Australia

UNSW School of Mechanical and Manufacturing Engineering Buildings J17 & J18

Hydraulic and Fire Services Concept Design Report

For:

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ATTACHED SKETCH DRAWINGS

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HSK-01	DRINKING & BORE WATER SCHEMATIC CONCEPT

1. INTRODUCTION

The purpose of this Concept Design Report is to establish the hydraulic and fire systems design criteria to service the proposed refurbishment of the UNSW J17 and J18 Mechanical Engineering Buildings.

It is expected that this document will evolve during the current design development phase and finally be signed off by the client prior to commencement of scheme design.

2. SITE DESCRIPTION

The site comprises of buildings J17 and J18 in the Mechanical and Manufacturing Engineering Precinct at the University of NSW, Kensington campus. The works comprise of the re-building and refurbishment of J17, the refurbishment of J18 and a covered area of Willis Lane.

3. SCOPE OF WORKS

The hydraulic and fire services included in our scope of works for Buildings J17 and J18 are:

- Relocation and disconnection of existing and/or redundant fire and hydraulic services (excluding Authority mains)
- Water, gas and sewer connections to the utility infrastructure
- Sanitary plumbing and drainage
- Trade wastewater drainage.
- Stormwater downpipes and gutter sizing and rainwater re-use options.
- Drinking, hot and bore (non-potable) water systems
- Natural gas
- Fire sprinklers
- Fire hydrants.
- Fire hose reels
- Portable fire extinguishers
- Fire Detection and EWIS

The services designs will be documented on the Scheme Design and Detailed Design drawings and specifications for Contract.

4. SHARING OF SERVICES WITH OTHER BUILDINGS

The fire and hydraulic services for building J17 and J18 are proposed to be generally stand-alone systems, metered separately and with independent connections to the utility mains within the Campus where required. For any systems that are proposed to be combined for cost,

convenience or other reasons, it will be clearly stated on the scheme design drawings and discussed with the design team and UNSW.

Regarding the fire systems, connections to other buildings for alarm purposes will be considered if requested by the UNSW or the project Fire Services Engineer.

5. STAGING

The design will be documented to allow for the staging of this project which is understood to be as follows:

Works in J17 will be divided into two stages:

- Stage 1 – South Wing, demolition and new build with new services
- Stage 2 – North Wing renovation with new services

Works in J18 will be divided into four stages:

- Stage 1 – Ground Floor, South Wing renovation with new services
- Stage 2 – Ground Floor, North Wing renovation with new services
- Stage 3 – Level 1, South Wing renovation with new services
- Stage 4 – Level 1, North Wing renovation with new services

6. UNSW DESIGN & CONSTRUCTION REQUIREMENTS

The requirements of the UNSW Design and Construction Requirements E.1 Hydraulic Services will be complied with where possible. Any deviations from these requirements will be scheduled on the cover sheet drawing for each service.

7. HYDRAULIC SERVICES

7.1. EXISTING SERVICES

7.1.1. Generally

Existing services identified from existing services drawings, site inspections and services searches by specialist surveyors will be documented for information, removal and/or relocation as required.

7.2. AUTHORITIES & UTILITY MAINS CONNECTIONS

7.2.1. Sydney Water Section 73

If required by the conditions of consent for the project, a Sydney Water Section 73 Sub-divider/Developer Certificate will need to be applied for.

Given that both buildings currently have water and sewer connections we do not anticipate any specific requirements or charges.

7.2.2. Sewer main connection

The existing discharge from both buildings connects to the sewer in Engineering Road and will be maintained and re-used.

7.2.3. Water main connection

The existing drinking and fire water supply to both buildings connects to the water main in Engineering Road.

J17 existing water meter is located in the landscaped area adjacent to Engineering Road and will be retained there.

J18 existing water meter and supply is located in the link bridge over Willis Lane and will be relocated to be adjacent to J18.

Backflow prevention devices will be provided to each building in accordance with UNSW requirements.

A new metered connection will be made to the Bore water supply main, subject to approval from the UNSW.

7.2.4. Natural Gas

The existing gas supply to both buildings is an un-metered service which connects to the gas main in Engineering Road

The existing connection will be maintained and re-used, subject to a review of its capacity, with both buildings metered and pressure regulated separately.

The meter and regulator assemblies will be located adjacent to each building being served.

7.2.5. Compliance

All systems will comply with the relevant requirements of the:

- National Construction Code
- AS3500 Parts 1 to 4 - National Plumbing and Drainage Code
- Plumbing Code of Australia
- Sydney Water Corporation
- UNSW Design and Construction Requirements, Section E.1, Revision 5.2 or as updated at time of design.

7.3. ROOF DRAINAGE

DESCRIPTION
The new roof drainage systems will be designed to cater for a 1:20 or 1:100 year storm event, as applicable to the location.

The new South Wing to J17 and the proposed covered area over Willis Lane will be provided with a new roof water drainage system connected to the existing in-ground system.

J18 roof is being replaced and new gutters and downpipes will be provided.

There is no requirement for stormwater on-site detention or rainwater re-use systems.

7.4. SEWER DRAINAGE

DESCRIPTION
The sewer drainage system to J17 and J18 will be a fully vented system connected to the existing drainage services.

Automatic air vents (AAV) will not be used unless unavoidable, and then placed in easily accessible locations.

The pipework and fittings will be uPVC.

7.5. TRADE WASTE PLUMBING & DRAINAGE

DESCRIPTION
The trade wastewater drainage requirements will be assessed from the detailed design requirement for both buildings.

The systems will include, subject to design development and Sydney Water requirements:

- A dedicated trade waste drainage system to collect all wastewater discharge, separate from general waste water.
- A grease trap to service the proposed café.
- Basket trap type floor wastes to be used where required in specific areas such as wash down areas etc.
- Flow meters and sample points if required to facilitate on-going monitoring of the system.

All trade waste water pipe work will be a chemical resistant type such as High Density Polyethylene (HDPE).

