surge Protective Devices for Telecommunication Applications
- AS/NZS ISO/IEC 14763-3 - Implementation and Operation of Customer Premises Cabling – Part 3: Acceptance for Optical Fibre Cabling
- AS/NZS IEC 61935.1 - Testing of Balanced Communications Cabling In Accordance with ISO/IEC 11801 – Part 1: Installed Cabling
- ISO/IEC 11801 Ed 2 - Information Technology – Generic Cabling for Customer Premises – Class A to F
- AS/NZS ISO/IEC24702:2007 Information Technology – Generic Cabling – Industrial Premises
- ANSI/TIA 568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards
- AS 1044 Limits of electromagnetic interference.
- AS 1670 - Fire Detection, Warning, Control and Intercom Systems
- AS 1851 (Series) - Maintenance of Fire Protection Equipment
- AS1680 Series - Interior Lighting Code
- AS 1798 Lighting poles and bracket arms – Preferred dimensions
- AS/NZS 2293 – Emergency Evacuation Lighting for Buildings.
- AS/NZS 2201.1 Intruder alarm systems – Client's premises
- AS2201.2 Intruder alarm systems – Monitoring centres
- AS2201.3 Intruder alarm systems – Detection devices for internal use
- AS/NZS 2201.5 Intruder alarm systems – Alarm transmission systems
- AS 3521 Identification cards – Physical characteristics
- AS 4718 Machine readable identity cards
- AS 4145.2 Locksets – Mechanical locksets for doors in buildings
- AS 4145.3 Locksets – Mechanical locksets for windows in buildings
- Relevant Local, State and Commonwealth Health Departments.

### **2.3 DDA COMPLIANCE**

The following elements must be installed to all conformance with current Disability Standards and DDA report.

#### **2.3.1 Security**

- Proximity/Card Readers to be at 900 -1100mm AFL and 500mm from any internal corner and 1000-2000mm from the arc of the door swing on auto opening doors.
- Push buttons to be 25mm minimum diameter and sit proud of the surround.
- Push buttons to be mounted 900-1200mm AFL.
- Controls which only require touching to be 900-1250mm AFL.

#### **2.3.2 Light Switches**

- In areas required to be accessible, all light switches to be at 900 -1100mm AFL and no less than 500mm from an internal corner except where positioned on the architrave.
- Switches to be a minimum of 30x30mm in size in accessible sanitary facilities and all accessible areas

#### **2.3.3 GPO's**

- To be at 900-1100mm AFL in accessible sanitary facilities and accessible sole occupancy units. GPOs to be no less than 500mm laterally from an internal corner

## **2.4 BUILDERS WORK**

The following work is included in the Builder's Contract as work to be undertaken by the Builder on behalf of the Electrical Contractor. All other work required for the completion of the Electrical Contract shall be allowed for in this tender.

- Building in of wall boxes for light switches and power outlets.
- Chasing and making good of conduit access for light switches and power outlets.
- Provision of all temporary lighting, 400/230V power and any other services required for the installation and testing of the Electrical Services.
- Trenching and backfilling for cables and conduits.

## **2.5 STRUCTURAL INTEGRITY**

Where electrical equipment including floor boxes, conduits and the like are to be installed within the building structure, or where core holes or other penetrations are to be provided, the contractor shall ensure that the integrity of the structure is maintained, and no damage occurs, by obtaining approval from the structural engineer beforehand.

## **2.6 BUILDING PENETRATIONS**

### **2.6.1 Fire And Smoke Rated Building Elements**

Refer architectural drawings for details and locations of all fire and smoke separation.

Seal penetrations with a system conforming to AS 4072.1. Service penetration fire-stopping systems shall comply with BCA Clause C4D15. Sealant products shall be rated to permit frequent alterations to services. Certifire Australia product certification is required.

Ensure all access is provided for periodic maintenance of all fire sealants. Allow for all required access panels and inspection points.

## **2.7 SEISMIC RESTRAINT**

Fixing off all electrical services and equipment shall comply with AS1170.4 Section 8 – Earthquake provisions. Provide lateral supports to light fittings, cable trays, etc. in accordance with AS1170.

Lateral supports shall be equal to vertical (weight) supports spaced at minimum 20% of all vertical supports and as a minimum one per each change of direction.

As part of completing a compliant seismic restraint solution, the contractor shall engage Kusch Group (ph: 1300 10 22 30) or suitably qualified seismic restraint consultant to:

- Review documentation
- provide guidance on seismic restraint requirements for services
- inspect and certify the final installation as compliant with AS1170.4 Section 8

## **2.8 UNDERGROUND SURVEYING OF EXISTING SERVICES**

The contractor shall allow to locate all existing services on the site including details such as size, depths, condition, material and offsets to notable landmarks such as buildings. A record shall be kept of these surveys and included in the as-built documentation to be handed over at the completion of the project.

The survey shall be conducted before any works commence and the information shall be submitted by the contractor to the Superintendent once completed with any proposed alterations to the design intent or alternative options proposed to fulfil the intent of the work scope.

The underground locating service shall be conducted by a skilled contractor experienced in such work.

## **2.9 CO-ORDINATION OF SERVICES**

The following works shall be fully coordinated between trades to ensure complete operation of the systems.

### **2.9.1 Electrical Services Documents**

The following works shall be completed as part of the **Electrical Services** installation for equipment documented in other trades.

#### **2.9.1.1 Hydraulic Services**

- Power supply to ancillary hydraulic equipment including HWU's, Sensor taps etc

#### **2.9.1.2 Mechanical Services**

- Power supply to Stage 1B mechanical equipment terminated at isolator adjacent to each piece of equipment.
- Power Supply to Mechanical Services Switchboards. Final connection to mechanical switchboards by Mechanical Contractor. Cabling to all mechanical services equipment shall be by Mechanical services contractor.
- Smoke detector system with control cable and signal to shut down plant to Stage 1A MSSB.

### **2.9.2 Mechanical Services Documents**

The follow Works have been documented in the **Mechanical Services Documents** for interconnection with the electrical services;

- Final connection of power to plant from isolator (stage 1B)
- Terminating sub-mains into MSSB (stage 1A)
- Terminating mechanical shut down cable into MSSB.

### **2.10 WORKMANSHIP**

It is expected that all work shall be carried out in a workmanlike manner and to an acceptable tradesman's standard to meet the requirements of all relevant Statutory Authorities. Any work not reaching this standard in the opinion of the Consultant or Statutory Authority will be rejected and rectified by the Contractor at their expense.

In addition to this, all workmanship, systems, equipment, materials and devices, including cable type and installation shall be installed in accordance with best practice and the Manufacturer's recommendations.

In the case of a conflict between the requirements of this specification and a nominated standard or Manufacturer's recommendations, the most stringent requirement shall prevail.

### **2.11 DEMOLITION WORK**

Disconnect and remove all redundant electrical fittings and wiring as part of the demolition part of this project. Redundant fittings and wiring shall become the property of the Contractor to be disposed of as they see fit.

Equipment to be retained that becomes disconnected during the contract, shall be reconnected at no cost to the Client.

The Contractor shall obtain a list from the EPA of components likely to contain toxic materials, such as PCB in condensers of lighting control gear, and where applicable they shall dispose of these components in accordance with regulations.

The following items shall remain the property of the Client. They shall be removed and stored where nominated by the Client on site.

The contractor shall visit site during the tender period to satisfy themselves with the extent of existing services on site.

### **2.12 STAGING**

The Contractor shall carry out the work in stages as described below to enable the installation of the work to suit other programs, either within or outside this contract.

The stages shall be as follows:

**2.12.1 Stage 1A**

New Stage 1A building works, external carpark and surrounding landscape areas.

**2.12.2 Stage 1B**

Demolition of existing junior school building, carpark works, and refurbishment of existing library building.

It is essential that those areas occupied by the Client remain fully operational. This shall comprise all services including, but not limited to, power, lighting, telecommunications, security, etc.

The Contractor will stage their work to ensure this occurs and where necessary make allowance for temporary connections as required.

Cut-overs as required shall be carried out at a time agreed to with the Client.

**2.13 CLIENT TRAINING**

Provide a skilled instructor to train the Client's staff on the operation of all electrical control systems included in the project scope and not limited to;

- Lighting control systems
- Audio visual systems,
- IT systems,
- Automated window systems
- Security & Access control systems
- Fire detection system,

and all other control services relevant to the development.

The timing of training shall be as agreed with the client and shall provide sufficient time for the client to familiarize themselves with the systems. Training shall be undertaken by a trained technician specializing in each system design, installation and operation.

Each training session shall be evidenced by a schedule of attendees with signature verification of acceptance required to prove satisfactory completion.

**2.14 ALTERNATIVE EQUIPMENT**

The Tenderer is also advised that a conforming tender, comprising the equipment specified, is required. Failure to do this may render the tender informal.

**2.14.1 Documentation Discrepancies**

Any discrepancies found in the Tender documents shall be referred to the Superintendent during the Tender period, with the allowed scope of works confirmed by the Contractor in their Tender submission for review and approval by Superintendent.

**2.14.2 Superseded Equipment**

In the event of a specified equipment being superseded and/or removed from the market, the Contractor shall notify the Superintendent and shall allow for the manufacturer's equivalent model and provide for superintendent approval as part of the tender submission.

**2.14.3 Alternative Equipment – Tender Stage**

Alternative equipment may be offered with the tender, but only as a Tender Option and must include details such as model numbers, performance data and any constraints that may affect the system performance, construction program or building layout or structure.

**2.14.4 Alternative Equipment – Construction Stage**

During the construction phase alternative equipment and systems may not be offered.

**2.15 CABLE COLOURS**

The following cabling colours shall be utilised for the communications, nurse call and security systems;

<b>Cable Type</b>	<b>Colour</b>
Network Data	Blue
Security Access Control	Green
Security CCTV	Purple
Security Duress	Orange

**2.16 ADDITIONAL GPOs, DIRECT CONNECTIONS & DATA**

Allow to supply & install additional data points, double GPOs, single phase direct connections and three phase direct connections as nominated below.

All power outlets shall be provided complete with 30m of cabling, local isolator (for direct connections) and are nominated in addition to those shown on the drawings.

All data points shall be provided complete with 30m of cabling and are nominated in addition to those shown on the drawings.

**2.16.1 Schedule Of Additional Outlets**

<b>Double GPOs</b>	10
<b>20A Single phase direct connection</b>	2
<b>20A Three phase, neutral &amp; earth direct connection</b>	2
<b>Single data points</b>	10

All additional outlets not utilised in the project shall be returned as a credit to the final contract sum.

**2.17 SHOP DRAWINGS**

Shop drawings shall be prepared before purchase and installation of equipment, to show details of the work, explain the relationship of all components to one another, the manner of installation of same and to facilitate co-ordination of all services.

Equipment to include:

- switchboards;
- technical cabling schematics
- cable duct, cable tray and catenary wire systems to house all wiring systems
- lighting controls
- hardwired & wireless communications systems
- communications enclosures
- audio visual
- fire detection layouts
- access Control and CCTV System configuration
- door access control locations including control panel locations, keypads, proximity readers,hold open devices etc.

