

APARTMENT DEVELOPMENT

11-13 WEST STREET, HINDMARSH SA

Project No: LCE13404

Fire Services Specification

Tender Issue Revision T2

SPECIFICATION ISSUE REGISTER

REVISION	DESCRIPTION	DATE ISSUED	AUTHOR	REVIEWED
T1	Tender Issue	29.03.2019	WL	JD
T2	Tender Issue	11.07.2019	WL	JD

PROJECT DIRECTORY

CLIENT

Cavatton MC Projects
5 First Street
Brompton SA 5007

ARCHITECT

Milne Architects
Level 1, 124 Franklin Street
Adelaide SA 5000

MECHANICAL, ELECTRICAL, HYDRAULIC AND FIRE PROTECTION SERVICES

Lucid Consulting Australia
Level 3/169 Pirie Street
Adelaide, SA 5000

STRUCTURAL AND CIVIL CONSULTING ENGINEERS

TMK Consulting Engineers
Level 6/100 Pirie Street
Adelaide, SA 5000

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1 GENERAL

1.1 CROSS-REFERENCES

All work covered within this specification shall be read in conjunction with the following trade packages and contracts. Should any discrepancy occur between the references the larger/greater shall be assumed and referred to the Engineer prior to proceeding with any works.

- Preliminaries and General Conditions of Contract
- Architectural Documentation
- Mechanical Services Documentation
- Electrical Services Documentation
- Hydraulic Services Documentation
- Structural Drawings for details of footings, piers, beams, columns or the like
- Acoustics Specification/Reports for details of full height partitions/acoustic requirements
- Geotechnical soil reports
- Civil Services Documentation
- Fire Engineering Report

The above documents shall be made available upon request through the head contractor.

1.2 PROJECT DETAILS

The works described within this specification pertain to the Fire Services installation at 13 West Street, Hindmarsh SA.

The contractor should note the specific requirement for connection of services off the adjacent site located at 17 West Street. All access is to be arranged in conjunction with the builder and strata manager for the property.

The works involve the installation of a combined hydrant / window drencher system, fire hose reel and fire extinguishers as documented within the fire services drawings and within this specification. The new fire services installation is to be connected to the existing fire hydrant system located at high level within the carpark of the adjacent site 17 West Street, Hindmarsh.

1.3 DEFINITION OF TERMS

Consulting Engineers	-	Lucid Consulting Australia
Proprietor	-	Client or end user of the proposed building
Architect	-	Milne Architects
Head Contractor	-	Building Contractor appointed to carry out the construction of the building. Fire Contractor shall enter contract to undertake the Fire Services installation with the successful Head Contractor.
Contractor	-	Installer undertaking the works, who shall be appropriately licensed and a member of the NFIA and/or the FPA
Works	-	As described within this specification
Provide	-	Supply, install, commission, and place into service
Equal Approved	-	Alternative product/method of installation which is presented to the consulting engineer and written approval is received.
Local Power Authority	-	SA Power Networks
Local Gas Authority	-	Envestra (APA Group)
Local Water Authority	-	SA Water Corporation
Local Fire Authority	-	South Australian Metropolitan Fire Services (SAMFS)

1.4 CONTRACT

Fixed Price Design and Construct

The Fire Contractor is to enter into a fixed price Design and Construct type contract. The following specification and accompanying drawings outline the general scope of works, design intent, minimum installation standards and minimum equipment capacity. Final design and documentation is yet to be undertaken and therefore the documentation does not show the complete installation and shall not be used for construction. The contractor shall take responsibility for the design, supply, installation and performance of the system. The Fire Contractor shall allow for all design finalisation, construction drawings, management, administration, labour and equipment to complete the installation. Site inspections should be undertaken during the tender period to verify the scope and building constraints. No variations will be accepted unless legitimate scope increase or unforeseen latent condition.

The design shall be verified by the Consulting Engineer prior to construction.

The Building Services Consulting Engineers shall be novated to the Head Contractor via post tender discussions and negotiations. Refer Architectural Contract Preliminaries and Specification for further details.

1.5 DRAWINGS

Refer to the following drawings accompanying this specification:

Drawing No.	Title	Revision
LCE13404-F00	General Notes, Schematic, Drawing Index and Legend of Symbols	T2
LCE13404-F01	Site Plan and Ground Floor Fire Services Arrangement	T2
LCE13404-F02	First Floor and Second Floor Fire Services Arrangement	T2
LCE13404-F03	Third Floor Fire Services Arrangement	T2
LCE13404-F04	Details	T2

The arrangements and details indicated on the above drawings are approximate only. Check all dimensions and building details prior to commencement of the work.

A 2-dimensional "AutoCAD" design model shall be made available, via request, to the head contractor. The AutoCAD model shall be used as an interpretation tool only for scope clarity and co-ordination with structure and other services. Under no circumstances shall it remove the obligation from the contractor to produce a construction set of documents (workshop drawings) for the proposed installation as nominated within this specification. Accuracy of the model shall not be relied upon for preparation of construction drawings, fabrication or installation.

1.6 LEGISLATIVE REQUIREMENTS

Comply in all respects with the requirements of the current standards applicable to the works in respect to equipment, material, workmanship and installation techniques.

The works must comply with the rules and regulations:

Reference Name	Authority/Corporation	Document(s)
Local government	SA Government	Development Act 1993
		Development Regulations 2008
	Australian Building Codes Board	National Construction Code 2016
Local water authority	SA Water Corporation	Conditions of Connection
Local power authority	SA Power Networks	Supply Regulations
Local fire authority	SA Metropolitan Fire Service	Conditions of Connection
		Policies and Guidelines
Work, Health and Safety authority	Safework SA	Work Health and Safety Act 2012

		Work Health and Safety Regulations 2012
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Technical Codes and Standards applicable to each fire services system installation are listed within each section of this specification.

1.7 SCOPE OF WORKS

The work covered by this specification includes the following.

1.7.1 General Requirements

- The detailed design, supply, installation, testing, commissioning, maintenance, service and warranty and all sundry and material items, whether mentioned in detail or not, required to complete the installation and place into working order.
- The planning, scheduling, procurement of components and installation to meet the programme, coordination and liaison with the head contractor and other trade packages.
- Full responsibility for the execution of the complete installation in accordance with this specification and drawings.
- The provision of a Fire Services installation that satisfies all statutory legislative, local authority, code requirements and satisfies the general details herein.
- Compliance with all relevant Work Health and Safety legislation and best practice including any site-specific requirements or regulations such as attendance at site inductions and adherence to the procedures covered in such inductions.

1.7.2 Description of the Installation

Site Infrastructure

- Existing towns mains connection and associated infrastructure inclusive of the site backflow prevention valve, hydrant pipework and in-line diesel fire pump located on 17 West Street shall remain and to be re-used as part of the new development.
- The existing diesel in-line fire pumpset to serve the new combined fire hydrant/window drencher system to be re-used as part of the new development.
- Update with new waterproof fire hydrant and window drencher system block plans to the existing fire brigade booster enclosure, fire pump room and fire isolated stairs.

Fire Hydrant System

- Provision of connection to the existing fire hydrant system via the blanked off 100mm tee fitting located at high level within the 17 West Street carpark adjacent the fire isolated stair for the fire water supply.
- Installation of new 100mm above ground fire hydrant pipework and all associated supports and fittings from the 17 West Street site to the new 13 West Street development.

- Provision for all fire services pipework supports shall have an FRL not less than 60/-/- while maintaining the pipe support temperature of not less than 500°C.
- Provision for all fire services pipework irrespective of size shall be seismically braced in accordance with AS1170.4-2007. The contractor shall allow to engage an independent structure engineer to provide certification of seismic bracing methodology as required.
- Provision of internal fire hydrant system including provision of isolation valves and fire hydrant valves.
- Provision of fire hydrants with oval spindles to deter vandalism.
- Performance (flow/pressure) testing and fire authority commissioning as required.
- Application to fire authority for booster and pump testing of the combined sprinkler/hydrant system (upon completion of works) including payment of associated fees.

