

# **PROJECT: 1 (LOT 181) GLENBURNIE TERRACE, PLYMPTON (APARTMENTS)**

## **WET FIRE SERVICES SPECIFICATION**

SECON Consulting Engineers  
456 Pulteney Street  
Adelaide SA 5000  
Phone: 08 82237800

Project Number: B9025  
Prepared For: Urbanize Architect

## Document Revision and Status

Date	Rev	Issued By	Notes	Checked	Approved
29/04/19	0	Stefan	BRC Issue	-	-

**Project No.** B9025

**Issued by** Stefan Ruter

**Building and Fire Services Senior Consultant**

[StefanR@secon.net.au](mailto:StefanR@secon.net.au)

# Table of Contents

ITEM	SCHEDULE
<b>WET FIRE SERVICES .....</b>	<b>6</b>
<b>1 GENERAL .....</b>	<b>6</b>
1.1 SCOPE OF WORKS .....	6
1.2 DOCUMENTS ISSUED .....	8
1.3 ASSOCIATED WORKS .....	8
<b>2 DESIGN AND COORDINATION INFORMATION .....</b>	<b>8</b>
2.1 DESIGN BASIS .....	8
2.2 EQUIPMENT WEIGHTS, SIZES, POWER REQUIREMENTS .....	9
2.3 SPACING OF PLANT AND EQUIPMENT .....	9
2.4 QUALIFICATIONS AND EXPERIENCE .....	9
2.5 LICENSED PERSONNEL .....	9
2.6 AUSTRALIAN STANDARDS .....	9
2.7 SETTING OUT .....	9
2.8 COORDINATION WITH OTHER TRADES .....	9
2.9 GUARANTEES .....	10
2.10 SPECIFICATION AND TENDER DRAWINGS .....	10
2.11 TENDER DOCUMENTS .....	10
2.12 SHOP DRAWINGS AND DETAILED DESIGN .....	10
2.13 AS INSTALLED DRAWINGS .....	11
2.14 SAMPLES .....	11
2.15 AUTHORITIES TESTING .....	11
2.16 AUTHORITIES, NOTICE OF ALTERATIONS AND CERTIFICATES .....	11
2.17 AUTHORITIES AND APPROVALS .....	12
2.18 MAINTENANCE LIFTING .....	12
2.19 INSPECTIONS .....	12
2.20 WARRANTIES .....	12
2.21 CERTIFICATE OF COMPLIANCE .....	13
2.22 EXTRANEOUS INTERFERENCE .....	13
2.23 OBVIOUS WORK .....	13
2.24 EARTHQUAKE PROTECTION .....	13
2.25 DEMOLITION .....	13
<b>3 MATERIALS AND WORKMANSHIP .....</b>	<b>13</b>
3.1 MATERIALS .....	13
3.2 LABOUR .....	13
3.3 WORKMANSHIP .....	13
3.4 CORROSION PREVENTION .....	14
3.5 ACCESSIBILITY .....	14
3.6 CLEANING .....	14
3.7 CHASES AND ENCASING .....	14
3.8 COVER PLATES .....	14
3.9 WALL, BEAM, FLOOR AND CEILING PENETRATIONS .....	14
3.10 EARTHQUAKE BRACING (PIPEWORK) .....	15
3.11 EARTHQUAKE BRACING (EQUIPMENT) .....	15
3.12 SUPPORTS .....	15
3.13 FLEXIBILITY .....	16
3.14 JOINTS .....	16
<b>4 PIPEWORK .....</b>	<b>16</b>
4.1 GENERAL .....	16
4.2 STEEL PIPEWORK (BLACK STEEL) .....	16
4.3 GALVANISED STEEL PIPEWORK (ROLLED GROVE) .....	16
4.4 GALVANISED STEEL PIPEWORK .....	16
4.5 COPPER PIPEWORK .....	17
4.6 PIPEWORK, DRAINS AND VENTS .....	17
4.7 UNDERGROUND PIPEWORK .....	17

<b>5</b>	<b>VALVES AND FITTINGS .....</b>	<b>18</b>
5.1	GENERAL .....	18
5.2	ISOLATING VALVES .....	18
5.3	NON RETURN VALVES (CHECK VALVES).....	18
5.4	MONITORED VALVES.....	18
5.5	STRAINERS .....	18
5.6	PRESSURE GAUGES.....	18
5.7	GAUGE COCKS.....	18
5.8	FLOW METERS .....	19
5.9	SOLENOID VALVES .....	19
5.10	PRESSURE / FLOW SWITCHES.....	19
<b>6</b>	<b>TRENCHING, BACKFILLING AND COMPACTION .....</b>	<b>19</b>
6.1	SERVICE TRENCHES .....	19
6.2	SPOIL .....	19
6.3	FLOORS AND PAVEMENT.....	19
6.4	PIPELAYING .....	19
6.5	BEDDING .....	19
6.6	MINIMUM COVER OVER PIPE .....	20
6.7	THRUST BLOCKS.....	20
6.8	BACKFILLING SERVICE TRENCHES.....	20
6.9	SERVICE MARKER.....	20
6.10	PLACING FILLING .....	20
6.11	COMPACTION .....	20
<b>7</b>	<b>PAINTING, CORROSION PROTECTION AND IDENTIFICATION.....</b>	<b>21</b>
7.1	SCOPE .....	21
7.2	EXCLUSIONS.....	21
7.3	CORROSION PROTECTION .....	21
7.4	PAINTING PROCEDURES .....	21
7.5	PAINT COLOURS .....	22
7.6	PLANT, EQUIPMENT AND VALVE IDENTIFICATION .....	22
7.7	PIPE IDENTIFICATION.....	22
7.8	FINISHES SCHEDULE.....	22
<b>8</b>	<b>TESTING AND COMMISSIONING .....</b>	<b>22</b>
8.1	TESTING .....	22
8.2	HYDROSTATIC TEST TABLES.....	23
8.3	SOLENOID OPERATED PIPEWORK (DRY PIPE).....	23
8.4	COMPLETION.....	23
8.5	COMMISSIONING.....	23
8.6	FINAL ACCEPTANCE TESTING .....	23
<b>9</b>	<b>CONTROLS.....</b>	<b>23</b>
9.1	GENERAL .....	23
9.2	SOLENOID VALVES .....	23
<b>10</b>	<b>ELECTRICAL .....</b>	<b>23</b>
10.1	GENERAL .....	23
10.2	STANDARDS.....	24
10.3	EARTHING .....	24
10.4	CABLING.....	24
10.5	ISOLATING SWITCHES.....	24
10.6	CONTROL SWITCHBOARD CABINETS .....	24
<b>11</b>	<b>FIRE HYDRANT PUMPING SYSTEM .....</b>	<b>25</b>
11.1	PUMPS GENERAL.....	25
11.2	DIESEL ENGINES.....	25
11.3	SUPPORT FRAME.....	25
11.4	FUEL TANK.....	25
11.5	JACKING PUMP.....	25
11.6	FLEXIBLE CONNECTORS .....	26
11.7	CONTROL PANEL .....	26
11.8	ALARMS.....	26
<b>12</b>	<b>FIRE SPRINKLER SYSTEM.....</b>	<b>27</b>
12.1	GENERAL .....	27
12.2	SPRINKLER HEAD LOCATIONS.....	27
12.3	SPRINKLER HEADS.....	27

12.4	MAIN CONTROL VALVE ASSEMBLY .....	28
12.5	JACKING PUMP .....	28
12.6	DRAIN SUMP .....	28
12.7	SUBSIDIARY SPRINKLER CONTROL VALVE STATIONS .....	28
12.8	PRE-ACTION VALVE SET .....	29
<b>13</b>	<b>FIRE HYDRANT AND HOSE REEL SYSTEM .....</b>	<b>29</b>
13.1	MAIN CONNECTION .....	29
13.2	UNDERGROUND PIPEWORK .....	29
13.3	PIPEWORK .....	29
13.4	VALVES .....	29
13.5	BOOSTER ASSEMBLY .....	29
13.6	FIRE BOOSTER CABINET .....	29
13.7	HYDRANT RISER PIPE .....	30
13.8	FIRE HOSE REELS .....	30
13.9	FIRE HOSE REEL BACK FLOW PREVENTION .....	30
13.10	FIRE HOSE REEL CABINET .....	30
13.11	PORTABLE FIRE EXTINGUISHER .....	30
<b>14</b>	<b>MAINTENANCE .....</b>	<b>30</b>
14.1	SCOPE .....	30
14.2	MAINTENANCE REQUIREMENTS .....	31
14.3	MAINTENANCE SCHEDULE .....	31
14.4	SERVICE REPORTS .....	31
14.5	OPERATING AND MAINTENANCE MANUALS .....	31
14.6	SERVICE BOOK .....	32
14.7	PRINCIPAL'S INSTRUCTION .....	32
14.8	LOG BOOK .....	32
<b>15</b>	<b>SCHEDULE OF MATERIAL .....</b>	<b>32</b>
15.1	PIPEWORK .....	32
<b>16</b>	<b>SCHEDULE OF PAINTING AND IDENTIFICATION .....</b>	<b>33</b>
<b>17</b>	<b>Fire SERVICES TENDER FORMS .....</b>	<b>34</b>
17.1	TENDER PRICE .....	34
17.2	SUMMARY OF COSTS .....	35
17.3	SPRINKLER HEADS .....	36
17.4	LABOUR AND MARK-UP .....	37

<b>WET FIRE SERVICES</b>
--------------------------

## 1 GENERAL

### 1.1 SCOPE OF WORKS

Outline Description: The works include but are not necessarily limited to the works referred to in the outline description given below.

Items not included in the specification but shown on the drawings or vice versa shall be included.

#### Fire Mains and Connections

- Make application and pay all fees for 150 dia Water Authority dedicated fire water service. Application and fee to include isolation valves in the Towns Main on each side of the connection.
- Include a PC sum for the towns mains water upgrade from Anzac Highway.
- Extend fire pipework main from tanks to fire sprinklers, fire hydrants and fire hose reels.
- Buried metallic pipes protected against corrosion by continuous wrapping in petrolatum tape to AWW C217.