In addition to the items above the contractor shall submit shop drawings of the communications racks showing the layout out of patch panels, equipment, battery backup and grouping of cabling.

Cables shall be arranged within the rack grouped as follows:

1. IT Outlets
2. AV Outlets
3. CCTV Cabling
4. WAP Outlets

The Superintendent shall make available 'AutoCAD' drawing files to assist the contractor. However, it remains the Contractor's responsibility to verify all dimensions on site.

The contractor shall email pdf versions of shop drawings to the relevant parties.

## **2.18        SAMPLES**

The contractor shall submit a physical sample of each piece of the following equipment prior to order. Samples shall be identified including type and manufacturer's name. Allow up to 14 days for the approval process:

- luminaries and lamps;
- switches and power outlets;
- telecommunications outlet and cable;
- audio and visual equipment;
- ducting and cable trays.
- keypads and proximity readers
- door control hardware
- reed switches
- security cable types

### **3 ELECTRICITY SUPPLY**

#### **3.1 EXISTING ELECTRICAL SUPPLY**

The existing electrical supply capacity to the facility is to remain.

The existing connection and metering shall be upgraded as documented.

The Electrical Contractor shall contact the Local Supply Authority, and shall co-ordinate all works, to ensure that all their requirements are met, and that supply is made available when required.

##### **3.1.1 Authority Application**

An application to the Authority has been made and a supply offer has been provided.

Refer to the electrical supply offer from the Local Supply Authority *under the ECN (TBC and case reference 00207683)*: for complete details, including but not limited to the following –

- Lead times
- Authority contacts
- Customer works. The contractor shall complete all of these works on behalf of the customer as part of the contract.

##### **3.1.2 Costs**

All Costs associated with physically making the supply available shall be allowed for in the tender. This shall include but not be limited to:

- ASP2 engagement and all associated fees
- Preparation of program
- Site coordination
- All requirements in the supply offer for site preparation
- Attendance at all site visits by authority and their representatives.
- Truck appointments, including any subsequent appointments, if authority cannot not complete works at appointed time, for any reason
- Road closures or changes
- Metering installation.

The following costs are not required to be included in the tender.

- Authority Contribution Charges

#### **3.2 SUPPLY AUTHORITY CO-ORDINATION**

The Electrical Contractor shall contact the Local Supply Authority, and shall co-ordinate all works, to ensure that all their requirements are met, and that supply is made available when required.

#### **3.3 REVIEW BY ELECTRICAL INSPECTOR & SUPPLY AUTHORITY**

The Contractor shall obtain approval of the Main Switchboard, supply arrangement and metering arrangement from the electrical inspector and the Supply Authority prior to manufacture and installation.

The contractor shall also engage a licenced electrical inspector to carry out a detailed review of the proposed prescribed electrical works and electrical works relating to the NSW Service and Installation Rules (SIR's) prior to commencing the construction of any switchboards in order to determine whether the proposed works comply with the regulations.

The contractor shall pay all costs associated with the review and approval process including any follow up reviews/approvals required.

A copy of the electrical inspector's findings from the above review/s shall be submitted to the Superintendent prior to works commencing.



### **3.4 CONDUITS**

#### **3.4.1 General**

Supply and install conduits for cabling where required and as shown on the drawings. Conduits shall be run concealed in roof or ceiling space, partitions, columns and masonry walls where possible, when conduits are surface mounted they shall be run parallel to walls, doors and structural members.

All conduits installed shall be symmetrical and evenly spaced. Allow to install easy draw-in and replacement of cables. Draw-in boxes shall be at maximum 20m centres when used for long runs.

Conduits which will be used by others or installed as spares shall be installed complete with suitable draw wire. Draw wires shall be a minimum 1.1mm diameter galvanised steel or other approved material. Spare conduits shall be installed complete with capped ends.

All conduit supplied shall be coloured and constructed of a material in accordance with relevant standards and regulations.

Conduits shall be filled with expanding foam to stop water and pest ingress.

Conduits for authority services shall be size and grade required by the authority.

#### **3.4.2 Conduit Supports**

Supply and install conduit supports to ensure all conduits are saddled firmly in place so that no sagging occurs between fixings. Where parallel multiple runs occur, have all saddles, joints, expansion couplings etc. together in line.

#### **3.4.3 Buried Conduits**

Excavate all trenches true to line and of suitable minimum width for the conduits to be laid. Excavations shall be made to the depth as required by relevant regulations. Trenching shall be run clear as much as possible of existing trees and shrubs which are to be retained, so as to cause the minimum disturbance to them. Provide saw cuts through concrete or asphalt paving where encountered.

Prior to any excavation existing services such as underground electrical cables, telecommunications cables, gas and storm water drains, etc. shall be accurately located and temporary means employed if necessary to maintain these services at all times. Any damage to existing services shall be made good by the Contractor without delay.

No excavation shall commence until a substantial quantity of conduits and jointing material is on site and trenches shall only be opened sufficiently in advance of conduit laying to enable work to proceed without delay. Provide all pumps and appliances required to keep the excavations free of water at all times whilst open. Divert all surface water and waterways from the excavation.

The Contractor shall bear full responsibility for the security of all excavations and where necessary properly timber and shore it up against collapse, provide temporary bridges, barricades, warning signals and lights.

Where unsuitable materials are encountered in the trench bottom, such materials shall be removed and replaced with compacted 6mm fine crushed rock to approval. All excavations below required depth shall also be back filled with compacted 6mm fine crushed rock to the level required.

All existing trees shall be protected from damage during the inground services works in accordance with AS4970-2009. The contractor shall allow to locate services outside the tree protection zone as required.

### **3.5 CABLE PITS**

Supply and install cable pits where required and as shown on the drawings.

Cable pits shall be pre-fabricated units, with separate pits for 'power' and 'communication', and shall be of 'ACO' Cablemate polymer concrete pits, complete with cast iron unfilled unit covers, frames and concrete surrounds. Pit covers shall finish flush with finished surface level and match the level and filled with material of adjacent surface.

All pits shall have a minimum rating suitable for the surrounding area as per the following table. Where a greater rating is required in other contract documents the greater class shall be allowed.

Class rating	Area use	Nominal wheel load (kg) as3996
B	Footways that may be mounted by a vehicle or livestock, and light tracker paths	2670
C	Malls and pedestrian areas open to slow moving commercial vehicles	5000
D	Carriageways of roads and areas open to commercial vehicles	8000

The pit shall be of sufficient size to provide a safe work environment. The dimensions of a cable pit shall be suitable for works under this contract and future provisions. These works special allowance include, but not limited to the following requirements:

- Minimum bending radius consideration, including those for possible future cable installation utilising the spare ducts;
- Space requirements for installation and maintenance of cable joints;
- Allowance for future cable joints for repairs to the cable installation.

The contractor shall ensure pits are appropriate for the number and sized of cables and conduits to be installed, the minimum dimensions of each pit shall be as follows.

Communications            600 x 600

Power Up to 25mm<sup>2</sup>        600 x 600

Power Greater than 25mm<sup>2</sup>    900 x 900

Power High Voltage        To local authority standard

Where the pit is for an authority asset such as Telstra or NBN the pit shall be the type approved by the asset owner.

### 3.5.1 Drainage

Conduits shall be installed with slope allowing water to drain into cable pits. Provide drainage from the bottom of cable pits, either to a suitable soakaway/absorption trenches filled with rubble or to the stormwater drainage system. Absorption trenches shall drain away from the building and be a minimum of 300 x 300 x 2000 mm.

For landscape applications, where only foot traffic is anticipated, a gravel compact base of minimum 150mm thickness is recommended at the bottom of the pit.

All cable pits shall be installed as per manufacturer recommendation including the general drainage provisions.

### 3.6 SURVEY OF EXISTING SWITCHBOARDS AND CABLES

The contractor shall allow to survey the existing switchboards, as nominated below, and provide a detailed report or single line diagram, which includes the following information;

Switchboard Designation	Board details	Board sub circuit details	Inspection Comments
Main switchboard (MSB)	Main switch capacity and setting: Upstream cable size and capacity: Number of ways (used/total)	All sub board switch capacities and settings: All submain cable sizes and capacities:	Manufacture date Manufacture Standard RCD protected circuits in accordance with AS3000: General condition report & comments

The survey shall be conducted before any significant works commence on site and the information shall be submitted by the contractor to the Superintendent once completed, and with a minimum of two weeks to enable the project team sufficient time to review and provide further direction.

### **3.7 SWITCHBOARDS**

Supply and install the following switchboards where shown on the drawings and/or as scheduled.

Boards shall be fabricated, and design verified strictly in accordance with the AS/NZ 61439 Series. The IP rating nominated be as per AS60529.

All metal boards shall be finished with primer, undercoat and 2 coats of epoxy polyester of colour schedule.

Circuit breakers shall be in accordance with AS/NZ 60947 Series and shall be approved and fault rated as required by the Local Supply Authority.

Residual current devices shall be in accordance with AS 3100, AS 3190 and AS/NZ 60898 Series as well as the requirements of the Local Supply Authority and/or other Authority having jurisdiction in their use.

Provide earthing in accordance with the Local Supply Authority's requirements and AS3000.

Upon request contractor shall submit design verification certificates to AS61439 for all switchboards.

For an MSB, the contractor shall include the relevant verification certificates and a Design Verification Report (DVR) including the switchboard assembler's design response addressing each of the items and requirements in AS61439. This shall be submitted with the final submission.

All boards shall be supplied complete including;

- Lift-off hinges for removeable hanging doors, panels and covers with stainless steel pins; each pair of hinges to have unequal length pins.
- Where panels and doors are to be removed, provide with chromium-plated D type handle, provide a minimum three points of latching for doors longer than 1000mm.
- Provide hinged escutcheon, provide a continuous 20mm wide support frame for the fixing of each escutcheon plate, including additional support where necessary to prevent panel distortion.
- Clip-in mounting chassis (where applicable), typed circuit identification card and holder, cable duct, earth and neutral bars and lockable doors with smoke sealing.
- Provide fixings in the supporting structure, and removable attachments for lifting Switchboard with dimensions greater than 1200 x 600
- Provide a switchboard legend within the door of the Switchboard. The legend shall include the cable size feeding the board, the origin of the cable and details of the areas that the circuits serve. Each circuit shall have the following labelled: Room Name/Area Description, Room Number and Circuit Designation. Provide an A3 laminated copy of the plan of the switchboard area served.
- Provide nameplate/compliance plate on Switchboard front door noting with minimum information of Switchboard rating, designed fault level, manufacturing date and the standards applicable.
- Provide engraved labels for all Air Circuit Breakers, Moulded Case Circuit Breakers, timeclocks, control switches, isolators, automatic transfer switches etc.

The MSB shall be an external board made from steel (powdercoated) with IP 65 rating.

The board shall be mounted on a 150mm high concrete plinth.

The board shall comprise the following components:

- incoming unmetered mains connection.
- CT metering and meters.
- distribution section.

#### **3.7.1 Safety Services**

This project has the following safety services and emergency equipment:

- Hydrant fire pumps;
- Smoke Control Systems;

- Control and Indicating Equipment;
- spare capacity for future.

All works on these services shall comply with as noted in AS3000 and the BCA/NCC. In addition to the requirements of the standards and Construction code the following shall be met.

