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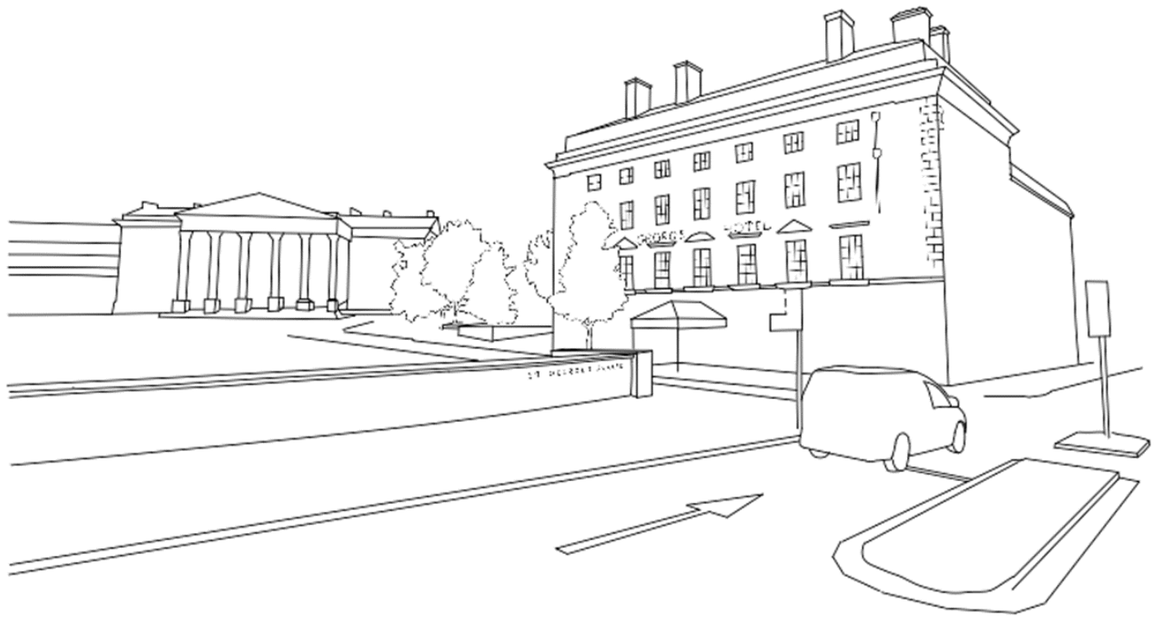
THE GEORGE HOTEL, HUDDERSFIELD

Listed Building Consent – MEP report



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THE GEORGE HOTEL, HUDDERSFIELD
LISTED BUILDING CONSENT – MEP REPORT

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Ramboll
240 Blackfriars Road
London
SE1 8NW
United Kingdom

T +44 20 7631 5291
https://uk.ramboll.com

Ramboll UK Limited
Registered in England & Wales
Company No: 03659970
Registered office:
240 Blackfriars Road
London
SE1 8NW

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1. INTRODUCTION

Following the report issued to support the Architectural RIBA Stage 2 package, this report is provided in support of Listed Building Consent and presents the further development of the MEP design in coordination with the design team.

The MEP proposals described within this report will require further design development prior to progressing with the RIBA stage 3 packages of information.

This report is to be read in conjunction with all architectural and structural information, the fire strategy report and all other documents issued as part of the listed building consent works.

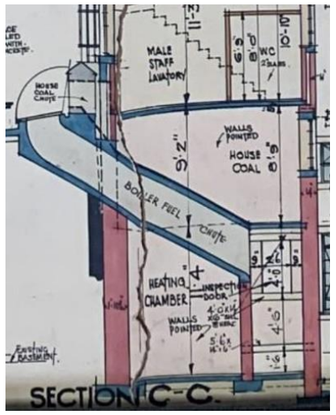
2. EXISTING MEP SYSTEMS

2.1 Heating

A gas supply entering the basement previously served a gas fired boiler plant. The majority of the gas fired boilers and associated plant and equipment have been decommissioned and removed at some point in the last 12 years.

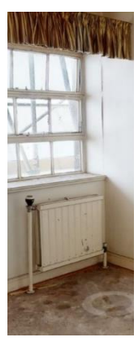
Sections of the heating and domestic hot water generators remain within the basement. None of which could be retained or brought back into operation. The associated header pipework is severely corroded and requires removal. It is very likely that the pipework gaskets are asbestos and therefore should be removed by an asbestos removal company.
As can be seen from the above image the remaining sections of heating plant are relatively modern and do not form part of the Hotels original installation.

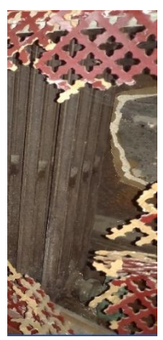
The remnants of what appears to be part of the coal fired boiler plant illustrated on the 1936/38 alterations drawings and image adjacent can still be seen in the basement, in a small room behind gas fired boilers.



As can be seen from the image, the plant is very poor condition and heavily corroded. It is very likely the the piece of plant contains
asbestos and therefore should be made safe.

Heating to occupied spaces was provided by a series of low temperature hot water heating circuits consisting of distribution pipework together with a combination of column radiators and panel radiators. Whilst the column radiators are old, they do not appear to be part of an original installation, they are in poor condition and will not be suitable or compatible with the proposed new heating system. The panel radiators are like to have been installed at some point after the column radiators and as can be seen are also in poor condition and will not be suitable or compatible with the proposed new heating system.





It is evident that some of the radiators incorporate thermostatic radiator valves (TRVs) providing an element of local control, it is assumed that temperature sensors in certain locations would have provided a basic method of zone control.

2.2 Ventilation

Ventilation to the George Hotel is provided via natural ventilation together with a number of mechanical ventilation systems.

The majority of perimeter rooms incorporate sash type opening windows, as can be seen from the images, the windows comprise of timber frames and single glazing. The thermal properties of the glazing and frames is very poor and the uncontrolled infiltration will be very high leading to significant heat loss. The windows are no longer fit for purpose in their current state. In a number of instaces secondary glazing has been added to the existing single glazing in order to improve the thermal properties of the windows.

In additon to opening windows, there appears to be evidence of a natural ventilation solution through the external wall facing John William Street in the form of small louvres (now bricked up) and small air bricks serving the restaurant space

As can been seen from the image, there appears to be evidence of a louvre beneath a lintel under the window. Underneath the adjacent window the louvre has been removed and the opening has been bricked up. Adjacent to the top of the windows there appear to be very small air bricks within the stone work. On the other side of the wall in the location of the air bricks is a timber panel completed with penetrations suggesting a method of natural ventilation in addition to the windows serving the restaurant.

The free area opening of this natural ventilation solution is very small and therefore the effectiveness of the system to provide ventilation is negligaible.

The bricking up of one of the louvres suggests that this method of ventilation was inadiquate and was replaced by a mechanical ventilation system at some point. A mechanical ventilation system is evident, ductwork runs along the perimeter wall serving the space.

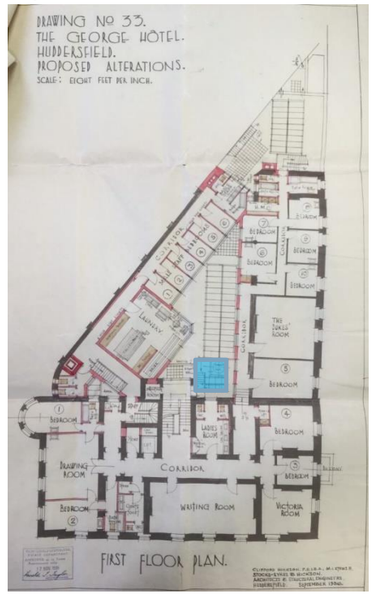
There are a number of mechanical ventilation systems that have been installed over the years to provide supply and extract air to various parts of the hotel, i.e kitchens and internal spaces, all of which are in a state of disrepair and obsolete. In a number of instances parts of the ventilation systems have been removed over the last 12 years.

The adjacent images are typical examples of mechanical ventilation systems installed within the hotel located within the basement. The adjacent system may have served the adjacent museum area and the restaurant above.

The below image is another example of a mechanical ventilation system which appeared to serve a fucntion room on the ground floor via grilles within the floor.

As can be seen from the images, the systems are not part of the original installation, however, they are well beyond their expected operational life, obsolete and not fit for purpose. This system could not be brought back into operation.

It is likely that the ductwork joints will be sealed with asbestos putty, therefore the asbestos should be removed by an asebestos removal company
Off the main staircase of the listed building on a half landing prior to reaching the first floor is a small plantroom. The plantroom itself appears to be part on the 1930s extension rather than the original building. The below drawing is marked up (blue square) to illustrate the location of the plantroom.

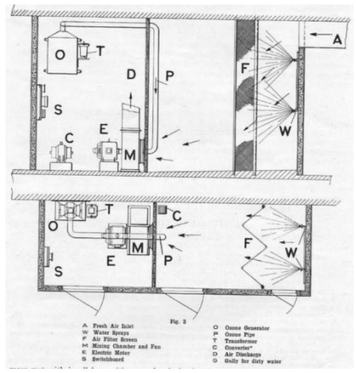


The plant room contains an “ozonair” ventilation system which may have been installed in the 1930s at the time of the extension.

Ozonair was established as a company in around 1900 by E L Joseph to generate “pure air ventilation”. A booklet “ozonair system of pure ventilation” published in 1921 is available.

The intention of the system was to provide clean, conditioned air together with the introduction of pure ozone as a means of keeping the air pure. Firstly fresh air was drawn into the system from outside, where its was washed via a fine mist of water, the air then passed through a filter into a mixing chamber where the fresh air is mixed with recirculated air. The air then passed through an ozone generator. The air was heated if necessary, via a heating coil before being introduced

to the space. It should also be noted that it was acknowledged at the time that the fine mist of water provided an element of evaporative cooling.



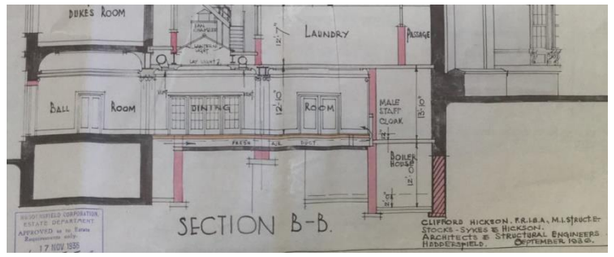
The adjacent image is an extract from the 1921 booklet *"Ozonair System of Pure Ventilation"* which illustrates the basic components of the system.

The booklet describes various applications where the ozonair systems could be utilised, which includes hotels, restaurants, and ball rooms.

Whilst original MEP drawings of the installation are not available in full, reviewing the location of the plantroom together with the direction of remaining ductwork in relation to the dining room, ball room and kitchen illustrated on the 1936 alterations drawings the conclusion could be drawn that the ozonair system provided the ventilation system to these areas.

As well as providing fresh air, the introduction of pure ozone would have been seen as a method of neutralising smells associated with the kitchens and services areas

It is certainly feasible that the ozone system provided supply and extract air to the dining room and ball room.

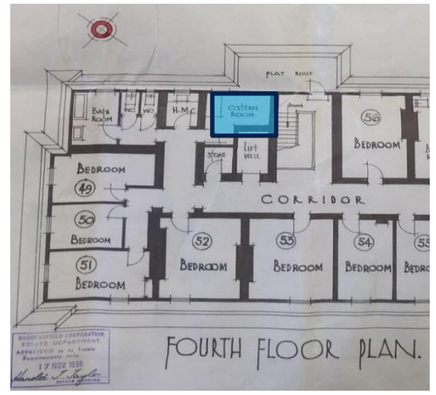


A section produced in 1936 (above) supports this theory, the section includes notes illustrating the route of the supply and extract air to and from the dining room. It appears that the supply air was introduced via a floor void, with the extract drawn from high level to an exhaust fan chamber in the roof of the plant room.
Further investigation would be required to trace out the system. Providing safe access was possible.

The below photographs below identify some of the components of the ozonair system installation

2.3 Domestic Water

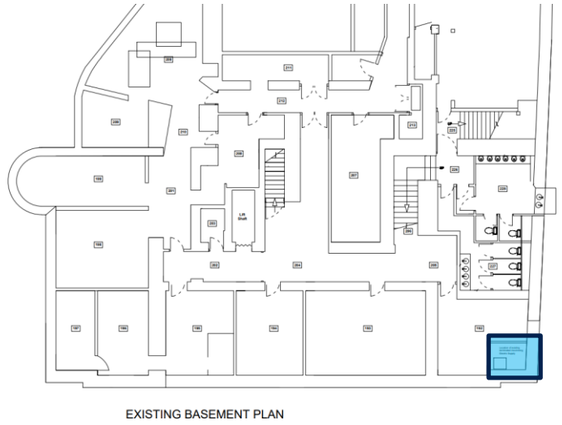
The existing incoming mains cold water branches off the main in John William Street distributes across the square and enters the basement. There is little remaining evidence of the existing water services system other than distribution pipework and some sanitary appliances. Cold water storage tanks and hot water storage cylinders appear to have been removed at some point in the last 12 years.



From the 1936 alteration drawings a cold water storage tank noted as the "Cistern room" appeared to be located on the fourth floor of the listed building adjacent the main stairs behind the lift shaft. It is understood that the cold water storage tank is located within a plantroom that projects up beyond the roof of the listed building above the highlighted area (blue square) on the adjacent 1936 drawing. Access was not available to this area, therefore it could not be ascertained as to whether a tank still remains.

If the tank remains it will be well beoynd its operational life and no longer fit for purpose

Incoming Power – The existing incoming 400V three-phase electrical supply cable enters the basement Electrical Room from John William Street and terminates into an HDCO, an electrical metering point and main electrical isolator are also present.



EXISTING BASEMENT PLAN

The existing electrical incoming area is highlighted in the drawing above.

The supply cable from the main electrical isolator has been removed along with most of the existing electrical distribution equipment. All of the existing electrical services equipment is redundant with many items having already been removed.

With the proposals for the new building to include air source heat pumps, hot water generation and all-electric kitchen and catering equipment, a new larger capacity incoming electrical supply will be required.

3. ENERGY AND CO2 REDUCTION

The George Hotel has not been occupied for the last 12 years and has become derelict in that time. Major refurbishment and new build works are required in order to bring The George Hotel up to modern standards and to align with the Radisson Red Hotel operational specifications.

What remains of the existing MEP installations that once served the George Hotel are no longer fit for purpose and cannot be re used. The majority of the main MEP plant and equipment has been removed at some point in the last 12 years; some air handling plant, duct and pipework distribution remains, along with the incoming power supply.

The intention is to strip out and replace all existing mechanical and electrical services systems with new, modern fit for purpose efficient systems which will provide the correct internal environment together with a building energy management system maximising operational control and monitoring of each system.

The following hierarchy for energy reduction will be followed:

- Use less energy: reduce demands, prioritise passive measures
- Use energy efficiently: highly efficient systems, recover energy, metering and controls
- Remove reliance on fossil fuels and utilise renewable energy
- Verify and optimise in use.

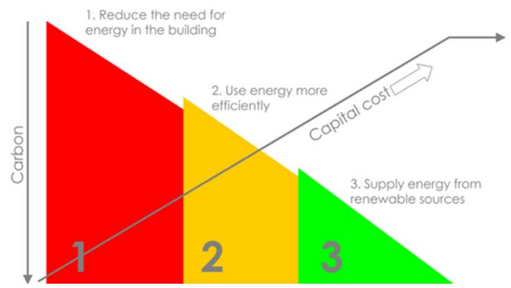


Figure 1 - Energy reduction heirarchy

Figure 3 - Energy reduction heirarchy

3.1 Sustainability Dialogue Tool

Utilising Ramboll's Sustainability Dialogue Tool the design team have reviewed sustainability in the built environment in relation to The George Hotel and generated a summary report.

We have reviewed eight priority areas and their themes, for every theme we have identified a level of ambition from 1 to 5. 1 being "compliance with local requirements or building code" and 5 being "world class"

As a design team, in collaboration with the client we have agreed where to focus our efforts in relation to sustainability specifically for the George Hotel.

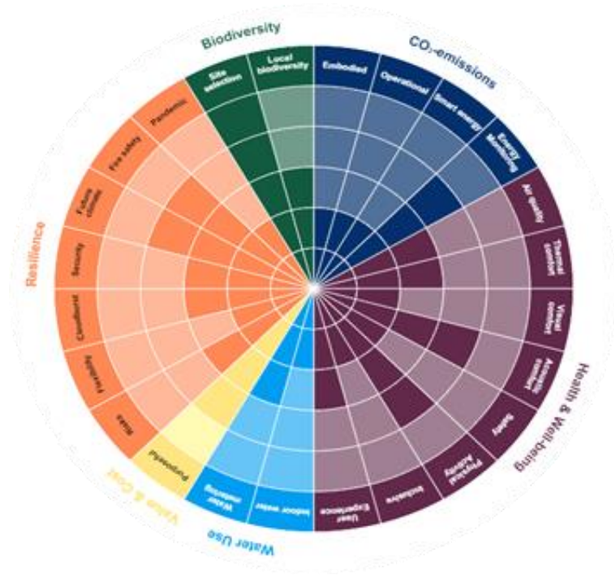


Figure 2 - Sustainability impact areas

The graphical illustration above summarises the sustainability profile of the project and provides a visual indication of priorities. These priorities are spread across 8 main themes:

1. CO_2 emissions
2. Circular Economy
3. Health and Wellbeing
4. Water Use
5. Cost and Value
6. Resilience
7. Biodiversity
8. Just transition

The sustainability dialogue tool report for the George Hotel is available as an appendix of the specific Sustainability report.

To facilitate the sustainability profile developed and to reduce energy consumption and CO_2 emissions for The George Hotel we have reviewed numerous potential fabric and MEP services interventions.
The key interventions are as follows:

Proposed interventions to the existing building fabric:

- Building fabric – through the inclusion of additional thermal insulation wherever possible, such as within the roofs and walls to reduce heat losses and gains
- Utilising the benefits of thermal mass
- Windows – replace windows where possible with high performance double glazed units to reduce heat losses, gains and uncontrolled infiltration.
- Air permeability – reduce air leakage paths, thereby reducing uncontrolled infiltration.
- Consideration of selection of materials used

Proposed Interventions new build fabric:

- High performance thermal insulation
- High performance glazing
- Low air permeability
- Consideration and selection of materials used

The proposed mechanical and electrical services systems will act as an enabler and will put The George Hotel on a pathway towards a net zero carbon in operation in the future. Removing the need for gas and providing all the buildings energy needs by electricity puts The George Hotel on the first step on the pathway towards net zero carbon in operation. As the national electricity grid de-carbonises over time (i.e. the amount of carbon emitted for kWh generated reduces) the electrical supply will eventually become “green” i.e the electricity supply will be generated via renewable technology. However it is essential in the first instance that the energy consumption of the Hotel is minimised through passive and high efficiency MEP engineered solutions, reducing the electrical load drawn from the grid in the first instance. Finally, we will consider the use of renewable technologies where appropriate to further drive down electricity drawn from the grid.

The proposed mechanical and electrical services systems include:

- Remove all reliance on fossil fuels, moving to an all-electric building
- Lighting - LED, together with daylight linking, absence and presence detection light control systems.
- Heating and cooling - Air Source heat Pumps (ASHPs), providing heating and cooling throughout
- Ventilation - Mechanical ventilation complete with heat recovery providing full fresh air, together with temperature and CO_2 control. Natural ventilation where suitable i.e the atrium
- Domestic Hot Water – Air Source heat Pumps (ASHPs), providing domestic hot water throughout
- Building Energy Management System – A complete BEMS system will provide full monitoring and optimised control of the building services systems.

4. POTENTIAL IMPROVEMENTS TO BUILDING FABRIC

As a partial refurbishment and a new build project, there are multiple strategies involved with the building fabric.

In the existing heritage building (Block A) glazing should be improved to new high performing glazing without altering the appearance of the existing building.
Where possible, insulation to the building, particularly floors and loft space.

In the new build elements (Block B and C) the building should be built with a high performance envelope, and high performance glazing, aiming to reduce the air permeability to as low as possible.

The entire building has a mechanical ventilation strategy, so reducing the air permeability does not affect fresh air paths, or internal comfort conditions. This means that reducing the air permeability to as low as possible helps to improve building performance, and reduce demands on the heating systems, therefore saving energy.

Further information on building fabric improvements can be found in the architectural report.

5. INCOMING SERVICES & PLANT AREAS

The section gives an overview of the new main plantroom locations, and primary services routes through the building.

