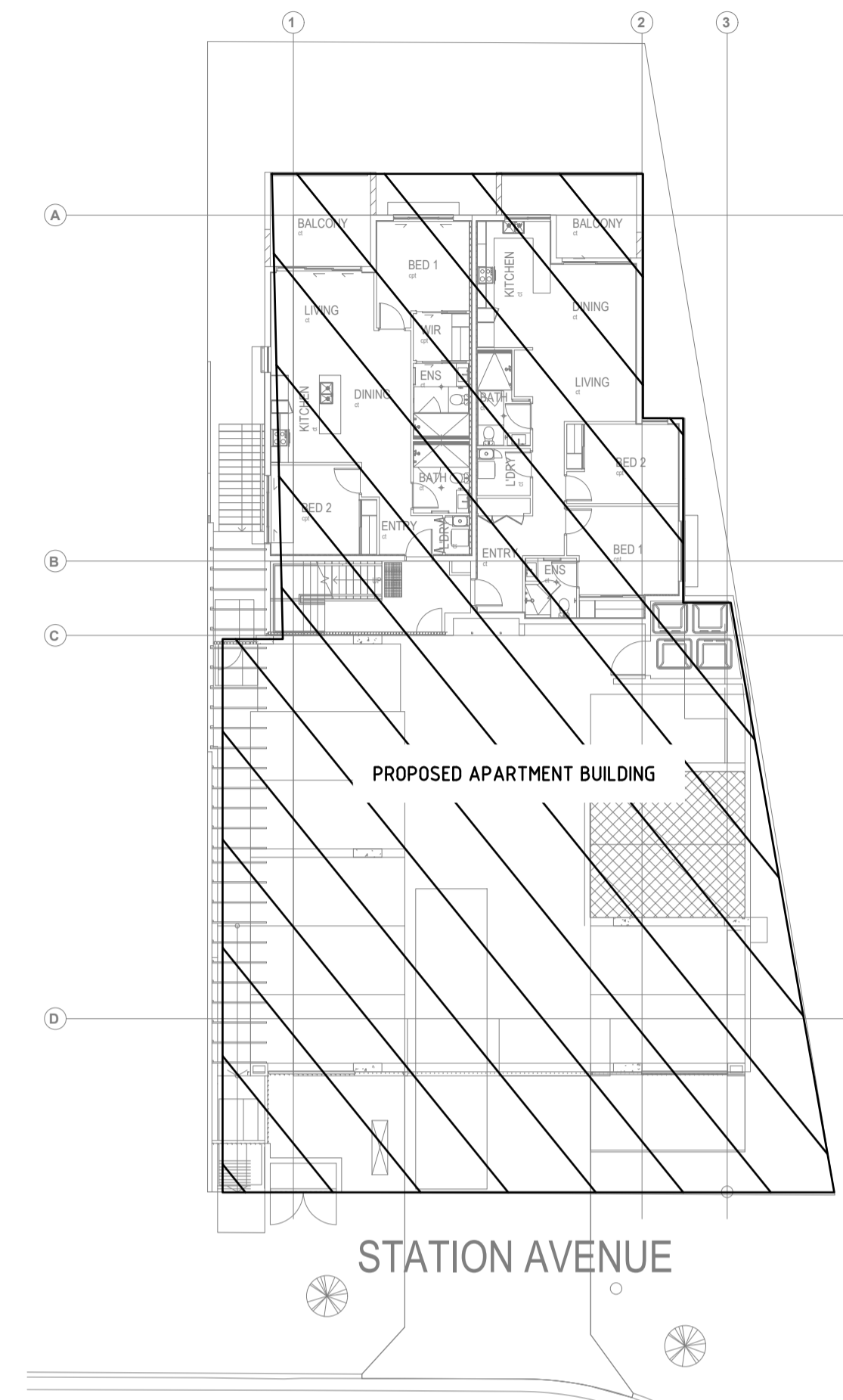


LEGEND

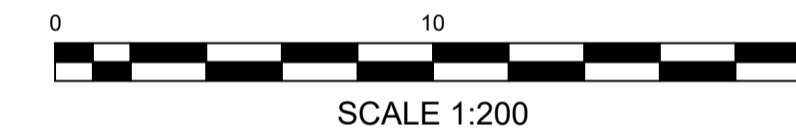
SYMBOL	DESCRIPTION
AC	AIR CONDITIONING CONTROL PANEL (WALL MOUNTED AT 1100)
EF	FAN CONTROL (WALL MOUNTED AT 1000) - EF=EXHAUST FAN
	UNINSULATED DUCT
FD	FD = FIRE DAMPER
	FLEXIBLE CONNECTION
	DUCT SET UP OR SET DOWN AS NOTED IN DIRECTION OF ARROW
	FLEXIBLE DUCT WITH SPIGOTS
EF-1	EQUIPMENT NUMBER - REFER TO SCHEDULE
	OPEN DUCT RISER/DROPPER
	HIDDEN DUCT RISER/DROPPER
	PIPE RISER
	600 x 600 ACCESS PANEL
	REFRIGERANT PIPEWORK - INDICATIVE ROUTE ONLY
	CONDENSATE PIPEWORK - INDICATIVE ROUTE ONLY
	PIPE DROPPER OR RISER
TD	TUNDISH - 30 DIA CONDENSATE DRAIN
WMTD	WALL MOUNTED 3 PORT TUNDISH
UBTD	UNDER BENCH TUNDISH
	AIR FLOW DIRECTION.
S-1	No. - GRILLE No. l/s - AIR QUANTITY
S/A	SUPPLY AIR
R/A	RETURN AIR
O/A	OUTDOOR AIR
E/A	EXHAUST AIR
	DOOR UNDERCUT BY 25mm
	SINGLE PHASE ELECTRICAL SUPPLY
	THREE PHASE ELECTRICAL SUPPLY
	FIRE SHUTDOWN SIGNAL

GENERAL NOTES:

- THESE NOTES SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATION NOTES ON DRAWING M007.
- ITEMS SHOWN BOXED ARE ASSOCIATED WORKS.
- ALL VENTILATED ROOMS TO HAVE 25mm UNDERCUT DOORS UNLESS NOTED OTHERWISE.
- DUCT SIZES GIVEN ARE CLEAR INTERNAL DIMENSIONS.
- FLEXIBLE DUCTING
 - 0 - 50l/s - 150 DIA.
 - 51 - 100l/s - 200 DIA.
 - 101 - 150l/s - 250 DIA.
- DO NOT SCALE DRAWINGS.
- EQUIPMENT SCHEDULES ARE TO BE READ IN CONJUNCTION WITH ALL DRAWINGS AND TO BE USED AS A GUIDE ONLY.
- RUN CONDENSATE DRAINS (MINIMUM FALL OF 1:40) FROM ALL AIR CONDITIONING INDOOR UNITS TO DISCHARGE TO TUNDISH WHERE SHOWN.
- ALL CONDENSATE DRAINS, REFRIGERATION PIPES AND ELECTRICAL WIRING ARE TO RUN IN WALL CAVITIES. EXTERNAL WALL PENETRATIONS SHALL BE AT LOW LEVEL.
- OUTDOOR UNITS FOR ALL AIR CONDITIONING SYSTEMS SHALL BE PROVIDED WITH MANUFACTURES OPTIONAL DRAIN KIT TO COLLECT ALL CONDENSATE PRODUCED DURING REVERSE CYCLE OPERATION. THE UNIT DRAINS OR DRIP TRAYS SHALL BE DRAINED TO THE TUNDISHES SHOWN.
- THE POSITION OF THE EQUIPMENT IN THE ROOF SPACE SHOWN ON THE DRAWINGS IS APPROXIMATE ONLY. THE EQUIPMENT SHALL BE LOCATED TO SUIT THE ROOF TRUSS SET OUT AND DESIGN AND TO ALLOW ALL NECESSARY ACCESS TO THE EQUIPMENT.
- THE EQUIPMENT ELECTRICAL SUPPLY REQUIREMENTS AND RATINGS ARE INDICATIVE ONLY. IT IS THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO LIAISE WITH THE ELECTRICAL CONTRACTOR ON THE FINAL SELECTED EQUIPMENT ELECTRICAL REQUIREMENTS TO ENSURE THE CORRECT SUPPLY AND PROTECTIVE DEVICES ARE INSTALLED.
- ALLOW TO PROVIDE ADDITIONAL ACCESS PANELS AS REQUIRED FOR COMMISSIONING AND MAINTENANCE PURPOSES.
- FLASH AND SEAL ALL WALL AND ROOF PENETRATIONS ASSOCIATED WITH THE MECHANICAL SERVICES TO MAKE VERMIN PROOF AND WATERPROOF.
- PROVIDE SAMPLES OF GRILLES, DIFFUSERS AND CONTROLLERS TO SUPERINTENDANT FOR APPROVAL PRIOR TO INSTALLATION.
- ALL CONTROLLER AND TEMPERATURE SENSOR LOCATIONS SHALL BE COORDINATED WITH JOINERY AND ARCHITECT.
- PAIR COIL REFRIGERATION PIPEWORK SHALL NOT BE USED ON THIS PROJECT.
- ALL CABLING SHALL RUN IN RECOGNISED CABLE MANAGEMENT SYSTEM.
- FLEXIBLE ELECTRICAL CONDUIT SHALL NOT BE USED IN DIRECT SUNLIGHT. CONDUIT SHALL EITHER BE COVERED OR PAINTED IN UV RESILIENT PAINT.
- SELECTIONS OF ALL UNITS SHALL BE AT THE SPECIFIED AIR ON CONDITIONS. LATENT CAPACITIES FOR ALL UNITS SHALL BE MET.
- ALL ELECTRICAL SUPPLIES TO MECHANICAL PLANT SHALL BE PROVIDED BY ELECTRICAL SERVICES WITH FINAL CONNECTION TO MECHANICAL PLANT BY MECHANICAL SERVICES.
- ALL RUN ON TIMERS SHALL BE SUPPLIED, INSTALLED AND COMMISSIONED BY MECHANICAL SERVICES. INTERLOCKING WITH LIGHTS SHALL BE BY ELECTRICAL SERVICES. COORDINATE ALL FINAL LOCATIONS AND SWITCHING REQUIREMENTS ON SITE.
- AIR BALANCING SHALL BE COMPLETED BY A NATA ACCREDITED ORGANISATION.
- ALL MECHANICAL ITEMS SHALL BE ADEQUATELY SUPPORTED WITH FIXING MECHANISMS THAT COMPLY WITH AS1170.4. CONFIRM REQUIREMENTS WITH STRUCTURAL ENGINEER AND BUILDER.