**3.7.1.1 Segregation**

Segregate emergency equipment from non-emergency equipment with metal partitions designed to prevent the spread of a fault from non-emergency equipment to emergency equipment.

**3.7.1.2 Equipment fixing**

Provide 50 mm minimum clearance between busbars for the following:

- Lifts, fire services and building emergency services;
- General installation services busbars;
- Equipment.

**3.7.1.3 Submains and final sub-circuits**

- Sub mains serving Safety Services shall be minimum 2-hour fire rated and shall be reticulated on fire rated cable ladder / conduits and supports for the entire route to suit the installation;

NHP boards are nominated,

**3.7.2 Manufacture & Construction – MSB**

The main switchboard shall be fabricated and design verified in accordance with the AS/NZS61439.2 Specification for Modular Switchboard Systems

Characteristics	Reference clause or sub clause	Default arrangement	Options listed in standard	User requirement
Electrical system	5			
Earthing system	5.2	Manufacturer's standard, selected to suit local requirements	TT / TN-C / TN-C-S / IT, TN-S	TN-C-S
Nominal voltage (V)	5.3	Local, according to installation conditions	Max. 1000 VAC or 1500 VDC.	400 v ac
Transient overvoltages	5.4, 5.5	Determined by the electrical system	Overvoltage category I / II / III / IV	III
Temporary overvoltages	5.5	Nominal system voltage 1 200 V	None	NONE
Rated frequency fn (Hz)	5.6	According to local installation conditions	d.c. / 50 Hz / 60 Hz	50 Hz
Additional on site testing requirements wiring, operational performance and function	5.7	Manufacturer's standard, according to application	None	
Short-circuit withstand capability	6			

Prospective short-circuit current at supply terminals Icp (kA)	6.2	Determined by the electrical system	None	50KA
Prospective short-circuit current in the neutral	6.3	Max. 60 % of phase values	None	
Prospective short-circuit current in the protective circuit	6.4	Max. 60 % of phase values	None	
SCPD in the incoming functional unit	6.5	According to local installation conditions	Yes / No	In kiosk
Co-ordination of short-circuit protective devices including external short-circuit protective device details.	6.6	According to local installation conditions	None	
Data associated with loads likely to contribute to the short-circuit current	6.7	No loads likely to make a significant contribution allowed for	None	
Protection of persons against electric shock in accordance with IEC 60364-4-41	7			
Type of protection against electric shock – Basic protection (protection against direct contact)	7.2	Basic protection	According to local installation regulations	
Type of protection against electric shock – Fault protection (protection against indirect contact)	7.3	According to local installation conditions	Automatic disconnection of supply / Electrical separation / Total insulation	

Characteristics	Reference clause	Default arrangement	Options listed in standard	User requirement
Installation environment	8			
Location type	8.2	Manufacturer's standard, according to application	Indoor / outdoor	Outdoor
Protection against ingress of solid foreign bodies and ingress of water	8.3	Indoor (enclosed) IP 2X Outdoor (min.) IP 23	IP 00, 2X, 3X, 4X, 5X, 6X	IP65
Protection after removal of withdrawable part	8.3	Manufacturer's standard	As for connected position / reduced protection to manufacturer's standard	

External mechanical impact (IK) NOTE IEC 61439-1 does not nominate specific IK codes.	8.4	None	None	
Resistance to UV radiation (applies for outdoor assemblies only unless specified otherwise)	8.5	Indoo rnot applicable. Outdoor temperate climate	None	
Resistance to corrosion	8.6	Normal Indoor/Outdoor arrangements	None	
Ambient air temperature – Lower limit	8.7	Indoor–5 °C Outdoor–25 °C	None	
Ambient air temperature – Upper limit	8.7	40 °C	None	50°C
Ambient air temperature – Daily average maximum	8.7	35 °C	None	
Maximum relative humidity	8.8	Indoor50 % at 40 °C Outdoor100 % at 25 °C	None	
Pollution degree (of the installation environment)	8.9	Industrial3	1 / 2 / 3 / 4	
Altitude	8.10	2 000 m	None	500m
EMC environment (A or B)	8.11	A or B according to the application	A / B	
Special service conditions (e.g. vibration, exceptional condensation, heavy pollution, corrosive environment, strong electric or magnetic fields, fungus, small creatures, explosion hazards, heavy vibration and shocks, earthquakes)	8.12	No special service conditions	None	

Characteristics	Reference clause	Default arrangement	Options listed in standard	User requirement
Installation method	9			
Type	9.2	Manufacturer's standard	Various e.g. floor standing / wall mounted	Floor standing
Stationary/Movable	9.3	Stationary	Stationary / movable	
Maximum overall dimensions and weight	9.4	Manufacturer's standard,	None	

		according to application		
External conductor type(s)	9.5	Manufacturer's standard	Cable / busbar trunking system	
Direction(s) of external conductors	9.6	Manufacturer's standard	None	
External conductor material	9.7	Copper	Copper / aluminium	Copper
External phase conductor, cross-sections, and terminations	9.8	As defined within the standard	None	
External PE, N, PEN conductors cross-sections, and terminations	9.9	As defined within the standard	None	
Special terminal identification requirements	9.10	Manufacturer's standard	None	
<b>Storage and handling</b>	<b>10</b>			
Maximum dimensions and weight of transport units	10.2	Manufacturer's standard	None	
Methods of transport (e.g. forklift, crane)	10.3	Manufacturer's standard	None	
Environmental conditions different from the service conditions	10.4	As service conditions	None	
Packing details	10.5	Manufacturer's standard	None	
<b>Operating arrangements</b>	<b>11</b>			
Access to manually operated devices	11.2		Authorised persons / ordinary persons	Ordinary Persons (lockable)
Location of manually operated devices	11.2	Easily accessible	None	
Isolation of load installation equipment items.	11.3	Manufacturer's standard	Individual / groups / all	Individual

Characteristics	Reference clause	Default arrangement	Options listed in standard	User requirement
Maintenance and upgrade capabilities	12			
Requirements related to accessibility for inspection and similar operations	12.2	No requirements for accessibility	None	Authority Standard
Requirements related to accessibility for maintenance in service by authorized persons	12.3	No requirements for accessibility	None	Authority Standard

Requirements related to extension under voltage	12.4	No requirements for accessibility	None	
Method of functional units connection	12.6		F = fixed connections D = disconnectable connection W = withdrawable connections	F
Protection against direct contact with hazardous live internal parts during maintenance or upgrade (e.g. functional units, main busbars, distribution busbars)	12.5	No requirements for protection during maintenance or upgrade	None	All live parts to be shielded to allow installation of submains on spare circuits and access to circuit breakers
Gangways	12.7	Basic protection	None	
Form of separation	12.8, Table B.1		Form 1, 2, 3, 4	3Bih
Capability to test individual operation of the auxiliary circuits relating to specified circuits while the functional unit is isolated.	12.2	Manufacturer's standard	None	
Current carrying capability	13			
Rated current of the ASSEMBLY I nA (A)	13.2	Manufacturer's standard, according to application	None	630A
Rated current of circuits I NC (A)	13.3	Manufacturer's standard, according to application	None	See Drawings
Rated diversity factor	13.4	As defined within the standard	RDF for groups of circuits / RDF for whole ASSEMBLY	
Ratio of cross-section of the neutral conductor to phase conductorsphase conductors up to and including 16 mm <sup>2</sup>	13.5.2	100 %	None	
Ratio of cross-section of the neutral conductor to phase conductorsphase conductors above 16 mm <sup>2</sup>	13.5.3	50 % (min. 16 mm <sup>2</sup> )	None	



a For exceptionally onerous applications, the user may need to specify more stringent requirements to those in the standard.

**3.7.3 Manufacture & Construction**

<b>Designation</b>	MSB	DB.JS	DB.JS-1
<b>Manufacture</b>	NHP	NHP	NHP
<b>Type</b>	Cubic/Custom/Concept Powerbus	Concept Powerbus	Concept Powerbus
<b>Mounting</b>	Floor	Wall	Wall
<b>Fault rating (kA)</b>	36	10	10
<b>Phases</b>	3	3	3
<b>Bus-bar rating (amps)</b>	≥ 630	≥ 160	≥ 160
<b>Min. Circuit Ways</b>	Refer Dwg	60 Power chassis 24 Lighting chassis	48 Power chassis 24 Lighting chassis 24 Mech
<b>Spare circuit ways required</b>	Yes - 35% spare on each chassis	Yes - 35% spare on each chassis	Yes - 35% spare on each chassis
<b>Lock</b>	Yes	Yes	Yes
<b>Colour</b>	Grey N12	Grey N12	Grey N12
<b>Installed in path of egress</b>	No	Yes	Yes
<b>Installed in architectural cupboard</b>	No	Yes	Yes
<b>Construction</b>	Steel	Steel with dust seals	Steel with dust seals
<b>IP Rating</b>	65	52	52
<b>Max Temperature Rise</b>	20°C	-	-
<b>Form of Segregation</b>	Refer above	2b	2b

**3.7.4 Equipment List**

**3.7.4.1 Main Switch or Isolators**

Non-Auto MCB – Terasaki

Refer drawings

**3.7.4.2 Control Switches**

Sprecher & Shuh with suitably engraved labels, indicating switch position and function such as;

SWITCHBOARD	TYPE	LEGEND	COMMENTS
DB.JS-1	A-O-M	"SECURITY LIGHTS"	
	A-O-M	"EF.3"	

### 3.7.4.3 Time-clock

NHP Grasslin 2 channel 7-day digital time clock.

SWITCHBOARD	CHANNEL	FUNCTION	COMMENTS
DB.JS and DB.JS-1	1	"SECURITY LIGHTS"	Channels and timeclocks to be added as required refer drawings.

### 3.7.4.4 Transformers

ADM Transformers. Transformers to not be loaded more than 80% of rated capacity.

### 3.7.4.5 Surge Protection

Supply and install NHP Cirprotec surge protection devices. The surge protection devices shall be in accordance with the appropriate category, class and/or type as per AS/NZS 1768, IEC 61643-11 and/or UL 1449 when connecting to main switchboard, distribution board and end circuit levels.

Surge protection devices shall be labelled and rated as per the requirements of the surge product standards IEC 61643-11 and/or UL 1449 3rd.

The surge diverter shall feature DIN mounting, replaceable modules and remote end of life monitoring via 250V/1A volt free contacts. Flag indication shall be provided whereby green flag indicates module is ok, and red flag means the module requires replacement.

Surge protection devices are to be installed with suitable upstream protection via fuses or circuit breakers in accordance with the manufacturer's recommendation.

Installation of the surge protection devices shall be in accordance with AS/NZS 3000 Wiring Rules and manufacturer's requirements

SWITCHBOARD	CATEGORY	SURGE CURRENT	PHASES	COMMENTS
MSB	Class 1+2	100kA I <sub>max</sub> , 25kA I <sub>imp</sub> , I <sub>n</sub> 20kA	3	Main switchboard Surge Protection
DB.X	Class 2	40kA I <sub>max</sub> , I <sub>n</sub> 20kA	3	Sub-board Surge Protection
Equipment Sub-circuit	Class 2+3	20kA I <sub>max</sub> , I <sub>n</sub> 10kA	3	Final sub-circuit connection to equipment

### 3.7.4.6 Multi-Function Power Meter

Socomec DIRIS A14.