7.6. SANITARY PLUMBING

DESCRIPTION
The sanitary plumbing will consist of drainage stacks and vents collecting waste water from the amenities, tearooms, etc.

All drainage pipework will be concealed in service risers, ceiling voids, etc., and accessible clear-outs will be provided adjacent to WCs and at the base of all stacks.

Any special UNSW requirements relating to the support of pipework in a blockage situation will be complied with.

Air conditioning condensate drainage will be collected via tundishes.

The pipework and fittings will be uPVC.

7.7. COLD WATER (Refer HSK-01)

DESCRIPTION
There will be separate incoming drinking water supplies for J17 and J18, pressure boosted as required, and directly fed to all fixtures and fittings and other services requirements with the exception of the WC's, which are proposed to be fed with Bore water, subject to approval.

The minimum pressure to all fixtures will be 250kPa (2.5 Bar).

The piping material will be Type B copper with silver soldered joints. Where underground pipework is larger than 80mm it will be polyethylene with fusion welded joints.

INCOMING SUPPLY
The incoming drinking water supply to each building will include the following:

- Pulse water meter assembly connected to the UNSW EMACS Energy Management System
- Backflow prevention devices (RPZD) to provide site containment in accordance with UNSW requirements
- Automatic backwash to 200 microns with valved by-pass.

7.8. HOT WATER (Refer HSK-01)

The provision of hot water throughout J17 and J18 will be discussed in detail with the design team and UNSW at scheme design, but the following is proposed at this stage:

DESCRIPTION
J17 to be provided with a central gas fired, solar boosted Rotex system with specific details to be confirmed. The hot water will be recirculated throughout the building with a flow and return piping system so as to ensure a rapid supply of hot water to the outlets and to maintain a maximum 5 degree temperature drop in the system.

For building J18, due to the size of the building and the low hot water use requirements, it is proposed to use instantaneous electric point of use water heaters, such as the Stiebel Eltron range, at each fixture.

Where, thermostatic mixing valves are required, they will be located either in a stainless steel lockable box or wall cupboards within the room.

No warm water will be provided to the public toilets except for accessible toilets, as per the UNSW Design and Construction Requirements.

The piping material will be as for Cold Water.

The piping insulation will be Kemlag where chased in wall and otherwise Thermotec 4-Zero.

7.9. BORE WATER (Refer HSK-01)

The use of Bore water to J17 and J18 will be subject to further discussion with the design team and UNSW engineers, but the following is proposed at this stage:

DESCRIPTION
The existing Bore water supply system in J17 will be retained and used to feed the WC's and other non-potable water requirements such as cooling towers, chilled water systems and irrigation systems, as agreed during the design phase.

The supply will be metered and fed to a roof level averaging water tank on J17, and the tank outlet pressure boosted if required, and connected the WC's. The water tank will also have a back-up drinking water supply in accordance with UNSW requirements.

The use of bore water to building J18 has been considered, however, there are a limited number of fixtures in the building and the use of bore water may not be viable. This will be discussed further with the design team once the extent of non-potable water use is established.

The piping material will be PE-HD or PE-MD, PN16 or above, and lilac colloured.

7.10. NATURAL GAS SERVICE

DESCRIPTION
The incoming metered gas supply to each building will be used for hot water generation, mechanical heating requirements, and other uses as identified during the design phase.

The peak gas demand will be assessed and systems sized accordingly with all calculations included on the drawings.

If a Gas Guard system is required, it will be activated by a flow switch on the fire sprinkler alarm bell supply and with no signal from the FIP to stop false alarms.

7.11. SANITARY WARE & TAPWARE

DESCRIPTION
The selection of sanitary ware and tapware will be by the architect in consultation with Waterman AHW and to satisfy the UNSW Design and Construction requirements.

COMPLIANCE
All tapware and sanitary fittings will be Watermark approved.

7.12. ESD & ENERGY EFFICIENCY

The following will be provided to enhance the sustainability of the development and increase the energy efficiency.

DOMESTIC WATER SYSTEMS
Basins in public toilets will be fitted with a single cold water timed flow tap

Provision of flow limiting devices on the hot and cold water systems to achieve the following maximum flow rates:

Item	Flow Rate (l/m)	WELS Star Rating
Basin	4	5 Star
Shower	9 - 10	2 to 3 Stars
Sink	7.5	4 Star

Toilets to incorporate a 4A water efficiency rating.

8. FIRE SERVICES

8.1. INTRODUCTION

Fire services generally will be provided in accordance with the deemed-to-satisfy (DTS) requirements of the BCA, relevant Australian Standards, and the requirements of the NSW Fire Brigades and other authorities having jurisdiction over the works, unless otherwise modified by the requirements of a fire engineering solution for this project.

The fire services will include:

- Automatic fire sprinkler system throughout the building.
- External and or internal fire drenchers where required as part of the Fire Engineers Solution.
- Fire hydrant and hose reel systems.
- Fire detection system.
- Emergency warning and intercom system (EWIS).
- Portable fire extinguishers.

8.2. FIRE SPRINKLER AND HYDRANT SUPPLY

Building J17
A new fire sprinkler and hydrant grade 3 water supply is proposed feeding separate hydrant and sprinkler booster assemblies and pump-sets for each service.

The electric sprinkler pump (fed from an electrical essential service supply) and diesel hydrant booster pumps (2 off) will be located within a plant room in accordance with AS 2941: Fixed fire protection installations – Pump-set systems. The pump room will require direct egress to outside.

The new fire brigade booster assemblies will be located on the building off Engineering Road.

Building J18
Similarly, a new fire sprinkler and hydrant grade 3 water supply is proposed feeding separate hydrant and sprinkler booster assemblies and pump-sets for each service.

The pump arrangements will be similar to J17.

Pump requirements and duty will be subject to review at scheme design.

Piping will be medium grade galvanised steel with galvanised steel rolled grooved couplings.

