1.3 DESCRIPTION OF THE WORKS AND DESIGN CRITERIA

1.3.1 Building Structure and Fabric

Information provided by AEW, the Architects

The building is a twin span curved roof portal frame with built-up insulated metal cladding on a secondary metal frame carrier system to the external walls and roof. Insulated precast concrete walls surround the docks with precast concrete retaining wing walls to the dock pit.

Curtain walling with automatic sliding door is proposed to the main entrance with windows at ground and first floor. Insulated sectional panel doors are proposed to industrial loading areas with insulated steel fire escape doors elsewhere.

The first floor and pant deck are a composite concrete and metal decking system. The compartment wall between the offices and core, and the warehouse is a proprietary insulated and fire performing modular panel system spanning from ground floor to the underside of the roof. All other internal walls will be British Gypsum metal frame stud systems.

The primary internal stair is a precast sectional stair around a precast concrete lift shaft. The secondary stair and ships ladder to the roof are steel. Key clamp handrails are proposed for edge protection to the plant deck and for handrails to the secondary stair and ships ladder. Lockable gate prevents unauthorised access to the Plant Deck and to the roof via the ships ladder.

Information provided by BWB, the Civil and Structural Engineers

Sub Structure

Foundations – these are pad bases to the main steel frame founding in the vibro improved ground. The ground bearing pressure used for the foundations was 150KN/m2.
Ground slab is ground bearing.

Superstructure

General description – The single bay portal framed envelope is on an 8m grid with two spans of 27.3m. The width of the building is therefore 55 and the overall length is 75m. Height to underside of haunch is 12.0m.
Floors – The office upper floor is of composite metal decking/concrete construction supported directly off the steel frame.
Structural design loadings – these are all in accordance with the Employers requirements specification:

Roof services	=	0.25KN/m2 (overall 0.37KN/m2 incl PV allowance)
Floor imposed (offices)	=	4.00KN/m2
Partitions	=	1.00KN/m2
Floor imposed (plant deck)	=	7.50KN/m2

Roof Drainage

The roof drainage system is a siphonic drainage system with primary and secondary systems. The system was designed by West Siphonics in accordance with the relevant reports and British standard BS EN 12056-Part 3:2000. The building has category 3 classification with 25 years building life.

1.3.2 Building Services

Information provided by GAC, the Mechanical Designers

The following design parameters shall be employed in the carrying out of all design works.

External

Winter

As per CIBSE Guide A table 2.5 for external temperatures not exceeded for more than 0.4% of year (use the 99.6% not exceeded column)

Summer
Based on Geographical location. As per CIBSE Guide A table 2.6 for external temperatures not exceeded for more than 0.4% of year (use the 99.6% not exceeded column).

Internal

Office and Hub Office	21°C ± 2°C winter / summer 23°C ± 2°C
Toilets	19°C ± 2°C
Stairs	18°C ± 2°C
Frost	12°C ± 2°C

Occupancy

Offices	1 person / 7.5m²
Meeting Rooms	1 person / 7.5m²

Ventilation

Offices	12 litres/sec/person
Toilets	10 ac/hr (extract)
Tea Rooms & Kitchenette	10 ac/hr (extract)

Infiltration

Offices	1 ac/hr

Noise Criteria

Offices	40 – 45 dB Laeq 20
Toilets	45 – 50 dB Laeq 20
Plant Room	NR50
External	NR65 at 1m

Domestic Water Services

Flow Velocity

Small Bore Pipework: <1.0m/s
15-50mm Pipework: 0.75 – 1.15m/s
>50mm Pipework: 1.25m/s – 3.0ms

Pressure Drop

Calculated according to the available head on the system and as required to give correct flow at terminal outlets and the avoidance of below atmospheric pressure conditions in return circuit.

Where applicable the mechanical services design will be developed, and the equipment will be sized, to accommodate future fitout of the under croft with a combination of welfare / lockers / canteen facilities. Pipework and ductwork will be formatted to allow for the easy addition of such facilities by the occupier.