5.1 VENTILATION, HEATING AND COOLING

Mechanical systems providing ventilation, heating and cooling to the building are located on the flat roof deck of Blocks B & C

The strategy has aimed to minimise all impact to Block A, avoiding plant on the roof, and penetrations through the façade, retaining the original appearance of the Block, as well as the retained façade of Block C along John Williams Street.

The plant area is highlighted in red in the adjacent image.

On the roof deck are 5no air handling units:

AHU 1	General communal areas
AHU 2	Block A (Heritage) bedrooms
AHU 3	Block C ground & first floor bedrooms
AHU 4	Banqueting suite
AHU 5	Kitchen supply & extract

VRF systems for the heating and cooling systems for the building, DX condensers for heating/frost coils within the air handing plant, and split DX condensers for the comms room cooling.

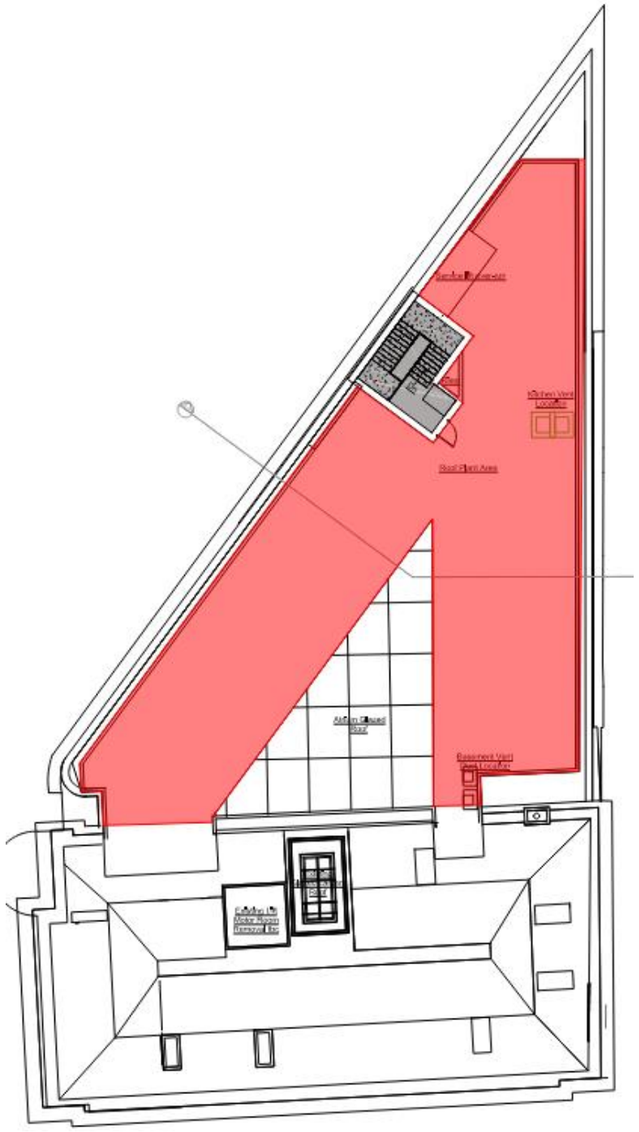


Figure 4 - Roof Deck

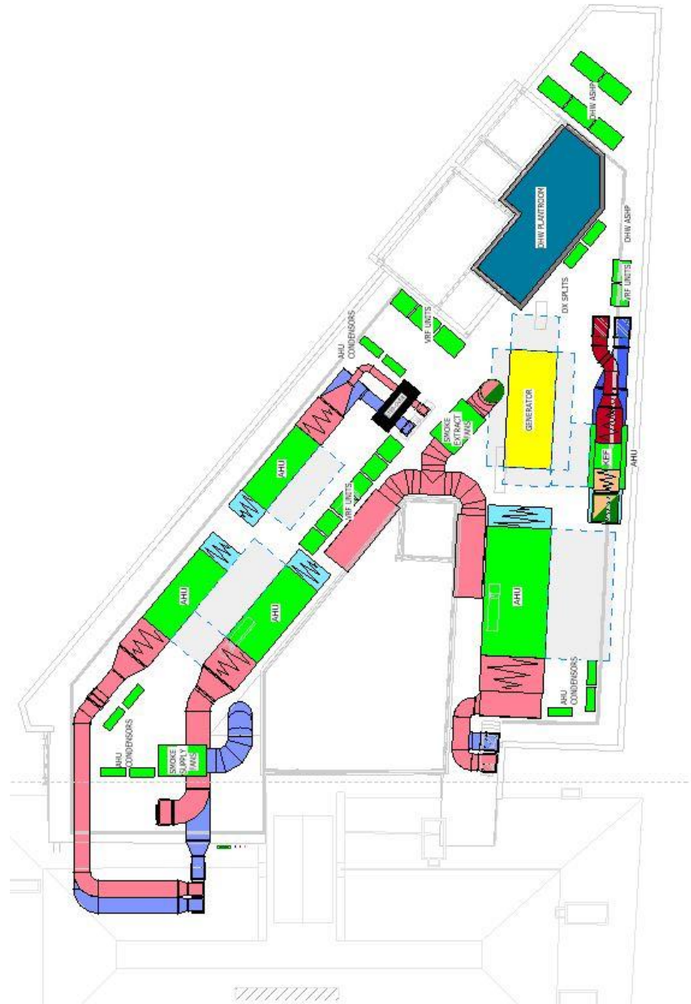


Figure 5 - Roof Plant Layout

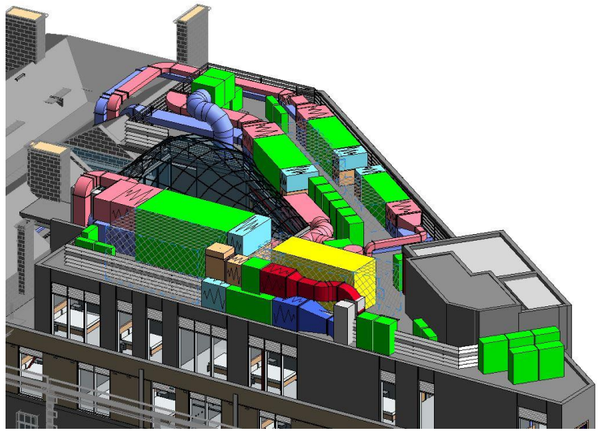


Figure 6 - Roof plant from NE

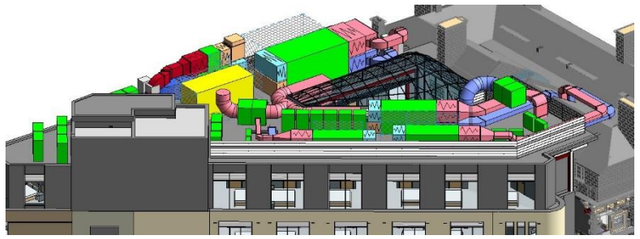


Figure 7 - Roof plant from NW

5.2 DHW

Equipment for DHW generation is located on the roof deck at the apex.

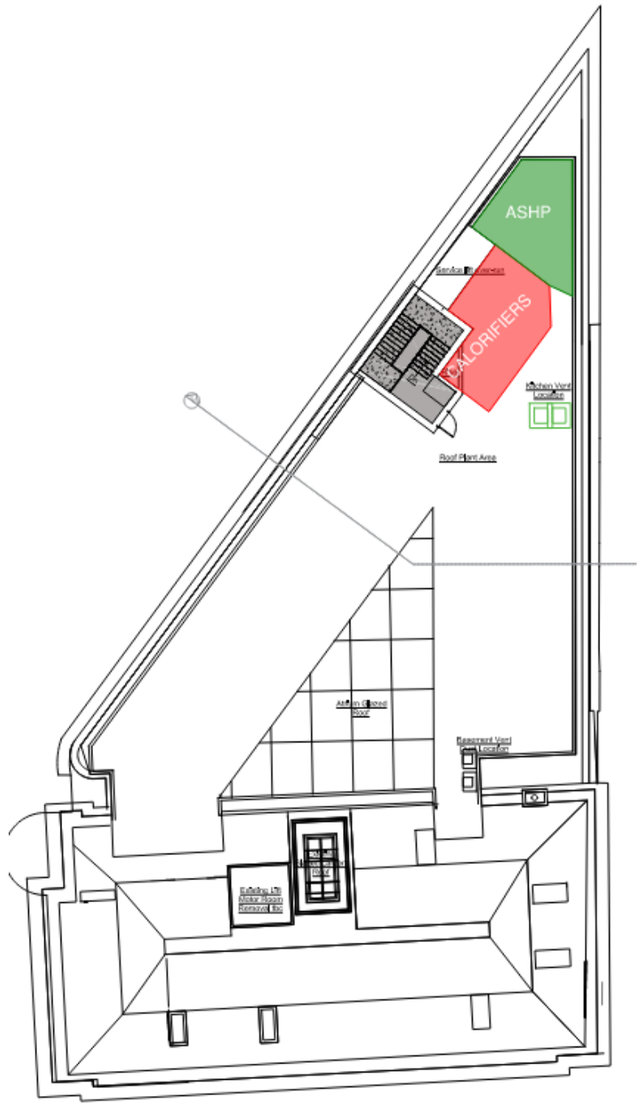


Figure 8 - DHW heat pump & calorifier location

5no air source heat pumps (ASHP) are located at the apex of blocks B and C, providing DHW generation to 5no 1000l calorifiers, located in a purpose built room, next to the roof entry stairwell.

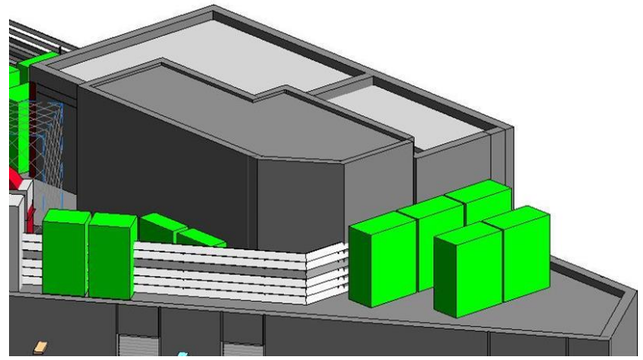


Figure 9 - ASHP & calorifier location

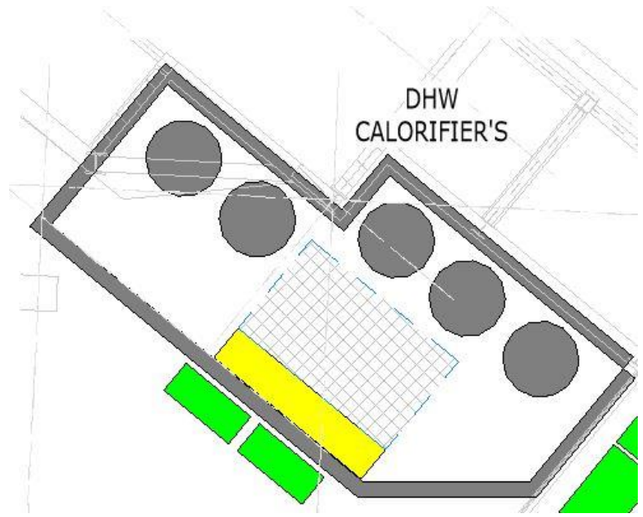


Figure 10 - Calorifiers room

5.3 COLD WATER STORAGE

Existing cold water enters from Railway St. into the corner of Block A.
This existing cold main position is to be used for incoming water services for the new project.

The pipework is to run through the basement of Block A at high level following the route shown in blue, in order to enter the tank room in Block B highlighted in red.

A new 18000 litre tank is to be located within this room, with a booster set to provide boosted cold water to the entire property.

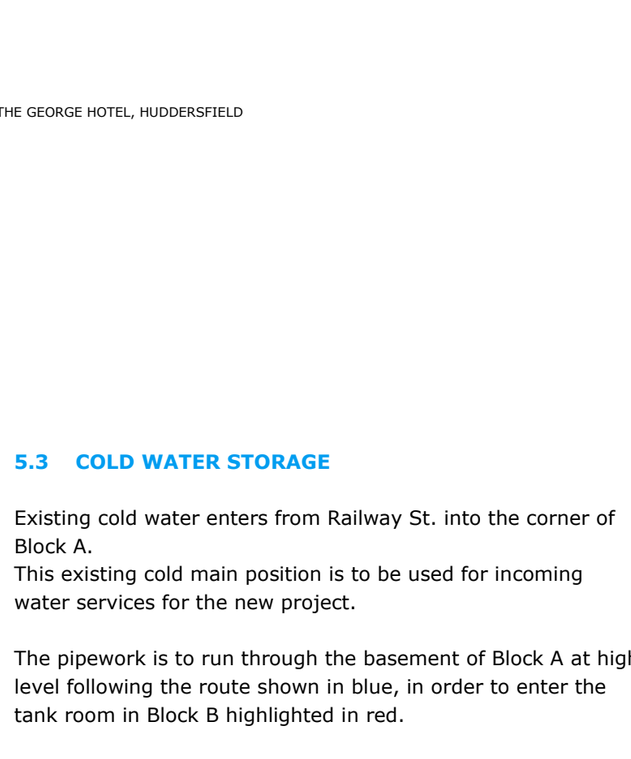


Figure 11 - Cold water storage tank room

5.4 ELECTRICITY

The existing electrical supply enters the basement of Block A in the South-Eastern corner from John William street.

With the building, comprising of MEP services and Kitchen equipment being "all-electric", the electrical demand for the refurbished building will be significantly greater then the existing incoming LV supply.

Following this stage, an application for a new incoming electrical supply will be submitted to Northern Powergrid, this will determine the extent of works and infrastructure they will require for the development, this is currently unknown.

A secondary electrical room located adjacent to the electrical tank room is utilised for additional electrical equipment and panels for the critical supplies that will be secondarily fed from the diesel generator.

Figure 12 - Electrical rooms

5.5 ELECTRICAL BACKUP GENERATOR

A diesel generator is proposed on the roof deck to maintain critical equipment and life safety systems in the event of a loss of power to the building.

The generator feeds an essential panel, providing power in event of power loss to the following services:

- Evacuation Lift
- Smoke supply and extract fans for the Atrium
- Selected landlord small power and lighting
- Server/Comms room

Location of the generator can be seen in plan and 3D below indicated in yellow.

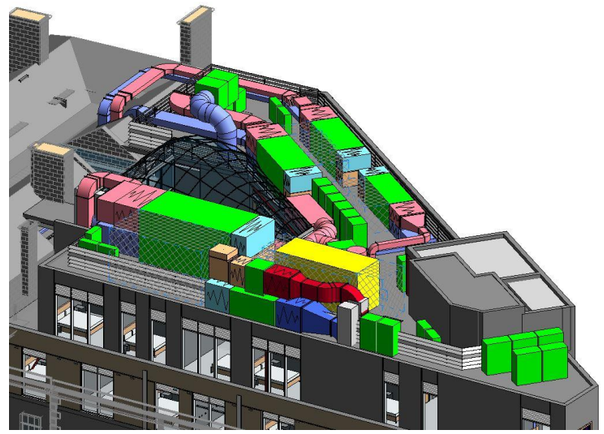


Figure 13 - Roof plant from NE

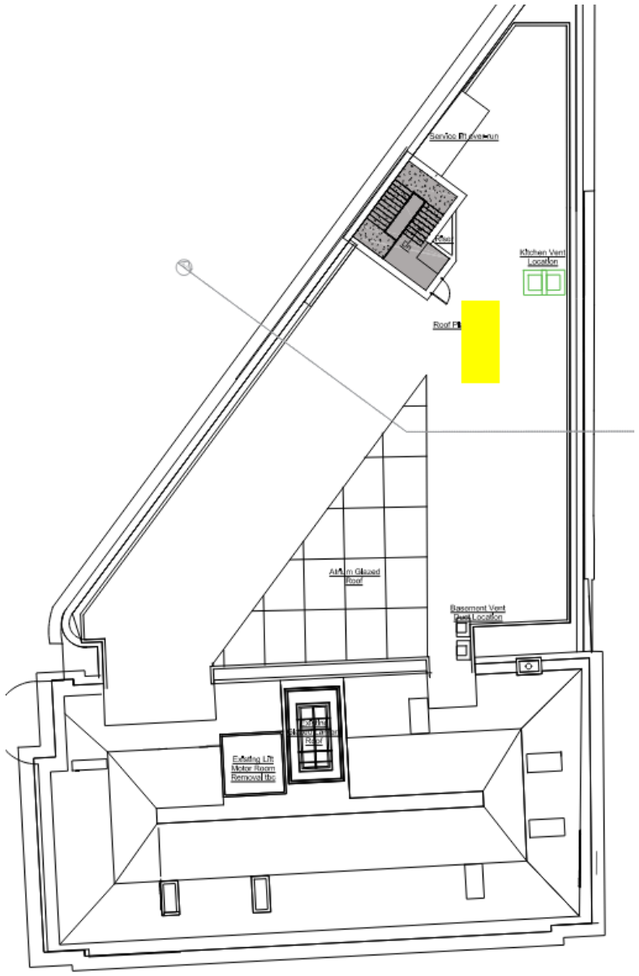


Figure 14 - Generator location

5.6 COMMUNICATIONS

A new server/comms room is located within the basement of Block B, and is highlighted in red below.

Figure 15 - Server room location

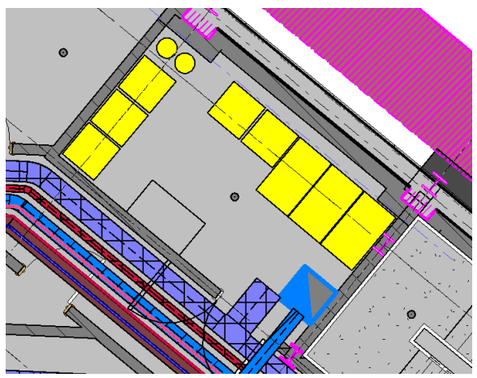


Figure 16 - Server room

5.7 PRIMARY SERVICE ROUTES

As electrical distribution and cold water services are located in the basement, and mechanical and DHW plant is located on the roof deck, risers throughout the full building are a necessity.

Within Blocks B and C, risers have been incorporated into the design in order to allow easy movement of services throughout the building.

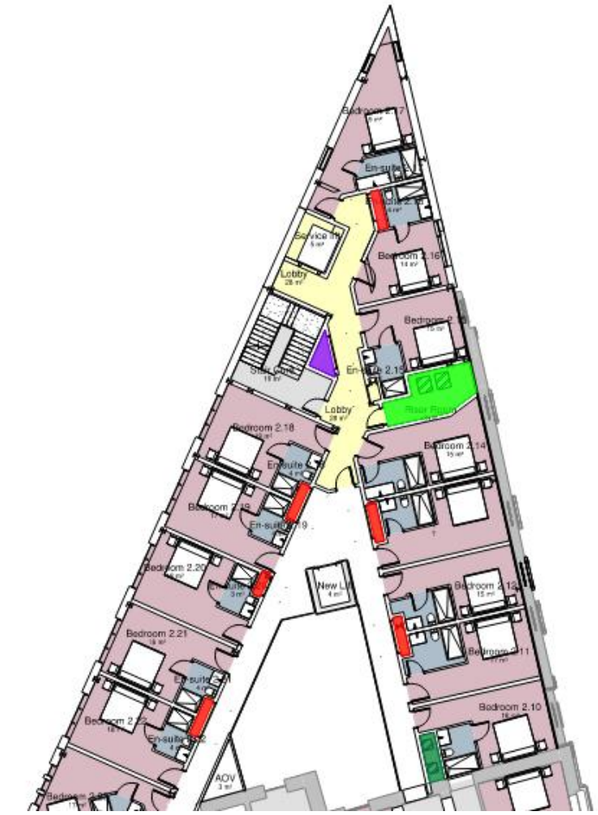


Figure 17 - Block B & C risers

MEP risers are highlighted in red. A dedicated riser for the kitchen supply and extract is highlighted in light green. A dedicated riser for banqueting areas supply and extract is highlighted in dark green, and a dedicated comms riser is highlighted in purple.

As with the plant space, internal routing within Block A has been carefully onsidered to retain the original appearance and structure of the building, making the minimum possible alterations to allow for suitable servicing of the building.

With Block A being an existing heritage asset, the incorporation of new risers at the back of bedrooms is not possible.

In this case a riser has been incorporated at the back of the Block A lift shaft, allowing for the rise of all MEP equipment feeding Block A.

The riser room is highlighted in red below:

Figure 18 - Block A riser room

All services for block A rise within this room, and utilise the corridor space in order to feed the rooms on each floor.

Risers contain a large quantity of MEP equipment, as can be seen from the adjacent 3D view of the Block A riser through the building.