8.3. FIRE SPRINKLER SYSTEM (Refer FSK-02)

The fire sprinklers for both building will be designed to comply with Australian Codes and Standards relevant to the works including:

- AS 2118.1 – 1999: Automatic fire sprinkler systems – Part 1: General requirements; and
- National Construction Code, including NSW variations.

The sprinkler systems will be installed to meet the fire sprinkler pressure and flow demands required by the occupancy hazard classifications of each building.

Sprinkler alarm connections are to be provided from the Fire Indicator Panel to UNSW Security Monitoring System providing alarm and fault signals to the NSW Fire Brigade.

Sprinkler control valves for both buildings are proposed to be in a sprinkler valve and pump room within each building where the equipment will be monitored as required by AS 2118.1 for supervisory and alarm purposes.

Sprinklers will be provided to protect the whole building to comply with BCA and AS 2118.1 requirements. Sprinklers will generally be fast response 68°C, apart from plant rooms and similar areas, which will be provided with fast response 79°C sprinklers.

External wall wetting drenchers will be provided to protect openings as required by the Fire Engineering Solution.

Areas such as sub-stations and main switch rooms will incorporate Multiple Jet Control's (MJC's) as required by Code and any other authority requirements.

8.4. FIRE HYDRANT SYSTEMS (Refer FSK-03)

Both buildings will bel be designed to comply with Australian Standards and Codes relevant to the works including:

- AS 2419.1 – 2005: Fire hydrant installations – Part 1: System design, installation and commissioning;
- National Construction Code, including NSW variations; and

The requirements and regulations of all authorities including:

- NSW Fire Brigades.

- Sydney Water.

Building J17 fire hydrants will be fed from a fire service ring main located in each fire stair with isolation valves provided for the purposes of isolating the installation into zones for maintenance purposes.

Hydrant landing valves will be provided with storz' hermaphrodite fittings and located within fire stairs of Building J17 or within 4m of the required exits of Building J18 to provide full coverage to each building.

Signalling from the auxiliary monitored equipment including the diesel pump to be connected back to the UNSW Security Alarm System.

8.5. FIRE HOSE REEL SYSTEMS

The fire hose reels will be fed from the domestic potable water system and located in accordance with the requirements of the National Construction Code which is generally within 4 metres of an exit for Building J17.

It is proposed to connect the fire hose reels to the hydrant installation.

The system will comply with the requirements of AS 2441 – 2005: Installation of fire hose reels.

The fire hose reel pipe material will be copper tube and fittings.

8.6. FIRE DETECTION SYSTEM (Refer FSK-01)

Each building will be provided with an automatic fire detection system designed to comply with Australian Standards and Codes relevant to the works including:

- AS 1670.1: Fire detection, warning, control and intercom systems – System design, installation and commissioning: Part 1 Fire; and/or
- AS 1668.1: The use of ventilation and air-conditioning in buildings - Fire and smoke control in multi-compartment buildings;
- National Construction Code , including NSW Variations;
- The requirements and regulations of all relevant authorities including the NSW Fire Brigades.

A Fire Indicator Panel (FIP) located at the lobby of each building shall be a microprocessor controlled analogue addressable panel.

The FIP is to interface with the campus security monitoring company and the Main Fire Indicator Panel (MFIP).

If both buildings are to be sprinkler protected, point-type addressable smoke and heat detectors will only be required at fire/smoke doors to activate closure devices or if required by AS 1668.1 for interfacing with air-conditioning and ventilation systems.

Manual call points will be provided as required by the BCA.

8.7. EMERGENCY WARNING AND INTERCOM SYSTEM (Refer FSK-01)

Each building will be provided with an Emergency Warning and Intercom System (EWIS) designed to comply with Australian Standards and Codes relevant to the works including:

- AS 1670.4: Fire detection, warning, control and intercom systems – System design, installation and commissioning: Part 4 Sound systems and intercom systems for emergency purposes;

- National Construction Code, including NSW Variations.

The EWIS Indicator Panel will be located adjacent to each building FIP. These panels will be located in a position as approved by the NSW Fire Brigades.

Speakers will be provided throughout the building to generate the sound pressure levels required by AS 1670.4. Some areas of the facility will incorporate strobe lights and speakers where sound pressure levels may not be effective in warning the building occupants within the facility.

Emergency call points and Warden Intercom Phones (WIP) will be provided as required by the BCA.

8.8. PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers are to be provided where required in accordance with AS 2444 – 2001: Portable fire extinguishers and fire blankets – Selection and location, and the National Construction Code.

Additional fire extinguishers will be provided as may be required by the fire engineering report.

