1.3 DESCRIPTION OF THE WORKS AND DESIGN CRITERIA

1.3.1 Building Structure and Fabric

**Information provided by Frank Shaw Associates, the Architects**

The buildings are constructed of a steel portal frame. Wall and roof cladding is site assembled built up metal cladding. Insulated precast concrete wall panels are used to dock areas. Steel doors to the warehouse. Aluminium windows and curtain wall are included to the office areas. New internal partitions are metal stud and plasterboard. Spaces created within the warehouse area are built from composite insulated panels. Internal warehouse racking is to be provided along with a steel framed mezzanine with steel stairs. Sprinkler installation with associated tanks, pipework and protective cages.

**Information provided by Richard Jackson, the Civil and Structural Engineers**

Foundations – concrete pads on engineered fill/ natural ground post cut and fill exercise.

1.3.2 Building Services

**Information provided by WM Building Services, the Mechanical Designers**

**MAIN OFFICES**

**HEATING**

The toilets, corridor and stairs and where not heated by VRF heat pump system and heat loss is in excess 100 watts heating are to be provided with standalone electric panel heater with integral time and temperature control. LST style electric heaters are provided to disabled toilets.

Within the locker room small drying rooms are provided, each is fitted with tubular heater linked to local room thermostat.

Duct mounted thyristor controlled electric heater batteries are installed to the supply duct branches within the locker rooms, the heating coils are controlled from the BMS to ensure operation is available when fans are running and BMS room sensor to control thyristor.

**MAINS COLD WATER SERVICES**

The original mains cold water routed on the plant deck is to be retained including the electromagnetic water conditioner, the mains water is adapted to serve the existing rainwater harvesting equipment but then is extended to serve a new cold water storage tank and booster.

The potable cold-water booster and tank serves the following areas/systems:

* Main Office toilet areas
* Main Office Hot water heater inlet
* Catering facility & vending

The system incorporates a pre-insulated GRP one piece cold water storage tank with a nominal volume of 2,250 litres, to be provided with; 25mm insulation, access manway, raised ball valve chamber, 25mm solenoid inlet valve, 25mm drain valve, screened overflow and warning pipe, screened vent, high and low level switches and temperature sensor linked to the BMS.

Two submersible pumps are fitted within the tank and provided with inverter drives and controlled from the booster pumps control panel. The control panel will contain main door interlocked isolator, pump selector switches, duty/share timer facility, run and trip lamps for pump, low water alarm lamp and interface to BMS for fault indication. The cold-water booster panel shall incorporate a relay for shut down of the booster in the event of high- or low-level switch activation.

The inlet to the booster set is fitted with isolating valve and flexible connection. The discharge side of the booster will contain flexible connections, isolating valve, and pressure gauge.

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.

Boosted 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 mineral wool section thermal insulation with identification applied in accordance with the specification.

**RAINWATER HARVESTING SYSTEM**

The original rainwater harvesting pipework and system routed on the plant deck is to be retained and upgraded to serve all the toilets and urinals in the fit out.

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 mineral wool thermal insulation with identification applied in accordance with the specification.

**HOT WATER SERVICE**

Located in the main office second floor plant deck is the domestic hot water system, this system serves the following areas/systems:

* Offices general domestic hot water service
* Catering facility

The offices are provided with hot water from a Hybrid system with LTHW generation from monobloc style air source heat pump and back up/assistance from electric hot water boiler, the air source heat pump is controlled as the primary heat source.

Two air source heat pumps are fitted internally on big foot based with drip tray and drain below, each heat pump has integral controls, pipework, and pumps. From the heat pump copper pipework links to the bottom coil of the cylinder. Each system is fitted with expansion vessel, automatic air vent and quick-fill connection.

Two vertical twin coil indirect hot water cylinders are provided within the plantroom, each fitted with electric water boiler, the electric boiler pipework links to the upper coil of the cylinder. Each system is fitted with automatic air vent and quick-fill connection.

The cylinders are provided with twin coil, dual control sensors and high limited thermostat, 100mm diameter 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.

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 minimum 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. This will also ensure the minimum heat loss in the system which the air source heat pumps have to accommodate.

The hot water pump is provided with isolating valves on suction and discharge and non-return on discharge.

The copper pipework to the offices runs at high level within the plantroom to the main riser and distributes to all outlets as required.

Thermostatic blending taps are incorporated on hot water outlets to disabled. Cleaner’s sinks, tearoom sinks are provided with unregulated hot water. Thermostatic blending taps are incorporated on hot water outlets to disabled wash basins. General basins are supplied with TMV3 blending valve, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed and within vanity units/IPS are fitted with mineral wool 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 vent cowl.

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 PVC 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.

**GROUND FLOOR VRF HEAT PUMP**

The ground floor offices, canteen and gym are heated and cooled with the original CAT A installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery. Two systems are installed in total as below:

* System 1 – Ground floor north & gym
* System 2 – Ground floor south

The CAT A installation is to be adapted and upgraded to accommodate the fit-out arrangement throughout.

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 internally on the main office second floor plant area and are charged with R410A 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 a mix of four-way standard and compact cassettes within the ceiling and wall mounted units. This equipment contains the evaporator coil, filter, fan, and discharge louvres.

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 cassette; room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

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

**FIRST & SECOND FLOOR VRF HEAT PUMP**

The first and second floor offices are heated and cooled with the installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery.

* System 3 – First & Second floor offices.

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 internally on the main office second floor plant area and are charged with R410A 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 a mix of four-way standard and compact cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan and discharge louvres.