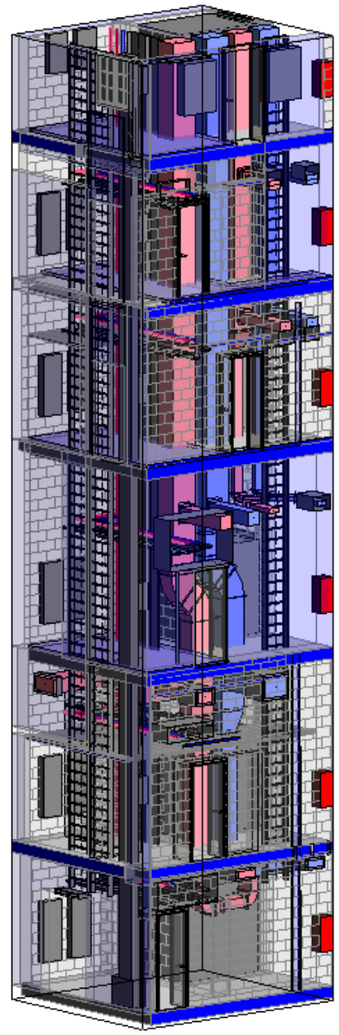


Figure 19 - Block A riser 3D

Routing of equipment can be seen on the drawings included within the submission. Throughout the heritage building of Block A, penetrations are needed within the existing building fabric in order to allow each guest room to be served. Builders works openings can be seen on the specific builders work drawings included within the submission.

Within each guest room, a fan coil unit is located above the door in order to heat and cool the rooms as required.

It is expected that this fan coil will be boxed in with a new boxing which will be constructed to ensure that the existing coving and heritage elements are undamaged.

In order to prevent damage to heritage items within the corridors in Block A, which are main service routes, equipment is to be routed below ceilings.

This equipment is to be suspended from the ceiling utilising as little fixings as required in order to retain mechanical soundness. Below the equipment, a raft is to be installed. This raft will be hung utilising the same fixings as the equipment, and will allow the equipment to be hidden, whilst still allowing heritage covings etc. to be visible.

Below is a typical fixing detail of the routing in Block A corridors.

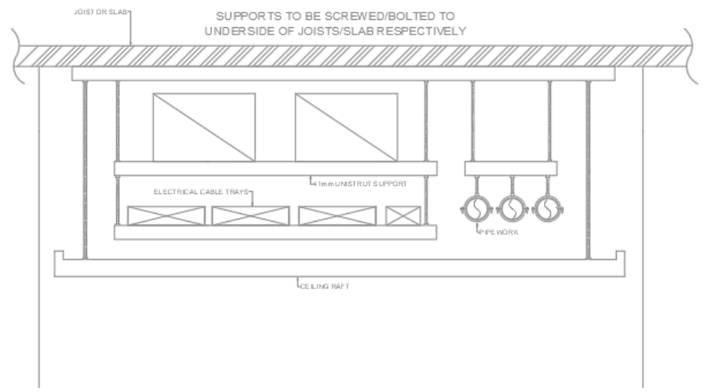


Figure 20 - Typical fixing detail

Further detail on the rafts is within the architectural report.

6. MECHANICAL SERVICES SYSTEMS

6.1 DESIGN CRITERIA

The winter external design criteria is **-5°C, saturated**

Temperatures will be controlled generally in accordance with CIBSE Guidance. The following specific areas are highlighted:

Room / Reference	Winter Temp (°C)(+/- 2°C)	Summer Temp (°C)(+/- 2°C)
Bedrooms	19-21	21-23
Conference	20-22	22-24
Bar / Lobby	20-22	22-24
Restaurant	20-22	22-24
Circulation	18	Uncontrolled
Toilets	18	Uncontrolled

The following guides will be used as a basis of design:

- Relevant British Standards
- Relevant CIBSE Guides
- Institute of Plumbing (IOP) Guidelines.
- Water Supply Regulations
- Building regulations Part L2B
- Building Regulations Part F
- Relevant BSRIA Guides
- DW 144; DW172
- BREEAM
- Radisson Hotel Group MEP specifications

Fresh air provision for each area served by mechanical ventilation will be as follows:

Room / Reference	Design Criteria
Bedrooms	12l/s/p
Conference	12l/s/p
Bar / Lobby	12l/s/p
Restaurant	12l/s/p
Toilets (Excluding En-Suites)	6 ACH

Air velocity within ductwork will be in accordance with the following, to meet adjacent space NR levels:

Duct Section	Velocity
Main ducts	Not exceeding 6.0m/s
Branch ducts	Not exceeding 4.5m/s
Grille/diffuser connection	Not exceeding 2.5m/s

Pipework will be sized to the following criteria:

Pipework less than 80mm in diameter	2m/s maximum velocity
Pipework 100-200mm in diameter	3m/s maximum velocity

6.2 INTERNAL ENVIRONMENTAL SYSTEMS

6.2.1 GUEST AREAS

The guestrooms, offices and public areas will be provided with heating and cooling as required to maintain the design criteria generally using refrigerant based systems. A VRF installation will be utilised, with air cooled condensing units located on the roof of Blocks B and C. This system will allow individual areas to be heated or cooled as necessary independently of other arears served by the same system (simultaneous heating and cooling) and will allow the recovery and sharing of energy between areas to maximise efficiency.
The internal terminal units will be served by several air-cooled condensing units located at roof level on Blocks B and C. The installation will be split into several circuits to provide control of the basement floor area, along with the common areas of the ground floor, independently of the bedrooms as the demand for these spaces will be different. The Bar/ lobby area, conference/meeting room(s) and restaurant will all be zoned individually to allow the temperature of each area to be controlled to suit demand. The system serving the bedrooms will be controlled on a room-by-room basis. This will enable cooling and heating to serve the occupants requirements accordingly.
The following independent VRF systems are expected to be used:

VRF System	Areas Served
1	General basement and ground areas
2	Block A - First floor bedrooms
3	Block A - Second floor bedrooms
4	Block A - Third floor bedrooms
5	Block A - Fourth floor bedrooms
6	Block B - 16no bedrooms
7	Block B - 16no bedrooms
8	Block C - 14no bedrooms
9	Block C - 14no bedrooms

The indoor terminal units located in each area will be of a type suitable to the design and function of that space. The majority of the indoor units will be the concealed fan coil type located in the area served ceiling void with supply and return air delivered and removed using ceiling mounted diffusers and grilles.
Guest bedrooms will be heated and cooled using fan coils type indoor units located in a bulkhead above the entrance lobby of each bedroom. Each bedroom will be served by a dedicated indoor unit and controller located within the room.
In rooms other than guest bedrooms, particularly larger rooms and irregular shaped rooms such are the Block A ground and first floor function/conference rooms, the restaurant/bar areas, and entrance/foyer areas multiple indoor units are required to adequately condition the space. The internal terminal units will be controlled according to temperature sensors which are either mounted within the guestroom or in the return air stream above the ceiling. A temperature controller modulates to maintain the set point temperature. The system should also be linked to the hotel VIN card system to allow the FCU to go into setback when the room is unoccupied.

It is proposed that central ventilation plant will provide minimum fresh air to most areas of the hotel. Guest bedrooms in Block B and third and fourth floors of Block C will be served utilising localised mechanical ventilation heat recovery (MVHR) units. Heating and cooling demand will be satisfied by the fan coil units in each space. This strategy will serve the bedrooms and public / staff areas of the hotel.

6.2.2 SERVER ROOM COOLING

Cooling is required to a main server room located within the basement of block B.
To ensure resilience of this system the sever room will be provided with cooling using dedicated refrigerant cooling systems. This system will comprise of a minimum of two systems elected on an n+1 basis with an automatic chance-over facility to ensure continued operation in the event of a single system failure.
The external condensing units associated with this system are located on the roof of Block B.

6.3 VENTILATION

Dedicated air handling systems will be selected to serve the various areas of the hotel giving due regard to their function, occupancy, hours of operation and ventilation requirements to provide sufficient fresh air. Variable speed drives will be provided to all fans. The following ventilation systems are proposed:

6.3.1 GENERAL AREAS (BASEMENT OFFICES, WC'S, RECEPTION, CONFERENCE ROOMS)

A fresh air system will serve the reception, conference rooms, bar and WC's. The air handling unit will be full fresh air and exhaust (no recirculation) incorporating heat recovery, DX heating/frost coils, attenuators, motorised dampers and filtration. Air will be supplied to areas defined at a constant supply volume. In order to minimise the dimension of the air handling plant and ventilation distribution systems the AHU will be selected to meet the zone fresh air requirements. Heating and Cooling will be provided via local fan coil units where applicable to minimise the ventilation load (as described in the Internal Environmental Systems section of this report) with tempered fresh air supplied to the space for ventilation purposes only.
The ventilation for the WC's will be provided by the same AHU as the general areas. Motorised control dampers and inverter speed control to fans will be provided to allow ventilation to be provided to the WC areas on a 24 hour basis without unnecessarily ventilating other unoccupied areas served by the same system.
The supply and extract AHU will be located on the roof deck, with the supply and extract terminating directly to atmosphere.

6.3.2 KITCHEN EXTRACT SYSTEM

A dedicated extract system will serve the Kitchen and adjoining ancillary areas. Extract ventilation will be achieved via dedicated exhaust ducts from the kitchen canopies, general areas. The entire installation is to be in accordance with DW 172. Kitchen extract ductwork to be fire rated if fire compartment lines are crossed and will rise to the extract fan, located on the roof deck. Access is to be provided at each floor for maintenance and cleaning. The design of the kitchen extract systems will be determined by the usage, layout and equipment used in the kitchen, this is information is required form the kitchen/catering specialist early in the next design stage.
It is anticipated that the canopies will be provided with a fire suppression system.

6.3.3 RESTAURANT / KITCHEN SUPPLY

Supply air to the restaurant and kitchen will be provided by a dedicated air handling unit located on the roof deck. This system will provide supply air at a slightly lower volume than the kitchen extract system with air being supplied to the restaurant based on occupancy and the balance of air being supplied to the kitchen. Air from the restaurant will be drawn into the kitchen via the serving counter or transfer grilles with the kitchen maintained at a negative pressure regime to its surrounding areas to avoid smells infiltrating other areas of the hotel.
The Air Handling Unit will be full fresh air, including LTHW heating / frost coils, attenuators, motorised dampers and filtration. The AHU will be sized and selected to meet the zone fresh air requirements. Heating and Cooling will be provided via local fan coil units to minimise the ventilation load, with tempered fresh air supplied to the space for ventilation purposes only.
The design of the Restaurant/kitchen supply air systems will be determined by the kitchen extract air volume, this is information is required from the kitchen/catering specialist early in the next design stage.

6.3.4 GUEST BEDROOMS & CORRIDOR

There is a split strategy for the guest bedrooms, depending on their position within the building.
All of the guest bedrooms within Block A, as well as the bedrooms on the first and second floor in Block C will be served via a dedicated air handling unit, located externally at roof level. The unit will supply tempered air to all guestrooms, tempered fresh will be delivered to the space via the rear of the fan coil units. Extract will be via the en-suite bathrooms to remove any odour or moisture. Extract to the ensuite bathrooms will be via the air handling unit not dedicated fans to allow energy to be recovered from the systems and reduce future maintenance requirements.
If required fresh air will be delivered to the guest corridors via ducted ceiling mounted grilles, likewise with the extract. The AHU will be full fresh air and exhaust (no recirculation) incorporating heat recovery.
Guest bedrooms within Block B, and those on the third and fourth floor of block C (above the listed façade) operate on the same principle, but rather than returning to central plant, have local mechanical ventilation heat recovery (MVHR) units within the space, ducted directly to atmosphere, avoiding space requirements internally for rising ductwork.

Regardless of the method, control in these areas will be linked to occupancy through the key card system.

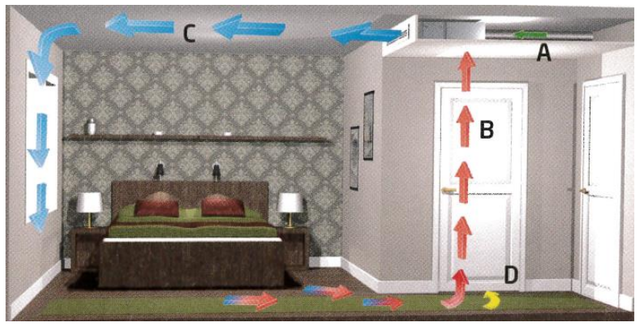


Figure 21 - Illustration of ventilation strategy to hotel bedrooms

(A)Fresh air via central plant or local MVHR, (B) Return air from room back into fan coil unit; (C) Conditioned air delivered from fan coil unit; (D) Stale air exhausted via extract grille in bathroom vis door undercut.

6.3.5 GENERAL AND CLEANERS/ REFUSE STORES

Ventilation will be achieved to the stores via the central AHUs as appropriate. These areas will be at negative pressures to surrounding areas, providing an air path.

6.3.6 SMOKE VENTILATION

Smoke Ventilation within the atrium is provided via fans located at roof level.
One twin fan extracting smoke at a rate of 53m³/s is located at towards the apex of the building, with a supply fan near to the join of Blocks A and B supplying air directly down a shaft, allowing the atrium to remain free of smoke in a fire condition. The smoke fans are fed from the main supply, but are also backed up by the electrical emergency generator.

6.3.7 FIRE DAMPERS

Wherever ductwork penetrates through fire compartments, 240v fire dampers will be installed to maintain the integrity of the fire compartment.

A main fire damper control panel will be located in the main entrance, close to the fire alarm panel, and will be interfaced with the Building Energy Management System (BEMS).

6.4 COLD WATER SYSTEMS

An existing cold water main to the building enters from Railway St. into the corner of Block A. Pending a flow and pressure test, it is proposed that his existing cold main position is to be used for incoming water services for the new project. This will supply a storage tank located in a plantroom at basement level at the plantroom it the junction between blocks A & B. This is sized as outlined in the basis of design section of this report and is designed to store sufficient water to cover mains water interruption. Exact requirements are to be agreed in the next design stage.

The storage tank supplies a cold-water booster pump set, sized to meet the pressure and flow rate requirements for the building. UV water treatment shall be used to prevent proliferation of Legionella and other biofilms within the water services. The boosted cold water service system will also serve the domestic hot water generation plant at roof level, to prevent scale build, up a water conditioner will be provided prior to any hot water generation plant.

Water will be distributed around the building via the bedroom risers to serve the bathrooms on the hotel floor. Packaged tanks and pump sets will be provided locally to provide category 5 backflow protection where this is necessary.

Since the water supply to Huddersfield is soft water, there are currently no plans to provide water softening plant and a dedicated softened water supply to the bedrooms.

All components of the water services system will be WRAS approved.

6.5 HOT WATER SYSTEMS

The hot water for the hotel will be generated using air source heat pumps. The ASHPs will be located at roof level and will feed buffer and storage cylinders in an adjacent, dedicated plant room in the rooftop plant area.
The incoming cold-water supply to the DHW generation will be taken from the BCWS supply. A water conditioner will be provided within the DHW plantroom, upstream of DHW generation plant, to prevent scale build-up. The DHW will be stored at a minimum of 60deg C. DHW will be distributed in bedroom risers as a flow and return circuit, ensuring efficient temperatures are maintained and reducing water wastage.

To prevent scalding, TMVs shall be provided at all outlets except kitchen sinks and cleaners sinks.

All Fittings will be WRAS approved.

6.6 FIRE SUPRESSION

At present, the current proposal is that the building shall not be protected by a sprinkler system, as defined by current fire strategy.

The building will be provided with dry risers in line with the fire engineer’s requirements.

6.7 DRAINAGE

6.7.1 ABOVE GROUND FOUL DRAINAGE

It is anticipated that sanitary drainage from the building shall be conveyed from all fixtures and fittings by means of a gravity modified primary ventilated discharge system. Where these fall

from block A, these shall connect to drain points within the basement. Where these fall from Blocks B & C, these shall be conveyed at high level to a sewer outfall adjacent to John William Street.

All vent pipes shall be run to roof level where they shall terminate to atmosphere.

All vertical drainage shall remain plumb throughout the building with no offsets. Pipework shall generally not run within bedrooms, nor shall it offset over them. Due to restricted head height within the basement, drainage drops from the ground floor to the basement shall be such that limited runs are required within the basement. Where appropriate, stub stacks will be introduced to alleviate the pressure within the system.

Grease-laden waste from the kitchens shall be collected and conveyed via a dedicated system before passing through a grease trap, located within the basement, prior to connection to the overall foul drainage system.

The foul drainage system will be developed on the basis of a traditional build bathroom. I.e. not off-site manufactured PODS.

Due to the existing structure and the complex nature of the grade II listed building, the verticality drainage is not as desired in the current strategy, further workshops are required with the architectural team to work these issues through.

6.7.2 ABOVE GROUND RAINWATER DRAINAGE

A dedicated rainwater drainage system shall drain all roof areas of the buildings. It is currently anticipated that all existing rainwater drainage in Block A will be removed and replaced with a new system to ensure compliance with current standards and regulations. Where the pipework is exposed, this will be heritage style, subject to architectural approval.

Where possible, the current strategy is to keep rainwater pipework on the exterior of the building, this is however subject to the extent of the basement, roof build-up and below ground drainage design. Where this is not possible rainwater pipework shall pass through risers in landlord areas associated with bathroom drainage and shall not pass-through bedroom areas.

It is proposed that the roof outlets in unoccupied areas are untrapped to maintain an efficient drainage system.

All above ground rainwater drainage shall be kept separate from foul water drainage. Block A to be as per existing condition, unless new layout dictates otherwise.

Blocks B and C shall have a new rainwater system installed, as such there will be a requirement for surface water from these blocks to be attenuated prior to discharge to the sewer.

6.7.3 GUESTROOM EN-SUITES

Each en-suite will be provided with a gravity foul drainage system to serve all sanitary appliances and condensate emitting cooling equipment.

It is our understanding that traditional bathrooms will be used on the project and therefore no interfaces for Pod type bathrooms are required.

The use of Air Admittance Valves (AAV's) is not desired and shall only be installed where architectural roof areas restrict the termination of a traditional vent pipe. All air admittance valves that are to be used have a current British Board of Agrément Certificate (BBA), and with the the agreement of the Engineer And CA. Air admittance valves will be located to allow full access for maintenance and replacement.

The routing of drainage pipework above inaccessible ceilings will be avoided wherever possible.
To facilitate maintenance access, provision for rodding access will be included in accordance with BS EN 12056-2:2000.

6.7.4 PLANTROOMS

All plantrooms & roof plant areas will be provided with a floor gully for washdown, plant drain down and condensate. Where provided at roof level these will be bunded and waterproofed to avoid rainwater ingress.
All floor gullies connecting direct to drain will be provided by the Below Ground Drainage Engineer.

6.7.5 CLEANERS STORES

All cleaners' stores will be provided with a waste vent pipe to serve cleaners sinks.

6.7.6 MATERIALS

To be discussed and agreed with the client, where possible HDPE or Cast Iron pipework should be used due to acoustic properties and longevity of the pipework. This will be developed further and agreed during Stage 3, this will also be influenced by the acoustic requirements.

6.7.7 INSULATION

Where pipelines pass through areas sensitive to noise, they should be insulated to comply with the requirements of the Building Regulations Document E. This will include pipework offsets at high level also.
Detail to be confirmed and specified by the acoustic specialist to ensure it complies with the requirements of the Building Regulations Document E.

7. ELECTRICAL SERVICES

7.1 GENERAL

The electrical services will be designed with items of plant and equipment arranged to allow adequate access for maintenance, removal, and replacement.
Any equipment located in ceiling voids will be located to avoid access from the public or front of house (FOH) areas or located to minimise access requirements.

7.2 ELECTRICAL SUPPLY

A maximum demand assessment has been carried out, giving an estimated maximum demand of 850kVA. This initial assessment will be updated as the design is developed and electrical loads are confirmed, the maximum demand will be re-assessed with a view to amend the agreed utility supply capacity. An application for a new incoming electrical supply will be submitted to the local DNO, Northern Powergrid.

7.2.1 LV SUPPLY

The building is currently served by a 400V three-phase LV power supply, owned and operated by Northern Powergrid. It is proposed that this supply will be removed.
In order to accommodate the new equipment and electrically powered mechanical plant, a new upgraded supply will be provided to meet the max demand above. It is envisaged the new supply will terminate into a new service unit within the building.
Discussions with Northern Powergrid will commence to establish a new power supply of adequate capacity and is made available and confirm the incoming location. This will dictate the location and level of the main electrical LV room, and the equipment required. At this stage it has been assumed the incoming electrical supply will be at 400V.

7.2.2 EMERGENCY POWER

Emergency power will be required for the building, subject to the fire strategy, building height and building use as determined by the fire engineer.

