

Brambles House
Waterlooville

Building Services Performance Specification

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Direct
Synergy

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1.00 Introduction

- 1.01 This scope of works is a summary specification document which describes the scheme of works for the mechanical, electrical and public health services installations at Brambles House, Waterlooville, PO7 7UW.
- 1.02 Redundant services shall be removed from areas of the building serving (except where the installation is built into the structure) and replaced with new installations.
- 1.03 The building engineering services shall be tested and commissioned in accordance with CIBSE and BISRIA recommendations.
- 1.04 Record drawings and operating and maintenance manuals shall be provided for the building engineering services.
- 1.05 The whole of the works shall be undertaken in a professional manner commensurate with the needs of a modern building environment suitable for high quality industrial units and shall be of a style and manner as would be expected of a quality development.
- 1.06 The works shall comply with all relevant British standards, Building Regulations, and other statutory requirements together with industry standard best practice.
- 1.07 Deleterious materials generally to be known as deleterious at the time of construction shall not be used.
- 1.08 The materials used for the works shall match existing or be of no lesser standard and performance.
- 1.09 The Contractor shall be responsible for the design, supply, installation, testing and commissioning of the Building Services.
- 1.10 The Contractor shall provide all necessary secondary support steelwork required to install the mechanical services installations. The fixings to the structure shall be suitable for the load imposed by the services installations and shall comply with the Structural Engineers requirements. The Contractor shall make sure waterproofing membranes not to be compromised by fixings.
- 1.11 The Contractor shall ensure that all the building services installations are installed such that it is fully accessible for maintenance purposes, which shall include all manufacturer's recommendations. Within plantrooms the plant shall be positioned to permit any item to be individually removed without the need to remove other plant and equipment items or sections of the pipework and ductwork distribution. The Contractor shall ensure that where continuous plasterboard (or other inaccessible design) ceilings are specified by the Architect the services installations are arranged such that no access panels are necessary (unless agreed and coordinated in advance with the Architect). The Contractor shall confirm the additional access panels as required, and this item shall be recorded in their working drawing layouts.
- 1.12 The Contractor shall allow for all liaison and co-ordination necessary with all other work package contractors to complete the building services installations. The Contractor shall provide all necessary liaison to ensure that their commissioning programme is co-ordinated with the installation and commissioning/testing programmes of all other works package contractors.

- 1.13 During the tendering process the contractor shall carry out the survey of the building. The contractor shall make note of the existing site conditions and the restrictions. The contractor shall make suitable allowances for any special measures in their tender as necessary.
- 1.14 The Contractor shall allow for suitable access equipment for removal and making good for the redundant installations installed externally and on the roof such as tenant's redundant security installations, TV aerials, mechanical plant, ductwork, etc.
- 1.15 The Contractor shall allow for making good all disturbed surface utilising finishes and materials (to match the associated surface) following strip out and removal of redundant services. The work shall be completed to good standard.
- 1.16 The contractor shall allow for minimum 10 working days for consultant engineer to complete review / appraisal of the technical submissions (calculations, equipment selection, drawings, etc.). The information commenting will be based on the A, B and C status process where A means no comments and the installation can progress in accordance the submission; B means the installation may proceed taking actions based on the comments provided and the information to be updated and re-submitted to suit the comments; and C mean the submission is rejected and the installation cannot be progressed based on the submission. Any installation carried out based on a C status submission cannot be accepted.

2.00 Design Criteria

2.01 The specific design criteria is as follows:

Mechanical Services

2.02 External Conditions

Winter	-4°C db / 100% humidity
Summer	30°C db / 20°C wb

2.03 Building Fabric Infiltration Rate

Winter	1 ACH
Summer	0.5 ACH

2.04 Internal Conditions:

Office Areas	Winter	20°C db +/- 2°C / no humidity control
	Summer	24°C db +/- 2°C / no humidity control
Shower and Toilets Areas	Winter	20°C db minimum / no RH control
	Summer	No maximum temperature control / no humidity control
Warehouse areas		No temperature control / no humidity control

2.05 Building Services Noise Criteria

Office areas	NR38
Tea point	NR40
Shower and toilet areas	NR45
External Areas	In accordance with the local Environmental Health Officers guidance

2.06 Internal Gains

Small power	20 W/m ² for office area terminal units
Lighting	8 W/m ² office areas
Occupants	90 W sensible and 50 W latent, per person

Building Services Performance Specification

2.07 Occupancy Rates

For fresh air ventilation and Comfort Cooling	1 person per 8m ² NIA
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2.08 Ventilation Rates

Office fresh air supply rate	12 litre/s per person - via openable windows (in addition to fabric infiltration) for perimeter FCU zones - via HRU for internal FCU zones
Toilet and Shower Extract	10 ACH or 25 l/s per cubicle, whichever is greater.
Tea point extract	15 l/s

2.09 Controls Tolerance

Controls tolerance on room temperature	± 2°C at point of measurement
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Electrical Services

2.10 Lighting Level

Office areas	375 to 400 lux (maintained illuminance) at 0.75 m working plane. Uniformity shall be 0.7 based on 70% reflectance for ceilings, 50% reflectance for walls and 20% reflectance for floor and upward reflecting surfaces. UGR 19 or less
Tea points	250 to 300 lux (maintained illuminance) at floor level
Plantrooms and Risers	250 lux (maintained illuminance) at floor level
Toilets, Shower, Staircase and Corridor Areas	200 lux (maintained illuminance) at floor level
Warehouse area	200 lux at floor level
Emergency Lighting	In accordance with BS 5266 / Minimum 1 lux at floor level.
External areas	In accordance with the CIBSE Lighting Guide
All other areas	In accordance with the CIBSE Lighting Guide
Luminous efficacy	Minimum 120 Lumens / Circuit Watt (average) for all areas)

2.11 Small Power Allowance

Office areas	20 W/m ² NIA
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2.12 Fire Alarm System - In accordance with BS 5839, Part 1, Category L2

Public Health Services

2.13 Plumbing Design Guide for Office Development BS 8558, BS EN 806 and BS 6700: Design Installation, Testing and Maintenance of Services Supplying Water for Domestic Use within Buildings.

2.14 BS EN 12056 Code of Practice for sanitary pipework

2.15 BS EN 752 Drain and Sewer Systems Outside Buildings.

2.16 Building Regulations Part H

2.17 BS 12056-2:2000 "Gravity Drainage within Buildings".

2.18 HSE Approved Code of Practice (ACoP) Guidance L8, Legionnaires Disease: The Control of Legionella Bacteria in Water Systems

2.19 CIBSE TM13, Minimising the Risk of Legionnaires Disease.

2.20 Cold and hot water pipework shall be copper tubing to BS EN 1057 with capillary jointed (integral solder ring) with 100% free solder plus flux.

2.21 Horizontal and vertical soil vent pipes shall be socket less cast iron above ground pipework to BS 416 or BS EN 877 with mechanical joints with earthing continuity strip as Ensign System.

2.22 Horizontal branch wastes, soil floats shall be uPVC to BS EN 4514 and BS EN 1329-2 as Polypipe Terrain series 100 & 200.

2.23 Point of use hot water heaters shall be sized for 5 litres storage per wash hand basin, 15 litres storage per sink and 45 litre storage per shower.

3.00

Design and Installation Standards

The Contractor shall ensure that the design and installation of the building services installations fully comply with all the statutory obligations, requirements and recommendations included in the documents listed below. Contractor shall ensure the works comply with the current edition of the published documents.

- 1) All British Standard Specifications
- 2) All British Standard Codes of Practice
- 3) The Health and Safety at Work Act
- 4) Recommendations of the Health and Safety at Work Executive
- 5) Factories Act
- 6) Offices, Shops and Railway Premises Act
- 7) Local Government Acts
- 8) Electricity Acts
- 9) Public Health Acts
- 10) Electricity at Work Regulations
- 11) Clean Air Acts
- 12) Control of Pollution Act
- 13) Workplace (Health, Safety and Welfare) Regulations
- 14) The Construction Regulations
- 15) Building Research Station Digest Recommendations
- 16) Local Byelaws and Regulations
- 17) Requirements of the Building Control Officer, Fire Officer and Environmental Health Officer
- 18) The Employer's Insurers requirements
- 19) Loss Prevention Council
- 20) Requirements of the local Water Supply Company, Electricity Supply Company and local Authority
- 21) Local Water Supply Authority Requirements
- 22) Water Supply/Water Fittings/Regulations.
- 23) The Institution of Engineering Technology Wiring Regulations for Electrical Installations including all amendments and Appendices.
- 24) COSHH
- 25) Requirements of British Telecom and other telecommunications companies whose services are in the building.
- 26) Local Authority Regulations and Approvals
- 27) Local Water Supply Company Byelaws
- 28) All documentation, recommendations, guides, etc., produced by the Chartered Institution of Building Services Engineers, including:
 - Guides
 - Commissioning Codes
 - Technical Memoranda
 - Practice Notes
 - Energy Notes
 - Codes Lighting Design
 - Knowledge Series

- 29) BSRIA Commissioning Codes and Application Guides
- 30) Institute of Plumbing Design Guide
- 31) Manufacturer's stipulations and recommendations for installation, testing, commissioning and maintenance
- 32) All bodies and authorities having jurisdiction.
- 33) Building Regulations
- 34) Gas Safety Regulations
- 35) Water Supply Regulations
- 36) BESA Guidelines and Specifications
- 37) Eurovent Guidelines
- 38) ACPO Policy (security systems)
- 39) NACOSS Code of Practice
- 40) Equality Act
- 41) British Council of Office Guides
- 42) LDSA Fire Safety Codes
- 43) Water Regulations Advisory Scheme
- 44) Construction Products Regulations
- 45) CDM Regulations
- 46) Health and Safety Executive Guidance Note EH48.

4.00 Electrical Services

4.01 Introduction

The following principal electrical engineering service shall be provided for the warehouse, office, common parts, toilet areas and external areas at Brambles House:-

- Strip out redundant electrical installations
- Overhaul the incoming electrical supply arrangement
- Provision of new electrical distribution equipment
- Provision of new distribution boards and sub-main cabling
- New lighting, lighting controls and emergency lighting installation
- New small power installations
- New fire alarm installations
- New disabled WC / shower alarm systems
- New photovoltaic installations (including the option costs)
- New electric vehicle charging point installations
- New energy monitoring system
- Overhaul of existing lightning protection system
- Testing and commissioning
- O&M manuals and record drawings

4.02 Scope of Works

The scope of works associated with the refurbishment of warehouse, office, common parts and toilet areas shall include, but not necessarily be limited to the design, supply, installation, testing and commissioning of the following works: -

- 4.02.01 The Contractor shall be responsible for the full design, supply, installation, testing and commissioning of the electrical installations.

4.03 Existing Installations and Strip Out

- 4.03.01 The Contractor shall carry out a site survey of areas of works including a full condition survey to ascertain the full strip out and refurbishment works.
- 4.03.02 The Contractor shall strip out the redundant small power installations including power supplies, socket outlets, conduits, etc.
- 4.03.03 The Contractor shall strip out all the tenant's data and IT installations including servers, cabinets, data points, routers, boosters, outlets, power supplies, UPS, cabling, etc. The data cabling within the floor, ceiling void, dado trunking etc. shall be removed in its entirety and disposed of.
- 4.03.04 The existing utility company fibre and copper telecom lines shall be retained. The existing Customer Splice Point (CSP) and the distribution point shall be relocated on the wall.