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 cassette; room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

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

**SECOND FLOOR SERVER ROOM TEMPERATURE CONTROL**

The server room is retained at a temperature to ensure equipment operation by an installation of two Mitsubishi two pipe split air conditioning system heat pump systems.

Condensers are sited internally on the main office second floor plant area 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 indoor evaporator part of the system is wall mounted. This equipment contains the evaporator coil, filter and fan. Each system is provided with a wall mounted hard wired controller and linked to the BMS for duty rotation and operation of the standby unit on failure.

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

**CANTEEN SUPPLY & EXTRACT VENTILATION**

The ground floor canteen ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second-floor plant deck.

The air handling units incorporates the following equipment:

Supply Side - Motorised air inlet damper.

* G4 Pleated panel filter
* F7 Rigid bag filter
* Access section
* Plate Heat Exchanger
* Supply fan.
* Access section
* DX Heating/Cooling Coil
* Discharge spigot.

Extract Side - Motorised exhaust air damper.

* G4 Pleated panel filter
* Access section
* Extract fan.
* Plate Heat Exchange c/w face & bypass damper.
* Access section
* Discharge spigot.

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the main office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments are fitted with standard fusible link fire dampers and access doors, any through protected route walls are fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units is achieved via the onboard control 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 heating/cooling coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through louvre faced diffusers, the extract from the space uses identical louvre faced diffusers.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible 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.

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

**TOILETS & LOCKERS SUPPLY & EXTRACT VENTILATION**

The ground and first floor toilets and ground floor locker & shower facility ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second-floor plant deck.

The air handling units incorporates the following equipment:

Supply Side - Motorised air inlet damper.

* G4 Pleated panel filter
* F7 Rigid bag filter
* Access section
* Plate Heat Exchanger
* Supply fan.
* Access section
* DX Heating/Cooling Coil
* Discharge spigot.

Extract Side - Motorised exhaust air damper.

* G4 Pleated panel filter
* Access section
* Extract fan.
* Plate Heat Exchange c/w face & bypass damper.
* Access section
* Discharge spigot.

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop down the face of the white wall and enter each space through the wall, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments are fitted with standard fusible link fire dampers and access doors, any through protected route walls are fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units is achieved via the onboard control 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 heating/cooling coil to maintain the required temperature conditions supplied to the space.

Local duct mounted electric heating coils are fitted in the locker room supply air branches to allow local control of space temperature.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through louvre faced diffusers, the extract from the space uses identical louvre faced diffusers or extract valves to toilet areas.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible 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.

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

**GYM SUPPLY & EXTRACT VENTILATION**

The ground floor gym ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second-floor plant deck.

The air handling units incorporates the following equipment:

Supply Side - Motorised air inlet damper.

* G4 Pleated panel filter
* F7 Rigid bag filter
* Access section
* Plate Heat Exchanger
* Supply fan.
* Access section
* Electric Heating Coil
* Discharge spigot.

Extract Side - Motorised exhaust air damper.

* G4 Pleated panel filter
* Access section
* Extract fan.
* Plate Heat Exchange c/w face & bypass damper.
* Access section
* Discharge spigot.

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches, and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop down the face of the white wall, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments are fitted with standard fusible link fire dampers and access doors, any through protected route walls are fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units is achieved via the onboard control 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 electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through swirl diffusers, the extract from the space uses identical swirl diffusers.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible 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.

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

**GENERAL OFFICES SUPPLY & EXTRACT VENTILATION**

The ground floor search rooms and new starter room and first and second floor office spaces and meeting room ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second-floor plant deck.

The air handling units incorporates the following equipment:

Supply Side - Motorised air inlet damper.

* G4 Pleated panel filter
* F7 Rigid bag filter
* Access section
* Plate Heat Exchanger
* Supply fan.
* Access section
* Electric Heating Coil
* Discharge spigot.

Extract Side - Motorised exhaust air damper.

* G4 Pleated panel filter
* Access section
* Extract fan.
* Plate Heat Exchange c/w face & bypass damper.
* Access section
* Discharge spigot.

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches, and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the main office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

All penetrations through the offices standard fire compartments are fitted with standard fusible link fire dampers and access doors, any through protected route walls are fitted with Mode 5 fire/smoke dampers with access doors linked to the BMS to drop on fire alarm.

Temperature control of the air handling units is achieved via the onboard control 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 electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through swirl diffusers, the extract from the space uses identical swirl diffusers.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible 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.

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

**SECOND FLOOR SERVER ROOM GAS SUPPRESSION EXTRACT VENTILATION**

An inline centrifugal extract fan is installed within the server room to dedicated ductwork extract system with discharge to discharge via extract grille to the warehouse at high velocity to high level.

The extract ductwork drops within the server room to serve an egg crate grille at low level and high level, system sized on 5 air changes per hour to allow the room to be cleared within 12 minutes of activation.

The extract ductwork as it passes through the fire compartment wall is fitted with a mode 5 fire/smoke damper and actuator, this damper operates in conjunction with the building management system and gas suppression system to close the damper on gas activation and open to allow extract to remove expensed gas.

**INBOUND DISTRIBUTION OFFICES No. 1**

**HEATING**

The toilets, corridor and stairs and where not heated by VRF heat pump system and heat loss is in excess 100 watts heating are to be provided with standalone electric panel heater with integral time and temperature control. LST style electric heaters are provided to disabled toilets.