Fire Hose Reels

- Fire Hose Reels located as indicated on drawings including associated statutory signage.
- Provision of localised testable double check valve adjacent fire hose reel to satisfy the local water authority's requirements.
- Provisions of vandal and weather resistant enclosures as nominated.

Automatic Fire Sprinkler System

- Provision for new external window wetting drenchers to service all openings as specified on the fire services drawings. Contractor to ensure drenchers are spaced in accordance with AS2118.2-2010.
- Dedicated window drencher system to be supplied off the pumped fire hydrant system. A geared isolation valve and all statutory signage as per the requirements of AS2118.2-2010 shall be installed at ground level within the fire isolated stair.
- Make provision and liaise with the structural engineer for approved method of penetrating walls to prevent damage to the existing structure including windows.
- No window drencher pipework shall be visible external to the building. Pipework shall be concealed within ceilings, bulkheads, or walls as applicable.
- Remote test valves to simulate single fire sprinkler head operation and test flow/pressure switches.
- Provision for water shields to be installed to all window drenchers, colour to be confirmed with the architect prior to installation.
- Annubar testing and fire authority/independent commissioning as required.
- Provision of one (1) additional fire sprinkler to account for coordination with other services. Should this sprinkler not be utilised during project works, allow to handover to the client at practical completion in original packaging.

- Flow switch within the carpark at high level and interface to the security panel to notify an externally monitored agency that 13 west street is discharging water. Contractor shall provide instruction to isolate the output as well as notify the monitoring agency that testing is to commence and no fire event is occurring.

Portable Fire Extinguishers

- Portable fire extinguishers of type and at locations as nominated on the drawings, including signage in accordance with AS 2444.
- Provisions of vandal and weather resistant enclosures as nominated.

General

- Testing, commissioning, service and warranty.
- Operating and Maintenance Manuals (two copies off) including all related approval documentation e.g. Electrical certificates of compliance, completed installer's statements.
- Preparation of work-as-executed drawings.
- Preparation of Fire Safety Log Books for all required fire safety systems.
- Application to the fire authority or independent commissioning agent for testing of the entire system (upon completion of works) including wet system booster testing and payment of all associated fees and charges.
- Provisions for independent third party certification of the installation as required by the relevant authority including payment of all associated fees and charges.
- Maintenance, warranty and defects liability extending for a period of 52 weeks from date of practical completion of the project. Maintenance procedures to be strictly in accordance with the requirements of the relevant legislation.
- Provision of completed maintenance certificate at the end of the 52 weeks defects and liability period. The maintenance certificate shall state that the systems operate in accordance with the requirements of the relevant legislation. The certificate shall take the format required within the relevant legislation.
- All associated building work unless specifically nominated below. This work shall include setting out and providing penetrations for all floor and wall penetrations for pipework and cabling, fire stopping penetrations, making good and painting.
- Painting, identification and labelling of all plant, equipment and piping systems.
- Seismic restraint of all plant, equipment and piping systems in accordance with AS1170.4-2017 irrespective of size.
- All other items necessary to form a complete and approved system.
- All rubbish is to be disposed of in the designated waste disposal area as directed on site. All rubbish is to be disposed of in this manner the same day that it is generated.

- Works to be coordinated with management to ensure continuity of trade. Maintain clear communications with Building Owners representative at all times.
- Provision of all statutory signage as required by AS2118.2, AS2419, AS2441, AS2444, and local brigade requirements unless otherwise nominated as being the responsibility of other trades.
- Associated works as necessary to complete the installation and as set out below.

1.7.3 Variations to the Scope

Instructions may be issued throughout the project which may alter the scope of works. Any aspects of any such works which are not specifically mentioned in any instruction are to comply with this specification.

Any claims for any additional costs or credits for any such variations must be submitted with a complete breakdown of costs including quantities and rates for all labour, materials and equipment. Variation Claims submitted without breakdowns will be rejected.

1.7.4 Substitutions

Where a substitution to the specification is proposed, the contractor shall submit each substitution, incorporating technical details and a cost breakdown, to the head contractor. The substitution shall be reviewed by the consulting engineer and the client for consideration. Unless approved by the consulting engineer and the client, the substitution will not be acceptable as an equal or approved approach to the specification.

1.7.5 Associated Works

The following works related to the fire services installation shall be carried out by the Head Contractor's related trades. Provide any additional work required for the completion and full operation of the fire services works.

Electrical Services

- Fire contractor shall supply and install signal cabling from the flow switch to the security panel with provision for the electrical services contractor to complete the termination of signal cabling within the security panel. Fire services contractor shall take lead in coordination of the works.

Building Related Trades

- Provision of sleeved penetrations in concrete slabs for pipework/cable penetrations.
- Patching and fire rating around penetrations to retain fire-rated integrity.
- The building works trade shall provide formed penetrations for the provision of window wetting fire sprinklers. Fire services trade shall allow for any escutcheons required to complete the fire sprinkler installation.

1.8 PERFORMANCE SOLUTIONS

The fire services design outlined within this specification incorporates deviations from the Deemed-to-Satisfy Provisions of the Building Code of Australia. These deviations have been justified and accepted as Performance Solutions through consultation and documentation with the project stakeholders.

The table below is a summary of the proposed alternative solutions and associated requirements of the FER over and above the Deemed-To-Satisfy requirement of the BCA. These are an extract from FER **Revision 00 dated 02/04/19** produced by Lucid Consulting Engineers. The fire protection services contractor is to ensure they have a copy of the current FER during the production of shop/design/working drawings and ensure that the requirements of FER are incorporated including in block plans, O&M Manuals etc which shall be made available by the head contractor. The summary below is provided for convenience only, it remains the fire protection contractor's responsibility to familiarise themselves with the fire engineers report, and to make due allowance to provide the safety measures outlined within the report.

No.	Proposed Performance Solution	Required fire protection and management systems
1	To permit openings to be located within 3 metres from the boundaries.	Openings within 3 metres from the boundaries shall be protected by the fire protection strategies specified on the tables below.

Level 1

Ref.	Fire Protection Strategies
D.25	Manual sliding door with external fire shutter that achieves-/60/- FRL.
D.38	Manual sliding door with external fire shutter that achieves-/60/- FRL.
W.01	Manually operable window with heat-strengthened glass.
W.02	Manually operable window with heat-strengthened glass.
W.03	Manually operable window with heat-strengthened glass.
W.04	Manually operable window with heat-strengthened glass.
W.05	Manual awning or sliding window with fire attenuation screen over operable pane and external drencher over fixed pane.
W.05	Manual awning or sliding window with fire attenuation screen over operable pane and external drencher over fixed pane.
W.07	Manual awning or sliding window with fire attenuation screen over operable pane and external drencher over fixed pane.

W.10	Manual awning or sliding window with fire attenuation screen over operable pane and external drencher over fixed pane.
W.11	Manual sliding window with heat-strengthened glass. Fixed half shall be nearest to southern boundary.

Level 2

Ref.	Fire Protection Type
D.55	Manual sliding door with external fire shutter that achieves -/60/- FRL.
D.68	Manual sliding door with external fire shutter that achieves -/60/- FRL.
W.04	Manually operable window with heat-strengthened glass.
W.13	Manually operable window with heat-strengthened glass.
W.15	Manually operable window with heat-strengthened glass.
W.16	Manually operable window with heat-strengthened glass.
W.18	Manual sliding window with heat-strengthened glass. Fixed half shall be nearest to southern boundary.
W.19	Manual awning or sliding window with fire attenuation screen over operable pane and external drencher over fixed pane.
W.22	Manual awning or sliding window with fire attenuation screen over operable pane and external drencher over fixed pane.
W.23	Manual sliding window with heat-strengthened glass. Fixed half shall be nearest to southern boundary.

Level 3

Ref.	Fire Protection Type
W.25	Manually operable window with heat-strengthened glass.
W.26	Manually operable window with heat-strengthened glass.
W.27	Manually operable window with heat-strengthened glass.
W.28	Manually operable window with heat-strengthened glass.
W.29	Manually operable window with heat-strengthened glass.