#### Fire Brigade Booster

- Fire Service Authority booster arrangement.
- Metal cabinet to Fire Service Authority booster arrangement including lockable hinged access doors. Cabinet size to comply with Fire Service Authority requirements to ensure clearances around valves. Provide concrete base to cabinet with gap between metal and concrete.
- Single testable check valve (STCV) in booster cabinet to OTR requirements. All pipework upstream of the STCV to be stainless steel.
- Monitored stop valve (gear operated) – fault alarm to run to raise fault on FIP.
- Paint (fully) fire booster enclosure to Architect nominated colour and re name "COMBINED FIRE SPRINKLER & HYDRANT BOOSTER"

#### Fire Hydrant System

- Internal fire hydrants
- Paint hydrant riser pipe and hydrant valve (red).
- Provide a new hydrant diesel pump.
- Pipework, valves, fittings and supports.
- Buried metallic pipes protected against corrosion by continuous wrapping in petrolatum tape to AWW C217.

#### Fire Sprinkler System

- Fire main from booster cabinet to sprinkler control valves
- Main Fire Sprinkler Controls including:-
  - . Monitored stop valve (gear operated butterfly) – fault alarm to/run in series with pressure switch to raise fault on FIP.
  - . Alarm Valve
  - . Pressure Switches to raise fault on FIP pressure switch double pole type
  - . Pressure Gauges
  - . Electric Jacking Pump
  - . South Australian Metropolitan Fire Service connection facility
  - . Testing Equipment
  - . Electrical wiring for pressure and monitored valves
  - . Connect signals from pressure switches, monitored valves and solenoid valves to Fire Indicator Panel.
- Sprinkler Control Valve including:-
  - . Monitored stop valve (gear operated butterfly) – fault alarm to/run in series with pressure switch to raise fault on FIP.

- . Flow switch to raise fault on FIP pressure switch double pole type
- . Solenoid test valve
- . Pressure Gauges
- . Drain pipe
- Fire sprinkler system including:-
  - . Layout of Sprinkler Heads to comply with AS 2118.1
  - . Hydraulic calculations
  - . Pipework, valves, fittings and supports
  - . Sprinkler Heads
- General
  - . Electrical wiring for pressure and monitored valves
  - . Connect signals from pressure switches, monitored valves and solenoid valves to Fire Indicator Panel.
  - . Electrical wiring for pressure and monitored valves
  - . Connect signals from pressure switches, monitored valves and solenoid valves to Fire Indicator Panel.
  - . Minimax unit to transmit signal to Fire Service Authority

### **Fire Hose Reel System**

- Fire hose reels including swing arm and isolating valve in the car park.
- Backflow prevention valves to fire hose reels in carpark
- Metal cabinet to house fire hose reel.
- Pipework, valves, fittings and supports.
- Buried metallic pipes protected against corrosion by continuous wrapping in petrolatum tape to AWW C217.

### **Portable Fire Extinguishers**

- Portable fire extinguishers including signage.

### **General**

- Equipment concrete plinths.
- Concrete sprinkler test pit.
- Identification and labelling of pipework, valves and equipment.
- Painting of equipment.
- Wall and floor penetrations.
- Sealing of wall and floor penetrations with approved fire rated sealant.
- Contractor to provide appropriate approved safety barriers and signage around excavations.
- Cutting and removing concrete paving and making good.
- Cutting and removing bitumen paving and making good.
- Trenching, backfilling and compaction as required for above services.
- Allow to revisit the site twelve months after the installation or when directed by the Client to recompact, fill and grade any trenches that have subsided.
- Provide traffic control in accordance with AS 1742 by an accredited person who shall possess a statement of attainment in Work zone Traffic Management issued by Transport SA. A copy of the certificate or card must be presented prior to commencement of work. The traffic control shall include signage and safety barriers around excavations to the Highways Department and Council approvals
- Electrical wiring and controls associated with above equipment.
- Noise and vibration control associated with above systems.
- Testing and Commissioning of the above systems.
- Allow for water truck to take water flow during main sprinkler and hydrant testing. Water to be disposed to suit EPA regulations.
- Weekly alarm tests to discharge to tundish connected to sewer.

- Maintenance and testing including weekly alarm tests
- Operating and Maintenance Manuals.
- Shop drawings and detailed design.
- Hydraulic calculations.
- "As-Installed" drawings.
- Hoisting of all equipment.
- All required scaffolding.
- Coordination of installation with other trades.
- Craneage as required for the installation of new equipment.
- Remove all redundant equipment, rubbish, etc from site.
- Remove all cuttings, swarth and rubbish from roof and gutters.
- Associated building works such as penetrations, openings, chasing, trenching, making good, manufacturer's access requirements unless detailed elsewhere in documents to be provided by other trades.
- Other works as shown on the drawings or in the specification.
- Equipment warranty, maintenance and servicing of the above systems for 12 months from the date of practical completion.

## 1.2 DOCUMENTS ISSUED

Drawings: The following drawings form an integral part of this specification:-

<b>Drawing No:</b>	<b>Description:</b>
B9025-F01	Wet Fire Services: Hydrant system level 1, drawing list, notes and legend.
B9025-F02	Wet Fire Services: Sprinkler system level 1
B9025-F03	Wet Fire Services: Floor plan level 2
B9025-F04	Wet Fire Services: Floor plan level 3-5
B9025-F05	Wet Fire Services: Details

## 1.3 ASSOCIATED WORKS

Apart from items scheduled below, provide everything necessary for successful and economical operation and to meet the intent of the Contract Documents for a fully automatic durable and trouble free system, including matters of minor design not specifically included in this document.

The Builder shall be deemed to have inspected the site, made allowances for all difficulties of access, installation, staging, testing commissioning, procurement, noise and vibration control etc and shall utilise their own experience and expertise to arrive at detailed design and installation allowances to achieve the objectives of the Contract Documents.

## 2 DESIGN AND COORDINATION INFORMATION

### 2.1 DESIGN BASIS

#### **Fire Sprinkler System**

Standard: To Australian Standard 2118.1 "Automatic fire sprinkler systems"

Occupancy Hazard:

- Car park : Ordinary Hazard Group 2 (OH2)

#### **Hydrant System**

Standard: To the Building Code of Australia and Australian Standard AS2419 Fire Hydrant Installation.

#### **Fire Hose Reels**

Standard: To AS1221 and 2441.

#### **Power Network Authority Main Supply System**

Equipment shall be designed for operation on the Power Network Authority electrical supply system rated at 415V, 30, 50Hz.



**Noise Emissions**

Noise emissions shall comply with data stated in “Noise and Vibration” section.

**Vibration Transmission**

Vibration transmission characteristics shall comply with data stated in “Noise and Vibration” section.

**2.2 EQUIPMENT WEIGHTS, SIZES, POWER REQUIREMENTS**

Equipment ratings, weights, sizes and power requirements have been transmitted to architectural, structural, and electrical engineering designers during the design phase of the project for inclusion in design and estimating processes.

Check all weights, sizes and electrical loads of relevant equipment proposed to be installed on the site and brands nominated in the Tender documents prior to committing to final reticulation sizes and equipment selections. Coordinate with relevant trades to ensure proper provisions and interface arrangements have been made, and include all due allowances for such coordination and perform without charge any minor adjustments.

**2.3 SPACING OF PLANT AND EQUIPMENT**

Ensure that plant and equipment items are readily accessible for operation and maintenance and that sufficient space is provided to comply with the manufacturer’s recommendations for overhaul, maintenance or repair.

Where other Contractors are operating in the areas concerned, determine the extent of their work and coordinate the layout of plant and equipment to be installed under this Contract, with that to be installed by the other Contractors.

**2.4 QUALIFICATIONS AND EXPERIENCE**

The Tenderer is deemed to have sufficient experience and expertise in Contracts of this nature and to have allowed all contingencies and minor works necessary to fulfil the intent of this Contract. Variation orders will not be issued for other than changes to the scope of works or scheduled capacities as initiated by the Architect.

**2.5 LICENSED PERSONNEL**

Fire Services: The work shall be performed by a company experienced in the installation and maintenance of Fire services using qualified and licenced tradespersons.

Electrical Services: The work shall be performed by or under direct supervision of an ‘A’ Class Electrician.

**2.6 AUSTRALIAN STANDARDS**

Australian Standards: Unless otherwise specified, materials and workmanship shall be in accordance with the relevant standard of the Standards Association of Australia.

Current Edition: A standard applicable to the works shall be the edition last published prior to the closing date for tenders unless otherwise specified.

Other Standards: Overseas standards and other standard documents named in the specification shall be applicable in the same manner as Australian Standards to relevant materials and workmanship.

**2.7 SETTING OUT**

Drawings show the design intent and indicate the locations of equipment. Set out each item of equipment in its optimum location for efficiency, appearance and maintenance access and to the approval of the Architect.

Ensure that plant and equipment items are readily accessible for operation and maintenance and that sufficient space is provided to comply with the manufacturer’s recommendations for overhaul, maintenance and repair.

**2.8 COORDINATION WITH OTHER TRADES**

Determine the extent of their work and coordinate the layout of plant and equipment to be installed under this section of the specification with that to be installed by the other trades to ensure there are no interface problems before installation commences.

## 2.9 GUARANTEES

Guarantee that the complete system within specified termination points shall safely, reliably, and efficiently provide the specified full load design capacity and performance throughout the full 12-month period following the date of issue of the Certificate of Practical Completion.

## 2.10 SPECIFICATION AND TENDER DRAWINGS

Ensure you have a full understanding of the technical and physical requirements of the system described in this specification and accompanying drawings, all appropriate codes, regulations and standards, manufacturer's data, requirements of regulatory and statutory authorities, and instructions issued by the Architect.

These drawings must not be used for architectural or structural work, but shall be read in conjunction with architectural, structural and all other relevant drawings.

Layouts: The services show the general layout of the fire services and do not include details of sets and bends required for the coordination between the structure and other trades. Due allowance shall be made in the tender price for all sets and bends.

## 2.11 TENDER DOCUMENTS

Ensure you have a full understanding of the technical and physical requirements of the system described in this specification and accompanying drawings, all appropriate codes, regulations and standards, manufacturer's data, requirements of regulatory and statutory authorities, and instructions issued by the Architect.

These drawings must not be used for architectural or structural work, but shall be read in conjunction with architectural, structural and all other relevant drawings.

Layouts: The services show the general layout of the fire services and do not include details of sets and bends required for the coordination between the structure and other trades. Due allowance shall be made in the tender price for all sets and bends.

## 2.12 SHOP DRAWINGS AND DETAILED DESIGN

The tender drawing show the intent of the design. The Contractor is responsible for the final sprinkler layouts and locations to comply with AS 2118 and the manufactures requirements, for the pipework layout and checking the sizes of all pipes taking into account the actual installation layout, bends, fittings and proposed sprinkler head against the site water flow and pressure to ensure the system meets all code requirements. Any changes from the tender drawings required to meet the above will not constitute a variation.

