FIRE PROTECTION SERVICES SPECIFICATION

18 April 2023

Project Number 08599101

Revision A

WERRIBEE PARK
MAIN DRIVE, WERRIBEE SOUTH VICTORIA

PREPARED FOR

PARKS VICTORIA

DOCUMENT AUTHORISATION ISSUE

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1. CONDITIONS OF TENDERING

1.1 CONTRACT DETAILS

Contract Conditions:	TBC
Tender:	Fixed Lump Sum
GST:	Inclusive
Closing of Tenders:	Date – to be confirmed
Placement of Lodgement:	Project Manager: Will Petherbridge will@sensum.com.au

1.2 INSPECTION OF 3.4SITE

a. The Tenderers shall be deemed to be fully informed (as far as practical) of the physical conditions upon the site and to have obtained all necessary information as to the risks, contingencies and their circumstance, which could have an effect on the cost and execution of work. Ignorance of the existing conditions or extent of the works will not be accepted as justification for subsequent variation to the accepted price.

b. Access to the site can be arranged by contacting Will Petherbridge on Tel: 0417 714 200. Access to the site without prior arrangement is not permitted.

1.3 VALIDITY PERIOD

a. Unless withdrawn, tenders shall remain valid for a period of 60 days from the expiration of the tender closing date.

1.4 DOCUMENTS TO BE LODGED

a. Tenderers are to supply with their quotation a project delivery time indicating earliest start times and proposed duration and sequence of works in accordance with the contract terms and conditions to minimise disruption to the site.

b. Tenderers are to provide a cost breakdown as per the 'Tender Forms' included as part of this document.

c. Tenders to be submitted in a plain envelope clearly marked with Tender Reference/Project Number and Tender Closing Date. The envelope shall contain the following:

   i. Any documentation directly relating to the tender price.

   ii. Schedule of deviations where the tenderer is unable to comply with the specification.

   iii. Schedule of alternatives offered.

   iv. Schedule of addenda received and allowed for: name each addendum.

   v. Completed tender forms of Price Breakup, technical data and unit rates.

   vi. Copy of license(s) where license(s) are required for the works being carried out.

   vii. Copy of Public Liability Insurance Certificate of Currency ($20,000,000).

   viii. Copy of Professional Indemnity Insurance Certificate of Currency ($5,000,000).

   ix. Copy of Workers Insurance Certificate of Currency (as applicable).

1.5 PROGRAM

a. The construction program will be a 20 week duration.

1.6 ALTERNATIVES

a. A detailed statement or schedule of deviations where the tenderer cannot completely match the requirements of the specification must be completed. These should only be minor in nature and must not affect the quality, performance, capacity, operating costs or maintainability of the installation.

b. All alternatives must be separately costed.

c. Offer alternatives only if providing advantages of system, equipment or price over and above the specified item.

d. Any alternatives offered must be reviewed by the Consulting Engineer and any costs is assessing those alternatives shall be paid to the Consulting Engineer by the Trade Contractor.

1.7 DISCREPANCIES

a. If any discrepancy, contradiction or omission appear in the Specification, the tenderer shall refer same to the Engineer for resolution before submitting a tender. The engineer will issue a directive on such matters in writing.

1.8 NOMINATED SUB-CONTRACTORS

a. The following specialist suppliers and firms have been nominated for aspects of the works as follows:

- Civil/Structural TBC – Sensum to confirm

1.9 TENDER EVALUATION

The Principal or his agents will not be obligated to accept the lowest or any tender. The Principal may conduct post-tender negotiations with one or more tenderers for the purposes of undertaking the Contract. In determining the best value for money, the Principal will consider and evaluate (in addition to the tender amount) the following aspects:

a. Past performance and relevant experience.

b. Quality Assurance and project resources.

c. Current workload.

d. Task Appreciation and Methodology.

e. Personnel.

Any tender which does not comply with the requirements of the Contract Tender Documentation may be considered informal and may be rejected without further analysis. However, the Principal reserves the right to waive any informalities in the tenders received.

1.10 CANVASSING

The tender of any Trade Contractor who seeks to canvass or who contacts the Principal or any other party, except for technical or contractual clarification, in relation to this tender at any time will not be considered and automatically excluded from the tender evaluation.

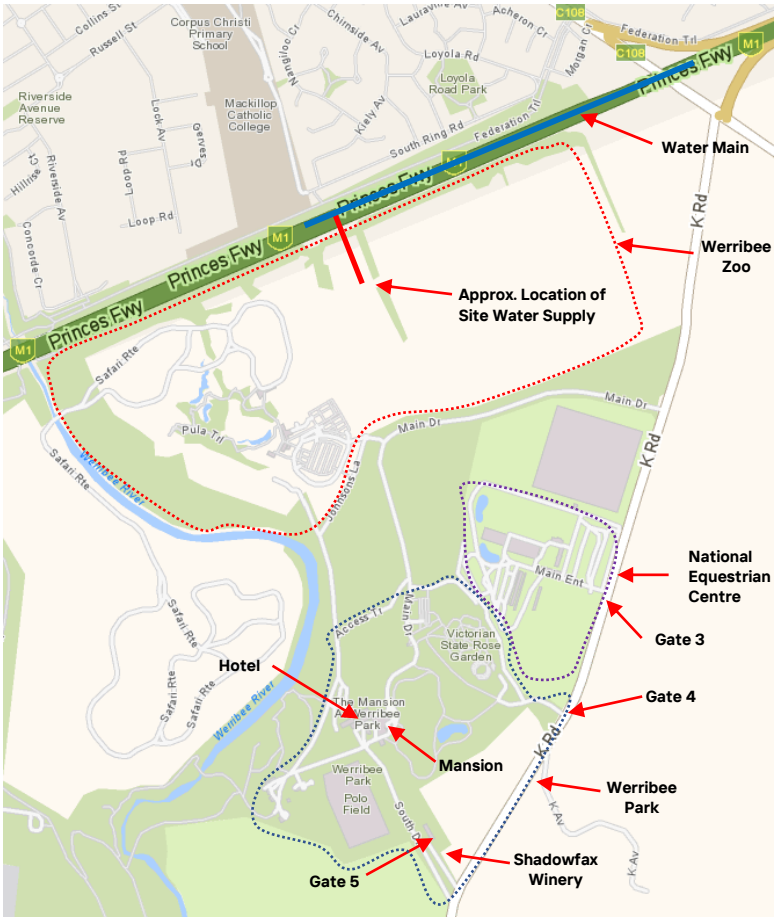
2. PROJECT DESCRIPTION AND EXTENT OF WORKS

2.1 PROJECT DESCRIPTION

The project involves replacing the existing site fire hydrant and hose reel system to Werribee Park, Main Drive, Werribee South Victoria.

The site consists of the following:

- The Mansion and Laundry (Heritage Listed)
- A Hotel
- Shadowfax Winery.



2.2 EXISTING FIRE HYDRANT SYSTEM

The water supply to Werribee Park extends from a town's water main near the Princess Freeway through the Werribee Zoo to the northern end of Werribee Park.

A combined domestic and fire water main loops around the Werribee Park site and extends to the sealed car park located at the northern end of the site (near the southern end of the Werribee Zoo). Existing in-ground fire plugs are located around the Mansion and Hotel.

The Hotel includes a fire sprinkler system c/w its own booster arrangement, which is also served from the site combined domestic and fire system.

Existing Fire Brigade booster and suction assemblies are located:

- Near the Gardener's Sheds and appears to serve the existing fire hydrant system
- To the southern end of the Mansion and Hotel and appears to serve the existing fire sprinkler system, and a single dual outlet hydrant.

2.3 PROJECT STAKEHOLDERS

Architect:	Lovell Chen
Authority:	Authority having jurisdiction over the project as required by relevant legislation/Building Act
Building Surveyors:	Philip Chun
Client/Principal:	Parks Victoria
Fire Consultant	Omnii Pty Ltd [Omnii]
Fire Safety Engineer:	Omnii
Trade Contractor:	The specialist fire services Trade Contractor appointed to carry out the works covered in this specification and drawings
The Works:	The trade contract works as described in Section 3.4 and throughout this document

2.4 DEFINITIONS

AFFL:	Above finished floor level
AHJ:	Authority having jurisdiction as defined under the relevant legislation
BCA:	Building Code of Australia
BMS:	Building Management System
Building Manager:	Person(s) responsible for the ongoing occupation of the building
DLP:	Defects Liability Period
DtS:	Deemed to Satisfy (eg. complies with the BCA and referenced standards)
EWCIE:	Emergency Warning Control and Indicating Equipment
FBP:	Fire Brigade Panel
FDCIE:	Fire Detection Control and Indicating Equipment
FFCP:	Fire Fan Control Panel
FM:	Factory Mutual®
FSCV:	Fire Sprinkler Control Valve
MSSB:	Mechanical Services Switchboard

N/C:	Normally closed
N/O:	Normally open
NCC:	National Construction Code
PC:	Prime Cost
Performance Solution:	Building solution which complies with the Performance Requirements other than by reason of satisfying the Deemed to Satisfy provisions
PS:	Provisional Sum
UL:	Underwriter Laboratories®
WHS:	Workplace Health and Safety.

2.5 SCHEDULE OF SPECIFICATION DRAWINGS

The following drawings shall be read in conjunction with this Specification:

DRAWING NUMBER	TITLE
08599101-F-00-00	Cover Page
08599101-F-SP-00	Site Plan
08599101-F-SP-01	Site - Part Plan
08599101-F-SP-02	Site - Part Plan
08599101-F-0G-02	Basement Level & Ground Level
08599101-F-0G-02	Level 01 & Level 02
08599101-F-0D-01	Detail Sheet
08599101-F-0D-02	Detail Sheet

The following sketches are provided for information only:

SKETCH NUMBER	TITLE
08599101-SKF-SP-00	Existing Fire Hydrant and FHR System – Site Plan
08599101-SKF-FH-11	Proposed New Fire Hydrant System - Basement & Ground Level Coverages
08599101-SKF-FH-12	Proposed New Fire Hydrant System - Level 01 & Level 02 Coverages
08599101-SKF-FHR-11	Proposed New Fire Hose Reel System - Basement & Ground Level Coverages
08599101-SKF-FHR-12	Proposed New Fire Hose Reel System - Level 01 & Level 02 Coverages

2.6 SCOPE OF WORKS

2.7 EXTENT OF WORKS

a. The extent of works comprises the fire protection services and associated works, including, but not limited to:

   i. Payment of all fees applicable to works.

ii. Preparation and submission of detailed workshop drawings.

iii. Alteration to existing Fire Sprinkler system, as required.

iv. Provision of new Fire Hydrant system, including pumps, tanks, etc., as required.

v. Alteration to existing Fire Hose Reel system, as required.

vi. Alteration to existing Fire Detection and Alarm System.

vii. Provision of new Portable Fire Fighting Equipment (eg. fire extinguishers, fire blankets, etc.).

viii. Provision of fire pump enclosure.

ix. Removal of existing redundant fire protection services equipment.

x. Provision of electrical works associated with the installation of the fire protection services.

xi. All co-ordination between the fire protection services and the existing building services and the building structure.

xii. Seismic restraint of all equipment.

xiii. Provision all penetrations and sealing of penetrations.

xiv. Provision all cutting of holes in walls and ceilings for installation of services.

xv. Testing and commissioning of the fire protection services, including the preparation of a detailed program of the same.

xvi. All isolations of the fire protection services to facilitate construction works.

xvii. Preparation and submission of all Baseline Data, including, but not limited to Technical Data, Manuals, As-built drawings, etc.

xviii. Defects warranty/liability for a period of 12 months from date of practical completion.

xix. Training staff in the operation of all systems.

xx. Maintenance for a period of 12 months from date of practical completion.

xxi. Temporary fire protection during construction.