Provide all ancillary CT's etc as required to measure the main electrical energy supply characteristics. Unit to have high level Modbus output capability to BMS.

All meters shall be commissioned and checked for calibration. Contractor shall include report of calibration in the maintenance manuals.

SWITCHBOARD	NUMBER	SUB-MAIN	COMMENT
DB.JS	1	MECHANICAL	

DB.JS-1	1	MECHANICAL	
---------	---	------------	--

**3.7.4.7 Multi-Function Power Meter – Lighting and Power**

NHP Carlo Gavazzi EM21R.

Supply and install matching clip on CT's to minimise space required within panel switchboard.

System to be setup as required to measure the main electrical energy supply characteristics. Unit to have high level Modbus output capability to BMS.

SWITCHBOARD	NUMBER	SUB-MAIN	COMMENT
DB.JS	1	LIGHT & POWER	
DB.JS-1	1	LIGHT & POWER	

**3.7.4.8 Emergency Lighting Test Kit**

The switchboards shall be fitted with a complete emergency lighting testing system complying with AS 2293. The test system shall be by NH and shall be provided complete with test switch, timer, contactors and relays as necessary.

The testing system shall include phase sensing for the lighting circuits serving the spaces housing the emergency light fittings and/or as indicated.

Emergency and Exit lights shall be connected to their own circuits

SWITCHBOARD	NUMBER	COMMENTS
DB.JS and DB.JS-1	1 each	

**3.8 METERS**

Provide space in the switchboard and/or separate meter panel for the Local Authority to mount all required meters to their requirements. The contractor shall make all necessary arrangements for the any metering requirements to be provided.

**3.8.1 Current Transformer (CT) Meter and Current Transformers (CTs)**

Provide space in either the switchboard or a nearby compliant meter panel to mount the CT Meter. CT Meter shall be installed within 10m cable length of the CTs.

Provide space and mount in the new main switchboard board the Local Supply Authority's CTs for their meters, in accordance with their requirements.

The design and location of the meter panel shall ensure the temperature limits of the CT Meter shall be within -10°C to +45°C

**3.9 DISCRIMINATION OF POWER CIRCUITS**

Circuit breakers and/or fuses shall be selected to ensure that the discrimination requirements of AS 3000 are met and a fault on any one circuit does not affect any other circuits on the same or higher level in the electrical circuit configuration.

**3.10 EARTHING**

The electrical contractor shall provide a complete earthing system to AS3000 Wiring Rules, this includes but is not limited to, an earth stake, men connections to sub switchboards, earthing of telephone MDF, earthing to conducting piping and earthing to structures including concrete slabs in shower and bathrooms, steel structures.

The earthing system is to be tested to ensure compliance with the standard.

### **3.10.1 Landscape**

Supply and install equipotential bonding of all poolside metallic objects including light poles etc in accordance with AS 3000 Clause 5.8 and 5.8.2.5.

Refer landscape and architectural drawings for locations.

Co-ordinate complete installation with landscape sub-contractor for connection at poles and terminated at the pool filtration board along with all pool earthing described above. Refer Pool hydraulics specification and drawings for coordination.

### **3.11 MAINS AND SUB-MAINS**

Supply and install the following mains and/or sub-mains. All shall be of the phases nominated and unless nominated otherwise contain earthing conductor of appropriate size in accordance with AS/NZS 3000.

Cable shall comply with AS 3008 and single core cables shall be run in trefoil. All cabling shall be spaced in accordance with AS/NZS 3008 so that de-rating factors need not be applied.

Where cables are installed in a manner that introduces a de-rating factor, then the cable sizes shall be increased to maintain the de-rated current rating of the specified cable.

All cables shall have a suitable mechanical and fire protection to comply with AS3013 and where nominated or otherwise required have a minimum fire rating of WS52W.

#### **3.11.1 Schedule of Mains and Sub-Mains**

Refer drawings.

### **3.12 SUB-CIRCUIT WIRING**

Supply and install all sub-circuit wiring between all items of electrical equipment, where shown on the drawing.

The following specific requirements shall apply:

- Wiring shall be concealed in all cases, where possible. Where this is unavoidable, it shall run in conduit, on cable trays, or cable ducts. Where exposed in occupied rooms, wiring shall be in 'Aussie Duct'.
- Wiring shall consist of V75 PVC insulated stranded cable where possible, with copper conductors to AS 3008. Minimum cable sizes shall be as follows:
  - i. General lighting 2.5mm<sup>2</sup>
  - ii. General Power 2.5mm<sup>2</sup>

In all instances, cables shall be selected having regard to current carrying capacity for the equipment concerned, voltage drop and derating factors.

- TPS sheathed cables may be used in false ceiling spaces and in partition walls. Wiring shall run in true line direction of the building, in a neat and grouped manner.
- Wiring in solid walls shall run in conduits within the wall cavity where possible, or chased into the walls, whereby the chase shall be of sufficient depth to fully recess the conduit used.
- Wiring run underground shall run in PVC conduit.
- Conduit ends shall be cut square and all burrs removed. Where metal conduits are used, the threads cut clean and full sized.
- Junction boxes shall be used in lieu of tees, and bends shall be used in place of elbows, except at the ends of runs or adjacent to equipment where elbows may be permitted.
- All conduits, light fittings, boxes, equipment, etc., shall be properly earthed.
- A loop system shall be used throughout, except where specific permission is given to do otherwise.
- All audio power shall be run such that the earth cables top each outlet are run in star configuration from the switchboard to ensure no earth loop is created.
- Wiring to island positions remote from walls shall be run in ceiling space below or chased into floor.

- Where run in ceiling space below they shall run in conduit which shall be clearly marked every 2 metres with sign stating that power is served from floor above, the switchboard number and the circuit number.
- Where chased into floor, it shall be given 50mm cover in accordance with regulations, as if not possible, chased into the floor and given a 1.6mm thick steel cover piece glued to the floor with a suitable adhesive.
- Speaker cabling shall run remote from power and light cabling, and where it must cross, it shall cross at right angles.

## **4**            **LIGHTING**

### **4.1**            **SWITCHES**

Supply and install all switches where shown on the drawings and/or as required. The switches shall generally be rated at 16A and recessed into walls.

Mounting height shall be 1000 AFL unless nominated otherwise on the drawings or on site.

Colour shall be White or standard colour to be nominated on site.

The following schedule nominates single switches only. Multi-gang, neon, 2-way, intermediate, etc., shall be provided where appropriate.

All switches in accessible areas shall be large button switches in accordance with DDA compliance requirements.

Switches shall be provided with push-in or glued on circuit identification tags. Alternatively 'Dymo' adhesive labels may be used on the switch concealed under the cover.

#### **4.1.1**            **Schedule of Switches**

##### **4.1.1.1**        **Wall Mounted Switches**

Wall mounted switches shall have clip on covers and be similar to PDL 600 Series, HPM Excel or Clipsal 2000.

##### **4.1.1.2**        **Architrave Switches**

Switches shall be Clipsal 2001, HPM XLA 770/1 or PDL 661.

##### **4.1.1.3**        **Stainless Steel Switches**

Switches shall be Clipsal B31VA, HPM MS70/1.

##### **4.1.1.4**        **Multi-gang Stainless Steel Switches**

Switch panels shall be similar to Clipsal recessed stainless steel Style 'B' or HPM MS 770 series, with space for a minimum of 2 spare spaces complete with blanking buttons.

##### **4.1.1.5**        **Weatherproof Switches - IP 56**

Wall mounted weatherproof switches shall be Wilco WISM Series, HPM H..SW, 110T or PDL RSW 110.

##### **4.1.1.6**        **Toilet - Light and Fan**

Switches shall be "Big Ideas Ph. 03 7038 9975" units with the following functions:

- movement sensor;
- noise sensor;
- fan controller;
- ceiling mounted.

The unit shall be arranged to automatically turn on the light and fan while a person is detected. The fan shall remain activated for 10 minutes after the toilet area is vacated.

The contractor shall engage the sensor manufacturer to undertake an assessment of the location and final quantities of all sensors based on the sensors proposed to be installed. Provide a layout drawing indicating sensor specifications and final locations to the Superintendent for review.

##### **4.1.1.7**        **Time Delay Switch**

Time delay switches shall be Legrand TX770/1RC push start/push restart with time adjustment of 1 sec to 239 hours.

#### **4.1.1.8 Electronic Dimmers**

Switches used to dim lights shall be electronic dimmers suitable for the resistive and inductive load applied with at least 25% spare capacity similar to HPM VA range.

In larger areas they shall be ceiling mounted units configured to suit the room size and layout, with isolator adjacent door in accordance with BCA Section J requirements.

In smaller areas such as stores they shall be wall mounted units incorporating the isolator switch.

#### **4.1.1.9 Automatic Light Switches**

Automatic Light Switches shall be of "Big Ideas Ph. 03 7038 9975" with the following functions:

- movement sensor;
- sound sensor;
- light level sensor.

Sensors shall generally be ceiling mounted. Where light switches are also indicated on the drawings, these shall isolate the function of the automatic light switches so the lights remain off.

The contractor shall engage the sensor manufacturer to undertake an assessment of the location and final quantities of all sensors based on the sensors proposed to be installed. Provide a layout drawing indicating sensor specifications and final locations to the Superintendent for review.

#### **4.1.1.10 3-Position Rotary Switches**

Switch mechanism shall be HPM 770 RS/D MEC.

The switch shall usually be used as standard A-O-M function and shall be wired accordingly. Provide engraved labels of each switch position and overall function either on the switch plate or adjacent to it. The exact function and wording for labels will be confirmed on site.

#### **4.1.1.11 Multiphase Isolator**

Shall be rotary switch with lever action NHP Electra B2N A4 - 20LE.

#### **4.1.1.12 Photo Electric Cell**

Supply and install 'Lumitrol' Photo Electric (PE) cells to control the external security lights. The light circuit unit shall be provided with an AUTO-O-BYPASS rotary switch in the Switchboard to provide manual control if required unless nominated otherwise.

## **4.2 LIGHT FITTINGS**

Supply and install all light fittings where shown on the drawings and/or as scheduled. The light fittings nominated indicate the minimum standard required, and the tender must include these specified items to be conforming.

The light fittings shall be installed complete with lamps, tubes, necessary diffusers, and any other components necessary to complete the fittings or the suspension or fitting of same.

The following conditions are to apply:

- a) All luminaires shall comply with AS/NZS 3820: Essential Safety requirements for low voltage electrical equipment.
- b) Where exposed to view, fitting carcasses shall be powder coated in a colour to be nominated on site.
- c) Where a suspended ceiling is used the exact type of suspension system used shall be determined first and the correct model light fitting ordered. The model number scheduled assumes a 2-way exposed T-Bar system and is provided to indicate the type of light required only.
- d) The light poles shall be complete with fitting mounting brackets. The contractor shall design, supply and install all poles suitable for ground conditions to ensure structural integrity and stability under appropriate design conditions for local area. The contractor shall submit footing design calculations to the superintendent for review prior to installation.