An emergency power system will be provided for life safety, emergency systems, data/IT, the evacuation lift, and selected landlord small power and lighting supplies within the Hotel.
A secondary power supply will be required for the Smoke Ventilation within the atrium area.

Please refer to the separate fire engineering report and strategy.

7.2.3 UTILITY METER

The utility meter will be located within the main LV switch room.

7.2.4 LV SWITCHGEAR

A main LV Switchboard will be provided with cables and busbar systems installed to distribute low voltage electrical power, safely, and reliably, around the building starting with the cables connecting the main LV switchboard and finishing at the output terminals of all distribution boards or mechanical services panels.
The distribution system will be sized to allow adequate capacity of the proposed loads and a 20% spare capacity for future usage.
All distribution equipment, cables and protective devices will be rated to ensure the safe withstand of calculated maximum fault currents in the network.

The main LV switchboard will be located in the LV switch room at basement floor level in Block A.

The location of the main LV switch room will be confirmed in liaison with Northern Powergrid as mentioned in 4.2.1.

The switchboard will be initially rated 1250A, three-phase, 400V, built to BS EN61439, Form 4, type 2, with an incoming ACB and outgoing MCCB protective devices. The panel will be front only access, mounted on a 100mm concrete plinth.

Power factor correction will be provided to ensure the overall power factor is maintained at 0.95.

Space will be provided to ensure harmonic filtration can be installed in the future.

A type 1 and type 2 surge protective device will be installed within the switchboard.

7.2.5 SUB MAIN DISTRIBUTION

From the main LV switchboard, sub mains distribution will be installed to the following:

- MCCB section boards.
- MCB distribution boards.
- Kitchen Panel boards.
- Mechanical control panels and plant.
- Lifts.
- XLPE/SWA/LSFZH sub-mains cables emanating from the main LV Switchboard to electrical risers and to supply distribution boards, fixed equipment, etc

Fire rated sub mains distribution cables will be installed to life safety systems, plant and equipment including the following:

- Fire alarm control panel.
- Evacuation lift
- Smoke supply and extract fans (Atrium)
- Evacuation control panel (if required)

7.2.6 METERING

Metering will be provided throughout the hotel as required by Building Regulations, BREEAM and CIBSE recommendations.

All metering will be connected to centralised monitoring system within the building to maintain a record of all energy usage.

7.3 FINAL CIRCUIT WIRING

Final circuit MCB Distribution Boards (DB's) to serve lighting and small power requirement will be provided at each riser and floor level and will incorporate sub-meters for both small power and lighting loads.

Arc Fault Detection Devices (AFDDs) will be installed on all final circuits in the Bedrooms in accordance with BS7671.

7.3.1 CABLE CONTAINMENT

A comprehensive cable containment installation including ladder, tray, basket and trunking/conduit will be provided for all systems. Segregation will be maintained between wiring systems in accordance with relevant standards.

The primary horizontal routes will be concealed within ceiling voids and services bulkheads within the circulation spaces. Containment will be exposed in areas with no ceiling finishes, e.g. plantrooms.

The primary vertical routes will be installed within services risers.

Containment systems will be sized to cater for the initial design requirements and 20% spare capacity to allow for future cable installation.

7.4 LIGHTING

7.4.1 ARCHITECTURAL LIGHTING AND CONTROL

The lighting design for all front of house (FOH) guest and public areas, lift lobbies, circulation corridors and guest rooms will be designed in conjunction with the project architect and interior designers, with a specialist lighting consultant.

7.4.2 LIGHTING DESIGN CRITERIA

The Hotel will be provided with energy efficient lighting to ensure the internal lighting solution provides a good safe, comfortable, balanced and interesting visual environment, which provides the required lighting levels in all areas. The general lighting will utilise intelligent but simple automatic lighting controls for effective and cost-effective operation. The internal lighting will be designed in accordance with illumination guidelines within:

- BSEN 12464-1
- SLL Code for Internal Lighting
- CIBSE guides

In order to meet Part L2A of the Building Regulations, all luminaires in regular use will utilise low energy lamps with high frequency dimmable ballasts. Therefore, LED lighting sources will be predominantly utilised.

Illumination will generally be provided to energy efficient light sources where possible in accordance with part L of the Building Regulations.

Room / Area	Illumination Level (lux)
Service Corridors	200
WC's	200
Guest Area WC's	200
Offices	500
Kitchen	500
Clean Store	300
Cleaners Store	100
General Stores	100
Luggage Store	100
Bar Store	300
Plantrooms	200
Electrical Switch rooms	200
Refuse	100
Service Yard	50

7.4.3 BACK OF HOUSE LIGHTING

The lighting design for the back of house (BOH) non-public/guest areas will be the responsibility of the electrical design engineer. All luminaires will utilise low energy LED lamp sources for compliance with Part L of the Building Regulations.

The selection of luminaires will be suitable for the proposed mounting environment and be compatible with the ceiling finishes. The lighting design will take cognisance of areas with computer use and be designed to align with CIBSE guidance.

Area	Luminaire
Plantrooms/Wet Areas	IP65 rated surface mounted linear luminaires with polycarbonate diffusers
BBOH Circulation	Surface/recessed mounted LED luminaires with polycarbonate diffusers
Management Offices	Recessed LED modular luminaires with glare control
Food Preparation	Minimum IP54 rated sealed modular/surface mounted LED luminaires suitable for cleaning by low pressure washing and disinfecting systems
Food and Beverage Storerooms	Minimum IP54 rated sealed modular/surface mounted LED luminaires suitable for cleaning by low pressure washing and disinfecting systems
General Stores	Surface mounted linear LED luminaires with polycarbonate diffusers
Service Areas	Surface mounted linear LED luminaires with polycarbonate/acrylic diffusers

Lighting control of BOH, non-public areas will generally be by local switches, however presence detection will be provided in transient spaces, with absence detection provided in Offices. Where appropriate PIR, timeclock and time scheduling via the central system will be provided in alignment with the client's requirements and Part L of the Building Regulations.

7.4.4 EMERGENCY LIGHTING

An emergency lighting system will be provided throughout the new Hotel. Emergency Lighting will generally comprise of dedicated LED emergency fittings, provided separate from the general lighting, operating in non-maintained mode, with either self-contained battery packs, or linked to a central battery system wired in 'enhanced' grade fire rated cable.

Emergency luminaires will be located to illuminate Escape routes; Plant rooms; External exits, etc. to enable occupants to safely evacuate the building in the event of an electrical supply failure.

The emergency lighting will operate virtually instantaneously on an electrical supply failure.

Batteries for the emergency lighting system will be rated for a full-rated output of 3 hours duration.

Final exits will be provided with self-contained maintained exit luminaires complete with running man pictograms with appropriate direction arrow in accordance with the Fire officer requirements. Each final exit will be provided with an external building mounted maintained bulkhead luminaire.

Emergency luminaires will also be located to clearly identify hazards, fire-fighting equipment (extinguishers, fire alarm break glass units etc), and to indicate changes of direction/level and draw attention to intersections.

In addition, any hazardous environments or processes will be provided with emergency lighting at an enhanced lux level, to enable the operator to safely shut-down the process before evacuation. This will include areas e.g. Kitchen.

A centralised intelligent self-test system will be provided to monitor the state and condition of the emergency lighting system

7.5 SMALL POWER INSTALLATION

Socket outlets, fused connection units, switches, outlets etc will be provided and located for general purpose use or for specific equipment and to safely support the activities of the particular rooms.

Sockets installed to service ICT equipment will be separate from the general power circuits and provided with dual earth terminals for compliance with IEE wiring regulations (BS7671).

Small power accessories will be selected to suit the mounting environment, mounted at the correct height for their intended purpose and in compliance with Building Regulations Part M.

Accessory finishes will be as detailed below:

Area	Finish
Public / Guest	To interior design specification
Public Areas (hidden)	White moulded plastic
Plant Spaces	Metalclad
Wet Areas	IP65
Back of house	White moulded plastic

7.6 FIRE DETECTION, ALARM AND VOICE EVACUATION SYSTEM

A fully automatic analogue addressable fire alarm and voice evacuation system will be provided. The system will be designed in accordance with BS 5839-1.

The fire alarm system proposals are to be reviewed to align with the building operators Fire Management Plan at the next stage.

Please refer to the separate fire engineering report and strategy.

The main fire alarm control panel will be located at or adjacent to the reception desk.

The fire alarm system will comprise of the following:

- Analogue addressable fire alarm panel located adjacent to the reception desk / fire service response entries with battery backup to provide 72 hours of autonomous operation.
- Interfaces to isolate items of mechanical plant and fire damper panels.
- Fire detection in the Atrium space will be provided by the installation of an air-aspirating smoke detection system.
- Interfaces to disabled refuge systems, access-controlled doors, lifts and lighting controls.
- Manual call points / sounders and optical smoke & heat-detectors.
- Internal strobes for the auditory impaired.
- Alarm link to an off-site monitoring station.
- All cabling will be RED sheathed and BASEC approved fire rated with soft-skin 'standard' and 'enhanced' cable, contained, supported and clipped in full compliance with BS5839;
- Void detection and remote indication will be provided.

7.6.1 VOICE EVACUATION SYSTEM

The voice evacuation system will be installed in all guestroom corridors and public areas, this will be capable of broadcasting different messages and accept inputs priority order.

7.6.2 EMERGENCY VOICE COMMUNICATIONS

An emergency voice communications system will be provided, in compliance with BS 5389-9, to allow fire fighters to communicate with one another and with others responsible for evacuating the building including communication and evacuation of disabled persons in emergency situations.

The system design will support the fire engineered solution, the operator's fire management plan and the requirements of the Fire Service. The master control station will be at the reception desk and the outstations provided adjacent to the disabled refuges located on all levels within the escape stairs.

Please refer to the separate fire engineering report and strategy.

7.7 SECURITY SYSTEMS

The security systems proposals are to be reviewed to align with the building operator's security management strategy.

7.7.1 INTRUDER ALARM SYSTEM

An intruder alarm system will be provided to ensure the safety and security of the guests and their personal belongings during their stay in the hotel. The intruder alarm system will be developed to align with the risk assessment and risk management strategy determined by discussion with the hotel operator.

The intruder alarm system (IAS) will comply with the requirements of BS EN 50131 and PD6662. To minimise the likelihood of false alarms the IAS will be capable of providing alarm confirmation technology generating and transmitting unconfirmed and confirmed alarm signals to the alarm receiving centre (ARC).

7.7.2 CLOSED CIRCUIT TELEVISION SYSTEM

A CCTV system will be provided for 24-hour surveillance of external areas and front of house and back of house areas and generally cover:

- Building Elevations
- Guest Entrances
- Service entrances
- Baggage stores
- Guest corridors
- Lift cars

7.7.3 ACCESS CONTROL

A stand-alone door locking system will be provided to control and monitor the access and egress of staff and guests throughout the hotel.
The exact requirements of the system will be incorporated into the next design stage once further information has been received, such as the operator's requirements.

7.7.4 STAFF ENTRY SYSTEM

Access controls will be provided to the staff entry door from the service yard/car park to regulate the access of staff personnel into the building.

7.8 GUEST SYSTEMS

7.8.1 GUEST MANAGEMENT SYSTEM

The hotel operators guest management system will operate via the IT/Data & Wi-Fi network throughout the building.

The main equipment will be located in the comms room. The head end equipment will be located at the reception desk. System wiring will be carried out in Cat 6a (Cca) UTP cables. Remote patch panels will be provided to limit the cable lengths to 90 metres. Backbone cabling infrastructure will be carried out using fibre optic cables. It is anticipated that 4 data outlets will be required per bedroom with a reasonable allowance for landlords areas. All cabling back to patch panels, Incoming data to building, active equipment including wi-fi and software is currently excluded.

7.8.2 TV SYSTEM

A fully networked distribution system of digital television channels, video movies, video games, teletext, hotel messages and interactive system features to outlets located throughout the building will be provided. Incoming television signals to the building, active equipment and software is currently excluded.

7.9 AUDIO VISUAL SYSTEMS

An audio-visual facility to the public spaces accommodating business meetings, exhibitions, conferences and private functions including the associated pre-function areas will be provided.

Generally, the audio-visual system will comprise the following:

- Sound distribution systems.
- Visual display projectors and screens.
- Cabling infrastructure.
- Control interlinks.

7.10 IT/DATA

A flexible data cabling system will be provided to deliver a hard-wired solution with a wireless overlay to data and telecoms equipment throughout the building.

The main equipment will be located in the comms room. System wiring will be carried out in Cat 6a (Cca) UTP cables. Remote patch panels will be provided to limit the cable lengths to 90 metres. Backbone cabling infrastructure will be carried out using fibre optic cables. The IT specialist will confirm the exact requirements.

Wi-Fi coverage will be provided throughout the building, signal strength testing will be carried out to enable full coverage.

The specific requirements will be determined by the IT specialist and the hotel operator.

For Offices the data outlets will be provided by a combination of RJ45 outlets either within floor boxes or 3-compartments dado-mounted trunking systems.

The specific areas will dictate the method of installation and this will be detailed during the design development stages

RJ45 outlets and dedicated UTP cablings will also be provided for the following services:

- Wireless Access Points (Power over ethernet)
- Display Screens and wayfinding signage
- Audio Visual Equipment
- Security Cameras (Power over ethernet)
- Access Control
- Printers and Multi-function Devices
- Metering Outstation
- BMS Outstations

Dedicated phone lines will be provided for the following services:

- Lifts
- Disabled Refuge Alarms
- Reception Foyer

7.11 EARTHING AND BONDING

The earthing and bonding installation will be carried out in compliance with BS 7430 and BS 7671.

7.12 LIGHTNING PROTECTION SYSTEM

A lightning protection system complying with the requirements of BS EN 62305 will be provided. A risk analysis calculation to determine the probability of a lightning strike will be carried out to determine the level of risk and the grade of system.

Although there is some evidence of an existing system, it is not clear if it is complete. It is proposed a full survey should be carried out, and a new system installed as required. The new system will be as inconspicuous as possible to be sympathetic the listed structure and should allow for the complex nature of the bell towers and roof structure. The system will utilise the new steelwork as down conductors where possible.

Current proposals include for the following:

- Copper or aluminium tapes to form the air termination across the roof of the building
- Steel columns to be utilised for the down conductors where possible
- Copper earth tapes to be connected to the columns via test points, to provide the connections to the earth termination network

8. AUTOMATIC CONTROL SYSTEM

A fully networked building management system will be installed. The system will come with a full graphics package and will be fully compatible with the hotel operators own operating system. Subject to further discussions with Building Control and the Fire Engineer it is likely that the BMS will be linked to the fire alarm system to enable shut down and control of the plant in a fire situation.
The BMS system will be networked and be connected to a central supervisor and printer.
Generally, the system will include the following functions:

Optimum stop/start routines
Multiple time programmer

- Alarm handling
- Primary energy consumption monitoring with modem facility to the clients energy manager
- Weather compensation control
- Run time summation
- Duty cycling of plant
- Sequence interlocking
- Fan inverter control and monitoring
- Pump inverter control and monitoring
- Show plant operating set conditions
- Show faults
- Show % of valves open or closed
- Condensing Unit control and monitoring
- ASHP control and monitoring
- AHU control and monitoring

The networked digital control & monitoring system (BMS or Building Management System) will provide control to all M&E systems (including accessories) throughout the hotel. Interface with the firefighting system is still to be established.
It is anticipated that an interface will be provided to the lighting control system, electrical monitoring and control system and an interface with all electrical systems (CCTV, access control, Intruder alarm, security, etc.).

The BMS system will provide:

- Stability of control;
- Suitability & reliability;
- Robustness;
- Protection from interference;
- Ease of use.
- Ease of expansion/future proofing to allow for new market trends

All control must be adequately supported in the event of interruption of the power supply in order that normal control resumes on mains return.

The BMS/Control System will include the Building Management System incorporating direct digital control techniques. The system will be complete with all sensing devices, control valves, damper actuators, input/output devices, hardware and software to form a complete and fully operational system.
The system will be designed and installed in accordance with the guidance set out in BSRIA Application Guide 9/2001; Standard specifications for BMS.
The new main control panel will be located in the main basement plantroom.
The following equipment will be monitored and controlled by the BMS. This list in not exhaustive and will be developed at the next design stage:

- Heating System:
  - Monitoring and control of the VRF plant.
  - Monitoring and control of the ASHP.
  - Optimisation of primary heating plant
  - Monitoring of pressurisation/auto-fill system
  - Monitoring and control of the primary circulation pumps including; automatic cycling of run/stand-by motor.
  - Monitoring and control of secondary circulation pumps including; adjustment of volume flow rate in variable volume applications, and automatic cycling of run/stand-by motor.
  - Control of weather compensated variable temperature circuit
  - Control of zone valves

  Monitoring and recording of temperature in all rooms via wall mounted sensors

- Cooling system:
  - Monitoring and control of the VRF plant
  - Monitoring of pressurisation/auto-fill system
  - Monitoring and control of the primary circulation pumps including; automatic cycling of run/stand-by motor.
  - Control of zone valves
  - Monitoring and control of secondary circulation pumps including; adjustment of volume flow rate in variable volume applications, and automatic cycling of run/stand-by motor.
  - Monitoring and recording of temperature in all rooms via wall mounted sensors
  - Monitoring of server room cooling systems.

- Ventilation System
  - Monitoring and control of all air handling plant including optimised operation based on occupancy and time schedules
  - Control of supply air temperatures
  - Control of variable volume ventilation systems including; operation of terminal VAV dampers
  - Operation and control of kitchen extract ventilation system
  - Monitoring of fire dampers

- Domestic Water Services System
  - Monitoring of the bulk storage tank including: High/low level indication and temperature monitoring
  - Monitoring of booster sets (booster sets to operate under dictates of own control system)
  - Monitoring and recording of water temperatures at point or origin and at the extremities of the distribution system
  - Monitoring of any remote electric water heaters
  - Monitoring and control of hot water generators including pasteurisation cycle.
  - Monitoring of meter flow rates to identify unusual water usage for leak detection purposes

- Metering
    - Monitoring and recording of all primary and sub-meters
    - Notification of unusual or excessive consumption

- External Lighting
    - Automatic control & synchronisation with site wide strategy

- Energy display screen
    - Function and display information to be agreed

9. VERTICAL TRANSPORT

Further information on vertical transport systems can be found in the specific vertical transport “STAGE 3 – planning and listed building consent Report”

10. APPENDICES

Appendix 1 – Builderswork Drawings

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
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3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

BWIC NOTES

1. BWIC INFORMATION IS INDICATIVE TO SHOW APPROXIMATE QUANTITIES/LOCATIONS FOR INFORMATION ONLY.
2. LEVEL 4 BWIC SHOWS WORST CASE AND CONTRACTOR TO CONFIRM ON SITE IF REQUIRED WITH REGARDS TO THE WALLS EXTENDING ABOVE THE CEILING.