Refer to the Fire Engineering Report for further details surrounding these Performance Solutions.

2 CONTRACT SUBMISSIONS

The contractor shall prepare and submit the items in each section identified below to the consulting engineer for approval.

2.1 TENDER SUBMISSIONS

The submissions required at tender shall incorporate, as a minimum, all information defined within the Appendices of this Specification. Any appendices not completed in entirety will be rejected.

2.2 PRE-CONSTRUCTION SUBMISSIONS

2.2.1 Samples

Submit the following sample equipment prior to commencing construction:

- All fire pipe and cable supports and catenaries proposed for the installation – brochure acceptable
- Fire sprinkler heads – brochure acceptable
- Hydrant and sprinkler pipework – brochure acceptable
- Flow Switch – brochure acceptable
- Isolation valves – brochure acceptable
- Signage – brochure acceptable
- Fire Hose Reel – brochure acceptable
- All portable fire extinguishers – brochure acceptable

Do not commence work affected by the samples until approval for the sample has been obtained by the consulting engineer and architect.

2.2.2 Workshop Drawings

The contractor must prepare workshop drawings from which the contract works shall be built.

Submit one copy of drawings (digital or print) for approval prior to commencing manufacture or installation.

Workshop drawings shall all be on the same size drawings sheets and shall be of a scale not less than 1:100 and larger where necessary.

Workshop drawings shall cover the following parts of the work:

- All wall, floor and ceiling penetrations.
- Pipework layouts including details of construction supports, seismic supports, anchoring, expansion, fixing, dimensions, etc.

- Coordinated reflected ceiling plans indicating all sprinklers, fire smoke alarm devices, air outlets and lights.
- Pipework schematics
- Fire stair details and set-out (minimum 1:20 scale).
- All signage locations on plans and elevations.

Examination of shop drawings shall not remove from the Contractor the responsibility for the correctness of the dimensions on such drawings nor compliance with Statutory Regulations or the requirements of this specification.

The Fire Services Trade Contractor shall coordinate with all other trades to ensure non-clashing of services.

Submit shop drawings with due account for the construction programme. Allow for 7 days for the return of such drawings. If requested submit a full document issue sheet detailing all shop drawing issue dates, return dates, re-submission dates and dates for outstanding drawings.

2.2.3 Calculations

The contractor shall allow undertaking of all relevant calculations for the works including the following:

- Hydraulic calculations using an approved proprietary program i.e. Hyena or approved equal

All calculations shall be submitted to the consulting engineer for review prior to the order of any equipment.

2.3 CONSTRUCTION SUBMISSIONS

2.3.1 Authorities, Permits, Fees, Certificates and Approvals

All works shall be carried out in accordance with the requirements of the local authorities including but not limited to the local water authority, electricity authority, local fire authority, the building certifier and to the satisfaction of the Superintendent. Allow to pay all fees relevant to the fire services package.

All fire service installations shall be inspected by the local fire authority prior to practical completion on the project. The contractor shall allow for payment of all associated inspection and testing fees.

All pipework shall be tested to the requirements of the relevant water supply authority and hydrostatically tested as detailed in this specification. The contractor shall allow for payment of all associated inspection and testing fees (if applicable).

The contractor shall upon completion of testing and commissioning, certify that the works have been completed and in accordance with the National Construction Code and relevant Australian Standards. Any alternative solutions to the deemed to satisfy provisions of the Building Code of Australia shall also be included within this certification.

This certification shall take the format of an 'Installer's Statement' as specified in the relevant legislations. Where not required by the relevant legislation, provide certification as outlined within the Appendices of the relevant installation standards.

In addition to the installer's statement, the Contractor shall procure a certificate of practical completion indicating a satisfactory installation from all relevant authorities and lodge same with Superintendent on completion of the Contract.

The final certificate for payment will not be issued until this requirement has been fulfilled.

2.3.2 Commissioning and Witnessing Plans

The contractor shall submit for approval a detailed commissioning plan indicating step by step testing strategy for all equipment. The commissioning plan shall be developed in conjunction with the building trade construction programme and shall be submitted to the head contractor and consulting engineer for review a minimum four weeks prior to any commencement of commissioning. The fire services contractor shall be responsible for providing commissioning duration period to head contractor for inclusion in the construction programme.

2.3.3 Commissioning Reports

The contractor shall submit for approval a detailed commissioning report including the above methodology undertaken and the results obtained. Commissioning results shall be recorded as necessary for the preventative maintenance of the facility.

2.4 POST-CONSTRUCTION SUBMISSIONS

2.4.1 As-Installed Drawings

Prior to practical completion, "As-Installed" drawings shall be submitted for approval.

As-Installed drawings shall be based from the approved Workshop drawings, amended to accurately reflect the final equipment selections and system installations on site.

Hard copies of the approved As-Installed drawings, along with a digital copy on a USB flash drive, shall be included within the Operating and Maintenance Manuals.

2.4.2 Operating and Maintenance Manuals

One (1) hard copy of the Operations and Maintenance Manuals shall be submitted to the Consulting Engineer for review and comment prior to practical completion being achieved. Operating and Maintenance manuals shall be written in clear concise English, containing a title page listing suppliers' names, addresses and telephone numbers, a table of contents, and as a minimum include the following sections:

- Table of Contents
- Contractor's Name, Address, Telephone number and emergency telephone numbers available 24 hours
- General description of the installation, written as briefly as possible, consistent with providing a general understanding of its features and operation.
- Written text on the method of operation of all installed systems

- Suppliers contact details
- Schedule of Technical Data
- Equipment/Manufacturer's specifications and relevant datasheets, including a list of all documents included for reference
- List of guarantees and warranties of Equipment Suppliers
- Commissioning documentation including Installer's Statements
- Summary of Performance Solutions pertaining to fire services installations
- Test data and authority certificates
- Hydraulic calculations
- Routine and Preventative inspection and maintenance requirements and procedure as specified in the referenced legislation, or manufacturer's specifications
- As installed drawings (Full size and A3 size)
- Fire Block plans

The Operating and Maintenance manual shall be A4 in size (with A3 drawings), printed or typed on durable printing paper, with each page consecutively numbered, and neatly bound in durable red vinyl hard back covers with embossed gold lettering on the front and on the spine.

Each section shall be separated with a divider and shall include a printed list identifying the information contained within.

Following review of this Operations and Maintenance Manual by the consulting engineer, the contractor shall make all relevant modifications to documentation and provide one hard copy in A4 lever arch folders and three (3) soft copies in PDF format on a write-protected USB 'flash drive'.

3 DESIGN, QUALITY AND WORKMANSHIP

3.1 GENERAL

The tender drawings indicate the sizes of pipes and the approved pipework routes throughout the building. They do not, however, purport to show all minor pipework offsets, hangers, method of fixing and clearances, all of which must be coordinated with other trades, measured on site and in accordance with AS 2419.1 and AS 2118. All piping arrangements shall be shown in detail on shop drawings and approved in general detail prior to commencement of installation.

All work shall be installed in an approved manner to meet structural and architectural conditions.

3.2 DESIGN REQUIREMENTS

Design criteria below forms the basis of the design of the works inclusive of any alternative solutions pertaining to the Building Solution.

3.2.1 Design for Environmental Conditions

The following general design criteria are applicable to the entire installation. Equipment and pipework systems shall be selected and installed with guarantee to operate without fault or failure under the nominated conditions for each component.

Criterion	Requirement
Extreme ambient conditions (maxima) under which all systems and services shall operate	46°C dry bulb 24°C wet bulb Full solar load
Extreme ambient conditions (minima) under which all systems and services shall operate	2.0°C dry bulb

Componentry located externally to the building and exposed to the ambient environmental conditions shall be suitably selected and installed for protection against corrosion, and ingress of moisture and dust.

3.2.2 Design for Earthquake Actions

All fire services componentry must be designed to resist earthquake actions, in accordance with the requirements of AS 1170.4-2007, without exception.