9. BUILDING SERVICES SPATIAL REQUIREMENTS

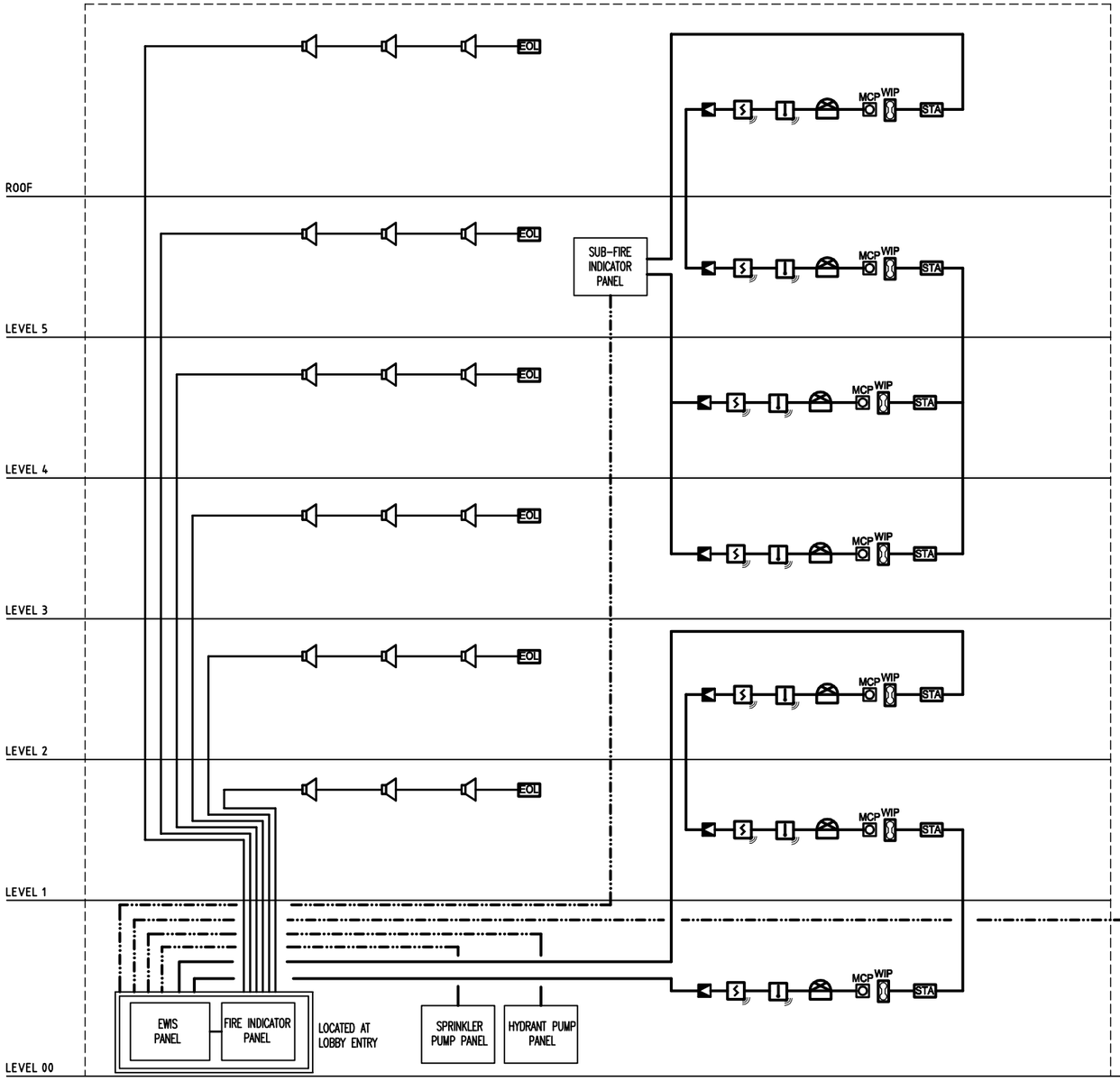
Note: All sizes shown are the clear internal dimensions required for services and are provided for preliminary planning purposes.

All requirements subject to review and confirmation of proposed locations.

HYDRAULIC & FIRE SERVICES ITEM	SIZE (m2)	MIN. WIDTH	LOCATION/ REMARKS
Fire Control Panel		0.8m wide x 1.5m high x 0.2m deep	Cupboard in ground floor entry/lobby to each building
Fire Sprinkler and Hydrant Pump Room	12	3.0m x 4.0m	At ground level with direct egress to outside to both J17 and J18. Requirements subject to fire engineering reports and client requirements. May be preferable to consolidate into a single pump room. To be
Fire hydrant and sprinkler booster assemblies		2.0m x 0.5m	J17 - Located externally to the fire pump room. J18 - existing location to be re-used. Both locations to comply with fire rating requirements around the booster assemblies (2m either side and 3m above the hose connection points).
Bore water storage tank and booster pumps	20	5.0m x 4.0m	J17 - Located on roof, either in south or north wing. Does not require an enclosure.
Fire hose reels.		0.8 wide x 0.4m deep	Within 4m of exits and elsewhere as required to provide full coverage to the buildings.
Fire hydrant landing valves			To be within each fire isolated stairs or near to non-fire isolated stairs, and else where as required.
Domestic hot water service	3	3.0m x 1m plus allowance for solar panels, nominally 10m2	J17 - Located on roof, either in south or north wing. Does not require an enclosure. J18 - hot water service to be from local point of use water heaters, preferably in cupboards below sinks.

HYDRAULIC & FIRE SERVICES ITEM	SIZE (m2)	MIN. WIDTH	LOCATION/ REMARKS
Main hydraulic risers (J17)	0.15	0.3m	Located adjacent to the amenities
Hydraulic reticulation (J18)	-	-	Provision for horizontal pipe reticulation in the services zone. Subject to further discussion.
Main fire riser	0.1	0.3m	Near to fire pump room
Gas Meter and regulator	1	1m	To be retained in landscaping adjacent to South wing.
Water meters and backflow prevention devices	2	1m	To be retained in landscaping adjacent to South wing.
Grease arrestor	2	1m	In-ground near to the café, away from walkways and accessible to pump out truck.
Drinking water pumps	3	1m	J17 - At ground level
Trade waste water treatment pit for industrial processes in J18	2	1m	In-ground near to the processes (ie the water jut cutting room). Requirements to be confirmed during detailed design.