SITE PLAN



Sheet List Table

Sheet Number	Sheet Title
M001	LEGEND, GENERAL NOTES, SITE PLAN, DRAWING LIST
M002	DETAILS
M003	EQUIPMENT SCHEDULES
M004	LOWER GROUND AIR CONDITIONING & VENTILATION LAYOUT
M005	GROUND FLOOR AIR CONDITIONING & VENTILATION LAYOUT
M006	LEVEL 2 & 3 AIR CONDITIONING & VENTILATION LAYOUT
M007	SPECIFICATION NOTES

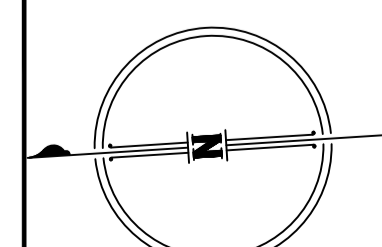
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PLOTTED: 25 Sep 2025, p:\2024\BS\24-0540 station avenue gaythorne\4_mech\24-0540 M001 LEGEND, GENERAL NOTES, SITE PLAN, DRAWING LIST.dwg

issue	amendment	checked	date
C2	CONSTRUCTION ISSUE	TC	25/09/25
C1	CONSTRUCTION ISSUE	TC	21/08/25
T1	TENDER ISSUE	TC	28/05/25
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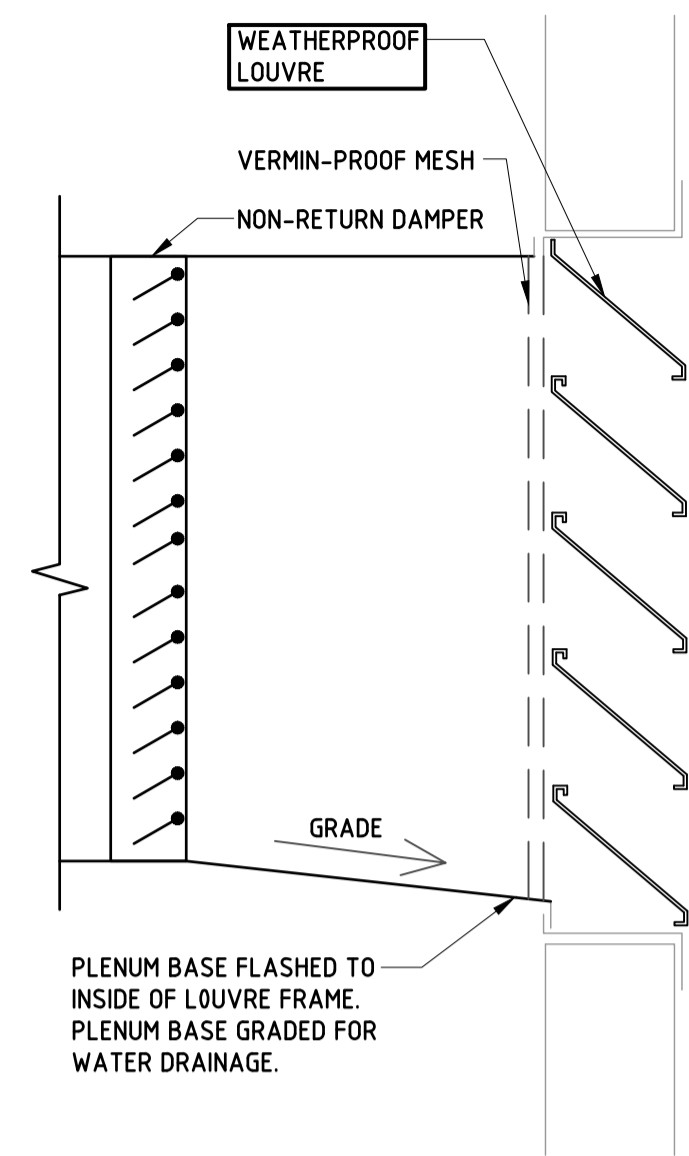


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STREET ADDRESS: 1/14, 39 Lawrence Dr, Norang QLD 4211
POSTAL ADDRESS: PO Box 29835, Manning DC QLD 4211
TELEPHONE: (07) 5596 1423
EMAIL: mail@pece.com.au
WEB: peter.eustace.com.au

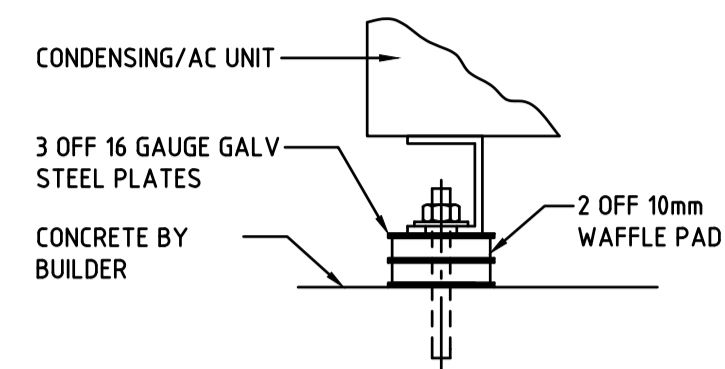
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architecture / masterplanning / interiors
Upper Ground Level
3/47 Anderson St
Fortitude Valley Q 4006
www.agarchitects.net.au
mail@agarchitects.net.au
ph. (07) 3852 1355

proprietor
AUSPACE DEVELOPMENTS GROUP PTY LTD
project
STATION AVENUE GAYTHORNE
location
16 STATION AVENUE GAYTHORNE

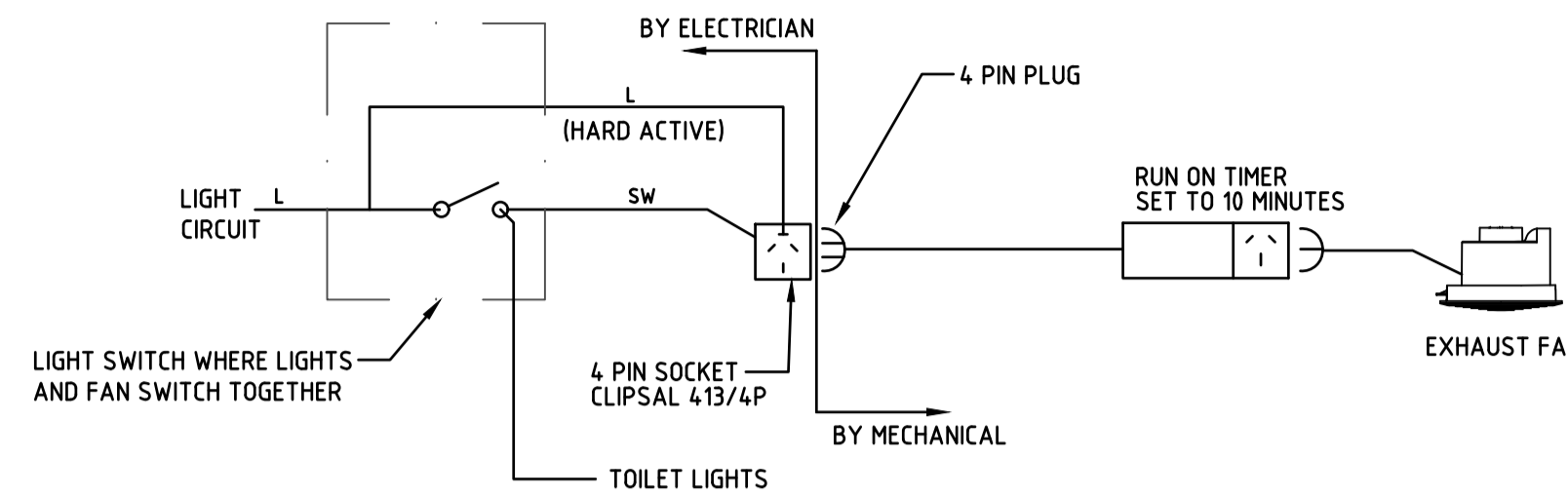
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MECHANICAL SERVICES LEGEND, GENERAL NOTES, SITE PLAN, DRAWING LIST
scale
1:200 @ A1 SHEET SIZE
date
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drawing number
24-0540/M001
design of work
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issue
TC
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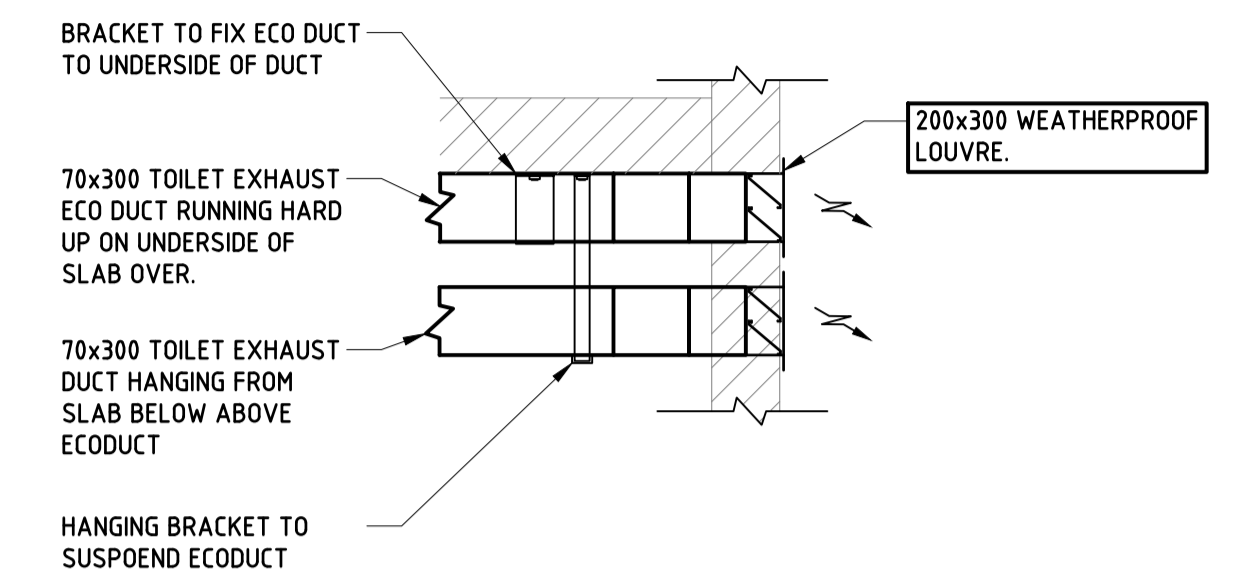
LOUVRE/PLENUM CONNECTION DETAIL
NOT TO SCALE