Rev	Description	Date	By	Chk	App
P02	PLANNING & LBC ISSUE	16/12 2022	JH	TS	RM
P01	PRELIMINARY DRAFT ISSUE	02/12 2022	JH	TS	RM

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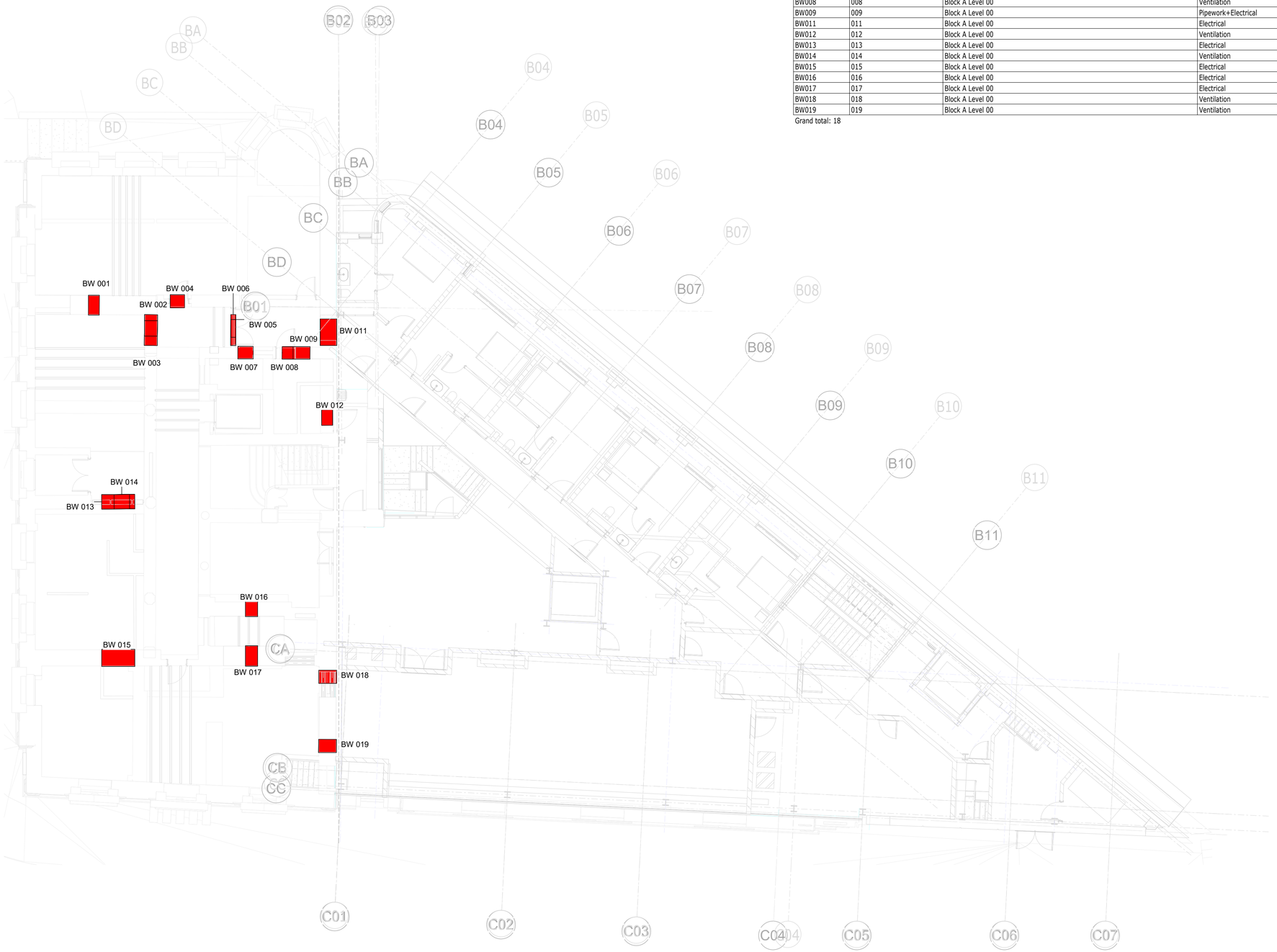
M&E BUILDERS LAYOUTS BUILDERSWORK BLOCK A LEVEL B1

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-AZ-B1-DR-ME-800100	P02



Voids Schedule 00			
Reference	Number	Level	Services
BW001	001	Block A Level 00	Ventilation
BW002	002	Block A Level 00	Electrical
BW003	003	Block A Level 00	Ventilation
BW004	004	Block A Level 00	Electrical
BW005	005	Block A Level 00	Ventilation
BW006	006	Block A Level 00	Electrical
BW007	007	Block A Level 00	Ventilation
BW008	008	Block A Level 00	Ventilation
BW009	009	Block A Level 00	Pipework+Electrical
BW011	011	Block A Level 00	Electrical
BW012	012	Block A Level 00	Ventilation
BW013	013	Block A Level 00	Electrical
BW014	014	Block A Level 00	Ventilation
BW015	015	Block A Level 00	Electrical
BW016	016	Block A Level 00	Electrical
BW017	017	Block A Level 00	Electrical
BW018	018	Block A Level 00	Ventilation
BW019	019	Block A Level 00	Ventilation

Grand total: 18

NOTES

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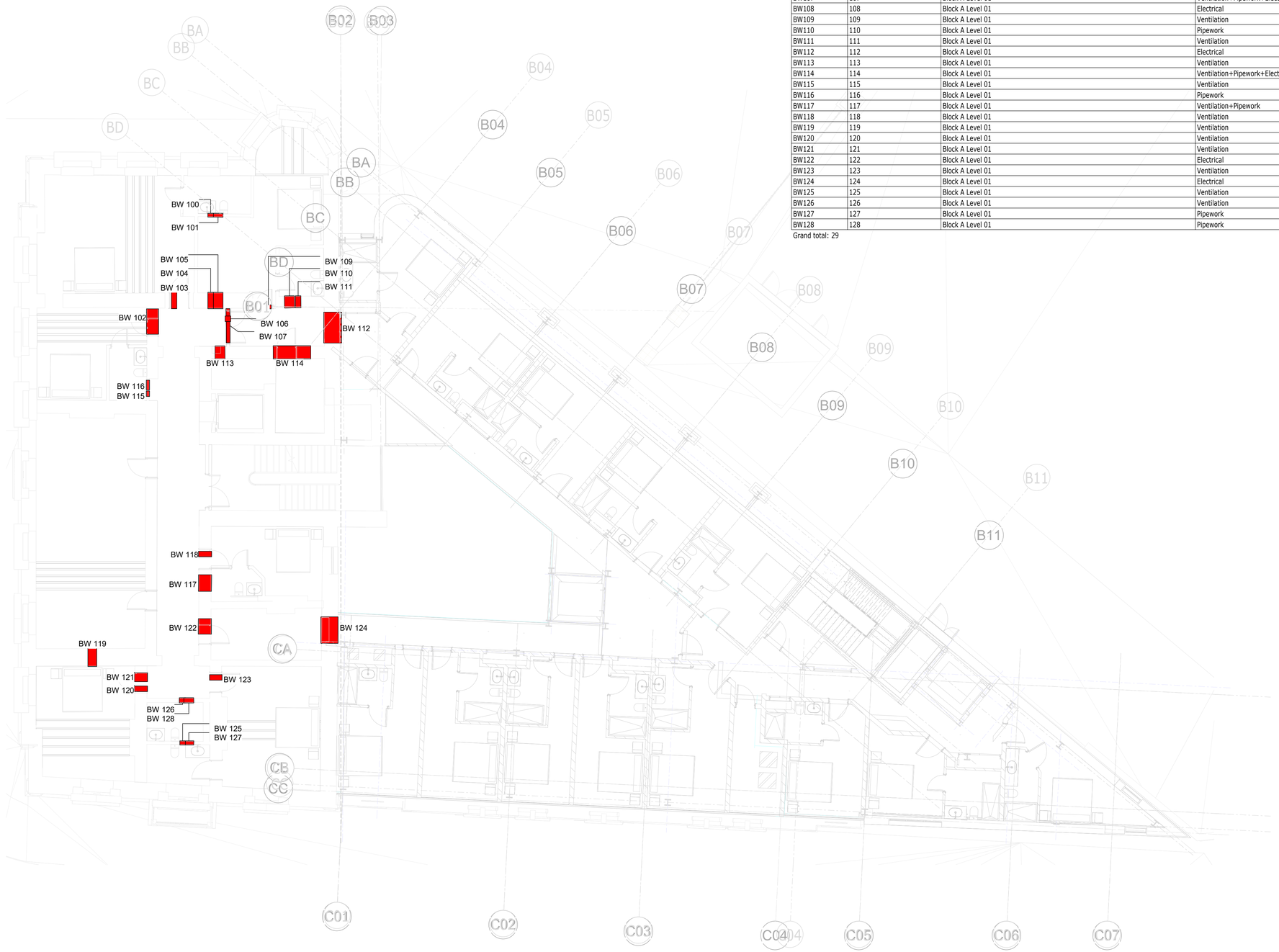
M&E BUILDERS LAYOUTS
BUILDERSWORK
BLOCK A
LEVEL 00

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-AZ-00-DR-ME-800101	P02



Voids Schedule 01			
Reference	Number	Level	Services
BW100	100	Block A Level 01	Ventilation
BW101	101	Block A Level 01	Pipework
BW102	102	Block A Level 01	Ventilation+Electrical
BW103	103	Block A Level 01	Ventilation
BW104	104	Block A Level 01	Ventilation
BW105	105	Block A Level 01	Pipework
BW106	106	Block A Level 01	Ventilation
BW107	107	Block A Level 01	Ventilation+Pipework+Electrical
BW108	108	Block A Level 01	Electrical
BW109	109	Block A Level 01	Ventilation
BW110	110	Block A Level 01	Pipework
BW111	111	Block A Level 01	Ventilation
BW112	112	Block A Level 01	Electrical
BW113	113	Block A Level 01	Ventilation
BW114	114	Block A Level 01	Ventilation+Pipework+Electrical
BW115	115	Block A Level 01	Ventilation
BW116	116	Block A Level 01	Pipework
BW117	117	Block A Level 01	Ventilation+Pipework
BW118	118	Block A Level 01	Ventilation
BW119	119	Block A Level 01	Ventilation
BW120	120	Block A Level 01	Ventilation
BW121	121	Block A Level 01	Ventilation
BW122	122	Block A Level 01	Electrical
BW123	123	Block A Level 01	Ventilation
BW124	124	Block A Level 01	Electrical
BW125	125	Block A Level 01	Ventilation
BW126	126	Block A Level 01	Ventilation
BW127	127	Block A Level 01	Pipework
BW128	128	Block A Level 01	Pipework

Grand total: 29

NOTES

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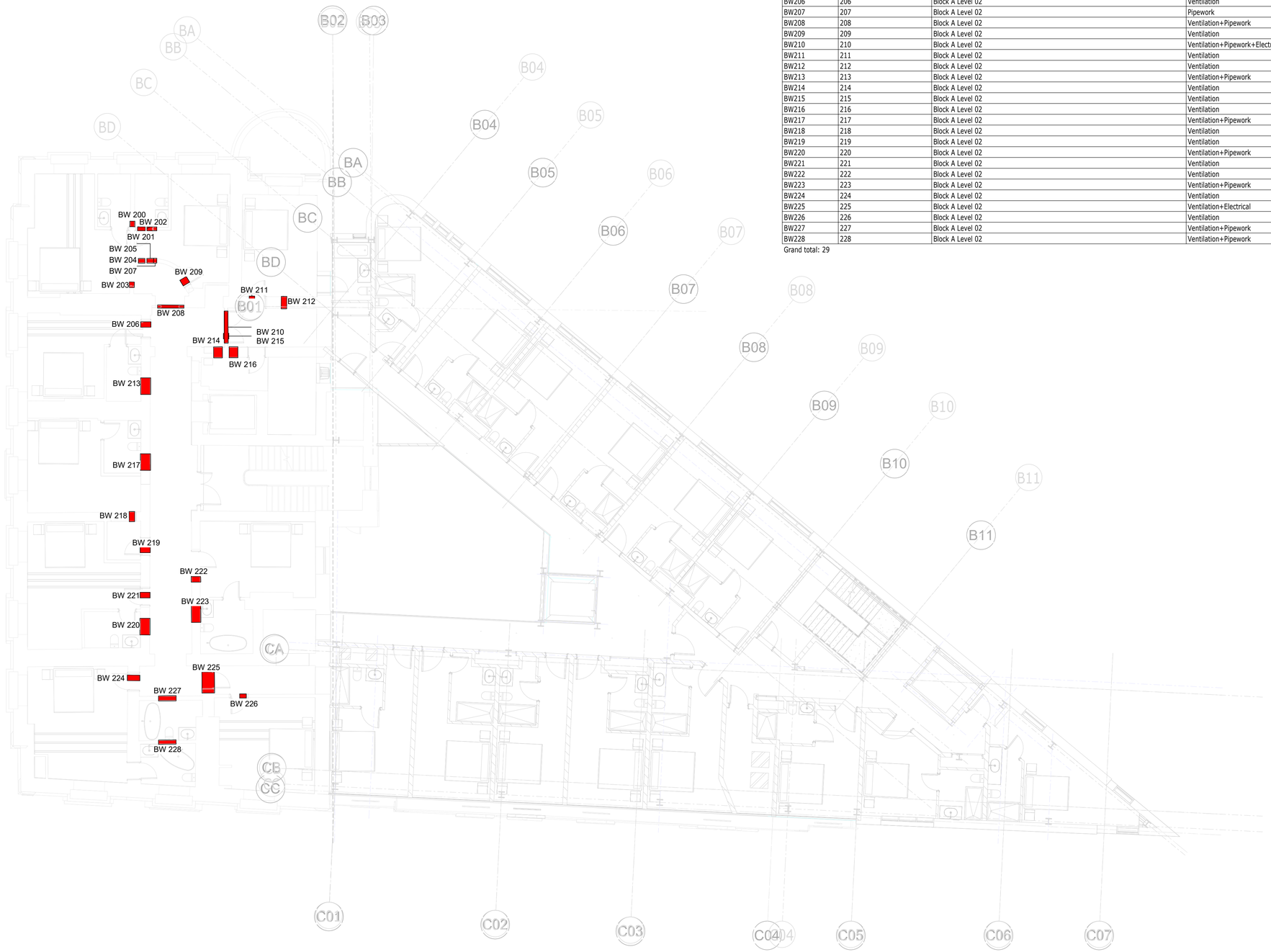
M&E BUILDERS LAYOUTS BUILDERSWORK BLOCK A LEVEL 01

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No: 4217-RAM-AZ-01-DR-ME-800102

Rev: P02



Voids Schedule 02

Reference	Number	Level	Services
BW200	200	Block A Level 02	Ventilation
BW201	201	Block A Level 02	Ventilation
BW202	202	Block A Level 02	Pipework
BW203	203	Block A Level 02	Ventilation
BW204	204	Block A Level 02	Ventilation
BW205	205	Block A Level 02	Pipework
BW206	206	Block A Level 02	Ventilation
BW207	207	Block A Level 02	Pipework
BW208	208	Block A Level 02	Ventilation+Pipework
BW209	209	Block A Level 02	Ventilation
BW210	210	Block A Level 02	Ventilation+Pipework+Electrical
BW211	211	Block A Level 02	Ventilation
BW212	212	Block A Level 02	Ventilation
BW213	213	Block A Level 02	Ventilation+Pipework
BW214	214	Block A Level 02	Ventilation
BW215	215	Block A Level 02	Ventilation
BW216	216	Block A Level 02	Ventilation
BW217	217	Block A Level 02	Ventilation+Pipework
BW218	218	Block A Level 02	Ventilation
BW219	219	Block A Level 02	Ventilation
BW220	220	Block A Level 02	Ventilation+Pipework
BW221	221	Block A Level 02	Ventilation
BW222	222	Block A Level 02	Ventilation
BW223	223	Block A Level 02	Ventilation+Pipework
BW224	224	Block A Level 02	Ventilation
BW225	225	Block A Level 02	Ventilation+Electrical
BW226	226	Block A Level 02	Ventilation
BW227	227	Block A Level 02	Ventilation+Pipework
BW228	228	Block A Level 02	Ventilation+Pipework

Grand total: 29

NOTES

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Drawing No:	Rev:
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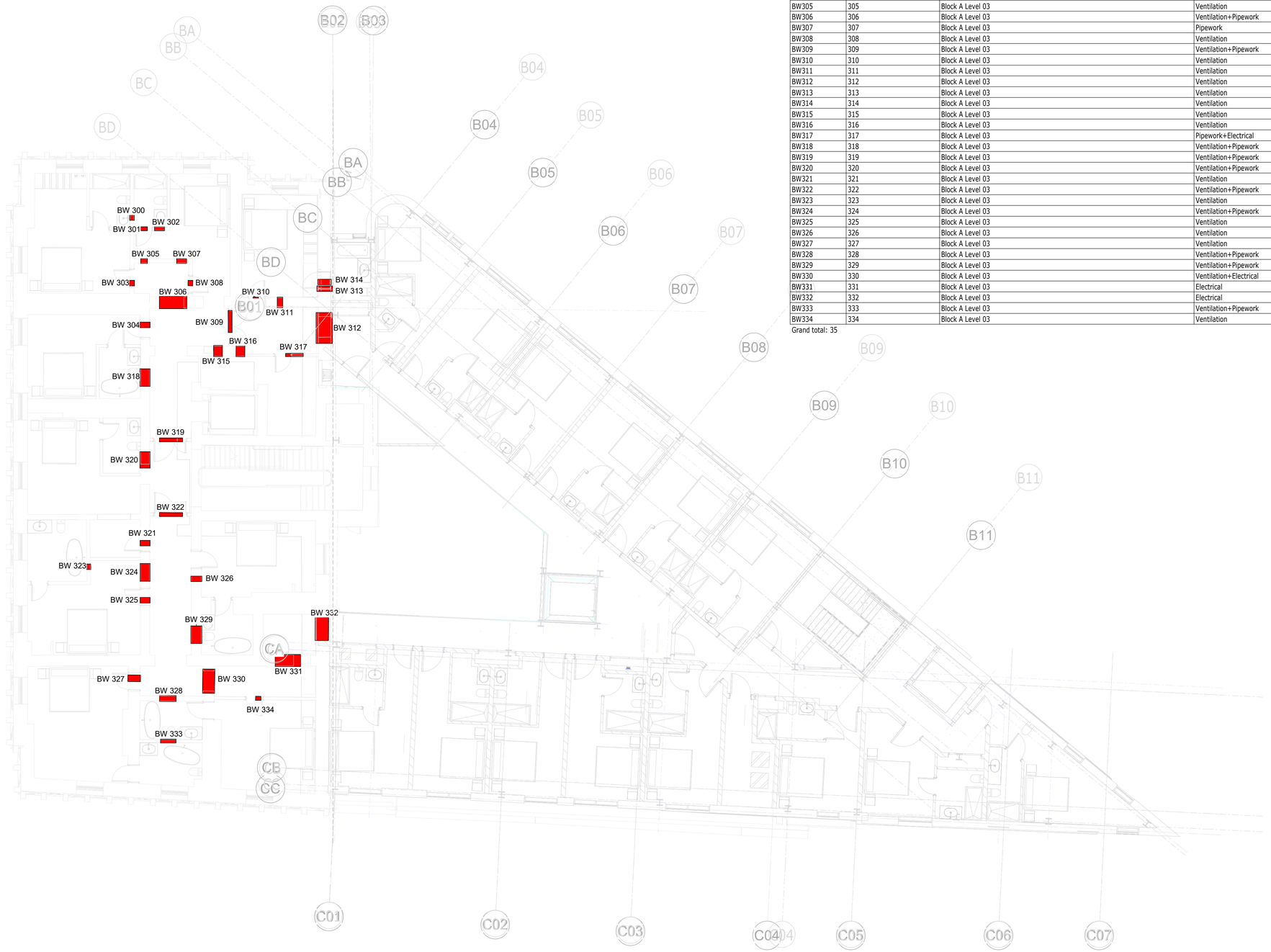

Voids Schedule 03

Reference	Number	Level	Services
BW300	300	Block A Level 03	Ventilation
BW301	301	Block A Level 03	Ventilation
BW302	302	Block A Level 03	Pipework
BW303	303	Block A Level 03	Ventilation
BW304	304	Block A Level 03	Ventilation
BW305	305	Block A Level 03	Ventilation
BW306	306	Block A Level 03	Ventilation+Pipework
BW307	307	Block A Level 03	Pipework
BW308	308	Block A Level 03	Ventilation
BW309	309	Block A Level 03	Ventilation+Pipework
BW310	310	Block A Level 03	Ventilation
BW311	311	Block A Level 03	Ventilation
BW312	312	Block A Level 03	Ventilation
BW313	313	Block A Level 03	Ventilation
BW314	314	Block A Level 03	Ventilation
BW315	315	Block A Level 03	Ventilation
BW316	316	Block A Level 03	Ventilation
BW317	317	Block A Level 03	Pipework+Electrical
BW318	318	Block A Level 03	Ventilation+Pipework
BW319	319	Block A Level 03	Ventilation+Pipework
BW320	320	Block A Level 03	Ventilation+Pipework
BW321	321	Block A Level 03	Ventilation
BW322	322	Block A Level 03	Ventilation+Pipework
BW323	323	Block A Level 03	Ventilation
BW324	324	Block A Level 03	Ventilation+Pipework
BW325	325	Block A Level 03	Ventilation
BW326	326	Block A Level 03	Ventilation
BW327	327	Block A Level 03	Ventilation
BW328	328	Block A Level 03	Ventilation+Pipework
BW329	329	Block A Level 03	Ventilation+Pipework
BW330	330	Block A Level 03	Ventilation+Electrical
BW331	331	Block A Level 03	Electrical
BW332	332	Block A Level 03	Electrical
BW333	333	Block A Level 03	Ventilation+Pipework
BW334	334	Block A Level 03	Ventilation