- e) LED fittings shall be fitted with purpose designed heat sinks to ensure the operating temperature is within the designed parameters of the LED fixtures. The ambient temperature range of the LED fitting shall be minimum -20C to 35C. LED fittings shall have a minimum CRI 80+. All LED fittings where specified to be dimmable are to be supplied with DALI compatible dimmable control gear and they shall have NATA certified photometric data,
- f) Test certificates shall be available upon Superintendent's request. LED fittings shall have a minimum lumen maintenance of 50% at 50,000 hours.
- g) All LED light fittings shall fully comply with the following:
  - i. ACMA (Australian Communication and Media Authority) Registration.

All fittings shall be registered with AMCA and receive permission to use the C Tick mark with identification number, or the RMC (Regulatory Compliance Mark). A European CE mark is not an acceptable approval. They must also comply with AS NZS CISPR15.

- ii. DOC (Declaration of Conformity) Compliance

The light fitting as a whole, not the individual components shall have DOC Compliance, such as an EMC test from an approved laboratory.

- iii. SAA Certification

All prescribed items, such as the driver, ballast and transformer must have Australian Electrical Safety approval as issued by Energy Safe Victoria and must be registered with ERAC – Electrical Equipment Safety System and AS 4417.1 or AS NZS 61347:2000 for earlier products.

Prior to ordering of light fittings, the following shall be confirmed for each fitting

- a) Confirm superintendent review of samples as noted elsewhere in this specification;
- b) Confirm all lamp colours;
- c) Confirm all fitting colours;
- d) Confirm delivery date.

#### **4.2.1 Schedule of Light Fittings**

Refer drawings.

### **4.3 LIGHTPOLES**

Install light poles where shown on the drawing and/or indicated below. Allow for excavation and installation of foundations to supports as recommended by the manufacturer. The contractor may engage the pole manufacturer to install the poles as part of the contract.

The installation shall include:

- Engineering computations for pole footing by pole manufacture
- Footings
- Cable entry and access
- Mounting of other electrical features
- Aiming of light fittings
- Earthing of pole

Anchor bolts shall be supplied by the pole supplier and shall be installed to their recommendations. Refer attached Manufacturers documentation located at rear of specification for mounting details. Note information provided for information only confirm all requirements with the manufacturer.

### **4.4 LED LIGHTING**

#### **4.4.1 LED Flexible Lighting**

Supply and install the LED flexible light fittings as shown on the drawings and specified.

Work shall include for laying of all LED light strips, and securing them to the building structure. The fitting is flexible and shall be mounted flush with the mirrors and fixed with sealant, and include for all equipment including, cables, cable covers, power supply and switching.



## **4.5            WIRING OF LIGHT FITTINGS**

### **4.5.1           General**

Confirm all wiring requirements of dimmed light fittings with lighting manufacture before rough-in of cables. No dimmed, LED lights or other specialty lights shall be wired until shop drawings have been submitted from lighting control company or similar.

### **4.5.2           Dimmed Lighting**

All dimmed light circuits shall be wired in 5 core cable as a minimum. Lights shall be wired loop to loop on circuits nominated. Where a circuit is dimmed, the control wire shall be to the manufacturers requirement and the power to the circuit shall also be switched.

### **4.5.3           LED Lighting**

Generally, wiring shall be either 5 core 1.5mm power wiring with control circuit, or low voltage CAT6 data cable with each light wired individually to a LED controller. Power and control shall then be provided to controller as per lighting manufactures details.

## **5**            **GENERAL POWER**

### **5.1**            **POWER OUTLETS**

Supply and install all Power Outlets where shown on the drawings and/or as scheduled. Mounting heights shall be 300mm above floor and 150mm above benches, unless nominated otherwise on the drawings or on site.

The units shall be as specified. The following schedule nominates single outlets only. Provide double or other outlets as nominated on the drawing.

Colour shall be White or standard colour as nominated on-site.

#### **5.1.1**            **Labelling of Outlets**

Outlets shall be provided with push-in or glued on circuit identification tags. Alternatively, 'Dymo' adhesive labels may be used on the switch concealed under the cover.

#### **5.1.2**            **Schedule of Power Outlets**

##### **5.1.2.1**            **Wall Mounted**

Wall mounted outlets shall be PDL 694, HPM XL 787 or Clipsal Iconic 3025.

##### **5.1.2.2**            **Wall Mounted – with USB Type C charging**

Wall mounted outlets shall be Clipsal 2015 with ICONIC series USB charging – USB charging mechanism to be a minimum 60watt Type-C rated connector.

##### **5.1.2.3**            **Weatherproof**

Weatherproof outlets shall be Clipsal 56 Series or 'Wilco' WSC Series.

##### **5.1.2.4**            **Suspended**

Suspended outlets shall be 'Wilco' SSO110 units suspended on stranded SS cable from above. Mounting heights shall be 1800 above floor unless nominated otherwise. Provide rigid fixing to structure.

##### **5.1.2.5**            **Multi-phase - IP56**

Multi-phase outlets shall be 'Wilco' 56C520, HPM H66C520 or PDL MCV520.

## **5.2**            **CABLE TRAY**

Supply and install cable tray where shown on the drawings and/or as required to support cabling. The tray shall be securely fastened to the building using angle iron brackets, and be in accordance with the Local Supply Authority's requirements. The tray shall be so positioned that the cables can be readily added or removed.

The tray shall be of sufficient width so cables can be accommodated without stacking one above the other except where installed in trefoil configuration.

**5.2.1 Schedule of Equipment**

<b>Designation</b>	Cable Tray
<b>Manufacture</b>	Australian Cable Supports P/L
<b>Type</b>	Rite Way
<b>Size</b>	As nominated
<b>Materials</b>	Steel
<b>Finish</b>	Custom colour (powdercoated)
<b>Cable fastening</b>	Cable ties (colour matched to tray colour)
<b>Max. distance between supports</b>	1200mm

**5.3 EQUIPMENT WIRING**

Wire up the following equipment as described.

Where equipment is being supplied by the Client or other trades the Electrical Contractor will first confirm with that supplier the power rating and phases required for that equipment, and shall provide the necessary MCB and cable sizes to suit in accordance with regulations.

**5.3.1 Hot Water Services**

Wire up all hot water services.

Provide a Wilco WISM 115 isolator adjacent to each.

**5.3.2 Stoves and Wall Ovens**

Direct wire with isolator switch.

**5.3.3 Microwave Ovens**

Local GPO.

**5.3.4 Hand Dryers**

Direct wire all hand dryers with local isolator.

**5.3.5 Exhaust Fans**

**5.3.5.1 Remote Control**

Wire fans from switchboard via time clock, and A-O-M switch as described elsewhere. Provide local isolator adjacent to each fan.

Wire up fans via light and fan motion switch(s).

**5.3.6 Ceiling Fans**

Direct wire fans via standard controller as supplied by equipment manufacturer.

**5.3.7 Airconditioning Units**

Direct wire all units with local isolators. Split units shall be provided with a separate power supply to both airconditioning units from the same circuit. All cable sizes and local isolators to be sized in accordance with manufacturer's recommendations.

All control cabling shall be by the Mechanical Contractor.

**5.3.8 Dishwasher**

Local GPO.

**5.3.9 Freezer & Fridges**

Local GPO.

**5.3.10 Boiling Water Unit**

Direct wire and control via timeclock in switchboard. Provide local pushbutton timer override adjacent to BWU on wall to enable timeclock bypass (adjustable – initial setting 60min). Push button timer to be Clipsal 31VETR.

**5.3.11 Boiling Water Unit with Inbuilt Timeclock**

Direct wire with local isolator.

**5.3.12 Power Supply**

Local GPO.

**5.3.13 Dimmers**

Direct wire.

**5.3.14 Auto-Doors**

Wire up all auto-doors as specified in the architectural documents and where shown on drawings. Wiring shall include GPO for motor, interconnection wiring between “Auto-OFF-Manual” key switch, manual door release and interface wiring to security and fire where access control is specified and/or shown on the drawings.

**5.3.15 FDCIE System**

Supply and install power as required for the complete operation of the fire alarm system as specified below. Power to the fire alarm system shall be on the live side of the MSB main switch and shall be run in fire rated cable, unless the alarm system has suitable battery backup to meet the requirements of AS1670 and AS3000.

**5.3.16 TV and Audio**

Local GPO in concealed behind unit. Coordinate exact location with AV installer and architectural layouts.

**5.4 MOTORISED WINDOW SYSTEM**

Supply, install and wire up a complete motorised window system where shown on the drawing and as follows. The system shall be supplied complete with actuators, drives control switches, transformers, wiring, power supplies wiring and commissioning as required to ensure proper operation of the system.

**5.4.1 Schedule of Motorised Window System**

<b>Designation</b>	Motorised Window System
<b>Manufacture</b>	Arens International
<b>Model No.</b>	
<b>Number Required</b>	Refer architectural dwgs
<b>Windows Per System</b>	All in each GLA
<b>Options</b>	Rain Sensor
	Fire Interface

	Central control unit
--	----------------------

The Fire Sprinkler Interface shall be arranged such that a signal from the fire system will cause all windows to close. Provide relays as required to enable this option to function.

The Rain Sensor will cause the windows in that particular system to close in the event of rain detection.

## **6 AUDIO VISUAL SYSTEMS**

The AV system and wiring shall be installed by the clients nominated AV contractor. The builder shall allow full and timely access to site for all pre-planning works, rough in, final fit off, and commissioning to occur in accordance with agreed construction programme.

All AV works shall also be coordinated on site by builder with all other trades including but not limited to electrical power, data installation locations as required by complete AV system design.

AV system installation shall include :

1. Projectors
2. AV cabling
3. Speaker systems
4. TV screens
5. PA system extension
6. Hearing Augmentation (including any required performance solutions)

## **7 TELECOMMUNICATIONS**

### **7.1 SCOPE**

Supply and install a telecommunication system where and as indicated on the drawing and as scheduled.

The scope of work shall generally comprise, but not limited to the supply and installation of the following;

- new underground conduits and pits;
- incoming NBN infrastructure relocation
- new network termination unit and power supplies
- new communication enclosures ;
- new horizontal cabling including fibre, data, and phone cabling;
- telecommunications outlets for data and voice;
- patch cables and leads;

The system shall be complete and comprise all sockets, plugs, cabling, terminations, and equipment as scheduled, including commissioning and testing. All cabling shall be labelled at both ends, to the satisfaction of the Superintendent.

The system shall be a CommScope “Netconnect” structured cabling network.

Upon completion the whole system must be CommScope “Netconnect” certified to the Communication Standard nominated and be installed by a CommScope “Netconnect” Certified Installer.

All test results must be forwarded to the Superintendent.

The whole installation, testing and proving shall be carried out by a CommScope “Netconnect” trained and qualified contractor for this standard of installation. Approval of this contractor must be obtained from the Superintendent prior to testing taking place.

#### **7.1.1 Class E Performance Testing on Cat 6 Installations**

The Structured Cabling System shall be tested by the installer for compliance to the requirements specified in the latest ISO/IEC 11801 standard for Class E performance using at least Level 3 testers or better in accordance with AS/NZS IEC 61935.1 – Testing.