- 4.03.05 The Contractor shall strip out and remove the BT Openreach ISDN line boxes and telephone outlets installed by the tenant throughout the building, including the data cabling back to the incoming BT main distribution point in the building. The telephone lines for the intruder alarm shall be decommissioned and removed. The telephone lines for the lift auto dialer and the fire alarm Redcare shall be replaced for the new installations. The Contractor shall allow for all necessary liaison with BT Openreach. To avoid delays in the program the Contractor shall ensure the BT Openreach application for the relocation of their assets is undertaken in a timely manner and the works program also allow for reasonable provision in accordance with BT Openreach timeframes.
- 4.03.06 The Contractor shall strip out the tenant installed IT and telecom equipment from the office and warehouse area.
- 4.03.07 The Contractor shall strip out the existing sub-main panels and distribution boards throughout the warehouse and office areas. The cabling shall be stripped back and removed from the main switch panel located in the main intake room.
- 4.03.08 The existing utility meter shall be retained and reused.
- 4.03.09 The existing main floor standing intake panel in the switch room shall be stripped out and replaced with new. The Contractor shall provide temporary power either via a temporary feed from the main incoming supply or a temporary standby generator during the main intake panel replacement works.
- 4.03.10 The Contractor shall allow to remove all existing outgoing services from the switchpanel. All redundant cabling shall be stripped out from the panel. Note: The utility metering CT chamber and fuses shall be retained and reused. The Contractor shall allow for SSE to temporarily isolate and remove the fuses to allow for the intake panel replacement works to be carried out. The Contractor shall allow for a temporary generator on site during the shutdown.
- 4.03.11 The existing power factor correction equipment and all associated cabling shall be stripped out from the main intake room.
- 4.03.12 The existing photovoltaic (PV) supply isolator shall be stripped out from the main intake room. Note: The Contractor shall provide a cost option to retain and reuse the existing fuse switch isolator subject to validation.
- 4.03.13 The Contractor shall strip out and dispose of the existing lighting installations from the reception, office, toilets, plant room and warehouse areas in their entirety. This shall include all luminaires, associated cabling, switches, containment and supports.
- 4.03.14 The existing power supplies for the mechanical and public health services shall be stripped out in their entirety including supplies to the external plant.
- 4.03.15 The small power installation throughout the reception, staircase, office, toilet and plant room areas shall be stripped out in its entirety including all outlets, cabling, containment and ancillary equipment.
- 4.03.16 The small power installation throughout the warehouse areas shall be stripped out in their entirety including all tenant's installations.
- 4.03.17 The power supplies for lift installation, roller shutters, fire alarm, tenant's security installations and disabled WC alarm shall be stripped out in their entirety.
- 4.03.18 The Contractor shall strip out and remove all tenant's security installations including cabling, control units, intruder alarms, CCTV cameras, alarm keypad, PIR, door contacts, etc. and all associated cabling, containment, and power supplies. The external wall mounted alarm units shall be removed.
- 4.03.19 The Contractor shall strip out and remove all tenant installed access control installations including video entry phones, external call panel, maglocks, door controllers, push to exit buttons, card readers, green break glass units and associated cabling, containment, and power supplies.

- 4.03.20 The existing fire alarm devices and fire alarm panel shall be removed and replaced with new devices and panel, including any fire alarm cabling.
- 4.03.21 The Contractor shall strip out tenant installed external signage power supplies.
- 4.03.22 The existing external LED flood lights, bollards, column lights and wall lights shall be stripped out including all cabling and containment.
- 4.03.23 The Contractor shall strip out and remove all redundant tenants' bespoke installations.
- 4.03.24 All existing redundant cable containment and supports shall be stripped out and removed.
- 4.03.25 The existing roof photovoltaic (PV) installation shall be stripped out in its entirety including all panels, cabling, inverters and ancillary equipment. Note: The Contractor shall provide a cost option to retain and reuse the existing installations subject to client confirmation. The Contractor shall allow to service, overhaul, test and commission the existing PV system as part of the works.

4.04 Incoming Electrical Supply, Metering and Main Intake Panel

- 4.04.01 The industrial unit is provided with a 1600A TP&N low voltage (LV) supply from the existing SSE substation (Ref: Hampshire Cosmetics S/S No. 7423677) located externally in a caged enclosure near the front entrance. The supply terminates into a main floor standing LV intake panel in the electrical switch room opposite the substation. The main utility meter is located on the wall adjacent to the intake panel with the metering CTs and fuses.
- 4.04.02 As part of the refurbishment works, the existing incoming supply and utility meter shall be retained and reused.
- 4.04.03 The existing main LV intake panel associated with the building shall be stripped out and replaced with a new main LV intake panel to serve the building. The works shall be carried out in a phased manner so that a temporary supply is maintained in the building during the refurbishment works. The Contractor shall program the intake panel replacement works to suit the overall program.
- 4.04.04 The Contractor shall supply and install a new main 1600A rated LV intake panel to serve the building. The intake panel shall be fed from the existing incoming supply on site. The new intake panel shall be installed within the existing switch room.
- 4.04.05 The Contractor shall liaise with SSE to carry out temporary disconnection of the main incoming supply to allow for the panel replacement.
- 4.04.06 The main intake panel shall be a free-standing front access panel with top entry and top exit cabling to minimum Form 4 Type 2 construction.
- 4.04.07 The Contractor shall review the site installations to ensure that the proposed intake panel arrangement fits within the switch room.
- 4.04.08 The following shall be incorporated as integral installations within the intake panel: -
 - Digital Ampere, Voltage, kW, kVA, kVAR and power factor meter on the main incomer
 - Power factor correction equipment
 - Surge suppression device
 - MID approved check meters on all outgoing ways and space for meter installation for spare ways
- 4.04.09 The Contractor shall ensure that adequate space is available for the main intake panel, taking account of proximity to other services, access for maintenance and installation of equipment and cable termination requirements during installation. The Contractor shall note the existing height restrictions in the electrical switch room while designing the main panel.

- 4.04.10 The intake panel shall be arranged to provide top cable entry/exit with front access.
- 4.04.11 The Contractor shall ensure that he has provided sufficient information to the specialist switchgear manufacturer to enable the intake panel to be prepared and delivered to site in sections where necessary ready for erection and to enable easy access taking account of any site restrictions, doorways, etc. in accordance with the Contract programme.
- 4.04.12 The Contractor shall submit to the CBSE fully detailed and dimensioned drawings of the intake panel, indicating proposed panel layout, construction details, cable termination facilities, switchgear and fuse switch sizes, earthing facilities and proposed labelling. Manufacture of the intake panel shall not commence until the Contractor has obtained the CBSE's written approval of the construction drawings. The CBSE reserves the right to witness all of the tests that are required to be carried out on the main intake panel to comply with the requirements of BS EN 61439 and the specification. Tests shall include injection test, simulated interlocking procedures and cause and effect of incoming actions. The Contractor shall provide a minimum of 7 working days written notice of the manufacturer's intention to carry out the test. Any costs required to facilitate the CBSE and the Client's appointed representatives to attend the manufacturer's test shall be borne by the Contractor.
- 4.04.13 The Contractor shall be deemed to have visited site to assess the full extent of the works.
- 4.04.14 The intake panel shall be front access free standing design as a minimum to BS EN 61439-1 on all incoming and outgoing ways.
- 4.04.15 The intake panel shall be of the metal clad type free standing floor mounted air insulated switchgear, with incoming cables top entry and outgoing cables arranged for top exit as applicable and shall be drip, damp and vermin proof and have an enclosure ingress protection code IP31 to BS 5420.
- 4.04.16 The maximum achievable height of the intake panel above finished floor level shall be confirmed by the Contractor based on the current site conditions.
- 4.04.17 The intake panel shall be a single busbar system, incorporating incoming and outgoing ways. The busbar system employed shall be of an adequate design to ensure optimum current carrying values are maintained throughout the busbar length. The busbar system arrangement shall be adequately rated.
- 4.04.18 The busbars shall be 4 pole air insulated, mounted on polyester glass fibre supports. The horizontal and vertical busbars shall be contained within segregated sheet steel compartments / chambers.
- 4.04.19 The busbars shall be single section copper or laminated untinned copper sections and bolted with zinc plated high tensile steel bolts.
- 4.04.20 All outgoing terminations including the neutral shall be made off within the protective device (common neutral terminations shall not be used).
- 4.04.21 Phase colour indications shall be fitted at various locations throughout the busbar system.
- 4.04.22 The main intake panel shall incorporate air circuit breaker as an incoming device and outgoing moulded case circuit breakers in conformance with the requirements of BS EN 60947-2 and IEC 947-2 and shall be certified with a minimum ICU/ICS of 50 kA for one second. All necessary moulded case circuit breakers shall be factory fitted and tested before dispatch. The Contractor shall provide spare breakers fully fitted with the devices as indicated on the distribution schematics.
- 4.04.23 All moulded case circuit breakers shall be of the three or four pole type. All moulded case circuit breakers shall be supplied and installed with variable depth handle mechanism's to convert the operating handle.
- 4.04.24 All protective relays shall be capable of functioning correctly up to a total harmonic voltage distortion of 5% resulting from any combination of harmonic currents generated by the load.

- 4.04.25 All moulded case circuit breakers shall be supplied with the following accessories as listed below: -
- i) Fixed Pattern/Plug In
 - ii) Electronic Relays Micrologic 5.0 for incomer and Micrologic 2.2 Trip units for outgoing devices
 - iii) External door interlocked operating handle (provide facility to change handles to non- interlocked type with defeatable interlocks.)
 - iv) Padlocking Facility on handle.
- 4.04.26 The intake panel shall be provided with current transformers located within the panel to facilitate meter reading for the electricity supply authority, and kWh sub-meters (digital type) where required.
- 4.04.27 The main intake panel and components shall be constructed to a symmetrical fault withstand capability of minimum 50kA for 1 second in accordance with IEC 157/1.
- 4.04.28 A substantial copper earth bar shall be provided running the entire length of the intake panel.
- 4.04.29 Each gland plate, support for protective device and door with electrical apparatus mounted upon, shall be bonded by means of earth conductor to the earth bar. A bolted earth bar link shall be provided between each adjacent section.
- 4.04.30 The main intake panel shall incorporate MID approved kWh meters (digital type) on the major outgoing ways as indicated on the design intent schematic. The meters shall be provided with modbus outputs for connection to the energy monitoring system (EMS).
- 4.04.31 All equipment associated with the distribution and switchgear panel shall be installed, fitted and further tested at site once the panel has been coupled/erected.
- 4.04.32 An earthing bar of adequate capacity to withstand the maximum earth fault current for a period of one second or a minimum dimension of 50 x 6mm, whichever is the greater. This shall be provided along the entire length of the intake panel.
- 4.04.33 The LV intake panel shall be connected onto the earthing system to form a common earthing system, using single core copper cables with green/yellow LS0H sheath.
- 4.04.34 As part of these works, the main LV intake panel shall be fitted and protected against transient over voltage by means of new electronic protection device on the load side of both incoming terminals, as manufactured by WJ Furse & Co Ltd or equal and approved. The cabling to the equipment shall be contained within the intake panel with unit flush mounted either fused direct or through a glazed door.
- 4.04.35 The main intake panel shall incorporate power factor correction equipment automatically controlled to achieve a power factor value of 0.95 or better. The Contractor shall include for supplying and installing one LC reactor cubicle.
- 4.04.36 The Contractor shall be deemed to have included for the supply and installation of the following multicore XLPE/SWA/LS0H control cables as listed below:-
- Control circuits from the red phase CT to communicate with each LC reactor cubicle.
- 4.04.37 The Contractor shall be responsible for ensuring that all protective devices have been properly selected, set and calibrated to provide adequate discrimination where deviated from the specification. The Contractor shall carry out a discrimination study as part of the technical submission approval prior to ordering the main intake panel.
- 4.04.38 The specialist switchgear subcontractor shall include for the supply and installation of the following equipment within the switch room:

- New LV schematic mounted in a glazed frame within the main intake room.
- New treatment for electrical shock notice in accordance with the Electricity (Factories Act) special regulations Reg. No. 29 within the main intake room.
- Continuous rubber mat to BS 61111 in front of the new intake panel.
- Traffolyte label to indicate the system operation/test procedures.