**Engineering CAD drawings will not be made available for the basis of the contractor's construction drawings.**

### Hydraulic Calculations

Requirement: Submit hydraulic calculation of the pipework system using an approved hydraulic analysis program.

Any items which the Architect may require to be detailed prior to installation shall be provided to shop drawing standard within seven calendar days of request. Note that Shop Drawings are deemed to include the detailed design and coordination with other trades and services to enable final selection of equipment, final detail design of all items and to enable fabrication and installation to proceed, including all necessary site measurement and coordination with existing and new works.

Shop Drawings shall include the following:-

- Fire Hydrant and Hose Reel Layout
- Fire Sprinkler Layouts to fully comply with AS 2118
- Pump installation details
- Equipment location and supports
- Sprinkler and pipework layouts
- Pipework locations, sizes and details
- Wall, floor, ceiling and roof penetrations
- Electrical wiring and controls
- Control Panel details

CAD: Drawings shall be prepared using CAD drafting format – AutoCAD Version 12 or later.

Drawings shall be to a scale of not less than 1:50 and larger as required.

Submit: Submit (4) four copies allowing 10 working days for the drawings to be examined and returned.

Compliance: The drawings will be examined for general compliance with the contract drawings and specification. Notwithstanding any endorsements, the Builder is not relieved of his responsibility for the adequacy of the installation.

Resubmission: Where drawings are returned for amendment, amended and re-submitted in sufficient time to prevent delays to the completion of the work.

All required shop drawings shall be prepared with all equipment, service lines, ductwork, cable runs and the like fully coordinated with those of all other trades and building elements. This requires locations and routes of the other engineering services (plumbing, fire, electrical etc) to be shown on the shop drawings to ensure there are no clashes prior to installation. Shop drawings shall incorporate sectional views (vertical) through ceiling and duct cavities to indicate the order of installation, and offsets required, for a fully coordinated installation.

Shop drawings may be submitted on a floor-by-floor basis but, in any case in adequate time to allow for examination by the Superintendent prior to commencement of ordering and fabrication.

### 2.13 AS INSTALLED DRAWINGS

Make AutoCAD V12 or later drawings of 'as installed' of all work. Show accurately the installed positions of all pipes, valves, ducts, motors, controls, access points, electrical connections, etc.

Submit progressively during the Contract at the end of each calendar month for work installed to that time. Submit as one transparency hard copy and one disk copy.

'As-Installed' drawings will be reviewed for quality and content in a similar manner as for shop drawings review. Where drawings are determined to be of sufficient quality and content for their purpose, they will be forwarded to the Principal for acceptance. Where errors, discrepancies or omissions are identified, they will be returned for correction.

Where drawings or calculations are returned for amendment, allow for amendments to be carried out and re-submitted in sufficient time to prevent delays to the completion of the work or awarding of Practical Completion.

The review of installed drawings is not intended to be a checking process, and the Contractor remains responsible at all times for the content, accuracy and scope of submitted documents.

**Tender drawings may be made available for the preparation of As Installed Drawings. These drawing shall have Secon Consulting Engineers name removed from the title block and shall be upgraded to as installed. A direct copy is not acceptable for an As Installed Drawing.**

### 2.14 SAMPLES

Submit samples of all items as Scheduled for approval.

Samples may, after approval by the Architect, be installed on the project provided they are suitably identified and their location is recorded and agreed to by the Architect.

For certain items where requested by the Builder, the first installed of each type may be accepted by the Architect as a sample.

Samples submitted during the Tender stage to determine style and appearance are not regarded as samples in relation to the Quality System, and will require to be resubmitted and approved by the Architect during the Contract.

### 2.15 AUTHORITIES TESTING

Carry out all tests required by the relevant authorities and perform without charge any making good necessary to obtain approvals. Give the Architect 48 hours' notice of such tests. Hand over test certificates and approvals on completion, leave a copy of all such items in the Maintenance Manual. Give sufficient notice for interruptions to supply.

### 2.16 AUTHORITIES, NOTICE OF ALTERATIONS AND CERTIFICATES

Carry Out Work: Carry out the work to the requirements of all relevant authorities, including:

- Local Council

- Health Authority Commission
- Safe Work Authority
- Insurance Council of Australia
- Building Code of Australia
- Fire Service Authority
- Power Network Authority
- Any other Authorities having jurisdiction over the Works

Make Application: Make formal application for supply or submit notice of alteration for each installation, pay all charges, obtain a Certificate on completion of the work and present to the Architect prior to Practical Completion. Include a copy of all such items in the Maintenance Manual.

Pipes, fittings, accessories and electrical items shall bear approval marks where and as required by the regulatory authority.

## 2.17 AUTHORITIES AND APPROVALS

Authorities: The public and other authorities whose requirements shall apply to the work in accordance with the general conditions and the ordinances, regulations, by-laws and the like specifying those requirements, shall include the following:

- Water Authority Corporation
- Local Council
- Health Authority Commission
- Safe Work Authority
- Insurance Council of Australia
- Building Code of Australia
- Fire Service Authority
- Power Network Authority
- Gas Authorities
- Any other Authorities having jurisdiction over the Works

Lodgement: Complete and lodge all necessary forms (including technical sections) for the submission of applications and approvals to the relevant authorities.

Approvals: The documents evidencing approval of such authorities, which are to be surrendered before the certificate or notice of Practical Completion is issued, shall include the authority's official certificate of completion.

Authorities Mark: Pipes, fittings, accessories and the like used shall bear approval marks where and as required by the regulating authority.

## 2.18 MAINTENANCE LIFTING

Where an item greater than 20 kg requires to be removed for maintenance or replacement, provide the following:-

- Suitable attachments on the item for connection of lifting equipment.
- Suitable attachments from the roof structure or roof slab, such as eye bolts or lifting beams, for the equipment to be removed and positioned over a fork lift, trolley or sled. Alternatively provide purpose built lifting frames. Show all proposed maintenance lifting arrangements on shop drawings and submit to the Architect for approval.

## 2.19 INSPECTIONS

Give 48 hours written notice to the Architect of all items requiring inspection, including prior to the sealing of shafts and risers.

## 2.20 WARRANTIES

Obtain and supply to the Architect at Practical Completion the warranties offered by the manufacturers of the equipment and accessories used in the Works.

### 2.21 CERTIFICATE OF COMPLIANCE

A certificate of compliance shall be supplied before each section of the finished work is handed over to the client, and at the completion of the project.

### 2.22 EXTRANEEOUS INTERFERENCE

Requirement: The electrical wiring and equipment shall operate without interference to radio, television, computer, communications or other systems within this and other local area installations.

### 2.23 OBVIOUS WORK

Minor Parts: If neither the specification nor drawings contain any mention of minor parts of work which in the opinion of the Architect is reasonable and obviously necessary for the satisfactory completion of the works, such parts shall be supplied and installed without extra charge.

### 2.24 EARTHQUAKE PROTECTION

Mount plant and equipment to withstand earthquake forces of 0.2 g horizontally and 0.2g vertically in addition to normal restraining forces.

Design of the mountings shall be such as to limit the dynamic force on equipment to 1.0 g.

### 2.25 DEMOLITION

General: Liaise with all concerned parties to ensure continuity of power supplies where applicable.

Surveys: Carry out all necessary surveys of other services to eliminate risk of damage during demolition.

Make Safe: Make safe all existing electrical services prior to demolition.

Removal: Remove all demolished equipment and materials from the site.

## 3 MATERIALS AND WORKMANSHIP ---

### 3.1 MATERIALS

Provision of Materials: Supply everything necessary for the proper completion of the work and for the proper performance of the systems.

Manufacturer's Recommendations: Unless otherwise specified, use manufactured items in accordance with current published recommendations of the relevant manufacturer.

Quality of Materials: Unless otherwise specified, materials to be incorporated in the works shall be new.

Protection of Materials: Store and protect material so as to preserve their quality and fitness for the Works.

Uniformity: Uniformity of type and manufacture of fittings, equipment and accessories shall be maintained throughout the installation.

### 3.2 LABOUR

Provision of Labour: Provide all qualified labour necessary for the proper completion of the work.

### 3.3 WORKMANSHIP

Best Practice: Properly and neatly execute all work to a high standard and best practice. Untidy work whether exposed to view or concealed will not be accepted.

Straight Lines: Run reticulated services in straight lines parallel or square to building surfaces with minimum joints and neat supporting systems.

Changes of Direction: Use long radius elbows or bends where practicable in preference to short radius elbows. Do not use mitered fittings.

Arrangement: Arrange pipework runs adjacent to and horizontally parallel with each other and with walls, ceilings, beams and the like. Keep at least 150mm above ground surface if under suspended ground floors. Provide adequate spacing, of at least 25mm between pipes, 50mm between pipes and electrical cables. Take off branches at right angles unless otherwise specified or shown on drawings.

Earthing: Pipework shall be electrically earthed adjacent to the source of gas supply.

### 3.4 CORROSION PREVENTION

Dissimilar Metals: Do not install copper in contact with steel, zinc, or other materials likely to generate electrolytic, galvanic or corrosive action. Make junctions between dissimilar metals with special fittings manufactured in suitable compatible material.

### 3.5 ACCESSIBILITY

Concealment: Where practical, conceal reticulated services so they are accessible within ducts or non-habitable enclosed spaces and ensure witnessed tests are conducted before enclosing. Obtain prior approval for the location of exposed services.

Enclosed Services: If services are to be enclosed so as to be not accessible after completion, obtain prior approval and record the actual locations on work as executed drawings, prior to enclosing.

Maintenance Access: Install plant items so they are accessible to manufacturer's recommendations for access, maintenance and servicing purposes, and comply with Occupational Health and Safety Regulations and Guidelines.

Access Hatch Locations: Plan the location and layout of plant and reticulated services to minimise the number and impact of maintenance access hatches. Where installation of these is unavoidable, obtain prior approval for the location and size and coordinate with the Builder for hatches to be provided.

Access Hatch Sizes: Unless noted otherwise, access hatches shall be 600 x 600 for full body access, and 300 x 300 for hands only access.

### 3.6 CLEANING

Pre-Cleaning: Before installation, clean reticulated services and equipment by a suitable method. Remove loose scale, burrs, fins and obstructions.

Capping Off: During construction, temporarily seal open ends and equipment to prevent the entry of foreign matter. Provide purpose-made covers of pressed steel or rigid plastic. Do not use wood plugs, rags, paper or the like.