2.8 DESCRIPTION OF WORK

2.8.1 Demolition

a. Demolition and removal of redundant equipment for the following:

i. Fire Sprinkler system.

ii. Fire Hydrant system.

iii. Fire Hose Reel system.

2.8.2 Fire Sprinkler System

The fire sprinkler system is existing and only serves the Hotel.

a. Allow to connect new water supply and booster arrangement to the existing fire sprinkler system infrastructure comprising pipework and valves.

2.8.3 Fire Hydrant System

a. Fire hydrant system throughout the site comprising ring main, distribution pipework, valve-operated outlets to suit the Fire Authority requirements and monitored isolation valves.

b. All Baseline data, as outlined in AS 2419.1 Section 11.

c. Fire hydrant pump sets, including:

i. Pre-assembled enclosure with access openings ventilation in accordance with AS 2419 and AS 941.

ii. Two Compression-ignition Fire Sprinkler pump sets (Primary/Standby).

iii. One Automatic Jockey Pump (Located adjacent the Fire Hydrant pump suction manifold).

iv. All ancillary equipment including but not limited to pipework, monitored isolation valves, check valves, flexible connections, pressure gauges, pressure relief valves, drain pipes, exhaust pipework, controls, fuel and anti-vibration mounts.

v. Associated wiring, controls, relays and interface devices.

vi. Pump flow testing facility, with discharge water piped to on-site Fire Hydrant tank.

d. Two 50 %-capacity Fire hydrant tanks, including:

i. Tank connection flanges, overflow and drain, maintenance access covers, external and internal ladders and external level indicator.

ii. Automatic infill valve arrangement, including, full size automatic flow control valve with pilot line, automatic make-up ball float valve arrangement, and all ancillary equipment, trim, etc., required to form a fully functioning system.

iii. Automatic make-up ball float valves arrangement and manual quick-fill arrangement, incorporating pipework, valves and fittings.

e. One Fire Hydrant and Sprinkler Booster assemblies, each including:

i. Four Booster Inlets – Fire Hydrant System.

ii. Four Booster Inlets – Fire Sprinkler System.

iii. One Large Bore Tank Suction Outlet.

iv. Weather-resistant metal enclosure.

v. Block plans and signage.

f. Thrust blocks and anchors for below-ground pipework, as required by pipework manufacturer recommendations.

2.8.4 Fire Hose Reel System

a. Fire hose reels, including associated pipework, fittings, and valves.

b. Water supply pipework connected to Fire Hydrant system.

2.8.5 Fire Detection and Alarm System

a. Upgrade of existing Fire Detection Control and Indicating Equipment (FDCIE) as follows:

i. Interface connection of field devices via input/output devices for monitoring of all alarm initiating devices, pressure switches, flow switches, monitored valves, pump status.

b. Interface and monitoring of Fire Pumps, including:

i. Two Combined Fire Hydrant and Sprinkler Pumps.

c. Cabling, conduits (above and in ground), cable tray and fixings as required to complete the installation.

d. Zone Block Plan.

e. All Baseline Data as required by AS 1670.1 Section 1.7.2.

2.8.6 Portable Fire Fighting Equipment

Portable fire extinguishers and Blankets in accordance with NCC, Omnii Fire Engineering Report and AS 2444.

2.8.7 Packaged Skid Fire Pump Enclosure

a. Whirly bird.

b. Ventilation louvre with anti-vermin mesh.

c. External bell and strobe.

d. Internal lighting and strip heater.

e. Wired distribution board with external junction box DB.

f. Full equipped and piped fire pump with enclosure.

g. Sealing of penetrations.

h. Signage and warning stickers.

i. 003 lockable swing doors.

j. Full AS 2941-2013 compliance.

k. Drainage.

l. Slab.

m. Galvanised base.

2.8.8 Electrical Work

a. Power supply to fire pumps.

b. General, Task and Emergency lighting to the Fire Pump Enclosure.

2.9 WORKS BY OTHER TRADES

The following works associated with the fire protection services installation shall be carried out by other Trades.

ITEM/DESCRIPTION	LOCATION	SPECIFICATION
BUILDING TRADES		
Concrete plinths for: ‣ 1x Fire Pump Enclosure ‣ 1x Fire Pumps ‣ 1x Fire Brigade Boosters	As nominated on the accompanying drawings.	Plinths shall be 150 mm high and sized to extend 150 mm past the equipment to be mounted upon them. Final plinth setout to be confirmed by Fire Contractor following equipment selection.
Labelling/Signage for: ‣ Fire Pump Room ‣ Fire Brigade Boosters ‣ Fire Hydrant cupboards ‣ Fire Hose Reel cupboards	As nominated on the accompanying drawings.	Provide approved wording of minimum 50 mm high lettering in a contrasting colour to the background finish.
Labelling/Signage for: ‣ Fire Extinguisher cupboards	As nominated above.	Minimum 50 mm high lettering. Contrasting colour to the background finish.
Provision of all major penetrations (i.e. ø65 mm and greater)	To be confirmed by Fire Protection Sub-contractor.	–
Bollards for vehicle protection of fire protection equipment	As nominated on the accompanying drawings.	Bollards shall be non-removable flanged and bolted, or cast-in, to the concrete hardstand. Provide complete with yellow powder-coated finish and reflective tape.
ELECTRICAL SERVICES		

ITEM/DESCRIPTION	LOCATION	SPECIFICATION
Power: Automatic Jockey Pump	Adjacent the sprinkler control valve assembly – refer accompanying drawings.	1 off: 240V AC | Single phase | 15-amp Hard-wired to Control Panel integrated Isolator Switch. Electrical Safety Service: No Supply may be provided by general purpose power circuit, and cabling does not need to be fire rated.
Power: Fire Hydrant Pump (Diesel)	Within the Fire Pump Enclosure – refer accompanying drawings.	2 off: 240V AC | Single phase | 15-amp Hard-wired to Control Panel from DB in pumphouse, fed from live side of main switch. Electrical Safety Service: Yes Provide dedicated circuit from an MSB or DB.
Power: Additional GPOs for: Fire Pump Enclosure	Within the Fire Pump Room – refer accompanying drawings.	1 off dual weatherproof GPO in each location provided by electrical trade contractor.
Lighting: General, Task and Emergency Lighting for: Fire Pump Room	As nominated on the accompanying drawings.	Emergency lighting to comply with AS 2293.1 requirements. Task lighting achieving minimum 400 lux at the Plan Reading
CIVIL WORKS		
Site Works: Fire water storage tank/pumphouse base, incl. site preparations and foundations as required. ‣ Soil test report ‣ In-ground survey ‣ Design and certification of tank foundations and ‣ Structural computations. ‣ Site preparation ‣ Preparation of tank foundations ‣ Concrete ring beam, steel reinforcement and slab to AS 2304. ‣ Tank bases/foundation inspection prior to installation. reinforcing and the pouring of concrete in accordance with AS 3600.		To suit 2 off ø7.0 m x 6.0 m (H) (nominal effective capacity 160kL) water storage tank. Packaged contained pump skid plinth 2.6 m x 4.8 m (approx.)
Site works ‣ repair garden beds ‣ lawn and path repair ‣ trenching and backfill ‣ surface cutting ‣ penetrations		

ITEM/DESCRIPTION	LOCATION	SPECIFICATION
Site works ‣ Repair garden beds ‣ Lawn repair ‣ Path repair ‣ Trenching and backfill ‣ Surface cutting, make good ‣ Penetrations	Various locations	
Drainage: Fire water storage tank drain	Directly adjacent the fire water storage tank.	1 off: 600 mm square pit with galvanised steel grate, minimum ø225 drain.
Drainage: Fire Pump Room	Within the Fire Pump Room	Provide general drainage for the fire pump room, and: 1 off: 450 mm square pit with galvanised steel grate adjacent the Sprinkler Control Valve assembly.

3. GENERAL REQUIREMENTS

3.1 SPECIFICATION AND DRAWINGS

a. The location of equipment as shown on the Specification drawings are approximate only, final equipment and service locations shall be determined through liaison with the Principal and other relevant Trade Contractors on site.

3.2 STANDARDS AND REGULATIONS

a. All works shall be carried out in accordance with the following Codes and Authorities requirements:

REFERENCE DOCUMENTS
State Legislation
Victorian Building Act 1993
Victorian Building Regulations 2018
Victorian Occupational Health and Safety Act 2004
Victorian Occupational Health and Safety Regulations 2017
Victorian Dangerous Goods Act 1985
Building Codes
National Construction Code, Building Code of Australia (BCA), Volume 1, 2019 Amendment 1
Australian Standards
AS 1670.1: 2018 – Fire detection, warning, control and intercom systems
AS 1851: 2012 – Routine services of fire protection systems and equipment
AS 2118.1: 2017 (Amendment 1) – Automatic fire sprinkler systems – General systems
AS 2304: 2019 – Water storage tanks for fire protection system
AS 2419.1: 2005 – Fire hydrant installations – System design, installation and commissioning
AS 2444:2001 – Portable fire extinguishers and fire blankets – Selection and location
AS 2941: 2013 – Fixed fire protection installations – Pumpset systems
AS/NZS 3000: 2018 – Electrical installations
AS/NZS 3500.1:2018 – Plumbing and drainage – Water services
AS/CA S009: 2020 – Installation requirements for customer cabling
Other
Omnii Fire Engineering Report: 8143102 FER Note: Confirm current revision prior to preparation of the shop drawings.

b. Unless nominated otherwise, the latest version current at the date of building approval of the above shall be applicable.

c. Where Australian Standards and Codes do not exist, the most appropriate FM Global Data Sheets, or NFPA codes shall apply, subject to approval by the Authority Having Jurisdiction.

d. Where this Specification expressly requires standards higher than or different from those applicable under the relevant Standard or Code documents, this Specification shall be followed.

e. Advise all subsequent amendments to the NCC, AS and other applicable codes as they come into force during the work and seek a direction regarding compliance for this project.

3.3 CO-ORDINATION OF INSTALLATION

a. Allow to follow the design intent of the drawings in planning and carrying out the work and shall cross check with other trades in order to verify the line, level, space and sequence in which the work is to be installed.

3.4 PROGRAM OF WORKS

a. Allow to submit a detailed program of works showing the intended method, stages and order of proceeding with the works in co-ordination with the building construction program, together with the period of time estimated for each and every stage of work. The program shall include at least the following:

   i. Dates of order of equipment and materials.

   ii. Dates of submission of installation shop drawings.

   iii. Dates of delivery of equipment and materials to site.

   iv. Dates of commencement and completion of every stage of works in line with the building construction programme, i.e., each floor level and/or zone area.

   v. Dates of expected completion of builder's work requirements, eg. water tank, pump room, control valve room, etc., as applicable.

   vi. Dates of requirement of temporary and permanent connections, eg. water supply etc., as applicable.

   vii. Dates of completion, commissioning and testing.

   viii. Dates of submission and inspection by relevant Authorities, if any.

b. Programs shall be regularly updated to reflect the actual progress and to meet the obligations under the Contract.

