1.3 DESCRIPTION OF THE WORKS AND DESIGN CRITERIA

1.3.1 Building Structure and Fabric

Information provided by UMC, the Architects

Construction of 1No. new logistic building and associated offices measuring:

67,587ft² / 6,279m² internal warehouse area with 9,443ft² / 877m² office; 12.5m to haunch, with the external envelope comprising of a built-up cladding system, curtain walling, and feature cladding areas. 5 no. dock levellers, and 2 no. level access doors are provided. Fire exist are provide in accordance with BC and the Fire Engineers requirements, internal fit out includes lift, WC, including accessible WC and shower, a small kitchenette is also provided to the upper floor office area. A main staircase and a secondary one are also provided, with both stairs receiving companion ladders extending to the roof to provide safe roof access. All internal amenities receive floor, wall and ceiling finishes, a M&E fit out is carried out by others. 2nd floor is used as a plant area, with access from stair 1.

The unit has dedicated car parking, including 20% EV charging, with the facility for 100%, secure service yards, cycle shelters and a sub-station, new landscaping is provided by others, along with new pedestrian and cycle access to all the unit.

BREEAM Excellent is sort for the scheme.

Information provided by Burrows Graham, the Civil and Structural Engineers

The single unit comprises a two span single storey portal frame structure providing approx. 80,000 square feet of internal space. A two storey office/plant structure sits within the overall footprint to the south of the unit and consists of steel frame with composite concrete/steel floors.

Stability is provided by portal action in one direction and by means of vertical braced bays in the other.

The unit is typically finished with lightweight cladding systems to roof and walls, with small areas of curtain walling.

The unit has been designed to sustain the following loads:

Roof: 0.6 kPa imposed load, 0.25 kPa service load and 0.15 kPa PV panel loading.

Office/upper floors: 4.0 kPa imposed load, 1.0 kPa partitions load, 0.5 kPa raised floor load, 0.25 kPa ceiling load and 0.25 kPa services load.

The frame is supported on reinforced concrete pads. These bear at shallow depth onto ground that has been treated via Vibro Stone Columns to achieve an allowable bearing pressure of 150 kPa.

Owing to variable external ground levels there are areas that utilise retaining walls on the line of the building. These are precast walls that are supported on reinforced concrete foundations.

The warehouse slab is ground bearing in nature and is to be designed to sustain the following loads:

UDL = 50 kPa (SLs), Raking leg load = 90kN (SLS), at minimum 300mm spacing.

1.3.2 Building Services

Information provided by WM Building Services Ltd, the Mechanical Services

Information provided by Walter Miles Electrical Engineers Ltd, the Electrical Designers

1.3 Description of the Works and Design Criteria

1.3.2 Building Services

MAIN OFFICES

HEATING

The offices are provided with heating and hot water from a monobloc style air source heat pump system, the refrigerant compressor circuit is all contained in the condensing unit located in the compound externally and generates hot water up to 58°C flow temperature with a differential of 5°C.

The heat pump is fitted with safety valve and all associated controls with flexibles connections to the flow and return pipework, connection set includes isolating valves and bypass flushing loop.

Copper pipework adapts at low level to pre-insulated flexible twin pipework is installed on refrigeration tray and rises vertically to the second-floor plantroom.

A single head wall mounted inline electronic heating pump is fitted on the heating flow to serve the following circuits:

- Constant temperature circuit serving hot water upper coil.
- Radiator single zone circuit.

Each pump is mounted on wall supports. The pump suction pipe is fitted with isolating valve, test points, pressure gauge, and flexible connection with the discharge pipe incorporating flexible connection, pressure gauge, test point and isolating valve.

The heating flow is fitted with diverting control valve with priority control to the hot water system to divert full heat to the hot water coil to ensure quick recovery.

The hot water upper coil connection is controlled from the ASHP interface control board and BMS, a standard valve arrangement consisting of isolating valve, commissioning valve on return & draincock to lowest connection.

The constant temperature radiator circuit is optimised to ensure the occupied space is at the correct temperature at the set time period. This pump set is electronic and will reduce speed to accommodate the closing of thermostatic radiator valves. Automatic bypass valves are fitted to ensure the minimum pump volume is always available and system extremities are always circulating.

A quick fill loop with isolating valves and double check valve is fitted on the heating return to allow the system to be filled and topped up, the loop is disconnected on commissioning and it should be noted that the system contains 20% by volume glycol to protect against freezing and any system top up should therefore also include the checking and top up of glycol.

A 6-litre chemical dosing pot is installed and linked across the heating flow and return and 25mm flushing valves installed to the main headers to enable circuit flushing and cleaning prior to commissioning.
The office and core area toilets, stairs and circulation spaces to the first floor are served from the ASHP heating circuit, commercial quality steel flat panel style radiators with top and side grilles are fitted to all areas, disabled toilets are provided with low surface temperature type.

Isolating valves and commissioning valves have been installed to the systems to enable ease of isolation and draining for maintenance.

Thermostatic radiator valves are fitted to all radiators to allow localised temperature trimming.

MAINS COLD WATER SERVICES

A new MDPE protectaline cold water main enters the building within the riser to the main offices and terminates with isolating valve, double check valve, drain cock and leak detection check meter. From this incoming location the mains cold water adapts to copper.