Grand total: 35

NOTES

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1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
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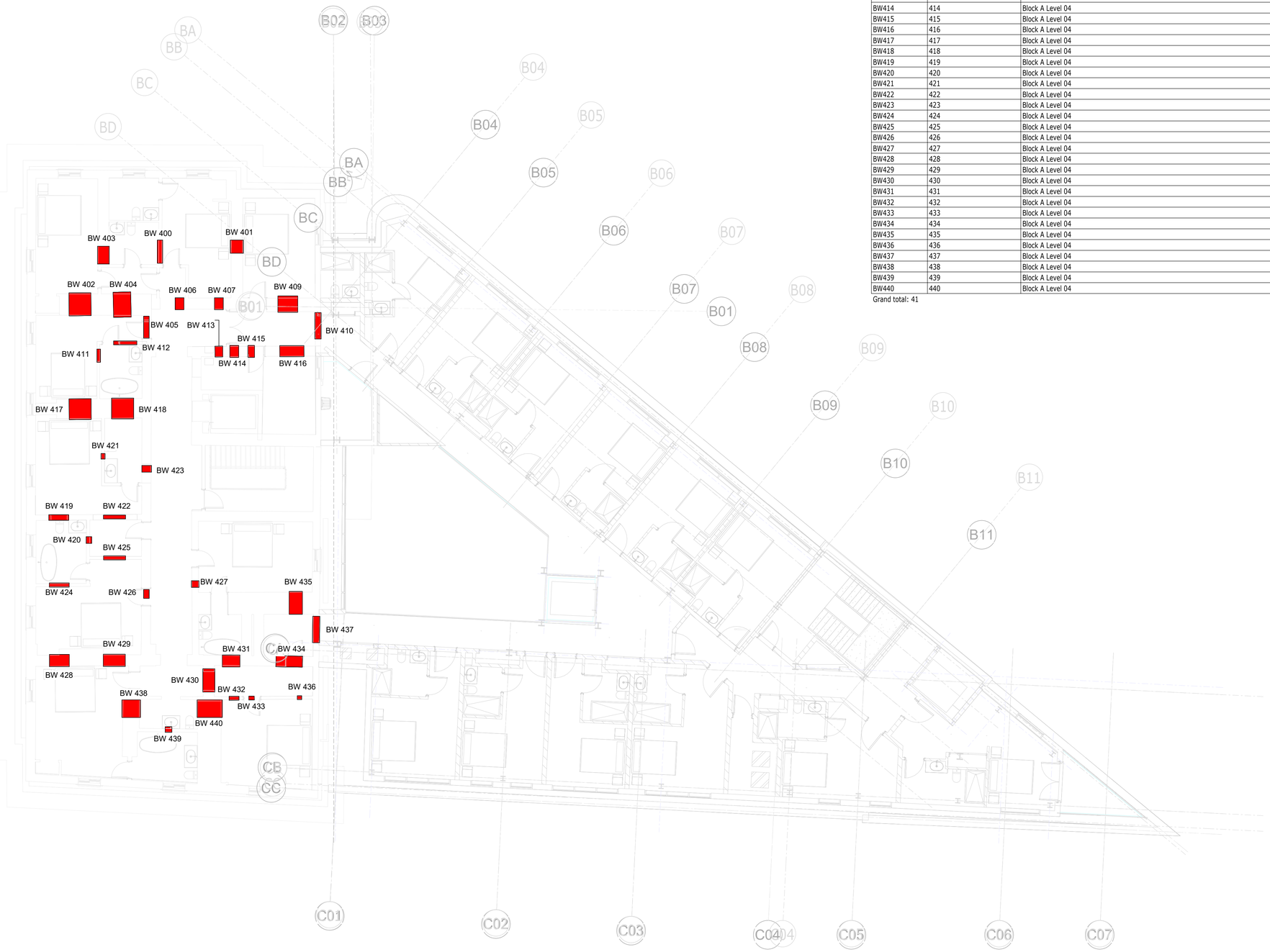

Voids Schedule 04			
Reference	Number	Level	Services
BW400	400	Block A Level 04	Ventilation
BW401	401	Block A Level 04	Ventilation
BW402	402	Block A Level 04	Ventilation
BW403	403	Block A Level 04	Ventilation
BW404	404	Block A Level 04	Ventilation
BW405	405	Block A Level 04	Ventilation
BW406	406	Block A Level 04	Ventilation
BW407	407	Block A Level 04	Ventilation
BW408	408	Block A Level 04	Ventilation
BW409	409	Block A Level 04	Ventilation
BW410	410	Block A Level 04	Electrical
BW411	411	Block A Level 04	Ventilation
BW412	412	Block A Level 04	Ventilation+Pipework+Electrical
BW413	413	Block A Level 04	Ventilation
BW414	414	Block A Level 04	Ventilation
BW415	415	Block A Level 04	Ventilation
BW416	416	Block A Level 04	Electrical
BW417	417	Block A Level 04	Ventilation
BW418	418	Block A Level 04	Ventilation
BW419	419	Block A Level 04	Ventilation
BW420	420	Block A Level 04	Ventilation
BW421	421	Block A Level 04	Ventilation
BW422	422	Block A Level 04	Ventilation
BW423	423	Block A Level 04	Electrical
BW424	424	Block A Level 04	Ventilation
BW425	425	Block A Level 04	Ventilation
BW426	426	Block A Level 04	Ventilation
BW427	427	Block A Level 04	Electrical
BW428	428	Block A Level 04	Ventilation
BW429	429	Block A Level 04	Ventilation
BW430	430	Block A Level 04	Electrical
BW431	431	Block A Level 04	Ventilation
BW432	432	Block A Level 04	Pipework
BW433	433	Block A Level 04	Ventilation
BW434	434	Block A Level 04	Electrical
BW435	435	Block A Level 04	Ventilation
BW436	436	Block A Level 04	Electrical
BW437	437	Block A Level 04	Electrical
BW438	438	Block A Level 04	Ventilation
BW439	439	Block A Level 04	Ventilation
BW440	440	Block A Level 04	Ventilation

Grand total: 41

NOTES

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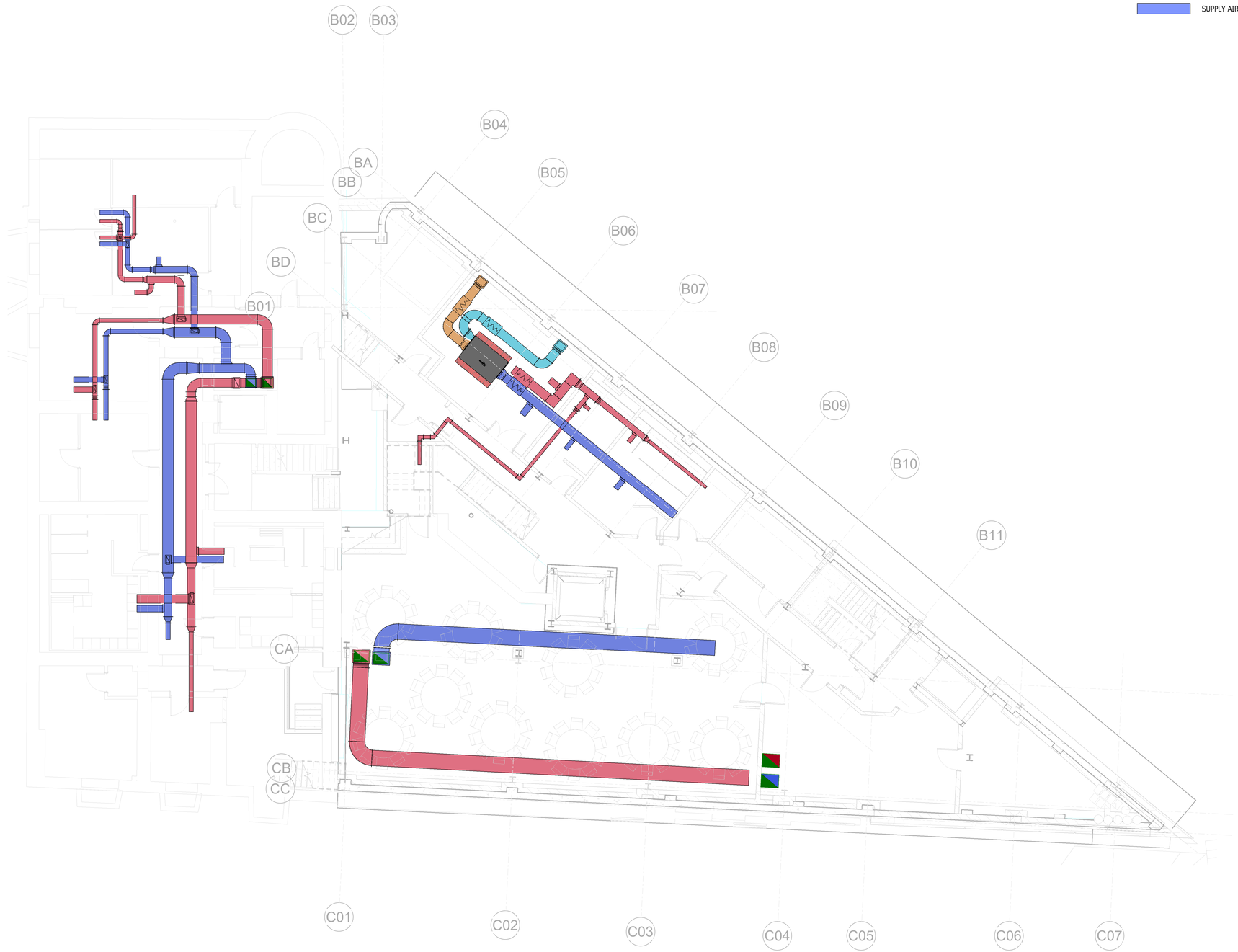
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-AZ-04-DR-ME-800105	P02

Appendix 2 – Ventilation routing drawings



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VENTILATION SYSTEM NOTES

1. WHERE VENTILATION SYSTEM DUCTWORK PASSES THROUGH A FIRE COMPARTMENT BARRIER, AUTOMATIC MECHANICAL FIRE DAMPER DEVICE SHALL BE INSTALLED. THE DEVICE SHALL BE, COMPLETE WITH A BUILD IN FRAME FOR FIXING TO THE BUILDING STRUCTURE. SPACING BETWEEN PIPEWORK FIRE STOPPING SHALL BE MINIMUM OF 200MM BETWEEN EACH DEVICE OR AS PER THE MANUFACTURE'S RECOMMENDATIONS.
2. ALL VENTILATION SYSTEM DUCTWORK BRANCH CONNECTIONS SHALL BE PROVIDED WITH VOLUME CONTROL DAMPERS TO FACILITATE BALANCING.
3. THE VENTILATION SYSTEMS DUCTWORK SHALL BE PROVIDED WITH ACCESS DOORS FOR MAINTENANCE AND CLEANING PURPOSES. THESE SHALL BE LOCATED ADJACENT TO ALL FIRE DAMPERS, VOLUME CONTROL DAMPERS AND HEATER BATTERIES, EITHER SIDE OF THE AIR TURNS AND AT LEAST 4 M INTERVALS ON DUCT ROUTES.
4. FLEXIBLE VENTILATION DUCTWORK SHALL ONLY BE USED FOR THE FINAL CONNECTIONS TO GRILLES. ALL FLEXIBLE DUCTWORK SHALL BE INSTALLED FULLY EXTENDED AND NO GREATER THAN 500MM IN LENGTH, WHEN MAKING FINAL CONNECTIONS.
5. THE CONTRACTOR SHALL PROVIDE ALL VENTILATION SYSTEM ATTENUATION AS REQUIRED BY THE PROJECT ACOUSTIC RECOMMENDATIONS
6. ALL FANS AND VENTILATION UNITS SHALL BE INSTALLED WITH ACCESSIBLE LOCATIONS WITH DUE REGARD TO THE MANUFACTURES MAINTENANCE SPACE RECOMMENDATIONS.

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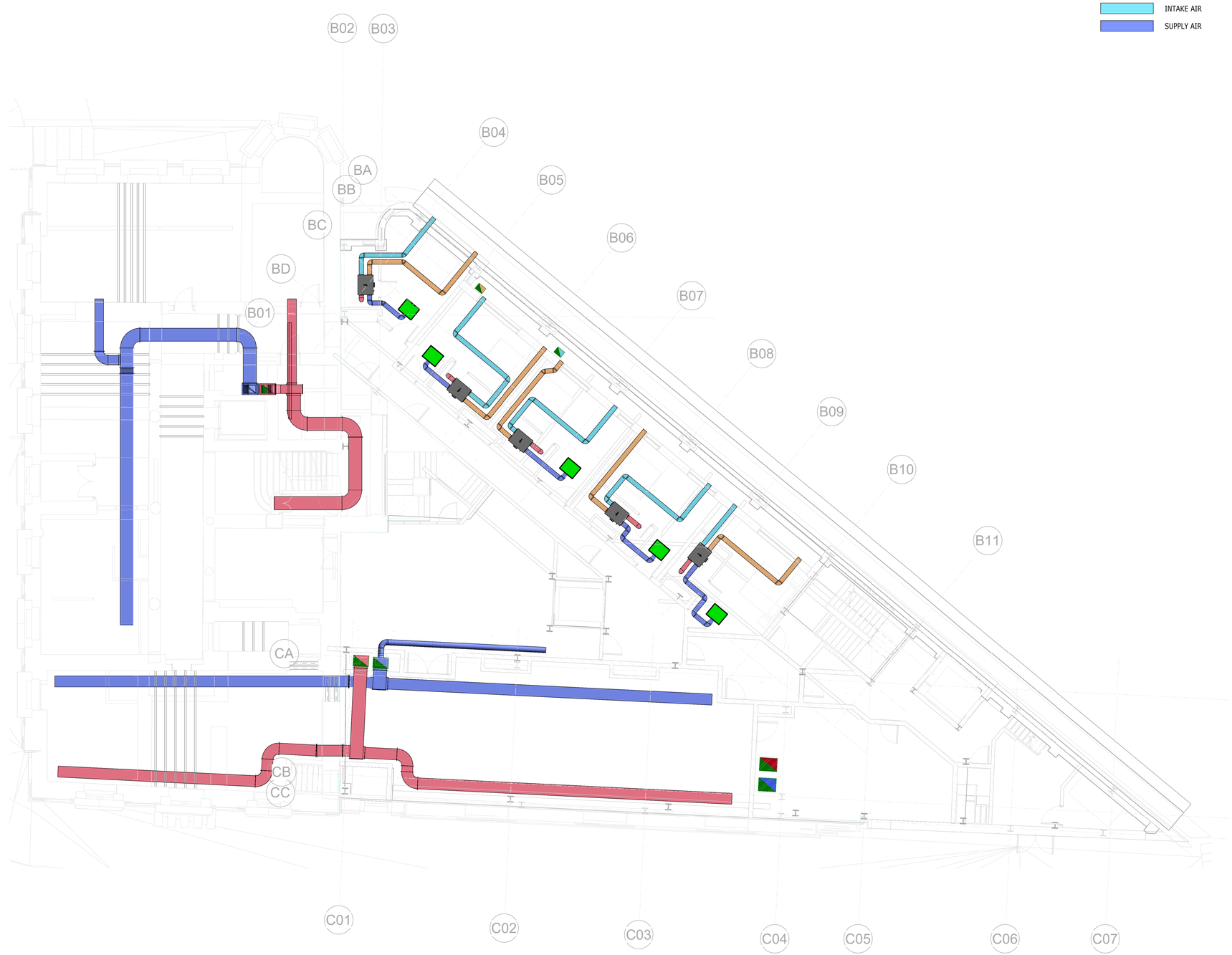
MECHANICAL SERVICES VENTILATION & AC SYS GENERAL ARRANGEMENT LEVEL B1

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-XX-B1-DR-M-570000	P02

LEGEND

- DISCHARGE AIR
- EXTRACT AIR
- EXTRACT AIR KITCHEN
- INTAKE AIR
- SUPPLY AIR



NOTES

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3. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.
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VENTILATION SYSTEM NOTES

1. WHERE VENTILATION SYSTEM DUCTWORK PASSES THROUGH A FIRE COMPARTMENT BARRIER, AUTOMATIC MECHANICAL FIRE DAMPER DEVICE SHALL BE INSTALLED. THE DEVICE SHALL BE, COMPLETE WITH A BUILD IN FRAME FOR FIXING TO THE BUILDING STRUCTURE. SPACING BETWEEN PIPEWORK FIRE STOPPING SHALL BE MINIMUM OF 200MM BETWEEN EACH DEVICE OR AS PER THE MANUFACTURE'S RECOMMENDATIONS.
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Rev	Description	Date	By	Chk	App
P02	PLANNING & LBC ISSUE	16/12 2022	JH	TS	RM
P01	PRELIMINARY DRAFT ISSUE	02/12 2022	JH	TS	RM

S3 - FOR REVIEW & COMMENT

THE GEORGE HOTEL
HUDDERSFIELD

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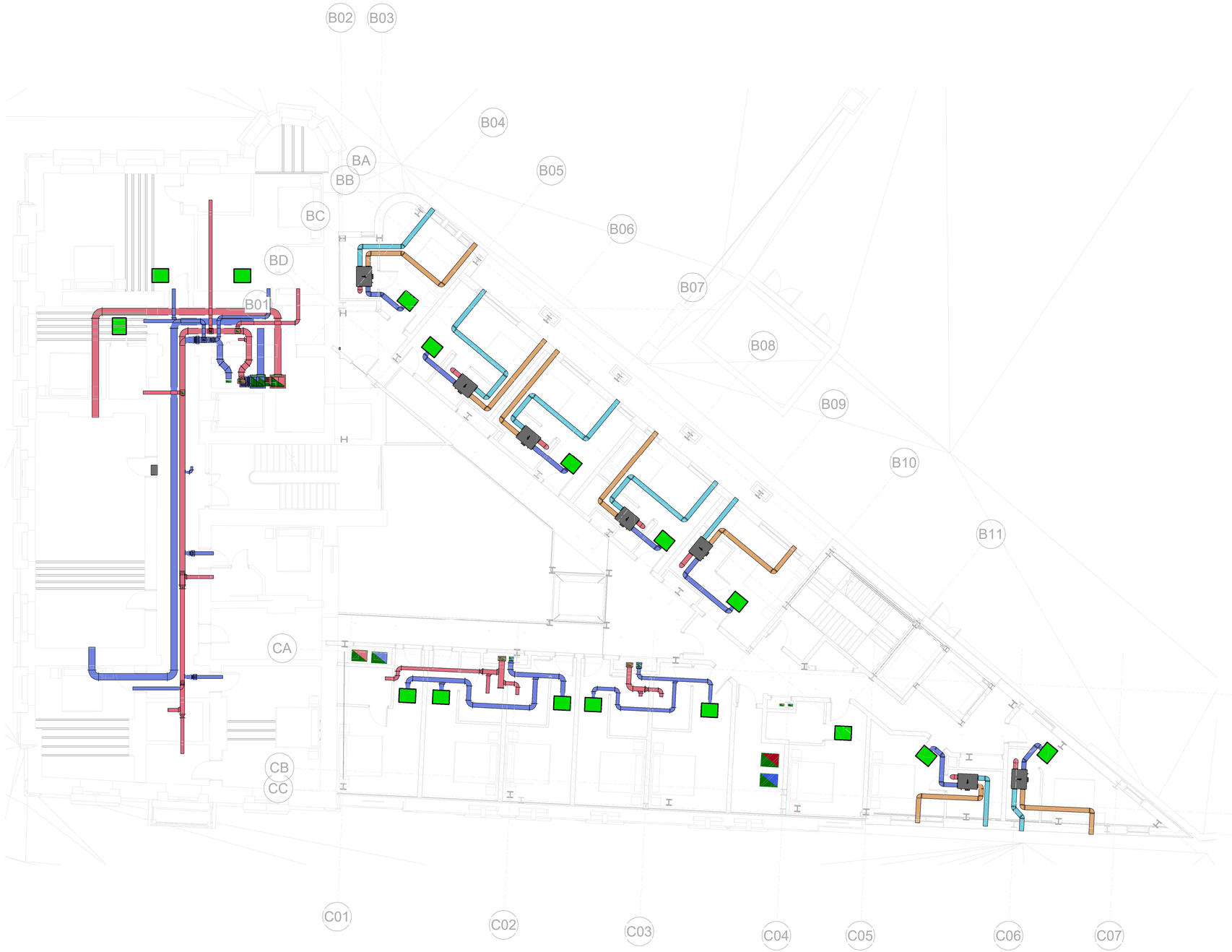
MECHANICAL SERVICES VENTILATION & AC SYS GENERAL ARRANGEMENT LEVEL 00

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No: 4217-RAM-XX-00-DR-M-570001