4.05 Sub-Main Distribution, Distribution Boards and Cabling

- 4.05.01 The Contractor shall design, supply and install a new floor standing or wall mounted MCCB type panel board to serve the office and warehouse areas. The panel board shall be served from the main intake panel in the switch room. The panel board shall be located on the warehouse wall behind the reception.
- 4.05.02 The Contractor shall design, supply and install a new floor standing or wall mounted MCCB type panel board to serve the roof photovoltaic array. The panel board shall connect to the main intake panel in the switch room. The panel board shall be located in the 2nd floor plant room area. Note: The Contractor shall provide a cost saving to retain and reuse the existing PV input panel located in the 2nd floor plant room.
- 4.05.03 The Contractor shall design, supply and install new split metered distribution boards to serve the warehouse, office and ancillary area power requirements as per the below:
- DB/W – Warehouse lighting and power
- DB/W2 – Warehouse lighting and power
- DB/LLR – Reception and common area lighting and power
- DB/T1 – 1st floor office lighting and power
- DB/LL2 – 2nd floor plantroom lighting and power
- DB/LMR – Lift services lighting and power
- DB/EXT – External services lighting and power
- 4.05.04 The new distribution boards shall be fed from the new intake panel or the warehouse sub-main panel board as indicated on the design intent schematic.
- 4.05.05 The new distribution boards shall be of the split metered type with separately metered lighting and power section as indicated in the distribution board schedules. The check meters in the distribution board shall be complete with modbus and pulse outputs for integration into an energy monitoring system.
- 4.05.06 The new distribution board serving the external services shall be installed within the main switch room.
- 4.05.07 The Contractor shall supply and install new suitably sized multi-core armoured XLPE/SWA/LSOH cabling from the main intake panel and the sub-main panel board to serve the various distribution boards, plant and equipment in the building. The cabling shall be installed on suitably sized containment.

- 4.05.08 The new distribution boards shall be wall mounted metal clad type, incorporating load breaking, 100A integral or greater as required with non-automatic isolator, miniature circuit breakers and hinge lockable covers. Distribution boards shall be of TP&N pattern and shall incorporate a minimum of 30% spare TP&N ways of miniature circuit breakers as required for the outgoing final circuits, 1 half of the spare ways shall be provided with miniature circuit breakers of appropriate rating with the remaining spare ways being fitted with proprietary manufactured blanking plates.
- 4.05.09 All final circuit neutral conductors shall be connected in the same order as phase conductors and the Contractor shall also achieve reasonably balanced circuit distribution over the three phases.
- 4.05.10 All distribution boards shall be adequately marked using white plastic labels engraved in black lettering to a minimum height of 6 mm and fixed with screws, stating its full description and/or area served, the maximum voltage present and the fault level as so designed in accordance with BS EN 60439.
- 4.05.11 All distribution boards shall be fitted with earthing terminals which shall consist of a main copper bar allowing adequate termination facilities for the main earth continuity conductor. Where cross bonding of earth connections is required within distribution boards, these shall be accessible and clearly visible from internal inspection. Provision is to be made on the main earthing bus bar for adequate termination of all circuit cables, allowing 1 mechanical clamp connection per circuit and with the exception of ring circuits, bunching of earthing cables will not be permitted.
- 4.05.12 All distribution boards shall have copper bus bars, adequate for the full rating of the distribution unit and shall not be less than the rating of any phase supply conductor.
- 4.05.13 All new distribution boards shall be fitted with surge suppression device either integral or adjacent to the distribution board within a weatherproof enclosure.
- 4.05.14 All new distribution boards shall be manufactured by Schneider, Eaton or equal and approved. The distribution boards shall comply with BS EN 61439.
- 4.05.15 All distribution boards shall be adequately marked using white plastic labels engraved in black lettering to a minimum height of 6mm and fixed with screws, stating its full description and / or area served, the maximum voltage present and the fault level as so designed in accordance with BS EN 61439.
- 4.05.16 Where neutral busbars are installed, these shall be rated at the maximum current of any phase conductor and where required these shall be suitable protected from other live parts of the equipment. Reduced neutral bus bars shall not be installed. All neutral connections shall be as designed as to incorporate full size neutral conductors using mechanical clamp connections with suitable means of anchoring cables for each final circuit installed.
- 4.05.17 All distribution boards shall be fitted with earthing terminals, which shall consist of a main copper bar allowing adequate termination facilities for the main earth continuity conductor. Where cross bonding of earth connections is required within distribution boards, these shall be accessible and clearly visible from internal inspection. Provision is to be made on the main earthing busbar for adequate termination of all circuit cables, allowing 1 mechanical clamp connection per circuit and with the exception of ring circuits, bunching of earthing cables will not be permitted.
- 4.05.18 All distribution boards shall have copper busbars, adequate for the full rating of the distribution unit and shall not be less than the rating of any phase supply conductor.

- 4.05.19 Circuit schedules shall indicate phasing, connected load, circuit breaker and final circuit cable size.
- 4.05.20 Miniature circuit breakers shall conform to the requirement of BS 60898. Miniature circuit breakers for lighting and small power circuits shall be with a type 'C' operating classification. RCD/RCBO protection shall be provided on general purpose socket outlet circuits. Upon completion of the installation, any designated spare ways within distribution boards shall be fitted with proprietary manufactured blanking plates.
- 4.05.21 The Contractor shall design, supply and install from the main intake panel, new XLPE/SWA/LSOH multicore cables to serve the new panel board, distribution boards, plant and equipment as necessary.
- 4.05.22 The Contractor shall design the cable size requirements. The new sub-main cables shall be designed to carry the design load plus 20% spare capacity. The cable sizing shall be carried out in compliance with BS 7671 – 18th Edition.
- 4.05.23 All cables shall be continuous throughout their length. Through joints will not be accepted. All cable terminations shall be made using compression type cable glands and lugs. Materials used in the manufacture, together with the manner in which the installation is carried out shall be such that no deleterious effects will occur to either the cable armouring or the cable gland.
- 4.05.24 All cables shall be clearly identified and labelled at both ends of the cable route, stating the source of supply and the load served. In respect of cables serving final circuit equipment, the cable shall be identified at both ends stating the source of supply and circuit number as well as load served.
- 4.05.25 Approved cable manufacturers:-
- Draka
 - Prysmian
 - AEI
- Or equal and approved.
- 4.05.26 The Contractor shall be deemed to have included for all cable lengths, runs having fully co-ordinated with all of the other services, structures, etc.
- 4.05.27 All sub-main and distribution cabling shall be supported on suitably sized cable trays within the risers and ceiling/floor voids.
- 4.05.28 Upon completion, the Contractor shall supply and install typed circuit charts within a clear perspex cover on the Contractors headed notepaper. The distribution charts shall provide the following information for each outgoing way:
- Load it is supplying
 - Cable size
 - Miniature circuit breaker rating
 - Area it is serving
 - Date of installation

4.06 Lighting and Lighting Controls Installation

- 4.06.01 The Contractor design, supply and install a new lighting installation within the office areas on the 1st floor. The light fittings shall be energy efficient luminaires with LED light source. The luminaires shall be of the recessed flat panel type and arranged on a regularised grid arrangement to suit the ceiling layout. The Contractor shall ensure that the luminaires are suitable for the proposed ceiling grid system. The Contractor shall confirm the ceiling grid arrangement with the lighting supplier prior to ordering the light fittings. The lighting installation shall provide lighting levels as indicated in the design criteria.
- 4.06.02 The Contractor shall supply and install a fully addressable DALI dimmable lighting control/management system on the office floor to encourage energy conservation and provide a flexible/adaptable installation for future tenant needs.
- 4.06.03 The lighting control system shall comply fully with the requirements of the latest Building Regulations Approved Document ADL2B.
- 4.06.04 There shall be no requirement for a front end PC, as the lighting on the floor will operate on a stand-alone basis.
- 4.06.05 The office area lighting shall be controlled using DALI lighting control modules (LCM), area controller and combined passive infrared motion sensors / photocell. Daylight dimming sensors shall be provided for the office areas to control the perimeter lights. The Contractor shall ensure that the maximum spacing between the PIRs is no more than 6m. The PIR coverage shall be provided so that there are no blind spots in all the areas. New LCM modules shall be provided, and these shall be suitable for DALI dimming control as necessary.
- 4.06.06 The lighting control system shall incorporate the ability for it to be amended via re-commissioning to suit tenant requirements. The lighting control system shall be provided with adequate access to carry out adjustments to all parameters on site with the help of a hand-held device.
- 4.06.07 All luminaires shall be DALI daylight controlled with zones within the workspace being occupancy controlled. All luminaires shall be dimmed to a pre-set level of 400 lux. The lighting control system shall have the ability to reduce the dimming levels to 10%.
- 4.06.08 Passive infra-red presence detectors shall be connected to the lighting control modules to switch on the lighting when people are detected in the area. Light level sensors shall be installed to control lighting control modules and luminaries adjacent to windows to dim the lighting under bright daylight conditions. Occupancy time out period shall be set between 15 seconds and 99 minutes.
- 4.06.09 The Contractor shall appoint the specialist lighting controls manufacturer such as Lighting Controls Ltd (Contact: Rob Walker, Tel: 079175 87287, Email: rob.walker@lightingcontrols.ltd.uk), to design, supply, test and commission the lighting controls installation. The Contractor shall include for attendance by the lighting control system manufacturer to commission, set to work and adequately demonstrate the completed installation.
- 4.06.10 All outputs from the LCM shall provide a permanent feed to the emergency luminaires. The test shall be carried out via the bus network and shall require one key switch being wired back to the area controller. A 10 minute, one hour or three hour test shall be operated through a key switch.
- 4.06.11 The lighting control installations shall be complete with local area controller for the unit located near the electrical distribution board, key switch for testing the emergency lighting.
- 4.06.12 New lighting circuits shall be provided from the office distribution board to serve the LCMs. All new lighting circuits shall be wired using either FP200 cables on trays or LS0H/LS0H single core cables in trunking and conduits with a minimum cable CSA of 2.5mm².