INSTALLED WORKS - EXTERNAL SERVICES

Gas Services
A new 90mm MDPE gas service has been taken from the incoming services location within the Warehouse area of Unit 3 to the site boundary where it has been left capped off for future connection.

At the incoming service location, the 90mm MDPE adapts to 80mm steel below ground before rising above ground into the warehouse. The incoming service is provided with purge valve and emergency control valve. The pipework has been left with blank flange for future connection.

Domestic Cold-Water Services
A new 63mm MDPE water main has been installed to the site from the main road to the site boundary. This main terminates with water meter and isolating valve provided by the water authority on the boundary.

From the outlet of the water authority water meter 63mm protecta-line pipework is installed to the incoming service location within the warehouse, all pipework being laid below 1000mm from the finished ground level and surrounded by sand for protection. A major water leak detection meter has been installed at the water authority meter position.

At the entry point to the building the protecta-line pipework converts to 42mm Copper, the incoming service is complete with stopcock, double check valve, draincock, water leak detection meter, isolation valve & water leak detection solenoid valve. A water conditioner has been installed on the incoming supply in the warehouse. From the water conditioner the pipework rises to serve equipment on the plant deck and services on the ground and first floors.

Controls
The following water meters have been supplied complete with pulsed output units which are connected to the Building Management Control Panel and utilised for logging purposes:

- Boundary Water Meter (Shippers)
- Boundary Water Meter (Leak Detection)
- Main Office Water Meter in Warehouse (Leak Detection)
- Rainwater Harvesting System top up water meter (Plant Deck)
- Hot water meter (Plant Deck)

MAIN OFFICES HEATING SERVICES

Heating to the First-Floor offices is provided by VRV air conditioning system.

A low temperature hot water radiator heating system has been installed to serve ancillary areas on the ground and first floors.

The main plant consists of an air to water hydrobox unit located on the plant deck. Pipework from the hydrobox unit feeds a low loss header from which the following circuits are taken

a) Constant Temperature Circuit to the radiators on the Ground and First Floors and frost coil of the Air Handling Unit
b) Constant temperature circuit to the domestic hot water cylinder

A dosing pot has been installed between the Hydrobox unit and low loss header

LPHW is circulated around the radiator circuit via a single head circulating pump.

Water treatment chemicals have been added to the LPHW heating system to inhibit the growth of microbiological organisms, limit the buildup of scale and prevent corrosion all in accordance with BS 7593:2006

The main distribution pipework serving the radiators has been concealed within ceiling void, service risers and walls wherever possible.

All pipework has been thermally insulated to BS5422.

The radiators are of the standard or ceiling LTHW radiant panel type. Radiators are provided with thermostatic radiator valves fitted to the flow pipework and lockshield valves fitted to the return for each radiator.

Controls
The heating is monitored and controlled from the BMS Control panel located on the plant deck

The LTHW pressurisation unit is permanently powered from the BMS Control Panel and operates under the dictates of its own integral controls.
The pressurisation unit common fault is monitored by the BMS and is also indicated on the control panel fascia.

VENTILATION SYSTEMS

General Supply & Extract Ventilation Systems

Supply and extract ventilation are provided by a packaged air handling unit (AHU01) as manufactured by Mansfield Pollard and is located on the plant deck.

The unit is provided with insulated fresh air intake which have been connected to a fresh air plenum box mounted to an external weather louvre (L1.01) c/w bird mesh grille which is integrated with the building façade.

The unit is provided with exhaust air ductwork which travels through the plant deck at high level and rises up and connect to a roof cowl.

Supply ductwork from the air handling unit is routed through the plant deck into the first-floor offices ceiling void with branches taken off terminating to ceiling mounted supply air diffusers as denoted on the record drawings.

The return air to the air handling unit is via ductwork installed within the first-floor ceiling void terminating to ceiling mounted extract grilles as denoted on the record drawings.

Attenuators have been installed immediately before and after the air handling unit to ensure noise levels within the space are within acceptable levels and specification.

The system is complete with all necessary VCDs for balancing purposes.

All penetrations through the offices fire compartments are fitted with standard fusible link type fire dampers and are complete with access door.