A certain percentage of the outlets may be chosen at random for verification of compliance testing by the end-user or by CommScope. The design data and the full results of all compliance tests performed by the installer are to be fully documented and submitted to end-user to hold for the period of the warranty.

The results must include 100% of total installation and provide full electronic data files for each cable run indicating the name of the person doing the testing, date, building, cable identification, cable length, and all the parameters specified in ISO/IEC 11801

#### **7.1.2 Schedule of Equipment & System Performance**

<b>Communication Standard</b>	Category 6 to ISO 11801
<b>Transmission Speeds</b>	Up to 10 Gigabit/s (Ethernet 10GBase-T)
<b>Cabling Warranty Period</b>	5 years
<b>Maximum Link Length for 1 Gigabit/s</b>	90m
<b>Maximum Link Length for 10 Gigabit/s</b>	45m

**7.1.3 Communication Enclosures**

<b>Designation</b>	TC.JS
<b>Manufacture</b>	Server Edge
<b>Type</b>	Wall
<b>Height</b>	6 Ru
<b>Width</b>	600
<b>Depth</b>	800
<b>Power Panel Fitted (Y/N)</b>	Yes
<b>No. Power Outlets</b>	10
<b>Ventilation Fan (Y/N)</b>	Yes
<b>Cable Minders &amp; Jumper Rings (Y/N)</b>	Yes
<b>Door Configuration</b>	Glass

**7.1.4 Communication Rack Equipment**

<b>Patch Panels - Copper</b>	RJ45 24 PORT
<b>No. off</b>	As required + 20%
<b>Patch Cords - Copper</b>	RJ45 1.5m
<b>No. off</b>	One per connected port.

<b>Patch Panels - Fibre</b>	LC duplex
<b>No. off</b>	As required + 20%
<b>Patch Cords - Fibre</b>	LC-LC 1.0m
<b>No. off</b>	As required + 20%

**7.1.5 Cable Distribution**

<b>Fibre tie cable from</b>	SERVER	TC.JS
<b>To</b>	TC.JS	AV.JS
<b>Cable Type</b>	OM4	OM4
<b>Number of Cores</b>	Refer Dwgs	Refer Dwgs



**7.1.6 Trace Wire:**

Supply and install a solid trace wire with thermoplastic insulation recommended for direct burial to all plastic pipes. The wire shall be installed to allow accurate trace of all pipework in the future.

Trace wire shall be laid flat and securely affixed to the pipe at 2 metre intervals

The Contractor shall perform a continuity test on all trace wire and repair or replace the failed segment of the wire at no cost to the client.

**7.1.7 Cabling Specification**

<b>Horizontal Cables (Data)</b>	Cat 6 UTP
<b>Horizontal Cables (Voice)</b>	Cat 6 UTP
<b>Outlets (Data)</b>	RJ45 Cat 6
<b>Outlets (Voice)</b>	RJ45 Cat 6
<b>Mounting Plates</b>	White

<b>Backbone Cables (Data)</b>	Fibreoptic OM4 Multimode
<b>Cores</b>	Refer Dwgs

**7.1.8 Patch Leads**

<b>Workstation Patch Cords</b>	RJ45 (2.1m) to match cable standard
<b>No. Off</b>	One per data outlet

**7.2 NBN SERVICES**

**7.2.1 National Broadband Network (NBN) Infrastructure**

Where nominated on the drawings, the contractor shall allow for the relocation of the NBN infrastructure complying with the following NBN developer requirements;

1. Provision of a suitable building entrance facility (lead-in) from the street network to the building entrance, through to any area designated for Telecommunications services. Where diversity or other special needs exist, an alternative entry location may also be required.
2. Provision of suitable space and access for the installation, maintenance and repair of all NBN Co. network elements up to and including the Network Termination Unit (NTU) and Power Supply Unit (PSU).
3. Provision of a minimum of P20 (23mm nominal inside diameter) communications conduit, from either the telecommunications room or riser/closet location to each NTU location where nominated.

NBN Co is responsible for the following installation requirements;

1. The cabling, installation and maintenance of all network elements up to and including the NTU and PSU. With the exception of the PSU batteries originally supplied at the time of installation.
2. Compliance to the Building Code of Australia for all cabling and with reasonable directions provided by authorised developers, builders, owners, managers and customers in respect to

building and fire authority requirements. In the cases where requests are received which are regarded as unreasonable, advice may be sought.

The whole installation, testing and proving shall be carried out by a trained and qualified contractor for this standard of installation. Approval of this contractor must be obtained from the Superintendent prior to testing taking place.

Equipment shall be as scheduled and as follows. Alternatives may be offered, provided a conforming specification is also submitted.

**7.2.2 Schedule of Equipment & System Performance**

<b>Communication Standard</b>	Category 6 AS 3080
<b>Transmission Speeds</b>	Up to 1000 Mbits/sec
<b>Cabling Warranty Period</b>	5 years

## **8 FIRE DETECTION AND ALARM SYSTEM**

### **8.1 FIRE DETECTION AND ALARM SYSTEM**

Supply and install a complete Fire Detection and Alarm System (FDAS) throughout the building in accordance with all relevant standards and regulations including AS 1670 the NCC and generally as shown on the drawings.

#### **8.1.1 Building Description and FDAS Requirements**

The Fire Detection and Alarm System shall be installed in accordance with the following relevant standards and regulations based on the following parameters:

- The building is considered a class 9b – assembly building
- The building has a rise in storeys of 2 and is less than 25m
- Does not have a basement area
- Does not have a stage or backstage area
- Is considered a sporting complex with a spectator seating area less than 1000 people

As a result, the proposed FDAS system shall incorporate:

- An automatic smoke detection system complying with NCC 2022 Specification 20 (S20C6)

#### **8.1.2 Fire Detection and Alarm System Scope of Works**

The system shall be supplied complete with the following components:

- fire detection control and indicating equipment (FDCIE) with necessary backup power facility;
- power supply from main switchboard with separate main switch;
- detectors selected to suit the risk including high temp, smoke, duct detection etc
- all interconnecting wiring;
- all necessary control components such as end of line devices (ELD), switches, relays, responders mechanical plant trip (GFA signal to MSSB's for HVAC shutdown), fail safe output to shut down power to all powered door locks in path of travel under GFA condition etc;;
- access to all concealed detectors;
- testing and commissioning;
- statement of compliance;
- log books;
- maintenance in accordance with AS 1851 during the defects liability period;
- as-built drawings.

Upon completion provide a signed "Certificate of Compliance" stating that the whole system has been fully tested, is complete and complies with AS 1670 from an independent Certified Contractor.

Detectors located in concealed spaces without access shall be provided with access in accordance with regulations. This shall comprise either 'Trafalgar' access hatches or 'Famco' brackets. Remote indicators shall be provided as well in all instances.

The system shall also incorporate the systems scheduled below which shall be complete, incorporate all necessary components and operate properly in accordance with regulations.

System shall be of manufacture nominated.

#### **8.1.3 Schedule of Equipment**

<b>Designation</b>	: Fire Detection and Alarm System
<b>Manufacture</b>	: Flamestop
<b>Model No.</b>	:Vigilant MX1

<b>Type</b>	: Fully point addressable
<b>Spare Capacity</b>	: 30%
<b>Detector Type</b>	: Smoke (thermals where suit hazard/risk)
<b>External Strobe</b>	: Yes mounted at front entrance
<b>Audible Warning System Type</b>	: N/A
<b>Intercom System</b>	: No
<b>Visual Warning System (Y/N)</b>	: Yes where required by AS1670.1 clause 3.8, 3.19 and 3.22
<b>Type</b>	: Visual Alarm Devices (VADs)
<b>Public Address Capability (Y/N)</b>	: No
<b>Manual Call Points</b>	: Allow 2 to be located as directed by superintendent
<b>Alarm Signalling Equipment (ASE)</b>	: No
<b>Supply Air Duct Detector</b>	: No
<b>Return Air System Detector</b>	: No
<b>Flow Switch</b>	: No
<b>Monitored Stop Valve</b>	: No
<b>Aspirating Smoke Detector for Lift shaft</b>	:N/A

In addition the system shall be supplied complete with the following:

- smoke detectors for all ventilation systems as required, including relays, wiring and other control components as necessary to shut down the air-handling plant in the event of a fire;
- Refer mechanical drawings for number, type, location and configuration.
- Connection to all automatic doors at required exits to release and open doors in the event of a fire alarm.
- - The system shall output to each mechanical services switchboard to provide a general fire alarm for shutdown of all air handling systems.

## **8.2 AUDIBLE AND VISUAL ALARM**

Provide audible and visual alarms where shown on the drawings, which shall be activated in the event of an alarm.

The audible alarm shall be a sounder complete with its own internal noise generator, and the visual alarm shall comprise a flashing light, preferably LED.

The units can be powered from the detector module if they do not impact on the minimum alarm period in active mode, and have the correct electrical characteristics, otherwise provide the necessary wiring, power supply, relays etc and interconnecting control wiring back to the detector module. Power shall be provided via the same power circuit.

## **8.3 PROVISIONAL HEADS**

In addition to the thermal and smoke heads shown on the drawing, the Contractor shall allow in their tender a Provisional Sum for the supply and installation of 10 additional heads.

This sum shall not be used in part or whole without written permission.

## **8.4 FIRE DETECTION AND ALARM SYSTEM TESTING AND COMMISSIONING**

The contractor shall allow to test and commission all Fire Detection and Alarm systems installed as part of this project and in accordance with the AS1670 series.

For all systems installed the contractor shall carry out preliminary testing, checking, control setting, etc. prior to the Superintendent being notified that the work has reached the state of Practical Completion.

Provide all necessary testing apparatus and be responsible for all costs associated with the testing.

Where interfaces with systems of other trades are involved, the Fire Detection Sub-Contractor shall ensure all interfaces with the relevant service shall be installed, tested and verified as one system. Systems subject to integrated testing include but a not limited to:

- HVAC systems, including fire fan control panel operation
- Automatic doors
- Integration with all emergency pathway doors

The Fire Detection Sub-Contractor shall attend to the combined commissioning of these systems when instructed by the Superintendent.

The results of the commissioning shall be included in the Operation and Maintenance Manuals in accordance with 'Operation and Maintenance Manuals' section of this specification.

### **8.4.1 COMMISSIONING REQUIREMENTS**

The Fire Detection and Alarm System Contractor shall ensure that commissioning is carried out in accordance with the AS1670 series. This shall include:

- Commissioning of the Fire Detection and Alarm System in accordance with Appendix A in AS1670.1:2018

### **8.4.2 COMMISSIONING DOCUMENTATION**

The Fire Detection and Alarm System Contractor shall provide the following commissioning documentation for inclusion in the FDAS Operating and Maintenance Manual:

- As-installed drawings of the fire detection system and the building warning system
- Commissioning test sheets confirming the operation of each connected device.
- Installers Statement as per Appendix F in AS1670.1:2018. In addition to the certification items listed in Appendix F, the contractor shall also include installation-relevant information as per the following:
  - o Table of all system components, their location, type, unique system designation and descriptor.
  - o Table of each system component having a fixed service life, nominating the service life expiry date
  - o Table of any connectable equipment, including interfaces to other services
  - o Table of reference for CIE manuals
  - o Table of each supplementary warning devices
  - o Power supply installation including power source and voltage, standby type, voltage and capacity
- Commissioning Statement as per Appendix G
- Baseline Data Report incorporating the information require per Clause 1.7.2 in AS1670.1:2018
- Fire Alarm Signalling Commissioning Statement as per Appendix C in AS1670.3:2018
- Installers Statement as per Appendix F in AS1670.4:2018. This may be incorporated with the fire detection statement as one document
- Commissioning Statement as per Appendix G in AS1670.4:2018
- Independent Certification of the complete Fire Detection and Alarm System

## **9 SECURITY SYSTEMS**

### **9.1 EXTENSION TO EXISTING SECURITY SYSTEM**

Modify and extend the existing security system for the premises, where shown on the drawings and/or as follows.