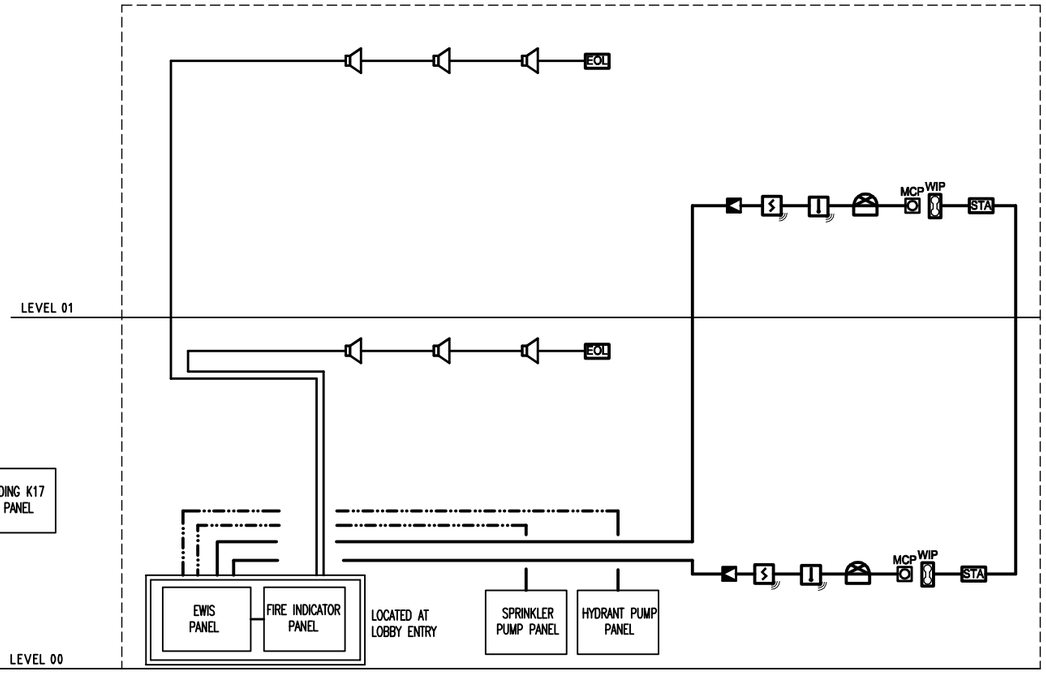
BUILDING J17



LEGEND

- SMOKE DETECTOR
- HEAT DETECTOR
- AUDIO-VISUAL ALARM
- MCP — MANUAL CALL POINT
- STA — SPRINKLER TAMPER ALARM
- EWIS SPEAKER
- WIP — WARDEN PHONE
- EOL — END-OF-LINE TERMINATION
- MAGNETIC HOLD OPEN DEVICE

BUILDING J18



Rev	Date	Description
P2	13/09/12	FOR APPROVAL
P1	06/09/12	PRELIMINARY ISSUE

Client: UNSW THE UNIVERSITY OF NEW SOUTH WALES

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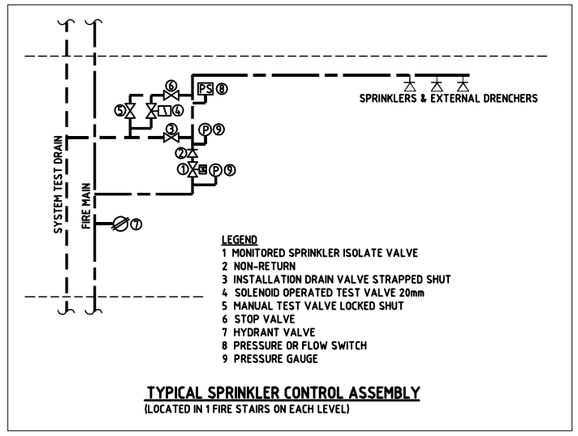
Project: UNSW MECHANICAL & MANUFACTURING PRECINCT DEVELOPMENT

Title: FIRE DETECTION & EWIS SCHEMATIC CONCEPT

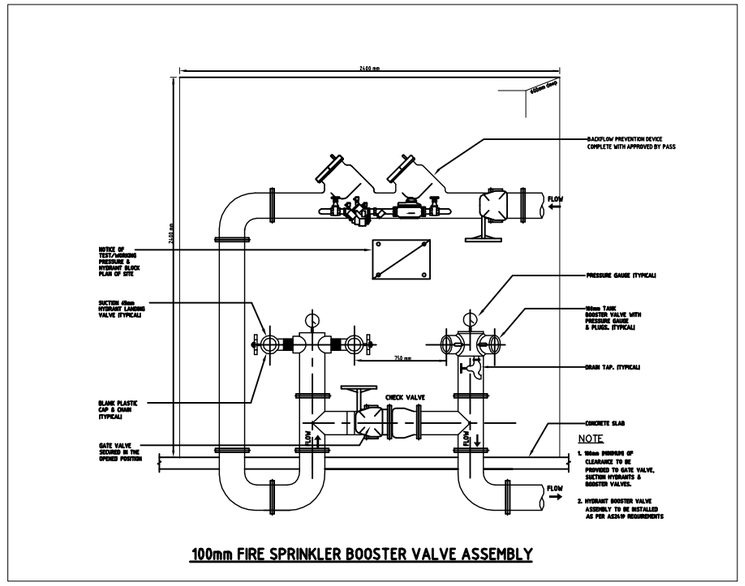
Scale NTS (A3)
Drawn: RL Engineer: RL
File: S:\Projects\24468\CAD\Sketches\24468-FSK01.dwg