Rev: P02



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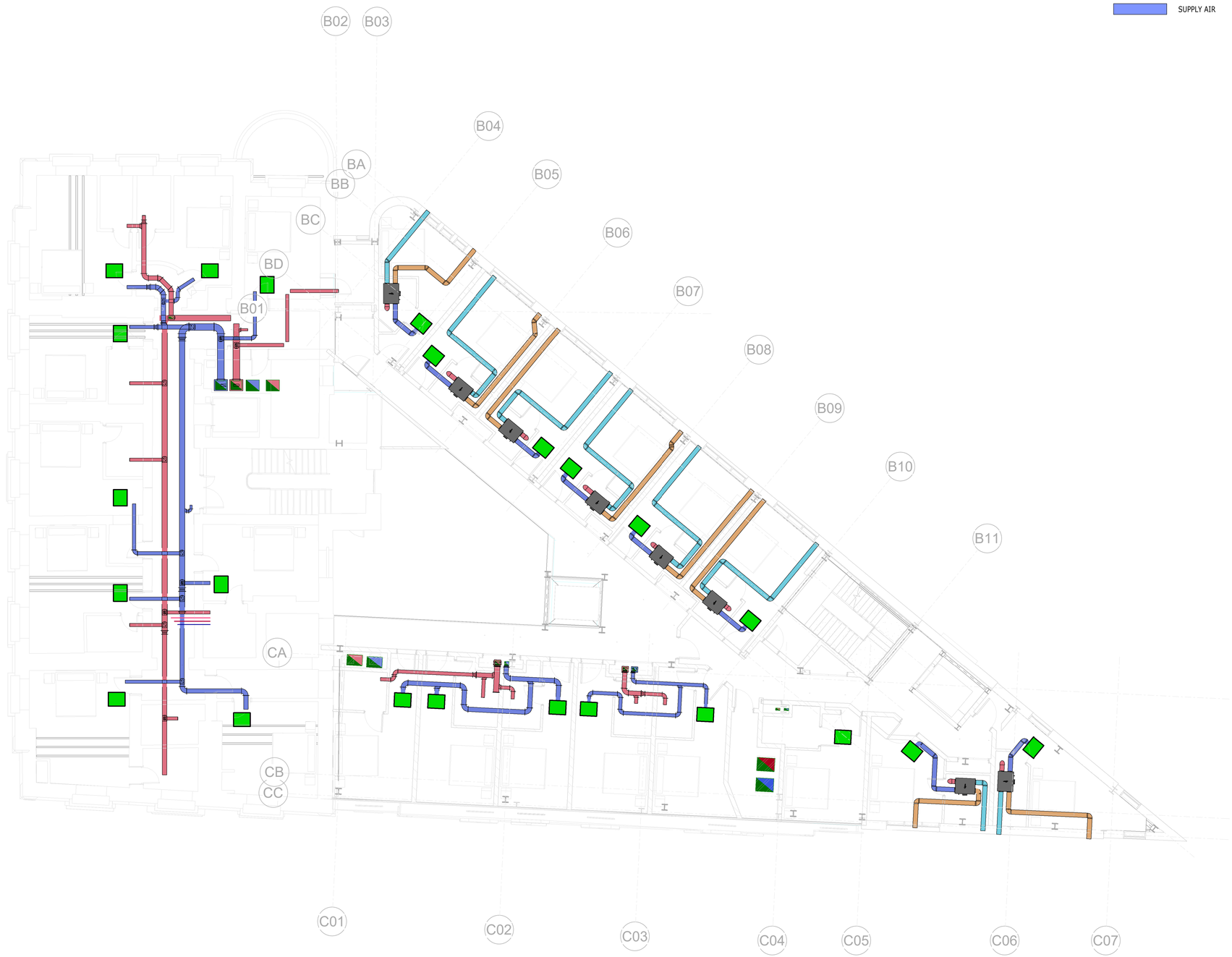
MECHANICAL SERVICES VENTILATION & AC SYS GENERAL ARRANGEMENT LEVEL 01

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-XX-01-DR-M-570002	P02



LEGEND

- DISCHARGE AIR
- EXTRACT AIR
- EXTRACT AIR KITCHEN
- INTAKE AIR
- SUPPLY AIR

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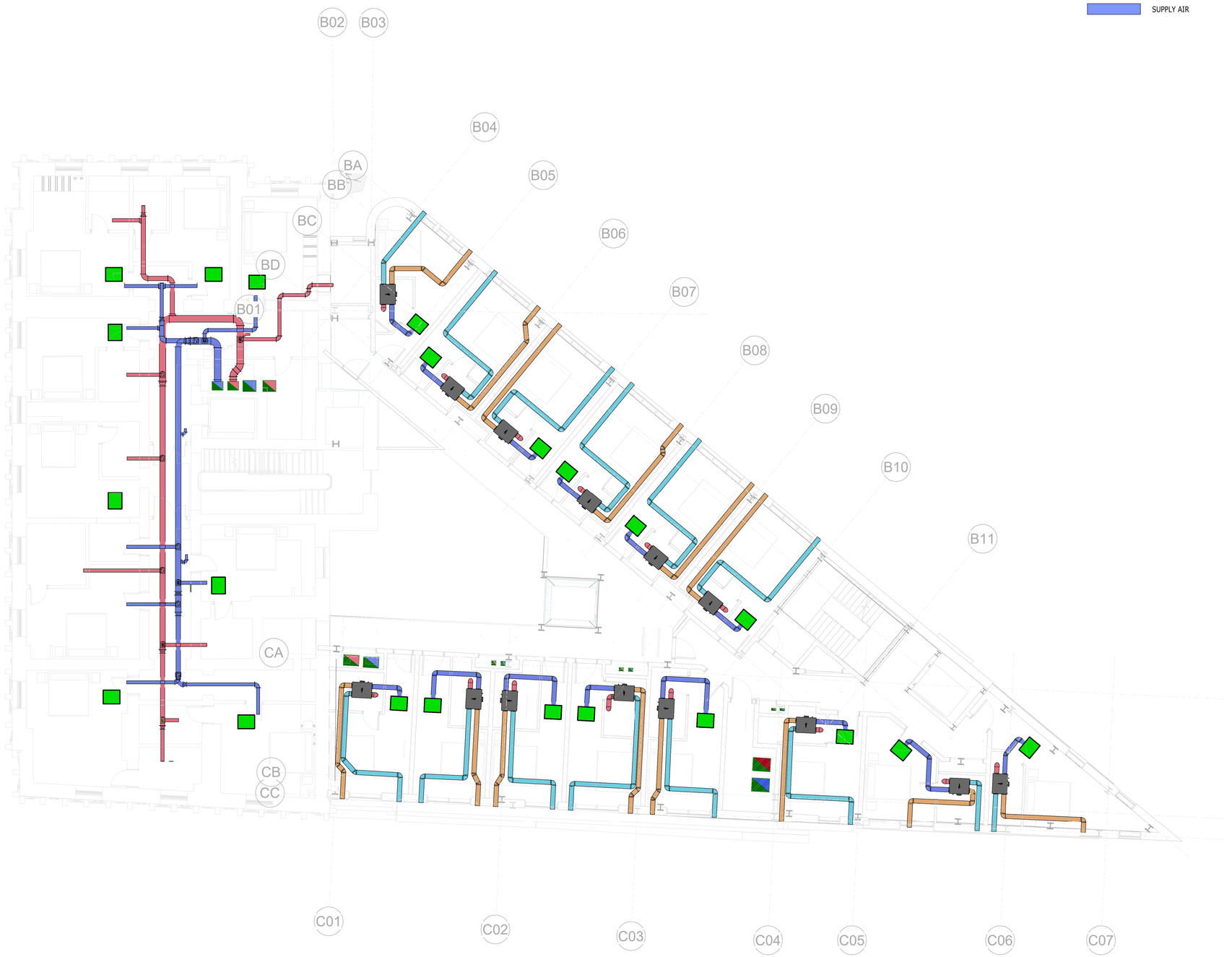
MECHANICAL SERVICES VENTILATION & AC SYS GENERAL ARRANGEMENT LEVEL 02

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-XX-02-DR-M-570003	P02



NOTES

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MECHANICAL SERVICES VENTILATION & AC SYS GENERAL ARRANGEMENT LEVEL 03

Project No:	Scale (@ A1):	Date:	Drawn:
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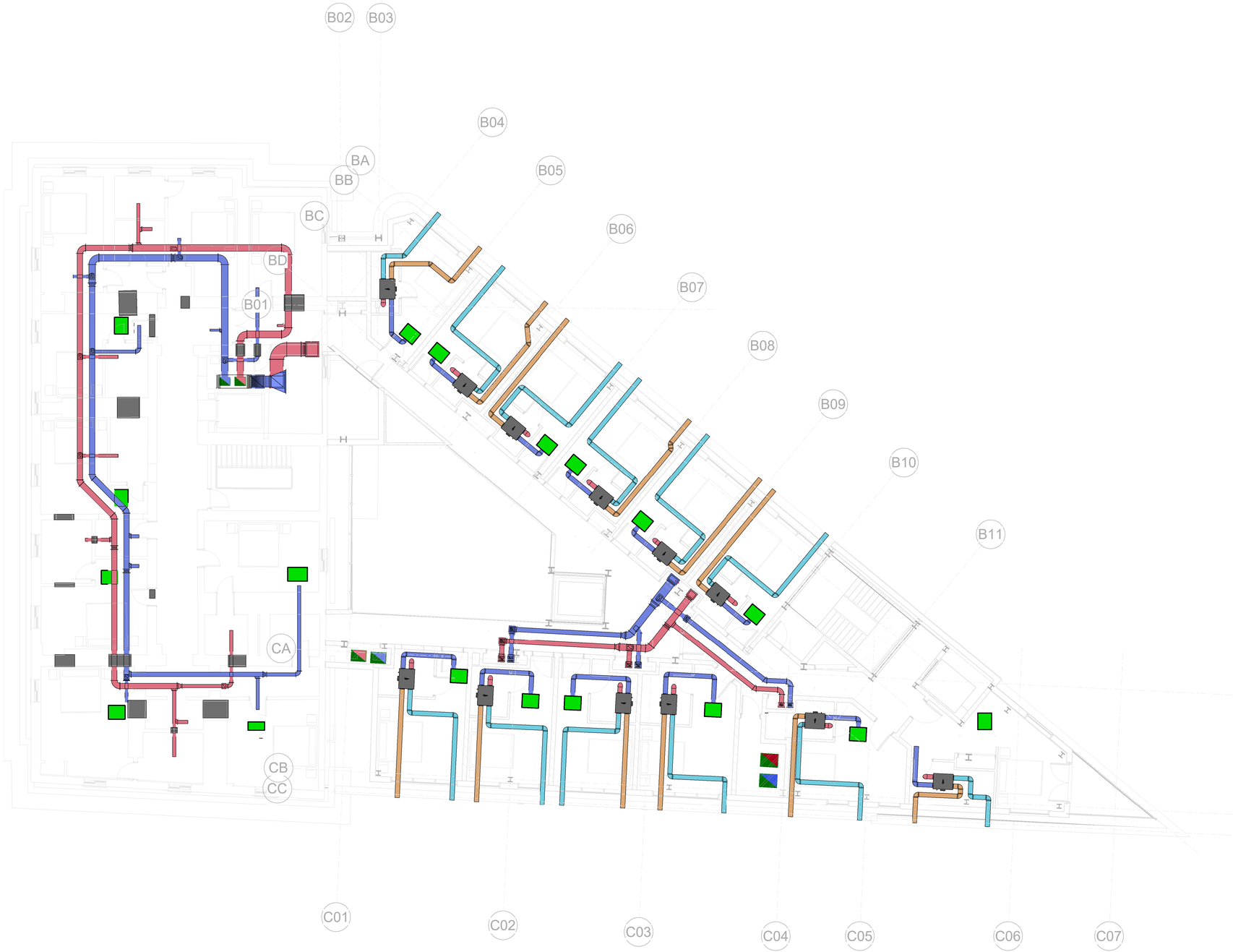
Drawing No:	Rev:
4217-RAM-XX-03-DR-M-570003	P02



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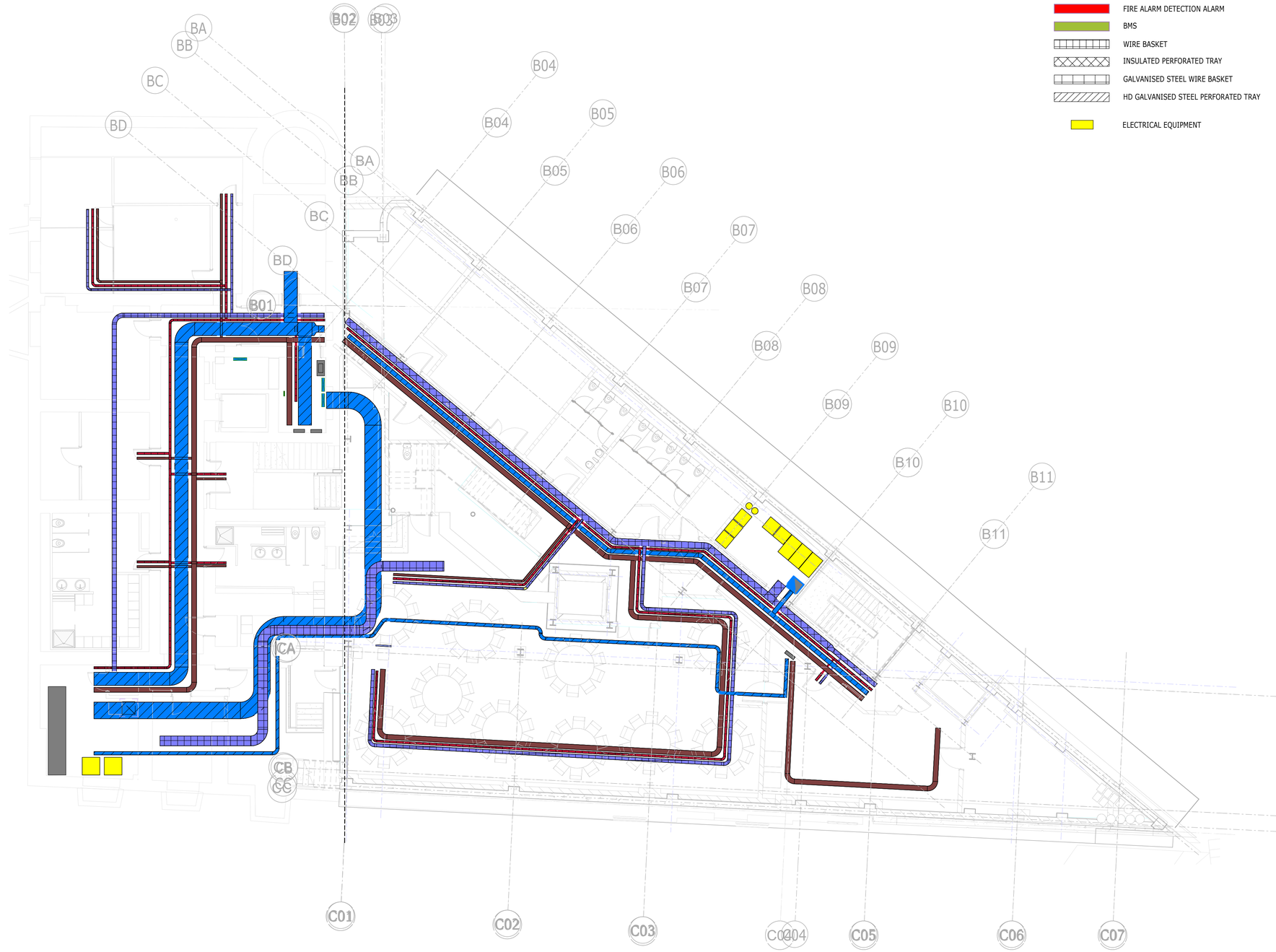
MECHANICAL SERVICES VENTILATION & AC SYS GENERAL ARRANGEMENT LEVEL 04

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	02/12/22	JH

Drawing No:	Rev:
4217-RAM-XX-04-DR-M-570005	P02

Appendix 3 – Electrical distribution drawings



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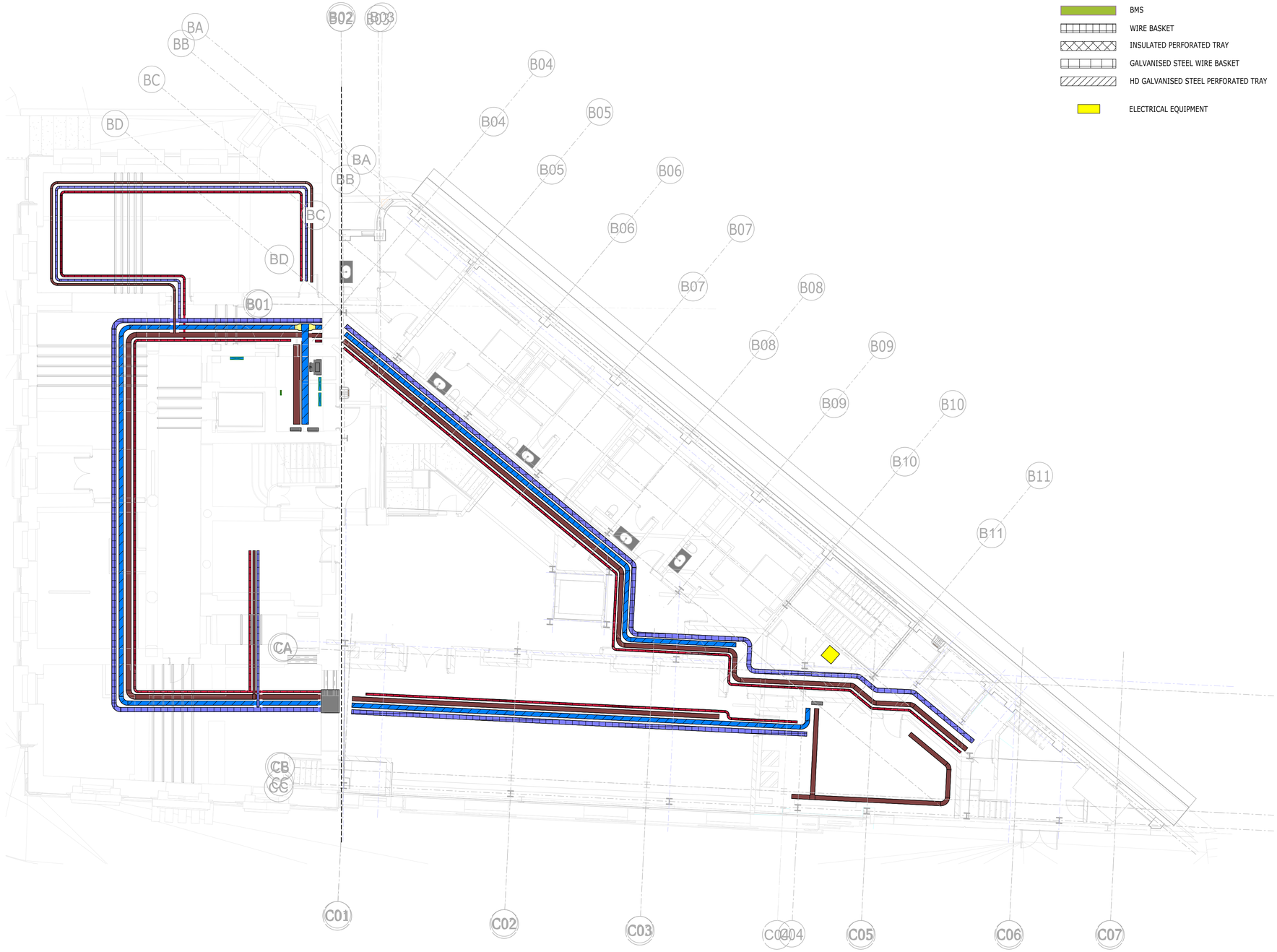
ELECTRICAL SERVICES
LV DISTRIBUTION SYS
GENERAL ARRANGEMENT
LEVEL B1