Mains cold water services pipework distributes within the office ceiling voids and risers to serve the following equipment/systems:

- General Plantroom equipment including pressurisation units.
- Office toilet areas
- Hot water cylinder inlet
- Rainwater harvesting make up.

The hot water heater serving the offices is provided with metered mains cold water to the cold-water inlet of the cylinder, the connection is fitted with manufacturer's proprietary unvented kit consisting of expansion vessel, pressure relief valve, isolating valve, check valve and pressure reducing valve.

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.

Mains cold water pipework is installed to all outlets with service valves within 300mm of the appliance.

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

RAINWATER HARVESTING SYSTEM

A rainwater harvesting scheme is to be provided to the following areas:

- Main Offices sanitary appliances

The general principle is that rainwater is collected at office roof level and connected via the gravity downpipes to the inlet of a 5000-litre underground rainwater storage tank provided with leaf filter to remove larger heavier particles within the rainwater disposal system.

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

The pump chamber of the tank is fitted with a 600mm diameter access turret and the filter with a 600mm diameter access turret and standard duty cover for on-going maintenance and inspection. The storage chamber access manway provides access to twin pump set, level sensors and the connection of MDPE pipework to the pump. The pump is provided with check valve and floating suction 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 pump discharge water via Black/green striped MDPE to the office entry location within main office riser, from this point the MDPE converts to copper tube with isolating valve and rises to second floor plant room.

The system is complete with automatic controls system to monitor and control the entire rainwater system, all floats, pumps, micro switches and solenoid valves are wired back to this combination unit in the plantroom, rainwater and make up water check meters linked to the BMS are fitted at this location.

The system is a pressurised system which incorporates a one piece 225 litre header tank for the internal storage of rainwater within the processing unit. The below ground inlet pipework is piped to an open connection on the header tank which discharges recovered rainwater into the tank a float valve is incorporated which under control of a solenoid valve will allow mains water make up under the dictates of the micro switch within the header tank, a single booster set is contained within the combination unit for pressurised discharge.

From the pumped discharge connection isolating valve copper pipework distributes to the offices ceiling voids to serve all sanitary appliances on all floors with service valves within 300mm of the appliance.

Proximity 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.

All pipework conveying recovered rainwater is insulated and identified clearly as rainwater and not for drinking, all cisterns with be fitted with labels to identify the water serving them is from a non-drinking water supply.

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

HOT WATER SERVICE

Located in the second-floor plant room is the domestic hot water system, this system serves the following areas/systems:

- Offices general domestic hot water service

The offices are provided with a single vertical indirect hot water cylinders with two coils connected to the solar thermal acting as pre-heat/buffer section of the cylinder and the other to the ASHP heating system via three port control valves to maintain hot water flow temperatures with priority to hot water recovery. Additionally, a 3-kW electric immersion is fitted in the cylinder to lift the temperature to 62°C and controlled from the ASHP interface board and BMS.

The hot water cylinder is provided with lower solar heating coil and upper high gain air source heat pump coil with larger surface area for lower operating temperatures, control sensors, thermometer, isolating valves on flow, return and cold-water inlet, drain valve, temperature and pressure relief valve, manufacturers unvented kit including pressure relief valve, pressure reducing valve, non-return valve and expansion vessel sized to accommodate hot water expansion during heat up, insulating jacket and casing. A cylinder circulating pump is provided and linked to the flow from the hot water cylinder to ensure the complete volume of the cylinder is raised to high temperature one a week to reduce risk of legionella infection.

The hot water cylinder is designed to maintain 60°C flow conditions with a single head bronze secondary hot water circulator fitted on the common cylinder return pipework to maintain a return water temperature of 55°C. To ensure hot water is provided to the draw off without delay lengths of uncirculated pipework is kept to a maximum of 3m for unblended water and 2m after blending valve installation. Thermal balancing valves are incorporated at return connections to balance the system to ensure temperature differential is maintained.

The hot water pump is provided with isolating valves on suction and discharge, non-return valve and 100mm diameter pressure gauges and gauge cock.

An external solar array consisting of 2No flat panel collectors are located externally on the warehouse roof and linked to the plantroom with pre-insulated aluminium flexible pipework and extended to the lower coil of the indirect hot water cylinders. An ultrasonic heat meter is fitted on the solar thermal pipework connections to report back to the automatic control system.

The solar system is fitted with pumping station consisting of single head pump, expansion vessel, safety valve and appropriate controller and sensors. The solar system is intended to be the primary source of hot water generation with the ASHP system used to ensure the water is raised to operating conditions when leaving the cylinder.

The copper pipework to the offices runs at high level within the plantroom to the first-floor office ceiling void and distributes to all outlets as required. Thermostatic blending taps are incorporated on hot water outlets to disabled and standard wash basins. Cleaner's sinks, tearoom sinks are supplied with unregulated hot water, service valves are fitted within 300mm of the appliance or associated blending valve.

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

PUBLIC HEALTH SERVICES

The public health installation is installed throughout the building to collect the soil and waste from each sanitary appliance. The installation shall also prevent the transmission of foul air into the building. Ventilated stacks and branch pipes are installed throughout the floors and shall discharge to atmosphere with bird cage or be fitted with air admittance valve within the void.

All appliances discharge foul water into stacks installed to concealed locations within IPS or voids etc, each stack is fitted with an inspection cover at 1.0m A.F.F.L. on each floor. Fire collars are fitted where the P.V.C. pipework passes through fire compartments.