3.5 PENETRATIONS

a. Allow for the provision of all penetrations, both vertically and horizontally, associated with these works including sealing of penetrations. Sealing of penetrations through fire rated elements shall be by approved and tested fire stopping methods to the required Fire Resistance Level (FRL). Fire stopping method and materials shall comply with NCC BCA Specification C3.15.

b. Penetrations passing through non fire rated walls or partitions shall be protected by sleeves and flush mounted cover plates and shall maintain any acoustic rating.

c. All sealing of fire rated penetrations to be carried out by an appropriately licensed contractor.

d. Provide a register of all fire-sealed penetrations with drawings identifying locations of each penetration.

3.6 PROTECTION

a. Provide arrangements for the safe custody of all materials and the equipment to be stored or installed onsite until finally inspected, tested and accepted.

b. Protect all work against damage or inclement weather and carefully store in a safe manor and secure all material and equipment received onsite that are not yet installed.

c. Protect all finished building surfaces with protective covering (drop sheets etc.) in the areas of immediate works.

d. Install protective covers over smoke detectors during the works. Covers are to be removed after the work area has been made dust-free at the end of each shift.

3.7 PERSONNEL SUPERVISION

a. Maintain on site full time during the performance of the contract works, a competent supervisor to accept responsibility for co-ordination and co-operation with other contractors and setting out the works.

b. Use only personnel who have been properly trained and are competent in the respective trades covered by these works and holds license(s) required by the regulatory Authorities.

3.8 WORKING HOURS

a. The work under the contract shall be executed within the following working hours:

   i. Monday to Friday: 7:30am to 5:00pm.

   ii. Shall not be performed without prior arrangement with the Building Manager, Tenant and Principal.

3.9 SPECIAL CIRCUMSTANCES

a. All works being performed in an existing building that is currently occupied must ensure that the fire protection services remain operational for the duration of works.

   i. All measures reasonably possible are taken to ensure that existing services are not affected in any way during works.

   ii. Liaise with Building Manager and existing Tenant/s.

b. No area shall remain unprotected without prior approval of the Principal and AHJ.

3.10 ISOLATION OF SERVICES

a. The Building Manager and Superintendent shall be notified 48 hours prior to any area being isolated.

b. The fire protection services shall remain operational at all times. If an area must be isolated to carry out works the minimum area possible shall be isolated and the protection to the remainder of the building must remain operational.

c. The Building Manager and Superintendent shall be notified of all works that could affect the operation of fire protection services.

d. The fire protection services must be operational after working hours each day.

e. Carry out the works in a manner to avoid false (unwanted) alarms and perform all isolations in accordance with the building representative's requirements. Areas outside the construction zone, where possible, shall be operational at all times.

3.11 MAINTAINING FIRE SERVICES PROTECTION TO THE BUILDING

a. The fire protection services shall remain operational at all times. If any area must be isolated to carry out the works the minimum area possible shall be isolated and the protection for the remainder of the building must remain operational.

b. The Superintendent must be notified of all areas to be isolated.

c. In buildings under construction, maintain fire precautions to BCA Section E1.9 requirements by way of permanent or temporary services.

d. Where a new Fire Indicator Panel and/or Emergency Control Panel are to be installed, the panel(s) shall be set up in temporary position next to the existing equipment and the circuits gradually transferred to the new panels. Once this is complete the existing panels can be removed and the new panels installed in its place.

3.12 HYDRAULIC DESIGN

a. Allow to prepare piping pressure loss calculations to demonstrate the final selection of pipe sizes. Calculations shall be computer graphically presented in conjunction with the available water supplies.

b. Upon undertaking the modelling, a copy of the input data and results shall be provided together with drawings indicating all design points and nodes, design area and isometric schemes.

c. Submit all calculations, associated drawings, and selected pump curves to the Superintendent for review prior to fabrication and ordering of equipment.

3.13 SAMPLES AND TECHNICAL DATA

a. Prior to the commencement of installation work, submit to the Superintendent for approval in good time so as not to cause delay in the construction program, samples of all equipment proposed to be used for the Contract.

b. Only samples deemed to comply with the Specification shall be submitted.

c. All equipment used shall include relevant approvals complying with BCA A2.2, Fire Brigade and any other Authority having jurisdiction.

d. Submit the following samples as a minimum:

   i. All types of fire sprinklers, including escutcheon plates, guards, etc.

   ii. All types of fire detectors and fire detection ancillaries.

e. The approved samples shall be retained on site or other nominated location approved by the Superintendent for reference until practical completion.

f. Do not use or install approved samples contrary to manufacturer's recommendations or their listed application.

g. Equipment supplier technical data scheduling may be provided where is not practical to provide a sample, only where deemed appropriate by the Superintendent.

3.14 SHOP DRAWINGS

a. Shop drawings, including manufacturer's shop drawings, shall be prepared and submitted to the Superintendent as a complete package in sequence with the construction program. The package shall contain scaled plan layouts, sectional drawings (elevations and plans), schematic wiring and line diagrams, installation details, etc., and shall show the following particulars:

   i. Service routings and levels relative to the structure and other services.

   ii. Legend of symbols.

   iii. Plant and equipment locations with dimensions.

   iv. Service joints, supports and fixing details together with their locations.

   v. Location and type of interfacing with other Trade Services.

   vi. Penetrations.

   vii. Hydraulic calculations where relevant.

   viii. No work shall proceed on or off the site unless these installation shop drawings have been approved in writing by the Superintendent.

b. Checking of approval of shop drawings is intended to assist with the co-ordination procedures and does not, in any way, relieve the installer of his responsibilities to provide a complete and conforming installation. The Superintendent and their authorised representative accepts no responsibility for errors or omissions which exist in the approved drawings where such errors or omissions are discovered later they shall be corrected irrespective of any approval given by the Consultant.

c. Keep on site a set of updated approved shop drawings available for inspection by the Superintendent or their representative at all times. The shop drawings shall be marked up with any modifications made during installation and commissioning and testing and utilised to produce 'as-installed' documentation.

3.15 EXISTING SERVICES ACCURACY

a. Omnii accepts no responsibility for the accuracy of the existing building set out and the services contained therein.

b. Verify all aspects of the existing building set out and services installation on site prior to any disconnection, removal of equipment, fabrication or construction.

3.16 SEISMIC RESTRAINTS

a. Seismic Restraints shall comply with AS 1170.4

3.17 MATERIALS, EQUIPMENT AND WORKMANSHIP

a. Work carried out shall be consistent with good industry practice.

b. The installation shall be in compliance with the statutory requirements in respect of labour safety, fire safety, structural safety, electrical safety and environmental protection.

c. All equipment installed under this Specification shall be neatly and accurately aligned to the complete satisfaction of the Superintendent. Equipment deemed by the Superintendent to be misaligned, poor quality or unacceptable standard shall be removed and reinstalled to the satisfaction of the Superintendent, including all costs.

d. Manufacturing uniformity of each individual fitting and accessory shall be uniformly maintained throughout the installation.

e. All materials, devices, fittings and ancillaries shall be new, of current model and comply with the relevant Australian Standards.

f. All materials, equipment, components and devices will be new and unused, of current manufacture and first quality unless indicated otherwise herein or on the drawings.

g. Manufacturer's recommendations will be adhered to with regard to both workmanship and associated materials, equipment, components and devices, whether or not a particular manufacturer has been specified.

h. All materials and equipment offered and accepted for installation will operate satisfactorily within the standards guaranteed by the manufacturers.

3.18 EQUIPMENT AND APPROVALS

a. All equipment installed shall be the products of reputable manufacturers and equipment shall be field proven in the environmental to be experienced in this project.

b. All equipment shall be installed in locations with due consideration given to future access requirements.

c. When a particular manufacturer has been adopted for fittings or equipment, all such fittings and their components shall be uniform throughout the Project.

d. All equipment used shall include all relevant approvals such as ActivFire, FM Global Approval, UL Listing, Fire Brigade and any other Authority having jurisdiction.

e. Documentation supporting the above approvals shall be submitted to the Superintendent with any samples and at any time on request.

3.19 FINISHES

3.19.1 General

a. All equipment shall be painted or provided with a protective finish suitable to its function to the satisfaction of the Principal.

b. Adopt project colour schemes subject to approval by the Principal and the Architect for all equipment and pipework where exposed to view.

c. Select coatings and finishes appropriate to the environmental conditions to which the equipment is exposed.

d. Protect all items of work during dispatch and whilst on site during progress of installation.

e. Use lead free materials.

3.19.2 Preparation of Surfaces

a. Clean all surfaces and make free from corrosion.

b. Prime/undercoat all metal surfaces. Etch prime galvanised or non-ferrous surfaces prior to application of secondary/top coating.

c. Treat concrete surfaces with suitable sealer.

3.20 SIGNAGE AND LABELLING

3.20.1 General

a. Lettering height for labels shall be minimum 5 mm, except that Switchboard labelling shall be minimum 6 mm.

b. All signage and labelling shall be located in an easily visible location. Equipment/device labels shall be located such that they are easily visible to any operator of that equipment or device.

c. Label all operating equipment, instruments, indicators, gauges, switches and valves.

3.20.2 Fixing and Mounting

a. Signage and labels shall be mechanically fixed using one of the following suitable methods as appropriate:

   i. Screwed or rivetted to a permanent part of the adjacent structure (eg. wall, cabinet or enclosure).

   ii. Chain or ring onto a valve handwheel or spindle.

   iii. Use of glue or silicone adhesives to fix signage will not be accepted.

3.20.3 Material and Manufacture

a. Labels shall generally be waterproof, UV stabilised and manufactured as nominated below.

Table 3.1 – Signage and Labelling Schedule

LOCATION	MATERIAL/S	DETAILING METHOD
Internal	Traffolyte Aluminium/Composite Stainless Steel	Engraved
	Aluminium/Composite Stainless Steel	Screen-printed
External	Aluminium/Composite Stainless Steel	Engraved
	Aluminium/Composite Stainless Steel	Screen-printed

3.21 FIRE PRECAUTIONS DURING CONSTRUCTION

a. During construction provide temporary fire protection services:

   i. To NCC requirements.

   ii. To Authority requirements.

3.22 WARRANTIES

a. Warranties shall extend for a period of 12 months unless noted otherwise.

b. All equipment and workmanship to be provided with a warranty.

c. Seek direction from the Superintendent as to the person to be named as Warrantee and include same. Register equipment with manufacturers as necessary. Retain copies delivered with components and equipment.

d. Commence warranty periods at practical completion or at acceptance of installation if acceptance is not concurrent with practical completion and submit a copy to the Superintendent.

3.23 PRACTICAL COMPLETION

a. At the point of practical completion of the work, give notice in writing to the Superintendent to arrange inspection ready for acceptance.

b. The following items constitute practical completion:

   i. Successful completion of functional and performance tests.

   ii. Successful completion of testing and commissioning.

   iii. All plant and equipment operating under normal conditions.

   iv. Submission of approved Operation and Maintenance manuals and As-Installed drawings.

   v. Certification of installation is submitted to the Approval Authorities.

3.24 REGISTRATION AND LICENSING

a. All design works shall be performed by an appropriately licenced engineer or designer, to the Building Surveyor's satisfaction:

   i. Victorian Consumer Affairs, Registered Professional Engineer (as relevant to the systems included).

b. All installation works shall be certified by an independent recognised testing contractor, including:

   i. AFSPAB, FPAA FPAS, or other accrediting body.