Project No.	Drawing No.	Revision
24468	FSK-01	P2

Plotted: 21 September, 2012 1:57pm By: DTennent

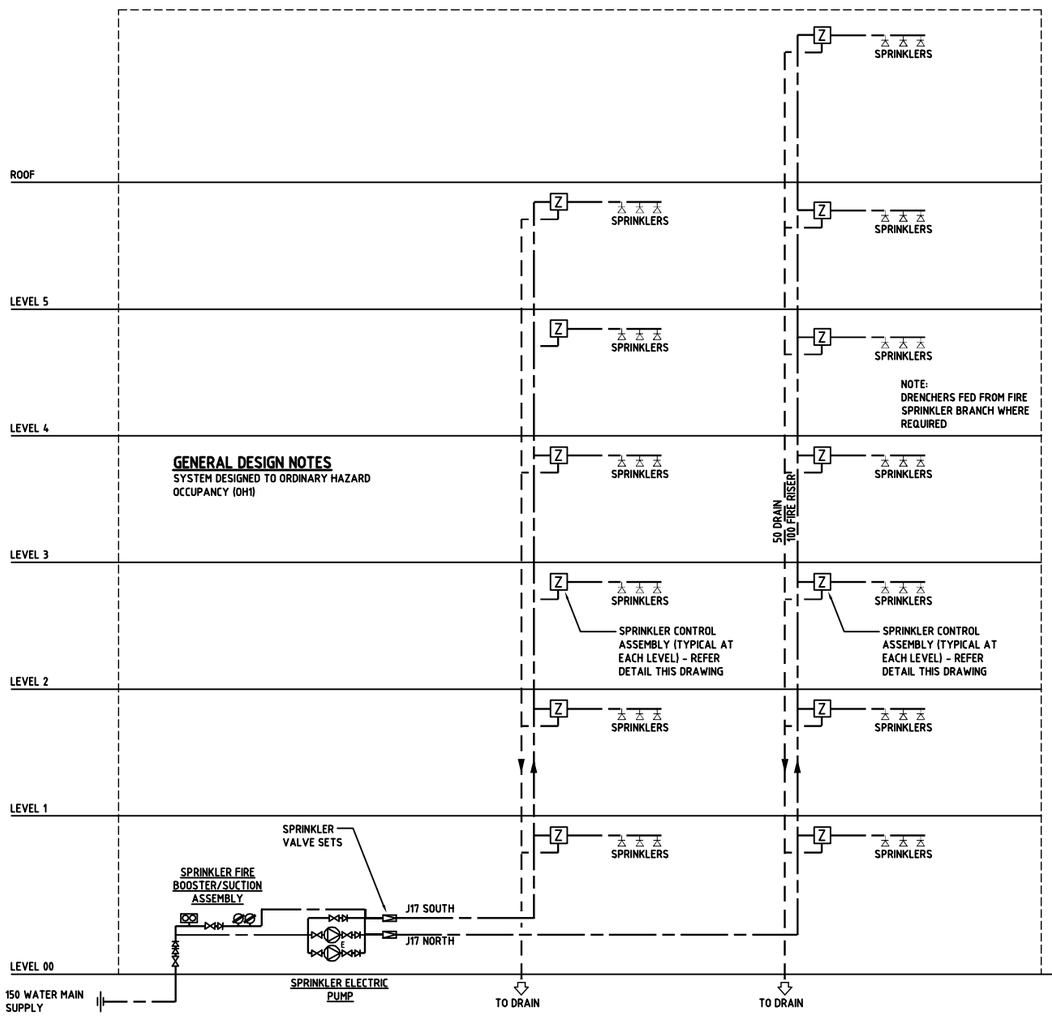


TYPICAL SPRINKLER CONTROL ASSEMBLY
(LOCATED IN 1 FIRE STAIRS ON EACH LEVEL)

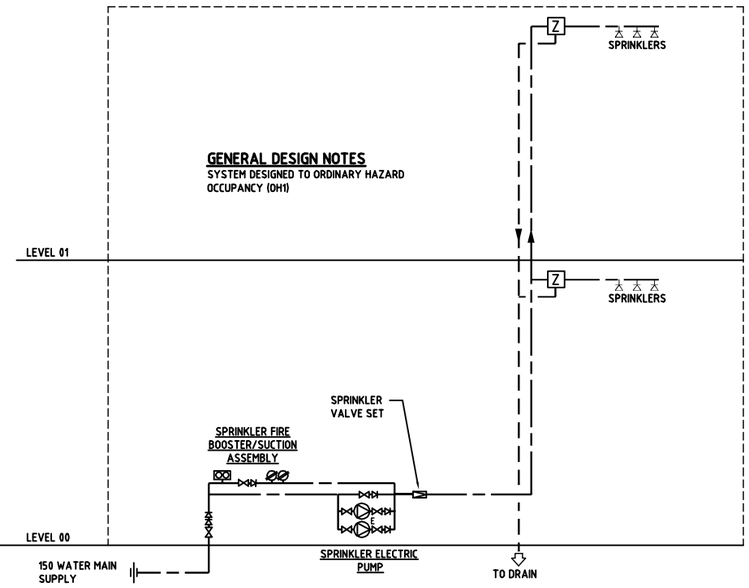


100mm FIRE SPRINKLER BOOSTER VALVE ASSEMBLY

BUILDING J17



BUILDING J18



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Project: UNSW MECHANICAL & MANUFACTURING PRECINCT DEVELOPMENT

Title: FIRE SPRINKLER SCHEMATIC CONCEPT

Scale NTS (A3)
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File: S:\Projects\24468\CAD\Sketches\24468-FSK02.dwg