The soil and waste pipework is grey UPVC soil pipework and white MUPVC waste pipework all manufactured by Polypipe Terrain and solvent welded throughout.

VRF HEAT PUMP

The ground floor reception first floor offices are serviced with the installation of a Daikin variable refrigeration volume air conditioning system with heat recovery. Three systems are installed in total as below:

- System 1 – Ground floor & first floor offices (Part)
- System 2 – First Floor Open Plan Office (Part)

The VRF air conditioning systems have the flexibility to provide heating and cooling simultaneously to all units, which means that two adjacent spaces can be operated differently at any one time due to the incorporation of solenoid valve kits to the system.

Condensers are sited externally to the main offices in the condenser compound and are charged with R32 refrigerant gas which when activated pumps the refrigerant around the systems to a series of solenoid valve kits via refrigerant grade pipework insulated with class O Armaflex on galvanised metal tray. The solenoid valves are energised in the correct sequence to give heating or cooling within the dedicated space.

The indoor evaporator elements of the system are all ducted fan coil units concealed within the ceiling void or wall mounted unit to the reception. This equipment contains the evaporator coil, filter, and fan. The fan coil fresh air is supplied to the rear of the fan coil or to grilles within the space via galvanised sheet metal ductwork.

From the fan coil discharge plenum secondary air insulated galvanised ductwork & flexible ductwork is extended to swirl diffusers where ceilings are installed with swirl size selected to ensure correct throws and terminal velocities.

Open swirl diffusers are to be used for extracting vitiated air into the ceiling plenum and then to the filtered rear of the fan coil unit.

The diffusers are fitted with galvanised plenum boxes with side entry spigots and connected to galvanised ductwork with flexible insulated ductwork a maximum of 500mm long. All plenum boxes on conditioned supply air are provided with acoustic and thermal lining internally.

All the indoor units are connected via a two-wire control cable to a central controller mounted on the plant room BMS panel facia, this allows each individual unit to be addressed and controlled independently. All indoor units are fitted with return air sensors mounted within the filter section of the fan coil; room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

PVC condense pipework is installed within the ceiling void and connects to all indoor units the unit drains are either pumped from an integral pump. These condense drain terminate with 32mm Hepworth HepVo dry traps to local soil stacks.

DX Cooling & Heating

The main offices for the purposes of supply air tempering is provided with DX heating/cooling coil within the AHU.

The condenser are sited externally to the main offices in the condenser compound and are charged with R32 refrigerant gas which when activated pumps the refrigerant around the system to the DX coil in pipework insulated with class O Armaflex on galvanised metal tray.

The condensers operation is via the BMS to enable and modulate its operation according to off coil and internal conditions using expansion valve and interface fitted to the coil.

Copper condense pipework is installed from the DX coil in copper pipework and discharges over floor gully.

OFFICES SUPPLY & EXTRACT VENTILATION

The office is provided with supply and extract ventilation by a heat recovery air handling unit mounted internally on the main plantroom.

The air handling units incorporates the following equipment:

Supply Side	-	Motorised air inlet damper.
	-	G4 Pleated panel filter c/w access
	-	F7 Rigid Bag Filter c/w access
	-	Plate Heat Exchanger
	-	Supply fan c/w access.
	-	DX Cooling/Heating Coil
	-	Discharge spigot.
Extract Side	-	G4 Pleated panel filter c/w access.
	-	Extract fan.
	-	Plate Heat Exchanger c/w Bypass Damper
	-	Motorised air exhaust damper

The air handling units are provided complete with electrical wiring to isolators with construction from double skinned insulated panels on a channel frame, access panels are fitted to all locations requiring regular access.

Exhaust air ductwork extends from the unit to connect to external louvre on Southwest elevation with fresh air inlet to a louvre on the Southeast Elevation.

The supply and extract ductwork from the unit connections runs at high level in the plantroom to enter the first-floor ceiling void through white wall with branch to ground floor through riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices fire compartments are fitted with standard fusible link fire dampers and access door to damper dependant.

The units are provided with comprehensive control and monitoring facility to the unit, all control items are fitted and wired on the unit and the complete system is interfaced with the building management system.

Temperature control of the air handling units is achieved via the building management system which under the dictates of a temperature sensor located in the supply air duct will modulate in sequence the face and bypass damper and DX cooling/heating coil to maintain the required temperature conditions supplied to the space.

All main branches are to be fitted with opposed blade volume control dampers for regulation, branches to terminals are fitted with single blade volume control dampers where necessary.

The supply air is discharged into the spaces through the ceiling void with tempered air then discharged into the space through the rear of the fan coil units.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible un-insulated and un-insulated ductwork a maximum of 500mm long. Where required the supply diffusers are provided with blanking plates or reduced neck boxes to ensure the correct throw and distribution of air within the space.

The return air to the air handling unit is from the void above the occupied space, ductwork fitted with multiple low velocity bell mouth terminations open in the void again using the plenum as a return air path draw air into the ductwork distribution system and back to the plantroom.

To affect the free passage of air from the space into the void swirl diffusers are used with sufficient free area to ensure an unrestricted path into the void.

All plantroom, riser, and ceiling void supply, return air and fresh air ductwork is fitted with 25mm mineral wool thermal insulation with identification applied to insulated and un-insulated ducts in accordance with the specification.