4. FIRE DETECTION AND ALARM SYSTEM

4.1 DESIGN CONDITIONS

a. Comply with the following:

   i. BCA Specification E2.2a Clause 6.

   ii. AS 1670.1.

4.2 FDCIE – EXISTING

a. The FDCIE is an existing Ampac.

b. Upgrade the existing panel as necessary to suit changes to the fire detection and alarm system.

4.3 FIELD DEVICES

a. All field devices shall be designed and installed in locations with a view to minimise the detrimental effects of moisture, dust, insects and other foreign materials.

b. Be installed in accordance with manufacturer's recommendations.

c. Addressable interface devices to allow supervised inputs/outputs for monitoring and operation of:

   i. Pressure switches.

   ii. Monitored valves.

   iii. Flow switches.

d. Normally energised type designed to 'fail-safe'.

e. Wiring between addressable devices and equipment such as pressure switches etc. shall be monitored for an open circuit.

4.4 VISUAL ALARM DEVICE (VAD) – EXTERNAL

a. Provide and install a red strobe light within 10 m of the designated building entry point connected to the FDCIE.

b. Location of warning light shall identify the location of the FDCIE.

c. Comply with all requirements of AS 1670.1 Clause 3.8 and AS 7240.23.

d. Provide lettering of not less than 50 mm, marked 'FIRE', on or adjacent to the strobe.

4.5 SHORT CIRCUIT ISOLATORS

a. All short circuit isolators shall be installed to protect the addressable loop against wire-to-wire short circuits.

b. In their normal state they shall pass data as required for normal system operation. In the event of a short circuit, the loop shall be disconnected between isolators.

c. Automatically reset when the wiring short circuit has been repaired.

4.6 SUPERVISED CONTROL CIRCUITS

a. Red sheathed or engraved sheath identification as to purpose.

b. Monitors via equipment for open circuit and closed circuit, i.e. addressable.

c. Can integrate both fail safe and non-fail safe functions in one multi-core cable with fire resistant rating to AS 3013 as for non-fail safe control circuits.

d. Relevant devices:

   i. Valve security.

   ii. Detection system loop monitoring.

4.7 FAIL SAFE CONTROL/ALARM CIRCUITS

a. Red sheathed.

b. Use voltage free normally open (de-energised state) contacts with normally energised relays. On alarm, relay de-energises and contacts open.

c. Relevant devices:

   i. Smoke detectors (excluding detectors forming part of fire mode operation).

4.8 NON FAIL SAFE CONTROL CIRCUITS

a. Non fail-safe control circuits shall be provided with fire rated cabling to AS 3013.

b. Use voltage free normally open (de-energised state) contacts with normally de-energised relays. On alarm, relay energises and contacts close.

c. Provides alarm/control to AS 1670.1, AS 1668.1.

d. Devices that can be connected to non-fail safe control circuit:

   i. Designated Building Entry VAD.

   ii. Fire Pump remote controls.

   iii. Pressure switches connection to FDCIE.

   iv. FDCIE to Security system and/or Access control system.

4.9 ELECTRICAL

a. Comply with AS 1670.1.

b. Comply with 'Electrical Systems' of this specification.

c. Utilise fire resistant cabling where passing through any evacuation zone, enroute to each final evacuation zone circuit destination.

d. Utilise non fire resistant cabling only where contained within the evacuation zone of the final circuit destination.

5. ELECTRICAL SYSTEMS

5.1 GENERAL REQUIREMENTS

a. Provide electrical services associated with power, control and alarm systems for fire services installations.

b. Comply with AS/ACIF S009, AS 1670.1, AS 3000 and AS 3013 as applicable for installation.

c. Comply with Australian Standards associated with cabling manufacture appropriate to the service.

d. Comply with requirements of AS 1170.4 (earthquake) where specified for cable installation and support systems.

e. Deliver on site, where possible, in sealed unopened coils or drums with makers' seals and labels intact.

f. Select cables with full consistent colour code and of appropriate grade for the service.

g. Use cabling as detailed on the drawings.

h. Provide a complete cable support system comprising trays/conduit/ducting including brackets, fixings and accessories.

i. Fabricate brackets, racks and hangers using structural steel sections or other materials in sections of equivalent strength.

j. Ensure a rigid support system for trays/conduit/ducting.

k. Provide metallic conduit installations within all plantrooms where located below 2 m above floor level.

l. Support and secure wiring in vertical runs at intervals of not more than 1 m or in accordance with manufacturer's recommendations.

m. Support and secure wiring in horizontal runs at intervals of 1.5 m or in accordance with manufacturer's recommendations.

n. Not use explosive fixings.

o. Run cables in a manner eliminating any possibility of strain on the cable.

p. Use dedicated penetrations for wiring run through building elements.

q. Test all cables after installation.

6. FIRE HYDRANT SYSTEM

6.1 DESIGN CONDITIONS

a. Comply with the following standards:

   i. AS 2419.1.

   ii. All secondary Australian Standards referenced therein, as applicable.

b. Comply with the project fire engineering.

6.2 DESIGN CRITERIA

The design criteria listed in the table below shall be applied to the system. Where a design criteria is not specified for a certain area, a suitable design for that application shall be applied.

Table 6.1 – Hydrant System Design Criteria

CRITERIA	VALUE	HYDRANTS IN OPERATION
Minimum pressure (unassisted)	350kPa	2
Minimum pressure (fixed on site pump)	700kPa	
Minimum flow (unassisted)	10 L/s per hydrant	
Minimum flow (Boosted)	10L/s per hydrant	
Minimum flow (fixed on site pump)	5L/s per hydrant	
Maximum pressure	1300kPa	

6.3 WATER SUPPLY

The fire hydrant system water supply shall comply with the requirements nominated below.

Table 6.2 – Hydrant Water Supply

COMPLIANCE	SUPPLY	SOURCE	NOMINAL DUTY POINT
AS 2419.1-2005	Single	Two 100 % Pumps Two 50 % Tanks	20 l/sec @ 900kPa

6.4 HYDRAULIC CALCULATIONS

a. The Trade Contractor shall prepare detailed hydraulic calculations and accept responsibility for final water supply sizing, pipe sizing and pipe routing.

b. Prepare and submit detailed hydraulic calculations for review by the Client or Client's Representative, the submission shall:

   i. Be submitted and approved prior to listing and fabrication of the pipework.

   ii. Demonstrate the system achieves required performance characteristics with chosen pipe sizes and hydrant parameters.

   iii. Include accompanying drawings which identify all design points and nodes, including plans, sections, schematics or isometrics as necessary to depict the system fully.

iv. Include the town main and/or selected pump performance curve(s), demonstrating that the design duty points are satisfied by the selection, as applicable.

v. Include calculations demonstrating the minimum effective tank capacity, as applicable.

6.5 BASELINE DATA

The following Baseline Data shall be provided as part of the fire hydrant system installation scope.

All Baseline Data shall be provided to the building owner/manager electronically, in addition to two hardcopies to be kept on site upon handover of the installation.

All signage, including those that form part of this baseline data, shall also comply with the relevant section of this specification.

a. Block Plan(s) complying with AS 2419.1 and this specification, provided at the following locations:

   i. Fire Pump Room.

   ii. Fire Brigade Booster.

b. Pressure Gauge Schedule

c. Valve List

d. 'As Constructed' drawings (including location and specification of all water supplies, pipework).

e. Operation and Maintenance Manuals (including technical data and supplier's details for all equipment).

f. Design Certificate and/or Designer's Statement.

g. Installation Certificate and/or Installer's Statement.

h. Commissioning Certificate (including Flow Test and Hydrostatic Test results).

6.6 HYDRANT VALVES AND STAND PIPE

a. Fire hydrant valves shall comply with AS 2419.2.

b. Installation of fire hydrant valves shall comply with AS 2419.1.

c. Provide connections compatible with equipment used by local Fire Brigade thread pattern.

d. Include brass caps chained to valve body.

e. Flanged connections shall be used to connect standpipes to the inground main. Rolled grooved couplings shall not be used inground.

f. Standpipes for fire hydrant valves shall be hot dipped galvanised steel suitably protected with suitable protective wrap installed in accordance with the manufacturer's requirements.

6.7 HAZARD WARNING SIGNAGE

a. Where equipment provides a hazard to occupants or service personnel, provide appropriate signage to warn of the potential hazard.

b. Signage shall comply with local Workplace, Health and Safety legislation.

6.8 FIRE HYDRANT BLOCK PLAN

a. Manufacture, mount and detail in accordance with all requirements of AS 2419.1 and the following.

b. As a minimum include:

   i. The layout of the protected building or areas and adjacent streets, access and egress points.

ii. A diagram of water supplies including sizes and locations of valves, boosters, storage tanks (capacity and locations) and pump duties.

iii. Location and total number of hydrants including operation discharge pressure and heights relative to the booster inlet connection.

iv. The year of installation, installer's and maintenance contractor's contact details.

6.9 FIRE HYDRANT BRIGADE BOOSTER

a. The Fire Brigade Booster shall comply with AS 2419.1 and the following.

b. The booster arrangement shall consist of the connections described below.

c. The Fire Brigade booster shall be provided within a weatherproof enclosure complying with clause 6.9.2 of this specification.

d. The Fire Brigade Booster Assembly shall incorporate each of the following:

Table 6.3 – Booster Assembly

CONNECTION TYPE	REQUIREMENT	NUMBER REQUIRED	MOUNTING HEIGHT (AFFL[1])
Inlets – Hydrant System	Booster	2	Minimum 750 mm Maximum 1200 mm
Inlets – Sprinkler System	Booster	2	Minimum 750 mm Maximum 1200 mm
Outlets	Tank Suction	2	Minimum 450 mm Maximum 600 mm

Note 1: Mounting height shall be measured from the centreline of the inlet/outlet to the finished floor level from which Fire Brigade personnel will be operating the equipment.

6.9.1 Booster Inlets, Feed Hydrant Outlets and Tank Suction Outlets (as required)

a. Provide booster connections complying with AS 2419.3, as required.

b. Where provided, Booster Heads shall be constructed of Cast Iron, epoxy lined, fitted with an integral non-return valve, and fitted with a hose-cock and pressure gauge.

c. Provide feed hydrant connections complying with AS 2419.2, as required.

d. Provide tank suction connections complying with AS 2419.1, as required.

e. All connections shall be compatible with local Fire Brigade connection type pattern.

f. All connections shall be fitted with chained plastic caps.

6.9.2 Fire Brigade Booster enclosure

a. Mount on concrete plinth base.

b. Locate appropriately for visibility, access and with paved/bitumen hardstand sized suitably for local Fire Brigade appliances.

c. Construct of sheet metal complete with rigid steel inner frame, stiffeners and supports mounted on legs butted to concrete plinth.

d. Provide clean, neat, non-sharp sheet metal edges free from burrs and indentations.

e. Incorporate appropriate number of access doors with minimum of three hinge supports.

f. Secure doors with minimum of two point locking arrangement with approved locking device complying with Fire Brigade requirements.

g. Provide feed hydrant signage to external face of enclosure, where applicable.

h. Provide signage that reads FIRE HYDRANT BOOSTER or similar, lettering shall be minimum 50 mm high and coloured contrasting to the background.

i. Provide enclosure with weather resistant powder-coated finish, colour scheme shall be approved by the project Principal and Architect.