Cleaning Out: Remove loose scale, dirt and the like from the pipework by flushing with clear water at a velocity sufficient to remove foreign matter and until clear water discharges at outlets. Leave the system free from foreign matter on completion.

Cleaning of Plant, Equipment, Reticulated Services: On completion of the work, clean all items externally and internally and leave free of dust, dirt, overspray, finger-marks, etc.

Storage: Store pipes on site in a suitable location to ensure the integrity of factory sealing up to the time of installation.

### 3.7 CHASES AND ENCASING

Approvals: Cut chases with a power saw unless otherwise approved. Do not chase reinforced concrete work without approval.

Expansion and Contraction: Services chased into masonry or encased in concrete shall not cross any movement joint, and shall be insulated so that expansion and contraction can take place without damage to the services or to the material or surface finish of the surrounding element.

Minimum Cover: Chased services shall have a minimum of 10mm mortar cover.

### 3.8 COVER PLATES

Requirement: Where pipework emerges from finished wall, floor or ceiling surfaces (other than surfaces within concealed spaces, plant rooms and the like) provide ornamental cover plates of matching colour where possible of non-ferrous metal or stainless steel, of nominal diameter 50mm greater than the diameter of the pipe, close-fitting and firmly fixed in place to the satisfaction of the Architect.

### 3.9 WALL, BEAM, FLOOR AND CEILING PENETRATIONS

Notification: Notify the Architect of the location and size of all penetrations.

#### General

Requirement: If different from those shown on service drawings, obtain approval from the Architect before proceeding.

Formwork Sleeves: Fabricated from 0.6mm galvanised steel, 20mm larger all round than the service and shall extend 50mm beyond finished surface. Position and fix these prior to wall, beam or floor construction, and remove on completion.

Making Good: Make good all penetrations to maintain the fire and/or acoustic rating of structure penetrated.

#### **Fire Rated Wall Penetrations (other than UPVC Pipes and Conduits)**

Requirement: Penetrations through Fire/Smoke wall shall be sealed with an approved epoxy seal and filled with an approved fire rated material to FRL rating of penetrated structure. Use Fyreguard, Fyre-Seal-IBS, Fyre-Mortar, or Fyre-Pillows together with Fyre-Seal-Mastic

#### **Fire Rated Floor Penetrations (other than UPVC Pipes and Conduits)**

Requirement: Seal the space between the services and the penetration with an approved epoxy seal and filled with an approved fire rated material. Use Fyreguard, Fyre-Seal-IBS, Fyre-Mortar, or Fyre-Pillows together with Fyre-Seal-Mastic

#### **Fire Rated Wall and Floor Penetrations (UPVC Pipes and HDPE Pipes)**

Requirement: Fire Prevention Collars to UPVC and HDPE pipes passing through floors and fire/smoke walls.

Approval: Fire Prevention Collars tested and approved to AS 1530.4 and AS 4072.1 with fire resistant rating equal to the floor or wall.

Installation: Floor Fire Prevention Collars cast into floor.

Manufacturer: "Hilti" or approved alternative.

#### **Fire and Vapour Sealed Penetrations through Fire Rated Walls and Floors**

Requirement: Use Fyreguard galvanised steel encased Fyre-Sleeves with pipework vapour seal lapped 50mm over each end of the steel sleeve.

#### **Cable Penetration of Fire Rated Ceiling**

Fyre-Spring: Use Fyreguard Fyre-Spring system.

#### **Light and Power Switches in Fire Rated Walls**

Fyre-Seal: Use Fyreguard Fyre-Seal-IBS strips to maintain fire integrity of wall.

#### **Core Holes**

Core Holes: Core holes through existing floors, slabs and walls. Prior to coring holes obtain approval for the location from the Structural Engineer. Seal penetration with approved fire rating material.

### **3.10 EARTHQUAKE BRACING (PIPEWORK)**

Requirement: Provide lateral bracing installed both along the line of the pipe and at 90° to the pipe. The bracing shall be capable of preventing sideways and longitudinal movement of the pipe. Support bracing same size members as the normal support. Longitudinal bracing at every second support bracket, in alternating directions along the pipe. Lateral bracing at every support bracket and alternating from side to side along the drain. Allow for qualified structural engineer to access and approve the bracing.

### **3.11 EARTHQUAKE BRACING (EQUIPMENT)**

Requirement: Provide support brackets from equipment to walls sufficient to ensure the equipment does not move in the event of earthquake forces of 0.2g horizontal and 0.2g vertically in addition to normal restraining forces. Provide details of supports for approval. Allow for qualified structural engineer to access and approve the bracing.

### **3.12 SUPPORTS**

Generally: Provide supports including hangers, saddles, bolted clips, anchor blocks to buried pipe and the like, sufficient to secure the pipework to adjacent surfaces, to restrain the internal forces of pressure pipings, and to support it at joints, at changes of direction, and at intervals suitable to the size and type of pipe, and as necessary to prevent sagging of pipework and vibration. Make provision for adjustment of gradient as required.

Proprietary Supports: Approved proprietary support systems shall be used.

Support Material: The same material as the pipe, or galvanised or non-ferrous metals, with bonded PVC or fibreglass woven tape sleeves to separate dissimilar metals. Provide fixing of compatible material.

Support Spacing: Space pipe supports, both vertical and horizontal, in accordance with the requirements of Australian Standard AS 2118 Automatic Fire Sprinkler Systems.

Additional Supports: Locate supports not more than 600mm either side of any change in direction, valve or piece of equipment.

### **3.13 FLEXIBILITY**

Expansion and contraction: Install the services with sufficient bends, expansion loops or expansion devices so that it can absorb its own expansion and contraction without developing excessive stresses in the pipework itself, in connected equipment, or in the supporting structure.

Vibration Isolation: Provide flexible connection between pipework and any equipment where vibration may be transmitted to the pipework.

### **3.14 JOINTS**

Generally: Keep the number of joints and junctions to a minimum. Use joints applicable to the materials used. Use demountable joints where permanent joints are impractical and at connections to all equipment and components.

Joints: Fit joints tightly, seal and make leakproof, with no internal projections, burrs or obstructions.

Permanent Joints: Provide welded or brazed joints where practicable, otherwise compression or screwed joints.

## **4 PIPEWORK**

---

### **4.1 GENERAL**

Requirement: Supply and erect pipework and equipment in accordance with the requirements of this Specification and associated drawings. Include all incidental and ancillary equipment necessary for the complete installation, the safe and efficient operation and the maintenance of the system.

### **4.2 STEEL PIPEWORK (BLACK STEEL)**

General: Steel tubes in general manufactured from Carbon Steel complying with medium grade black steel to AS 1074 or AS 1835 as applicable.

Bends: Bends and tees to have a radii of not less than 1.5 times the diameter of the pipe. Where these radii cannot be obtained use long radius bends and elbows as manufactured by Tubemakers of Australia.

Joints: Joint fully welded to AS CB15 or made using mechanical groove suitable for Victaulic couplings. Pipes shall be rolled grooved using on approved rolled grooving machine. Fittings, gaskets, etc, approved for use in fire service.

### **4.3 GALVANISED STEEL PIPEWORK (ROLLED GROOVE)**

General: Steel tubes in general manufactured from Carbon Steel complying with medium grade black steel to AS 1074 or AS 1835 as applicable and AS 1650 galvanised coating. Bury below ground in accordance with AS2419.

Bends: Bends and tees to have a radii of not less than 1.5 times the diameter of the pipe. Where these radii cannot be obtained use long radius bends and elbows as manufactured by Tubemakers of Australia.

Joints: Joint fully welded to AS CB15 or made using mechanical groove suitable for Victaulic couplings. Pipes shall be rolled grooved using on approved rolled grooving machine. Fittings, gaskets, etc, approved for use in fire service.

Support Spacing: Space pipe supports, both vertical and horizontal, in accordance with the requirements of Australian Standard AS 2118 Automatic Fire Sprinkler Systems.

Additional Supports: Locate supports not more than 600mm either side of any change in direction, valve or piece of equipment

### **4.4 GALVANISED STEEL PIPEWORK**

General: Steel tubes in general manufactured from Carbon Steel complying with heavy duty thickness up to DN 80 and medium duty thickness over DN 80 to galvanised steel to AS 1074 and AS 1650 galvanised coating. Bury below ground in accordance with AS2419.



Bends: Bend and tees to have a radius of not less than 1.5 times the diameter of the pipe. Where these radii can not be obtained, use long radius bends and elbows as manufactured by Tubemakers of Australia.

Joints: Bends and fittings galvanised screwed complying with AS 1074 and AS 3673. Fittings, gaskets, etc, approved for use in fire service.

Pipework 65dia and over shall be joined using screwed flanges to AS 2129 Table "E" with M12 bolts and suitable gasket. Threads shall be taper-taper.

#### 4.5 COPPER PIPEWORK

Tubes: To AS 1432.

Fittings: Shall be de-zincification resistant.

Flanges: Bronze brazing flanges (boss or plate type) and blind or blank flanges; full face flanges to AS 2129.

- Flange material: Not inferior in joining properties to alloy C92610 to AS 1565.

Joints: Make silver brazed slip joints. Either use a capillary fitting or expand one tube over the other leaving a minimum of clearance and an effective overlap not less than the following table:

Pipe Size:	Overlap (mm):
All	12

##### Brazing

To AS 1167 Clause 3.7. Use a minimum of heat and avoid damage to pipe and fittings.

Brazing alloy: To AS 1167 Part 1.

- Brazing copper to copper: Alloy B4 to Table 2
- Brazing copper to brass: A suitable copper to brass alloy

Pulled Bends: to AS 1135 Clause 3.4.3.

#### 4.6 PIPEWORK, DRAINS AND VENTS

All pipework shall be installed to enable the system to be drained. All drains and vent outlets shall be valved, plugged, clearly labelled and installed in easily accessible locations.

Pipework shall be graded and drained in accordance with AS 2118.

Adequate air bleeding facilities shall be provided to ensure a minimum of time between the operation of any sprinkler head and the operation of the control switch.

The air cocks shall be located in positions convenient to operation. The aircocks shall be connected to drain pipework which shall discharge into the drain pipework. Suitable signs shall be provided

#### 4.7 UNDERGROUND PIPEWORK

Requirement: Buried metallic pipes protected against corrosion by continuous wrapping in petrolatum tape to AWW C217. Protect underground water piping, valves and fittings utilising the "Denso" Superbond CPT 750 system installed to the manufacturers recommendations.