TOILET EXTRACT VENTILATION

The office core area toilets and cleaner's room are provided with supply air from the primary ventilation plant and extract ventilation from a dedicated twin extract fan mounted within the second-floor plant deck.

The toilet extract system consists of a series of circular extract valves to the core area toilets on all floors connected via galvanised extract ductwork distribution system. A twin direct drive fan set with auto-changeover controls, back draught shutter and BMS interface is fitted internally and supported on anti-vibration mountings.

The exhaust air ductwork is extended to connect onto the exhaust air common louvre in the Southwest elevation.

The toilet extract ductwork from the unit connections runs at high level in the plantroom to enter the first-floor ceiling void through white wall with branch to ground floor through riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

Penetrations through the offices fire compartments are fitted with standard fusible link fire dampers and access door to damper.

The fan is fitted with an integral auto-changeover panel which indicates the fan running and activates the automatic changeover with fault indication to the building management system.

All main branches are to be fitted with opposed blade volume control dampers for regulation, branches to terminals are fitted with single blade dampers where necessary.

SITE WIDE

NATURAL GAS INSTALLATION

Within the base build works a new low pressure gas supply has been extended to within the site boundary. From this point the gas supply connects to a new gas meter & governor externally.

From the outlet of the meter steel pipework is extended through the gas meter kiosk floor slab and into the ground where it adapts to MDPE. A low-pressure site wide MDPE main is installed to the building, MDPE pipework is extended to the building entry locations where it adapts to steel below ground rises above ground into the building.

At the Incoming entry the point into the building the gas incoming locations has been fitted with purge valve, additional emergency control valve and de-commissioning valve.

WAREHOUSE

At the entry point to the main office's entry point on gridline B1/3 the gas is fitted with 40mm purge valve, 80mm additional emergency control valve & 40mm purge de-commissioning valve.

The 80mm gas is blanked and valved at low level for future fit out extension.

DOMESTIC MAINS COLD WATER SERVICES

A new blue protectaline 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 meter Blue protectaline pipework is installed to all the incoming locations around the building all pipework being laid below 750mm from the finished ground level and surrounded by sand for protection.

At each entry point of entry to the building a stopcock, double check valve and draincock are fitted, a leak detection meter linked to the leak detection panel and pulsed output water meter linked to BMS is provided to the areas detailed below:

The following locations are served from the site wide domestic water main:

Main Office Riser – Leak detection meter & alarm fitted.

The following criteria forms the basis of the design for the mechanical services:

External Design Temperatures for plant selection

Summer Weather File Temperature	28.1°C dry bulb 19.2°C wet bulb
Winter Weather File Temperature	-3°C dry bulb -3.6°C wet bulb
Summer Condenser External Temperature	35°C dry bulb
Winter Condenser External Temperature	5°C dry bulb

Internal Design Temperatures

Offices	21°C db winter 23°C db summer ± 2°C
Reception	21°C db winter 28°C db summer max.
Corridors, Stairs & Circulation	18°C db winter Uncontrolled summer
Toilets	19°C db winter Uncontrolled summer
Stores/Cleaners	16°C db winter Uncontrolled summer
Warehouse	10°C db winter (for office calculations) Uncontrolled summer (for office calculations)

External Infiltration

Offices/Breakouts	1.0 air changes per hour

Occupancy

Office	1 Person/7.5m^2
Cellular Office	1 Person/4.5m^2

Heat Gains

Occupants	As IES Software to suit operations
Lighting	15 W/m^2
Power	25 W/m^2

Radiation Solar Load & Sol Air Temperature

As IES Software

Ventilation Rates

Offices	12l/s per person supply/100% Extract
Corridors & Circulation	1 l/s per m2
Toilets	10 ACH extract 8 ACH make up air
Cleaners Stores	10 ACH extract 8 ACH make up air

Noise

External Noise Limit	**NR65 1m from building**
Office	40 – 45 dB Laeq 20
Cellular Offices	40 – 45 dB Laeq 20
Toilets & Access WC	45 – 50 dB Laeq 20
Stairwells	45 – 50 dB Laeq 20
Corridors/Lobbies General	45 – 50 dB Laeq 20
Stores/Cleaners	45 – 50 dB Laeq 20
Plant Rooms	NR 50

U Values

External Walls Office & Warehouse	0.35 W/m^{2}K
Internal Wall Warehouse	0.35 W/m^{2}K
Internal Walls Office	0.67 W/m^{2}K
External Windows/Curtain Walling	1.50 W/m^{2}K & 0.35 G Value
Solid Personnel Doors	1.70 W/m^{2}K
Vehicle Access Doors	0.50 W/m^{2}K
Pro Wall to Docks	0.27 W/m^{2}K
Glazed Personnel Doors External	1.50 W/m^{2}K & 0.35 G Value
Roof	0.23 W/m^{2}K
Ground Floor Slab Warehouse	0.12 W/m^{2}K
Ground Floor Slab Office	0.37 W/m^{2}K
Internal Upper Floor Slabs	1.31 W/m^{2}K

Hot water plant design

Based on CIBSE & IPHE Guidelines	
Hot Water Storage Temperature	62°C
Hot Water Flow Temperature	55-60°C
Hot Water Return Temperature	50-55°C
Disabled Outlet Temperatures	38-43°C Maximum
General Basin Outlet Temperature	55-60°C
Outlet Pressure	1.0bar(g) minimum