**MAINS COLD WATER SERVICES**

The original incoming mains cold water and leak detection arrangement is to be maintained with upgraded pipework from this point to rise into plantroom and connect to existing electromagnetic water conditioner. From this point the water is extended into the riser and then distributes to all floors.

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

* Main Office toilet areas
* Tea points and water coolers
* Main Office Hot water heater unvented kits

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, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

**HOT WATER SERVICE**

The domestic hot water to the toilets, tea points and cleaners’ rooms are provided from local unvented electric hot water heaters.

The hot water is generated locally from a Hyco multi-point unvented electric water heater located at low level in the toilet vanity units, ceiling void or kitchen base unit.

The unvented water heaters are fitted with expansion kits consisting of isolating valve, check valve, pressure reducing valve, expansion vessel and pressure relief valve. The pressure relief valve discharges to Hepworth dry traps connected to the foul waste pipework.

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 any blending valve installation.

Thermostatic blending taps are incorporated on hot water outlets to disabled. Cleaner’s sinks, tearoom sinks are provided with unregulated hot water. Thermostatic blending taps are incorporated on hot water outlets to disabled wash basins. General basins are supplied with TMV3 blending valve, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed and within vanity units/IPS are fitted with mineral wool 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 vent cowl.

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 uPVC 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 and first floor offices are heated and cooled with the original CAT A installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery. Two systems are installed in total as below:

* System 1 – Ground & first floor

The CAT A installation is to be adapted and upgraded to accommodate the fit-out arrangement throughout.

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 internally in the second-floor plant area and are charged with R410A 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 a mix of four-way standard and compact cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan, and discharge louvres.

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 cassette; room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

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

**GENERAL OFFICES SUPPLY & EXTRACT VENTILATION**

The ground and first floor office spaces and meeting room ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second-floor plant deck.

The air handling units incorporates the following equipment:

Supply Side - Motorised air inlet damper.

* G4 Pleated panel filter
* F7 Rigid bag filter
* Access section
* Plate Heat Exchanger
* Supply fan.
* Access section
* Electric Heating Coil
* Discharge spigot.

Extract Side - Motorised exhaust air damper.

* G4 Pleated panel filter
* Access section
* Extract fan.
* Plate Heat Exchange c/w face & bypass damper.
* Access section
* Discharge spigot.

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the main office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

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

Temperature control of the air handling units is achieved via the onboard control 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 electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through louvre faced diffusers, the extract from the space uses identical louvre faced diffusers.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible 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.

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

**TOILET EXTRACT SYSTEM**

The inbound distribution office toilets and cleaners’ room is provided with extract ventilation from the upgraded dedicated twin extract fan mounted located internally on the distribution office second floor plant area.

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 with internal anti-vibration mountings and flexible connections.

The exhaust air ductwork is extended around the plant deck from the fan to connect to external louvre.

The toilet extract ductwork from the unit connection drops into the main riser to the ground floor ceiling void, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

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

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 and to be used for minor local trimming only.

Make up air for the toilet extract system is via undercut doors or supply air from the ventilation system into the space.

**OUTBOUND DISTRIBUTION OFFICES No. 2**

**HEATING**

The toilets, corridor and stairs and where not heated by VRF heat pump system and heat loss is in excess 100 watts heating are to be provided with standalone electric panel heater with integral time and temperature control. LST style electric heaters are provided to disabled toilets.

**MAINS COLD WATER SERVICES**

The original incoming mains cold water and leak detection arrangement is to be maintained with upgraded pipework from this point to rise into plantroom and connect to existing electromagnetic water conditioner. From this point the water is extended into the riser and then distributes to all floors.

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

* Main Office toilet areas
* Tea points and water coolers
* Main Office Hot water heater unvented kits

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, warehouse, plantrooms or risers is fitted with mineral wool thermal insulation with identification applied in accordance with the specification.

**HOT WATER SERVICE**

The domestic hot water to the toilets, tea points and cleaners’ rooms are provided from local unvented electric hot water heaters.

The hot water is generated locally from a Hyco multi-point unvented electric water heater located at low level in the toilet vanity units, ceiling void or kitchen base unit.

The unvented water heaters are fitted with expansion kits consisting of isolating valve, check valve, pressure reducing valve, expansion vessel and pressure relief valve. The pressure relief valve discharges to Hepworth dry traps connected to the foul waste pipework.

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 any blending valve installation.

Thermostatic blending taps are incorporated on hot water outlets to disabled. Cleaner’s sinks, tearoom sinks are provided with unregulated hot water. Thermostatic blending taps are incorporated on hot water outlets to disabled wash basins. General basins are supplied with TMV3 blending valve, service valves are fitted within 300mm of the appliance or associated blending valve.

All pipework where concealed and within vanity units/IPS are fitted with mineral wool 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 vent cowl.

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 uPVC 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 and first floor offices are heated and cooled with the original CAT A installation of a Mitsubishi variable refrigeration volume air conditioning system with heat recovery. Two systems are installed in total as below:

* System 1 – Ground & first floor

The CAT A installation is to be adapted and upgraded to accommodate the fit-out arrangement throughout.

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 internally in the second-floor plant area and are charged with R410A 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 a mix of four-way standard and compact cassettes within the ceiling. This equipment contains the evaporator coil, filter, fan, and discharge louvres.

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 cassette; room controllers are also fitted within each serviced space to comply with BREEAM zoning requirements.

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

**GENERAL OFFICES SUPPLY & EXTRACT VENTILATION**

The ground and first floor office spaces and meeting room ventilation requirements are satisfied with supply and extract ventilation using an ERP compliant heat recovery air handling unit mounted internally on the second-floor plant deck.