Cleaning: Prior to application clean the surface thoroughly to AS 1627-2 Class 2 Standard.

Primer: Prime the cleaned substrate with Superbond Cleaner.

Mastic: Where necessary, contour all sharp and irregular profiles with "Denso" Butyl Mastic Strip.

Tape: Spirally apply "Denso" Superbond tape without stretching with a 55% overlap to achieve consistent full double thickness. Select a tape width roughly equal to pipe diameter.

Manufacturer's Recommendations: Ensure system is applied in accordance with manufacturer's recommendations and arrange manufacturer to inspect application and forward written evidence of correct application.

Verification: Provide inspection and verification of all protective wrapping.

---

## 5 VALVES AND FITTINGS

---

### 5.1 GENERAL

Requirement: Valves shall have Water Authority Corporation and Fire Service Authority approvals. All valves and associated equipment shall be the standard product of approved valve manufactures. Sample valves may be required to be submitted for approval.

Suitability: Ensure valves are entirely suitable and correctly sized for each application and unless otherwise shown shall be of pipeline size. Valves and fittings shall be selected for an operating pressure of 1000kPa. And a working pressure of 1400kPa.

Accessibility: Install valves and accessories in positions easily accessible for operation and maintenance. Pressure gauges and similar instruments shall be readily visible after installation.

Valve packing: Ensure valve packing is suitable for the service and such packings shall be examined prior to installation and where necessary replaced.

Connections: The connection between each valve and adjacent pipes shall be made with either flange or union to permit removal of the valve without dismantling piping. Flanges shall not be lighter than Table "E" and shall in any case be heavier if working pressures so require. All isolating valves controlling water supplies and not monitored shall be secured with padlocked chain.

### 5.2 ISOLATING VALVES

- Gate Valves: Kitz FCL cast iron or approved alternative (outside screw and yoke).
- Butterfly Turnflo TICS3 or approved alternative (Gear operated).

### 5.3 NON RETURN VALVES (CHECK VALVES)

Check valves shall be:-

- Mission TRW "Duo Check" or approved alternative, spring loaded split plate type. Bodies shall be cast iron with stainless steel or bronze plates.
- Emerson VALVCHEQ figure SC03 or equally approved.

### 5.4 MONITORED VALVES

Requirement: Monitored valves shall be fitted with a micro-switch attached to the valve spindle and shall activate the alarm system when the valve is closed. The switch shall be so located that even partial closure of the valve will raise the alarm.

### 5.5 STRAINERS

Type: Strainers shall be bronze bodied Y type selected to suit the working pressure and temperature of the system installed.

Connections: Strainers up to 50mm diameter shall have screwed end connections and flanged connections over 50mm diameter.

Size: Strainers shall be of the same nominal size as the line in which it is installed.

Filter Screen: Strainers shall be provided with renewable bronze or stainless steel perforated filter screen (1.4mm hole x 2.5mm pitch).

Drain: Provide a valve drain connection on all strainers over 50mm. Drain shall discharge over tundish.

### 5.6 PRESSURE GAUGES

Type: Gauges shall be dial type of National or equivalent manufacture and be of the bourdon tube type, with an integral hexagonal connection and shall comply with AS 1349. Gauges shall be installed with a gauge cock.

Gauge cocks: Provide with all pressure gauges.

Scale: Instrument scale ranges shall be selected for the specific duty and the normal operating point shall be approximately mid scale.

### 5.7 GAUGE COCKS

Requirement: Install with all pressure gauges.

Type: Brass plug type with screw connections of 10mm nominal diameter.

Construction: Brass body, brass plug and sealing ring coated with TFE.

## **5.8 FLOW METERS**

Requirement: Provide flow meter pipe connection for testing sprinkler system.

Selection: Device selected to suit fluid, flow rate and pressures.

Annubar: Annubar sensing tubes permanently installed in pipework where shown. Install in strict accordance with manufacturers recommendations.

## **5.9 SOLENOID VALVES**

Requirement: Solenoid valve selected to suit the installed situation.

Construction: Brass body with internal part stainless steel and brass. Sealing material synthetic rubber (NBR) or Viton (FKM) to suit the installation.

Operation: Power to open power rating: 14watts 24V DC.

## **5.10 PRESSURE / FLOW SWITCHES**

Pressure and flow switches shall be installed where shown on the drawing.

Pressure and flow switches shall have adjustable settings.

Pressure and flow switches shall be totally enclosed, water proof and be suitable for the fire service with particular reference to water pressure and differential settings.

# **6 TRENCHING, BACKFILLING AND COMPACTION**

---

## **6.1 SERVICE TRENCHES**

Excavation: Excavate to the lines, levels and grades as required for underground services. Unless otherwise specified make the trenches straight between inspection points, junctions and the connection.

## **6.2 SPOIL**

Surplus Excavated Material: Remove from the site excavated material not reusable as backfilling.

Disposal: The Contractor shall be solely responsible for the safe and harmless disposal of surplus excavated material away from the site.

Re-Useable Spoil: Store where directed.

## **6.3 FLOORS AND PAVEMENT**

Approval: Mark the edges of floors or pavement to be removed and obtain approval prior to the execution of work.

Cutting: Cut floors and pavement with a concrete saw to a minimum depth of 100mm then remove the floor/paving.

Disposal: Remove floor/paving from site and dispose in an approved manner.

## **6.4 PIPELAYING**

Generally: Lay pipelines straight between required changes of direction, properly supported, with watertight joints aligned flush at internal surfaces.

## **6.5 BEDDING**

Pipe Bedding: Unless otherwise specified bed the pipework on a continuous underlay of pipe bedding material, compacted if granular, of minimum thickness after compaction as required by the relevant standard, but in any case not less than 75mm. Grade the bedding evenly to the required gradient of the pipework.

### **Underlay Material**

Requirement: Sand or selected excavated material free from hard or sharp objects or lumps, to AS 2032 Clause 4.2.1.2.

For Plastic Pipes: Fine aggregate graded as follows to AS 1152 sieves:-

**Sieve aperture (mm):      Percentage passing (by mass):**

6.7	100
4.75	90 to 100
2.36	60 to 100
1.18	40 to 100
0.6	20 to 90
0.3	8 to 50
0.15	0 to 20
0.075	0 to 10

**6.6 MINIMUM COVER OVER PIPE**

Unless overridden by regulatory authority requirements or otherwise specified, the following table shall apply:-

- pipes not subject to vehicular loading:	450mm
- pipes subject to vehicular loading - not in roadways:	600mm
- under sealed roadways:	600mm
- under unsealed roadways:	750mm
- pipes in embankments or subject to construction equipment loading:	750mm

**6.7 THRUST BLOCKS**

Thrust blocks shall be provided to transmit the loads imposed on the pipeline to adjacent soil or rock.

Thrust blocks are required wherever the pipeline:-

- Changes direction
- Terminates
- Changes diameter
- Is expected to develop a thrust, eg at a valve, etc.

Thrust blocks shall be designed as recommended by the manufacturer and to suit the trenching and soil condition on the site.

**6.8 BACKFILLING SERVICE TRENCHES**

Pipe Trenches: Compact so that the pipe is buttressed by the walls of the trench.

Backfill Material: Unless otherwise specified, backfill with general filling, with no stones retained on a 25mm sieve occurring within 150mm of the service.

Topsoil: Where service excavations occur in topsoil areas, complete the backfilling using the topsoil.

**6.9 SERVICE MARKER**

Provide continuous service marker tape over the pipe for the full length of the underground pipework system. The plastic marker tape shall incorporate metal strip. The marker tape shall comply with AS 2648.

**6.10 PLACING FILLING**

Extent: Place and compact filling so that the surface is constantly self draining.

Layers: Placing filling in layers not exceeding the thickness stated below measured loose and compact each layer.

Maximum Layer Thickness: 150mm.

**6.11 COMPACTION**

Compaction: To AS 1289.

Cohesive Material: Not less than 90% modified maximum dry density.

Non-Cohesive Material: Not less than 95% modified maximum dry density.

Protection: Protect the works during compaction from damage by compaction operations, compact by hand if necessary to prevent damage or disturbance to services, pipe joints and the like.

---

## 7 PAINTING, CORROSION PROTECTION AND IDENTIFICATION

---

### 7.1 SCOPE

Corrosion protection, painting and identification of all items to ensure the following:-

- Protection against moisture or corrosive agents which may be encountered during the service life of installed items.
- Painting to provide an attractive durable and cleanable surface in all areas.
- Identification of all plant, controls, valves, wires, terminals, controls, pipes, ducts, etc with durable labels and painted markers.

### 7.2 EXCLUSIONS

The following surfaces shall not be painted:-

- Fibreglass, PVC, stainless steel, chrome plated surfaces.
- Bearings, motor rails, adjusting screws, valve bodies and actuators etc.
- Proprietary equipment if supplied in manufacturer's standard paint colours and finishes and if not specified elsewhere to suit Architectural finishes.

### 7.3 CORROSION PROTECTION

Equipment and the total installation shall be designed to prevent the accumulation of moisture. Sharp corners shall be radiused and crevices shall be sealed by continuous seal welds, or use of an approved filler.

Dissimilar metals shall be prevented from contact by a 3mm air gap or 1.5mm of PVC insulator. Bolts, rivets and clips shall have a corrosion resistance equal to the component to which they are attached and shall be of the same noble metal.

#### Surface Preparation

Surfaces shall be prepared as follows:-

- Black Steel  
Shall be degreased and loose rust, scale and other matter removed by hand or power tool cleaning. The surface shall immediately be given one coat of zinc based primer.
- Galvanised Steel, Copper, Aluminium  
Shall be degreased and coated with vinyl etch primer.
- Zincanneal  
Shall be degreased and etch primed.
- Surfaces Subject To Oil Spillage  
Shall be degreased and coated with oil resistant undercoat and finishing coat.

#### Metal Coatings

Repair steel surfaces damaged by welding, or rust, by the application of a cold phosphating (phosphoric acid) solution. Wash off residue after the reaction is complete.

Galvanised steel pipe supports, fabricated components, bolts, nuts etc. installed in damp locations, in the ground, or exposed to the weather.

### 7.4 PAINTING PROCEDURES

Protect all adjacent surfaces from paint splatter and remove all spillage or spots so that adjacent finishes are in a clean and unmarked condition.

Use first quality lead free paints pre-mixed and delivered to site clearly labelled in the manufacturers sealed containers.