Project No. 24468 | Drawing No. FSK-02 | Revision P2

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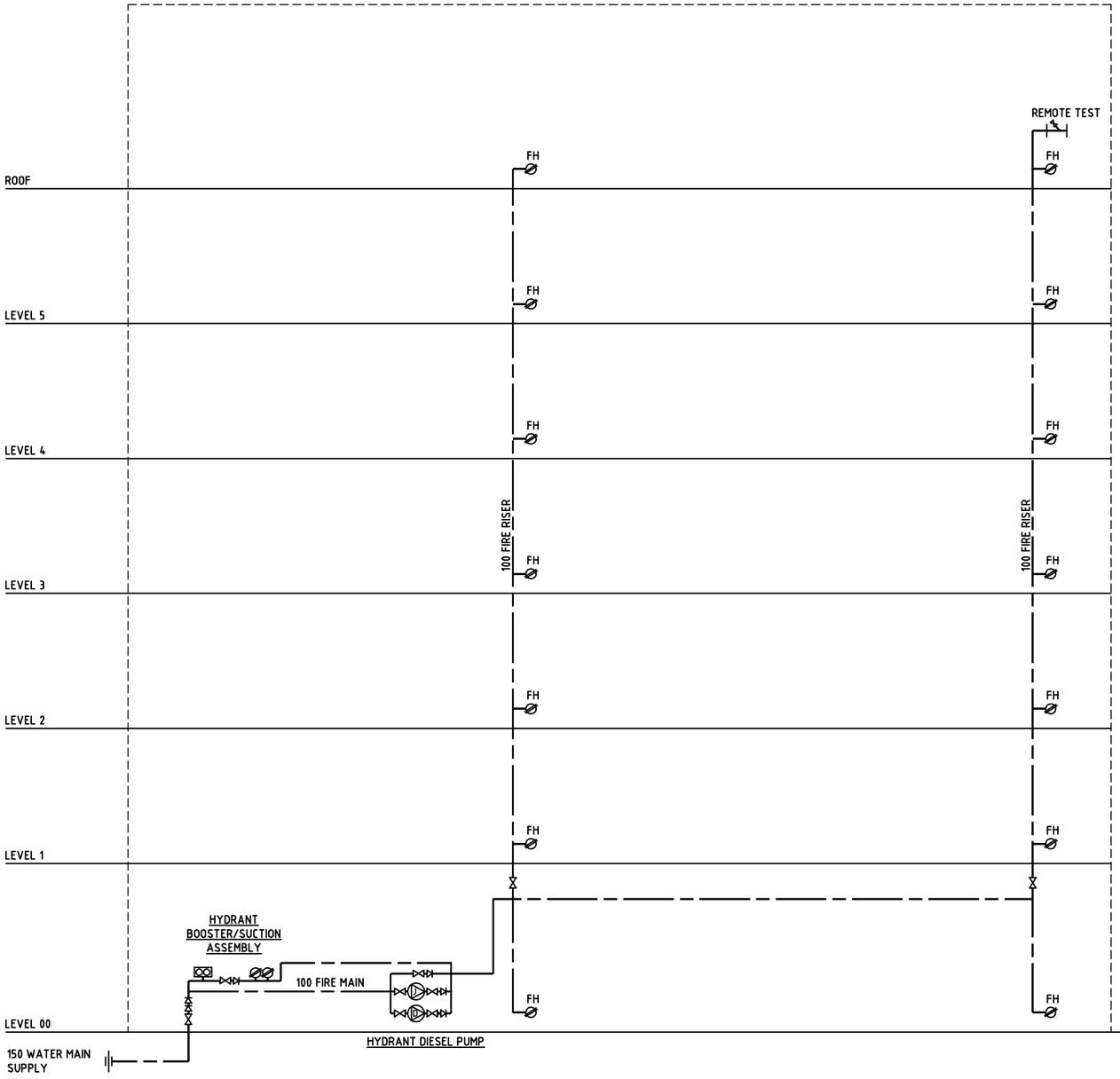
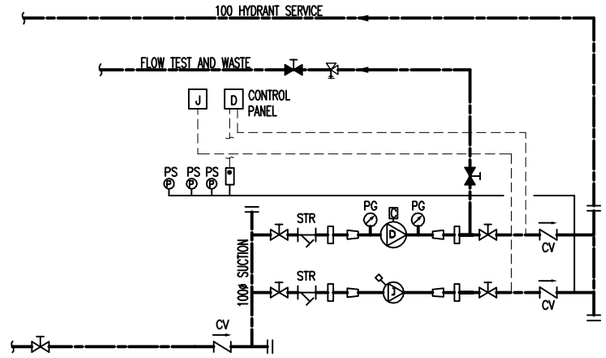
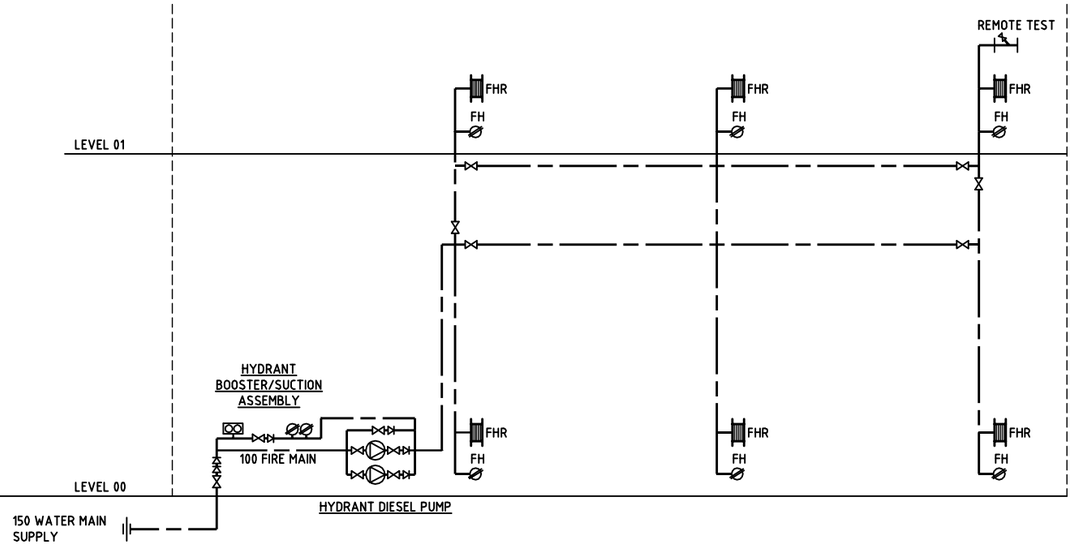
BUILDING J17





PUMP DETAIL

BUILDING J18



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Project: UNSW MECHANICAL & MANUFACTURING PRECINCT DEVELOPMENT

Title: FIRE HYDRANT SCHEMATIC CONCEPT

Scale NTS (A3)
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Project No.	Drawing No.	Revision
24468	FSK-03	P3