The air handling unit is provided with a frost coil fed from the LTHW C.T radiator circuit

All ductwork has been installed to the requirements of DW144

Controls
The air handling unit operates from its own integral control panel and interfaces with the BMS control panel located on the plant deck.

The air handling unit operates on a fixed time basis.

The air handling unit is interlocked with the fire alarm system and will be disabled when the fire alarm system is activated.

Ground & First Floor Toilet Extract Ventilation

Toilet extract ventilation is provided via a twin fan extract fan unit (EF1.01) located on the plant deck and is as manufactured by Systemair.

Exhaust ductwork from the extract fan is routed through the plant deck at high level and connects to the air handling unit general exhaust ductwork.

Extract ductwork is routed through the plant deck into the first-floor offices ceiling void and service risers to the ground floor with branches taken off terminating to ceiling mounted extract air valves as denoted on the record drawings.

Final connection from ductwork to air valves is via flexible ductwork

The system is complete with all necessary VCDs for balancing purposes.

All penetrations through fire compartments are fitted with standard fusible link type fire dampers and are complete with access door.

Attenuators have been installed immediately before and after the extract fan to ensure noise levels within the space are within acceptable levels and specification.

Cross talk attenuators have been installed as required to the ductwork system between WC walls on the first floor as denoted on the record drawings.

All ductwork has been installed to the requirements of DW144.

Controls
The twin fan extract fan is connected to its own controller with auto changeover panel which provides fan rotation and change over operation on fan failure. The fan is also connected and controlled from the BMS control panel located on the plant deck.

The system is interlocked with the fire alarm system and will shut down on fire alarm activation.

AIR CONDITIONING & COMFORT COOLING

First Floor Offices

The first-floor offices are served with the installation of a variable refrigerant volume refrigeration system capable of providing simultaneous heating and cooling to the space.

The VRV fan coil units have been installed within the ceiling void.

The VRV fan coil units comprise of an air filter, heat exchange coil, centrifugal fans, drain pan and removable underside access panel.

A BS branch controller has been installed located on the plant deck which is connected to an external condenser unit via refrigeration pipework.

Refrigeration pipework is taken from the BS branch controller to feed each fan coil unit. The branch controller determines whether heating or cooling is provided from the fan coil.

Conditioned air is delivered into the areas via supply air ductwork which travels from the fan coil units and terminates onto swirl air diffusers mounted within the suspended ceiling as denoted on the record drawings.

All ductwork has been installed to the requirements of DW144 and is thermally insulated to BS 5422 and identified in accordance with BS 1710.

Fresh makeup air is delivered the rear of the fan coil units by ductwork terminating onto swirl return air grilles all as denoted on the record drawings

Final connection from ductwork to supply diffusers or return air grilles is via flexible ductwork

A condenser unit is connected to the branch selector and fan coil units and is located in the ground floor external condenser compound.

All refrigerant pipework has been installed utilising soft/medium drawn copper tubing and is complete with the appropriate headers and joints, and is insulated with a closed cellular foam insulation to prevent heat loss and heat gain and is also vapour sealed to prevent the formation of condensation on the pipe surface in accordance with BS EN 378:

u-PVC condensate pipework has been installed within the ceiling void and connects to all indoor units. The condense drains terminate with 32mm Hepworth HepVo dry traps to local soil stacks.

Controls

The VRV indoor units are provided with temperature sensor & individual controller mounted within the area as detailed on the record drawings and are connected and controlled from a central I-Touch control panel located in the BMS Control Panel located on the plant deck.

The system is interlocked with the fire alarm system and will shut down on fire alarm activation.

The I-Touch control panel provides the user but is not limited to the following functions

- Run & Stop Operation
- Set Time and Date
- Set Up Timers for individual zones / groups
- Changing temperature set point
- Alarm Monitoring

DOMESTIC WATER SERVICES

Cold-Water Services

A new 63mm protecta-line cold water main enters the building within the ground floor warehouse and is complete with stop cock, double check valve, draincock, water leak detection water meter linked to the energy monitoring control panel, isolation valve and water leak detection solenoid valve. From this incoming location, the mains cold water adapts to 42mm copper. A water conditioner has been installed on the incoming supply in the warehouse. From the water conditioner the pipework runs within risers and ceiling voids to serve the following

- Rainwater Harvesting System combi unit on the plantdeck
- Mains cold water feed to the LPHW expansion vessel on the plant deck
- Mains cold water feed to the hot water cylinder on the plant deck
- Shower, WHB's and sink outlets on the Ground and First floors

All WHB and Sink outlets are complete with service valves.