The air handling units incorporates the following equipment:

Supply Side - Motorised air inlet damper.

* G4 Pleated panel filter
* F7 Rigid bag filter
* Access section
* Plate Heat Exchanger
* Supply fan.
* Access section
* Electric Heating Coil
* Discharge spigot.

Extract Side - Motorised exhaust air damper.

* G4 Pleated panel filter
* Access section
* Extract fan.
* Plate Heat Exchange c/w face & bypass damper.
* Access section
* Discharge spigot.

The air handling units are provided with integrated BACnet controls system to allow network link to the site Trend controls system, all sensors, switches and motors are pre-wired within the unit.

Fresh air ductwork and exhaust ductwork is extended around the plant deck to external louvres spaced to allow suitable separation between air streams.

The supply and extract ductwork from the unit connections runs on the plant deck to drop into the main office riser, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

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

Temperature control of the air handling units is achieved via the onboard control 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 electric heating coil to maintain the required temperature conditions supplied to the space.

All branches and terminals are to be fitted with opposed blade volume control dampers for regulation.

The ductwork distributes in the ceiling void to discharge tempered air directly into the room through louvre faced diffusers, the extract from the space uses identical louvre faced diffusers.

All primary grilles and diffusers are fitted with galvanised plenum boxes with side or top entry spigots and connected to galvanised ductwork with flexible 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.

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

**TOILET EXTRACT SYSTEM**

The outbound distribution office toilets and cleaners’ room is provided with extract ventilation from the upgraded dedicated twin extract fan mounted located internally on the distribution office second floor plant area.

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 with internal anti-vibration mountings and flexible connections.

The exhaust air ductwork is extended around the plant deck from the fan to connect to external louvre.

The toilet extract ductwork from the unit connection drops into the main riser to the ground floor ceiling void, silencers are fitted immediately after the unit to ensure noise levels within the space are within acceptable limits.

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

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 and to be used for minor local trimming only.

Make up air for the toilet extract system is via undercut doors or supply air from the ventilation system into the space.

**WAREHOUSE FROST PROTECTION**

The scope consists of the supply and installation of four off warm air, high velocity nozzle induction systems. The racked warehouse being served, is divided broadly in to four quarters, with one system serving each of the areas. Two of the AHU’s are located in the Distribution Office No. 1 Plant Room and two located in the Distribution Office No. 2 Plant Room.

 In calculating the requirements of the systems, we have followed the following criteria.

Internal temperature +6°c

External temperature -4°c

Natural infiltration 0.10 a.c/hr

Ventilation through unit 95% recirculation and 5% fresh air in winter.

 5%-100% fresh air for summer free cooling as required.

‘U’ value floor 0.05w/m²K

‘U’ value walls 0.26w/m²K

‘U’ value roof 0.16w/m²K

‘U’ value roof lights (10%) 1.40w/m²K

No external heat sources have been considered when sizing the required plant.

The total heat load requirement for the building based on these parameters is 940kw allowing 10% for heat up and 10% for height gives a total duty of 1137kW to provide further cover for defrost we have allowed for a total plant capacity of 1200 kW. The heat load is met by a four equally sized AHUs from the UVU/NRVU ranges, together with four off equally sized Lennox ASHP’s. The units proposed to serve the areas are LTHW fired appliances, for internal location.

The galvanised ductwork distribution systems are co-ordinated with other services and the building structure. Multiple self-balancing, spun aluminium nozzles, are fitted to the systems, and co-ordinated with the storage racking layout. The units are located within the north and south hub-office plantrooms, which are warehouse adjacent at first floor level. The units will each serve a main header of ductwork, crossing under valleys, to the centre of the warehouse. Each spine will feed three nozzle ranges, running approximately half of the building length, and covering half of the warehouse width, i.e. one quarter of the warehouse per system. Each nozzle range will cross the racking in a perpendicular fashion, allowing the nozzles to be able to be discharged directly into the racking aisles. The full details of our installation are shown on our drawing reference P23027-WMB-WH-ZZ-DR-H-1500.

**AHU SELECTION**

The AHUs are going to be located in the distribution office No. 1 & No. 2 second floor plantrooms. There are two units each side, installed as a handed pair. The AHU’s construction is of extruded aluminium pentapost section, with double skinned panels and 50mm insulation. Outer panels are of plastisol in goosewing grey finish. A 150mm high folded steel base frame is included on the units.

In the direction of airflow, the AHUs comprise of a two-way mixing box, with fresh air and recirculation air dampers. Front withdrawal pleated, disposable panel filters to G4 are included, and bag filters to F7. Access to the filter section is via a full height door in the mixing section.

A 900mm long attenuator provides noise reduction from the fan to the fresh air and recirculation damper openings. An in-duct attenuator is provided in the supply side of each AHU, within the distribution ducts.

The fan section includes a backward curved plug fan, mounted with the motor on its own base frame, and isolated from the structure via anti-vibration mounts.

The LTHW coil provided in each unit is of copper tube and aluminium fin construction. The coils will operate on 45/40 dec C water provided by the ASHP’s, however the coil selections are made on 42.5/37.5 deg water to make them more robust and to meet duty during defrost conditions of the Heat pumps.

**DISTRIBUTION OFFICE No. 1 AHU’s**

AHU Performance

Fan Volume 9.5 m³/s

Fan Type Backward curved plug fan.

Heat Output 329kw (heat pumps) plus 72kw from electric immersion

Motor 22kw, 3 phase, 415-volt, 50 Hz.