- 4.06.13 The office luminaires shall completely match and be fully integrated with the ceiling construction. The luminaires shall be provided in a grid pattern as indicated on the design drawings. In this regard the Contractor shall allow for the setting out/spacing of luminaires as indicated on the design drawings to achieve the required maintained illumination levels by dimming the luminaires as necessary. The Contractor shall provide a separate lighting zone in the ceiling void to ensure that other services do not interfere with the lighting zone. It shall be the Contractor's responsibility to co-ordinate on site installation of mechanical and electrical equipment in the ceiling void to achieve the lighting zone. The lighting zone shall be 65mm minimum for an LED option
- 4.06.14 The Contractor shall supply and install a new lighting installation within the main entrance lobby and reception area comprising suspended LED linear profile luminaires. The lighting circuits shall be wired from the lighting section of the new distribution board serving the reception area. The reception lighting shall be controlled via local PIRs.
- 4.06.15 The Contractor shall supply and install a new lighting installation within the toilet areas comprising recessed LED down lights. The lighting circuits shall be wired from the lighting section of the new distribution boards serving the toilet areas. The toilet area lighting shall be controlled via local PIRs.
- 4.06.16 The Contractor shall supply and install a new lighting installation within the main and secondary staircase areas comprising LED wall or ceiling. The lighting circuits shall be wired from the lighting section of the new distribution boards serving the staircase areas. The staircase lighting shall be controlled via PIRs installed on each landing.
- 4.06.17 The Contractor shall supply and install new linear LED batten type luminaires with polycarbonate diffusers within the plant and storerooms. The lighting circuits shall be wired from the lighting section of the new distribution board serving the common areas. The plant and storeroom lighting shall be controlled via local PIRs.
- 4.06.18 The Contractor shall supply and install new high bay circular LED lighting within the warehouse areas. The lighting circuits shall be wired from the lighting section of the new warehouse distribution board. The warehouse lighting shall be controlled via PIRs integrated within the warehouse high bay luminaires.
- 4.06.19 The Contractor shall supply and install new linear LED batten type luminaires with polycarbonate diffusers in the warehouse area under the office space. The lighting shall be controlled via local PIRs.
- 4.06.20 The Contractor shall supply and install new LED bulkhead type luminaires above each exit door from the warehouse area. The luminaires shall be installed both internally and externally above each door. The bulkhead lights shall be wired from the lighting section of the new warehouse distribution boards. The luminaires shall be of the non-maintained type and operate on power failure.
- 4.06.21 The Contractor shall supply and install new LED flood lights on the façade. The flood lights shall be wired on a radial circuit from the local distribution board as per the distribution board circuit schedules.
- 4.06.22 The Contractor shall supply and install new external lighting to the car park and ancillary areas as indicated on the design intent drawing. The external lighting shall be wired using multicore armoured cables installed within rigid ducts. The external lighting shall be controlled via time clock and photocells.
- 4.06.23 The Contractor shall supply and install new external buried rigid ducts for new external services cabling. The Contractor shall allow for all trenching, backfilling and making good of external surfaces to suit new installations.
- 4.06.24 The Contractor shall be responsible for arranging samples and providing technical submittals for approval to the design team prior to ordering the luminaires. The Contractor shall ensure that the arrangement of samples and the technical submittal approvals are carried out at the

start of the project and correctly programmed to avoid any delays to the project. Any costs associated with project delays and unapproved luminaire installations shall be borne by the Contractor.

- 4.06.25 The tender returns shall be based on the luminaires as specified. All option costs shall be provided as below the line figures.
- 4.06.26 All luminaires shall be provided as new unless otherwise noted as existing.
- 4.06.27 The lighting installation within the building shall be wired with FP200 cable on cable trays or PVC/LSOH single core cables in conduit and trunking.
- 4.06.28 The cables in the office areas shall generally be routed on the main cable routes and where cables exit cable tray to serve lighting control modules, the cables shall be clipped to the building soffit at a minimum of 0.5 m spacing. From the lighting control module/marshalling box, a number of luminaires (up to 8-9 no.) shall be served via flexible cords, generally of 3-4 m length. A minimum of 1 No. spare luminaire connection ports shall be allowed on each of the lighting control modules as of day one. Note: All cable clips shall be PVC covered metal clips. Plastic cable ties shall not be used in any location.
- 4.06.29 The lighting installation shall utilise a plug-in system to allow future layout flexibility.
- 4.06.30 The Contractor shall install the system such that within office areas the circuits associated with the lighting installation shall also afford the facility to locally switch luminaires without major disruption or alteration to the existing circuit wiring. To achieve this, the circuits will comprise a phase and neutral to each luminaire with a spare phase wire allowing for connection at a later date of the local switch line.
- 4.06.31 All cables and cable containment systems associated with office areas shall be totally concealed whether flush within the buildings fabric or within false ceiling voids. Concealed conduit installation within walls shall be carried out using galvanised steel conduits. Conduits installed externally within plant rooms areas shall be galvanised steel conduits.
- 4.06.32 The minimum size of conductor to be used when wiring the lighting circuits shall be 1.5 mm².

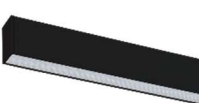
4.07 Emergency Lighting Installation

- 4.07.01 The Contractor shall design, supply and install a new emergency lighting installation for the offices, warehouse and ancillary areas to comply with the latest BS 5266: Part 1 and BS EN 1838 requirements.
- 4.07.02 The emergency lighting within the reception, office, toilets, staircase and plant areas shall generally be provided by 3-hour battery inverter packs integrated within standard luminaires. The emergency lighting shall provide a minimum maintained illuminance of 1 lux at floor level throughout all the areas in emergency mode.
- 4.07.03 The existing twin directional emergency lighting within the warehouse areas shall be stripped out and replaced with new twin directional LED emergency lighting as indicated on the design intent drawing.
- 4.07.04 New test facilities for emergency luminaires shall be provided by key operated test switch for each circuit located in a multi-gang switch local to the distribution board.
- 4.07.05 Escape / exit signage (pictogram type) shall be provided at all doors on escape routes and open plan areas (change of direction), 3-hour non-maintained type.
- 4.07.06 The emergency lighting shall be fully tested, commissioned and certified in accordance with the recommendations of BS5266. Upon completion of the whole of the emergency lighting installation, the Contractor shall complete and issue inspection and test certificates as required by the latest BS 5266, Part 1.

Building Services Performance Specification

4.07.07 The light fittings schedule for the tender, design and installation purposes shall be as per the luminaire schedule.

4.08 Luminaire Schedule

Type / Location	Reference	Image	Colour Temp (K)	LM/W	Control	OTHER
A/AE Reception and Offices	Tamlite MODLED PBL66300N WD+ STF66/ PBL66300N WDD3+ STF66		4000	130	DALI	UGR 19 recessed low glare reduction module, CRI>80, Opal polycarbonate TP(a) diffuser, extruded aluminium body white finish, integral driver. Type AE complete with 3-hour remote emergency battery pack
B / BE Toilets and lobbies with suspended ceilings.	Tamlite Astro		4000	110	PIR	Recessed low glare high output LED down light complete with opal diffuser and control gear. Type BE to be provided with 3 hour emergency backup. White finish.
C / CE Plant, storerooms and lobbies without suspended ceilings	Tamlite Cyclone		4000	156	PIR	Surface mounted linear IP65 rated LED batten type luminaire with polycarbonate diffuser. Luminaire complete with control gear and integral PIR. Type CE to be provided with 3 hour emergency backup. White finish.
D/DE D1/D1E Reception	Tamlite Signum N		4000	141	PIR	Suspended direct / indirect linear LED profile luminaire complete with electronic control gear and integral PIR. Type DE/D1E to be provided with 3 hour emergency

Building Services Performance Specification

Type / Location	Reference	Image	Colour Temp (K)	LM/W	Control	OTHER
						backup. Black finish subject to Architect's confirmation. Lengths to suit drawing layout.
EXIT1 Office	Tamlite ELITE ELES3E4		5000	-	Non-maintained	Recessed emergency exit blade, non-maintained, complete with integral driver and 3 hour emergency battery pack. Pictogram legend to suit direction of travel.
EXIT2 Warehouse exit doors	Tamlite Elite BH ELBM3E4		4000	-	Non-maintained	IP65 rated surface mounted LED bulkhead luminaire complete with electronic driver and 3 hour integral emergency battery backup. Pictogram legend to suit direction of travel.
EE Warehouse	Tamlite Elite ELTNNM3		4000	76	Non-maintained	Surface mounted Elite TS emergency twin spot, fixed output, non-maintained and 3 hour integral emergency backup.
F/FE Riser cupboards and store cupboards	Tamlite Nimrod S NMSP180N WW + M3		4000	106	PIR	Surface mounted square LED bulkhead luminaire complete with control gear. Type FE to be provided with 3 hour integral emergency backup.

Building Services Performance Specification

Type Location /	Reference	Image	Colour Temp (K)	LM/W	Control	OTHER
GE Staircases	Tamlite Saturn Circular Wall Light STN230NW M3		4000	135	PIR	Surface mounted circular wall/ceiling luminaire with polycarbonate body finished in white and complete with electronic driver. Type GE to be provided with 3 hour integral emergency backup
HE External exit doors	Tamlite City WL CWL90T2N WBM3		4000	-	Timeclock & photocell control. Emergency non-maintained	Surface mounted IP65 rated high performance wall light finished in black with wide optic, electronic control gear and 3 hour integral emergency battery backup.
JE External exit doors from warehouse	Tamlite Elite BH		4000		Timeclock & photocell control. Emergency non-maintained	Surface mounted IP65 rated wall emergency bulkhead with electronic control gear and 3 hour integral emergency battery backup.
K External flood lights	Tamlite Explorer		4000	125	Photocell / Timeclock	IP65 rated surface mounted high performance flood light

Building Services Performance Specification

Type Location /	Reference	Image	Colour Temp (K)	LM/W	Control	OTHER
L External walk ways	Tamlite City BL		4000	100	Photocell Timeclock	IP rated extruded aluminium bollard complete with control gear.
M External Car Park	Tamlite City RL		4000	143	Photocell Timeclock	IP rated high performance road lantern with area option complete with suitable height column and control gear.
W Warehouse Areas	Tamlite Alpha		4000	145	Integral PIR or microwave detector	High bay suspended LED luminaire with extra wide optic and integral control sensor.