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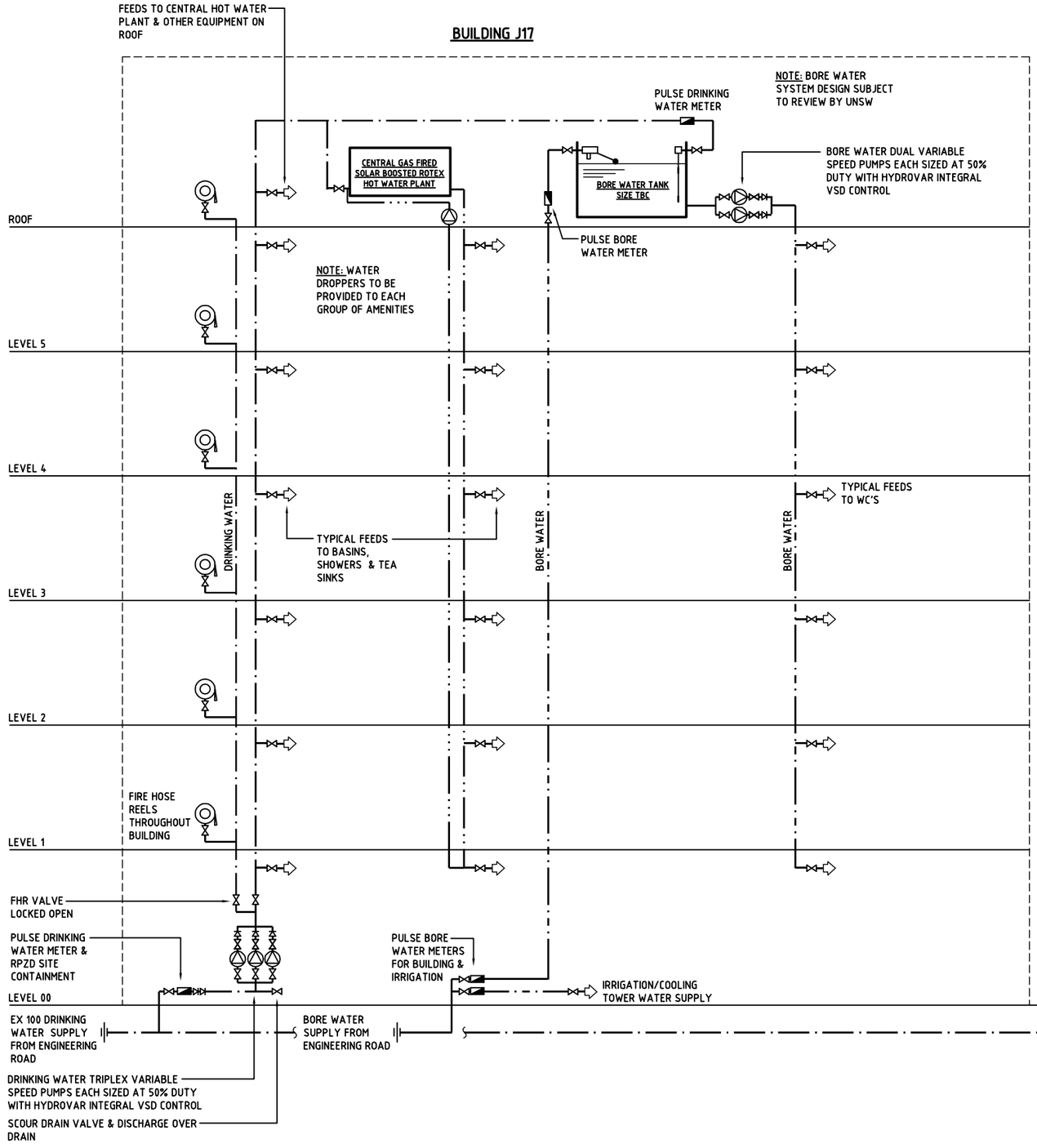

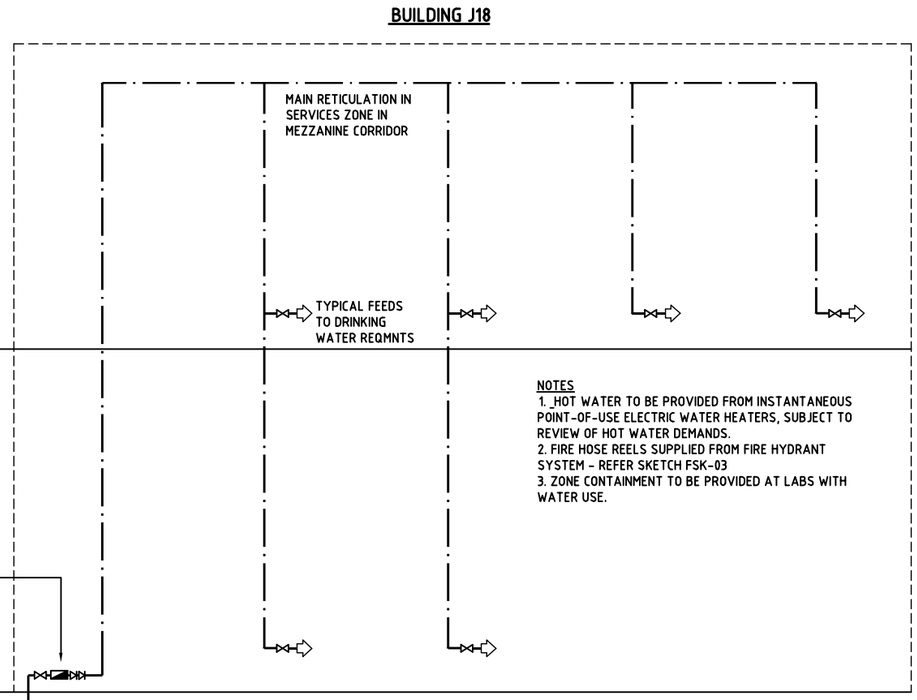

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Project: UNSW MECHANICAL & MANUFACTURING PRECINCT DEVELOPMENT

Title: DRINKING & BORE WATER SCHEMATIC CONCEPT

Scale NTS (A3)
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