Fresh Air 5% winter and up to 100% in summer

Heating Medium LTHW 45/40 deg C

Supply Air Temps 33.6 deg C

Filters Panel disposable to G4, bags to F7

Control Modulating

Model Bespoke

Quantity 2 off

Handing 1 as drawn, 1 opposite hand

Colour Goosewing Grey

Location Internal

Orientation Horizontal

Approx Size 5.9ml x 2.35mw x 2.27mh

Weight 3600kg (estimate)

**DISTRIBUTION OFFICE No. 2 AHU’s**

AHU Performance

Fan Volume 9.5 m³/s

Fan Type Backward curved plug fan.

Heat Output 329kw (heat pumps) plus 72kw from electric immersion

Motor 22kw, 3 phase, 415-volt, 50 Hz.

Fresh Air 5% winter and up to 100% in summer

Heating Medium LTHW 45/40 deg C

Supply Air Temps 33.6 deg C

Filters Panel disposable to G4, bags to F7

Control Modulating

Model Bespoke

Quantity 2 off

Handing 1 as drawn, 1 opposite hand

Colour Goosewing Grey

Location Internal

Orientation Horizontal

Approx Size 5.9ml x 2.35mw x 2.27mh

Weight 3600kg (estimate)

All design work for this element of the project will make due consideration for specification requirements, industry standards, CDM regulations and all governing legislation.

**AIR SOURCE HEAT PUMP HEATING**

Two 328.5 kW air cooled high efficiency air source heat pumps fitted with multiple scroll compressors are provided to the external compound at each office location, the air source heat pumps provide the source for low temperature hot water and will supply a flow temperature of 45°C and a return temperature of 40°C. Pipework connects to the air sour heat pumps with flow isolating valve, 100mm temperature gauge, 100mm pressure gauge, test point and flexible connection and return commissioning valve, strainer, non-return valve 100mm temperature gauge, test point and flexible connection.

To provide circulation through the air source heat pumps a twin head variable speed high efficiency cast iron primary circulation pump is fitted and piped within the chiller framework, all isolating valves, strainers and flushing bypasses are provided within the chiller frame.

The multiple variable speed compressors are charged with R32 refrigerant gas and connected to flooded shell and tube evaporator.

Low noise high efficiency condenser fans are fitted to the roof of the air source heat pump to reject heat to the atmosphere, electronic expansion valves are fitted to the compressor circuits.

The chiller is provided with micro-processor based control system and panel with BMS interface facility through BacNet over MSTP, the unit is fitted with anti-vibration mounts and is mounted onto pre-fabricated big foot bases.

The air source heat pumps are provided with integral buffer vessel located on the mounted to rear of air source heat pump to increase system capacity provide better control during load fluctuations and deal with defrost cycle. The chillers are sized to allow for additional load to the building load which will assist in ensuring flow temperatures are maintained. For extended low ambient temperatures an electric heater battery is installed in the buffer vessel to operate on back up heat only to ensure optimum efficiency of the system is maintained.

Pipework flow and return headers link the air source heat pump to a large bore horizontal low loss header located on the internal plant deck to further increase system capacity and also to provide a loop for pump circulation.

Within the main office plant deck a twin head inverter driven electronic floor mounted inline cast iron heating pump arranged operating as run and standby is fitted from the low temperature heating water header to serve the following circuits:

* Warehouse frost protection AHU No. 1
* Warehouse frost protection AHU No. 2

The twin pump is mounted on mild steel plate fitted with suitable anti-vibration mountings. The pump suction pipe is fitted with isolating valve, strainer, test points, pressure gauge, and flexible connection with the discharge pipe incorporating flexible connection, pressure gauge, test point and isolating valve.

An air/dirt separator is mounted within the low temperature heating flow pipework at high level within the plantroom, any dirt collected is deposited in the blow down section to the bottom for regular removal and remove air trapped in the water to vent prior to injecting back into the secondary circuit.

All air handling unit coil connections are fitted with three port control valve on the return connection controlled from the building management system, a standard valve arrangement consisting of flushing bypass valve, isolating valve on flow, flow strainer, commissioning valve on return, draincock to lowest connection and test points across coil and three port valve is incorporated with flexible connections to coil.

A floor mounted single pump pressurisation unit and floor mounted expansion vessel has been fitted to provide the make for the system and accommodate expansion. The pressurisation unit also houses high and low pressure switches to act as a safety cut out.

An 11 litre chemical dosing pot has been installed and linked across the primary low temperature hot water flow and return and 50mm flushing valves installed to the main headers externally to enable circuit flushing and cleaning prior to commissioning.

The system is dosed with glycol at 20% to protect against freezing and ensure continued operation during very low ambient conditions.

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

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

***External Design Temperatures for plant selection***

|  |  |
| --- | --- |
| Summer Weather File Temperature | 30.0°C dry bulb20.0°C wet bulb |
| Winter Weather File Temperature | -4°C dry bulb-4°C wet bulb |
| Summer Condenser External Temperature | 35°C dry bulb |
| Winter Condenser External Temperature | 5°C dry bulb |

***Internal Design Temperatures***

|  |  |
| --- | --- |
| Offices/Meeting Rooms | 21°C db winter 23°C db summer ± 1.5°C |
| Reception  | 21°C db winter23°C db summer ± 1.5°C |
| Canteen  | 21°C db winter23°C db summer ± 1.5°C |
| Locker Rooms  | 19°C db winterUncontrolled summer |
| Stores/Cleaners  | 16°C db winterUncontrolled summer |
| Corridors, Stairs & Circulation | 18°C db winterUncontrolled summer |
| Toilets  | 19°C db winterUncontrolled summer |
| Warehouse  | 5°C db winter (for purposes of heat loss)Uncontrolled summer |