Hot water pipework sizing

Based on CIBSE & IPHE Guidelines	
Loading Units	Medium Demand – CIPHE Guidelines
Pipework Velocity	1.15m/s max < 54mm 3m/s max > 54mm
Pipework pressure drop	To Suit Incoming 1.5 Bar Pressure

Cold water pipework sizing

Based on CIBSE & IPHE Guidelines	
Loading Units	Medium Demand – IPHE Guidelines
Pipework Velocity	1.15m/s max < 54mm 3m/s max > 54mm
Pipework pressure drop	To Suit Incoming 1.5 Bar Pressure

Heating System Parameters

Based on CIBSE Guidelines	
ASHP Heating Pipework Temperatures: Primary CT Heating	58°C Flow &53°C Return 58°C Flow & 53°C Return
Pipework Velocity	1.5m/s max
Pipework pressure drop	300Pa/m max

Ventilation System Parameters

Based on CIBSE Guidelines	
Ductwork Plantrooms	6.0 m/s max
Ductwork Riser	6.0 m/s max
Ductwork Main Ducts	5.0 m/s max
Ductwork Branch	4.0 m/s max
Ductwork Terminal Branch	3 m/s max
Louvres	3.4 m/s max Exhaust (Thru Free Area) 3.0 m/s max Supply (Thru Free Area)
Max Pressure Drop – Any Duct Section	1.0Pa/m max

1.3 Description of the Works and Design Criteria

1.3.2 Building Services

Electrical Design Criteria

The Electrical Services design & installation are in compliance with all relevant British Standards & Codes of Practice, IET Edition Wiring Regulations (BS7671), CIBSE Guides, Building Regulations and the requirements of BREEAM.

Lighting

Light levels are accordance with the Specification.

Area	Lux
Office	500
Circulation/Corridors	100
Stairs	150
Cleaners Store	200
Plantrooms/Risers	200
Toilets	200
Reception/Main Entrance	300

Fire Alarm System

P1 system to office areas designed in accordance with BS5839.

Emergency Lighting

Designed to comply with BS5266

Distribution Boards

Sized to suit number of connected circuits plus 25% minimum spare capacity.

External Lighting

Average lighting levels shall be as follows:-

Area	Lux
Service Yard	30
Car Park	10
Staff Entrance	50
Dock Doors	50

Lighting Protection

System in accordance BS EN 62305: 2011

General

The electrical installations completed as part of our scope of works includes the infrastructure, distribution and the electrical installations completed as part of our scope of works includes the infrastructure, distribution and services of the following.

1. HV cabling
2. HV/LV transformer
3. LV tails from transformer to main LV panel
4. Main LV panel boards
5. Installation of local DB's
6. Installation of small power and lighting to the office
7. Installation of warehouse exit door emergency exit lighting
8. Installation of dock door busbar and isolators
9. Installation of P1 fire alarm system to the offices
10. Installation of Disabled refuge system
11. External lighting
12. Installation of power and fire alarm containment to the offices
13. Installation of containment to warehouse
14. Mechanical supplies in the offices
15. Installation of EVC points to car park

LV Supply

The source for the LV supply is a utility Ring Main Unit (RMU) located at the site boundary. The Regional Electricity Company has provided a 500KVA metered HV supply. A client owned HV switchgear panel is located adjacent to the DNO HV switchgear. This comprises of an incoming SE6 switch and 3 No outgoing CET-T2 HV switches. A 185mm triplex HV cable is routed from each of the outgoing HV switches in radial circuits via ducts to the sitewide transformers located as below:

- TX1, 0.5MVA KNAN – located to the right of the office.

LV tails are provided from each transformer to main LV panels. For LV 1 2x1core 300mm per phase and neutral plus 240mm CPC are provided routed through cable trench/ducts.

ONLY PERSONS WITH THE NECESSARY COMPETANCE AND QUALIFICATIONS SHOULD CARRY OUT ANY SWITCHING OR WORKS ON THE SITEWIDE HV/LV SYSTEM.

AN EMERGENCY STOP HAS BEEN PROVIDED BY THE MAIN LV PANEL , WHICH IN THE EVENT OF AN EMERGENCY CAN BE OPERATED WHICH WILL ISOLATE THE SUPPLY TO THE LV PANEL

Main Switchgear and sub-distribution

There is 1 main LV panel located in the Warehouse.

LV1 is located near to Distribution Office 1 at gridline 3/B.

Each panel is floor mounted and has a main switch to isolate the electrical supply to all the outgoings ways. The main LV panels have been electrically rated to suit the load of the transformer and have surge protection units fitted to prevent/reduce potential surge damage caused by lightning protection. The panels are Form 4 type 2, with outgoing MCCB ways to suit the anticipated electrical load and electric meters with both Pulsed and Mod bus outlets fitted to the larger electrical loads.

All outgoing ways are top exit and a 25% spare capacity has been provided for future use

XLPE/SWA/LSZH sub-main cables have been taken from the LV1 panel and secured to cable tray or ladder to feed sub-distribution boards and the dock door busbar.

All outgoing ways have engraved labels to suit the designated circuit.

ONLY PERSONS WITH THE NECESSARY COMPETANCE SHOULD OPPERATE LV MCCB'S or MCB's. NEVER CLOSE A MCCB OR MCB ON LOAD.