Notes: -

- Design basis manufacturer for Luminaires shall as scheduled above.
- The tender returns shall be based on the above scheduled luminaires.
- Luminaires samples shall be provided prior ordering for Client's approval.
- All luminaires shall be provided with 5-year warranty/guarantee at no extra cost from the manufacturers.
- Tamlite Contact: Mr Ajay Chander, Mob: 07961805168, Email: AChander@tamlite.co.uk

4.09 Small Power Installation and Plant Supplies

- The existing small power installations throughout the building shall be stripped out in their entirety including all outlets, cabling and containment.
- The Contractor shall supply and install cleaner's socket outlets in the office areas. The socket outlets shall be wall mounted and wired on a separate ring circuit.
- The existing small power installation in the reception, corridors, staircases, tea point and toilet areas shall be stripped out and renewed as part of the works. The circuits shall be wired as

ring or radial circuits from the local area distribution board. Refer to distribution board schedules for the circuit types. The Contractor shall supply and install new power supplies to the following services:

- a. New reception general purpose socket outlets
- b. New reception desk socket outlets
- c. New disabled toilet / shower alarm supply
- d. New general purpose single socket outlets on each stair landing
- e. New general purpose socket outlets and fused connection units for the tea point areas
- f. New general purpose single socket outlets in the toilet lobbies
- g. New general purpose twin socket outlets in the plant / storerooms
- h. New fused connection units in the toilet areas for hand dryers

4.09.04 All general purpose socket outlets shall be provided with RCD protection. Hand dryer power circuits in the toilet areas shall be provided with RCBO protection at the distribution boards.

4.09.05 The Contractor shall provide all power supplies to items of fixed equipment by means of fused connection units or suitable isolators.

4.09.06 The existing small power installation in the warehouse areas shall be stripped out in its entirety. The Contractor shall provide a new twin socket adjacent to each distribution board and the main panel in the warehouse area. The sockets shall be wired as radial circuits from the distribution board in each area.

4.09.07 The Contractor shall supply and install new power supplies associated with the roller shutter doors. The new power supplies shall be wired on dedicated radial circuits from the power section of the new warehouse distribution board.

4.09.08 The Contractor shall supply and install switched fused connection units in the toilet areas for the hand dryers. The fused connection units shall be positioned tight to the underside of the ceiling with cable drop in metal conduit to feed a backbox with blanking plate in the location of the hand dryer. Hand dryer to be supplied by others.

4.09.09 The Contractor shall, design, supply, install, test and commission power supplies to all new mechanical services and public health equipment. The electrical contractor shall design, supply, install, test and commission power supplies to mechanical services equipment generally to the following items of equipment but not limited to: -

- Reception and office fan coil units, branch connector boxes and controls
- Reception and office external condensers
- Electric panel heaters in the staircase, toilet and ancillary areas
- Electric towel rails in the showers
- Reception overdoor heater
- Electric hot water calorifier immersion heater, circulation pump and trace heating tape
- Toilet ventilation fan
- Office heat recovery ventilation unit

4.09.10 The electric panel heaters within the reception, staircases, storerooms, plantrooms and toilet areas shall be wired using suitably sized FP200 cabling terminating in a 13A fused connection unit. The cabling shall be concealed within ceiling void or within the wall make up in the office and front of house areas. The new electrical cabling between the fused outlets and the electrical heaters shall be chased in the walls and concealed out of view.

- 4.09.11 The reception overdoor heater shall be wired using suitable sized XLPE/SWA/LSOH cabling terminating in a 32A TP&N isolator. The cabling shall be concealed within the ceiling void.
- 4.09.12 The immersion heater element in the electric hot water calorifier shall be wired using suitably sized FP200 or XLPE/SWA/LSOH cabling terminating in a 32A TP&N isolator.
- 4.09.13 The calorifier circulation pump and the trace heating tape shall be wired using suitably sized FP200 cabling terminating in a 13A fused connection unit.
- 4.09.14 The toilet extract fan shall be wired using suitable sized FP200 or XLPE/SWA/LSOH cabling terminating in a 16A isolator.
- 4.09.15 The office heat recovery ventilation fan shall be wired using suitable sized XLPE/SWA/LSOH cabling terminating in a 20A isolator.
- 4.09.16 The office and reception fan coil units, branch connector boxes and controls shall be wired using suitably sized FP200 or PVC/LSOH cabling in trunking and conduits terminating in a fused connection unit.
- 4.09.17 The Contractor shall supply and install a new suitably sized sub-main XLPE/SWA/LSOH cable to serve the new passenger lift. The supply shall terminate into a fuse switch isolator in the existing lift motor room.
- 4.09.18 All socket outlets, connection units, isolators and control switches shall be labelled clearly to identify the circuit feeding them and the item of equipment being served.
- 4.09.19 All cable and cable containment systems associated with warehouse and plant room areas shall generally be surface mounted. All cable and cable containment systems associated with office, staircase and toilet areas shall generally be concealed either flush within the building fabric or within suspended ceiling / floor voids. Where the cables are installed within ceiling / floor voids a system of cable trays will be installed to contain the wiring. Brackets to support the cable containment system will be installed at regular distances as recommended by the manufacturer. Metal cable ties shall be provided to support the cables on the tray. Plastic ties shall not be used.
- 4.09.20 All surface mounted cabling in the warehouse, plant room and store rooms shall be installed in galvanised steel conduits.
- 4.09.21 Any external supplies shall be via XLPE/SWA/LSOH cables wired in the form of radial circuits taken from the distribution boards to the point of termination. The XLPE/SWA/LSOH cables shall be installed in either ducts or on medium duty cable tray dependent upon the location.
- 4.09.22 The electrical contractor shall liaise with the mechanical / public health contractor to ensure the supplies for the mechanical / public health equipment are provided to the required locations.
- 4.09.23 All fused switched connection units and supply isolators serving the mechanical and public health plant shall be suitably labelled using weatherproof permanent labels indicating the circuit reference.

4.10 Earthing, Bonding and Lightning Protection Installations

- 4.10.01 The existing main incoming supply earthing arrangements shall be retained and reused.
- 4.10.02 The Contractor shall test and certify the existing earthing installations in the building. The Contractor shall design, supply and install a new earth bar in the main intake room and adjacent to the warehouse sub-main panel board.
- 4.10.03 The Contractor shall design, supply and install earthing provisions to the new electrical installation to comply with BS 7430 and BS 7671:18th Edition. Existing earthing provisions shall be tested, and faults shall be repaired as necessary.

- 4.10.04 The Contractor shall include for earth bonding all new mechanical plant, equipment, ductwork, pipework and ancillary service including all the retained installation in the second floor in accordance with the latest edition of the Regulations for Electrical Installations, prepared by the Institution of Engineering & Technology (BS 7671).
- 4.10.05 The Contractor shall test and certify the existing lightning protection system.
- 4.10.06 Any non-compliant part of the system shall be repaired/installed. Certification for the existing system shall be provided by a certified lightning protection specialist.

4.11 Fire Alarm Installations

- 4.11.01 The premises is provided with an analogue addressable fire alarm system emanating from a main fire alarm panel located in the reception area.
- 4.11.02 As part of the works, the existing fire alarm system in the unit shall be stripped out in its entirety along with all outgoing cabling, containment and devices.
- 4.11.03 The Contractor shall design, supply, install, test and commissioning a new open protocol, fully addressable system to BS 5839 Part 1 requirements to a Category L2 standard of coverage. The fire alarm panel shall be located within the main entrance reception area in a discrete location.
- 4.11.04 The fire alarm panel shall be a minimum of 4 loops with 25% spare capacity on each loop and for the number of loops used.
- 4.11.05 A Redcare facility shall be provided for future off site monitoring of the fire alarm system. This shall comprise both the auto dial out facility within the panel and a telephone point adjacent to the main fire alarm panel. The telephone point shall be wired back to the main telecom intake point and left coiled for future connection by the tenant.
- 4.11.06 The fire alarm system shall initiate on all out evacuation upon receipt of single alarm activation.
- 4.11.07 The fire alarm control panel shall be such that upon total system power failure an automatic re-boot routine can be initiated in order to re-establish the system in its correct working condition. Facilities shall also be provided whereby device location legends can be easily changed through the alpha-numeric keypad on the front of the panel. The control panel shall be provided with an integral paper printer such that all events are provided with hard copy readout. Adequate facilities shall also be provided within the processing unit within the fire alarm control panel such that an electronic memory provides full event logging facilities.
- 4.11.08 The fire alarm installation shall be carried out using CZW rated cables (FP200 or equal and approved), run on dedicated galvanised medium duty cable tray (dedicated for fire alarm cables) where 2 or more cables are installed along the same route and clipped using metal cable ties. Fire alarm cables supported from other cable management systems will not be acceptable.
- 4.11.09 Automatic smoke, beam and heat detectors of the appropriate type shall be provided throughout the office, warehouse and general areas including all ceiling/floor voids above 800mm. Detectors shall be provided within 1.5m of a lift shaft and services riser opening. Detectors shall **NOT** be located within 500mm of any wall / vertical obstruction. Detectors shall be analogue automatic detector, fitted with an addressable plug in base. Each base shall be programmed with individual code number, which shall be configured to an approved description indicating the location, zone number, and loop number when an alarm condition is initiated. Note: The Contractor may as an alternative provide beam detectors in the warehouse space.
- 4.11.10 Detector bases shall be installed in strict accordance with the instructions and installation drawings issued by the fire alarm equipment manufacturer and supplier. All alarm detectors,

whether heat or smoke, indicated as being installed within concealed locations including the top of lift shaft, etc., shall be provided with remote LED indicators flush installed on the underside of the adjacent ceiling. Remote indicators shall be of the square pattern and be suitable for being flush metal outlet boxes.

- 4.11.11 Open plan office areas shall be provided with automatic detection throughout as they are considered to be undefined escape routes. In addition, automatic detection shall be provided in any ceiling voids that are over 800mm in depth.
- 4.11.12 Manually operated type break glass call points shall be located in accordance with BS 5839 Part 1. The break glass call points shall be installed at 1200mm AFFL. Where the contractor is utilising the existing break glass call point locations, they shall include dropping the call points to 1200mm AFFL as necessary.
- 4.11.13 Both automatic and manual devices shall be provided with an engraved, screw fixed label attached to the detectors / base or call point back box providing red lettering on a white background detailing the device number and loop.
- 4.11.14 The fire alarm system shall incorporate flashing beacons within all areas of the building including office space, core areas, toilets, plant rooms, etc., such that full coverage is provided related to occupants that have hearing disabilities. The Contractor shall make allowance within the tender to provide a flashing beacon in each WC cubicle in line with the Building Control officer's requirements.
- 4.11.15 The sounder system shall be carried out using electronic sounders, with combined sounder / smoke detectors or wall mounted sounders.
- 4.11.16 All new sounders and flashing beacons shall be coloured white, flat plate type of minimal dimensions, recessed and shall be of the loop powered type and in compliance with BS 5839 requirements. The flashing beacons and sounders shall generally be mounted on the standard smoke detector base. **Note: Red hooter type sounders shall not be used in front of house areas such as reception, toilets, toilet lobbies, office areas, lift lobbies, etc.**
- 4.11.17 The disabled toilet/shower accommodations shall be provided with an IP rated combined sounder and beacon base.
- 4.11.18 Interface modules shall be installed to provide volt free signalling to all ancillary equipment, e.g., ventilation plant, lift, access controlled doors, etc.
Upon activation of a fire alarm, the interface units shall shut down / initiate the following:-
 - Ventilation fans shall be shutdown.
 - VRF systems shall be shutdown.
 - Passenger lift to return to ground floor.
- 4.11.19 The Contractor shall be responsible for designing and providing the fire alarm system installations within the building, which complies and operates in accordance with the design intent of the specification regardless of which equipment manufacturer is used. It is therefore incumbent on the Contractor to ensure that all equipment, cabling, however minor or ancillary, together with all other items necessary to provide a system compliant with this specification, are provided as part of these works. All such equipment shall be deemed to be included in the Contractor's tender return.
- 4.11.20 The control panel shall have the capability of disabling the interface signals to the above systems for use when carrying out routine fire alarm system testing.
- 4.11.21 The Contractor shall ensure that sufficient spare capacity is provided for future tenant's fit-out installations.
- 4.11.22 Upon completion of the installation the Contractor shall arrange for the manufacturer / supplier of the fire alarm system to carry out full commissioning of the system to ensure that

it is operating satisfactorily and in accordance with the specification. The commissioning shall include the proving of the receipt of signals from each and every single manual and automatic call point, together with outputs and controls. The Contractor shall also provide building layout drawings of each floor level for record testing; this information shall include all areas of the completed system to the CBSE for witnessing of sample test which shall be carried out in conjunction with the equipment supplier / commissioning engineer. Written notice shall be provided to the CBSE of the Contractors intention to carry out such tests, giving seven days' notice of the test date.