The scope of works shall include the modification, supply, installation, cabling and configuration of the complete security system. The Contractor shall be responsible to provide all elements required for the satisfactory completion of the works.

Where required, the modified security system shall be provided with the following:

- All System Hardware;
- All equipment panels and Racks;
- All System software and programming;
- All interface cable, equipment, and other items to make the systems completely operational in accordance with this Specification,

The system shall be supplied complete, to ensure that the system operates properly and shall comprise the following security system components;

The security system shall provide an integrated system for the nominated security components as scheduled below;

#### **9.1.1 Schedule of Performance**

<b>Manufacture</b>	Tecom
<b>Model</b>	GE Challenger 10
<b>UPS Power</b>	Minimum 8 hours @ full load
<b>Battery Backup (Y/N)</b>	Yes- 8hrs min with 30% spare capacity
<b>System Control PC (Y/N)</b>	No
	No (Client Supplied Server)
<b>System Management Software</b>	Existing
<b>System Software Licences (Y/N)</b>	No
<b>No off. Licences</b>	N/A

#### **9.1.2 Security Power Supplies**

The security system shall be provided with separate power supplies serving the following components. All power circuits shall be dedicated for the security equipment and supplied from the nominated switchboard within the switchboard zone.

- Security System Control Panel
- Headend Equipment;
- Door Access Controllers;

#### **9.1.3 Security Management Software on Client Supplied Server**

The contractor shall allow for the installation of all required software onto a client supplied server which shall be located in the nominated communications rack. Allow for licensing, software and coordination for the installation of the systems to enable proper functionality.

All headend equipment shall be located in the nominated communications room.

The Contractor shall coordinate and liaise with the client to ensure the data and information collected is encrypted and in accordance with the client's information management standard protocols.

#### **9.1.4 Confirmation of Room/Area Naming Convention**

The contractor shall confirm with the Client on wording, room names and number of all rooms/areas prior to the programming and commissioning of the security system.

### **9.2 EXTENSION TO EXISTING ACCESS CONTROL SYSTEM**

Modify and extend the existing access security system for the premises, where shown on the drawings and/or as follows. The system shall be supplied complete, to ensure that the system operates properly and shall comprise door hardware, access readers, control module, control panels, wiring, power supply.

The system shall be fail safe and arranged such that in the event of a fire alarm the doors shall release.

The contractor shall allow to provide the required power supply. Where a generator is installed the shall be arranged to be fed from the Essential Services section of the switchboard. The system shall be provided with battery backup to ensure the building remains secure in the event of power failure. All components of the system shall be covered by the battery backup.

The Access Control system shall be provided with the following:

- Internal and External door control devices;
- Electromechanical locks (including cable transfer units, handles, escutcheons, key cylinders and latches as appropriate);
- IP Data Network cabling and infrastructure,
- Equipment Racks and Enclosures;
- Power supply and battery backup;
- All system programming (e.g. programming of codes, point descriptors, alarm message text, etc.),

System to be able to identify users, monitor and log the operation and access of all access controlled doors, with time and user activation. System to have capability of limiting access to individual users during certain times of day and days of the week.

The Access Control System shall be supplied complete with dedicated power supply on separate circuit(s) for all equipment including control panel and door controllers, from the nominated switchboard.

### **9.3 EXTENSION TO EXISTING INTRUDER DETECTION SYSTEM**

Modify and extend the existing intruder detection system for the premises, as follows. Provide passive infra-red detectors generally to all external rooms through both stages, complete with all wiring, power supplies, gpo's and control panels as required. The system shall be modified and extended in accordance with the manufacturers requirements to ensure that the system operates properly and is fully tested and commissioned.

System shall be zoned (with separate keypads where shown) to enable the activation of detectors in the premise to identify the location of the intruder.

The Intruder Detection System shall be modified and provided complete with dedicated power supply on separate circuit(s) for all equipment from the nominated switchboard.

The Intruder Detection System shall be modified and provided with the following:

- Control Modules and Panels;
- Remote Arming Station;
- Each zone shall be individually identifiable at the control panel;
- Passive Infra-red (PIR) detectors;
- IP Data Network cabling and infrastructure;
- Equipment Racks and Enclosures;
- Power supply and battery backup;
- Wiring;
- All System Programming (e.g. programming of codes, point descriptors, alarm message text, etc.),

**9.4 SECURITY CABLE SPECIFICATION**

The following cable specifications shall be allowed for as part of the Security Specification;

Component	Cable Specification
Wiegand Proximity Card Readers	7 Core Screened Cable, Stranded 7x 14/0.20, Overall Shield, Not Twisted-Pair.
Card Readers	Shielded Twisted Pair (STP), 2 Pairs (individually shielded), Stranded 4x 7/0.30.
Electric Mortice/Strike	Heavy Duty Figure 8 Cable, Stranded 2x 24/0.20.
Reed and Tongue Sense for Monitored Electric Strikes	4 Core Security Cable, Stranded 4x 14/0.20.
Break Glass Units, Egress Buttons, Duress Buttons, PIR's, Door Status Indicators	4 Core Security Cable, Stranded 4x 14/0.20.
RS-485 LAN	Shielded Twisted Pair (STP), 2 Pairs (individually shielded), Stranded 4x 7/0.30.
LAN Equipment	Belden 8723 with a separate earth wire (2.5mm <sup>2</sup> Green/Yellow) or 4mm <sup>2</sup> for longer distances.
Data Cabling	Cat6 or 6A (Standard TCP/IP network)
CCTV Cameras	CAT6A

All cabling is to be labelled, certified to cabling manufacturers standards and installed in accordance with AS3080.

All Access Control & CCTV data cabling and patch leads shall be provided with alternative cable sheath colour. Refer to standard identification colours in this specification.

All security and CCTV data points shall be clearly labelled to differentiate these points from the standard communications data points throughout the building.



## **10 PAINING & EQUIPMENT IDENTIFICATION**

### **10.1 SCOPE**

The Contractor shall paint all parts of the work forming part of the Contract. All painting shall be carried out by a competent Tradesman Painter using first class materials of approved manufacture. The finishing coats shall be to colour nominated by the Superintendent.

### **10.2 IDENTIFICATION**

All pipelines, conduits, and the like shall be provided with identification bands and arrows in accordance with AS 1345 and where applicable AS 5601.

Preformed adhesive pipe markers such as 'Seton' may be used in lieu of painting on pipes.

### **10.3 PAINTWORK**

In general, all work shall be given two priming and two finishing coats of oil base paint. The following particular requirements shall also be met:

- a) All metal surfaces subject to oxidation shall be first treated with an approved phosphating agent applied to the maker's directions.
- b) All Apparatus Enclosures shall be painted internally with 2 coats of "Anodite" or other approved anti-corrosive paint. Externally two priming and two finishing coats of paint shall be applied.

## **11 MAINTENANCE & SERVICING**

### **11.1 GENERAL**

The contractor shall maintain the whole of the equipment in a proper and efficient working order for a period of twelve (12) months, from the time of final satisfactory inspection

### **11.2 DEFECT RECTIFICATION**

All defective parts during the defect liability period shall be replaced without cost to the Client. This includes all electronic, electrical and mechanical components falling within the maintenance period, unless failure is due to improper use of the equipment by persons other than employees of the Installer.

### **11.3 PREVENTATIVE MAINTENANCE**

For the duration of the defects liability period the contractor shall allow for and carry out routine preventative maintenance on all equipment including during the defects liability period.

The contractor will conduct programmed maintenance and provide service reports to the client, superintendent and engineer in accordance with the following table.

<b>SYSTEM</b>	<b>1 Monthly</b>	<b>3 Monthly</b>	<b>6 Monthly</b>	<b>12 Months</b>
Emergency Lights			✓	✓
Switchboards			✓	✓
Light Fittings			✓	✓
Public Address System		✓	✓	✓
Telecommunications Wiring				✓
Fire Detection	✓	✓	✓	✓
Security	✓	✓	✓	✓

### **11.4 MAINTENANCE OF FIRE PROTECTION EQUIPMENT**

The Client has a legal obligation to carry out regular maintenance of all fire protection systems and equipment in accordance with AS 1851. The contractor shall include in their tender to carry out all maintenance in strict accordance with this standard as well as allow to rectify defects if and when they arise during the Defects Liability period.

The Contractor shall prepare all the necessary log books and schedules for the maintenance of all the relevant fire protection systems and equipment installed as part of the Electrical Services based in strict accordance with the schedules described in the current version of AS 1851, and forward these to the Client for storage and use on site. The log books can be in either triplicate as specified or an approved electronic recording system.

The contractor shall carryout the tests until the completion of the end of defects liability period.

AS 1851 Section		Independent Certification	Frequencies			
			Monthly	Three Monthly	Six-Monthly	Yearly
6	Fire Detection	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
7	Smoke and Heat Alarms		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
18	Smoke Control & HVAC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tick indicates by contractor and included in tender sum.						

**11.5 MAINTENANCE RECORDS**

Up-to-date maintenance reports and log books shall be provided for all plant, equipment and systems installed.

Maintenance records shall contain at least the following information:

- Date, item of plant, equipment or system and nature of service performed.
- Details of defects found and rectification procedure undertaken.
- The name of the person and company performing the service.

**11.5.1 Availability of manuals and records**

Operating and maintenance manuals and maintenance service records shall be readily available at the site for inspection by the client, superintendent or regulatory authority upon request. For the purpose of maintenance management the maintenance service records shall be handed over to the client at the completion of the maintenance period for their on-going maintenance program and retained for a period as required by the regulatory authority. Defects identified in service or inspection reports shall be notified to the plant owner/occupier, manager or their nominated representative in a timely way.

**11.5.2 Emergency Lighting and Exit Signage**

The contractor shall provide a mechanism for the recording of the initial and ongoing testing records in accordance with the requirements of Appendix clause G3, AS/NZS 2293.1-2018.

**11.6 CONTRACTOR AVAILABILITY AND RESPONSE TIME**

From the date of commissioning the system, the contractor shall deem to be available twenty-four (24) hours a day, seven (7) days a week. The Installer shall respond to a system fault within two (2) hours at the request of the Client.

## **12 TESTING AND COMMISSIONING**

### **12.1 SCOPE**

The contractor shall allow to test and commission all Electrical Services systems installed as part of this project.

For all systems installed the contractor shall carry out preliminary testing, checking, control setting, etc. prior to the Superintendent being notified that the work has reached the state of Practical Completion.

Provide all necessary testing apparatus and be responsible for all costs associated with the testing.