Thinning, mixing or adding of other colours or brands will not be accepted.

Paints for priming, undercoating, finishing and re-coating shall be compatible with each other and the surface conditions to be painted.

Primers shall be an approved zinc chromate or other metal work primer.

Steel surfaces shall be cleaned of oil and other manufacturing lubricants and etch primed prior to applying finishing coats. Galvanised surfaces are not required to be painted.

Damage to a manufacturers surface finish shall be restored to the original corrosion resistance of the finish. Epoxy coated surfaces shall be lightly abraded followed by an active solvent wipe and restoration of original coating thickness.

Weld spatter, slag, burrs and other surface irregularities shall be removed or repaired before surface protection is applied.

Submit details of paint materials and samples of surface preparation and paint finish to the Architect prior to proceeding. Surface preparation and paint finish samples may be the first installed items of each type.

## 7.5 PAINT COLOURS

Paint systems shall be full-gloss, solvent-borne paint appropriate to the pipework material and its location (interior, exterior or hot surface).

Paint colours shall be:-

Fire Services - Signal Red No. 537

Drains - Black

Submit colours to the Architect for approval prior to proceeding.

## 7.6 PLANT, EQUIPMENT AND VALVE IDENTIFICATION

Provide the following identification systems.

Equipment Nameplates: Engraved plates permanently fixed by mechanical means to factory-assembled items of equipment.

Lettering: Except for plant items shall be 5mm upper case engraved black lettering on a white background.

Lettering for plant items shall be 50mm high or appropriate smaller lettering if approved by the Architect.

Specific: Labelling for specific Fire Service Authority facilities such as boosters, etc shall be to the size, type and colour approved by the authority.

## 7.7 PIPE IDENTIFICATION

Pipework shall be identified to AS 1345.

Identification shall be by means of the basic identification colours of AS 1345, applied to the pipework either as full-length painting, or as painting in bands at intervals to AS 1345 clause 6, or as securely attached pipeline markers to AS 1345 clause 6 and figs. 1 and 2.

Location of Bands or markers shall be to AS 1345 clause 6.2

## 7.8 FINISHES SCHEDULE

Item	Colour
Sprinkler, Hydrant Pipework/Valves:	Signal Red No 537
Drains:	Black
Standard colour schedule to AS K185	

# 8 TESTING AND COMMISSIONING ---

## 8.1 TESTING

Requirement: Apparatus, material, equipment and instruments shall be properly calibrated and all labour necessary, and carry out the tests required by the Specification, Standards or regulatory authorities, in the presence of the clients representative and the authorised representative of the relevant authority for the service under test.

Compliance: On successful completion of tests, if required for identifiable elements of the installation, supply a certificate of compliance and affix a compliance plate.

Hydrostatic Tests: Fill the pipework with water and test at the pressure and for the duration stated in the HYDROSTATIC TEST TABLES, unless overridden by regulatory authority requirements.

## 8.2 HYDROSTATIC TEST TABLES

Service	Test Fluid	Test Pressure	Duration	Allowable Loss
Fire Services Copper or Steel	Water	1800 kPa	2 hrs	Nil

## 8.3 SOLENOID OPERATED PIPEWORK (DRY PIPE)

Requirement: Do not allow water to enter pipework downstream of solenoid valve. If water does not completely drain then dry with compressed air.

Testing: Test pipework with compressed air to 1800kPa.

## 8.4 COMPLETION

Completion: Check pipe joints, valve seats, strainers and the like. Replace if damaged and re-test.

Commissioning: After satisfactory completion, turn on control and isolating valves and leave the systems in full operating condition.

## 8.5 COMMISSIONING

Installation: Carry out tests necessary to prove that the installation meets the specified requirements and all the tests required by Authorities during an on completion of the works, and furnish details in writing of the tests carried out, test results and all certificates of approval issued.

Operation: Test all control equipment, pressure switches, alarms and similar equipment for correct sequence of operation and adjust as necessary.

General: In general, the operation of each piece of equipment individually and each completed service as a whole, shall be tested and correctly balanced to achieve the required satisfactory performance.

## 8.6 FINAL ACCEPTANCE TESTING

Carry out final acceptance testing in the presence of a GAPS representative. The tests shall demonstrate that the pumping system will perform in accordance with the manufacturers certified characteristics curve and that the driver, accessories, all alarms and ancillary equipment are correctly arranged and in proper working order.

Contact GAPS to arrange testing and obtain guidance on the appropriate test procedure.

# 9 CONTROLS ---

## 9.1 GENERAL

General: Automatic control equipment approved of design and manufacture.

Wiring: Provide all electrical wiring associated with the controls.

Requirement: Provide the controls and instruments that are necessary for the correct operation and protection of the equipment installed including all incidental work not specifically mentioned in this specification.

Provide wiring from FIP to pressure switches, main sprinkler control valves, monitored valves, solenoid valves, etc and back to enable monitoring of valves and alarms and operation of the solenoid valves.

Provide voltage free contact on monitored valves, pressure switches and solenoid valves.

## 9.2 SOLENOID VALVES

The Solenoid Valves (Pre-action) shall be opened from a signal from a detector within the area. When the valve opens water will be emitted into the dry pipe system.

# 10 ELECTRICAL ---

## 10.1 GENERAL

Requirement: Supply and install the complete electrical installation necessary for the satisfactory operation of all plant and equipment.

Ambient Temperatures: Materials, equipment, components and devices rated for the ambient temperatures within its immediate area.

## 10.2 STANDARDS

Regulation: Comply with the requirements of the SAA Wiring Rules AS 3000 and the Supply Authority having jurisdiction over the installation.

Supply: Equipment suitable for operation on, and clearly marked for, its respective electrical supply. Unless otherwise specified, all equipment suitable for 415V 50Hz, 240V 50Hz supply or 24V low voltage as required.

## 10.3 EARTHING

Requirement: Earthed in accordance with the requirements of the SAA Wiring Rules AS 3000 and the Supply Authority having jurisdiction over the installation. In addition earth exposed metal of all electrical equipment.

## 10.4 CABLING

Requirement: Fire Protection equipment wired in TNS red sheathed.

TNS: TNS cables PVC insulated and sheathed.

Standard: Cables multi-stranded copper conductors minimum sized 1.5mm and sized to suit the rating of the circuit and allowable voltage drop unless otherwise specified use AS 3008.1 to determine current rating and voltage drop.

Supports: Support all cables clear of ceiling tiles and support from structural members at 1000mm intervals in horizontal and 2000mm intervals in vertical runs. Use cable tray or catenaries. **DO NOT SUPPORT FROM CEILING HANGERS.**

Excess: Remove excess cables from ceiling spaces.

Exposed: Where unavoidably exposed to view or installed in plantrooms, install wiring in metal conduit.

## 10.5 ISOLATING SWITCHES

Requirement: Metal clad isolating switches supplied and installed adjacent items of equipment and as required by regulations.

Location: Isolating switches mounted to fixed structures so that removal of equipment for service or replacement is possible without switch removal.

## 10.6 CONTROL SWITCHBOARD CABINETS

Manufacturer: Switchboards constructed by an approved switchboard manufacturer.

Requirement: Provide a metal enclosure comprising of panels, lockable hinged doors, and the like, giving the required enclosure, segregation and degree of protection.

Construction: To AS 3947.1

Degree of Protection: To AS 1939.

Dust Seals: Provide resilient strip seal, of foam neoprene or the like, around each door, housed in a suitable channel or housing and fixed with an approved industrial adhesive.

Escutcheon Plates: Provide removable escutcheon plates with neat cut-outs for circuit breakers handles and the like. Fit chrome plated lifting handles or knobs to each escutcheon plate.

Floor mounting: Provide a metal plinth channel, not less than 75mm high, for mounting the complete control switchboard cabinet assembly on site. Securely fix plinth to floor and control switchboard cabinet.

Wall mounted: For flush or semi-flush control switchboard cabinets: provide a facing flange, of the same material and finish as the enclosure, and of a section that incorporates a return allowing the outside edge to fit neatly against the wall. Min flange width 32mm.

General: Equipment grouped on the control board according to function and type, with due regard to convenience of operation and maintenance. Layout of equipment within boards to allow adequate spacing for provision of labelling. Spare room capacity of 25% in all compartments shall be allowed in the cabinet for future expansion.

Definition: Switchboards and control boards for the purpose of this specification shall be classed as switchboards as defined by the Wiring Rules.

Wiring: Wiring within the control switchboard cabinets neatly grouped and loomed, except where enclosed in ductwork.



Fuses: Fused switch units provided with HRC cartridge fuses complying with AS 2005 and of suitable current rating for the plant installed. A set of three spare fuses for each fuse size installed, housed in suitable racks, shall be provided.

Fuse labelling: Fused switch units labelled with the fuse size installed in a visible position on the unit.

Main Switch: The Main switch(es) on control switchboards cabinets either of the circuit breaker type or on-load isolator type.

## 11 FIRE HYDRANT PUMPING SYSTEM

### 11.1 PUMPS GENERAL

The pump set shall incorporate Diesel engine driven centrifugal pump on a fully welded galvanised steel support frame with fuel tank, batteries, control panel and controls, etc. Pump set to be Australian Industrial pump systems or approved equivalent. Allow for the pump set to be assembled inside the fire pump room.

### 11.2 DIESEL ENGINES

Each diesel engine pump shall be direct coupled via a spacer coupling to a "Cummins" or equal approved Diesel engine. The engine shall be heat exchanger cooled, industrial engine and complete with control cubicle fitted and wired. Provide engine exhaust and silencer.

The Diesel engine shall have a maximum speed of 2600rpm.

The Diesel shall be complete with a 100 litre fuel tank and stand.

The pumpset will be capable of doing 5L/s @ 500kPa.

Note: The above figures do not include for a margin for pump deterioration as required by AS2118. Ensure the pumps selected include the margins.

The diesel engine shall have the following features:-

- Governor to maintain rated pump rpm within a range of 10 percent between shutoff and maximum load conditions of the pump.
- An over speed governor to shut down the engine at 20 percent above rated engine rpm. This device should have a manual reset only.
- Provide main battery contactors to allow manual start of the diesel in case of a control failure.
- Two storage battery units arranged that manual and automatic starting of the engine can be accomplished with either battery unit.
- The attempt to-start cycle should be six crank periods of approximately 15-second duration separated by 5 rest periods of approximately 15-second duration.
- Slow start/stop function.

### 11.3 SUPPORT FRAME

The pumps and engine shall be mounted on a fully welded galvanised steel support frame. The frame shall be supported from the slab via anti-vibration spring mounts.