Provide restraints and supports designed and certified by a structural engineer, to all equipment, pipework, supports and isolation mounts in accordance with AS 1170.4-2007 Section 8, incorporating the following design criteria:

Criteria	Symbol	Factor
Importance Level	I	2
Annual Probability of Exceedance	yr	500
Soil Classification	P	De
Hazard Factor	Z	0.1
Probability Factor	Kp	1
Structural Classification	EDC	II

For further information regarding earthquake restraining, refer to following:-

- Gripple Seismic Installation Manual
- Tyco flow control, 2002, Unistrut seismic bracing systems
- Fema e-74, January 2011, reducing the risks of non-structural earthquake damage - a practical guide.

All restraints and supports shall be issued to the structural engineer to review the adequacy of the structure to support the services loads, including seismic forces. Proof of formal review and approval by structural engineer shall be provided as part of the shop drawing review process.

Where internal expertise is not available to the contractor, formal engagement of a registered structural engineer shall be sought for design of earthquake restraints. Cost of engagement shall be included in Tender pricing and listed as a separate item when applicable.

The spacing of bracing along a run of piping or conduit should not vary greatly in order to ensure uniform deflection and loading.

Each unit of equipment connected to a run of piping or conduit shall be individually and independently braced. Thermal expansion and contraction forces, where present, must be considered in the layout of transverse and longitudinal braces. Flexibility should be provided where pipes pass through structural seismic or expansion joints, or connect to equipment with vibration isolators.

Services components and supports shall have a minimum of 50 mm clearance from all ceiling hangers and the ceiling grid.

Do not core through, cut through or otherwise damage steel reinforcement in concrete slabs, beams or columns when installing seismic bracing.

3.3 UNIFORMITY

Uniformity of type and manufacturer of each individual device and fitting shall be maintained throughout the project.

All devices and equipment shall be approved and listed by CSIRO ActivFire, and/or FM Global and Underwriters Laboratories as applicable.

3.4 WARRANTIES

All equipment and workmanship to be provided with a warranty.

Warranties shall commence at date of practical completion and shall extend for a minimum of 12 months.

3.5 PAINTING

All concealed pipework and metal surfaces, excepting galvanised surfaces, shall be supplied with one coat of red zinc chromate primer applied. The paint shall be undiluted and in accordance with the appropriate SAA Code. All surfaces to be painted shall be thoroughly dry, cleaned down, free from weld splatter, burrs, dust, rust, cement and grease and the like.

Exposed pipes, valves, conduits, wiring ducts, cable trays, brackets, fixings, supports, frames, covers, etc. shall be painted with at least two coats of best quality oil paint in colours as nominated by the Architect. Confirm colour selections with project architect prior to painting.

Exposed pipes and pipe supports below the internal feature stair shall be to the quality and finish to match the exposed steel structure as nominated by the Architect. Confirm colour selections with project architect prior to painting.

Exposed pipes, fittings and supports within the carpark shall be painted with a colour and finish as nominated by the Architect. Confirm colour selections with project architect prior to painting.

Items shall be painted off site. Where damage occurs to the paintwork of such equipment, the damaged item shall be refinished with primer and final coats to restore the surface to its specified conditions of colour, finish and quality.

Galvanised surfaces shall be etch-primed before painting.

Damaged or unsatisfactory painting shall be made good.

3.6 FIRE-STOPPING PENETRATIONS

Where services penetrate fire walls, floors or other fire-rated barrier, sealant for those penetrations shall be sealed to the approval of the relevant Authorities.

Tenderers shall note the specific requirements to fire stop all pipework and cable penetrations through each floor and fire-rated wall.

Submit details of proposed fire resistant sealants for approval prior to installations.

Upon completion of the project, provide written confirmation to the Superintendent that the above requirement has been complied with.

3.7 FIRE SERVICES DURING CONSTRUCTION

3.7.1 Protection of Equipment

At all times during storage and during installation, pipes shall have snug fitting covers in place over open ends. Rag, wood plugs, etc., shall not be used to cover ends of pipes. Suitable covers shall be of pressed steel or plastic.

Electronic equipment shall be stored in protected areas or provided with shrouds once installed to prevent damage from weather, dust, spills and the like.

Protective caps for sprinkler heads and fire detection devices shall be fitted until all installation works have been completed. Remove caps prior to final inspections.

Where construction works introduce risk to installed components, provide suitable protection to prevent damage, or remove from site.

Existing fire hydrant system in building 17 West Street is to remain operational during construction. Where shut-downs are required to install the new fire hydrant system, contractor shall provide 10 working days notice to the project manager. Shutdowns shall be kept to a practical minimum.

4 SITE WATER SUPPLY

4.1 GENERAL

The site is currently provided with an existing 100mm dedicated fire services supply from the existing 200mm SA Water Corporation towns' mains in West St. The existing connection currently serves the residential apartment building located at 17 West Street which will share services infrastructure with the 13 West Street residential apartment. The contractor is to connect to the existing fire system's infrastructure via a capped 100mm tee fitting adjacent the fire isolated stair. This connection location is downstream of the fire services in-line diesel pump as documented on the fire services drawings.

This existing connection is to be connected to a new 100mm dedicated fire services connection. The location of the new connection shall be coordinated to enter the site as outlined in the drawings.

4.2 BACKFLOW PREVENTION

Provide all necessary backflow prevention valves in accordance with the requirements of the local water authority and as nominated on drawings.

The existing testable double check valve on the incoming site water supply, located within the fire brigade booster assembly enclosure in an accessible location shall remain.

Refer to Section 9 for valve specifications.

5 FIRE BRIGADE BOOSTER ASSEMBLY AND PUMP

5.1 GENERAL

The new site will utilise the existing fire brigade booster assembly and in-line fire diesel pump-set arrangement located in the adjacent building of 17 West St.

Refer to the hydrant systems commissioning data available via the builder as well as the fire services drawings for further details.

5.1.1 Cross-References

Refer to Section 4 for water supply details.

Refer to Section 6 for fire hydrant system requirements.

Refer to Section 0 for fire sprinkler system requirements.

Refer to Section 9 for pipework material specifications.

5.2 FIRE BRIGADE BOOSTER ASSEMBLY

The existing fire brigade booster assembly located in building 17 West St was designed to meet the following minimum criteria:

Criterion	Requirement
Number of hydrants required to flow	1
Minimum flow rate per hydrant, unassisted (with on-site pumpset)	10 L/s
Minimum pressure at most disadvantaged hydrant, unassisted (with on-site pumpset)	200kPa
Minimum flow rate per hydrant, assisted by fire brigade	10 L/s
Minimum pressure per hydrant, assisted by fire brigade	700 kPa

5.3 PUMPS

The existing pump infrastructure located in building 17 West St was designed to meet the following minimum criteria:

Pump	Desig.	Drive	Duty Point 1	Duty Point 2
Fire Protection Pump 1	FP-1	Diesel	5 L/s @ 540 kPa	13 L/s @ 90 kPa
Jockey Pump	JP-1	Electric	1 L/s @ 1,000 kPa	N/A

6 FIRE HYDRANT SYSTEM

6.1 GENERAL

The fire hydrant system shall reticulate throughout the building via a dedicated fire hydrant riser within the stair of the building. Isolated take-off shall be provided for the supply of water to the drencher system riser located within the ground floor fire isolated stair.

6.1.1 Cross-References

Refer to Section 4 for water supply details.

Refer to Section 5 for fire brigade booster assembly requirements.

Refer to Section 9 for pipework material specifications.

6.2 DESIGN CRITERIA

The minimum design criteria that the fire hydrant system must achieve are listed as follows:

Criterion	Requirement
Number of hydrants required to flow	1
Minimum flow rate per hydrant, unassisted (with on-site pumpset)	5 L/s
Minimum pressure at hydrant, unassisted (with on-site pumpset)	700kPa
Minimum flow rate per hydrant, assisted by fire brigade	10 L/s
Minimum pressure per hydrant, assisted by fire brigade	700 kPa

6.2.1 Codes and Standards

The following Codes and Standards are applicable to the installation and must be adhered to in all respects unless otherwise noted.