LV Small power and distribution.

Office small power.

Dedicated distribution boards have been installed to the offices to provide small power to items such as socket outlet, hand dryers and fused spurs for small load mechanical equipment. Boards have been provided as detailed below.

Office DB2 – Ground Floor Lighting & Power
Office DB3 – First Floor Lighting & Power & Staircase Lighting
Office DB4 – Ground Floor, First Floor & Plant Deck Mechanical Supplies

Socket outlets.
Sockets have been provided throughout the office area on all levels for general purpose / cleaners use. These have been installed at 450mm AFFL and have generally been recessed in to the walls. All general purpose and cleaners sockets are protected by RCD devices and are on their own circuit.

As there is no raised access floor to the ground floor sockets in the ground floor main office open plan office area are within a surface dado trunking with risers to the ceiling void.

Underfloor bus bar.
To allow flexibility for future furniture layouts underfloor bus bars have been installed in the raised access floor areas of the office areas. These bus bars are fed from dedicated supplies from a local board in LSF/SWA cables on cable tray and terminated into the end of the bar, with a clean earth provided for high earth leakage items. 3-way floor boxes sit within cut outs in the floor tiles and contain 1 x 2 gang socket outlets, 1 x blank plate for telecoms and 1 x blank plate for data.

Plastic fused spurs.
White fused spur outlets have been provided within the kitchenettes and W.C's for items such as water heaters, hand dryers and disabled toilet alarms with the spurs mounted at high lever on in the kitchen units.

Metal Clad fused spurs.
Within the ceiling voids of the office metal clad fused spurs have been provided for the mechanical plant AC units. These supplies have been wired in a ring formation back to the local distribution board

Mechanical services wiring
Mechanical services on the plant deck are fed from a dedicated distribution board on the plant deck. Local isolation is provided by either suitably rated isolators or metal clad fused spurs.

Warehouse

Each level access and service door has an electrical supply which is terminated into an isolator to allow the door manufacture to connect their control panel. From the isolator a flexible cable within galvanised conduit is connected at high level. Supplies to the door bus bars are taken from the main panels.

External power

Within the service yard a power supply has been provided for foul pumps which are fed from the local distribution boards.

Containment

Within the building there is a verity of containment used to allow cables to fixed around the office areas dependant on the type and size of cable required.

Warehouse
Cable tray and ladder has been installed around the perimeter of the warehouse for the XLPE/SWA/LSZH cable supplies to the door dock busbar and external lighting distribution boards.

Office and core areas

Cable tray.
Cable tray has been installed to the offices above the ceiling to support the LSOH twin and earth cables with vertical metal rigid or flexible conduits in the walls to protect the cables from penetrations.

Conduit.
Galvanised conduit has been used within the walls of the office to provide protection to the LSOH twin and earth cables and to also provide a pathway for future rewiring for small power and lighting circuits. Additional 25mm conduit have been used to contain the fire rated cables in the office when used for the fire alarm installation. Flexible conduit has been used in the stair core areas as there are no suitable routes for rigid conduit routes.

Conduit drops have been provided at doors into the office space for the future access control installation.

Lighting / Emergency Lighting

Office and core areas.

Office and core area luminaires utilise a mixture of recessed modular and circular LED fittings with surface linear fittings used in the riser and plant area.

Office
The office has various fittings installed in the gridded ceilings to provide the necessary lighting required. Open office areas and meeting rooms are provided with recessed dimmable 600x600 LED fittings. Control of these fittings is via recessed PIR's which allow the fittings to be dimmed down dependant on the amount of natural lighting entering the room. Meeting rooms are also provided with manual dimming switches.

W.C's.
The W.C's within the offices have gridded ceilings with recessed LED downlights provided and flush PIR detectors.

Main Office Reception area.
General lighting to the reception is provided by recessed LED downlights controlled via recessed PIR's.

Core areas and corridors.
In the core areas and corridors LED downlights lights have been installed, controlled via ceiling mounted PIR control.

2nd floor Plant Deck.
Lighting to the first floor is provided by manually switched Dextra Typhon Trunking mounted linear LED fittings.

Riser and Distribution Office Plant Areas
The plant deck and escape stair are fitted with IP65 rated linear Led fittings with local manual switching.

Lighting installation.
All light fittings within the office and core areas are connected via a klik plug and flexible cable to a socket which allows the fitting to be disconnected without effecting others on the circuit. Dependant on the type and quantity of fittings the klik plug can be connected into a multi or single module, 3 or 4 pins. Cabling to the lighting circuits is provided in 3 core and earth LSOH cable on cable tray mounted above the ceiling back to the lighting DB's located on each floor in the riser cupboards.

FOR SAFETY THE RELEVANT CIRCUIT SHOULD BE ISOLATED BEFORE UNPLUGGING ANY FITTING.

Office emergency lighting.

Emergency lighting to the office and core areas has been installed to meet the requirements of BS5266-1 with emergency pack integral to the necessary fittings. Emergency fittings are indicated with a green LED indicator to show both power is present and that the batteries are charging.

All emergency lighting to the offices are integral to the fittings and are indicated with a green LED when charging and red when there is a faulty.

As the emergency lighting is not self-test there is an emergency test key located at the local DB's.