6.10 PIPEWORK, FITTINGS AND INSTALLATION

6.10.1 General

Comply with AS 2419.1 and AS 3500.1.

6.10.2 Pipework

a. Comply with AS 2419.1, AS 3500.1 and this specification.

b. Piping types, material, finish and the corresponding jointing method shall be selected from the following table only, materials not shown below must be submitted to the Consultant and Principal for approval prior to any works.

c. Use of Light Duty steel piping is not acceptable.

Table 6.4 – Fire Piping Types

MATERIAL	COMPLIANCE	FINISH	SPECIFICATION/RATING	FITTINGS/JOINTS
Above-Ground Piping				
Mild Steel	Up to ø150 mm: AS 1074	Hot-dip Galvanised with Cold Gal Primer on damaged/cut areas	Minimum Medium Grade	Threaded Roll-grooved Welded
	Over ø150 mm: ASTM A106	Hot-dip Galvanised with Cold Gal Primer on damaged/cut areas	Minimum Schedule 20	Roll-grooved Flanged Welded
Below-Ground Piping				
Polyethylene (PE)	AS 4130-2018 Series 2	Factory finish	Minimum PN16, or 1.5 times the system working pressure PE100 SDR11	Roll-grooved Electro-fusion

d. Pipe fittings and jointing methods shall comply with the following table.

Table 6.5 – Fire Pipe Fittings

PIPE TYPE	FITTING/JOINTS	COMPLIANCE/SPECIFICATION
Above-Ground Piping Types		
Mild Steel	Threaded	Galvanised Malleable Iron (Gal Mal) fittings with BSP Taper Thread to AS 1722.1/AS ISO 7.1
	Roll-grooved	UL or FM approved and listed. Grooved and installed in strictly accordance with manufacturers requirements.
	Flanged	AS 2129 Table E or ASME B16.5
Below-Ground Piping Types		
Polyethylene (PE)	Roll-grooved	Comply with AS 4219-2020. UL or FM approved and listed. Grooved and installed in strictly accordance with manufacturers requirements.

PIPE TYPE	FITTING/JOINTS	COMPLIANCE/SPECIFICATION
	Electro-fusion	Comply with AS 4219-2020. Fittings and pipework shall be provided by the same supplier and compatible. Installed strictly accordance with manufacturers requirements by trained and certified installers.

e. On site welding not permitted.

f. Long radius bends shall be preferred where space permits.

g. Mitre joints are not recommended, where used hydraulic calculations must demonstrate the system performance is not unduly affected. Mitre joints are not permitted within pump suction or flow test line pipework.

h. All piping used throughout the project shall be new and in good condition, with no visible corrosion, rust or damage. Re-use of old pipework is not permitted.

6.10.3 Pipe Supports and Installation

a. Support pipework from the building structure.

b. Pipework shall not be supported from other services and/or ceilings.

c. All pipework shall be supported with hangers, anchors, brackets, saddles, clips, etc., complying with AS 2419.1 with adequate provision for expansion and contraction and for corrosion protection.

d. Vertical rising pipework shall be supported at the base and intermediately to carry the total weight of the riser. Branches from risers shall not be used as a means of support for the riser. Intermediate supports on vertical rising pipes shall be designed to suit the applicable with no sagging or warping of the support.

e. Use corrosion resistant supports.

f. Embedding of piping in concrete floors or any other surfacing material of the building is not permitted. Where required, recesses may be formed in the concrete element to facilitate installation of the pipework.

g. Slope range pipes for draining not less than 4 mm per metre and distribution pipes not less than 2 mm per metre.

h. Provide with fire-resistant approval in accordance with AS 2419.

6.10.4 Below-Ground Pipework Installation

a. Excavation, Trenches and Backfilling shall comply with AS 2566.2, AS 2419.1 and AS 3500.1 except as noted below.

b. Depth of cover shall be minimum 600 mm, except where located below an unsealed roadway or any roadway subjected to heavy construction machinery, the depth of cover shall be minimum 750 mm.

c. All below-ground steel pipework and fittings shall be hot-dip galvanised and doubled wrapped in petrolatum tape along the entire length of buried pipe in accordance with AS 2419.1 and the following:

   i. Steel pipework shall only be installed below-ground where transitioning from PVC-U or PE pipework, and shall not be more than 1.5 m in total length.

   ii. Fit two applications of petrolatum tape with minimum width of 100 mm after initial paste preparation to the pipe surface; utilise a spiral formation with a minimum 50 % overlap on the first application, and a reverse spiral formation over the first layer for the second application.

   iii. A layer of self-adhesive polyethylene tape shall be applied over the petrolatum tape.

iv. Extend protective wrapping at least 150 mm above the finished surface level.

d. Buried services shall be identified as follows:

i. Provide red marker tape containing the word 'Fire' for all below-ground fire service pipework and conduits.

ii. Marker tape shall comply with requirements of AS 1345 and AS 2648.1.

iii. Use 150 mm wide poly-vinyl chloride or polyethylene warning tape placed 150 mm above the top of the service.

iv. Detectable marker tape, fitted with a detectable wire trace, shall be used for all buried plastic services.

6.11 VALVES AND DEVICES

6.11.1 Valve Monitoring

a. Comply with AS 2419.1, AS 4118.1.4 and have FM or UL listing.

6.11.2 Pressure Gauges

a. Conform to AS 2118.1 Section 8.

b. Dials not less than 100 mm diameter.

c. Calibrated in kPa to a maximum of not more than 2.5 times the operating pressure, generally up to a maximum value 1,600kPa.

d. Provide isolating valve/cock for each pressure gauge.

6.11.3 Flexible Connections

a. Flexible connections shall be supplied and installed for all pipework where excessive movement is expected between the structure.

b. Flexible connections shall be of axial pattern bellow type and shall have roll grooved or flanged ends as appropriate to facilitate replacement.

c. Incorporate internal liners and shall be manufactured with stainless steel external protective sleeves.

d. Flexible connectors shall be provided with an FM or UL approval.

6.11.4 Valves

a. Comply with AS 2419.1.

b. Clean prior to installation, with open ends temporarily sealed with proprietary covers of pressed steel or plastic.

c. Isolation valves shall consist of the following

i. Comply with AS 2419.1

ii. Valve type shall be as follows:

– 50 mm and above – Gear-operated Butterfly or OS&Y Gate

– 50 mm and below – Ball

– Flow test throttling – Globe or Gear-operated Butterfly.

iii. Outside screw and yoke (OS&Y) type where required by Code.

iv. Incorporate indicator (where not OS&Y type) to identify open or closed status on sizes 80 mm and greater.

v. Incorporate visible coloured open or closed position flag indicator for butterfly type.

vi. Monitor where identified on drawings and as required by AS 2419.1.

vii. Connections type shall be screwed, flange or rolled groove depending on the size. Pipe connections for pipe diameters over 200NB, or where nominated on the drawings shall be flanged. All other connections shall be screwed or rolled grooved depending on the size. Screwed connections shall not be used on pipe sizes over 50 mm diameter.

d. Non-Return (Check) Valves shall comply with the following:

i. Comply with AS 4118.1.6.

ii. Hinged rubber faced clapper.

6.12 FIRE HYDRANT PUMP SETS

6.12.1 General

a. Comply with AS 2118.1, AS 2941 and the specifications outlined in the following table.

b. The fire pump, driver, controller and accessories shall be furnished by the one pump manufacturer.

c. Adopt pumps of identical manufacture, type and performance.

d. Provide flexible connections between both the suction and discharge pipework and pump flange of each pump.

e. Provide pressure gauges on both the pump suction and discharge pipework in accordance with AS 2941.

f. Incorporate circulation relief valve on each pump in accordance with AS 2941.

g. Provide system pressure relief to each pump in accordance with AS 2491 unless detailed otherwise on the drawings.

h. Comply with the specifications as follows.

FIRE PUMP SET SPECIFICATIONS	
Pump Configuration	2 x 100 % Duty
Number of pumps in operation	1
Pump Type	Horizontal shaft, ISO centrifugal end suction
Driver type	Diesel Engine
Preferred Operating Speed	2,400 RPM or less
Medium	Water
Medium Source	Fire Water Tank
Indicative Duty Points	1,200 L/min at 900 kPa

6.12.2 Pumps

a. Select impeller such that their diameters do not exceed one impeller size less than the maximum size impeller that can be fitted into the pump casing.

b. Mount pumps and drivers on vibration absorbing mounts on plinths 150 mm minimum high.

c. Submit pump curve characteristics for approval by the Principal and their representative.

6.12.3 Electric Motor

a. Comply with AS 2941.

b. The motor shall be totally enclosed type.

c. The motor shall be sized for non-overloading under all conditions of operation and be mounted in such a manner that vibration and noise is kept to a minimum.

d. The motor shall operate on three-phase 415-volt supply.

6.12.4 Diesel Engine

a. Comply with AS 2941.

b. The diesel engine shall be water cooled, electrically started, complete with batteries, generator, exhaust system, gauges and couplings.

c. The motor shall be fitted with a self-contained lubricating oil system.

d. Separate batteries shall be fitted for automatic and control/manual systems engine start.

e. The diesel engine shall be provided with an automatic electric starter, generator and battery system, all of 12-volt rating. The starter and alternator shall be integrally mounted with the engine. Manual start facilities shall also be provided.

f. Starting system shall be capable to start in ambient conditions from a minimum 0°C.

g. Power supply shall be supplied from the pump switchboard. The charger shall be complete with fuses, output voltmeter, AC supply alive indicator.

h. The pump shall be provided with a manual mechanical emergency stop lever. The lever shall be suitably labelled.

6.12.5 Diesel Exhaust

a. The main components of the exhaust system shall include flexible connection to the engine manifold, residential type silencer, the exhaust pipe, flexible suspension and anchoring to structure of the exhaust piping as required.

b. The exhaust pipe shall be fabricated from galvanised steel exhaust pipe.

c. The whole of the exhaust system shall be gas tight.

d. All necessary allowances shall be made for adequate contraction and expansion so that there shall be no damage or excessive stress on the flue or the surrounding structure.

e. Supports and guides shall allow adequate movement due to thermal expansion and contraction.

f. The flue shall be rigidly supported above the flexible connection to the engine so that the weight of flue does not place any undue stress either on the flexible connections or the engine exhaust manifold.

g. A rain sleeve/cap at the top of the exhaust pipe and over-flashing at the roof penetration shall be provided.

h. The exhaust pipe shall be insulated with 50 mm thick sectional mineral fibre with Sisalation jacket within the building and where exposed to pedestrian traffic. Zinc anneal sheet cladding shall be provided wherever insulation is exposed to view.

i. Include for exhaust pipe, silencer and discharge from diesel pump set discharging external to pump room wall complete with rain sleeve/cap.

6.12.6 Control Panels

a. Comply with AS 2941.

b. Enclosure with IP54 rating.

c. The interior of the panels shall be ventilated.

d. Wiring shall be copper stranded conductor, PVC insulated cable, neatly arranged, laced into forms and suitably clamped.

e. Wire shall be identified as necessary by the use of colour coding, numbered ferrules, all agreeing with the wiring diagrams. Terminal strips shall be provided for all outgoing wiring.

f. Provide with the following facilities:

   i. Mains isolator.

   ii. Manual start and stop buttons.

   iii. Protected emergency manual start button.

   iv. Alarm mute push button.

   v. Indicator/alarm test push button.

g. Indicator lights for the following:

   i. Power available.

   ii. Power fail.

   iii. Pump run.

h. Diesel engine control panel to be provide with the following additional facilities:

   i. Engine hours run meter.

   ii. Oil press gauge.

   iii. Water temperature gauge.

   iv. Batteries and battery charger.

   v. Crank isolated indication.

   vi. Low fuel indication.

   vii. Low crank volts indication.

   viii. Low control volts indication.

   ix. Charger fail indication.

   x. Charger boost indication.

   xi. Low oil pressure indication.

   xii. Equipment starting arrangement shall comply with NFPA20 Clause 12.5.4.