Code/Standard	Year	Title/Description
BCA Section E1.3	2016	Fire Hydrants
AS 2118.2	2010	Automatic Fire Sprinkler Systems – Drencher systems
AS 2419.1	2005	Fire Hydrant Installations: Part 1: System design, installation and commissioning

6.3 FIRE HYDRANT VALVES

Provide fire hydrant valves in accordance with the local fire authority requirements with oval spindles or chain and padlocks (utilising Lockwood 003) to deter vandalism within the fire isolated stairways as indicated on drawings. Ensure that final fire hydrant locations are coordinated, and the design does not impede on egress requirements as well as that all clearances around the fire hydrant valve are maintained in accordance with AS2419.1.

Ensure that each fire hydrant valve is provided with caps provided with captive chains and maintenance tags.

7 FIRE HOSE REELS

7.1 GENERAL

Provide fire hose reel as indicated on the fire services drawings. Fire hose reel must be located no further than 4 metres from exit doors in accordance with the BCA, unless otherwise specified.

7.1.1 Cross-References

Refer to Section 9 for pipework material specifications.

7.2 DESIGN CRITERIA

The minimum design criteria that the fire hose reel system must achieve are listed as follows:

Criterion	Requirement
Relevant BCA Clause(s)	E1.4
Relevant Standard(s)	AS 1221-1997 AS 2441-2005
Minimum flow rate at nozzle	0.45 L/s
Minimum pressure at nozzle	210 kPa

7.2.1 Codes and Standards

The following Codes and Standards are applicable to the installation and must be adhered to in all respects unless otherwise noted.

Code/Standard	Year	Description
AS 1221	1991	Fire hose reels
AS 2441	2005	Installation of fire hose reels

7.3 MANUFACTURE

Fire hose reels shall be manufactured in accordance with AS 1221. Fire hose reels shall be equipped with 19 mm x 36 m long fire hose reels and approved nozzle.

7.3.1 Colours and Finishes

Fire hose reels shall generally be of standard colour and finish, with exceptions as noted on drawings or as follows:

Location	Finish
Generally	Powdercoat Red

7.4 INSTALLATION

Fire hose reels shall be installed with heights and clearances as nominated in AS 2441-2005 unless otherwise noted.

7.4.1 Water Supplies and Isolation

Water supplies for fire hose reels shall be from the existing fire hose reel system located on 17 West Street as indicated on drawings.

Provide isolation valve on the water supply for the fire hose reel. Isolating valves shall be fitted with an interlock, such that the fire hose nozzle may not be removed until the valve is opened.

7.4.2 Signage

Statutory signage must be installed as nominated on drawings and as per the requirements of AS 2441.

Obtain approval for locations of signage from the architect or consulting engineer on site prior to installation.

8 AUTOMATIC FIRE SPRINKLER SYSTEM

8.1 GENERAL

Provide automatic fire window drencher system for protection of the external windows in accordance with AS 2118.2 and the BCA DTS Provisions. The window drencher system shall reticulate and connect from the fire hydrant system via an locked open isolation valve as per AS2118.2.

Allow to undertake hydrostatic testing of system upon completion of all works to sprinkler system pipework before pressurising with water.

Commission and coordinate performance flow testing upon completion of the works and allow for payment of all associated fees (if applicable). Ensure that performance flow testing is not undertaken simultaneously with fire hydrant testing. Ensure all testing is scheduled with sufficient notice so as not to delay practical completion.

8.1.1 Cross-References

Refer to Section 4 for water supply details.

Refer to Section 5 for fire brigade booster assembly requirements.

Refer to Section 6 for fire hydrant system requirements.

Refer to Section 9 for pipework material specifications.

Refer to Section 11 for testing and commissioning requirements.

8.2 DESIGN CRITERIA

The minimum design criteria that the automatic fire sprinkler system must achieve are listed as follows:

Criterion		Requirement		
Area	Hazard	Flow Rate/Discharge	Minimum Pressure	Sprinkler Spacing
Level 1 – Level 3	-	100 L/min per head, up to 12 heads per facade	156 kPa	Window-wetting

8.2.1 Codes and Standards

The following Codes and Standards are applicable to the installation and must be adhered to in all respects unless otherwise noted.

Code/Standard	Year	Description
AS 2118.2	2010	Automatic Fire Sprinkler Systems – Drencher systems.

AS 2419.1	2005	Fire Hydrant Installations: Part 1: System design, installation and commissioning
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8.2.2 Ancillary Equipment

The window drencher installation shall be provided with the following ancillary items:

- Locked open isolation valve as per the requirements of AS2118.2-2010.
- System block plan.
- A water- and fade-resistant block plan in accordance with AS2118.1 Clause 8.3 shall be installed in with the window drencher system isolation valve.

8.2.3 Location Identification

The window drencher system isolation valve shall be clearly identified with fade-resistant signage as follows:

- With the lettering "FIRE SERVICE VALVE CLOSE ONLY TO ISOLATE DRENCHERS".
- The lettering shall be minimum height 50 mm in a colour contrasting with that of background.

8.3 SPRINKLER HEADS

8.3.1 General

Sprinkler heads shall generally be of the type as described below.

Unless otherwise clarified, all sprinkler heads shall be of the quartzoid bulb type, suitably rated and designed for fusing temperatures as follows:

Location

Sprinkler type

Wall/Window Wetting Sprinklers:

- External wall wetting fire sprinklers 93°C 15mm fast response brass side wall fire sprinkler head type with wall wetting deflector.

The numbers and arrangement of required sprinkler heads are indicated on the drawings but notwithstanding this, the entire sprinkler installation shall strictly conform to the requirements of AS2118.1.

All sprinkler heads selected shall be listed and approved by CSIRO Activfire, FM Global and/or Underwriters Laboratories.

Installation of sprinkler heads shall be in accordance with Manufacturer's Data sheets.

8.3.2 Escutcheon Plates

Escutcheon plates shall be fabricated from steel, aluminium or brass and shall be flat, convex or top hat (recessed) profile to the requirements of the architect or as specified.

Painted escutcheons shall be factory finished with colours as specified by the architect.

8.3.3 Guards

Wherever sprinkler heads are subject to damage or if the head is less than 2300mm from finished floor level the sprinkler heads shall be protected with a passivated zinc plated steel guard suitable for the sprinkler head type installed. The guard shall not affect the spray pattern or function of the sprinkler head.

8.3.4 Baffles

Baffles shall be provided where necessary to prevent sprinkler heads from discharging directly onto electrical switchgear, motors etc. Shields shall be fabricated from galvanised steel and painted to match the surroundings.

8.3.5 Water Shields

Water shields shall be provided where necessary to shield from water discharge from other sprinklers. Shields shall be semi-spherical malleable iron fittings to fix flush to wall and not affect the spray pattern or function of the sprinkler head.

8.4 SPARE SPRINKLERS

A stock of spare sprinklers shall be provided in the fire pump room located on 17 West Street. Spare sprinklers shall be stocked for all types and/or temperature ratings installed within the protected building in accordance with AS 2118.

8.5 TESTING FACILITIES

8.5.1 Remote Test Valve Assemblies

Provide a remote test valve assembly at the end of the most remote range pipe located on each level.

Test piping shall be minimum 25 mm nominal bore, and shall extend to the common test drain located within the fire isolated stair.

Provide an isolation valve for each assembly in an accessible location. This isolation valve shall be secured in the closed position, and provided with a Lockwood 003 key. Provide a label to the isolation valve as follows:

- Lettering not less than 8 mm high, in a colour contrasting to the background.
- Label shall state: "SPRINKLER REMOTE TEST VALVE – TO BE LOCKED SHUT".

Provide a pressure gauge adjacent each isolation valve in a visible location.

9 PIPEWORK AND VALVES

9.1 GENERAL

Provide pipework and valves for fire suppression systems as applicable in accordance with this specification.

9.1.1 Cross-References

Refer to Section 5 for fire brigade booster assembly details.

Refer to Section 6 for fire hydrant system details.