To assist in BREEAM credit collection toilet PIR detection is fitted to each space and linked to two port control valves, on detection the valves will open to allow water to fill cisterns and basins, during periods without occupation the valves will remain closed.

All pipework where concealed, within voids and risers is fitted with phenolic thermal insulation with identification applied in accordance with the specification.

Rainwater Harvesting System

A rainwater harvesting scheme has been installed to serve the following areas:

- Main Offices WC appliances on the Ground and First Floors
- External bib tap

Rainwater is collected at roof level and connected via the gravity downpipes to the inlet of a 5,000-litre external underground rainwater storage tank located adjacent the Warehouse.

The water discharges into the storage area of the tank through an inlet calmer. Any rainwater discharged into the tank whilst full will be diverted to drain from a tank connection.

The pump chamber of the tank is fitted with a 600mm diameter access turret for on-going maintenance and inspection. The system is provided with a twin pump booster set (Run & Standby) and UV filter.

The main storage chamber is fitted with an overflow to discharge excess water to drain and encourage the removal of floating particles within the tank.

The system is complete with an automatic controls system to monitor and control the entire rainwater system, all floats, pumps, micro switches and solenoid valves are wired back to the control unit located on the plant deck.

From the pumped discharge isolating valve copper pipework distributes within service risers and ceiling voids to serve all sanitary appliances on the Ground & First floors with service valves fitted within 300mm of the appliance.

All pipework where concealed, within voids or risers is fitted with phenolic foam thermal insulation with identification applied in accordance with the specification.

To assist in BREEAM credit collection PIR detection is fitted to each space and linked to two port control valves, on detection the valves will open to allow water to fill cisterns, during periods without occupation the valves will remain closed.

Controls

The Rainwater harvesting system is a packaged unit complete with inbuilt controls and will be available for continuous automatic operation. The control panel is monitored via the BMS for faults and an alarm will be initiated on a rainwater harvesting system alarm condition.

The UV filter is monitored by the BMS for a fault status that is also indicated on the control panel fascia

Hot Water

Domestic hot water is provided from a VRV Hydrobox air to water heat pump system as manufactured by Daikin and a solar panel system incorporating a 300-litre solar twin coil hot water storage cylinder as manufactured by AO Smith and is located on the plant deck, The Hydrobox unit is interconnected to the VRV condenser unit.

Hot water flow & return pipework is installed from the hot water storage cylinder within service risers and ceiling voids to all points of draw off, service valves have been installed to all WHB's and cleaners sink outlets within 300mm of the appliance.

TMV3 thermostatic blending valves have been installed to all wash hand basins to limit the hot water temperature to 43°C

The return pipework is fitted with a hot water secondary return pump located on the plant deck

Controls

Water meters have been installed throughout the systems and all are monitored and recorded by the energy monitoring controls.

The hot water system operates when its time zone is active. Once active, the heating is controlled by the BMS to maintain a hot water return temperature of 60°C.

The hot water secondary pump runs continually to circulate hot water around the system and eliminate stagnation.

The secondary pump is monitored for water flow failure on the BMS and the control panel fascia.

The solar heating temperature is monitored by the BMS.

The solar heating system is monitored by the BMS for a fault status that is also indicated on the control panel fascia.

Sterilization

The water systems have been sterilised and chlorinated in accordance with BS6700 and local water company requirements.

BUILDING MANAGEMENT & ENERGY MONITORING SYSTEM

An energy monitoring system, consisting of an intelligent controller and associated interface devices monitor and control the mechanical services.

From this location all pulsed output sub-meters on the water, electricity and future gas meter can be read.

The energy monitoring control panel is located on the plant deck.