4.12 Disabled Persons WC / Shower Alarm System

- 4.12.01 The Contractor shall design, supply and install a new disabled WC / shower alarm system within the disabled WC / showers on site. The system shall comprise ceiling mounted pull cord unit located adjacent to the WC pan / shower seat, a control unit mounted above the ceiling line, a flush mounted reset unit with reassurance lamp mounted 1200 mm above finished floor level adjacent to the WC pan / shower seat and a flush mounted over door indicator lamp with sounder mounted at high level outside the disabled WC / shower room.
- 4.12.02 The system shall operate such that upon initiation of the pull cord switch, the relevant red indicator lamp immediately illuminates, and stays illuminated and an audible alarm is initiated until such times that the relevant reset unit is activated and the system returns to its normal status.
- 4.12.03 The system shall be fully tested, commissioned and witnessed to the CBSE.
- 4.12.04 The disabled persons WC /shower alarm systems shall be as manufactured by C-Tec or equal and approved.

4.13 Electronic Vehicle Car Charging Points (EVCP)

- 4.13.01 The Contractor shall design, supply and install 6 No. new twin electric vehicle car charging points (EVCPs) within the car park areas near the secondary staircase car parking spaces (final positions to be agreed with the client).
- 4.13.02 EVCP shall be based on PodPoint Twin Charger T22, EV link – EVQ by Schneider Electric or equal and approved. EVCP shall be compatible for three phase 22 kW, 400 V AC power supply with max current of 45A.
- 4.13.03 EVCP shall allow for a charging time of 3-4 hours.
- 4.13.04 The EVCP shall be provided with the following functions but not limited to the same:
- Floor standing 22 kW rapid car charging points
 - Payment options: RFID / Card.
 - User charging station dialog: touch screen or screen with keypad for displaying the residual charge and the recharging set point.
 - Charging management: Socket locked during charging; emergency stop button.
 - Data transmission: wired connection (Ethernet TCP/IP) or wireless connection for transmitting data concerning operation status, activation/deactivation of the charging station etc.
 - Authorized user RFID tag reader: management of the list of authorized users by a remote server.
- 4.13.05 Installation of the EVCP shall be in accordance the manufacturer's recommendations.

- 4.13.06 The power supplies for the EVCP shall be provided from the new check metered distribution board dedicated to EVCPs.
- 4.13.07 The Contractor shall allow for local trenching to route the cables from the main intake room to the new car charging points. The cables shall be routed in a 100mm rigiduct to the car charging points.
- 4.13.08 The Contractor shall provide suitable ducts from the distribution board for additional 6 No. future car parking chargers adjacent to the proposed future chargers.
- 4.13.09 The Contractor shall design, supply and install suitable concrete foundations for each EV charging point.
- 4.13.10 Final location of the EVCPs to be agreed.

4.14 Photovoltaic Installation (PV)

- 4.14.01 The existing PV installations on site shall be disconnected and stripped out in their entirety to allow for the roof works to be completed.
- 4.14.02 The Contractor shall design, supply, install, test and commission a new PV array system comprising minimum of 53 kWp of energy generating photovoltaic panels. Final area will be dependent on final panel selection.
- 4.14.03 **PV Option 1:** The Contractor shall provide an option cost to design, supply, install, test and commission a new PV array system comprising minimum of 277.5 kWp of energy generating photovoltaic panels. Final area will be dependent on final panel selection.
- 4.14.04 **PV Option 2:** The Contractor shall provide an option cost to temporarily isolate, disconnect and safely remove the existing PV panels from the roof and safely store the panels on site for reuse once the roof refurbishment works are completed.
- 4.14.05 The PV panels shall be as manufactured by Sunpower and from their Maxeon 6 AC 435W panels or equal and approved. The panels shall achieve minimum efficiency of 22%.
- 4.14.06 The photovoltaic panels shall be installed on the roof above the offices and part of the warehouse roof, located between rooflights as per the existing arrangement.
- 4.14.07 The Contractor shall prepare full calculations of annual system yield demonstrating the annual and daily energy production profile for the complete integrated system, based on the locations and orientation. Calculations shall also be presented identifying all system component losses. The inverters shall be matched to the PV modules and associated DC cabling to deliver the maximum system yield.
- 4.14.08 The PV modules shall be mounted at roof level on lightweight bespoke support frames appropriately fixed to the roof structure. The PV modules shall be accessed via designated walkways between the runs of modules. The Contractor shall fully co-ordinate the location and arrangement of the PV arrays with other installation installed on/through the roof in conjunction with the Architect.
- 4.14.09 The PV modules shall be connected together electrically as multiple arrays to suit the output. The modules shall be supplied with factory fitted leads equipped with simple in-line push-fit plug and socket connectors to make interconnection rapid and straightforward.
- 4.14.10 The PV modules shall be joined together and connected to inverter units via a double pole dc isolator. The double pole dc isolator shall allow the dc supply to the inverter from the PV array to be safely connected, even under full load (generation) conditions. The output from the inverter shall connect to the PV input panel board located in the 2nd floor plant room which in turn will feed into the main intake panel.

- 4.14.11 All dc connections shall be made using double-insulated dc cabling and touch proof connectors to prevent accidental access to live dc conductors. The inverters shall be mounted in secure lockable ventilated enclosure located within the warehouse area adjacent to the PV input distribution board.
- 4.14.12 An Ofgem approved total generation Smart Export Guarantee (SEG) kWh meter shall be provided to monitor the amount of electricity generated by each of the PV array systems.
- 4.14.13 Upon completion of the works the whole of the installation shall be commissioned and tested in conjunction with the PV module manufacturer/supplier to confirm correct functioning of the PV modules.
- 4.14.14 The Contractor shall allow to liaise with SSEN to obtain permission to operate the PV system in parallel with the mains power. This shall include for completing and submitting the G59 application to SSE for approval.
- 4.14.15 The PV installation specialist contractor & supplier of the system components shall be MCS accredited. Additionally, all PV panels & inverters shall be MCS accredited and supplied with a 25 year performance warranty as standard. The PV specialist shall be ACE Solar Energy (Wolverhampton) or equal and approved.
- 4.14.16 The Contractor shall provide a cost option to retain and reuse the existing main fuse switch isolators, PV input panel board, G59 control panel, generation meter, inverters and secondary supports subject to validation.
- 4.14.17 The Contractor shall allow to liaise with SSEN to obtain permission to operate the PV system in parallel with the mains power. This shall include, but not limited to, installation compliance with the latest Energy Networks Association (ENA) G99 regulation and completing the relevant DNO applications for the PV installation.
- 4.14.18 The Contractor shall allow for carrying out review of the roof structure by qualified structural engineer to confirm the suitability of the existing roof to accommodate the additional load from the PV installation.

4.15 Energy Monitoring System

- 4.15.01 The new metering installations shall be complete with new energy monitoring system. The Contractor shall employ the energy metering specialist Rayleigh Instruments (Contact: John Marris, Tel: 07966 678548, Email: j.marais@rayleigh.com.) to carry out the installation, networking and commissioned of the energy monitoring system as necessary.
- 4.15.02 The Contractor shall install a complete functioning remote energy monitoring system with a meter gateway with integral GSM transmitter interfaced with the main electrical supply MID meter, the new water meter and the check meters.
- 4.15.03 The energy monitoring system shall be complete with GSM gateway transmitters, antenna, MID Compliant Modbus main electrical supply meter (located within the main switch room), pulse receiver for water meter, modbus check meters, DIN rail enclosure and data cabling.
- 4.15.04 The energy monitoring system shall be provided with a 24 month subscription for GSM data bundle, management, data visualisation, billing reports, and third party data transmittance.
- 4.15.05 The remote energy monitoring system subscription shall be transferred to the Client FM team. The Contractor shall liaise with the client FM Team's appointed web based metering asset management company to ensure the live information is activated.

4.16 Data and Telecoms Installation

- 4.16.01 The existing incoming BT Openreach copper distribution board and fibre service shall be retained and reused.

- 4.16.02 The existing tenant installed data and telecoms installations shall be stripped out in their entirety throughout the premises.
- 4.16.03 The fibre service terminates within the first floor comms rooms. As part of the works, the Contractor shall liaise with BT Openreach to allow for the service to be relocated adjacent to the new distribution board serving the office areas on the 1st floor.
- 4.16.04 The Contractor shall install a new phone line to the new passenger lift control panel in the 2nd floor lift motor room.
- 4.16.05 The Contractor shall be responsible for liaising with BT Openreach and the Client to arrange for an active telephone line for the lift as this will be required for the final commissioning and handover of the lift. The Contractor shall ensure that the application is made as early as possible to get the line ordered and installed in line with the contract programme. Note: The Contractor may retail and reuse the existing telephone line subject to validation.

4.17 Cable Containment Systems

- 4.17.01 The Contractor shall be responsible for the design, supply and installation of all of the following cable containment systems in the building.
- 4.17.02 A dedicated cable containment system for each of the following systems:
- Power Cable tray, trunking and ladder
 - Fire alarm Cable tray
 - Small power and lighting Cable tray, trunking and conduits
 - Telecoms Cable tray
 - Metering Cable tray
- 4.17.03 The Contractor shall be responsible for the proper spacing, segregation and co-ordination of all cable containment routes.
- 4.17.04 The following list defines which type of cable shall be installed on each particular cable containment system.