9.2 DESIGN CRITERIA

Final sizing of pipes shall be subject to final hydraulic calculations carried out by the Fire Services Trade incorporating the performance characteristics of the type of sprinkler head utilised in the installation.

The design, fabrication and installation for piping installed in the Works shall be suitable for a design working pressure of 1200 kPa and a maximum working pressure of one and one half times the design working pressure.

9.2.1 Codes and Standards

The following Codes and Standards are applicable to the installation and must be adhered to in all respects unless otherwise noted.

Code/Standard	Year	Description
AS 2118.2	2010	Automatic Fire Sprinkler Systems – Drencher systems.
AS 2118.9	1995	Automatic fire sprinkler systems – Piping support and installation
AS 2419.1	2005	Fire hydrant installations - System design, installation and commissioning
AS 4118.1.2	1996	Fire sprinkler systems – Components – Alarm valves (wet)
AS 4118.1.6	1995	Fire sprinkler systems – Components – Stop valves and non-return valves
AS 4118.2.1	1995	Light wall steel pipe
AS 1074	1989	Steel piping
AS 1432	2004	Copper piping
AS 4130	2009	HDPE piping
BS EN 10241	2000	Steel threaded pipe fittings
ASME B16.9	2012	Factory-Made Wrought Buttwelding Fittings
ASME B16.28	1994	Wrought Steel Butt-welding Short Radius Elbows and Returns

BS 1256	2000	Threaded pipe fittings in malleable cast iron and cast copper alloy
AS 1650	1989	Hot-dipped galvanized coatings on ferrous articles
AS 1722.1	1975	Pipe threads of Whitworth form – Sealing pipe threads
AS/NZS 4791	2006	Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
AS/NZS 4792	2006	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process

9.3 PIPEWORK MATERIALS

All above ground pipework unless otherwise nominated shall be either medium wall thickness steel, or lightwall galvanised steel

CPVC pipework will not be accepted.

Light wall or extra light wall pipework will not be accepted.

Copper piping will not be accepted for above ground installations.

Comply with the following pipework manufacturing codes and standards:

- Light wall steel pipe and fittings must conform with the minimum wall thickness outlined in AS4118.2.1.
- AS 1074 for steel piping, medium weight grade as a minimum.
- AS 1432 for copper piping, Grade 'B' as a minimum.
- AS/NZS 2280: for ductile iron piping.
- AS 4130 for HDPE pipes
- Comply with pipe fitting manufacturing Codes.
- BS 1640 and BS EN 10241
- ASME B16.9
- ASME B16.28
- Comply with AS/NZS 4791/4792 for hot dipped galvanising.

Do not utilise copper hydrant pipework.

HDPE pipework to be utilised for in ground pipework only outside the building perimeter. Utilise Type A copper or 316 stainless steel (double denso wrapped) below building footings and slabs.

All underground pipework fittings shall match the pipework material.

Utilise approved densomastic petrolatum based wrapping system (two coats) for corrosion protection of all underground steel pipework. Extend wrapping 150mm above finished ground level.

Utilise heavy duty pipework support systems where installing galvanised steel hydrant pipework within non-sprinkler protected buildings. Provide sample of proposed pipework support system to the Consulting Engineer for approval prior to installation.

All hydrant pipework to be minimum PN (16) rated unless otherwise stated.

PN (20) pipework may be required to suit specific installation requirements. Obtain clarification from Consulting Engineer prior to ordering of pipework and materials.

9.3.1 Corrosion Protection

Wherever pipework is installed in damp or exposed locations and excessive corrosion may occur or where the Superintendent directs, all piping, supports or other mild steel components shall be corrosion protected by means of hot dipped galvanising or an approved equivalent.

All steel bolts and nuts installed in the locations noted above shall be corrosion protected by means of cadmium plating or approved equivalent.

9.3.2 Fabrication of Steel Piping

Steel piping generally shall be prefabricated at the Fire Sprinkler contractor's factory, using welded, flanged and/or screwed joints and fittings and shall be delivered to site ready for assembly. Welding on site shall not be permitted.

Long lengths of pipe and permanent joints shall be used except where otherwise specified. Pipe offcuts shall not be used to fabricate lengths of pipe.

All pipes shall be cut square with the run of pipe, preferably with a hacksaw, formed to the correct shape for welding and/or threading, ground off smooth and all sharp edges and burrs removed from the bore of the pipe.

9.4 FITTINGS AND PIPE COUPLINGS

For small bore pipework up to DN 50 size utilise screwed fittings as specified below.

For pipe sizes greater than DN 50 size utilise rolled groove fittings and couplings as specified herein.

Pipework shall comprise in-line galvanised coating of minimum weight 100 gm/m² in accordance with AS 1650 External Coatings, for pipes up to and including 100 DN and external/internal coating for pipes over 100 DN.

9.4.1 Screwed Fittings

Screwed fittings shall be selected for working pressure not exceeding 1000 kPa.

Malleable iron fittings shall be in accordance with BS1256 - 1968 Malleable Cast Iron Screwed Pipe Fittings, etc., or approved equal.

Screwed joints shall be kept to a minimum, pipes greater than 65mm NB shall not be screwed. Hexagon nipples may be used. Long threads and barrel nipples will not be approved.

Screwed tees shall be kept to a minimum, where range pipe takeoffs occur and/or where sprinkler heads are to be installed, either screwed sockets or welded components similar to "Thredolets" shall be used.

9.4.2 Screwed Joints

Screwed pipe threads shall be in accordance with AS 1722 - 1976 Pipe threads of Whitworth Forms.

Male threads shall be tapered and cut long enough to screw to full depth of female threads (sockets).

Screwed joints shall be sealed with a non-hardening material such as Teflon tape, spun yarn of New Zealand flax, white hemp or sintered PTFE mixed with a soft setting mineral lubricant, inert, non-toxic and solvent free. Only one type of jointing compound shall be used throughout the Works.

9.4.3 Butt Welded

Butt welded fittings shall be in accordance with BS 1640 Steel Butt Welding Pipe Fittings etc.

9.4.4 Fabricated

Fabricated tees, elbows and similar pipe fittings may be fabricated from steel pipe as previously specified. The Fire Sprinkler Trade Contractor shall submit for approval samples of proposed fittings, before commencing manufacture of same.

9.4.5 Mechanical Grooved Couplings

Pipes may be jointed by mechanical grooved couplings consisting of an approved combination of couplings, gaskets and grooves.

Grooves shall not be cut in pipes and rolled grooves shall be dimensionally compatible with coupling.

Gaskets shall be suitable for continuous service for both air and water in the temperature range -40 deg C to 150 deg C, and shall be pliable, smooth and free of obvious surface porosity and mould flash.

When coupling is assembled, gaskets shall be fully enclosed within the housing of the coupling.

9.4.6 Connection to Valves and Other Components

Where valves and other screwed components of plant are indicated, a union or flanged type joint shall be provided in the vicinity of the valve or component to enable same to be screwed without dismantling an extensive amount of piping.

9.5 INSTALLATION OF PIPING

9.5.1 General

All piping installed shall be set out in accordance with the directions of the related Tender documents and shall be installed to secure a neat and workmanlike appearance.

All piping shall be arranged, supported, graded, and drained to suit the duty and/or service conditions applicable and shall be installed complete with all fittings and components connected up and ready for testing.

9.5.2 Expansion and Contraction

The piping shall be arranged with bend and offsets so that the system is sufficiently flexible to absorb the whole of its own expansion and contraction without developing excessive stress in the piping, or in the supporting structure.

9.5.3 Grading and Drainage of Pipes

Sprinkler piping shall be so installed that the system can be thoroughly drained. As far as practicable, all pipes shall be graded to drain to the installation drain valves.

9.5.4 Cleaning Out of Piping Systems

All piping shall be thoroughly cleansed of loose scale and dirt before erection and following erection and sealing of joints shall be thoroughly cleaned out in the presence of and to the satisfaction of the Superintendent.

All piping shall be flushed through with clean water at the highest practicable velocity and the flushing out process shall continue until all foreign matter is removed. The water used shall be progressively discharged from selected points in the system, either to drain or other suitable location.