DO NOT CONTINUEALLY CHARGE AND DISCHARGE THE EMERGENCY LIGHT FITTINGS AS THIS WILL SHORTERN AND POSSIBLY DAMAGE THE BATTERIES WITHIN.

External Lighting

The external lighting provides lighting to the Car park, site entrances, service yards and building perimeter.

The lighting scheme utilises LED lamps and control gear mounted in the light fittings which are either column or directly mounted to the building.

Column mounted lighting
A mixture of 10 metre and 6 metre columns have been installed to provide the necessary lighting to the services yards and site perimeter. Fittings are installed on top of the columns with flexible cables passing through the column to the base where they are terminated into fused cut out.

The electrical supply to the columns passes from the building and into underground ducts, under the roads and surface yard and into the base of the columns.

Build mount lighting.
Lighting has also been mounted to the building to provide lighting to the road ways and services yards with the fittings fixed through the external cladding with threaded rod, nuts and washers. Additionally, to prevent the internal cladding from being crushed by the tightening of the fixing brackets an external bracket supplied by the building cladder has been fitted. The electrical supply to the fittings is installed on cable tray around the perimeter of the warehouse and terminate into fused spurs allowing a flexible cable to pass through the cladding and into the light fitting.

Lighting to the main office entrance is provided by 2 No bollard fittings.

External lighting control
A dedicated distribution board has been installed to provide power to the external lighting and small power items. This board has service enclosures mounted above with N/O contactors fitted which are operated by a photocell and programmer. The Photocell is mounted externally above the build mount lighting to prevent interference and both the photocell and programmer need to operate to allow the power to be passed onto the contactors.

Disabled Refuge Alarm

A disabled refuge system has been installed to the offices to cover staircases. The disabled refuge control panel is located at the main office reception adjacent to the fire alarm panel. At each landing designated as a disabled refuge a call station has been installed that will allow persons at these locations to contact the main reception via the main panel to ask for assistance if required. The cabling used to connect the main panel to the outstations is a 4c and earth enhanced fire rated cable.

Disabled Toilet Alarms

To the W.C's designated for Disabled use alarms comprising of 1 No emergency red pull cord, (2 No in showers) 1 No reset button (2 No in showers) and 1 No over-door audible/visual warning unit have been fitted. In the event of assistance being required within the W.C the pull cord can be pulled to operate the red indicator triangle and auditable sounder to summon help from outside. If required, the reset is located within the room with the power supply located at high level.

Lightning Protection

A Lightning Protection System has been installed to meet the requirements of the specification and BS EN 62305 to the warehouse and office building. Rods are positioned at no more than 16mtrs around the perimeter with tapes connected onto the main steels.

Electric Vehicle Charging

The Electric Vehicle Charge (EVC) are supplied from a dedicated distribution board located in the ground floor riser. A number of Electric Vehicle Charge (EVC) stations have been provided in the main and disabled bay car park. The charge points are single phase dual output 7kw bollards and single phase single output 7kw bollards fed from dedicated distribution boards located within GRP kiosks in the car park. Cables from each distribution boards are routed through a buried duct system.

Testing and Commissioning

Electrical services test certification and commissioning has been carried in accordance with the NICEIC regulations.

Specialists installations and testing not covered by the Regulations for Electrical Installations has been tested to the relevant British Standards or Code of Practice.

1.3.3 Site Works and Infrastructure

Information provided by Burrows Graham the Civil and Structural Engineers

The external areas include a concrete service yard to the West of the unit. This provides HGV access to the unit via a combination of level access doors and dock doors. Docks are set 1200mm below the finished slab level of the unit.

To the south of the unit sits a car park for cars and light vans. This is a combination of tarmac and block paving construction.

Surface water drainage is collected from all hard standing areas and directed into below ground attenuation tanks. These allow a combination of discharge to ground (soakaway) with an overflow system connecting off site in the Thames Water foul water public sewer in Horton Road. This has been approved by Thames Water.

Foul water drainage is collected from the unit and discharges into the public Thames Water sewer in Horton Road.

Information provided by UMC, the Architects

New road, pedestrian and cycle access is provided to each unit, with a mixture of permeable, non-permeable paving and tarmac isles to the main car park areas. Accessible, car sharing, and 20% EV charging is provided, with the provision for 100%. Motorcycle storage is also included.

Each new unit has its own dedicated car parking and secure service yard, with auto sliding gates to the service area.

External Bin and Recycling areas as required by BREEAM are located within the service yard and marked as such. External amenity area has been included for so all employees can leave the unit and sit outside.

Tactile and blister paving has been provided as required, with the building protected with bollards and Armco to vulnerable external elements.

A full M&E infrastructure scheme has been proposed, refer to the specific disciplines for further details.

POYLE 80, HORTON ROAD

TECHNICAL NOTE

Civil & Structural Design Statement

DOCUMENT CONTROL SHEET

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STRUCTURAL ENGINEERING DESIGN STATEMENT FOR HEALTH AND SAFETY FILE

Burrows Graham Ltd were appointed as civil and structural design engineers for a new Industrial development comprising 1no. warehouse building at Factory Lane, Croydon.

Design Philosophy

Steelwork

The structural frame was designed by Severfield on behalf of the main Contractor Winvic, in accordance with BS5950-1.

Imposed roof loading was calculated using BS6399-3.

Wind loads were determined in accordance with BS6399-2.