Power (Tray, Cable Trunking and Ladder)

- Main cables
- Sub-main cables

Fire Alarm (Tray)

- Detection loop
- Interface cables
- Disabled refuge system cables

Small Power and Lighting (Tray, Trunking and Conduits)

- 230/400 V AC cabling from distribution boards

Energy Monitoring System (Tray)

- Network cabling
- Controls cabling
- Meter cabling

Telecoms (Tray)

- Telecoms cabling
- IT cabling
- Data cabling

4.18 Testing and Commissioning

- 4.18.01 The electrical services associated with the refurbishment works above including the retained and reused electrical services installations shall be commissioned, tested and certified in accordance with BS 7430, BS 7671:18th Edition by a competent NIEIC certified & registered person.
- 4.18.02 The fire alarm installations shall be commissioned, tested and certified in accordance with BS 5839 part 1 requirements, by BAFE certified installer.
- 4.18.03 The new emergency lighting installations shall be commissioned, tested and certified BS 5266 requirements.
- 4.18.04 The lighting and the lighting controls installations shall be commissioned, tested and certified in accordance with the manufacture requirements.
- 4.18.05 The Contractor shall supply operating and maintenance manuals, and all associated as built drawings on completion of the project. The "As Built" drawings shall include the new and retained existing installations in the refurbished areas.

5.00 Mechanical Services

5.01 Introduction

The following principal mechanical engineering services shall be provided for the office, common parts, toilet areas and external areas at 1 Brambles House, Waterloo: -

- Removal of redundant mechanical services plant and all associated equipment.
- New VRF heat recovery systems to office areas
- New Split AC system serving the reception area
- New pipework, ductwork, grilles and diffusers
- New twin extract ventilation systems
- New office mechanical ventilation system with heat recovery
- New ductwork installations
- New condensate drainage installation
- New electric heating for common parts
- New overdoor electric heater serving reception entrance
- Services noise attenuation and acoustic treatment
- Secondary supports
- Testing and commissioning
- O&M manuals and record drawings

5.02 Scope of Works

The scope of works associated with the refurbishment of the office, common parts and toilet areas shall include, but not necessarily be limited to the design, supply, installation, testing and commissioning of the following works: -

- 5.02.01 The Contractor shall carry out the design and provide the entire mechanical services associated with the works.

5.03 Existing Services and Strip Out

- 5.03.01 The Contractor shall remove all redundant mechanical services plant, pipework, equipment and the associated controls from the unit.
- 5.03.02 The works shall include the disconnection of all electrical supplies and draining of any retained water prior to removal.
- 5.03.03 The Contractor shall disconnect and strip out all existing air conditioning systems such as chillers, VRF systems, heat pumps, closed control units, split units, outdoor condensers, fan coil units, BS boxes, controls, pipework, cabling, supports, tray work, condensate drainage, pumps, etc. from the office and warehouse areas. The Contractor shall remove the air conditioning systems from site for safe disposal in accordance with best practice, the F Gas Regulations and statutory requirements.
- 5.03.04 The Contractor shall disconnect and strip out the existing boiler and steam boiler installation including plant room equipment, heating pipework, radiators and ancillary equipment

throughout the unit. The existing gas supply shall be capped off at the main meter after the main isolation valve.

- 5.03.05 The Contractor shall disconnect and strip out the existing gas fired heaters from the warehouse areas in its entirety. The strip out shall include gas pipework, flues, controls, cabling, fixings, power supplies and the gas fired heaters. The existing gas supply shall be capped off at the main meter after the main isolation valve prior to strip out. Where the flues are routed through the roof or warehouse walls, the Contractor shall provide suitable weatherproof blanking plates.
- 5.03.06 The Contractor shall disconnect and strip out the existing ventilation plant and associated ductwork from the warehouse and office areas in its entirety including all supports, fixings, power supplies, cabling and containment.
- 5.03.07 The Contractor shall disconnect and strip out the existing ventilation ductwork installed on the façade and associated fixings in its entirety.
- 5.03.08 Note: Existing façade louvres shall be retained and cleaned. The ductwork connection to the louvres shall be removed in its entirety.
- 5.03.09 Strip out all existing mechanical controls and power installations including associated control panels, controllers, field devices, sensors, actuators, wiring, containment, supports, etc.
- 5.03.10 Strip out the toilet and tea point ventilation ductwork throughout the unit.
- 5.03.11 Strip out all electric heating installation such as panel heaters, frost heaters, door heaters, etc. in its entirety including all cabling, containment and fixings.

5.04 VRF Heat Recovery System to the Office Areas

- 5.04.01 The Contractor shall design, supply, install, test and commission an independent VRF inverter driven heat recovery system for the 1st floor office areas and a VRF heat pump multi-split system to serve the ground floor entrance reception area as indicated on the design intent drawings.
- 5.04.02 The Contractor shall employ a specialist refrigeration engineer to install all refrigeration-based systems, together with their associated control systems. The system shall be installed in accordance with best practice, manufacturer's recommendations and the F Gas Regulations.
- 5.04.03 The Contractor shall complete heat gain and heat loss calculations using suitable thermal modelling software like TAS, IES or Hevacomp for sizing the VRF system fan coil unit and condensers. The VRF system selection calculations shall be based on the design criteria. Suitable design margins (minimum 10%) shall be applied to the calculated heat loss and heat gain figures. Heat gain and heat losses shall be calculated for each fan coil unit temperature control zones for selecting the associated fan coil unit. Simultaneous floor heat loss and heat gain can be used for selecting the outdoor condenser units provided the connected fan coil unit index capacity for the condensers is not exceeded.
- 5.04.04 The VRF system shall include air-cooled heat recovery outdoor condenser units and condensers shall be located in the condenser compound at ground level. The indoor fan coil units shall be cassette fan coil units and located recessed within the office ceiling areas as shown in our intent drawings. The VRF system shall be capable of providing simultaneous heating and cooling at different fan coil unit zones and incorporate branch selector / controller boxes located in the ceiling void.
- 5.04.05 All components of the VRF system shall be covered by minimum 5-year manufacturer's warranty subject to normal terms and conditions that apply to ensure that the systems have been installed correctly and their warranties shall be assignable.

Building Services Performance Specification

- 5.04.06 The VRF systems shall be supplied from either of the following manufacturer – Daikin, Mitsubishi Electric (Not Heavy Industry), Toshiba, Panasonic, LG or Samsung.
- 5.04.07 The Contractor shall provide all refrigerant gas pipework for the VRF equipment, together with all ancillaries and interconnecting power and control cabling for a complete system. The VRF systems shall use R32 or R410a refrigerant.
- 5.04.08 The office outdoor units shall be provided with 415 V 3-phase mains supply.
- 5.04.09 The Contractor shall provide acoustics sound attenuation to the condensing unit to meet design criteria according to Environmental Health Regulations.
- 5.04.10 Plant and equipment serving the office areas shall be sized for intermittent office operating hours of 8am to 6pm but shall also be selected acoustically for daily 24-hours operation. In addition, plant and equipment serving the reception area shall be sized for daily 24 hours operation.
- 5.04.11 The indoor fan coil unit's layout throughout the office shall be arranged to conform, as close as sensibly possible with the temperature control zoning layout as shown in our tender drawings. Each fan coil unit shall be capable of operating in heating or cooling mode, independent of the other fan coil units connected to the same system.
- 5.04.12 The refrigerant specialist contractor shall design, supply, install, test and commission all the interconnecting refrigeration pipework between the outdoor unit and the connected indoor units.
- 5.04.13 The refrigeration pipework shall be routed on suitably sized galvanised medium duty cable trays. All refrigeration pipework shall be insulated with UV resistant class 'O', closed cell, thermal insulation installed to achieve a vapour seal. All refrigerant pipework shall be supplied and installed in accordance with manufacturer's recommendations and sizes, and the standard specification. Schematic drawings of each refrigeration system and control wiring shall be provided by the approved supplier. All pipework to be carried out in refrigerant quality soft / medium drawn copper tubing to BS 2871, Part 2, 1972 and complete with the appropriate refnet headers and joints. Pipework installations shall be carried out by an approved (certificate approval must be submitted prior to installation commencement) refrigeration engineer and in accordance with latest edition BS EN 378. The pipework shall be pressure, vacuum and strength tested in accordance with the manufacturer's recommendations.
- 5.04.14 Dry nitrogen must be utilised at all times in the system during brazing (no cold brazing will be permitted). All refrigerant pipework is delivered to site with end caps and the pipework shall be protected during the installation to prevent the ingress of dirt and moisture.
- 5.04.15 The refrigerant pipework is to be properly fixed and supported at a minimum of 1.5m centres and where required should be supported on Unistrut. All refrigerant pipework shall be provided with Traffolyte labels fixed by means of cable ties, provided at a minimum of 3m intervals, identifying the condenser unit reference and the suction / liquid line motions.
- 5.04.16 Secondary support steel brackets shall be provided to able span between the above ceiling joists and tie the fixings for the mechanical services (trays, ducts, fan coils units, BS boxes, pipework, etc. including the electrical trays).
- 5.04.17 Each fan coil unit within the office areas shall be provided with a room controller incorporating space air temperature sensor mounted on the nearest wall or column.
- 5.04.18 The Contractor shall provide all control cabling between all parts of the system to the manufacturer's recommendations. All control wiring associated with the VRF system shall be carried out in coloured LS0H / LS0H cabling and shall be clipped wherever possible to refrigeration pipework. Where control cabling is installed, away from the refrigeration pipework, then it shall be routed on either galvanised tray / basket or within metal conduits. All the recessed or surface mounted cabling on the wall shall be distributed via metal conduits.

- 5.04.19 The remote controllers shall be hard-wired to the associated outdoor units complete with a display capable of the following functions: -
- On / off / auto operating mode for the FCU
 - Zone temperature set-point
 - Fan speed
 - Timer settings
 - Filter status
- 5.04.20 The frost protection routine for the VRF system shall be automatically initiated upon reaching the low-level set point in any zone. The associated condensing unit shall activate to provide heating to the office space. The space shall be heated until the low limit set point is reached.
- 5.04.21 New gravity condensate drainage installation to collect the condensate discharge from the fan coil units shall be provide. The condensate pipework shall be run laid to fall in ABS or copper pipework. If Copper pipework is used pipework shall be insulated rigid in foil faced mineral wool insulation. If ABS pipework is used pipework shall be suitably supported to prevent sagging. The condensate drainage system shall incorporate rodding eyes at all changes in direction. The Contractor shall allow for additional condensate pumps where gravity fall cannot be achieved. The condensate drainage installation drains into local soil vent pipework via waterless trap.

5.05 Electric Heating

- 5.05.01 The toilets, showers, staircase and lobby areas shall be provided with electric heating only.
- 5.05.02 Electric panel heaters shall be supplied, installed, tested and commissioned.
- 5.05.03 The panel heaters for male toilets, female toilets, changing areas, staircase and lobby shall be Dimplex Monterey MFPE Electric Panel Heaters.
- 5.05.04 The electric heaters for the DDA WC shall be 300W ECOSUN E300U low temperature radiant ceiling panel heater as manufactured by ATC.
- 5.05.05 The electric heaters for the DDA Shower and WC shall be 300W ECOSUN E300U low temperature radiant ceiling panel heater as manufactured by ATC and TCP Smart WiFi Electric Heated Towel Rail 850 x 500mm.
- 5.05.06 The electric heaters for the Shower cubicles shall be TCP Smart WiFi Electric Heated Towel Rail 850 x 500mm.
- 5.05.07 The electric heaters and towel rail shall be completed with integral time switch and thermostatic temperature controllers.
- 5.05.08 The electrical cabling between the fused outlets and the electrical panel heaters shall be chased in the walls and concealed out of view.
- 5.05.09 The ground floor main reception entrance shall be fitted with an electric door air heater. The door heater shall be provided by JS Air curtains and located as shown on our design intent layout. The door heater shall be provided with power supply and local controls.
- 5.05.10 The electrical heating installations shall be designed to ensure compliance with the specified temperatures included in this specification for the each of the areas. The Contractor shall complete heat loss calculations to appropriately size the electric heating installations. The heater sizing shall include suitable design margin (minimum 20%).