9.5.5 Pipe Sleeves and Cover Plates

Unless otherwise indicated or approved where pipes exposed to view, pass through walls, floor and ceilings, approved galvanised steel cover plates and sleeves shall be provided, except that where pipe sleeves are located in concealed spaces, plant room etc., cover plates are not required.

Pipes passing through ceiling shall be offset sufficiently to prevent fouling of cornices, mouldings etc.

Grouting in of pipes of size larger than 50mm NB where they pass through walls and/or floors, will not be permitted. Loose fitting cover plates will not be accepted.

9.6 PIPE SUPPORTS

Pipe supports shall generally be in accordance with AS 2118.9 and AS1170.4-2005.

Unless otherwise approved or directed, supports shall be of a design which provides for longitudinal movement of the piping. Supports except where otherwise specified, shall be fabricated from substantial mild steel sections and shall be securely fixed in position. Supports

and their fixings shall be of adequate strength to withstand the hydraulic and/or other forces to be encountered.

Unless otherwise directed, all pipe supports shall be adjusted prior to painting.

9.6.1 Pipe Support Attachments for Steel Piping

Straps or clips for steel piping shall be of mild steel of the single pear-shape type and shall be of approved proprietary manufacture.

9.6.2 Saddle Type Support

Saddle type supports shall be of rolled steel section of 25mm wide x 1.6mm thick double side type and the saddle shall be securely fixed to the building member or supporting structure.

Saddle type supports will not be approved as a means of supporting pipes over 50mm NB.

A neoprene strip shall be provided between the pipework and support saddle in all locations.

9.6.3 Bolts and Nuts

All bolts and coach screws shall be sized to suit the load but in no case shall the diameter be less than 8mm.

9.6.4 Span of Supports

The distance between pipe supports shall not exceed that specified in manufacturer's specifications or Australian Standards.

Exposed pipework risers shall be secured at floor and ceiling; pipes up to 25 NB shall have at least two intermediate supports.

9.6.5 Fastening of Supports

Where the structure is of masonry or concrete, the supports shall be fastened with approved expanding type bolts.

Explosive powder fastening tools shall only be used where specifically approved beforehand by the Superintendent.

Coach screws shall be used for fastening supports to timber. All coach screws must be hot dipped galvanised.

9.7 FIRE RESISTANCE

For fire hydrant, fire hose reel, and window-wetting sprinkler pipework located outside the fire isolated stairway in a non-sprinkler-protected area, it shall be provided with a means of protection from the effects of fire for a minimum duration of 60 minutes. This may be via:

- Enclosing fire hydrant pipework with fire-rated construction; or
- Provision of fire-rated treatment to the pipework supports to achieve a FRL not less than 60/-/- whilst maintaining a pipe-support temperature of 500°C when tested in accordance with AS 1530.4; or

- Other measures to prevent early collapse when exposed to fire.

9.8 NOISE AND VIBRATION

Achieve specified noise and vibration level criteria.

Acoustically seal pipework penetrations through plant rooms, sound-rated walls and acoustic enclosures.

9.8.1 Spring Hangers

Isolate pipework hangers or brackets to prevent vibration and noise transmission, particularly for pipework connected to pumps, as follows:

- Incorporate neoprene inserts to hangers.
- Use up to 40mm static deflection.
- Include for minimum 99% isolation efficiency.
- Provide loading relevant to code pipe hanger spacing requirements.

9.9 VALVES

9.9.1 General

All valves utilised within the fire system shall be FM Listed or UL Approved for use in fire systems.

All valves utilised in contact with potable water supplies, such as from the town's main connection up to and including the backflow prevention device and associated isolation valves, shall be Water Marked approved in accordance with the NCC.

9.9.2 Isolation Valves

Isolation valves shall be provided in accordance with the following:

- Multi-turn gear-activated type.
- Right-handed.
- Complete with position indication via rising spindle, stem, or indicator flag.
- Complete with monitoring facility where nominated on drawings and required by the relevant system Standard.
- Resiliently seated Watermark-approved if used as part of a backflow prevention valve assembly.

10 PORTABLE FIRE EXTINGUISHERS

10.1 GENERAL

Supply and install all portable fire extinguishers and fire blankets to the locations shown on the drawings, including mounting brackets, location and identification signs.

Final location of all portable extinguishers and associated signage is to be determined by site inspection and approval from the local fire authority prior to installation.

10.2 DESIGN CRITERIA

10.2.1 Codes and Standards

The following Codes and Standards are applicable to the installation and must be adhered to in all respects unless otherwise noted.

Code/Standard	Year	Description
AS 2444	2001	Portable Fire Extinguishers and Fire Blankets – Selection and location.
AS 1841.1	2007	Portable fire extinguishers – General requirements
AS 1841.2	2007	Portable fire extinguishers – Specific requirements for water type extinguishers.
AS 1841.5	2007	Portable fire extinguishers – Specific requirements for powder type extinguishers.
AS 1841.6	2007	Portable fire extinguishers – Specific requirements for carbon dioxide type extinguishers.
AS 1850	2009	Portable Fire Extinguishers – Classification, rating and performance testing.
AS 3504	2006	Fire blankets

10.3 PORTABLE FIRE EXTINGUISHERS

Provide portable fire extinguishers of the following type in the locations and quantities nominated on drawings:

Level/Area	Type	Capacity	Rating
Within Carpark Area	Dry chemical	4.5kg	4A:80BE
	Carbon dioxide	5.0kg	10BE
Common Area Corridors	Dry chemical	4.5kg	4A:80BE

Obtain architect's approval of locations on site prior to installation.

10.3.1 Installation in Cabinets

Where indicated on drawings, fire extinguishers shall be concealed within enclosures, generally in accordance with AS 2441.

Sheetmetal cabinets shall be provided by the fire services trade.

Sheetmetal cabinets shall be provided as follows:

Location	Cabinet Type	Finish/Colour	Handle/Lock
Carpark	Wall-mounted	Standard red	003 Key Lock with frangible panel and Flush handle

Sheetmetal cabinets located externally to the building shall be weatherproof.

11 TESTING AND COMMISSIONING

11.1 GENERAL

Prepare and submit Inspection and Test Plans 10 working weeks prior to the scheduled testing and commissioning period for review and approval.

Provide sufficient notice (minimum 5 working days) so that all testing and commissioning may be witnessed by the Building Services Consulting Engineer for the purposes of certifying to the Building Owner that all work has been completed in accordance with specification requirements.

Ensure the correct phase sequence is maintained throughout the installation.

Provide test certificates and Certificates of Compliance for approval. Include copies within Installation Manuals.

Obtain approval before energising newly installed or reconnected wiring or equipment.

During testing, replace any component and equipment damaged as a result of incorrect installation work.

11.2 TESTING

11.2.1 Pipework

Each pipework system shall be tested in sections as the work proceeds in accordance with the relevant Australian Standard Code and with the following requirements:

- Test pressure shall be applied during the construction period, with each section being blanked until further tests are made.
- All equipment, material and labour necessary for testing shall be provided and all necessary "blanking off" shall be done to prevent excessive pressure to equipment, seals or other similar parts of the system.
- Open and close all control valves under water pressure to ensure proper operation.
- Apply a test pressure of 1700kPa (hydrant), and 1500kPa (window-wetting sprinkler) to the section under the test, or 1.5 times the system working pressure, whichever is the greater and;
 - Retain section under test without makeup pressure for the longer duration of two hours or the time necessary to inspect all joints in the test section.
 - The test section shall be considered satisfactory if there is no pressure drop for the duration of the test and no leaks are apparent in the test section.
 - All defects disclosed during testing shall be immediately rectified and fresh tests carried out as required by the Superintendent.
- Pressure testing shall be carried out as follows:
 - Before piping is boxed in or otherwise covered.
 - Before ceilings are replaced or installed and finishing trades have commenced their work.

The Fire Services Trade shall submit a programme indicating proposed sections of pipework system to be tested. All pressure testing dates, duration and pressure are to be noted on a record set of drawings.