ABOVE GROUND DRAINAGE

Above Ground Drainage

The sanitaryware is connected to a vented above ground drainage system comprising uPVC/muPVC vertical soil stacks. The drainage system is vented to atmosphere.

Throughout the system, access points have been provided on all vertical discharge stacks at each floor level and at changes of direction to assist in the maintenance of the system and the clearing of blockages.

The drainage from all sanitary appliances and mechanical equipment has been connected to the above ground gravity drainage system as well as the condensate from air conditioning units.

All sanitaryware is fitted with proprietary traps and the branch pipes have a minimum nominal size of 32mm to washhand basins, 40mm to sinks and 110mm to WC's.

All penetrations above 100mm through floors are fitted with fire collars

Information provided by EBM, the Electrical Designers

The works comprise the fitting out of a Warehouse unit with a two-storey office block with ground floor reception area, first floor office space and warehouse plant deck.

Electrical works include the installation of office power, lighting and fire alarm system, power to dock doors, emergency exit signage to warehouse, external lighting in the car park and mounted to building structure, a PV supply to internal isolator and external power to EV charging and petrol interceptor.

The fire alarm system that has been provided to the office area is a P1 classification and fully automatic and analogue addressable.

External lighting will be installed to the building, including both car park and a yard area.

In summary the following electrical items have been provided to the building.

- LV Electrical Distribution
- Office Lighting / Emergency Lighting
- Warehouse Emergency lighting
- External Lighting
- Office Small Power
- Warehouse Dock Door Supplies
- EV charging
- Earthing and bonding
- Fire Alarm (Office only)
- Disabled Refuge Alarm
- Disabled Toilet Alarm
- Lightning Protection

1.3.3 Site Works and Infrastructure

Information provided by AEW, the Architects

The perimeter path around the building is concrete with a gravel margin adjacent to the building. Immediately outside of the main entrance, the surface finish is precast concrete block.

Yard areas are proposed as in situ concrete with tarmac to the site entrance bellmouth and the car park gangway. Car parking spaces will be precast block paving.

A king post retaining system is proposed to the north-west section of the yard with all other retaining on the eastern and southern boundary to be precast flags on edge.

Soft landscaping will be as Approved under the Planning Application.

Information provided by BWB, the Civil and Structural Engineers

Surface Water Drainage

The primary roof drainage is siphonically drained and collected in manholes as identified on the layouts and discharged into the main drainage network. The service yard and on-site road infrastructure are collected by slot drains and kerb drainage and discharge to a carrier system.

The service yard and car park drains through a full retention interceptor prior to discharge from site.

All surface water discharges to private drainage systems within the site access road, which then utilise the Unit 2 pump station to convey flows to the United Utilities sewer in Great Bank Road to the south-west of Unit 3.

In accordance with BS EN 752 Part 4 the underground drainage system is designed for a 1 in 1 year storm frequency with no surcharging and for a 1 in 100 year storm + 40% climate change with some surcharging and no flooding.

Hydraulic design parameters and global variables

- Drainage calculations have been completed on MicroDrainage software.
- Parameters based on “Modified Rational Data” for simulation.
- Rainfall: Storm intensities based on the Flood Studies Report approach.
- Design Return Period: 1, 30 and 100 years.
- Climate Change: 40% on the 100-year event.
- M5-60: 19.0mm
- Ratio ‘r’: 0.316
- Volumetric Runoff coefficient: 0.75
- Global time of entry: 1 min for siphonic downpipes. 5 mins elsewhere.
- Infiltration: None allowed for
- Backdrops: None present in the surface water system.
- Depth: varies throughout
- Surcharge: No surcharging of pipes during 1:1 year event, where practicably possible.

Foul Water Drainage

The foul drainage serves the office, welfare facilities and the bin store. Foul drainage has been designed in accordance with Building Regulations Approved Document H and BS EN 752.

Foul drainage discharges into existing United Utilities foul sewer in the highway to the southwest of the site.

External Yard

The external yard slab is 190mm thick reinforced concrete slab, jointed and cast in compliance with The Concrete Society Technical Report No. 66.