### 11.4 FUEL TANK

The system shall incorporate a 100 litre fuel tank.

### 11.5 JACKING PUMP

Make: "Ajax JP 1516T" or similar approved vertical multi-stage centrifugal pump.

Capacity: Minimum capacity of 0.5 litres/second against a system head of 1500kPa with a maximum speed of 2900 rpm. The motor shall be a three phase 415 volt.

Construction: Pump construction as follows:-

Housing:	Cast Iron
Outer sleeve	Stainless Steel
Pedestal	Steel
Shaft	Stainless Steel
Impeller:	Stainless Steel

Guide Vanes      Stainless Steel

Seals: Self adjusting mechanical seals with diamond polished tungsten carbide face.

Bearings: Self lubricating.

Name Plate: Brass plate stamped to indicate the pump performance and fitted to the pump by the manufacturer.

Motor: Driven by an electric motor. Install motor on a base plate which is an integral part of the pump casing.

A 34 litre pressure tank shall be installed in the system.

### **11.6 FLEXIBLE CONNECTORS**

Flexible joints shall be "Flexmetallic" flexible rubber joint or approved alternative.

### **11.7 CONTROL PANEL**

A control panel shall be provided adjacent to the pump. The control panel shall comply with AS2941 and the requirements of the local fire brigade. The control panel shall be mounted on a metal support frame. Provide all electrical wiring between control panel and pumps.

The control panel shall incorporate the following:-

- Main electrical isolating switch
- Electrical motor starters
- Diesel pump starting
- Battery charges
- Cranking timer
- Speed switch
- Auto start isolating key switch for diesels, electric and jacking pump.

The control panel shall incorporate the following LED indicator lamps:-

- Power available to pump (all phases)
- Phase failure
- Battery chargers power supply failure
- Running
- Failed to start
- Auto start isolated
- Alarm silencer

The control panel shall incorporate the following instruments:-

- Tacho
- Hours run
- Oil pressure
- Temperature
- Alternator charge ammeter

### **11.8 ALARMS**

The system shall incorporate an audible alarm. The bell shall be activated when any of the following occur:-

- Battery charger power supply failure
- Engine running
- Engine failed to start
- Auto start isolated.

## 12 FIRE SPRINKLER SYSTEM

### 12.1 GENERAL

Additional: Allow a PC sum in the tender price for additional ceiling mounted sprinkler including pipework.

Requirement: Supply and install a complete automatic fire sprinkler system of the wet pipe type.

Pipework: Refer to schedules for pipework and fitting type.

Access: Provision shall be made for gaining access to all sprinkler heads.

### 12.2 SPRINKLER HEAD LOCATIONS

Obstructions: Ensure sprinkler heads are located at the required distances from walls, beams, light fittings and bulkheads etc. to comply with the particular sprinkler head as specified by the manufacturer.

Concealed space (CS) sprinkler heads shall be installed from the roof apex and obstructions etc. to comply with the particular sprinkler head as specified by the manufacturer.

### 12.3 SPRINKLER HEADS

Wet Sprinkler heads: Sprinkler heads shall be fast response (suitable for the application) of the sealed glass bulb type as approved by NFPA, FM and UL and designed for fusing temperatures as follows:-

- Ceiling Mounted	57 - 77 Deg C
- Ceiling Voids or Similar	79 - 107 Deg C
- Roof Spaces	79 - 107 Deg C
- Linen Chute	
- External	79 - 107 Deg C
- Exhaust Hoods	141 Deg C
- Exhaust Ductwork	141 Deg C
- Plantrooms	79 - 107 Deg C
- Lift Motor Room	141 Deg C
- Atrium	79 - 107 Deg C

The following types of sprinkler heads shall be installed in locations as indicated:-

Location	Type
Side Wall:	Brass exposed with wall flange painted white.
Ceiling Mounted	Brass fully recessed with base bracket and cover plate: Cover plate painted white.
Ceiling Mounted / Eaves	Semi Recessed with escutcheon plate. Fully painted white.
Ceiling Voids:	Brass Pendant.
Atrium:	Brass pendants painted white.
Roof Space/Exhaust hoods/ductwork:	Brass pendant.
External:	Brass pendants painted white with hood.
Plantrooms and exposed locations and linen chute:	Brass residential pendant (with wire guards).
Caprark:	Brass residential pendant
Meter Room	Brass residential pendant (with wire guards).

Note: Where indicated on drawing use quick response.

Freezer Sprinkler heads: Freezer Room heads: Standard Response Dry Pendent sprinklers "Viking" or equal approved. Freezer temperature - 50 Deg C

Spare Sprinkler heads: Supply spare sprinkler head of each type used as required by AS 2118. The spare sprinkler heads shall be stored in a locked box installed in the Sprinkler Control Valve Enclosure. The temperature rating of all spare sprinkler heads shall be clearly marked. Provide also in the box the required spanner to remove and replace the sprinkler heads.

## 12.4 MAIN CONTROL VALVE ASSEMBLY

Requirement: Main control valve assemblies comprise the following items, plus any other ancillary equipment necessary for the correct operation, control and testing of the system.

- Main stop valve (Gear Operated Monitored Butterfly Valve. Monitored valve to raise fault on FIP.
- Check Valve, (Duo Check).
- Alarm valve, "Viking or similar.
- Pressure switch to raise primary alarm on FIP. Pressure switch double pole type.
- Drain valve to enable the whole system to be drained (Gate Valve).
- Alarm test valve to enable the testing of the pressure switch without the operation of any sprinkler head (Gate Valve).
- Alarm Gong including pipework, isolating valve and strainer.
- Fire Service Authority Booster inlets.
- Annubar test probe and drain pipework.
- Pressure gauges arranged to indicate mains pressure and system pressure.
- Electric Jacking Pump including pipework and valves. Provide electrical wiring from jacking pump power supply located in enclosure.
- Provide Block Plan and emergency instructions within the cabinet.

Note: Main stop valve shall be permanently monitored.

## 12.5 JACKING PUMP

Make: "Grundfos" or similar approved multi-stage centrifugal pump.

Capacity: Minimum capacity of 0.2 litres/second against a system head of 1000kPa with a maximum speed of 2900 rpm. The motor shall be a single phase 240 volt.

Construction: Pump construction as follows:-

Housing:	Stainless Steel
Outer sleeve:	Stainless Steel
Pedestal:	Steel
Shaft:	Stainless Steel
Impeller:	Stainless Steel
Guide Vanes:	Stainless Steel

Seals: Self adjusting mechanical seals with diamond polished tungsten carbide face.

Bearings: Self lubricating.

Name Plate: Brass plate stamped to indicate the pump performance and fitted to the pump by the manufacturer.

Motor: Driven by an electric motor. Install motor on a base plate which is an integral part of the pump casing.

## 12.6 DRAIN SUMP

Requirement: Provide reinforced concrete sump in sprinkler valve enclosure. Connect to stormwater pipe and provide grate over outlet.

## 12.7 SUBSIDIARY SPRINKLER CONTROL VALVE STATIONS

Requirement: Subsidiary Sprinkler Control Valve Stations comprising the following items, plus any other ancillary equipment necessary for the correct operations, control and testing of the system.

- Monitored stop valve (gear operated butterfly) – fault alarm to/run in series with pressure switch to raise fault on FIP.
- Check valve (Duo check)
- Pressure switch to raise fault on FIP pressure switch double pole type
- Test valve
- Drain pipe

## 12.8 PRE-ACTION VALVE SET

Requirement: Pre-action valve set comprising the following:-

- Monitored stop valve (gear operated butterfly) – fault alarm to connect to FIP.
- Solenoid valve
- Test valve and drain

The solenoid valve connected to the smoke detection system to open in the event of a fire and allow water to enter into the dry pipe system.

## 13 FIRE HYDRANT AND HOSE REEL SYSTEM

### 13.1 MAIN CONNECTION

Requirement: Connect the fire service to the supply authorities main, all in accordance with the supply authority's requirements and using components approved by authority. Extend from connection to hydrants and hose reels shown on the drawings.

The fire service extends more than 3 metres into the site. Provide check valve within 3m of the boundary to comply with Water Authority. Turnflo Wafer or similar approved of size of pipe. Mount above the ground on a concrete plinth.

### 13.2 UNDERGROUND PIPEWORK

Requirement: Protective Wrap.

### 13.3 PIPEWORK

Requirement: Refer to schedule.

### 13.4 VALVES

General: Valves approved by Water Authority Corporation and Fire Service Authority.

Install: To AS 2419

Maintained: To AS 1851.4

Hydrant Valves: Millcock 90 degree valve incorporating 65mm dia. Quick coupling outlet connection approved by the relevant Fire Authority, together with plastic cap and captive chain.

Isolating Valves: Proprietary Item: Gate - Kitz FCC cast iron outside screw and yoke or, Proprietary Item: Butterfly - Turnflo.

Check Valves: Proprietary Items: Duo - TRW Mission Duo.

Booster Inlet: Female 65mm Fire Service Authority incorporating non-return valves.

### 13.5 BOOSTER ASSEMBLY

Description: Assembly incorporating hydrant valves, booster inlets, isolating valve and check valve as detailed. Strap and lock isolating valve in open position.

Photo Etched Diagram: Install within the booster cabinet a photo etched schematic diagram showing protected building, water supply sizes, location of Water Authority Corporation mains, pipework, control valves, hydrants and hose reels and any unusual features of the installation.

Pressures: Permanently fix to the booster cabinet a red plate with white 25mm block lettering with the wording:

Safe Working Pressure: 1.2MPa

Test Pressure: 1.8MPa

Boost System To: Mpa for ..... l/m at 0.7MPa

Boost system pressure to be filled in after Fire tests.

### 13.6 FIRE BOOSTER CABINET

Requirement: Install weatherproof metal cabinet to cover the booster assembly. Design the cabinet to Fire Service Authority requirements.

Manufacture: Fully welded angle iron frame to provide rigid support for 1.6mm galvanised sheet cover. Cabinet to incorporate brass hinged doors to enable full access to all components. Budget type locks (square 8mm to 5mm taper key) to doors. Incorporate hold open device to doors.

Plinth: Mount cabinet on a 75mm concrete plinth graded to ensure water shed. Finish cabinet sheetmetal cover 25mm above top of plinth.

### **13.7 HYDRANT RISER PIPE**

Riser Pipe: Riser pipe shall be galvanised pipe. Provide concrete base to riser pipe.