A loading of 0.25kN/m^2 has been adopted for roof services generally. Specific loads applied by Siphonic drainage pipes are also catered for. An Additional imposed loading of 0.15kN/m2 has been applied to account for PV panels to the roof.

The warehouse superstructure is designed as a two-span portal frame.

Internal valley columns are arranged on a hit/miss basis. Longitudinal frame stability is achieved using wind girders in the plane of the roof structure, located at both ends of the warehouse. The wind girders transfer forces to vertical bracing systems within the side elevations. Portal frame action provides transverse stability.

The offices, are of simple beam and column construction.

Upper Floor Slabs

The upper floor concrete slabs were designed by Severfield and are comprised of 150mm mesh reinforced concrete slabs cast upon profiled metal decking which spans between steel floor beams. The beams are designed to act compositely with the concrete floor construction and the steel beam sizes benefitting from composite action.

The intermediate office floor areas have been designed for dead weight and a general office imposed loading of 4kN/m^2 + 1kN/m^2 for partitions.

Plant areas have been designed for dead weight and an imposed loading of 7.5kN/m^2.

Ground Floor Slabs

The warehouse floor was designed by ABS Brymar. Whilst the core and entrance area floors have been designed by Burrows Graham. All internal slabs are ground bearing concrete slabs reinforced with steel fabric and cast on a continuous polyethylene membrane.

The warehouse floor is designed for the following imposed loads:

50 kN/m^2 or

70 kN racking leg loads (minimum 300mm back to back spacing) or

25 kN/m line load

Design was completed following the recommendations given in Concrete Society Technical Report No. 34 – 4th Edition.

Foundations

Foundations are designed by Burrows Graham to carry the loads from the steel frame.

Stanchion bases are traditional reinforced concrete (grade C32/40 generally) pads and are sized to limit the net bearing pressure under working loads to a maximum of 150kN/m^2 in accordance with the work carried out by Menard to provide ground improvement of the building footprint.

Foundations are designed as a mixture of pinned bases and constrado bases to suit to fire boundary condtions determined by the architect and fire consultant. The Superstructure frame has received Intumescent finishes as part of the fire design strategy.

Precast concrete retaining walls are supported on fabric reinforced concrete strip footings. Refer to specialist Sub-contractor drawings for details of precast walls.

Drainage

Foul water drainage discharges into existing outfalls that connect into a Thames Water owned sewer in Horton Road.

The surface water drainage network consists of gravity pipe system which connect to infiltration/attenuation tanks prior to discharging to the same FW sewer in Horton Road. Agreement for this discharge has been approved with Thames Water and the LLFA.

The surface water from the service yards pass through petrol interceptors prior to entering the soakaways. Interceptors are fitted to surface water drainage systems to protect the environment from pollution by oils. They separate the oil from the water, and then retain the oil safely until it is removed. They are installed to contain oil leaks from vehicles and plant and accidental spillages. The interceptors have been specified in accordance with BS EN 858-1:2002.

Residual Risk Assessment

Any unusual risks associated with the engineering design are recorded on the Final-Construction drawings.

Any proposed future structural alterations should be reviewed by a Structural Engineer prior to commencement of site works. This includes any holes to be formed through ground floor slabs or upper floor slabs/ plant decks.

Demolition Statement

The building structure is a conventional steel portal frame and no special or unusual requirements for future demolition are envisaged.

The demolition contractor should consult the Final Construction steelwork drawings and pay particular attention to the location of bracing systems which should be maintained during demolition to provide stability.

Maintenance Notes

Internal Floor Slabs

Joint sealants should be inspected periodically by the building user. Any damaged sealants should be replaced where necessary.

The upper floor slabs are suspended and cracking may therefore occur due to load induced stresses. In addition, both the upper floor slabs and the ground bearing slabs will potentially crack due to concrete shrinkage. Any cracks up to 0.9mm width should be repaired by an experienced specialist contractor using an appropriate epoxy resin injection system. If any cracks open by more than 0.9mm, a Structural Engineer should be consulted prior to determining an appropriate repair strategy.

The floor should be cleaned regularly to prevent dirt and dust from building up. Operation of mechanical handling equipment on dirty/dusty floors can cause increased wear on the floor.

The floor is treated with a spray-applied curing/sealing/hardening membrane. This surface sealer should be re-applied periodically (approximately 5 year intervals) by a specialist contractor.

External Concrete Pavements

Joint sealants should be inspected periodically by the building user. Any damaged sealants should be replaced where necessary.

Minor local repairs to the concrete pavements may be required periodically. The pavements should be inspected at regular intervals and any repairs required should be carried out by a specialist contractor.

Foul and Surface Water Sewers

In general, sewers, manholes and drainage channels are unlikely to require maintenance other than periodic inspections, unless a blockage occurs. Silt pits are likely to require cleaning out at approximately 12 month intervals. In all instances, inspection and cleaning is to be carried out only by an experienced specialist contractor, following the guidelines given in "Safe Working in Sewers and at Sewage Works", published by National Joint Health and Safety Committee for the Water Services.

Surface Water Interceptors

For maintenance instructions for surface water interceptors refer to the interceptor manufacturer's information. Inspection and cleaning shall be carried out by specialist contractor following guidelines given in the latest edition of "Safe Working in Sewers and at Sewage Works", published by National Joint Health and Safety Committee for the water services.