***External Infiltration***

|  |  |
| --- | --- |
| Offices  | 0.50 air changes per hour |

***Occupancy***

|  |  |
| --- | --- |
| Office | As Furniture Layout  |

***Heat Gains***

|  |  |
| --- | --- |
| Occupants | As IES Software to suit operations |
| Lighting  | 15 W/m2 |
| Power | 25 W/m2 |

***Radiation Solar Load & Sol Air Temperature***

As IES Software

***Ventilation Rates***

|  |  |
| --- | --- |
| Offices | 12l/s per person supply/100% Extract |
| Canteen | 10l/s per person supply/100% Extract |
| Gym | 20l/s per person supply/100% Extract |
| Corridors & Circulation | 0.5 l/s/m2 (excludes stairwells)  |
| Toilets  | 10 ACH extract8 ACH make up air |
| Cleaners Stores | 10 ACH extract8 ACH make up air |

***Noise***

|  |  |
| --- | --- |
| External Noise Limit | NR65 @ 1m from louvre |
| Office | 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 | 0.26 W/m2K |
| Internal Wall Warehouse | 0.35 W/m2K |
| Internal Walls Office | 0.67 W/m2K |
| External Windows/Curtain Walling | 1.40 W/m2K & 0.29 G Value |
| Solid Personnel Doors | 1.70 W/m2K |
| Vehicle Access Doors | 1.00 W/m2K |
| Pro Wall to Docks | 0.27 W/m2K |
| Glazed Personnel Doors External | 1.60 W/m2K & 0.29 G Value |
| Roof | 0.16 W/m2K |
| Ground Floor Slab Warehouse | 0.05 W/m2K |
| Ground Floor Slab Office  | 0.05 W/m2K |
| Internal Upper Floor Slabs  | 3.26 W/m2K |
|  |  |

***Hot water plant design***

|  |  |
| --- | --- |
| **Based on CIBSE & IPHE Guidelines** |  |
| Hot Water Storage Temperature | 62°C |
| Hot Water Flow Temperature | 55-60°C |
| Disabled Outlet Temperatures | 38-43°C Maximum |
| General Basin Outlet Temperature  | 40-45°C Maximum |
|  |  |
| Outlet Pressure | 1.0bar(g) minimum |

***Hot water pipework sizing***

|  |  |
| --- | --- |
| **Based on CIBSE & IPHE Guidelines** |  |
| Loading Units | Medium Demand – CIPHE Guidelines |
| Pipework Velocity | 1.5m/s max in occupied spaces |
| 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 | 1.5m/s max in occupied spaces |
| Pipework pressure drop | To Suit Incoming 1.5 Bar Pressure |

***Ventilation System Parameters***

|  |  |
| --- | --- |
| **Based on CIBSE Guidelines** |  |
| Ductwork Plantrooms | 6.0 m/s max |
| Ductwork Riser | 6.0 m/s max |
| Ductwork Main Ducts | 5.5 m/s max |
| Ductwork Branch | 4.5 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 |

**Information provided by Walter Miles, the Electrical Designers**

**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** | **Height** |
| Offices | 400 | 850mm affl |
| Circulation | 150 | Floor level |
| Reception Desk | 500 | 850mm affl |
| Reception area | 300 | Floor level |
| Toilets /lockers | 200 | Floor level |
| Plant Areas | 200 | Floor level |
| Stairwell | 150 | Floor level |
| Tea Room/Kitchen | 400 | 850mm affl |
| Gymnasium | 300 | Floor level |
| First aid rm | 300 | Floor level |
| Therapy room | 300 | Floor level |
| Comms room | 500 | Floor level |
| Search room | 400 | Floor level |
| Warehouse Marshalling | 300 | Floor level |
| Warehouse Racking | 2500 | Floor level |
| Warehouse Mezzanine | 300 | Floor level |
| RRU | 300 | Floor level |

**Fire Alarm System**

L1 system to office areas designed in accordance with BS5839.

L1 system to warehouse 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** | **Height** |
| External Canopy | 100 | Floor level |

**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. Extension to existing Main LV panel boards
2. Installation of local DB’s for fit out
3. Alterations to small power and lighting to the offices to suit fit out
4. Installation of supplies for Kitchen equipment in the main office
5. Installation of lighting to warehouse and mezzanines
6. Installation of warehouse general small power, including comms cabinet supplies
7. Alterations to fire alarm to the offices to suit fit out
8. Installation of power supplies to warehouse
9. Installation of small power to forklift workshop area
10. Alterations warehouse fire alarm to suit fit out
11. Installation of warehouse and mezzanine high level fire alarm
12. Lighting to external canopies
13. Installation of data containment to offices to suit fit out
14. Installation of containment to warehouse to suit fit out
15. Alterations to Mechanical supplies in the offices to suit the fit out

 data installation

1. Security/CCTV/Access control installation

**LV Supply**

The existing incoming supply has been retained with no alteration. 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 3000KVA 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, 1.5MVA KNAN – located adjacent to Distribution Office 1
* TX2, 1.5MVA KNAN – located adjacent to Distribution Office 2
* TX3, 1.MVA KNAN – located in the north of the car park

LV tails are provided from each transformer to main LV panels. For LV 1 and LV2 5x1core 500mm per phase and neutral plus 300mm CPC are provided. Due to restrictions with foundation works these are routed above ground on cable ladder. For LV2 3x1core 500mm per phase and neutral plus 300mm 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 are 2 main LV panels located in the Warehouse and 1 in the car park.