Paint: Paint riser pipe white and hydrant valve red.

### **13.8 FIRE HOSE REELS**

#### **Requirements**

Design: To AS 1221

Installed: To AS 2441

Maintained: To AS 1851.2

Hose: 36 metres of 19mm dia with 6mm dia nozzle and operating handle.

Supply Pipe: Incorporating a gate valve with a device to secure the hose nozzle when the valve is shut.

Instruction Plate: Permanently attach to the hose reel an instruction plate.

### **13.9 FIRE HOSE REEL BACK FLOW PREVENTION**

Backflow prevention: Install Double Check Valve (DCV) to incoming water supply to fire hose reel.

### **13.10 FIRE HOSE REEL CABINET**

The fire hose reel shall be mounted in a metal fire hose reel box with hinged door.

### **13.11 PORTABLE FIRE EXTINGUISHER**

#### **New Portable Fire Extinguishers**

Refer to drawings for type and size.

Classification and Fire Tests: To AS 1850.

Maintained: To AS 1851.1

Signage: Provide signs for portable fire extinguishers

Portable Fire Extinguishers

- Dry Chemical 4.5kg: To AS 1846.

#### **Locations**

The drawings show the general location of the portable fire extinguishers. Prior to installing the portable fire extinguishers or signage obtain approval for the final locations.

#### **Installation**

Mount on purpose made brackets and provide instruction plates all to requirements of AS 2444.

---

## **14 MAINTENANCE**

### **14.1 SCOPE**

Provide a comprehensive maintenance service from the date of Practical Completion during the 12 months Defects Liability Period for all items in the Contract, including regular preventative maintenance and attendance at breakdown call-outs on 24 hours per day, 7 days per week.

Maintenance shall include routine servicing in accordance with manufacturers recommended procedures to achieve safe and reliable operation, the attendance at all emergency call outs, and the repair of break downs including provision of associated consumables and replacement components.

Maintenance shall be at manufacturer's recommended intervals or 3-monthly, whichever is the most frequent.

Service Contract: Prior to the expiration of the Defects Liability Period, prepare and submit an annual service contract for consideration.

Shut Down: Where it is necessary to shut down any part of the installation for service, the procedures laid down by the Fire Service Authority in their "Conditions of Connection" shall be strictly adhered to.

## 14.2 MAINTENANCE REQUIREMENTS

Service Visits: Make service visits at the specified intervals and carry out the regular maintenance procedures.

Emergency Calls: Attend emergency calls within 24 hours of the time of a generated call.

Faults: Make good faults or damage caused by defects in the installation, and replace defective parts.

Materials: Supply the necessary maintenance materials including lubricants and cleaning materials.

Program: Before the start of the maintenance period, submit to the Architect a maintenance program showing the proposed dates of required service visits. State the contact telephone numbers of the service operators to be provided, and describe the arrangements for the prompt attention to emergency calls.

Results: Record the result of each service visit in the log book, including comments on the functioning of the system, work carried out, items requiring corrective action, adjustments made, name of service operator and obtain the signature of the Principal's designated representative.

Report: Report to the Principal's designated representative on arriving and before leaving the site.

End of Defects: At the end of the defect's liability period, make a final service visit and upon satisfactory completion of the above procedures, certify in writing that the system is operating correctly and has been fully and properly maintained during the Maintenance Period.

## 14.3 MAINTENANCE SCHEDULE

Routine Maintenance: The following minimum routine maintenance shall be carried out together with additional maintenance necessary to ensure optimum performance and correct operation of all equipment installed under this Contract.

Equipment shall be tested and maintained in accordance with:-

- AS 2118 Automatic Fire Sprinkler System
- AS 1851 Part 1 Portable Fire Extinguishers and Fire Blankets
- AS 1851 Part 2 Fire Hose Reels
- AS 1851 Part 4 Hydrants
- Building Code of Australia
- The requirements of the Fire Service Authority

## 14.4 SERVICE REPORTS

Requirement: Submit a written report not later than (7) seven days following regular visits and each visit to site to investigate an abnormality. The report shall include dates, diagnosis of fault, repairs or adjustments made and replacement parts and materials used.

## 14.5 OPERATING AND MAINTENANCE MANUALS

Requirement: Prior to Practical Completion submit for approval one (1) copy of the Operating and Maintenance Instructions.

Operation: Include all necessary demonstrations and explanations of the correct sequence of operation and the function of each piece of equipment under both automatic and manual control.

Size: Pages shall be reinforced loose leaf A4 size.

Plans: "As Installed" plans (hard copy and computer disc copy) showing the layout and location of all equipment installed.

Submission: Following submission and approval of draft copies, prepare three (3) copies of an approved manual.

Typed: The manuals shall be written in clear concise English, printed or typed on durable printing paper with each page consecutively numbered. Provide dividers between sections with plastic covered labelled tags.

Binding: Bind the manual in a black vinyl hardback A4 folder with gold lettering. The front cover to include the following wording:-

- **1 (LOT 181) GLENBURNIE TERRACE, PLYMPTON (APARTMENTS)**

- Wet Fire Services
- Secon Consulting Engineers
- "Contractors Name"

The spine to include the following wording:-

**1 (LOT 181) GLENBURNIE TERRACE, PLYMPTON (APARTMENTS)**

- Wet Fire Services

Components: The components of the manuals shall include the following:-

- Title page with telephone numbers of maintenance personnel.
- Index and sub-index for each section.
- Description of each system and operating instructions. Include setting up, control, alarm, test and emergency procedures.
- Schedule of inspection and preventative maintenance and repair instructions for each item of equipment.
- Parts list and equipment details and source of supply of replacement components.
- Set points of controls and test sheets.
- Test results including settings.
- Corrected "As-Installed" drawings on DWG CAD format (print copies and one disc copy).

Technical Manuals: The Manuals shall include but not be limited to the following items:-

- Fire sprinklers
- Valves and fittings
- Pumps
- Fire hose reels
- Portable fire extinguishers

Manufacturer's Catalogue: Manufacturer's catalogues, instructions and generally descriptive pamphlets as appropriate shall be included, both to reduce the text and to provide prime source information.

#### **14.6 SERVICE BOOK**

Arrange all service personnel whether for routine or breakdown maintenance to:-

- 'log in' in the log book on arrival in site.
- provide a written report in the log book describing nature of the call out, problems identified and action taken.
- have the report witnessed by the Principal Representative or his delegate.
- 'log off' on completion of the work.

#### **14.7 PRINCIPAL'S INSTRUCTION**

At times to be agreed instruct the Principal's operational maintenance staff in the recommended methods of operation and maintenance of the systems.

#### **14.8 LOG BOOK**

Requirement: Prepare and maintain a Log Book.

### **15 SCHEDULE OF MATERIAL**

#### **15.1 PIPEWORK**

##### **Hydrants**

Below Ground - Copper Type A or "Medium Grade" Galvanised steel.

Above Ground Black Steel "Medium Grade" or Copper Type A or "Medium Grade" Galvanised steel.

##### **Sprinkler Pipework**

Below Ground: Blue Brute Class 20 or Copper Type B

Above Ground: Medium Wall Steel Pressure Pipes or "Medium Grade" Black steel.



Downstream from solenoid valves: "Medium Grade" Galvanised steel.

**Drainage Pipework (Underground)**

From Tank Overflow: UPVC 5H Class

Drain Pipe from Box Tundish in Pump House: UPVC 5H Class

**Hydrant Risers/Pillars**

Pipe: "Medium Grade" Galvanised Steel

Note: Paint riser pipe white with blue reflective ring to riser 150mm below centre line of hydrant outlet.

Paint hydrant red "Medium Grade" Galvanised Steel

---

**16 SCHEDULE OF PAINTING AND IDENTIFICATION**

---

Pipework:	Black Steel: Fully paint above ground Identification lettering and direction arrows
Labelling Items:	Valves, equipment, gauges instruments and similar
Equipment:	Protect from corrosion or weathering
Equipment Exposed:	Fully paint

**17 FIRE SERVICES TENDER FORMS****17.1 TENDER PRICE**

We the undersigned hereby provide our Fixed Lump Sum Tender Offer to carry out the entire works in accordance to the specification, drawings, addenda's and general conditions of contract

TENDER PRICE: \$.....

ADDENDA'S No: \$.....

GST: \$.....

**TOTAL TENDER PRICE: \$ .....**

Amount in words:

.....

.....

COMPANY:.....

ADDRESS & CONTACT Ph: .....

SIGNED BY: .....

TITLE: .....

DATE: .....

**FIRE SERVICES TENDER FORMS****17.2 SUMMARY OF COSTS**

The costs indicated below make up the "Tender Price", including supply, delivery, installation, testing and warranty maintenance, overhead and profits for the various sections of the work.

<b>Item</b>	<b>Fixed Lump Sum</b>
SA water connection PC Sum	\$ 100,000.00
Fire Sprinkler incl. Pipework labour & materials	\$ .....
Fire Hydrant incl. Pipework labour & materials	\$ .....
Pump set incl. Pipework labour & materials	\$ .....
Fire Hose Reel incl. Pipework labour & materials	\$ .....
Fire Extinguishers	\$ .....
O & M manuals incl client tuition	\$ .....
Testing, Commissioning & balancing	\$ .....
52 Weeks Preventative Maintenance & service	\$ .....
Sundries / Misc	\$ .....
Additional sprinkler heads PC Sum	\$ 10,000.00
GST where applicable	\$ .....
<b>TOTAL TENDER PRICE</b>	<b>\$ .....</b>

**FIRE SERVICES TENDER FORMS****17.3 SPRINKLER HEADS**

Location	Ceiling	Void	Exposed	Residential Sidewall	Residential Pendent	External Drencher
Manufacturer						

**SCHEDULE OF RATES****17.4 LABOUR AND MARK-UP**

Labour rates applicable to the contract and include all on-costs, loading, allowances, overhead recovery and profits, excluding GST.

	Normal Time	Time & Half	Double Time
Electrician – installation	\$	\$	\$
Plumber – installation	\$	\$	\$
Fire Contractor – Installation	\$	\$	\$
Foreman / Leading Hand – Site	\$	\$	\$
Commissioning Technician – Site	\$	\$	\$
Project Manager – Site / Office	\$	\$	\$
CAD Draftsperson – Site / Office	\$	\$	\$
Maintenance / Service Technician	\$	\$	\$

Mark-up to be applied on the total costs to purchase goods and materials:- %

Mark-up to be applied on the total costs of sub-contractors:- ..... %