6.12.7 Pressure Maintenance Pump – Jockey Pump

a. Comply with AS 2941.

b. Automatic operation.

c. Self-priming.

d. Operate on single-phase 240-volt or three-phase 415-volt power supply, as required.

e. Mount on wall bracket or on 100 mm minimum concrete plinth.

6.12.8 Flow Test Facility

a. Flow sensing element appropriate for the installation.

b. Install flow test facility with piping size sufficient for maximum flow incorporating isolating valve, throttling test valve and required upstream/downstream pipe length dimensions to ensure correct measurement in accordance with manufacturer's requirements.

6.12.9 Pressure Relief Valves

a. Provide pressure relief valve where required by AS 2941.

b. Comply with AS 2491.

c. Sized to prevent the over pressurisation of the system.

d. Hydraulically operated pilot-controlled type.

e. Bronze bodied with renewable stainless disc and seat with springs protected from working fluid.

f. Lockable shield to prevent unauthorised alteration to setting.

g. Drained to waste (or storage tank where one is provided on site).

h. Incorporate a sight glass with integral flow indicator.

6.12.10 Noise Management

a. Comply with Authority requirement. It is the installers responsibility to establish what these requirements are and incorporate them into the selection of the equipment.

b. Use noise control measures like silencer, barriers and enclosures.

c. Provide suitable warning signage where a noise hazard exists.

d. Carry out a noise level survey of the site and equipment enclosure where a noise hazard (both environmental and workplace and safety) in accordance with Authority requirements and legislation.

6.12.11 Fire Pump Enclosure

a. The pump enclosure shall satisfy the following specifications.

b. Dimensions specified below shall be considered nominal and final dimensions shall be confirmed by the contractor based on the equipment selected.

FIRE PUMP ENCLOSURE SPECIFICATIONS	
Length	3.75 m
Width	3.0 m
Height	2.7 m
Construction Type	Pre-assembled packaged container type Weatherproof Prefabricated steel enclosure with powder-coated finish.
Exterior Finish	Steel sheeting colourbind
Base and Footing Type	Concrete
Access	One personnel access door (minimum 820 mm wide), and One roller shutter (minimum 2.4 m wide) Doors on each side of the prefabricated enclosure to facilitate access to the controller/s and all major equipment.
Drainage	Slope Concrete floor towards drain outlets. Drains provided by Hydraulic/Civil services, refer to Works by Others section of this specification.
Ventilation	Provide louvres on two opposing sides of the room. Size louvres to suit AS 2941 ventilation requirement.

FIRE PUMP ENCLOSURE SPECIFICATIONS	
Electrical	Lighting and Power by Electrical services, refer to Works by Others section of this specification. Provide the following: ‣ General lighting in accordance with AS 3000. ‣ Emergency lighting in accordance with AS 2293.1. ‣ 240-volt single phase power hardwired to each Diesel fire pump control panel. (Separate main switch/circuit breaker from Main Switchboard, or from dedicated local Distribution Board) ‣ One dual weatherproof GPO

6.13 COMBINED FIRE HYDRANT AND SPRINKLER WATER STORAGE TANKS

6.13.1 General

a. The fire water storage tank/s and associated equipment shall be designed and installed in compliance with the relevant sections of AS 2304, AS 3500.1 and AS 2419.1.

b. The final effective capacity of the fire sprinkler water storage tank/s shall be determined by the contractor and shall be demonstrated by suitable hydraulic calculations.

c. For circular or rectangular steel panel tanks the supplier shall be responsible for design and construction of the tank/s including all auxiliaries.

d. For void liner tanks where the tank is formed by building and structural elements the fire contractor shall be responsible for design and installation of tank nozzles, puddle flanges and all associated accessories.

6.13.2 Water Level Indicator

a. Comply with AS 2304.

b. Include 'cat and mouse' type water level indicator to serve each tank compartment complying with:

   i. Indication divided into 100 mm increments.

   ii. Flexible stainless steel cable and float and pulley arrangement.

   iii. Point of scale type (water tube type indicator not permitted).

   iv. Withstand wind loading based on design gust speed of V2 = 51 m/s.

   v. Level indictor shall be positioned so that it is visible to approaching fire vehicles and brigade booster locations.

6.13.3 Inlet Fill Arrangement

a. Air gap to comply with AS 2304 and AS 3500.1.

b. Infill valves shall be accessible from Ground level.

c. Where sensing pipework is required between the infill valve and the float it shall be galvanised steel or copper tube. Plastic is not acceptable.

6.13.4 Alarm and Indicators

a. Each tank shall be provided with an automatic level indication that is capable of being monitored.

b. Alarms and indicators shall be provided for the following:

   i. Low Level: 50 % of full capacity.

6.13.5 Plinth/Tank Base

a. All tanks shall be mounted on a concrete base.

b. The base shall extend to provide 300 mm wide strip around the outside perimeter of the tank.

c. Provide detail drawings of concrete bases (by civil) to the Superintendent or their representative for approval.

d. Concrete bases shall comply with manufacturer's and Authority requirements.

6.13.6 Liner

a. Tank liners shall comply with AS 2304.

b. Liners shall be attached and fixed in place in accordance with AS 2304.

c. Liners shall be multi-layer fabricated from PVC or similar approved material and shall incorporate a reinforced scrim layer.

d. Void tanks shall be provided with a geotextile underlay suitable for the application to protect the liner from uneven or sharp surfaces of the building elements.

e. Liners and underlays shall include minimum design life of 10 years in accordance with AS 2304 and shall also be provided with a minimum warranty of the same period.

6.13.7 Signage

a. Signage shall be provided in accordance with AS 2419.1 and AS 2304.

b. Advertising signage is not permitted on the tank without the approval of the Superintendent.

6.14 HYDRANT SYSTEM TESTING AND COMMISSIONING

Testing and commissioning activities shall be undertaken in accordance with section 9 of this specification and the following.

6.14.1 Fire Pumps

a. Perform all testing and commissioning activities in accordance with AS 2419.1, AS 2941, and the following:

   i. The contractor shall perform the following testing prior to Authority, Fire Brigade and Superintendent testing:

      – Verify noise levels are within acceptable limits for the site location

      – Verify pump sets run and operate satisfactorily

      – Complete hydrostatic pressure testing of all pipework

      – Complete pressure and flow testing to satisfy the system duty points.

   ii. The contractor shall perform the following testing in the presence of the Authority, Fire Brigade and/or Superintendent as required:

      – Complete pressure and flow testing to satisfy the system duty points as requested by the Authority, Fire Brigade, Superintendent or their representative.

6.14.2 Fire Tank Storage Tank/s

a. Commissioning shall be in accordance with the manufacturer's installation requirements.

b. Clean to remove construction residues. Prior to testing, all pipe internals shall be flushed clean using approved methods.

c. Make arrangements and provide all necessary connections to the tank/s, isolation valves and hoses, etc. for filling. Supply all certification, inspections and temporary items such as gaskets, blind flanges, caps etc.

d. The filling of the new tank(s) shall be in accordance with the relevant Standard. Settlement of the foundation shall be monitored, and the results shall be submitted to the Superintendent for approval.

e. Leak testing shall be in accordance with the applicable design code, which is to be nominated by the Supplier.

7. FIRE HOSE REEL SYSTEM

7.1 DESIGN CONDITIONS

a. Comply with the following:

   i. Fire hose reels shall comply with AS 1221.

   ii. Installation to comply with AS 2441.

b. Comply with the project fire engineering.

7.2 DESIGN CRITERIA

a. Locate to provide complete coverage with hose length of 36 m and 4 m of water spray.

b. Fire hose reels shall be located within 4 m of an exit, and coverage shall not extend through fire or smoke doors.

c. Where coverage is not achieved by primary hose reels located adjacent and exit, provide additional on-floor fire hose reels to achieve coverage.

d. Where additional on-floor fire hose reels are provided, locate directly adjacent an internal fire hydrant, or in a path of travel to an exit where no internal fire hydrants are installed.

7.3 WATER SUPPLY

The fire hose reel system water supply shall be provided as follows:

a. Connected to the Fire Hydrant System water supply.

b. Achieve minimum performance as follows:

   i. 19 mm Hose type: 0.33 L/sec (19.8 L/min) at 220 kPa ± 10 kPa.

   ii. 25 mm Hose type: 0.41 L/sec (24.6 L/min) at 220 kPa ± 10 kPa.

7.4 MOUNTING AND ENCLOSURE

a. Where exposed to external elements, provide with one of the following:

   i. A weatherproof metal cabinet, with powder-coated or painted finish.

   ii. A proprietary weatherproof and UV-resistant vinyl cover.

b. Where located in a position where they may be accessed by people outside the facility, be stolen, or be vandalised, provide in a tamperproof cabinet, including:

   i. L003 locked door.

   ii. Integral 'break glass' key window with key included.

7.5 SIGNAGE AND LABELLING

a. Where not installed within a cabinet, the fire hose reel is to be provided with location signage as required by AS 2441.

b. Where installed within a cabinet, cupboard, or enclosure, provide signage reading "FIRE HOSE REEL", as follows:

   i. Minimum 50 mm high lettering.

   ii. Lettering of a contrasting colour to the background finish, eg. White lettering on a Red cabinet, or Black lettering on a White cupboard door.

7.6 PIPEWORK, FITTINGS AND SUPPORTS

7.6.1 General

Pipework, fittings, and supports shall comply with all requirements of the following:

a. Where supplied by a Fire Hydrant System, or Combined Fire Hydrant and Sprinkler System, AS 2419.1.

b. Where supplied by a Domestic Potable Water System, a standalone Fire Hose Reel System, AS/NZS 3500.1

c. Where supplied by a Fire Sprinkler System, AS 2118.1.

7.6.2 Pipework

a. Piping types, material, finish and the corresponding jointing method shall be selected from the following table only, materials not shown below must be submitted to the Consultant and Principal for approval prior to any works.

b. Use of Light Duty steel piping is not acceptable.

Table 7.1 – Fire Hose Reel Piping Types

MATERIAL	COMPLIANCE	FINISH	SPECIFICATION/RATING	FITTINGS/JOINTS
Above-Ground Piping				
Mild Steel	Up to ø150 mm: AS 1074	Hot-dip Galvanised with Cold Gal Primer on damaged/cut areas	Medium Grade	Threaded Roll-grooved Welded
Copper	AS 1432-2004	Factory finish	*DN25 – DN50:* Minimum Type A *DN50-DN150:* Minimum Type B Select Type with safe working pressure to suit not less than 1.5 times operating pressure of the water supply system, but not less than the above.	Brazed/Soldered Push-fit Press-fit
Below-Ground Piping				
Copper	AS 1432-2004	Factory finish	*DN25 – DN50:* Minimum Type A *DN50-DN150:* Minimum Type B Select Type with safe working pressure to suit not less than 1.5 times operating pressure of the water supply system, but not less than the above.	Brazed/Soldered Push-fit Press-fit
Polyethylene (PE)	AS 4130-2018 Series 2	Factory finish	Minimum PN16, or 1.5 times the system working pressure PE100 SDR11	Roll-grooved Electro-fusion
Polyvinyl Chloride (PVC, -M, -O, -U)	AS/NZS 1477-2017 Series 2	Factory finish	Minimum PN16	Rubber Ring Joint (RRJ)

c. Pipe fittings and jointing methods shall comply with the following table.