LV1 is located near to Distribution Office 1 at gridline 20/C. Extended to suit fit out

LV2 is located near to Distribution Office 2 at gridline 21/K. Extended to suit fit out

LV3 is located externally in the car park within a GRP kiosk. Panel unchanged from base build

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.

The existing LV1 and LV2 panels have been extended to suit the requirements of the fit out.

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 and LV2 panels and secured to cable tray or ladder to feed sub-distribution boards and the dock door busbar. Cables from LV3 are routed through ducts.

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.

Main Office Sub Panel Board – 2nd floor plant deck – base build retained

Main Office Ground Floor Cleaners Room – Small Power DB – base build retained

Main Office Ground Floor Cleaners Room – Lighting DB – base build retained

Main Office Plant Deck – base build retained

Distribution Office 1 First Floor riser – base build retained

Distribution Office 2 First Floor riser – base build retained

Warehouse Welfare Block – Welfare block removed. DB reused for warehouse power

RRU Building – base build retained

ECV DB’s in car park “island” areas – base build retained

Additional DB’s for 1st floor office lighting and power

Kitchen Panel board and distribution boards – 1st floor riser

**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.

**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 W.C’s for items such as hand dryers and disabled toilet alarms with the spurs mounted at high level.

**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.

**Kitchen**

Supplies to kitchen appliances and services are taken from dedicated distribution boards located in the first floor riser above the kitchen. Local isolation is provided as required in accordance with the requirements of the kitchen specialist.

**Warehouse**

The existing dock door busbars and door supplies are retained as existing. Sockets outlets are installed adjacent to each dock door fed from the existing dock door busbar.

Six new distribution boards have been installed for general purpose small power around the warehouse. The boards are located around the perimeter of the warehouse. The distribution boards provide supplies for the general small power sockets and comms cabinet supplies.

* DB26 – GL 25/K
* DB27 – GL 38/K
* DB28 – GL 10/K
* DB29 – GL 52/H4
* DB42 – GL 23/C
* DB43 – GL 14/C
* DB42 – GL 38/C
* DB45 – GL 1/D2
* DB50 – GL 38/C for battery charge

Power supplies are provided for the following:

* VNA charge
* Pallet Profile
* Forklift workshop c/w general small power
* Each comms cabinet has 2 No 16A outlets on different circuits fed from the same distribution

 board.

* Power supplies to end of aisle printers
* Rat mat
* Bird scarer

**Mechanical services wiring**

Power supplies have been provided for the external heat pumps located adjacent to each distribution office. Supplies are taken from the main LV panels.

**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.

Additional containment has been installed for lighting header bar supplies and general-purpose small power. Cable basket has been installed at high level across the warehouse for data cabling.

**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.

Data basket has been installed throughout the site for distributing data cables. A data cable “mesh” is installed within the floor void of the office areas.

**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.

**1st Floor**

Lighting to the first floor open plan area is provided by Tecton Trunking mounted linear LED fittings with integral PIR.

**2nd floor Plant Deck.**

Lighting to the first floor is provided by manually switched Tecton 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.

**Warehouse Lighting**

In the warehouse areas and mezzanine hi-bay LED Thorlux lighting has been used connected to Thorlux Zipline lighting busbar. The Hi-Bay LED fittings are fitted with “wide angle” reflectors in open plan, marshalling mezzanine areas and rack reflectors in racked areas. Fittings above the mezzanine areas are mounted at 4M above the mezzanine floor level.

All fittings are switched in groups with control via Thorlux smartscan control system. The smartscan system wirelessly links luminaires into a Gateway which collects and transmits their energy performance data and complete operational information. The data from all SmartScan luminaires, is transmitted to the SmartScan Website for viewing using tablets, smartphones, laptops and computers. The SmartScan Gateway has a 230V mains supply to operate as all communication is via a secure MQTT GSM connection. See manufactures literature for further information

Each run of lighting busbar is fed from a header busbar. The header busbars are fed from either the main LV or local sub distribution boards. All header busbar are fed via SWA cables routed on cable tray.

**Warehouse Emergency Lighting**

Emergency lighting to the warehouse and below mezzanine has been installed to meet the requirements of BS5266-1 with an integral emergency pack to the necessary fittings. Illuminated exit signage is provided to fire exit doors with and external bulkhead on the exterior.

Emergency fittings are indicated with a green LED indicator to show both power is present and that the batteries are charging. The LED will display red when a fault is present.

As the emergency lighting is controlled via the smartscan control system there is no provision of emergency test keys at the DB’s or main panels, see manufactures literature for further information.

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

**External Lighting**

The existing external lighting has been retained with no alterations.

The external canopies are provided with surface mounted IP65 rated linear Led fittings with integral smartscan PIR/photocell.

**Fire Alarm**

The existing category L1 fire alarm system in the office areas has been altered and extended to suit the fit out works.

The existing category M1 fire alarm system in the warehouse has been upgraded to a L1 system with air sampling protection at high level.

The fire alarm is controlled and monitored by a main panel located at the office main entrance with lockable doors to prevent unauthorised access. Further panels are provided adjacent to the distribution offices for the warehouse and distribution office fire alarm. All panels are connected to form a network.