11.2.2 Portable Fire Extinguishers

Portable fire extinguishers shall be factory-tested prior to delivery to site.

Test mounting brackets and the like for robustness and ease of operation.

11.3 COMMISSIONING

11.3.1 Fire Hydrant System

- Undertake independent performance testing (i.e. flow and pressure testing) to ensure the minimum performance criteria are achieved.
- Arrange with fire authority or independent commissioning authority to attend site and carry out verification performance flow test of the hydrant system including with the operation of the fire pump.

11.3.2 Fire Hose Reels

- Arrange with independent commissioning authority to attend site and carry out flow test of fire hose reels simultaneously with sprinkler flow test.

11.3.3 Automatic Fire Sprinkler System

- Arrange with fire authority or independent commissioning authority to attend site and carry out flow test of the window drencher flow test independently to the hydrant system.

12 SERVICE AND MAINTENANCE

12.1 SERVICE CONTRACT

Provide 24-hour emergency call-out services and arrive on site to rectify defective items within 2 hours of notification of a defective item.

12.2 MAINTENANCE WORKS

The maintenance period shall be 12 months from the date of Practical Completion.

After commissioning of the system, provide full maintenance support through the maintenance period. This support shall include all action necessary to maintain the system operating correctly as specified, and shall include but not be limited to:

- Carry out weekly tests as required by the relevant standards;
- Carry out monthly inspections and perform maintenance work at the frequencies and following the procedures recommended by the manufacturers of the supplied equipment;
- Promptly rectify faults. Replace faulty materials and equipment.
- Routine adjustment and servicing of all equipment including ancillary equipment.

During the Warranty and Maintenance Period, this general maintenance support shall be free of charge to the Proprietor. Maintenance support costs shall be deemed to be included in the Tender price.

Provide maintenance check sheets and arrange for signing of these by the nominated site representation. Provide a copy of the check sheets to the principal on a monthly basis.

12.3 ONGOING TRAINING

Coinciding with Commissioning and routine inspection visits, at times to be agreed with the principal, instruct the Principal's operational maintenance staff in the recommended methods of operation and maintenance of the systems.

In addition, provide a time allowance of 8 hours for the initial instruction in the operation of all systems.

12.4 CERTIFICATION

At 12 months from the date of practical completion, allow to provide a maintenance certificate in accordance with the relevant legislative requirements.

At the end of the maintenance period make a final service visit and, upon satisfactory completion of the above procedures, certify in writing that the installation is operating correctly.

Approval for the release of retention monies will not be granted until 12 consecutive monthly check sheets have been received by the Proprietor.

APPENDIX A TENDER PRICE BREAKDOWN

This schedule is required to be filled out at time of Tender Submission. The amounts indicated in the total Tender price including administration costs and profit for sections of the work are as follows:

ITEM	AMOUNT TENDERED
Site Water Supply	
Connection from 17 West Street hydrant system	\$
Other	\$
Sub-Total	\$
Fire Hydrant System	
Pipework, Valves and Fittings	\$
Controls and Interfaces	\$
Other	\$
Sub-Total	\$
Automatic Fire Sprinkler System	
Sprinklers	\$
Pipework, Valves and Fittings	\$
Controls and Interfaces	\$
Other	\$
Sub-Total	\$
Fire Hose Reels	
Pipework, Valves and Fittings	\$
Controls and Interfaces	\$
Other	\$
Sub-Total	\$
Portable Fire Extinguishers	
Extinguishers	\$
Other	\$
Sub-Total	\$

General provisions including

Workshop Drawings	\$
O&M Manuals/Block Plans	\$
Testing and Commissioning	\$
Fire Authority Commissioning	\$
User Training	\$
12 months defects liability period including maintenance.	\$
Other (specify)	\$

TOTAL (EXCL. 10% GST)	\$ _____
GST	\$ _____
TOTAL (INCL. 10% GST)	\$ _____

APPENDIX B SCHEDULE OF RATES

The following rates will be used to price variations including any fit out works and shall include all costs, profit and GST associated with the design, supply, installation, testing, commissioning and defects liability associated with such works. The rates shall allow for all materials, workshop drawing alterations, system programming, labour, cartage, freight, tools, plant scaffolding, painting appliances, etc.

Should the Tenderer require differing rates for variation additions as distinct from variation omissions or reductions or differing rates during the various stages of construction and defect liability period, then these additional rates shall be provided in addition to the following:

Fire Hydrant/Hose Reel System

Internal hydrant valve, complete with 2.0m of Ø100 pipework,	\$
Fire hose reel complete with sheet metal enclosure, complete with 2.0m of Ø25 pipework, connection to the domestic cold-water system, drain down, and recharge of system.	\$
100mm Flow Switch	\$
Drain down and recharge of hydrant system.	\$
Unit rate for 1 off new / modification of dry fire block plan	\$

Automatic Fire Sprinkler System

Window wetting fire sprinkler head including pipework excluding drain down and recharge	\$
Unit rate for 1 off drain down and recharge of fire sprinkler installation.	\$
Pressure switch	\$
Flow Switch	\$
Unit rate for cut in to existing/installed pipework, excluding drain down and recharge	\$
Unit rate for 1 off drain down and recharge of fire sprinkler installation.	\$
Unit rate for 1 off new / modification of sprinkler fire block plan	\$

Cabling, complete with termination at equipment and FIP (\$/m)

Network cable	\$
Catenary wiring	\$
Ø25 Conduit (above ground)	\$

Ø32 Conduit (above ground) \$

Ø25 Conduit (below ground) \$

Ø32 Conduit (below ground) \$

Fire Extinguisher

Supply and installation of a 3.5 kg CO2 extinguisher including brackets and signage. \$

Supply and installation of a 4.5 kg dry chemical powder extinguisher including brackets and signage. \$

Supply and installation of a 9 litre air-water type extinguisher including brackets and signage. \$

	Ø100	Ø80	Ø65	Ø50	Ø40	Ø32	Ø25
Valves/Ancillary	\$	\$	\$	\$	\$	\$	\$
Above ground isolation valve	\$	\$	\$	\$	\$	\$	\$
Extra cost for monitoring of above ground valve, complete with wiring and termination at FIP	\$	\$	\$	\$	\$	\$	\$
In ground Sluice Valve	\$	\$	\$	\$	\$	\$	\$
Pipework	\$	\$	\$	\$	\$	\$	\$
Pipework Above Ground (\$/m)	\$	\$	\$	\$	\$	\$	\$
Pipework Below Ground (\$/m)	\$	\$	\$	\$	\$	\$	\$

GENERAL

The following trades shall be charged at the rates per hour:

Trade	Normal	Time/Half	Double Time
Sprinkler Fitter	\$	\$	\$
Site Electrician	\$	\$	\$
Shop Electrician	\$	\$	\$
Draftsman	\$	\$	\$

APPENDIX C SCHEDULE OF TECHNICAL DATA – SUPPRESSION SYSTEMS

Complete this schedule of material items proposed and include with Tender. All items shall comply with the specification unless the Tender nominates and includes details of the nonconformity.

1. Sprinkler Heads – Window Wetting

Make
Model/Nos

2. Isolation Valve

Make
Model/Nos

3. Hydrant Valves

Make
Model/Nos

4. Pipework (above ground)

Type

5. Pipework (below ground)

Type

6. Pressure Switch

Make
Model/Nos

7. Flow Switch

Make
Model/Nos

8. Check Valve

Make
Model/Nos

9. Backflow Prevention Valve

Make
Model/Nos

DETAIL – EQUIPMENT CONFORMITY

Items below all points where tendered items differ from the specification:

APPENDIX D SCHEDULE OF SUBCONTRACTORS AND PERSONNEL

Identify below Sub-Contractors included within the tender submission.

ITEM	SUB-CONTRACTOR
Wet Systems
Dry Systems
Trenching and Excavation
Testing and Commissioning
Other

Identify key personnel identified to be involved in the project:

Personnel	Name	Years' Experience	Years with Company
Project Manager
Foreman