Table 7.2 – Fire Hose Reel Pipe Fittings

PIPE TYPE	FITTING/JOINTS	COMPLIANCE/SPECIFICATION
Above-Ground Piping Types		
Mild Steel	Threaded	Galvanised Malleable Iron (Gal Mal) fittings with BSP Taper Thread to AS 1722.1/AS ISO 7.1 Install with Sealant Tape complying with AS/NZS 4020.
	Roll-grooved	UL or FM approved and listed. Grooved and installed in strictly accordance with manufacturers requirements.
	Flanged	AS 2129 Table E or ASME B16.5
Copper, Type B	Brazed/Soldered, Press-fit, Push-fit	AS 3688-2016.
Below-ground Piping Types		
Copper, Type B	Brazed/Soldered, Press-fit, Push-fit	AS 3688-2016.
Polyethylene (PE)	Roll-grooved	Comply with AS 4219-2020. UL or FM approved and listed. Grooved and installed in strictly accordance with manufacturers requirements.
	Electro-fusion	Comply with AS 4219-2020. Fittings and pipework shall be provided by the same supplier and compatible. Installed strictly accordance with manufacturers requirements by trained and certified installers.
Polyvinyl Chloride (PVC, -M, -O, -U)	Rubber Ring Joint (RRJ)	Compatible RRJ Ductile Iron fittings complying with AS/NZS 2280.

d. On site welding not permitted.

e. All piping used throughout the project shall be new and in good condition, with no visible corrosion, rust or damage. Re-use of old pipework is not permitted.

f. Where Copper piping is used, it shall be installed and commissioned in accordance with the requirements of AS 4809-2017.

7.6.3 Pipe Supports and Installation

a. Support pipework from the building structure.

b. Pipework shall not be supported from other services and/or ceilings.

c. Vertical rising pipework shall be supported at the base and intermediately to carry the total weight of the riser. Branches from risers shall not be used as a means of support for the riser.
Intermediate supports on vertical rising pipes shall be designed to suit the applicable with no sagging or warping of the support.

d. Use corrosion resistant supports.

e. Embedding of piping in concrete floors or any other surfacing material of the building is not permitted. Where required, recesses may be formed in the concrete element to facilitate installation of the pipework.

7.6.4 Below-ground Pipework Installation

a. Excavation, Trenches and Backfilling shall comply with AS 2566.2, AS 2419.1 and AS 3500.1 except as noted below.

b. Depth of cover shall be minimum 600 mm, except where located below an unsealed roadway or any roadway subjected to heavy construction machinery, the depth of cover shall be minimum 750 mm.

c. Where steel pipework is installed below-ground it shall be galvanised and doubled wrapped in petrolatum tape along the entire length of buried pipe in accordance with the following:

   i. Steel pipework shall only be installed below-ground where transitioning from Copper, PVC-U or PE pipework, and shall not be more than 1.5 m in total length.

   ii. Fit two applications of petrolatum tape with minimum width of 100 mm after initial paste preparation to the pipe surface; utilise a spiral formation with a minimum 50 % overlap on the first application, and a reverse spiral formation over the first layer for the second application.

   iii. A layer of self-adhesive polyethylene tape shall be applied over the petrolatum tape.

   iv. Extend protective wrapping at least 150 mm above the finished surface level.

d. Buried services shall be identified as follows:

   i. Provide red marker tape containing the word 'Fire' for all below-ground pipework.

   ii. Marker tape shall comply with requirements of AS 1345 and AS 2648.1.

   iii. Use 150 mm wide poly-vinyl chloride or polyethylene warning tape placed 150 mm above the top of the service.

   iv. Detectable marker tape, fitted with a detectable wire trace, shall be used for all buried plastic piping types.

8. PORTABLE FIRE-FIGHTING EQUIPMENT

8.1 DESIGN CONDITIONS

a. Portable fire-fighting equipment shall comply with the following:

   i. NCC Section E1.6.

   ii. AS 2444.

b. Comply with the project Fire Engineering Report.

8.2 DESIGN CRITERIA

a. Select type and capacity of fire extinguishers as follows:

LOCATION	TYPE	RATING	NOMINAL CAPACITY
Electrical Switchboards	Dry Chemical	2A:30B(E)	2.0kg
Kitchen	Wet Chemical	2A:4F	2.0 L
Kitchen	Fire Blanket – 1.8 m x 1.0 m	n/a	n/a
Fire hose reel	Dry Chemical	6A:60B(E)	4.5kg
Electrical Switchrooms	Dry Chemical	6A:60B(E)	4.5kg

8.3 MOUNTING AND ENCLOSURE

a. Where exposed to external elements, provide with one of the following:

   i. A weatherproof metal cabinet, with powder-coated or painted finish.

   ii. A proprietary weatherproof and UV-resistant vinyl cover.

b. Where located in a position where they may be accessed by people outside the facility, be stolen, or be vandalised, provide in a tamperproof cabinet, including:

   i. L003 locked door.

   ii. Integral 'break glass' key window with key included.

8.4 SIGNAGE AND LABELLING

a. Where not installed within a cabinet, the fire hose reel is to be provided with location signage as required by AS 2441.

b. Where installed within a cabinet, cupboard, or enclosure, provide signage reading "FIRE EXTINGUISHER", as follows:

   i. Minimum 35 mm high lettering.

   ii. Lettering of a contrasting colour to the background finish, eg. White lettering on a Red cabinet, or Black lettering on a White cupboard door.

9. TESTING, COMMISSIONING AND HANDOVER

9.1 GENERAL

a. Commission the full completed installation and carry out complete functional and performance tests for all equipment and systems installed, make all necessary adjustments, including setting all controls and checking the operation of all protective and safety devices in accordance with the manufacturer's instructions, the requirements of the statutory rules and regulations and to the satisfaction of the Consultant before the installations will be accepted.

9.2 PERSONNEL

a. The minimum required personnel for testing and commissioning shall be as follows:

   i. One person at FDCIE.

   ii. One person carrying out the testing.

b. All personnel shall be supplied with two-way radios.

9.3 TESTING EQUIPMENT

a. The following equipment shall be provided to carry out testing and commissioning of the Fire Protection Services:

Equipment Present	Required Testing Equipment
Fire Pump FDCIE Status Indication	FDCIE
Flow test	Eagle eye or approved flow test measuring device, pressure gauges

b. All testing equipment used shall be calibrated, within the past six months, and supporting documentation shall be provided upon request.

9.4 COMMISSIONING MANAGEMENT

9.4.1 Inspection and Test Plans

a. Prior to any tests, submit detailed commissioning and testing procedures, methods, format of test records and a programme for the commissioning and testing to the Superintendent for approval at least four weeks before commencement of commissioning and testing. They shall be updated as the work progresses towards completion. All commissioning and testing procedures for works that are required to be tested during construction shall be submitted in for approval.

b. Provide a detailed plan on the programme of the commissioning and testing works at the commencement of the Contract, in order to ensure that all of such works can be completed within the Contract period. The commissioning and testing programme submitted shall detail the types of commissioning and testing works required, the listing of the programme into system-by-system and area-by-area basis, the tests that are required during construction and at the time before the completion of the works, the period of tests and the milestone dates.

c. Detailed commissioning and testing procedures shall be submitted for all systems and be prepared in two main parts covering the following:

   i. Testing that is required to be carried out during the construction period.

   ii. Commissioning and testing required for certification of the works and prior to commencement of the Maintenance Period/Defects Liability Period.

d. Within one week after each test, provide signed data record sheet with endorsement to the Superintendent's representative witnessing the test, irrespective whether the test is successful or not. For testing that is required to be carried out during the construction period, the Contractor shall submit a formal commissioning and testing report or certificate for each test and endorsed by Superintendent.

e. Undertake commissioning in the following stages.

9.4.2 System Interface

a. Provide system interface diagram adjacent to the FDCIE.

b. System interface diagram shall comply with AS 1670.1 and AS 1851.

c. The system interface diagram shall detail all interfaces between the fire protection and other services and the operation required in fire mode.

9.4.3 Visual Inspection and Checking

a. Site inspections of 'work in progress' will be made by the Superintendent or their representative from time to time. Works to be permanently concealed shall be subjected to inspection and other tests before cover up. During the inspection, if it is discovered that any works have been covered up before inspection, testing and commissioning, this work shall be uncovered for inspection and testing. The cost involved in uncovering the work, inspecting, testing and re-concealing the work, together with any consequential losses, shall be paid at no additional cost to the Principal. Any defective works and installation of poor workmanship found during visual inspection shall be rectified or replaced before proceeding with further tests.

9.4.4 Setting to Work, Safety and Quality Tests

a. Prior to any commissioning and testing works, check the completion of the works, the associated builder's work, the related fire services provisions and the associated building services installations, to ensure that commissioning can be proceeded without obstruction.

b. Before any installation is subjected to commissioning and site testing, it shall be thoroughly cleaned both internally and externally.

c. Initially setting the equipment or system to work shall include the following:

   i. Preliminary checks to ensure that all systems and system components are in a satisfactory and safe condition before being put into operation.

   ii. Preliminary adjustment and setting of all equipment, consistent with eventual design performance.

   iii. Energising or put into operation all equipment.

   iv. Checking the proper functioning of all equipment.

d. Arrange for any specialist equipment or personnel required for commissioning and testing.

9.4.5 Commissioning, Regulations, Tuning and Adjustment – Contractor/Installer Testing

a. Commission and adjust the installation and equipment as appropriate and necessary to deliver the conditions and requirements specified. Allow to carry out such adjustment and re-adjustment as necessary until all the performance requirements are met.

b. Provide written certification at the completion of commissioning and include a copy of all commissioning records with certification.

9.4.6 Functional Tests – Superintendent Testing

a. Demonstrate to the satisfaction of the Superintendent or their representative the functioning and operation of the installation, system and equipment complying with the operational and functional intent. Demonstrate and test the proper operational mode, control and the sequence of the operation in various parts of the system and installation.

9.4.7 Performance Tests – Authority Testing

a. Carry out tests to prove the performance of the system and equipment in term statutory requirements and Authority approval. Modify the installation, system and equipment as necessary till the performance requirements are met. The final setting and operational parameters of all equipment shall be recorded.

b. Allow to carry out test by simulation or other approved method required by the Authorities.

9.4.8 Rectification of Defects

a. Any defects of workmanship, materials and performance, maladjustments or other irregularities which become apparent during commissioning and testing shall be rectified at no additional cost to the Principal and the relevant part of the commissioning or testing procedure shall be repeated to the satisfaction of the Superintendent or their representative.

9.5 CERTIFICATION

a. Provide certification of all works covered by this specification in accordance with Authority requirements.

b. All works, including certification, shall be provided by an appropriately licensed or qualified contractor in accordance with the requirements of Authorities.