Test, demonstrate and report on operational readiness of the following systems :

- General Lighting
- General Power
- Emergency and exit lighting
- Automatic Lighting Control systems
- Communications Cabling
- Security System, including intruder detection, door access, system.

Each system shall be tested as specified in the respective section for the system herein and the associated Standards. All electrical Installation testing shall be carried out in accordance with AS/NZS 3017.

Where interfaces with systems of other trades are involved, the Electrical Sub-Contractor shall attend to the combined commissioning of these systems when instructed by the Superintendent.

Refer to 'Fire Detection and Alarm System' section for specific testing and commissioning requirements of the fire detection and alarm system.

The results of the commissioning shall be included in the Operation and Maintenance Manuals.

### **12.2 INSTRUCTION OF OPERATORS**

Provide a skilled technician to instruct and advise the Proprietor's Operator in matters of operation, maintenance and taking records relating to the Electrical Services. The agreed date shall be determined with the Superintendent.

### **12.3 COMMISSIONING**

Provide a skilled operator to completely and properly commission all equipment and controls specified herein in this Specification. All equipment shall be checked and adjusted and shall be operated from full load to minimum. After 300 hours operation after the handover date the contractor shall clean all filters, clean strainers, check drives, check mountings and clean down equipment etc. and ensure that everything is operating properly.

### **12.4 COMMISSIONING REPORT**

Provide a final commissioning report documenting commissioning methods and test results of each system or feature within the contract documents. The report must also include a documented list of outstanding commissioning issues, records of all functional/commissioning testing undertaken and list any seasonal testing required in the future.

### **12.5 CERTIFICATION**

Upon completion the Contractor shall provide "Certificates of Compliance" for all individual systems and the project in general.

The certificates shall be signed by the relevant Contractor/Sub Contractor and shall state that the whole system has been installed, commissioned and tested in accordance with the relevant Australian Standards and Regulations.

This includes but is not limited to:

- Certificate of Electrical Safety

- Emergency and exit lighting systems
- The voice data cabling by a qualified Cable Certifier.
- Medical Electrical Wiring conducted by an independent Bio-Medical tester
- Independent Certification of the Fire Detection System
- Seismic Fixing

All certificates shall be included in the Operation and Maintenance Manuals.

## **13 CONTRACT COMPLETION DOCUMENTATION**

Final progress payment and practical completion will not be made until the following has been completed.

### **13.1 CERTIFICATE OF COMPLIANCE**

All works under the testing and commissioning section of this specification is completed.

### **13.2 MAINTENANCE MANUALS & AS BUILTS**

Provide to the Superintendent three (3) copies of a properly bound Instruction Manual which they shall prepare, giving full details of the construction, maintenance and operation of all equipment purchased by the Contractor forming part of this Contract. These manuals shall be provided at the time of handing over the work and shall be a condition of issuance of Practical Completion. The maintenance period shall not commence until satisfactory Manuals have been received.

#### **13.2.1 Objectives**

The objectives the Operations and Maintenance Manuals shall achieve are:

- a) To be of sufficient detail to enable the Principal to take over any maintenance, operation or use of the new facility and to do so in a safe, effective and efficient manner.
- b) To provide information on where replacement parts and equipment can be sourced and the capacity type and identification of each item, so they can be properly ordered or replaced.
- c) Provide names and contact details of the installing contractors/sub-contractors for future reference.
- d) To be fully completed and finalised prior to the Principals occupation, use or acceptance of the new facility.

#### **13.2.2 Maintenance Manual Format**

The format of the Operation and Maintenance manuals is to be as follows;

Maintenance manuals shall be provided into hard covered, durable 3 or 4 ring binders with durable labels on the front cover and spine and coloured section identifiers with labels.

Manuals shall be provided in both hard copy format and digital format as follows;

##### **13.2.2.1 Hard Copies**

- “As built/as installed” drawings shall be folded into transparent A4 sized plastic sleeves.
- The remainder of the manual including general description, operating instructions, maintenance instructions, equipment lists, suppliers and installing contractors shall be printed on heavy A4 paper and inserted into plastic sleeves and arranged with 2 pages (back to back) per sleeve.

##### **13.2.2.2 Digital Copies**

- “As built/as installed” drawings shall be provided in both AutoCAD 2014 format and PDF format.
- The remainder of the manual shall be provided in PDF format. Digital copies shall be provided on CD or memory stick in plastic folders inside the manual.

#### **13.2.3 Maintenance Manual Sections**

The manuals shall be segregated into the following sections;

- a) **Introduction & Scope** – general description of plant or equipment, including capacities, purpose and intended mode of operation;
- b) **Operation Instructions** - operating instructions, including method of starting and stopping plant, important data sheets and alternative modes of operation;
- c) **Operation Description** - description of control systems, schematic diagrams and detailed functional description, including lists of symbols used;
- d) **Maintenance** - maintenance instructions, including methods of carrying out the work, special precautions and recommended periodic attention;

- e) **Emergency Lighting and Exit Signage** – provision of all operation and maintenance requirements in accordance with Appendix G2, AS/NZS 2293.1-2018
- f) **Commissioning Settings** - Adjustment of and correct settings for all control and safety devices;
- g) **Commissioning Data** – final commissioning data pertinent to this installation.
- h) **Equipment Details** - a spare parts list showing part numbers and description of all items and where necessary "exploded" views shall be used to assist in identifying the component;
- i) **Warranty and Certificates** - descriptions of all warranties and (both contracted and procured through suppliers) for the assets and descriptions of any certificates issued as part of the works including uploaded copies of all relevant documents
- j) **Drawings and Reference** - all 'as-installed' drawings and equipment catalogues;

#### **13.2.4 Submission of Manuals**

All manuals shall be submitted no later than three months before the practical completion to enable a preliminary review of the manuals. It is understood that the manuals may not contain elements such as as-built drawings and certificates. However, the manuals can be prepared to indicate the respective proposed layouts.

Should the Principal and or the Authorised Person identify any errors or omissions in the submitted data then within the time period stated in any approved Commissioning and Handover Plan or the issued Defect Notice the Contractor is required to rectify any items and to pay all such costs that may be incurred to update the final data.

NOTE: 1 No. copy of Instruction Manual only shall be provided for engineer's review and approval prior to the completion and submission of all 3 No. manuals.

#### **13.2.5 As-Built Drawings**

The Contractor will be required to mark up all new installation and existing connection locations with dimensioned offsets from existing buildings and/or survey markers during the currency of the project. Prior to the handing over of the job, As-Built dimensioned drawings shall be properly drawn up by the Contractor free of any superfluous markings and handed to the Superintendent for review and approval.

The Contractor shall also mark and dimension on the 'as-built' drawings the exact position and depth of all services as actually laid in the ground where applicable. Services to be included shall be all those associated with the Contract and including any existing services crossovers and/or connection locations for all services including water, gas, drains, services pipework, electrical mains and conduits.

Ensure the content, accuracy and level of detail of as-built drawings are equivalent to those in the detail design drawings used for construction and are sufficient to describe and to ensure the efficient operation of the assets created under the Contract. Where required to describe the Works, include digital photographs of specific aspects of the Works in as-built drawings or operations and maintenance manuals. The drawings shall include as installed circuit and data point numbering.

All work as executed and as-built documentation must be in accord with the Specification. Verify each drawing certifying accuracy, completeness, correctness and compliance with CAD conventions.

The Superintendent will make available 'AutoCAD' existing survey drawing files to assist the contractor. However, it remains the Contractor's responsibility to verify all dimensions on site.

#### **13.2.6 Compliance with Laws, Standards and Specifications**

The Contractor shall check and verify that all data and attached files and documents that form the completed O&M Manuals comply with the relevant Laws, Standards, Codes and Specifications applicable to the works to enable the proper operation and maintenance by the Principal and or its appointed agents of the completed works.

#### **13.2.7 Preparation of Manuals**

The Operation and Maintenance Manual shall be prepared by an independent suitably qualified person experienced in preparation of Operation and Maintenance Manuals.

### **13.3        THERMAL IMAGING**

The Contractor shall have a thermal image of the switchboards carried out by an approved contractor with proper IR camera for this purpose. The thermal images and certification that the board meets acceptable temperature levels shall be included in the maintenance manuals.

This work shall be carried out within 1 month after hand-over and when the switchboard is operating at a relatively high load.



## **14**      **WARRANTY PERIOD**

The Contractor shall warrant the performance, condition and operation of the whole installation for a period of 12 months from the date of Practical Completion of the works.

The contractors shall include all manufacturer's warranties as part of the Maintenance Manual.

**15 MONETARY SUMS AND TENDER SCHEDULE**

**15.1 TENDER SCHEDULE**

**15.1.1 Section Costs Stage 1A**

	Authority charges associated with making power supply available.	\$.....
	Supply and installation of MSB and metering	\$.....
	Supply and installation of switchboards	\$.....
	Supply and installation of light fittings	\$.....
	Supply and installation of emergency and exit lights	\$.....
	Supply and installation of power outlets and direct connections	\$.....
	Supply and installation of security system	\$.....
	Supply and installation of access control system	\$.....
	Supply and installation of fire detection system	\$.....
	Supply and installation of telecommunication cabling	\$.....
	Supply and installation of conduits and pits	\$.....
	Supply and installation of lighting control system	\$.....
	Commissioning and Testing	\$.....
	Maintenance Manuals	\$.....
	As-built drawings	\$.....
	Defects Liability Maintenance	\$.....
	Additional outlets (power & data)	\$.....
	Total Tender Price Ex GST	\$.....

**15.1.2 Section Costs Stage 1B**

	Supply and installation of switchboards	\$.....
	Supply and installation of light fittings	\$.....
	Supply and installation of emergency and exit lights	\$.....
	Supply and installation of power outlets and direct connections	\$.....
	Supply and installation of security system	\$.....
	Supply and installation of access control system	\$.....
	Supply and installation of fire detection system	\$.....
	Supply and installation of telecommunication cabling	\$.....
	Supply and installation of conduits and pits	\$.....
	Supply and installation of lighting control system	\$.....
	Commissioning and Testing	\$.....
	Maintenance Manuals	\$.....
	As-built drawings	\$.....
	Defects Liability Maintenance	\$.....
	Additional outlets (power & data)	\$.....
	Total Tender Price Ex GST	\$.....

**15.1.3 Unit Rates for Additional Works**

	Double GPO	\$.....
	16ASP MCB (RCD type)	\$.....
	Light Fittings	\$ Supply and Install for each fitting
	Contractor to provide schedule of Light Fittings and costs. Has this been provided?	Yes / No
	Data Point (Double outlet)	\$.....
	Smoke detector (including Commissioning)	\$.....
	Thermal Detector (including Commissioning)	\$.....
	Thermal Detector Concealed (Commissioning & indicator)	\$.....
	Audible alarm speaker	\$.....
	Security Keypad	\$.....
	Proximity Reader	\$.....
	Single Door Control (two keypads, electric lock)	\$.....
	Double Door Control (two keypads, magnetic lock)	\$.....

**15.1.4 Electrical Contractor Details**

Electrical Contractors Company Name	.....
Electrical Contractors Registration Number	.....
Date	.....
Signature	.....