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	01/12/22	JS

Drawing No: 4217-RAM-XX-B1-DR-E-610000

Rev: P02



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THE GEORGE HOTEL
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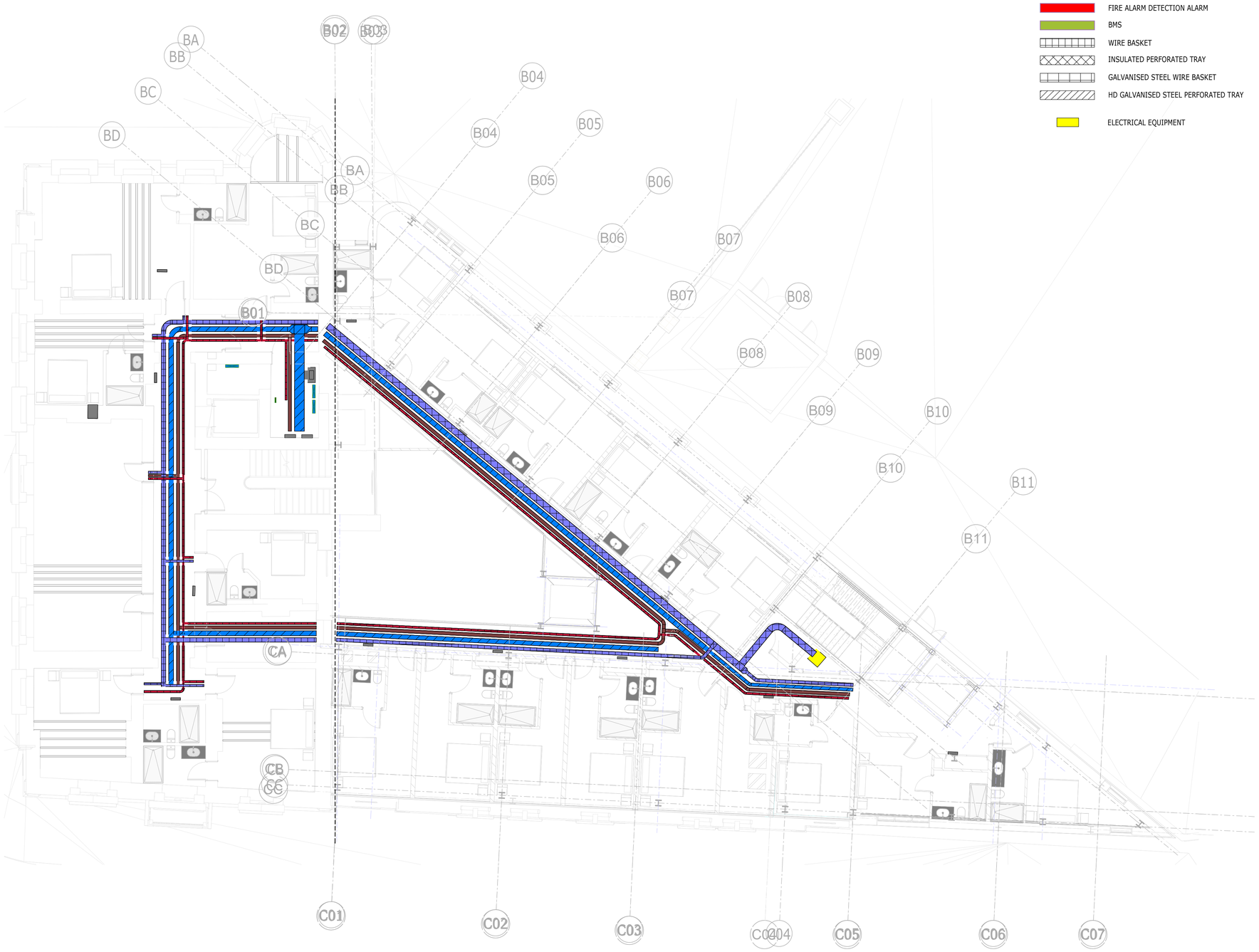
ELECTRICAL SERVICES
LV DISTRIBUTION SYS
GENERAL ARRANGEMENT
LEVEL 00

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	01/12/22	JS

Drawing No: 4217-RAM-XX-00-DR-E-610001

Rev: P02



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S3 - FOR REVIEW & COMMENT

THE GEORGE HOTEL
HUDDERSFIELD

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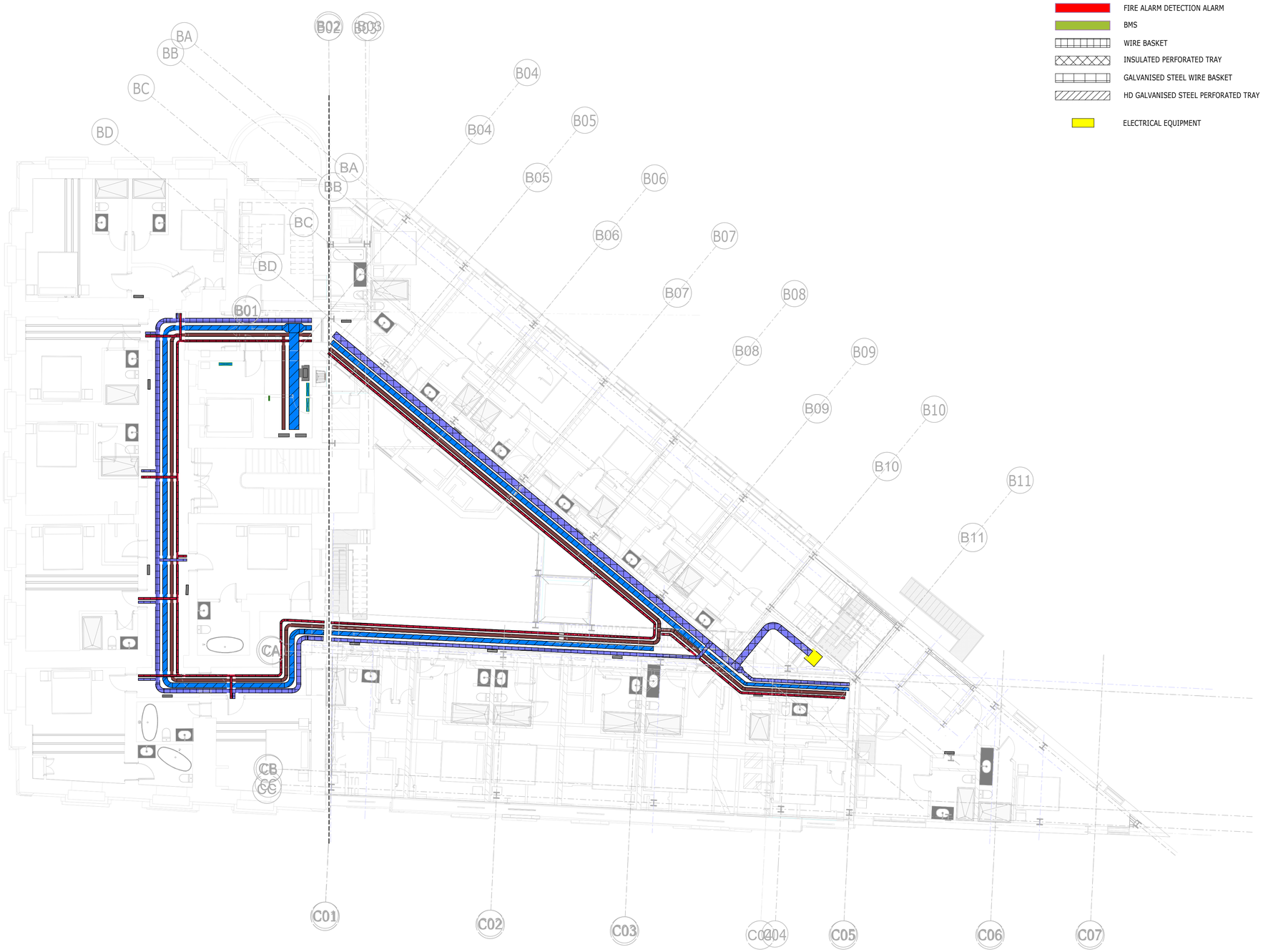
ELECTRICAL SERVICES
LV DISTRIBUTION SYS
GENERAL ARRANGEMENT
LEVEL 01

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	01/12/22	JS

Drawing No: 4217-RAM-XX-01-DR-E-610002

Rev: P02



LEGEND:

- LV DISTRIBUTION
- SMALL POWER AND LIGHTING
- DATA AND COMMS
- FIRE ALARM DETECTION ALARM
- BMS
- WIRE BASKET
- INSULATED PERFORATED TRAY
- GALVANISED STEEL WIRE BASKET
- HD GALVANISED STEEL PERFORATED TRAY
- ELECTRICAL EQUIPMENT

NOTES

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P01	PRELIMINARY DRAFT ISSUE	02/12 2022	JS	TS	RM

PRELIMINARY

THE GEORGE HOTEL
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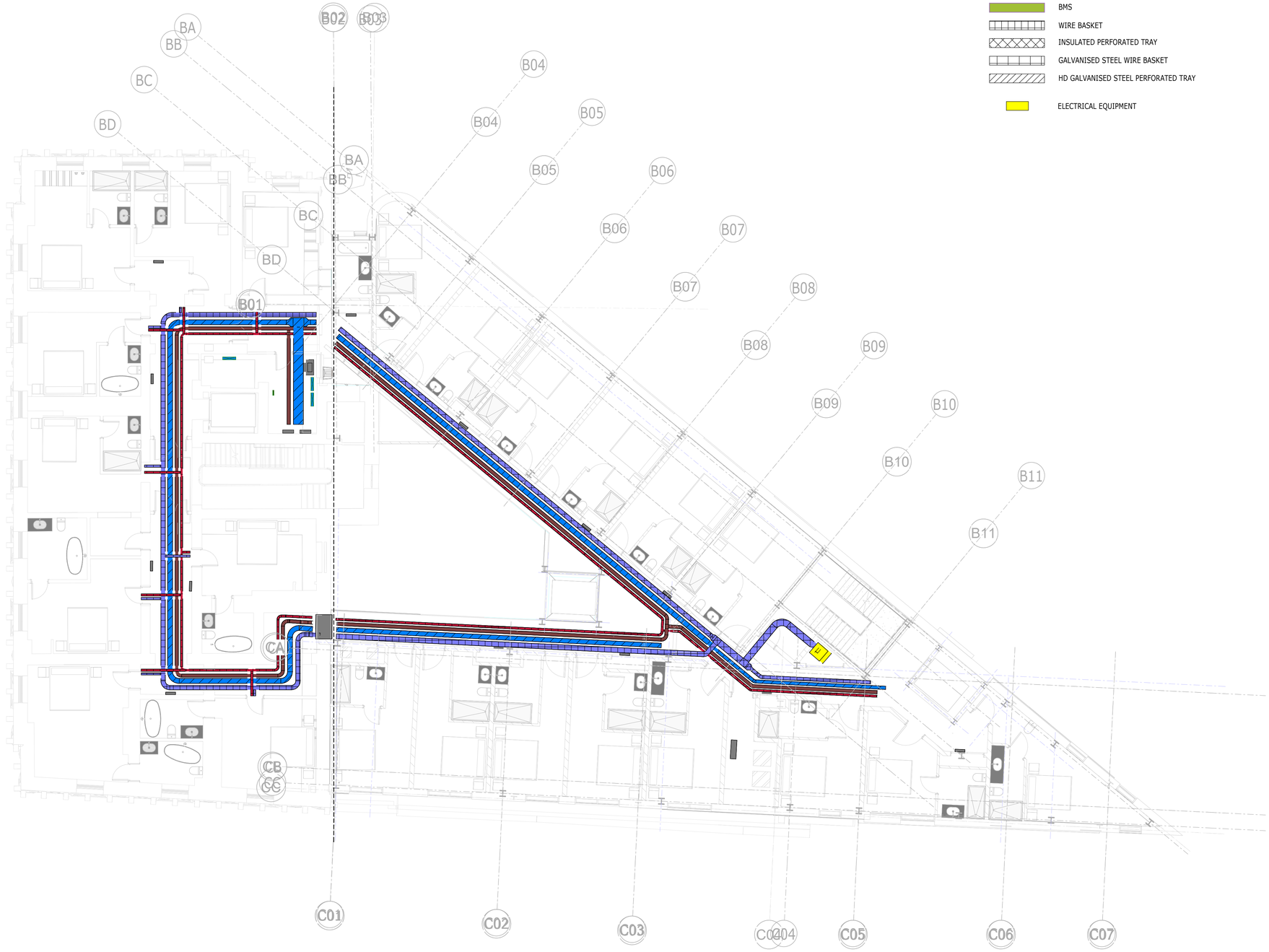
ELECTRICAL SERVICES
LV DISTRIBUTION SYS
GENERAL ARRANGEMENT
LEVEL 02

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	01/12/22	JS

Drawing No:	Rev:
4217-RAM-XX-02-DR-E-610003	P02



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THE GEORGE HOTEL
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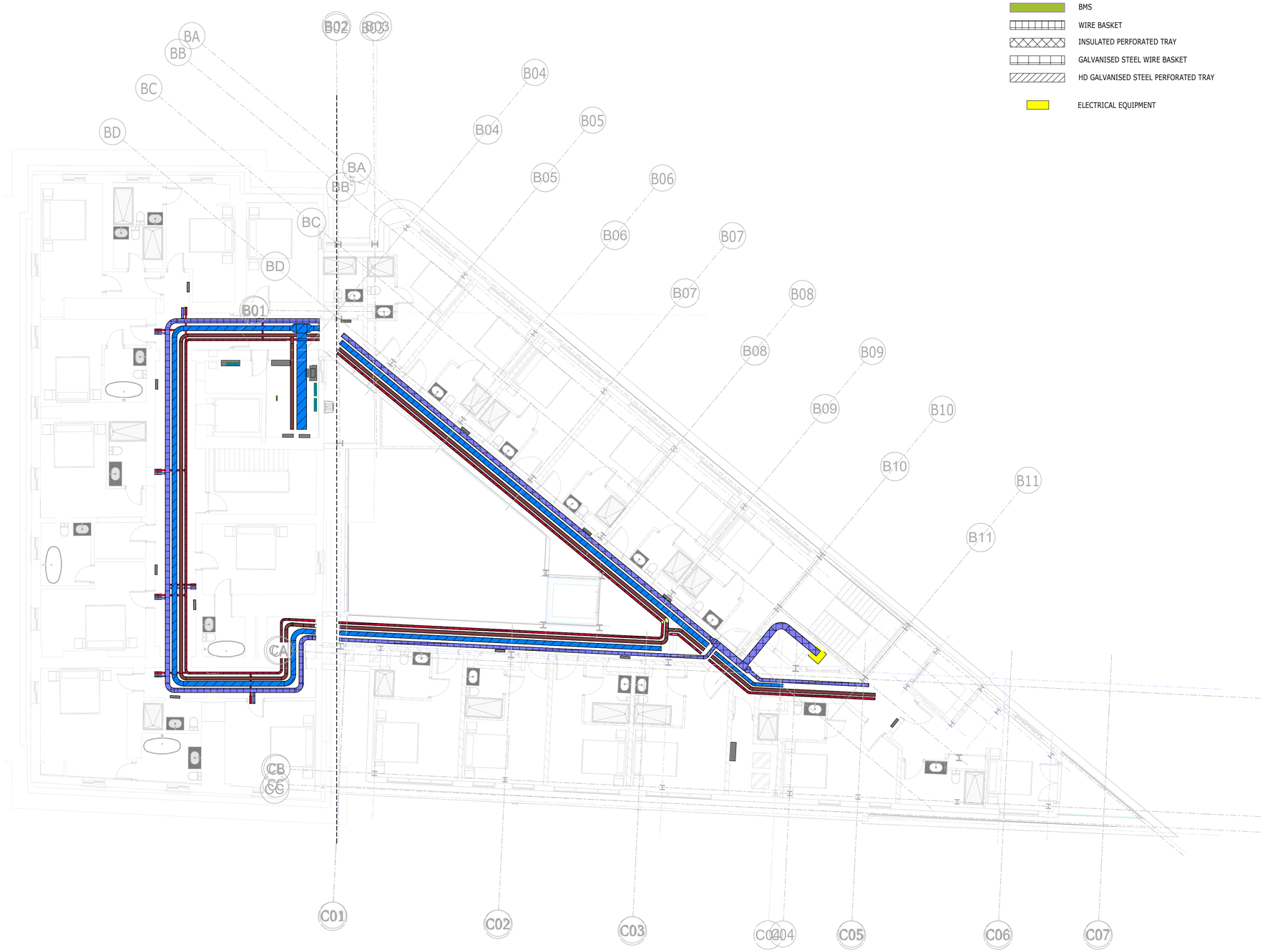
ELECTRICAL SERVICES
LV DISTRIBUTION SYS
GENERAL ARRANGEMENT
LEVEL 03

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	01/12/22	JS

Drawing No: 4217-RAM-XX-03-DR-E-610004

Rev: P02



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THE GEORGE HOTEL
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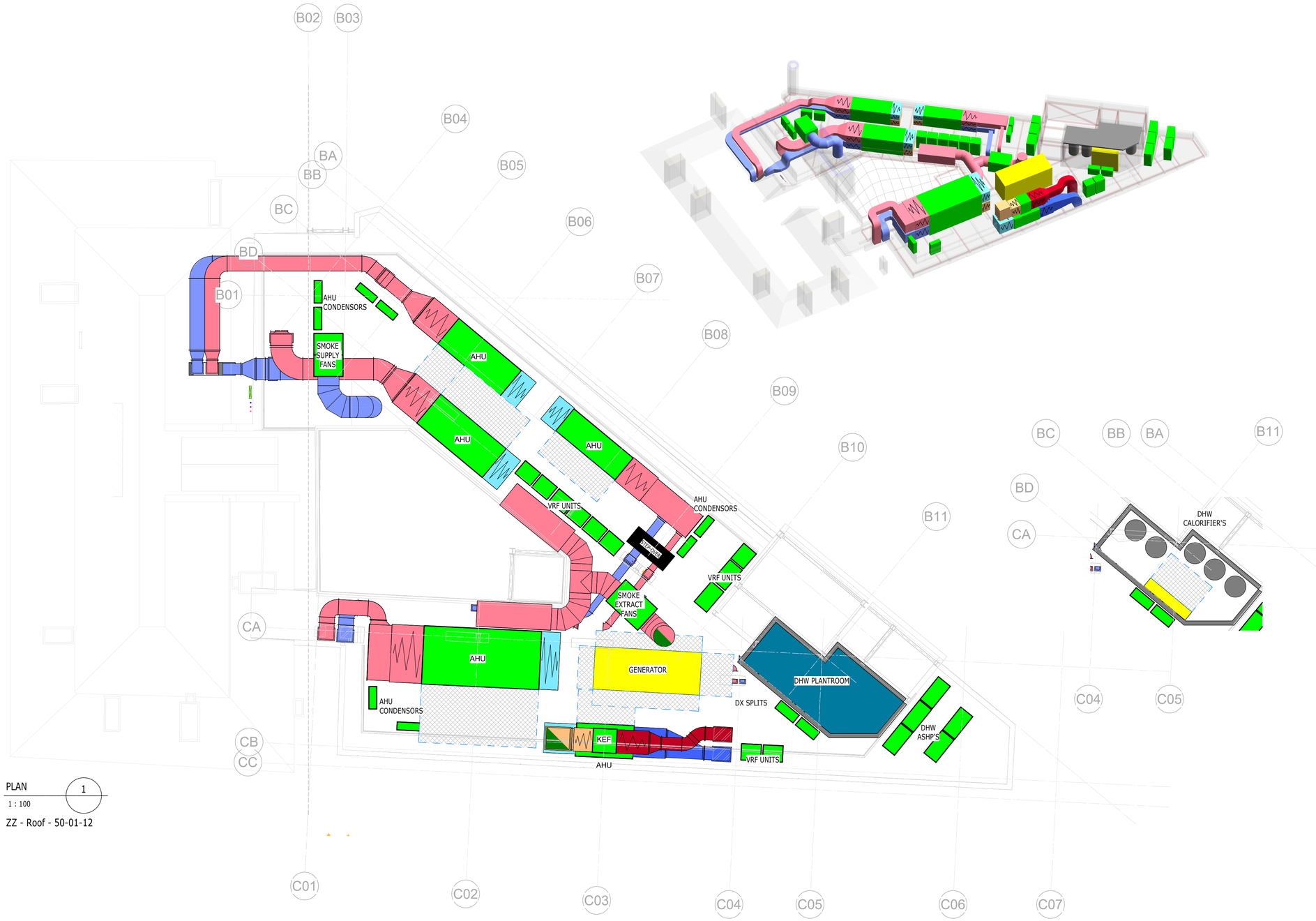
ELECTRICAL SERVICES
LV DISTRIBUTION SYS
GENERAL ARRANGEMENT
LEVEL 04

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	01/12/22	JS

Drawing No:	Rev:
4217-RAM-XX-04-DR-E-610005	P02

Appendix 4 – Roof layout drawing



PLAN 1

1 : 100

ZZ - Roof - 50-01-12

LEGEND

- DISCHARGE AIR
- EXTRACT AIR
- EXTRACT AIR KITCHEN
- INTAKE AIR
- SUPPLY AIR

NOTES

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COMBINED DETAIL
GENERAL ARRANGEMENT
ROOF PLANT

Project No:	Scale (@ A1):	Date:	Drawn:
1620008662	1:100	16/11/22	JH

Drawing No: 4217-RAM-XX-RF-DR-ME-500112

Rev: P01