Fire alarm to the office and core areas has been provided by point detection either mounted in the voids created by room segregation when greater than 800mm and/or on ceiling tiles or open ceilings as necessary to comply with the level of Category. To open office and corridor areas standard detectors or detectors with integral sounders have been fitted as necessary to comply with the level of Category and to provide the necessary sound indication in the event of a fire. Within cleaners cupboards heat detectors have been used to try and reduce the possibility of false alarms generated by heat. Within W.C’s ceiling mounted sounder/strobes have been provided to give both a visual and audible alarm in the event of a fire.

The warehouse has been provided with call points at each exit door and at locations to suit the requirements of BS5839. Sounders/beacons are provided throughout the warehouse.

Detection to the warehouse and mezzanine is provided by a HSSD system, The system comprises of control panels located around the warehouse perimeter and within the racked area with “red” air sampling pipework. The panels are linked to the existing fire alarm system via fire alarm interfaces.

**Call Point**

Manual activation of the fire alarm is provided to call points at designated emergency exits from the office and also at change of levels.

**Fire Alarm Interfaces**

Single channel interfaces have been provided to give a signal when the fire alarm is operated to shut down mechanical plant and lower the lift to the ground floor unless a fire is detected in the ground floor reception, in which case, the lift shall return to the first floor. An output interface is provided to send fire alarm signal to the PV system. Fire alarm interfaces are also provided at each sprinkler flow switch.

Each door access controller is interfaced to the fire alarm system to unlock doors on fire activation.

**Cabling**

The fire alarm has been wired in a 120-minute fire rated cable installed on dedicated tray with metal ties where the cable rises vertically.

**Disabled Refuge Alarm**

The existing disabled refuge system has been retained with no alterations

**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**

The existing lightning Protection System has been retained. The additional canopies have been provided with connections to earth pits as required by BS EN 62305.

**Data**

The main comms room is located on the second floor of the main office with a dedicated trunking routed from the incoming fibre location. A diverse fibre network is provided between the main comms room and the distribution office comms cabinets.

**Office**

* Distribute and terminate Multi mode Fibre Back bone installation
* Provide Multimode fibre connection to RRU
* Main wiring cabinets in Comms room with integral UPS
* Fibre patch panels
* Cat ̕A Patch panels
* Cat ̕A cabling – Office areas only
* RRU Data cabinet
* Data outlets wall mounted or within floor box

**Warehouse**

* Multi-mode Fibre Back bone installation
* Distribution wiring cabinets (DWC) in warehouse, distribution offices, gatehouse
* Fibre patch panels
* Surface data outlets

All DWC's are supplied by Fibre Optic cables from the Main Office comms Room on diversely routed cable containment for business continuity in case of a link failure.

**Distribution Wiring Cabinets (DWC’S)**

Floor mounted Distribution wiring cabinets are installed throughout the warehouse areas to provide full coverage of all areas for CAT ̕ cabling installation. The cabinets in the main comms room and distribution offices are fed via a local 15KW UPS.

All cabinets have 2 No 16Amp supplies from local distribution boards.

**Security Systems**

The Security installation (CCTV/Access/Intruder) has been installed by a specialist sub-contractor.

**Door Access**

Access control is provided to various doors at multiple locations as per the drawings via door controllers. Access control is also provided at the car park turnstiles. The door controllers are installed at central locations, generally in risers or cleaner’s room.

Backup batteries are provided to power controller in the event of a power failure. When the batteries are depleted, the door will fail safe in each instance.

Access Control Readers are generally installed at a height of 1.2 metres adjacent to the non-secure side of each door. Card Readers are only installed on the non-secure side of the Access Control Door, egress from the secure side will be provided by a Request to Exit button. Surface mount double-pole resettable break glass units are installed at a height of 1.2 metres adjacent to the secure side of each access-controlled door to provide egress in times of emergency.

Access control cards will also be provided. Card programming is to be carried out by a member of the end user Staff.

**Video Intercom**

Video intercoms are installed at each turnstile location. The intercoms are connected to a video handset located at the main reception desk.

**CCTV**

 The system is IP based CCTV system and comprises of:

CCTV cameras

CCTV Server located within comms room cabinet

All cameras are IP/POE connected to Active IT/Switching equipment. A data network is provided for the CCTV system, including all cabling, POE switches racks and network points of sufficient capacity to handle the proposed CCTV system.

**Recording**

All cameras are recorded on CCTV servers located in a rack withing the comms room

**CCTV Columns**

A CCTV camera post is installed to cover main entrance near to the gatehouse.

**Intruder Detection**

An intruder alarm system is installed to cover the main office and warehouse perimeter. The system is controlled from a Security panel located in the main office Comms Room.

Intruder alarm keypads are located adjacent to the main office entrance and next to the security panel in the main office comms room.

Door contacts are installed at all external doors. The warehouse external doors are also provided with an intruder alarm door guard.

Dual tech sensor are installed to the ground of the main office and around the warehouse perimeter for intruder detection

**Testing and Commissioning**

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

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

**Information provided by A&F Sprinklers, the Fire Sprinkler Designers (If applicable)**

1.3.3 Site Works and Infrastructure

**Information provided by Frank Shaw Associates, the Architects**

The service yards and HGV access routes are constructed from in-situ concrete. Other access points are laid to tarmac. Car parks and footpaths are finished in concrete block paving. There is a comprehensive soft landscaping scheme consisting of grass, indigenous trees, and shrubs. Additional site protection measures have been installed including armco.

**Information provided by Richard Jackson, the Civil and Structural Engineers**

Accesses (SCC Adoption standards (DMRB), yards (TRN 66), carparks (Suds manual), below ground foul (Part H) and surface water drainage (SCC LLFA criteria) Retaining wall foundations.