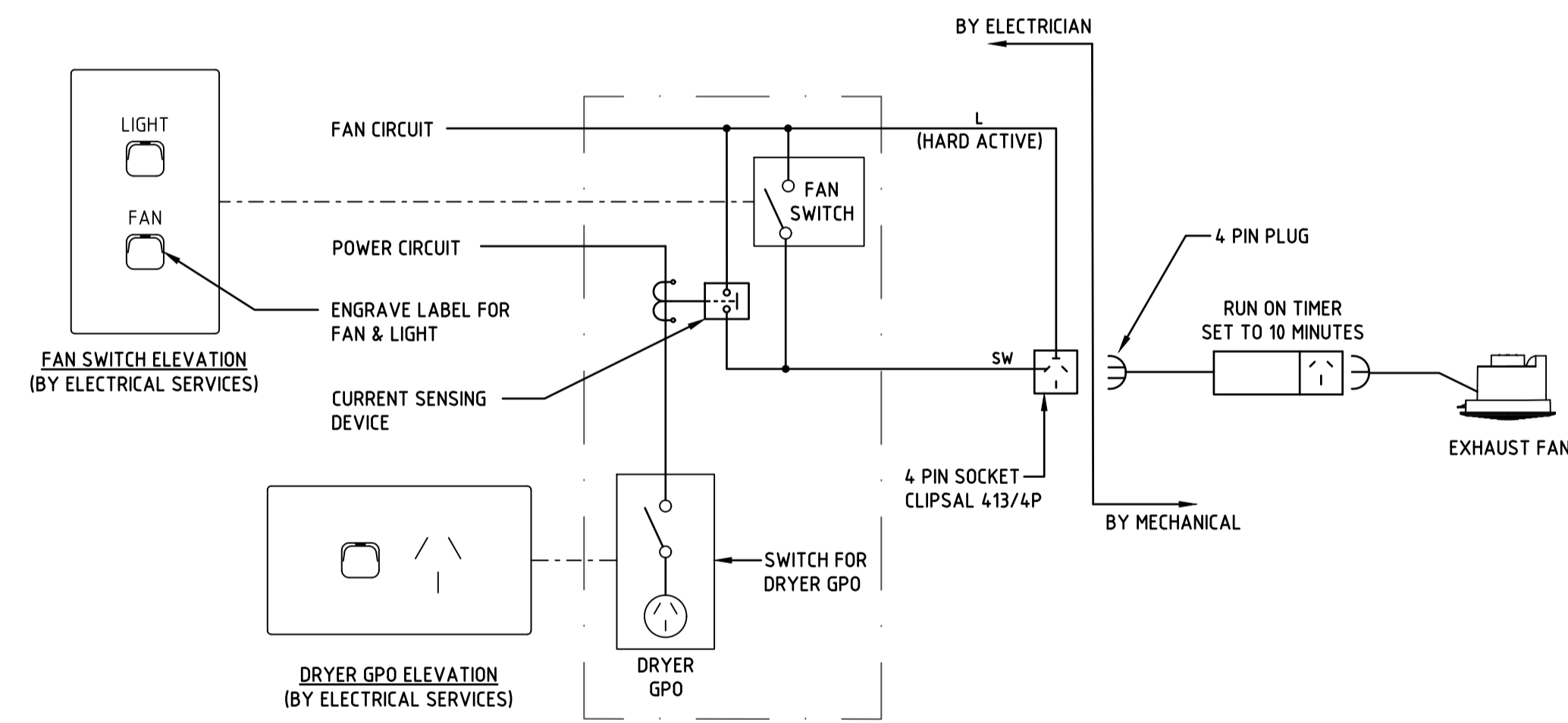
AIR-CONDITIONING & CONDENSING UNIT VIBRATION ISOLATION DETAIL
(CONCRETE MOUNT)



TOILET EXHAUST FAN INTERLOCKED WITH LIGHTS WIRING DETAIL
NOT TO SCALE

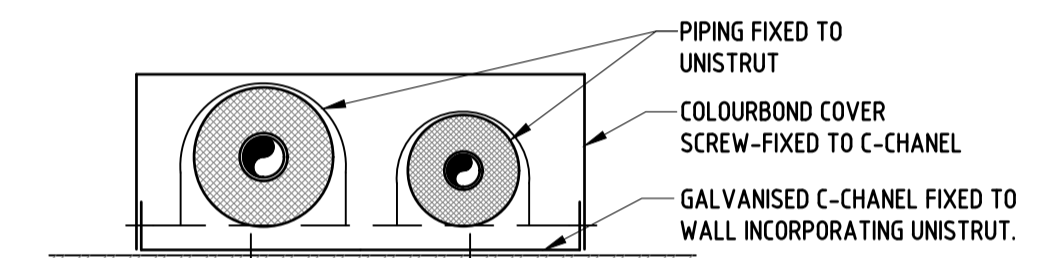


TOILET EXHAUST STACKED WEATHERPROOF DISCHARGE LOUVRE DETAIL
SCALE 1:10

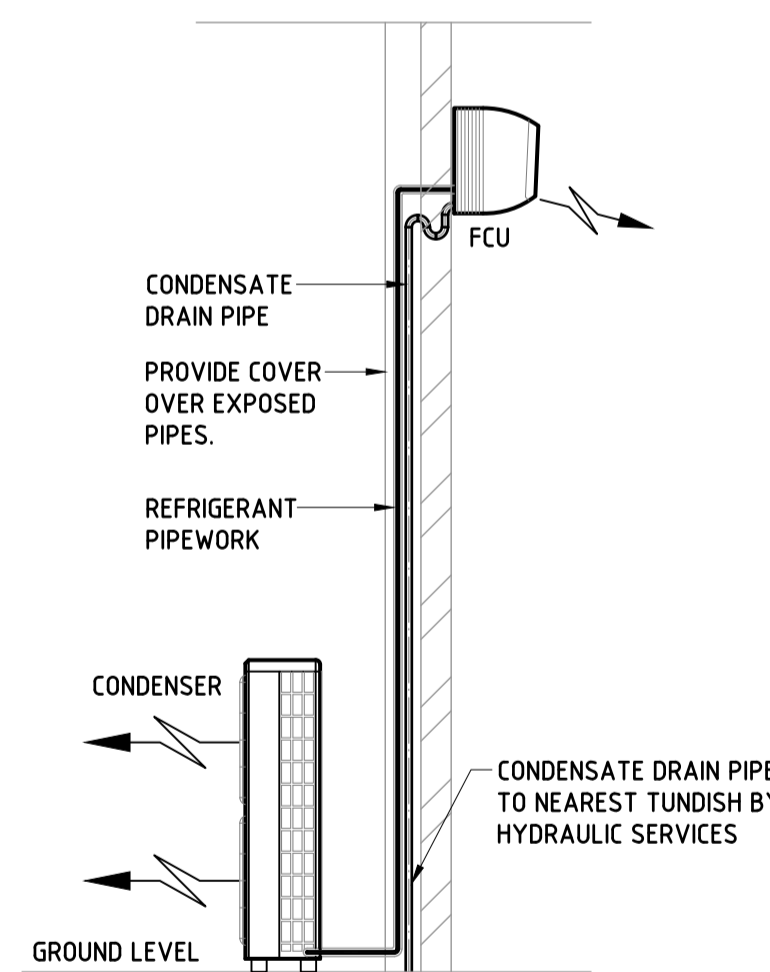


LAUNDRY GPO/EXHAUST FAN SWITCHING DETAIL
NOT TO SCALE

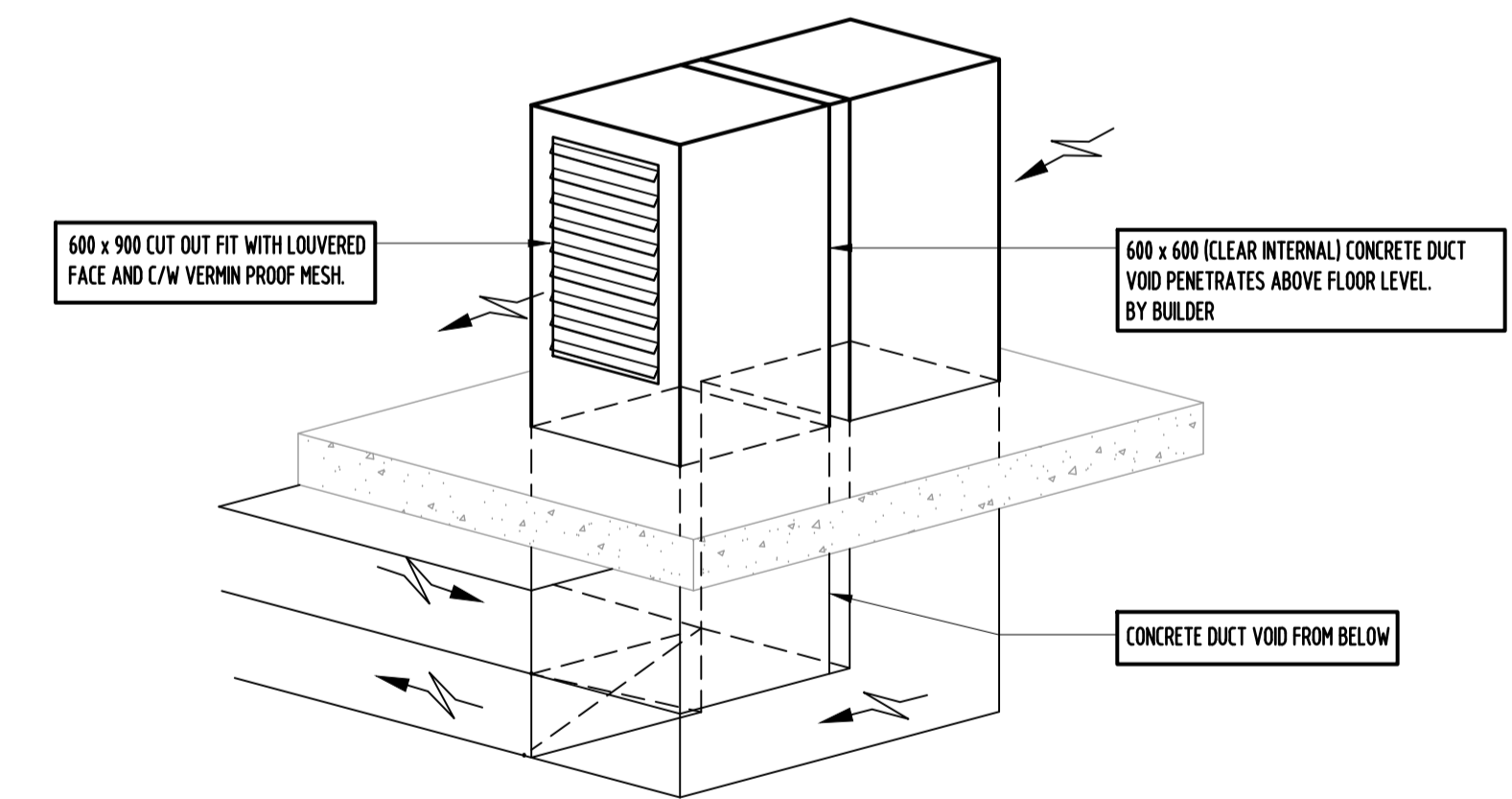
ELECTRICAL CONTRACTOR SHALL PROVIDE GPO & SWITCH PLATE.
EXHAUST FAN MUST OPERATE WHEN POWER IS SWITCHED ON TO DRYER REGARDLESS OF SWITCH POSITION.
EXHAUST FAN MUST OPERATE WHEN WALL FAN SWITCH IS IN ON POSITION REGARDLESS OF DRYER OPERATION.



TYPICAL DETAIL OF BOX SECTION FOR PIPING
NOT TO SCALE



TYPICAL INDOOR FCU INSTALLATION
NOT TO SCALE



PUMP ROOM EXHAUST DISCHARGE & INTAKE POINT
NOT TO SCALE

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STREET ADDRESS: 1/14, 39 Lawrence Dr, Norring QLD 4211
POSTAL ADDRESS: PO Box 29835, Palmring DC QLD 4211
TELEPHONE: (07) 5596 1423
EMAIL: mail@pecc.com.au
WEB: peter.eustace.com.au

agarchitects
architecture / masterplanning / interiors
Upper Ground Level
3/47 Anderson St
Fortitude Valley Q 4006
www.agarchitects.net.au
mail@agarchitects.net.au
ph. (07) 3852 1355

proprietor
AUSPACE DEVELOPMENTS GROUP PTY LTD
project
STATION AVENUE GAYTHORNE
location
16 STATION AVENUE GAYTHORNE

drawing title
MECHANICAL SERVICES DETAILS

scale
NTS @ A1 SHEET SIZE
date
NOV '24
design
TC
TC
drawing number
24-0540/M002
issue
C2

PLOTTED: 25 Sep 2025, p:\2024\BS\24-0540 station avenue gaythorne\4_mech\24-0540 M003 EQUIPMENT SCHEDULES.dwg

AIR CONDITIONING UNIT SCHEDULE														
OUTDOOR UNIT NO	INDOOR UNIT NO	AREA SERVED	MINIMUM CAPACITY GTH (kW)	MINIMUM SENSIBLE CAPACITY GTSH (kW)	MINIMUM LATENT CAPACITY GTLH (kW)	COIL AIR ON CONDITIONS (°C DB / °C WB)	COIL AIR OFF CONDITIONS (°C DB / °C WB)	SUPPLY AIR (l/s)	O / AIR (l/s)	SOUND DATA (max dBA @ 3m)	COMMENTS	POWER INPUT		AIR FILTERS
												kW	ph	
OU-1	-	-	9.0	-	-	-	-	-	-	48	Multi Split Reverse Cycle Outdoor Unit	3.0	1	-
-	FCU-1.1	Living / Dining	5.0	4.5	0.5	23.0 / 17.0	14.6 / 13.8	-	-	38	Wall mounted unit	0.05	1	Manufacturers factory filter
-	FCU-1.2	Bed 1	2.0	1.8	0.2	23.0 / 17.0	14.6 / 13.8	-	-	34	Wall mounted unit	0.04	1	Manufacturers factory filter
-	FCU-1.3	Study	2.0	1.8	0.2	23.0 / 17.0	14.6 / 13.8	-	-	34	Wall mounted unit	0.04	1	Manufacturers factory filter
OU-2 TO OU-12	-	-	9.0	-	-	-	-	-	-	48	Multi Split Reverse Cycle Outdoor Unit	3.0	1	-
-	FCU-2.1 TO FCU-12.1	Living / Dining	5.0	4.5	0.5	23.0 / 17.0	14.6 / 13.8	-	-	38	Wall mounted unit	0.05	1	Manufacturers factory filter
-	FCU-2.2 TO FCU-12.2	Bed 1	2.0	1.8	0.2	23.0 / 17.0	14.6 / 13.8	-	-	34	Wall mounted unit	0.04	1	Manufacturers factory filter
-	FCU-2.3 TO FCU-12.3	Bed 2	2.0	1.8	0.2	23.0 / 17.0	14.6 / 13.8	-	-	34	Wall mounted unit	0.04	1	Manufacturers factory filter

Notes:

- The above table is estimated minimum capacities, contractor is to confirm equipment selection prior to ordering.
- Latent capacities must also be met as a minimum. Capacities specified are minimum effective capacities of installed equipment, not nominal capacities.
- Verify fan static pressure prior to ordering.
- All fan coil units and outdoor units must be accessible for maintenance.
- Single and three phase power supplies to isolators adjacent to the units noted above, by Electrical Services. Circuit breakers to be sized to match the equipment selected.
- Final filter selection by mechanical contractor to suit selected equipment, maximum air velocity across the media face not to exceed 2.5m/s.
- All fan coil units to have integrated condensate pumps except where noted on drawings.
- Contractor to confirm that refrigerant gas toxicity levels will not exceed the requirements of AS5149.1-2016 prior to ordering of equipment, and re-group VRF indoor units as required.
- Capacities of all units shall be calculated with actual pipe lengths, for both horizontal and vertical runs, with manufacturer system selection confirming actual capacities.
- Air on conditions shown for outdoor condensing units are ambient conditions for indoor unit outside air design. Condensing units operating temperature range: Summer -5°C DB to 45°C DB (cooling), winter: -15°C WB to 15°C WB (heating).

VENTILATION FANS SCHEDULE												
FAN NO	QTY	PURPOSE	DUTY (l/s)	EST STATIC (Pa)	FAN TYPE	SPEED (rpm)	FAN DIA (mm)	MOTOR POWER INPUT		SOUND DATA (max dBA @ 3m)	FAN DETAILS (PROPOSED SELECTION)	OPERATION
								kW	ph			
EF-1	21	Bathroom exhaust	25	100	Ceiling mounted exhaust fan	950	150	0.06	1	38	Fantech RESPF150 or approved equal	Interlocking with lights by electrical light services c/w 10 minute run on timer
EF-2	10	Laundry exhaust	40	100	Ceiling mounted exhaust fan	950	150	0.06	1	38	Fantech RESPF150 or approved equal	Refer laundry exhaust detail on M002
EF-3	2	Bathroom/Laundry exhaust	40	100	Ceiling mounted exhaust fan	950	150	0.06	1	38	Fantech RESPF150 or approved equal	Interlocking with lights by electrical light services c/w 10 minute run on timer. Also provide wall mounted switch next to light switch
EF-4	1	Pump room exhaust	900/150	150	In-line duct mounted exhaust fan	1500	350	0.5	1	46	Fantech PUEEC35 or approved equal	Refer controls section on M007
SF-1	1	Pump room supply	800	60	wall mounted supply fan	1320	450	0.37	3	54	Fantech CPD0454FR or approved equal	Refer controls section on M007

NOTE

- Verify fan static pressure prior to ordering.
- Time Clocks shall be a single channel, 7 day type with battery back-up, mounted in the local electrical distribution board.
- Axial fans shall be adjustable pitch and have the capacity for 10% additional flow and 20% additional pressure.
- All ancillaries will be provided as necessary for a complete operating system.
- All fans will be suspended with appropriate vibration isolators whilst maintaining air tight construction.
- All fans must be accessible for maintenance.
- Fan selection information shall be used as a guide only. Mechanical services contractor shall select fans based on application.

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P3	PRELIMINARY ISSUE	TC	12/03/25
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STREET ADDRESS: U14, 39 Lawrence Dr, Norong QLD 4211
POSTAL ADDRESS: PO Box 29835, Norong DC QLD 4211
TELEPHONE: (07) 5596 1423
EMAIL: mail@pece.com.au
WEB: peter.eustace.com.au

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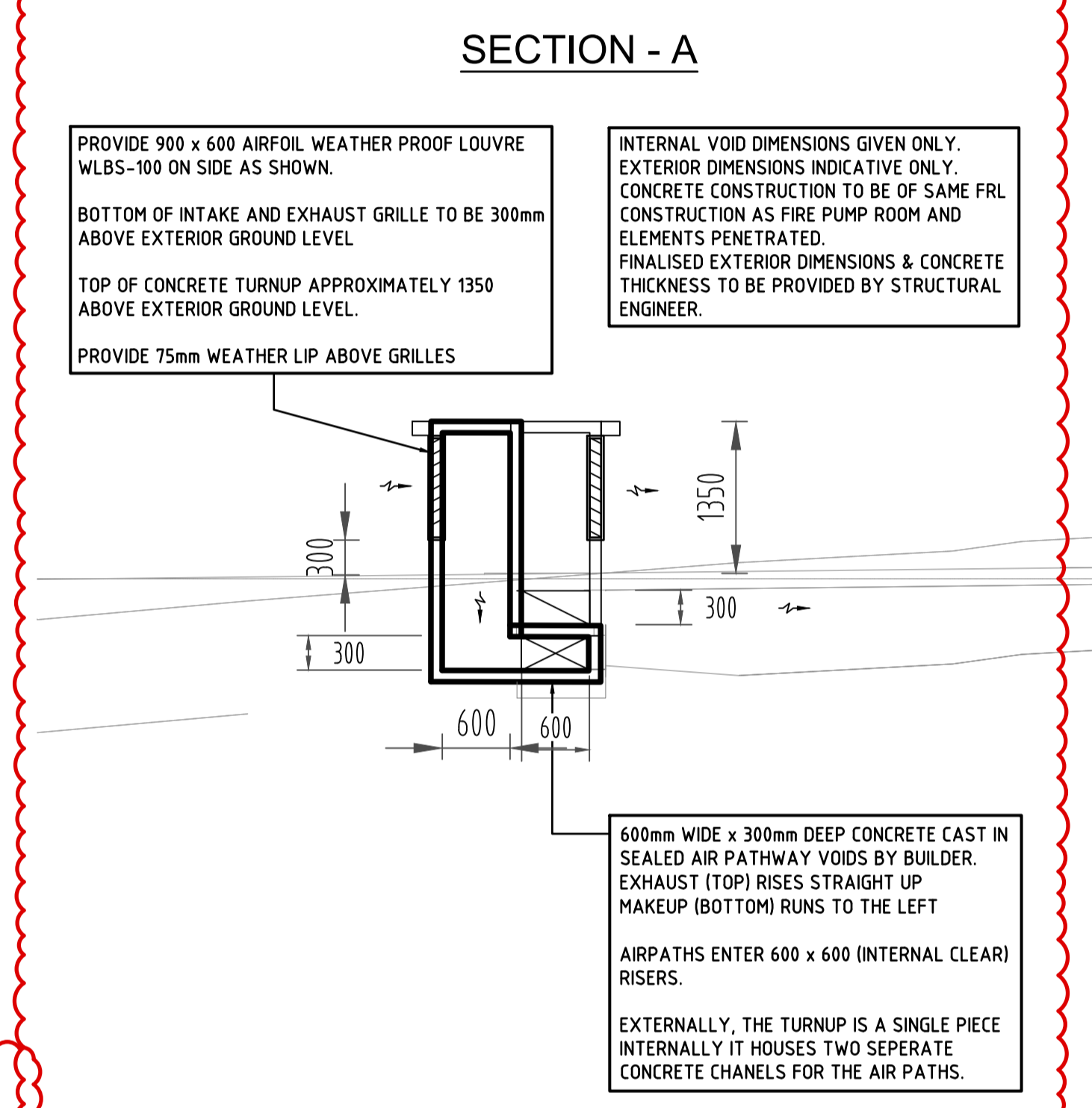
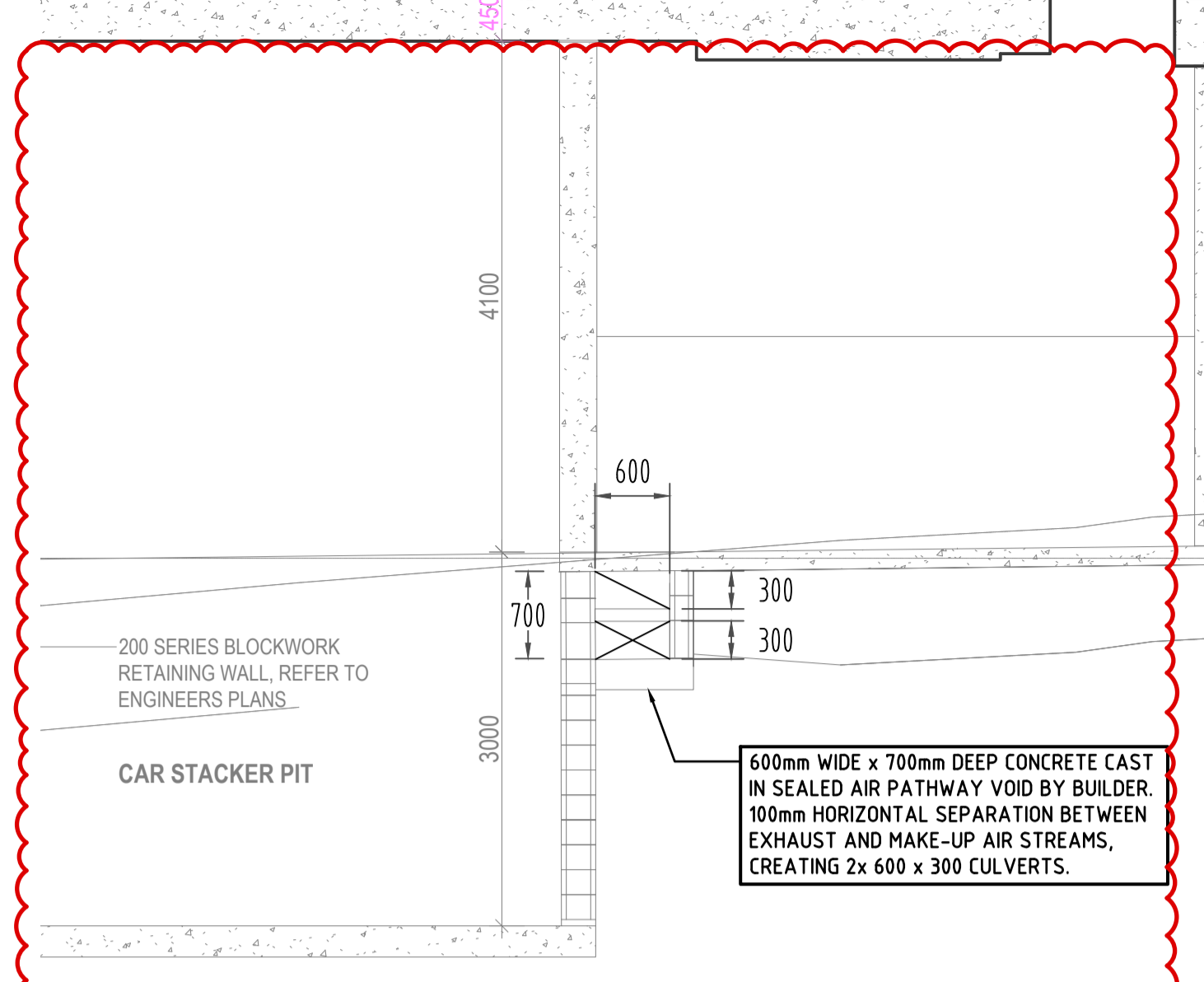
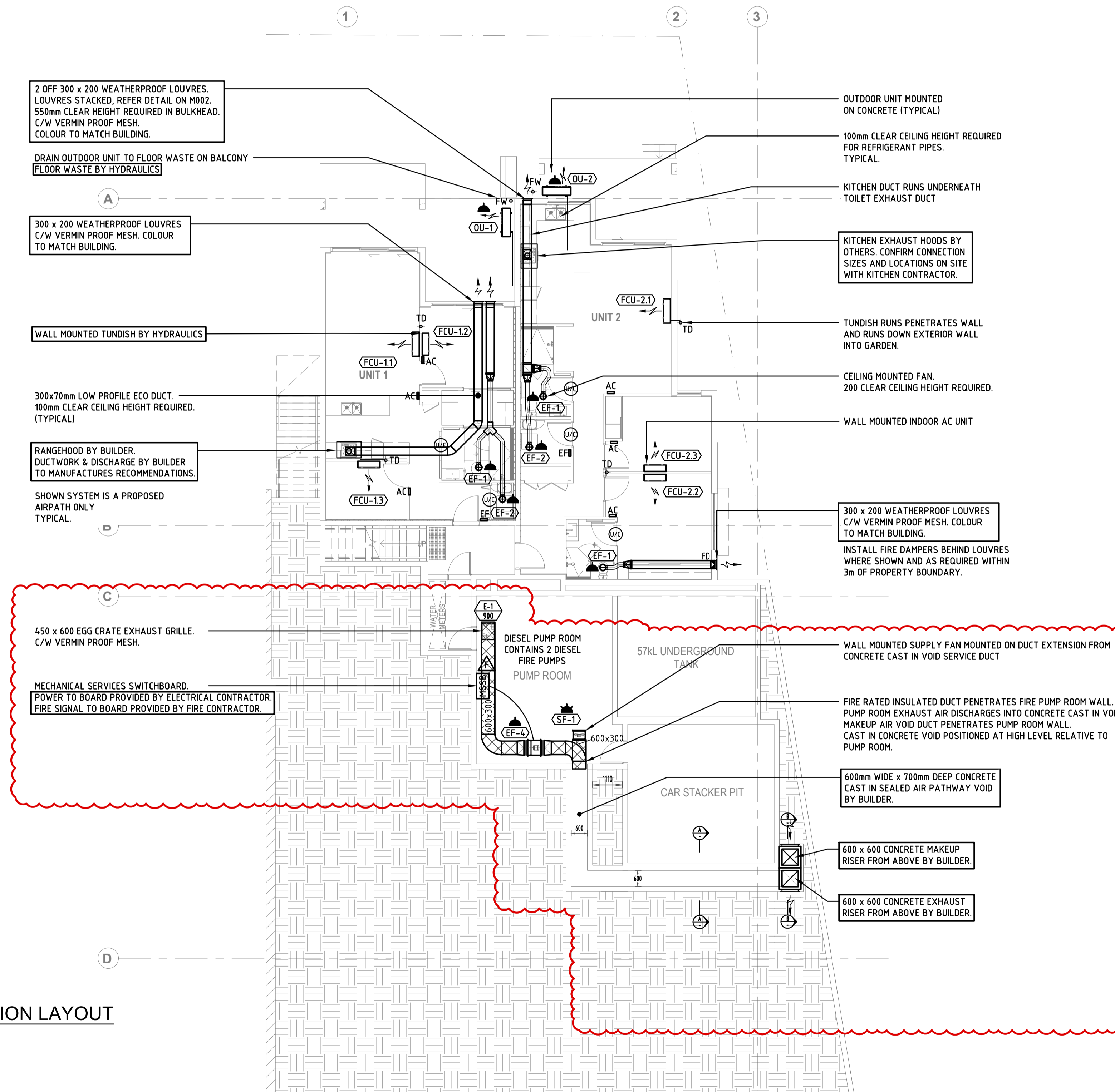
proprietor
AUSPACE DEVELOPMENTS GROUP PTY LTD
project
STATION AVENUE GAYTHORNE
location
16 STATION AVENUE GAYTHORNE

drawing title
MECHANICAL SERVICES EQUIPMENT SCHEDULES

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date
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design of arch
TC
issue
C2
drawing number
24-0540/M003

OUTDOOR UNIT NOTES

- ELECTRICAL ISOLATORS SHALL BE MOUNTED ON WALL OR ON UNITSRUT SUPPORT POST. DO NOT MOUNT ISOLATORS ON AIR CONDITIONING UNITS.
- EXPOSED PIPEWORK SHALL BE COVERED WITH COLORBOND HAT SECTION FOR PROTECTION. COLOUR TO ARCHITECTS APPROVAL.
- PROVIDE ALUMINIUM ENGRAVED LABELS, SCREW FIXED TO CONDENSER CASING WITH CORROSION RESISTANT SCREWS.
- ALL OUTDOOR UNITS SHALL SIT IN STAINLESS STEEL DRAIN TRAYS, GRADED TOWARDS DRAIN EXIT. CONDENSATE WASTE SHALL BE DRAINED TO DISCHARGE OVER FLOOR WASTE GRATE WITH ALL COMPONENTS SCREWED TO CONCRETE AND SECURED TO FLOOR WASTE GRATE.



LOWER GROUND AIR CONDITIONING & VENTILATION LAYOUT

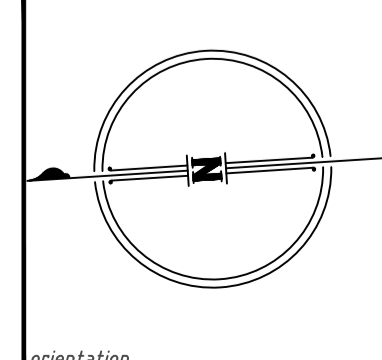


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 STREET ADDRESS: 1/14, 39 Lawrence Dr, Norong QLD 4211
 POSTAL ADDRESS: PO Box 29835, Palm Bay QLD 4211
 TELEPHONE: (07) 5596 1423
 EMAIL: mail@pece.com.au
 WEB: peter.eustace.com.au

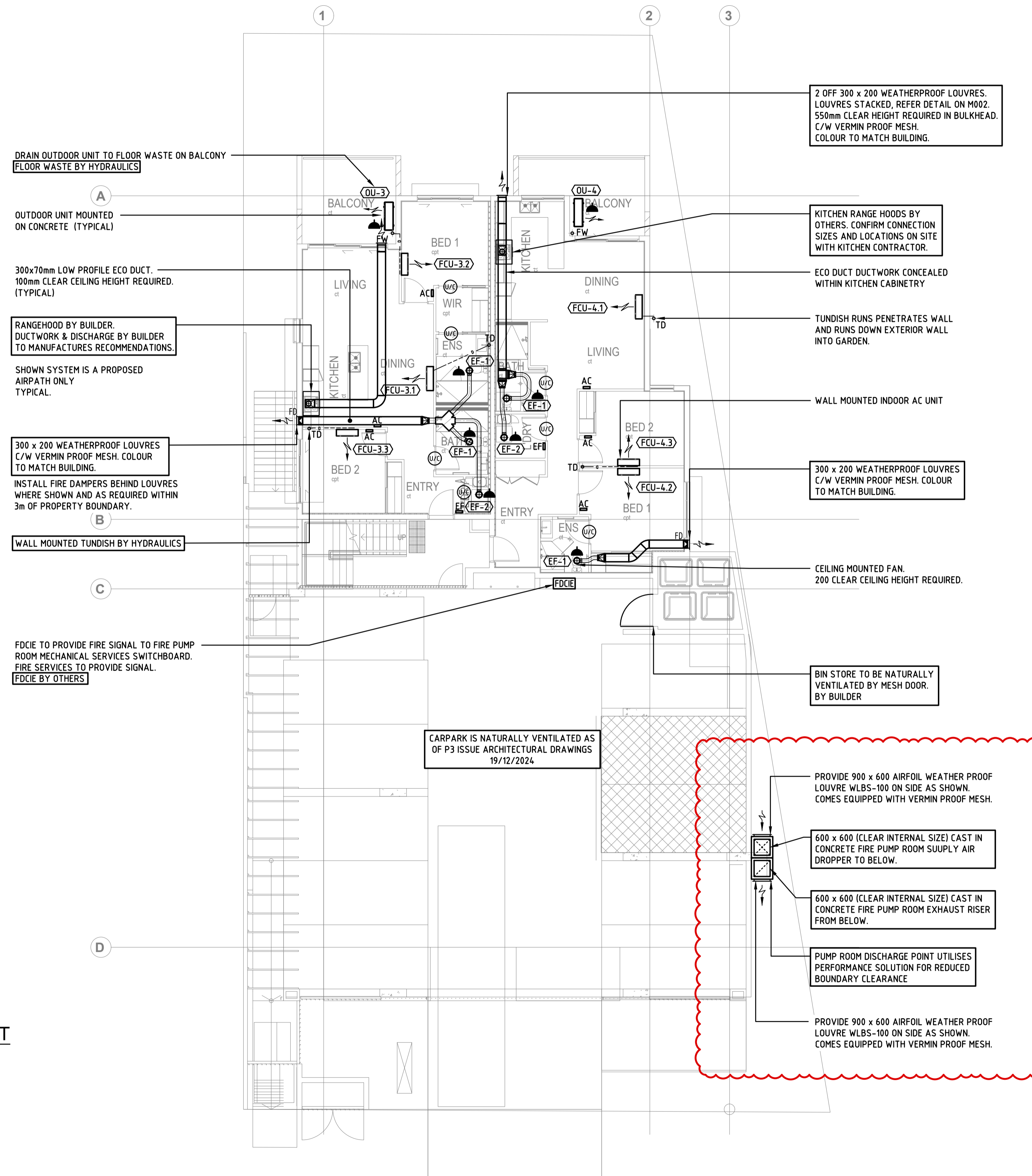
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 Upper Ground Level
 3/47 Anderson St
 Fortitude Valley Q 4006
 www.agarchitects.net.au
 mail@agarchitects.net.au
 ph. (07) 3852 1355

proprietor: **AUSPACE DEVELOPMENTS GROUP PTY LTD**
 project: **STATION AVENUE GAYTHORNE**
 location: **16 STATION AVENUE GAYTHORNE**

drawing title: **MECHANICAL SERVICES LOWER GROUND AIR CONDITIONING & VENTILATION LAYOUT**
 scale: **1:100 @ A1 SHEET SIZE** date: **NOV '24** design by: **TC** issue: **TC**
 drawing number: **24-0540/M004** issue: **C2**

OUTDOOR UNIT NOTES

1. ELECTRICAL ISOLATORS SHALL BE MOUNTED ON WALL OR ON UNITSRUT SUPPORT POST. DO NOT MOUNT ISOLATORS ON AIR CONDITIONING UNITS.
2. EXPOSED PIPEWORK SHALL BE COVERED WITH COLORBOND HAT SECTION FOR PROTECTION. COLOUR TO ARCHITECTS APPROVAL.
3. PROVIDE ALUMINIUM ENGRAVED LABELS, SCREW FIXED TO CONDENSER CASING WITH CORROSION RESISTANT SCREWS.
4. ALL OUTDOOR UNITS SHALL SIT IN STAINLESS STEEL DRAIN TRAYS, GRADED TOWARDS DRAIN EXIT. CONDENSATE WASTE SHALL BE DRAINED TO DISCHARGE OVER FLOOR WASTE GRATE WITH ALL COMPONENTS SCREWED TO CONCRETE AND SECURED TO FLOOR WASTE GRATE.
5. CONDENSERS ON BALCONIES SHALL BE POSITIONED AWAY FROM RAILINGS SO THAT THEY ARE NOT USED TO CLIMB ONTO RAILINGS.



LEVEL 1 AIR CONDITIONING & VENTILATION LAYOUT

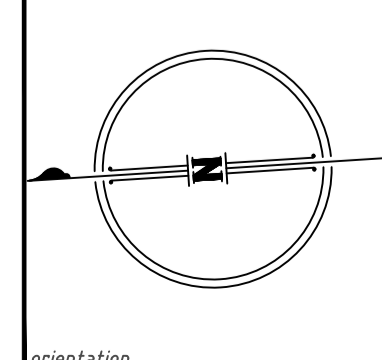


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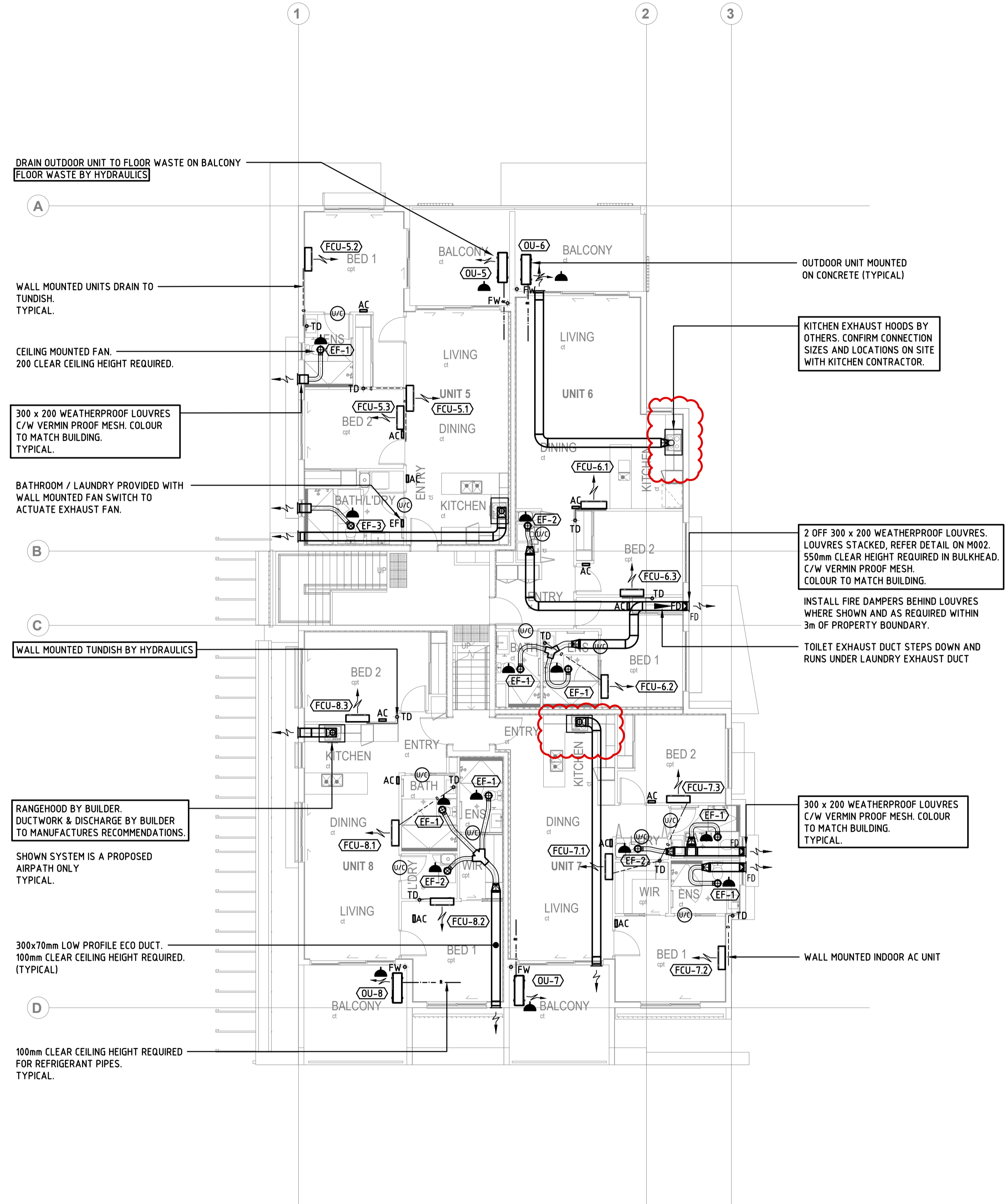
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 architecture / masterplanning / interiors
 Upper Ground Level
 3/47 Anderson St
 Fortitude Valley Q 4006
 www.agarchitects.net.au
 mail@agarchitects.net.au
 ph. (07) 3852 1355

proprietor
AUSPACE DEVELOPMENTS GROUP PTY LTD
 project
STATION AVENUE GAYTHORNE
 location
16 STATION AVENUE GAYTHORNE

drawing title
MECHANICAL SERVICES LEVEL 1 AIR CONDITIONING & VENTILATION LAYOUT
 scale: 1:100 @ A1 SHEET SIZE date: NOV '24 design: TC issue: TC
 drawing number: 24-0540/M005

OUTDOOR UNIT NOTES

1. ELECTRICAL ISOLATORS SHALL BE MOUNTED ON WALL OR ON UNITSRUT SUPPORT POST. DO NOT MOUNT ISOLATORS ON AIR CONDITIONING UNITS.
2. EXPOSED PIPEWORK SHALL BE COVERED WITH COLORBOND HAT SECTION FOR PROTECTION. COLOUR TO ARCHITECTS APPROVAL.
3. PROVIDE ALUMINIUM ENGRAVED LABELS, SCREW FIXED TO CONDENSER CASING WITH CORROSION RESISTANT SCREWS.
4. ALL OUTDOOR UNITS SHALL SIT IN STAINLESS STEEL DRAIN TRAYS, GRADED TOWARDS DRAIN EXIT. CONDENSATE WASTE SHALL BE DRAINED TO DISCHARGE OVER FLOOR WASTE GRATE WITH ALL COMPONENTS SCREWED TO CONCRETE AND SECURED TO FLOOR WASTE GRATE.
5. CONDENSERS ON BALCONIES SHALL BE POSITIONED AWAY FROM RAILINGS SO THAT THEY ARE NOT USED TO CLIMB ONTO RAILINGS.



LEVEL 2 & 3 AIR CONDITIONING & VENTILATION LAYOUT



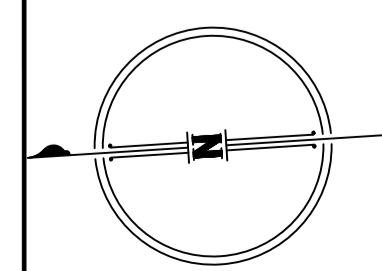
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PLOTTED: 25 Sep 2025, p:\2024\BS\24-0540 station avenue gaythorne\4_mech\24-0540 M006 LEVEL 2 & 3 AIR CONDITIONING & VENTILATION LAYOUT.dwg

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P1	PRELIMINARY ISSUE	TC	20/01/25
P2	PRELIMINARY ISSUE	LH	12/03/25
P3	PRELIMINARY ISSUE	TC	12/03/25
P4	PRELIMINARY ISSUE	TC	26/03/25
P5	PRELIMINARY ISSUE	TC	23/04/25
T1	TENDER ISSUE	TC	28/05/25
C1	CONSTRUCTION ISSUE	TC	21/08/25
C2	CONSTRUCTION ISSUE	TC	25/09/25

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ISSUED FOR CONSTRUCTION



PE CONSULTING ENGINEERS
STREET ADDRESS: U14, 39 Lawrence Dr, Norong QLD 4211
POSTAL ADDRESS: PO Box 29835, Palmberg DC QLD 4211
TELEPHONE: (07) 5596 1423
EMAIL: mail@pece.com.au
WEB: peter.eustace.com.au

agarchitects
architecture / masterplanning / interiors
Upper Ground Level
3/47 Anderson St
Fortitude Valley Q 4006
www.agarchitects.net.au
mail@agarchitects.net.au
ph. (07) 3852 1355

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issue
C2
drawing number
24-0540/M006

Specification Notes

Instructions to Tenderers

Advise the Consulting Engineer of any discrepancy or obvious omission in the drawings or specification prior to submission of the tender.

Scope

Extent of Work

The work includes but is not limited to the following main elements:

- Multi-split air conditioning system as indicated.
- Ventilation systems as indicated.
- Variable speed drives as required by NCC.
- Fire dampers as indicated.
- Refrigeration pipework as indicated (to be used as a guide only).
- Insulation as indicated as a minimum. Insulation shall be to NCC standards.
- Electrical works as required.
- Anti-corrosion treatment to condenser coils and casing, including certificates of application.
- Painting and finishing as indicated.
- Security cage as indicated.
- Flash and seal all wall and roof penetrations associated with the mechanical services to make vermin proof and waterproof.
- Provision of controls systems to provide the required means of automated control, including temperature sensors, individual wall mounted controllers and central controller as indicated.
- All associated electrical power and control wiring and equipment to facilitate automatic operation of equipment. All electrical works shall comply with the most recent AS3000 requirements.
- Provision of workshop drawings in time to enable design and coordination of trusses and other building elements to accommodate mechanical systems.
- Liaise with the hydraulic and electrical services to ensure all interfaces between trades have been correctly tendered.
- Painting of all exposed mechanical plant where required.
- All transport to site, positioning and hoisting of equipment.
- Tenderers shall include engaging a seismic restraint specialist to design and certify all equipment mountings where required for compliance with AS1170.4 – 2007.
- Training the Client in the operation and use of the mechanical services systems.
- All equipment testing, commissioning and maintenance for the specified period after the Date of Practical Completion.
- Supply of operating and maintenance manuals and "as-installed" drawings in AutoCAD and PDF format.
- Labelling of all plant and systems, including labelling of mechanical equipment in EDB to AS3000 requirements.
- Twelve months service warranty maintenance period.
- Any additional work necessary to provide a complete, operative installation in accordance with performance requirements and miscellaneous work as specified or shown on the drawings.

Work in Other Trades

Related work in connection with the Mechanical Services (performed by other trades) includes the following:

By Main Contractor/Builder

- Access to the roof space and ceiling space for servicing of plant and equipment.
- Drain points for condensate, final locations to be coordinated with hydraulic services contractor.
- Space in the roof for equipment installation. Mechanical contractor shall co-ordinate with truss manufacturer.
- Acoustic and thermal insulation to roof, walls and plant decks to NCC requirements.
- Formed and trimmed openings through walls, floors, windows, ceilings and roof for mechanical and electrical components.
- External louvres.
- Temporary light and power during construction.
- Domestic kitchen rangehood by builder. Exhaust system shown is a diagrammatic air-path only. Ductwork, equipment, & discharge grille are dependent on builders selected kitchen range hood. Builder to coordinate and install to manufacturer details.

By Electrical Services

The following works associated with the Mechanical Services installation are specified in the Electrical Services:

Three (3) phase or single (1) phase power supplies shall be provided to or adjacent to the mechanical services plant listed below. Cables shall be connected direct to the larger items of equipment and switchboards or to local isolators as noted:

- Air conditioning plant - local isolator
- Exhaust air fans - local isolator

By Fire Services

- The following works associated with the Mechanical Services installation are specified in the Fire Services:
- Fire signal to pump room exhaust fan to run fan at full speed in fire mode.

All isolators and RCD's must comply with the most recent AS3000 requirements.

By Hydraulic Services

- Co-ordinate with mechanical contractor to ensure pipe-work & mechanical equipment do not clash.

General Requirements

This section outlines general requirements which are applicable to all sections of this specification and the works.

Standards and Regulations

Conform to the latest editions of all standards and regulations. The following standards and regulations are always applicable:

NCC2022	National Construction Code 2022
AS1668.1	Fire and smoke control in buildings
AS1668.2	Mechanical ventilation for acceptable indoor air quality.
AS1668.4	Natural ventilation of buildings
AS5149	Refrigeration systems and heat pumps - Safety and environmental requirements
AS3000	Wiring Rules
AS3688	Air Handling and Water Systems of Buildings - Microbial Control
AS/NZS3823	Performance of electrical appliances - Air conditioners and heat pumps
AS1170.4	Structural Design Actions - Earthquake actions in Australia
All other relevant Acts and Regulations, Local Authority Requirements, Australian Standards and Codes having jurisdiction.	

Manufacturer's Warranty

Provide manufacturer's warranty agreements where applicable. Complete all necessary documentation on the Owner's behalf. Include copies of warranties in the maintenance manuals.

Provide warranties for anti-corrosion treatment for all units.

Co-ordination

Co-ordinate shop drawing design with other building and services elements.

Co-ordinate with truss manufacturers to ensure space is provided for ceiling plant.

Certification

Certify that the works have been installed to the requirements of all applicable rules and regulations.

Provide a Form 16 at completion of the works.

Hazard Assessment and Risk Management

Comply with the requirements of the Workplace Health and Safety Act and Regulations with respect to hazard identification and risk management.

Submit a hazard assessment and risk management plan for the construction phase of the works.

Setting Out

The positioning of equipment as shown on the drawings is approximate and diagrammatic only, and these drawings shall not be used for exact setting out. Locations shall be confirmed prior to installation.

Building Penetrations

Maintain integrity of building systems such as waterproofing and termite management at building penetrations.

Maintenance Access

Locate all relevant equipment to ensure adequate maintenance access in accordance with Workplace Health and Safety regulations.

Clean Up

At completion clean all mechanical equipment to as-new condition. Remove all waste and debris on a continuous basis. Remove construction dust from all duct and trays.

Testing and Commissioning

Fully test and commission the complete mechanical installation prior to practical completion. Record all test results and submit for inspection prior to practical completion.

Test Instrument Calibration

All test instruments shall have current calibration certificates. Certificates shall be shown to the Superintendent prior to commencement of each test. Certificate currency shall be 12 months maximum.

Design Criteria

Air Conditioning Systems Design Criteria

The total equipment capacity has been determined using the following design criteria, supplemented as necessary by examination of the working drawings of the building, which are available for examination by the tenderers.

Design Information - General

Condition	Summer	Winter
Outside Conditions (Gaythorne)	32.3°C DB/24.8°C WB	9.1°C DB
Required Inside Conditions	23°C DB ± 1°C, 50% RH nominal	20°C ± 1°C

Air Conditioning Units

Multi-Split Air Conditioning System

The outdoor condensing units shall be inverter multi-split type as scheduled on the drawings.

The indoor air conditioning units shall be of the split unitary type and shall operate on R410A. Indoor fan coil units shall be a combination of the following unit types:

- Wall mounted fan coil units
- Ceiling mounted cassette units - 4 way blow

The air conditioning units shall be of the reverse cycle type with the specified minimum capacity, when tested in accordance with AS 3823.1.1 refrigerated room air conditioners Condition A. Notwithstanding, the Units shall be capable of operating in ambient temperatures up to 46°C. Capacities shall be as nominated on the drawing.

Preference will be given to units with condenser and evaporator coils constructed with copper tubes and aluminium fins, rotary compressors and casings constructed from zinc coated steel.

All internal components shall be resiliently mounted and balanced to eliminate transmission of vibration to the external fittings and casing of the unit.

Noise levels shall not exceed NR40 within a room with high speed fan operating. Units which are excessively noisy or transmit excessive vibration will be rejected.

Power supply to the unit shall be 240V single phase 50 Hertz.

All units to have integrated condensate pumps to achieve required drain falls.

All ducted units shall have OBD's for balancing outside air.

Unit manufacturer shall be Daikin, Samsung, Fujitsu, Toshiba, Mitsubishi Electric, Hitachi or LG. Substitutions will not be accepted unless approved by the Consultant. Any change to electrical or drain requirements as a result of any approved substitution will be the responsibility of the contractor.

Ceiling Mounted Exhaust Fans

- The fan shall be a ceiling mounted exhaust fan as indicated.
- Fans shall have integrated non-return dampers.
- Capacity of the fan shall be as nominated in the fan schedule.

Air Distribution System

Rectangular ductwork construction

- Ductwork shall be fabricated from first quality patent-flattened galvanised sheet steel.
- Ductwork construction shall be based upon SMACNA Standards and AS4254

Modular low profile PVC ductwork systems

- Ductwork shall be neatly assembled from a proprietary Australian made modular plastic ductwork system of Ecoduct (300 series) manufacture of nominal size 300x70mm.
- Compliance with Specification C.2.5 Clause 5 in NCCC2019 Amendment 1 shall be demonstrated with test reports in accordance with AS/NZS 1530.3:1999 and UL 181.
- Plastic sheet subject to testing shall achieve the following when tested to 1530.3:1999:

Nominal Material Composition:	PVC
Nominal Material Thickness:	2.0mm
Ignitability Index:	0
Spread of Flame Index:	0
Heat Evolved Index:	0
Smoke Developed Index:	0

- Duct product shall be certified to pass the UL 181 burning test.
- Provide test certificates to the Superintendent for approval prior to commencement of construction.
- Ductwork shall be supplied and installed in accordance with the applicable requirements of AS/NZS 3666.1:2011 and AS 4254.2:2012, including all associated components in accordance with the manufacturer's instructions.
- Modular components shall be fixed in place with the self-tapping screws through proprietary Ecoduct Flat Duct Clips. All ductwork joints shall be sealed using Ecoduct Acrylic Joint Sealant, applied in accordance with the manufacturer's instructions to provide a fire retarded and acoustic duct seal.

Control dampers

- Control dampers shall be fitted in main duct branches, generally where shown on the drawing and as necessary for system balancing and in return air, exhaust air and outside air inlet ducts or openings where balancing is required.

Flexible Connections

- Approved flexible connections shall be provided between the inlets and outlets of all air handling equipment and adjacent ductwork and shall be truly aligned to ensure smooth air flow.
- Flexible connections shall be readily accessible for maintenance and removal, and shall be positively airtight under full fan pressure.

Circular flexible ductwork

- All flexible ductwork shall comply with AS 4254 and AS 4508. Flexible ductwork used for supply and return air applications shall be of the patent pre-insulated type, compliant with the NCC Part J6D6 (i.e total R Value of R1.0) and shall be suitable for the duties and pressures as required for the particular system.
- Flexible duct runs shall not exceed 5m. Where flexible duct runs are more than 5m, an insulated section of solid circular duct shall be provided to reduce the flexible duct length below 5m. Circular duct insulation shall have a minimum total R value in accordance with the NCC Part J6D6.
- Flexible ductwork must not account for more than 6m in total length in any duct run.
- Duct core shall be constructed with an aluminium / polyester film laminate incorporating a coated mechanical spring wire helix and solvent based adhesive.
- The polyester insulation blanket surrounding the core shall be encapsulated in a UV resistant polyethylene sleeve or aluminium / polyester laminated sleeve for the fire rated version
- For ventilation and relief air applications the core shall be constructed with an aluminium / polyester film laminate incorporating a coated mechanical spring wire helix and solvent based adhesive.
- All bends made in flexible ducting shall be formed to manufacturer's recommendations and shall have a centre-line radius of not less than 1.5 times the diameter of the ducts. Bends shall remain at full diameter throughout the length of the bend and all bends deformed or damaged in any way during installation shall be replaced with new bends
- All fittings such as tee-pieces, Y-pieces and reducers shall be of galvanised metal exactly as specified for circular sheet metal ductwork.
- All joints between the lengths of flexible ductwork shall be made with short spigots of galvanised sheet metal circular duct to form a slip joint. Similarly all connections to fittings and terminal boxes etc. shall be of the spigotted slip joint type.
- Duct connections shall be taped and provided with bands as follows.
- All joints shall be fixed with proprietary line duct bands. These shall be continuous type metal or PVC bands similar to "Jubilee" hose clips or approved equivalent may be used. Self tapping metal screws and rivets shall not be used.
- All flexible ducts shall be adequately supported with hanger straps and half saddles of "gutterguard" located at 1500 maximum centres, to prevent undue sagging and strictly in accordance with the requirements of this section of the specification.
- Circular flexible acoustic ductwork shall be of the metal helix type incorporating perforated acoustic lining and reinforced external vapour barrier.
- The ductwork shall have the following minimum indices when tested in accordance with AS 1530.

Ignitability	-	0
Spread of Flame	-	0
Heat Evolved	-	0
Smoke Developed	-	3

External Louvres

- External weatherproof louvres shall be similar to "Holyoake" Type "OHL".
- External weatherproof louvres shall be not less than 50% free open area.
- Manufactured from aluminium - Colour to Architect's approval.

Fire Dampers

- Fire and/or smoke dampers shall be supplied in all locations shown on the drawings and also where required to comply with statutory requirements.
- Only dampers that have been tested, certified and approved to the requirements of the local Authorities will be permitted for the project. All fire and/or smoke dampers shall be installed and certified by a licensed installer.
- Dampers shall comply with AS1682 Parts 1 & 2 and maintained in accordance with AS1851.
- Dampers shall be rated to maintain the fire rating of the slab or wall in which they are installed.
- Provide a duct access panel in ductwork for inspections of the dampers
- Fire dampers may be blade or curtain type depending on configuration.
- Fusible links shall be of the type approved by the Insurance Council of Australia
- Fire dampers shall be fixed firmly to the fire wall, maintaining its operational status on the deterioration of connecting ductwork. No duct shall be solid fixed to the fire damper. A slipjoint and sealant shall be used alone.

Refrigeration Pipework

- Install refrigerant lines and electrical wiring between indoor and outdoor unit.
- Provide dehydrated copper tube suction and liquid lines manufactured in accordance with AS1571.
- Pressure test for leaks and hold test for the period recommended by the equipment manufacturer.
- Support pipework securely and without any visible sags. Provide UPVC pipe sleeves over pipework at each support.
- All exposed pipework to be enclosed in PVC ducting or covered with Colorbond hat sections.
- Where adjoining insulation meets on refrigerant pipework, it must be protected by a vapour barrier on the outside of the insulation. The vapour barrier shall be achieved by gluing & taping the adjoining pieces of insulation.

Condensate Drains

- Condensate drains shall be run from each unit, trapped where necessary in PVC of not less than 25mm nominal bore to the drain point provided. Confirm location of existing drain points.
- Insulate drain with elastomeric closed cell pipe insulation with minimum of 19mm thick wall thickness on drain lines.
- Other drain lines and drip trays subject to condensate formation shall also be insulated.
- Support pipework securely and without any visible sags. Provide UPVC pipe sleeves over pipework at each support.

Pipework Insulation

- Refrigerant pipework must be insulated in accordance with the NCC Part J6D9.
- For nominal pipe size not greater than 40mm:

Temperature Range	Minimum Material R-Value
Refrigerant not more than 2°C	1.3
Refrigerant more than 2°C but not more than 20°C	1.0
Refrigerant more than 30°C but not more than 85°C	1.7

- For nominal pipe size greater than 40mm and not greater than 80mm:

Temperature Range	Minimum Material R-Value
Refrigerant not more than 2°C	1.7
Refrigerant more than 2°C but not more than 20°C	1.5
Refrigerant more than 30°C but not more than 85°C	1.7

- Thermal resistivity of insulation material must be tested in accordance with AS4859.1. Documentation indicating as such must be provided on request.

Electrical

- Provision and termination of three (3) phase and single (1) phase power supplies to isolators adjacent to all mechanical services plant as indicated on drawings by electrical services for final connection by Mechanical Services.
- All wiring to mechanical equipment shall be run from these isolators by the Mechanical Services.
- All air conditioning plants shall automatically reset in the event of power failure after the appropriate interval recommended by the manufacturer.
- All conduit exposed to direct sunlight shall be rigid UV resistant or painted flexible conduit.
- All electrical works shall comply with the most recent AS3000 requirements.

Controls

- Air conditioning units controlled from local controller.
- Toilet, ensuite and bathroom exhaust fans shall be interlocked with lights by electrical services c/w 10 minute run-on timer.
- Laundry exhaust fans shall have a wall mounted switch and be interlocked with dryer as shown on M002 details
- All switch plates shall match those in the Electrical Services.

Mechanical Services Switchboard fire pump controls

- Pump room exhaust fan shall run at full speed (900 l/s) upon receipt of fire signal, until fire signal is disabled.
- Pump room exhaust fan shall run at reduced speed (150l/s) at all other times.
- Pump room exhaust fan must be able to be speed controlled via VSD in order to meet both flowrate requirements.
- Pump room supply fan to run on at full speed (800l/s) upon receipt of fire signal with exhaust fan.
- Pump room supply fan shall remain off at all other times.
- Pump room supply fan shall be controlled via VSD
- Mechanical services switchboard to allow manual speed control of Fire Pump Exhaust Fan (EF-4) for maintenance.
- Maintenance Manual switch position must not interfere with automatic fire signal run on.

Switchboards

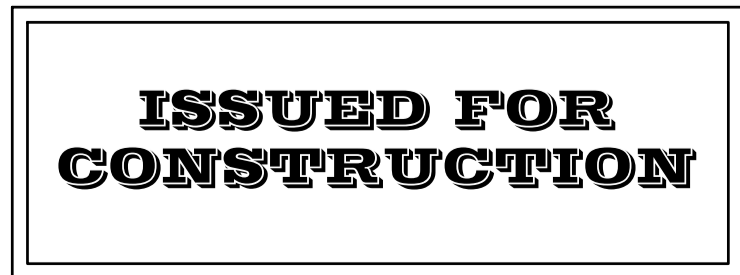
- Approval of switchboard workshop drawings is required prior to manufacturing of switchboards. Switchboards shall be manufactured to AS61439.
- All switchboards shall be designed and manufactured by recognised switchboard builder with proven capability and 10 years minimum experience plus accreditation from the respective equipment manufacturers for installed switchgear and components to maintain the warranty provided by the respective manufacturer in the completed switchboard assembly.
- Minimum warranty period for the completed switchboard assembly is 12 months after practical completion. Include all costs to extend warranty if necessary to meet this requirement.
- Cubicle IP ratings - IP42 for internal locations and IP56 for external locations (uno).
- Segregation (to AS61439):
 - Form 1 up to maximum 400A incoming supply.
 - Form 2 greater than 400A up to 800A incoming supply.
 - Form 3 greater than 800A incoming supply.
- Materials: Cubicles shall be annealed sheet steel internal areas.
- Type tested switchboards shall be manufactured by holders of a current nata test certification for the specified fault levels.
- All Form 3 switchboards shall be type tested.
- Maximum height for wall mounted cubicles shall be 1.6m. Minimum height of base mounted switchboards 1.8m to top. Base mounted cubicles fixed against wall in internal locations shall have a minimum gauge of 1.6mm.
- Minimum sheet metal gauges (uno) shall be:
 - Wall mounted cubicles 1.6mm zinc annealed steel.
 - Wall mounted cubicles 1.2mm stainless sheet steel 316.
 - Free standing cubicles 2.0mm zinc annealed steel.
 - Free standing cubicles 1.6mm stainless sheet steel 316.
- All metal works shall be folded, seam welded at joints (monocoque technique). Non-welded riveted or screwed together cubicle assemblies are not acceptable. Fully welded cubicles bolted together are acceptable mounted on a common channel plinth or other approved rigid alignment frame.
- Doors larger than 0.5m² in area shall be stiffened with top hat sections.
- Doors greater than 1m in height shall be fitted with 3 point locking system. Colour electrical orange within cupboards and plant rooms or to match wall where exposed to view.
- Provide metal folded edge schedule holders, neatly typed card in each door and heavy duty clear plastic window.
- Pressure tested moulded clear plastic clip-in holders are not acceptable.
- Cubicles shall be finished with baked enamel paint on thermostat powder coating to AS4506.
- Doors in internal locations shall be fitted with key locking flush/knob latch. Key shall be lowe & fletcher 92268 or equivalent.
- Door seals shall be closed cell neoprene and aligned against door return edge. Secure with door seal manufacturer recommended adhesive and retention clips/angles suitable for proposed switchboard location and temperature exposure.
- All switchboards shall have captive screws on escutcheon panels with chrome "D" handles. Escutcheons greater than 1m in height shall be hinged and removable. Provide pole fillers to all spare escutcheon cutouts.
- Provide gland plates top and bottom, slotted pvc wiring ducts and cable entry room top & bottom.
- Busbar chassis shall be copper and insulated and have 50% spare pole spaces (uno).
- Provide dead front metal escutcheon in front of all circuit breaker chassis.
- All power terminations shall be lugged. Tunnel terminations up to 16mm² are acceptable.
- All control wiring shall be lugged and numbered.
- All exterior switchboards greater than 3m³ internal overall volume shall be provided with anti-condensation measures such as anti-condensation heaters at the bottom of each effective segregated tier in accordance with heater manufacturers rating and control recommendations for the expected environment at the switchboard installation location. Provide manufacturers recommendation with workshop drawings for approval.
 - Unless noted otherwise all electrical boards and control panels shall have workshop drawings submitted for approval. workshop drawings shall include the following:
 - detail layouts for segregation, dimensions, construction, finishes and fitout.
 - external front elevations with and without doors.
 - cross section for each compartment.
 - details of door seals and cabinet accessory mountings
 - cubicle construction details schedule.
 - equipment schedule.
 - labelling schedule including letter heights.
 - single line & control diagrams (the total number of poles is to be determined by the contractor based on the number of circuits and spare pole capacity required).
 - A full set of as-constructed electrical schematic diagrams shall be provided within an approved document holder fitter behind door of cabinet or other approved location.
- Where time switches or timer controls are used, the instructions shall be laminated and inserted into the schedule holder.
 - Switchboard labelling - All switchboards shall be labelled.
 - Interior locations:
 - Engraved laminated pvc screw fixed. Lettering shall be 6mm block lettering for minor equipment and 10mm block lettering for major equipment. Warning and emergency equipment labels shall be white letters on red background. standard labels shall be black letters on white background.
 - Submit full details of proposed text plus manufacturing details for all labels on workshop drawings.
 - Mandatory labels on all switchboards shall include:
 - main switch/isolator - rating and frame size.
 - submain controls - destination, rating and frame size
 - incoming cable - source, size and type

Switchgear ID labels fixed to slotted duct lids is acceptable (uno).

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orientation



architect



preparator

AUSPACE DEVELOPMENTS GROUP PTY LTD

project

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