9.6 RECORDS AND LOG BOOKS

a. Provide log books which must be kept on site and record details of all site visits, whether of routine or emergency nature.

b. Provide log books in accordance with Australian Standards and/or Authority requirements.

9.7 WORK-AS-EXECUTED DRAWINGS

a. Submit Work-As-Executed drawings as follows:

   i. One copy for approval.

   ii. One copy in each manual.

   iii. Two additional full size copies.

   iv. One laminated copy to be installed within Fire Control Centre or Room, as appropriate.

   v. One electronic copy on USB Drive complete with hard copy of all directories.

b. Use the accepted reviewed shop drawings as a basis for update and amendment.

c. Show the 'As Installed' locations of building elements, plant and equipment.

d. Show amended off-the-grid dimensions where applicable. Include any revised relationship to building structure and other services, and changes made during commissioning and the maintenance period.

e. Show amendments to wiring/control schematics based on testing and commissioning requirements to achieve final operational conditions.

f. Include final copies of the systems block plan layouts (fire sprinkler, detection and similar as required by Australian Standards).

g. Electronic copies of work-as-executed drawings shall be provided in PDF and AutoCAD DWG format files on USB Drive with a hard copy of all directories.

9.8 OPERATION AND MAINTENANCE (O&M) MANUALS

a. Submit operation and maintenance manuals for the installations.

b. Provide three hard copies and one electronic copy on USB Drive.

c. Provide A4 size loose leaf, in commercial quality ring binders with hard covers, each indexed, divided and titled.

d. Include the following sections:

   i. Table of Contents.

   ii. Schedule of Suppliers and Sub-Contractors.

   iii. Technical Data.

   iv. Material Safety Data Sheets (MSDS), as applicable.

   v. General description of the systems installed, written to ensure that the building users or nominated representative staff fully understand the scope and facilities provided. Identify function, normal operating characteristics, and limiting conditions.

   vi. System calculations.

   vii. Operation procedures.

   viii. Maintenance procedures.

   ix. Commissioning report(s).

   x. Certificates.

   xi. Work-as-executed drawings.

e. Provide manual covers in red vinyl with suitable labelling in the following format:

Installation Manual for Fire Protection Services

Werribee Park

Main Drive, Werribee South VIC

Consulting Engineer	Omnii Pty Ltd
Fire Protection Services Contractor:	'As Appropriate'

f. Co-ordinate style of lettering and information contained as the manual cover with the Superintendent, for consistency with other Trades, as appropriate to the project.

g. Electronic copies of manual shall be provided in PDF and Microsoft Word .doc format files on USB Drive with hard copies of all directories.

9.9 OWNER INSTRUCTION/HANDOVER

a. Allow to provide the owner and their representative instruction on all systems installed as part of this specification.

b. The service of a Commissioning Personnel shall be required for two half day periods to instruct the Owner's nominated representatives in the detailed operation of plant and equipment initially.

c. An agreed in writing program for the training sessions is to be submitted to the Superintendent for approval two weeks prior to practical completion.

d. Use qualified personnel who are knowledgeable about the installations.

10. MAINTENANCE AND SERVICING

10.1 GENERAL

During the maintenance and Defect Liability Period (DLP) commencing from the date of practical completion provide all essential services testing, servicing and maintenance in accordance with the relevant Australian Standard and local legislation.

Maintenance services shall include the following:

a. Routine inspections, tests and maintenance services.

b. Emergency inspections, tests and repairs.

c. Submission of monthly reports on maintenance activities performed.

All inspections, tests, maintenance services and repairs shall be carried out generally in accordance with the manufacturer's recommendations/instructions and Australian Standard AS 1851-2012 Routine service of fire protection systems and equipment.

10.2 MAINTENANCE REQUIREMENTS

a. Carry out routine maintenance and servicing commencing from the date of Practical Completion for the period defined in this specification.

b. Provide for all repairs necessary to maintain the fire service installation in a safe, reliable and operative condition at all times. Ensure that the servicing staff carry out the necessary repairs by utilising manufacturer's original replacement parts.

c. A log book shall be provided and retained adjacent to respective plant and equipment (listed below) for recording all events for the fire service installation in the Maintenance Period. Replace log books as they become due.

   i. Fire Pumps.

   ii. Fire Hydrant and Hose Reel System (located with Essential Services records).

   iii. Other fire safety equipment.

d. Ensure minimum interruption to the functioning of the fire service installation during each inspection, testing, repair or maintenance service. Inform the Building Manager of the commencement and completion of each site attendance, whenever the disconnection, reconnection or testing of the fire service is involved. This, however, is not to be construed as an authority to leave any part of the system inoperative for an undue length of time.

e. Use only competent and experienced technicians equipped with the appropriate testing instruments, tools, equipment, etc to inspect, service, test, adjust and maintain the fire service installation in a satisfactory operating condition. Definition of a competent person is defined in AS 1851-2012.

f. Repair or replace any part of the system proved to be defective by reason of negligence, faulty design, inadequate routine maintenance and supervision, workmanship or materials. No claim whatsoever shall be made for such repair or replacement.

g. Any necessary repairs shall be carried out with the most practicably expeditious means to ensure minimum interruption to the operation of the fire service installation.

h. Use approved and calibrated instruments for any required testing or servicing.

i. No replacement of equipment shall be carried out at any time unless the Building Manager has been notified and given approval.

10.3 ONGOING MAINTENANCE AND SERVICING

a. Submit a proposal to the Building Manager to continue with routine maintenance and servicing within two weeks prior to the end of the Defects Warranty and Liability period.

b. Provide details of the procedures to be carried out.

c. List additional levels of service other than general which relate to equipment/system overhaul and/or other long term special levels of service.

d. Identify callout rates for emergencies, false alarms, faults or acts of vandalism.

TENDER FORMS

TENDER FORM A PRICE SCHEDULE

Fire Protection Services Tender Form for:

Werribee Park

Main Drive, Main Drive VIC

COMPONENT		COST
1.	Fire Detection and Alarm System Interface	$
2.	Fire Sprinkler System Connection	$
3.	Fire Hydrant and Hose Reel System	$
4.	Portable Fire-fighting Equipment	$
5.	Testing, Commissioning and Certification	$
6.	Maintenance and Servicing for 12-month Warranty Period	$
7.	Maintenance Manuals and As-Installed Documents	$
8.	Training	$
9.	Miscellaneous/Builder's Works	$
10.	Fire Pump Enclosure and Associated Works	$
Sub-Total:		$
GST:		$
Total:		$

All Tender Schedules must be competed and presented with the tender price before submission will be considered.

Notes

1. Maintenance to be provided by existing maintenance contractor.

Name of Tenderer:

Address:

Signed: By: Date:

TENDER FORM B COMPANY PROFILE

B1 SCHEDULE OF SUB-CONTRACTORS

We advise that our Tender includes work as described below to be carried out in each case by the Sub-Contractor or supplier stated:

Fire Sprinkler, Fire Hydrant and Hose Reel _____

Fire Detection and Alarm _____

Production of Shop Drawings and Design _____

Associated Builder's Works _____

Maintenance and Servicing for 12 months Warranty Period _____

Other _____

B2 SCHEDULE OF PERSONNEL

The following personnel have been assigned to the Contract:

Contracts Manager _____

Technical Designer _____

Site Foreperson _____

Draftsperson _____

B3 DEVIATIONS

Any proposed changes to the design including further review and further assessment must be completed by the Fire Engineer of record. Costs associated with further reviews or assessments, if proposed by the Trade Contractor, must be allowed in their tender. This includes allowance of all fees for reviews by the full existing consultant team, as deemed appropriate by the existing consultant team.

Identify here all details where the tender does not comply with this Technical Specification. If left blank, it assumes fully conforming tender.

Deviation	Adjustment

Name of Tenderer:

Address:

Signed: By: Date:

TENDER FORM C SCHEDULE OF UNIT RATES

FIRE DETECTION AND ALARM SYSTEM

EQUIPMENT	UNIT RATE
Flow Switch	$
Pressure Switch	$
Input/Output device	$
Visual Alarm Device (Loop Powered, Addressable)	$
Visual Alarm Device (Conventional)	$

ELECTRICAL WIRING

Additions

EQUIPMENT	DESIGN PHASE		CONSTRUCTION PHASE	
WIRING	**TPS (PER M)**	**RADOX (PER M)**	**TPS (PER M)**	**RADOX (PER M)**
1.0 mm²	$	$	$	$
1.5 mm²	$	$	$	$
2.5 mm²	$	$	$	$
CONDUITS AND FITTING	**CONDUITS (LENGTHS)**	**FITTINGS (ELBOW/TEE)**	**CONDUITS (LENGTHS)**	**FITTINGS (ELBOW/TEE)**
16 mm	$	$	$	$
20 mm	$	$	$	$
25 mm	$	$	$	$
32 mm	$	$	$	$

Deletions

EQUIPMENT	DESIGN PHASE		CONSTRUCTION PHASE	
WIRING	**TPS (PER M)**	**RADOX (PER M)**	**TPS (PER M)**	**RADOX (PER M)**
1.0 mm²	-$	-$	-$	-$
1.5 mm²	-$	-$	-$	-$
2.5 mm²	-$	-$	-$	-$
CONDUITS AND FITTING	**CONDUITS (LENGTHS)**	**FITTINGS (ELBOW/TEE)**	**CONDUITS (LENGTHS)**	**FITTINGS (ELBOW/TEE)**
16 mm	-$	-$	-$	-$
20 mm	-$	-$	-$	-$
25 mm	-$	-$	-$	-$
32 mm	-$	-$	-$	-$

Name of Tenderer:

Address:

Signed: By: Date:

FIRE EXTINGUISHERS

Complete, installed with statutory signage:

TYPE – SAA RATING	UNIT RATE
Dry Chemical Powder – 2A:40B:(E)	$
Dry Chemical Powder – 3A:60B:(E)	$
Dry Chemical Powder – 4A:80B:(E)	$
Wet Chemical – 2A:4F	$

HOURLY CHARGE FOR LABOUR

CLASSIFICATION	NORMAL HOURS	AFTER HOURS
Contracts Manager	$	$
Design Draftsman	$	N/A
Leading Hand or Foreman	$	$
Trades Installer/Fitter	$	$
Apprentice	$	$
Service	$	$

MISCELLANEOUS

DESCRIPTION	UNIT RATE
Call out rates (ongoing cost as per hourly rates)	$
Drain down	$
Site re-establishment	$

Name of Tenderer:

Address:

Signed: By: Date:

TENDER FORM D SCHEDULE OF TECHNICAL DATA

a. Visual Alarm Device (Internal Strobe)

   i. Manufacturer/Model: _____

b. Visual Alarm Device Light (external)

   i. Manufacturer/Model: _____

c. Non Fire Rated Cable

   i. Manufacturer/Model: _____

d. Fire Rated Cable

   i. Manufacturer/Model: _____

e. Isolation Valve

   i. Manufacturer/Model: _____

f. Check Valve

   i. Manufacturer/Model: _____

g. Fire Pump – Diesel

   i. Manufacturer/Model: _____

h. Pressure Maintenance Pump – Jockey

   i. Manufacturer/Model: _____

i. Piping

   i. Manufacturer/Model: _____

j. Flow Switch

   i. Manufacturer/Model: _____

k. Pressure Switch

   i. Manufacturer/Model: _____

l. Fire Water Storage Tank

   i. Manufacturer/Model: _____

Name of Tenderer: _____

Address: _____

Signed: By: Date: