

M&E BUILDING SERVICES DESIGN GUIDANCE

QUEEN VICTORIA ST

Produced by XCO₂ for Thackeray Estates

FEBRUARY 2021



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ABBREVIATIONS

Abbreviation	M&E equipment
MVHR	Mechanical Ventilation with Heat Recovery
ASHP	Air Source Heat Pump
BCWS	Boosted Cold Water Service
PV	Photovoltaic Panel
LTHW	Low Temperature Hot Water
DHW	Domestic Hot Water
SVP	Soil Vent Pipe
VRF	Variable Refrigerant Flow
HIU	Heat Interface Unit
LV	Low Voltage
HV	High Voltage
MSDB	Multi-Service Distribution Board
BMS	Building Management System
TV-IRS	TV – Integrated Reception System
CCTV	Closed Circuit TV
DNO/IDNO	Distribution Network Operator / Independent Distribution Network Operator

Revision	Rev 0	Rev 01				
Remarks	Issue	Issue				
Prepared by	YJ/NG	YJ/NG				
Checked by	MB	MB				
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1. EXECUTIVE SUMMARY

This report provides MEP design guidance information for the Queen Victoria St development located in the Reading, specifically detailing the building mechanical, public health and electrical services.

The purpose of this document is to provide the team with a strategy for servicing the site so that reasonable provision of space can be provided within the buildings at an early stage. It should be noted that space requirements are based on early-stage calculations and may change as the design develops to a more detailed level. All sizes should be viewed as indicative at this stage and should be updated with any changes to the design strategy or accommodation schedule. This is not a detailed design or construction document.

The attachments to this report are as follows:

- Appendix A – Building Services Design Guidance Drawings

1.1 SITE OVERVIEW

The development involves the renovation of a listed building at 1-15 Queen Victoria St, Reading, RG1 1SY, which includes a three-storey hotel building comprising of 41 hotel rooms and 16 retail units. The following provides a high-level overview of the mechanical, electrical, and public health designs.

1.2 SERVICES OVERVIEW

1.2.1 INFRASTRUCTURE SERVICES OVERVIEW

The utility infrastructure services within the development will comprise of the following:

- Provide new connections and retain or upgrade existing ones to supply the electrical load of the development.
- Incoming telecommunications connections (potentially from multiple suppliers) to serve the various units of the development.
- 17No. incoming mains water supply to the building to serve a hotel cold water tank and 16 retail units.
- Possible secondary electrical power supply from an alternative local substation / the local LV network, to provide secure supplies to life safety plant and equipment

1.2.2 MECHANICAL SERVICES OVERVIEW

The mechanical services within the development will comprise of:

- Space heating and cooling in Apart hotel will be via ceiling mounted fan coil units. Primary heating and cooling will be generated by roof mounted VRF system.
- Centralised Mechanical Ventilation with Heat Recovery (MVHR) units located on the roof will serve the Aparthotel via vertical and horizontal ductwork.
- Space heating and cooling in Retail units will be via ceiling mounted fan coil units. These will be a tenant fitout item. A dedicated communal VRF system will be provided to limit the number of external condenser units.
- Ventilation for retail units will be provided by tenant fitout MVHRs with air intake and exhaust grilles on the external façade facing the courtyard.

1.2.3 PUBLIC HEALTH SERVICES OVERVIEW

The public health services within the development will comprise of:

- Incoming water infrastructure including utility connections and meters
- Break tank and separate booster pump set potable water services
- Above ground sanitary drainage
- A roof mounted heat pump and thermal stored within the basement plantroom will supply the Aparthotel with domestic hot water via a Low Temperature Hot Water (LTHW) communal heating circuit. Heat will be generated by a central heat pump mounted on the roof and stored in hot water cylinders.
- Retail units will be provided with dedicated mains water supply and hot water generation will be a tenant fitout item

1.2.4 ELECTRICAL SERVICES OVERVIEW

The electrical services within the development will comprise of:

- Existing and new Incoming LV (LV) supplies from the local LV network and the existing substation to serve the development, terminating within the new electrical switch room for the hotel and internally to the areas served for the retail units.
- Low Voltage (LV) fuse boards/distribution panels serving tenant and landlord distribution boards throughout the buildings
- Life-safety/back-up power supplies to serve life safety systems (e.g. smoke extract systems, firefighting lift and sprinkler pumps)
- Energy efficient lighting using high performance LED luminaires throughout
- Electrical power outlets throughout the building to suit room occupancy requirements
- Electrical supplies to plant items and equipment
- Lift installations (specified by others), including passenger and firefighting lifts, as required
- Lightning protection (final requirements to be confirmed by specialist at later design stages)
- Fire alarm system to suit the building fire strategy (requirements as confirmed by fire specialist)
- Integrated Reception System (IRS), to independently serve the residential and commercial demises
- Provisions for Telecom/data, security and any other specialist systems distribution, to independently serve the residential and commercial demises
- PV on the roof to match the need of the development's energy strategy

1.2.5 INTEGRATION WITH LISTED BUILDING

- Central plant has been located within the new build elements of the development or in the existing basement
- Risers have been predominantly located within the new build elements
- Risers have only been located within the listed elements where it is unavoidable
- Ventilation services to the apart hotel has been centralised to minimise any penetrations through the listed façade
- Ventilation intake and exhaust points have been integrated into the courtyard side façade to minimise any penetrations through the listed façade
- Communal VRF for Retail units to minimise number of roof top condenser units

1.3 SERVICES ITEMS NOT COVERED IN THIS REPORT

- Acoustic design
- Specialist lighting
- Above ground drainage
- Below ground drainage
- External rainwater drainage
- Lift design
- Fire services & strategy*
- Sprinklers
- Security*
- Telecoms*
- IT and AV*

* Space provision for these items has been allowed in our design.

2. DESIGN CRITERIA

The following section lists the design criteria on which the services design was based. It should be reviewed by the client and other design team members prior to commencement of the next stage of design.

2.1 MECHANICAL AND PUBLIC HEALTH SERVICES

Table 1: Heating and cooling allowances

Area	Heating	Cooling
Hotel room	100 W/m2	120 W/m2
Retail	100 W/m2	140 W/m2

Table 2: Ventilation Provision

Area	Ventilation Rate
Hotel room	10l/sp
Retail	7.5l/sp

Table 3: System Temperatures

Area	System Temperatures (°C)
Domestic Hot Water	55 in distribution, 50 at fixtures

2.2 ELECTRICAL SERVICES

Table 4: Electrical Service Connection from Grid Network

Parameter	Description
Low Voltage	230/400V +10/-6%
Phase	3-phase
Frequency	50Hz
Earthing Provision	Protective Multiple Earthing (TNC-S) or as per local provider's requirements

Table 5: Electrical Load Inclusions

As well as allowances for the general apartment and landlord electrical loads, at this stage of the design further allowances have been made for the following systems. 2no. lifts - Mechanical plant to include: Hot water heat pump (to serve hot water), Heating circulation pump, air source heat pumps, water booster set
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General load allowances have been based on BSRIA Rules of Thumb and UK Power Network EDS08-0136 LV Network Design documents.

3. SUMMARY OF BUILDING SERVICES STRATEGY

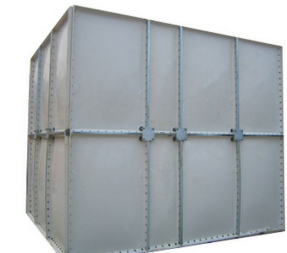
Services	Strategy
Incoming Utility Services/Metering	The development will be served by: • 17No incoming residential water supply, one of which will be installed up to a bulk water meter and into the break tank located in the cold water plant room. From the break tank, a booster set will distribute water to the hotel rooms. The other 16no. incoming water supply will be installed up to water meters for each retail unit. • New, retained and upgraded incoming low voltage electricity supplies from the local network and the existing substation. • A secondary power supply will also be required to serve life-safety equipment in the building. Current provision is for a generator set to be provided, however, alternative methodologies including a diverse incoming secondary LV supply to the building are to be considered further at future design stages. • Incoming telecommunications & data supplies will be installed up to data communications boxes/distribution points within the Electrical plant rooms/electrical risers/ retail units, where the services for the buildings will commence. It is envisaged at this stage that fibre services will be provided to the building, in addition to any analogue lines for specialist and emergency systems.
Power connections	• The electrical demand of the total of the existing, extended and new areas of the development has been assessed to be in the region of 270kVA at this stage. • Existing connections are expected to be retained or upgraded with new connections to be provided for the additional units. The supplies will be terminated in metered lockable isolators, positioned adjacent to the substation in the dedicated switch room or within the areas served for the retail units. • Multi-Service Distribution Boards within the Electrical switch room and the electrical riser will provide supplies to the hotel units and the building's communal services.
Electrical Distribution & Metering	• The supplies to each apartment and retail unit are expected to be single-phase (230V), with the hotel building connecting to a three-phase (400V) supply from the local substation or LV network. • Electrical distribution throughout the building shall be via a series of Switch Boards and Distribution Boards, which shall feed each individual hotel apartment unit and all landlord loads. • A 3-phase utility meter shall be provided within the electrical switch room to monitor the apartment hotel loads. • The retail units are expected to be metered independently and individually. • Mechanical and electrical services shall be vertically distributed in an accessible riser spanning the full height of the building.
Secondary Power	• Secondary power supplies to be provided to all essential life safety equipment, to operate should the primary mains power source be interrupted. All life safety equipment to be provided with dual power supplies in accordance with BS 9991 & BS 9999. • It is envisaged at this stage that a secondary power supply will be required to serve the sprinkler system within the building and any further systems as determined by the project Fire Strategy. • Current provision is for a generator set to be provided to supply all life safety power in the building, however, alternative methodologies including a diverse incoming secondary LV supply to the building are being considered and will be developed further at future design phases. • Risk assessment and Building Control approval required to confirm proposed approach. • Final requirements of life safety equipment to be confirmed by the Fire Specialist and Building Control.
Apart Hotel Cold Water Service	• A cold-water storage tank and booster pump set will be installed in the cold-water plant room to serve potable water supply of the hotel rooms.

Services	Strategy
Above Ground Drainage and Rainwater Drainage	- The development will utilise a gravity driven foul water drainage system - The above ground drainage system will consist of common vertical stacks, with all water appliances and sanitary ware situated close to the stacks. - For simplicity WCs/toilets and bathrooms are proposed to be stacked vertically where possible and toilets in adjoining rooms should be placed back to back to reduce the quantity of vertical waste pipes. - Soil stacks/soil ventilation waste pipes serving toilets should be brought directly down to municipal sewers and be vented directly at roof level or by using Air Admittance Valves (building control to approve this before moving forward with the design). - Soil stacks/soil ventilation waste pipes will generally measure 110 mm in diameter each. - As the building is over 3 storeys, waste must be drained into a separate stub stack at ground level if there are WC connections connecting to the same SVP in the floor above. - Rainwater drainage will be generally via internal downpipes. - Below ground drainage will be by the civil engineer.
Apart Hotel Hot Water service	The hot water services in the development will comprise of the following: - A hot water heat pump will supply the building with domestic hot water via a domestic Hot Water circuit. Heat will be generated by the hot water heat pump and stored in hot water cylinders. - Central hot water cylinders will be provided with a backup electrical heater - Recirculating DHW pipework shall be distributed from the hot water cylinder to each of the hotel rooms.
Apart Hotel Heating and Cooling	- Primary heating and cooling will be generated by the roof mounted air source heat pumps. - Heating and cooling in each hotel room and retail unit will be provided by fan coil units which are served by refrigerant pipework running from the air source heat pumps.
General Ventilation	- All hotel rooms are proposed to be mechanical ventilated using centralised MVHR units located on the roof. Fresh air ductwork and extract air ductwork will run horizontally within ceiling void and vertical within ductwork risers to the roof. - The electrical substation ventilation shall be strictly in-line with the UKPN / Independent Connection Provider instructions which require natural ventilation through its façade.
Retail Unit Services	- Ventilation air intake and exhaust positions integrated into façade/signage on courtyard side. Ventilation plant to be tenant fitout. - Communal VRF provided for heating and cooling services, landlord will then operate and manage the use of this system billing tenants for usage. Compatible internal FCUs will then be connected to the communal system as part of the tenant fitout. - DHW services will be by tenant fitout where required. - Retail units will have dedicated water and power utilities connections
Renewables	- PV to be provided at roof level as per the requirements of the Energy Strategy for the development. - G99 export agreement as required.

4. PLANT SUMMARY

The following tables outline the main plant required for the systems proposed by XCO2. Full plant spatial requirements can be found in Appendix A.

Table 6: Mechanical Plant Rooms

Mechanical Plant Rooms			
Items	Floor area (with service zone)	Comments	Indicative picture
Apart Hotel Cold Water Tank Room	16 m ²	- Domestic Cold storage tank with separate booster pump set located on basement floor - Total Tank Volume: 6,000L - Tank Storage Volume: 4,800L - Tank Dimensions: 2m x 1.5m x 2mH - Minimum clear height: 2.75m - Double door access required Daily demand = 9,000 L/day	  
Apart Hotel Hot water Plantroom	10 m ²	- Located on the basement floor - Double door access required - Minimum clear height 2m - Equipment includes: - DHW hot water tanks - Heating circulation Pumps - Expansion Vessel, Pressurisation Unit, Dirt & Air Separator, Dosing Pot and other ancillary equipment - Mechanical Control Panel	

Mechanical Plant Rooms			
Items	Floor area (with service zone)	Comments	Indicative picture
Apart Hotel VRF	15 m ²	- Located on roof 4no Daikin air source heat pumps - Acoustic enclosure will be required in accordance with Paragraph 7.5 of the Noise Impact Assessment. Approx. Capacity = 170kW	
Retail VRF	10 m ²	- Located on roof 3no Daikin air source heat pumps - Acoustic enclosure will be required in accordance with Paragraph 7.5 of the Noise Impact Assessment. Approx. Capacity = 110kW	
Apart Hotel Hot Water Heat Pumps	10 m ²	- Located on roof 2no Mitsubishi Ecodan CAHV monobloc units or similar - Acoustic enclosure will be required in accordance with Paragraph 7.5 of the Noise Impact Assessment. Approx. Capacity = 60kW	
Mechanical Control Panels	1 m ²	- Located on roof - To serve Heating, Ventilation and Air-Conditioning electrical equipment	
Access Space		Access routes to plantrooms will need to be considered to allow plant replacement in the event of a failure.	

Table 7: Electrical Plant Rooms

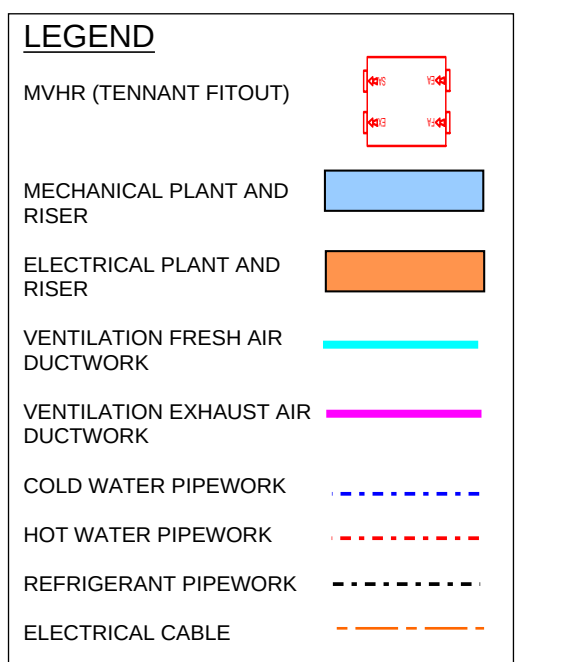
Electrical Plant & Equipment			
Items	Floor area (with service zone)	Comments	Indicative picture
Switch Room / Electrical Services Room	15 m ² Floor to ceiling 3m minimum.	Switch rooms ideally located close to the building substation and at the centre of the loads served within the building, to contain main electrical, and telecommunications intake and distribution equipment. Switch room to contain main board panel, Distribution Boards, and the building's main security equipment.	
Switch Boards/Fuse splitter panels	Sizes & rating TBC. 1000mm clear fall-back space	Floor mounted in the electrical switch rooms – to serve distribution boards and supplies to various parts of the development.	
Generator (IF REQUIRED)	Size allowance at this stage 7 m ² Floor to ceiling 3m minimum if installed internally. TBC based on final requirements, as confirmed by fire specialist.	Installed within dedicated 2-h fire protected space if internal. Emergency Generator for secondary electrical supplies to life safety systems within the building. Provisions for cross ventilation inlet / outlet air, flues exhaust, re-fuelling and maintenance / replacement. Flue to be run to the roof of the building that contains the room via dedicated riser. Secondary power supplies to distribute from the room. Refer to MEP guidance sketches for proposed location and requirements. Final rating of generator set TBC at future design stages based on confirmed life safety equipment requirements.	
CT Chamber	750H x 550W x 300D	Installed within Switch Room. 1000mm minimum working space at front – 1000mm minimum distance from cable entry point for cable bending. Must be wall mounted between 1800 and 1055 mm from ground floor level.	

Electrical Plant & Equipment			
Items	Floor area (with service zone)	Comments	Indicative picture
Distribution Boards	450W x 800H x 150D	Wall mounted in electrical switch rooms / riser cupboards as required – to provide lighting and small power circuits.	
Automatic Transfer Switch (ATS)	TBC based on final equipment served.	Required to automatically switch to secondary electrical supply should the primary supply to life safety equipment be lost. Located within life safety plant or as close to equipment served as possible.	
Integrated Reception System (IRS)	1m ²	Roof top mounted aerial array, with distribution equipment within electrical riser cupboards. Separate systems provided for each building.	
PV Panels	As per the Energy Strategy for the development. See separate report.		
PV inverters, isolators and associated electrical meters	1200H x 1000W x 800D	PV inverters and ancillary equipment to be located within dedicated space provided at roof top level/within electrical riser cupboards on upper floors – number and requirements TBC with PV specialist.	

APPENDIX A – MEP DESIGN GUIDANCE DRAWINGS

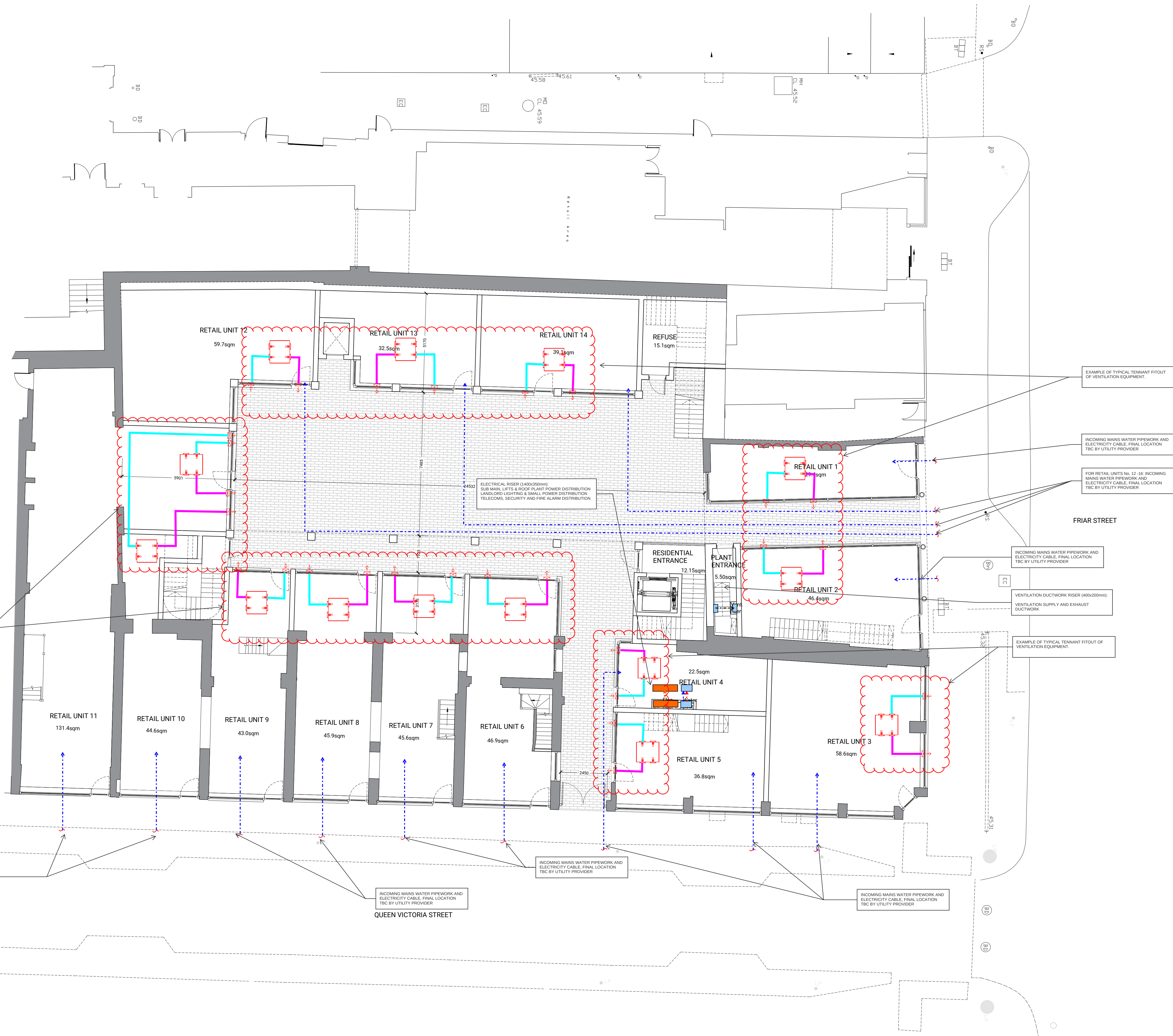
The following sketch mark-ups are to be read in conjunction with this document.

- 9631-SK-M&E-001 MEP Design Guidance Sketches – Basement Floor
- 9631-SK-M&E-002 MEP Design Guidance Sketches – Ground Floor
- 9631-SK-M&E-003 MEP Design Guidance Sketches – First Floor
- 9631-SK-M&E-004 MEP Design Guidance Sketches – Second Floor
- 9631-SK-M&E-005 MEP Design Guidance Sketches – Third Floor
- 9631-SK-M&E-006 MEP Design Guidance Sketches – Roof



XCO₂

Drawing Number	Revision
631-SK-M&E-001	P0



LEGEND

- MVHR (TENNANT FITOUT)
- MECHANICAL PLANT AND RISER
- ELECTRICAL PLANT AND RISER
- VENTILATION FRESH AIR DUCTWORK
- VENTILATION EXHAUST AIR DUCTWORK
- COLD WATER PIPEWORK
- HOT WATER PIPEWORK
- REFRIGERANT PIPEWORK
- ELECTRICAL CABLE

P0 25.01.21 Planning issue
D1 20.01.21 Discussed

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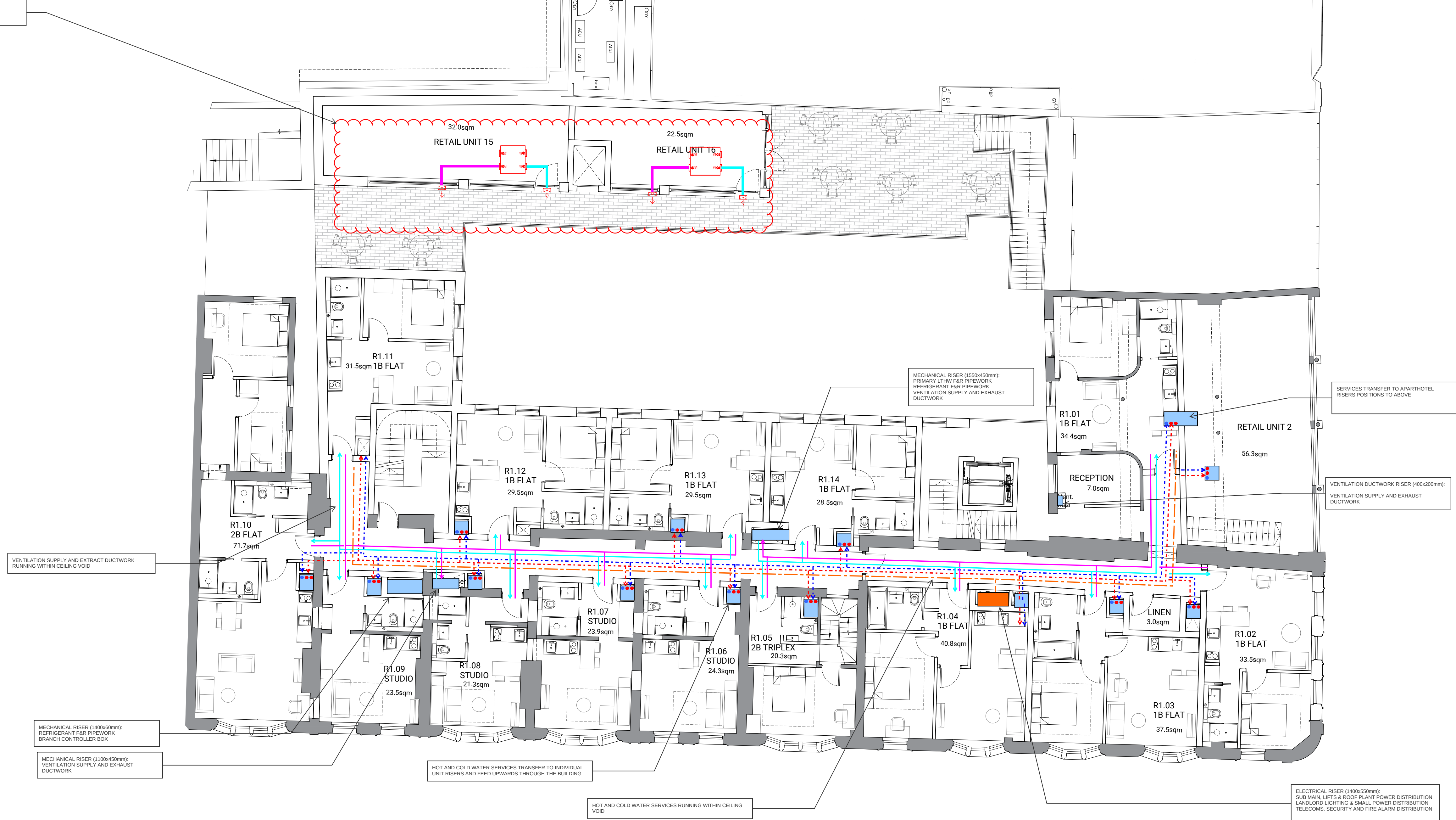
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MEP DESIGN GUIDANCE
GROUND FLOOR

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Drawing Number	Revision
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OF TYPICAL TENANT FITOUT OF
ON EQUIPMENT.



LEGEND

MVHR (TENANT FITOUT)

MECHANICAL PLANT AND RISER

ELECTRICAL PLANT AND RISER

VENTILATION FRESH AIR DUCTWORK

VENTILATION EXHAUST AIR DUCTWORK

COLD WATER PIPEWORK

HOT WATER PIPEWORK

REFRIGERANT PIPEWORK

ELECTRICAL CABLE

P0 25.01.21 Planning issue

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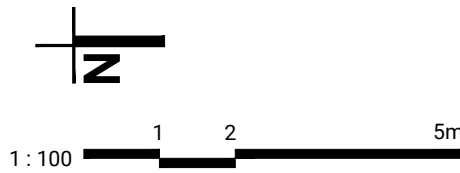
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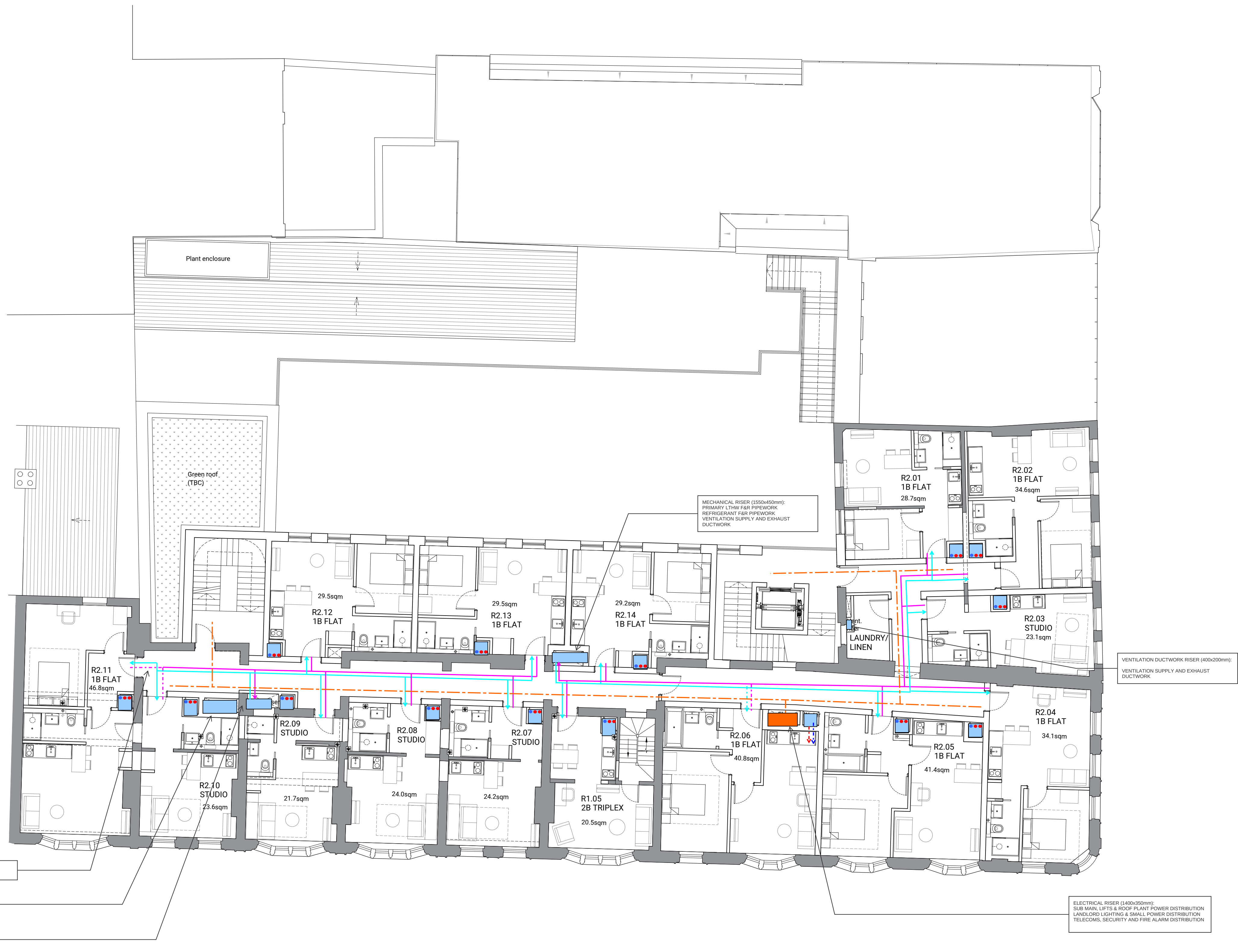
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**MEP DESIGN GUIDANCE
FIRST FLOOR**

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LEGEND	
MVHR (TENNANT FITOUT)	
MECHANICAL PLANT AND RISER	
ELECTRICAL PLANT AND RISER	
VENTILATION FRESH AIR DUCTWORK	
VENTILATION EXHAUST AIR DUCTWORK	
COLD WATER PIPEWORK	
HOT WATER PIPEWORK	
REFRIGERANT PIPEWORK	
ELECTRICAL CABLE	

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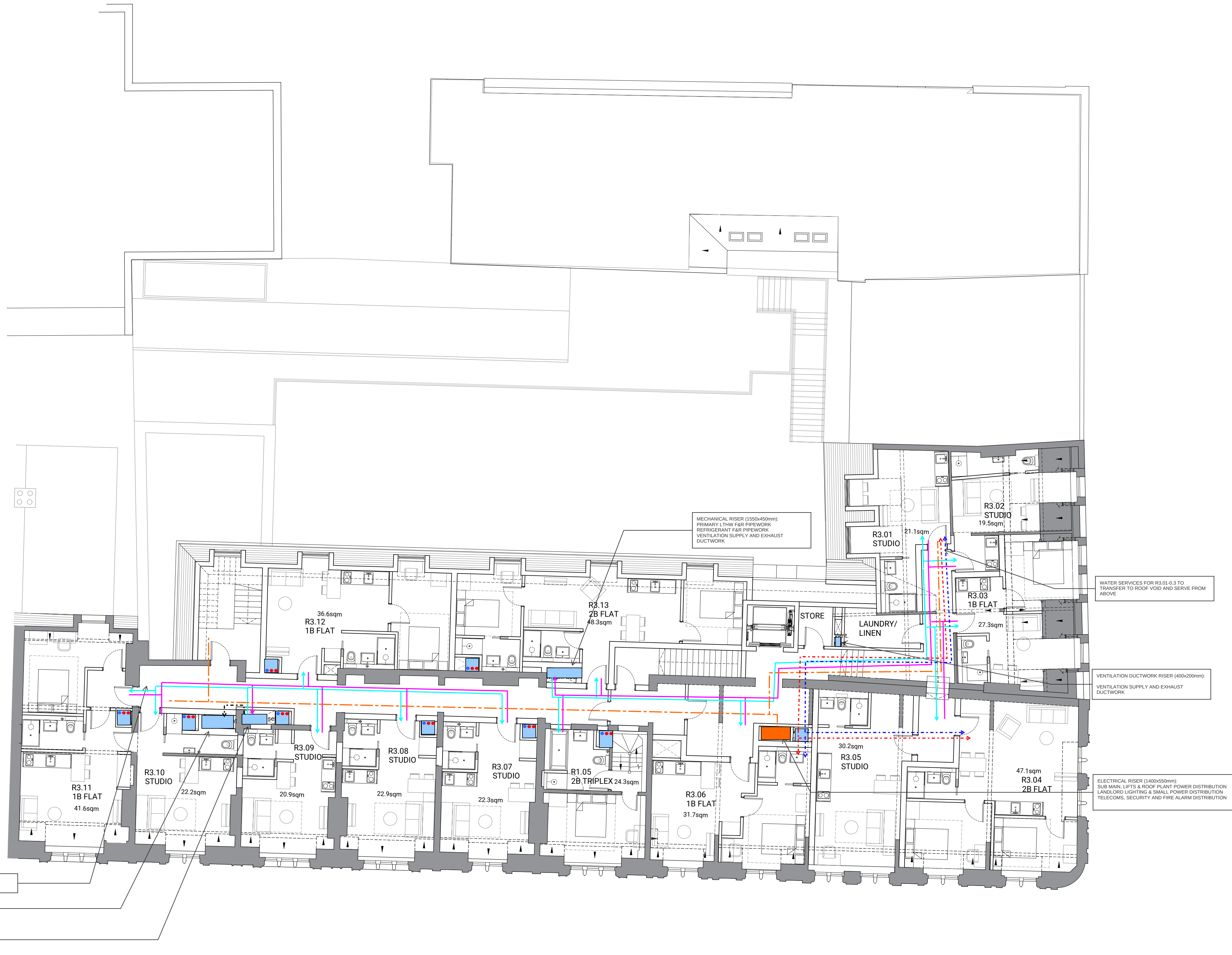
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Title
**MEP DESIGN GUIDANCE
SECOND FLOOR**

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LEGEND

MVHR (TENNANT FITOUT)

MECHANICAL PLANT AND RISER

ELECTRICAL PLANT AND RISER

VENTILATION FRESH AIR DUCTWORK

VENTILATION EXHAUST AIR DUCTWORK

COLD WATER PIPEWORK

HOT WATER PIPEWORK

REFRIGERANT PIPEWORK

ELECTRICAL CABLE

- P0 25.01.21 Planning issue
P1 28.01.21 Layout in no. 147 & 148 amended

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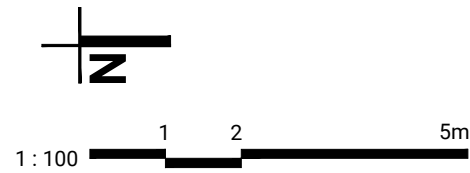
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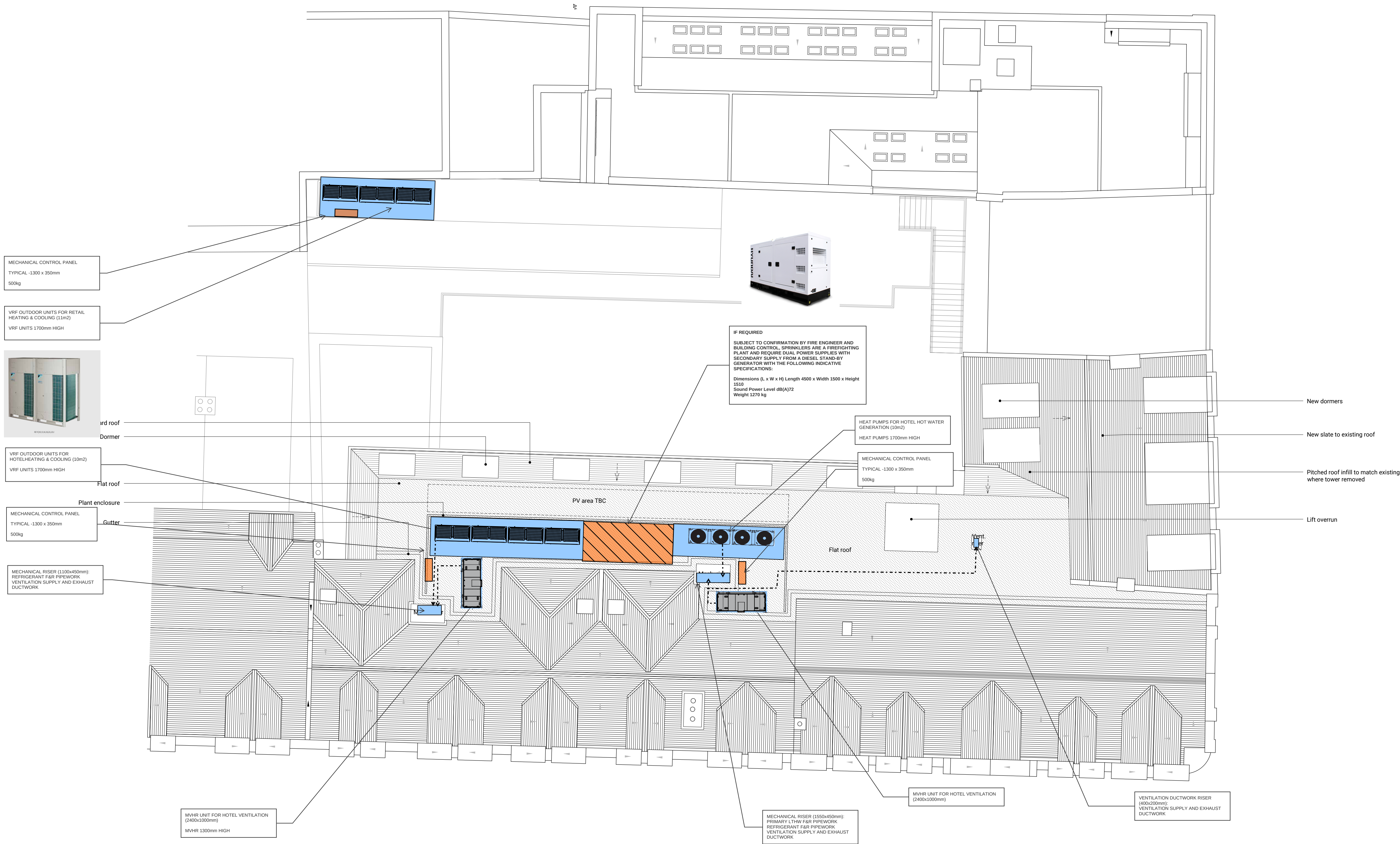
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MEP DESIGN GUIDANCE
THIRD FLOOR

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Revision
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LEGEND	
MVHR (TENNANT FITOUT)	
MECHANICAL PLANT AND RISER	
ELECTRICAL PLANT AND RISER	
VENTILATION FRESH AIR DUCTWORK	
VENTILATION EXHAUST AIR DUCTWORK	
COLD WATER PIPEWORK	
HOT WATER PIPEWORK	
REFRIGERANT PIPEWORK	
ELECTRICAL CABLE	

P2 29.01.21 Risers amended

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Title
**MEP DESIGN GUIDANCE
ROOF**

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