5.06 Office Heat Recovery Ventilation System

- 5.06.01 The internal fan coil unit zones in the 1st floor office areas shall be provided with mechanical fresh air supply and extract air via a new Heat Recovery Ventilation Unit (HRU) to provide mechanical fresh air supply and extract ventilation to meet the design criteria as set out in this specification.
- 5.06.02 The HRU unit shall be supplied by the office VRF manufacturer selected for the scheme or equal and approved.
- 5.06.03 The fresh air from the new HRU unit shall be supplied directly into the office space via ceiling recessed supply grilles and new galvanised steel ductwork distribution as shown in our design intent drawings.
- 5.06.04 The extract air from the office areas shall be drawn into the HRU unit via new extract bell mouth in the ceiling void and extract grilles installed in the suspended ceiling.
- 5.06.05 All fire compartment barriers, walls or floors penetrated by ductwork installation shall be provided with fire dampers to maintain the integrity of the compartment penetrated. The fire damper is to be fire rated at the same level as the wall or floor slab or barrier that they are penetrating.
- 5.06.06 All ductwork installations shall be provided with access panels for cleaning purposes as defined by BESA document TR19. All new ductwork installations shall be galvanised steel type constructed to the recommendations in the current BESA ductwork specification DW144 Class A.
- 5.06.07 Attenuators shall be provided to achieve specified noise levels. Ventilation openings and duct penetration through the structure / partitions shall not undermine the sound reduction indices of the structure / partitions. Should cross-talk attenuators be required, then they shall be selected and installed to ensure that the structure / partition sound reduction indices are maintained when speech conditions occur.
- 5.06.08 The RAL finish to the ceiling grilles and diffuser shall be to match ceiling tile finishes.
- 5.06.09 The supply and extract ductwork within unheated voids and areas shall be insulated with foil faced mineral wool to prevent condensation inside the ductwork.
- 5.06.10 The office HRU unit shall be controlled via the VRF controller and provide the following functions: -
- auto change over on fan failure (for twin fans only)
 - auto duty share (for twin fans only)
 - time schedule
 - on/off controls
 - fan speed control
 - Thermostat controller
 - Fire alarm interface relay
- 5.06.11 The ventilation controller shall be linked to the fire alarm system and in the event of a fire alarm condition within the building, the fans shall be stopped. The system shall not shut down when the fire alarm system is in weekly fire alarm sounder test mode.
- 5.06.12 Suitable attenuation shall be provided to all ventilation systems to comply with the specified noise levels.

- 5.06.13 The fans shall be provided with panel filter to BS EN 779 G4 rating.
- 5.06.14 All new ductwork shall be supplied and erected by a specialist ductwork sub-Contractor under the responsibility of the Contractor.
- 5.06.15 All new ductwork shall be provided with access doors as required by the general specification. The level of access required is for cleaning purposes as defined by BESA document TR 19. The Contractor shall pay particular attention to the requirements for access doors adjacent to all fire dampers, hand control dampers and motorised dampers together with points for ductwork cleaning.
- 5.06.16 Fire dampers shall be provided to BESA 145 requirement where the duct penetrates cavity barriers and between floors, walls etc. to maintain the fire compartmentation. Fire rated ductwork must be provided where the ductwork crosses any means of escape to Building Control requirements. The fire dampers shall be rated to the equivalent fire rating of the cavity barrier and fire compartment wall or floor penetrated. The fire dampers shall be rated to the equivalent fire rating of the cavity barrier and fire compartment wall or floor penetrated.
- 5.06.17 Office fresh air supply and extract grilles shall be 600x600 louvred faced grilles.
- 5.06.18 The office HRU unit shall be sized and commissioned to meet the design criteria as defined in this specification.
- 5.06.19 The supply and extract atmosphere side spigots of the office HRU unit shall be ducted to outside via the external wall with weatherproof ventilation louvres.
- 5.06.20 The “as commissioned” specific fan power (SFP) shall not exceed 1.5 W/l/s for the office HRU system.

5.07 Toilet Ventilation System

- 5.07.01 The Contractor shall design, supply, install, test and commission a new twin extract ventilation system to serve the toilet areas and showers consisting of Twin Extract Fan (TEF) and ductwork distribution. The extract air from the toilets and showers shall be taken via new circular extract louver valves.
- 5.07.02 Make up air into the toilets and storeroom areas shall be drawn in from the windows or corridors via undercut doors.
- 5.07.03 The TEF shall be controlled via manufacturer supplied controller and shall incorporate time schedule, fan speed setting control and fire alarm interface relay.
- 5.07.04 New exhaust air ductwork shall be provided from the toilet area to the external façade louver as indicated on the design intent drawing.
- 5.07.05 The TEF unit shall be interfaced with the fire alarm system and in the event of a fire alarm condition the TEF unit shall be stopped. The system shall not shut down when the fire alarm system is in weekly fire alarm sounder test mode.
- 5.07.06 The TEF unit shall have a maximum specific fan power not exceeding Building Regulations requirements. The “as commissioned” specific fan power (SFP) shall not exceed 0.5 W/l/s for the toilet ventilation system.
- 5.07.07 The ventilation grille shall be finished to match the ceiling finishes in each toilet.
- 5.07.08 All extract ductwork shall be provided with fire dampers at each penetration of a fire compartment wall. The fire dampers shall be rated to the equivalent fire rating of the fire compartment wall or floor penetrated.

- 5.07.09 All ductwork shall be supplied and erected by a specialist ductwork sub-contractor under the control and responsibility of the Contractor.
- 5.07.10 Unless space constraints occur, all ductwork installations shall be formed by the provision of slide on flanges. Slip joints will not be acceptable except where the Contractor can demonstrate that the space constraints limit the use of flanges.
- 5.07.11 All supply and extract ductwork shall be strictly in accordance with DW144.
- 5.07.12 All ductwork shall be internally cleaned in accordance with the recommendations of BESA TR19 during the commissioning stage.
- 5.07.13 All new ductwork shall be provided with access doors as required. The level of access required is for cleaning purposes as defined by BESA document TR 19. The Contractor shall pay particular attention to the requirements for access doors adjacent to all fire dampers, hand control dampers and motorised dampers together with points for ductwork cleaning.
- 5.07.14 Fire dampers shall be provided to BESA 145 requirement where the duct penetrates cavity barriers and between floors, walls etc. to maintain the fire compartmentation. Fire rated ductwork must be provided where the ductwork crosses any means of escape to Building Control requirements. The fire dampers shall be rated to the equivalent fire rating of the cavity barrier and fire compartment wall or floor penetrated. The fire dampers shall be rated to the equivalent fire rating of the cavity barrier and fire compartment wall or floor penetrated.
- 5.07.15 The twin extract fans shall be sized and commissioned to meet the design criteria as defined in this specification
- 5.07.16 The toilet extract fan shall be supplied with time control switches and the systems shall be linked to the fire alarm system in the event of fire alarm condition within the building, the systems shall be shut down.
- 5.07.17 Attenuators shall be provided to achieve specified noise levels. Ventilation openings and duct penetration through the structure / partitions shall not undermine the sound reduction indices of the structure / partitions. Should cross-talk attenuators be required, then they shall be selected and installed to ensure that the structure / partition sound reduction indices are maintained when speech conditions occur.
- 5.07.18 The RAL finish to the ceiling grilles and diffuser shall be to match local ceiling finishes.
- 5.07.19 The toilet extract ventilation system shall be provided with volume control dampers (VCD) for balancing the air flow. Upon completion of the installation all the entire ventilation systems shall be balanced.
- 5.07.20 The new ductwork installations shall incorporate galvanised mild steel ducts installed to BESA DW144 requirements.
- 5.07.21 The "as commissioned" specific fan power (SFP) shall not exceed 0.5 W//s for the toilet extract system.

5.08 Acoustic and Anti-Vibration Equipment

- 5.08.01 As part of the works the Contractor shall be responsible for carrying out acoustic proving tests prior to practical completion being granted. These tests shall cover both internal and external noise levels, including the internal noise level being measured in each individual room / area of the building. These noise tests shall only be carried out once all aspects of the testing and commissioning have been completed. If the results indicate that the required noise criteria are not achieved, then the Contractor shall undertake appropriate remedial works and carry out further testing until such time as the specified requirements are achieved. Attenuators, anti-vibration mounts, flexible couplings, pump bellows etc. shall be installed to ensure that noise levels in the building meet with the specified levels and prevent vibration being transmitted to the structure.

- 5.08.02 The specialist acoustic supplier shall confirm that all noise criteria shall be met against the final Contractor plant selections and working drawing layouts and details. The vibration limits on slabs from the landlord's plant / equipment shall not exceed curve 1 of BS 6472.
- 5.09 Testing, Balancing and Commissioning**
- 5.09.01 The entire mechanical services installation shall be balanced and commissioned by the Contractor in accordance with the CIBSE Commissioning Codes and BSRIA Guidelines. The balancing and commissioning shall be carried out by a specialist commissioning company.
- 5.09.02 All volume control dampers shall have their final position marked on site by red paint or permanent marker.
- 5.09.03 The Contractor shall submit in writing the balancing and commissioning test results before any witnessing will take place. The Consultant Engineer will only witness test results if the test sheets demonstrate that the balancing and commissioning has been completed and carried out satisfactorily in accordance with the specification requirement. If during witnessing the test results are found to be inaccurate, then the Contractor shall re-balance and re-commission the systems again. This procedure shall continue until the satisfactory witnessing is completed.
- 5.09.04 The Contractor shall supply operating and maintenance manuals, and all associated as built drawings on completion of the project. The As built drawings shall include the new and retained existing installations in the refurbished areas.

6.0 Public Health Services

6.01 Introduction

The following principal public health services shall be provided for the warehouse, office, common parts, toilet areas and external areas at Brambles House: -

- Decommissioning and strip out of the existing redundant public health services.
- Terminate existing sprinkler mains water supply in an internal below ground accessible chamber.
- Modify the existing mains water supply distribution system
- New electric water heater and associated expansion vessel
- New hot and cold water pipework installation
- New sanitary drainage pipework installation
- Pressure jet clean and followed by CCTV survey of the drainage installation
- Potable water pipework chlorination
- Testing and commissioning
- Secondary supports
- Testing and commissioning
- O&M manuals and record drawings

6.02 Scope of Works

The scope of works associated with the refurbishment of warehouse, office, common parts, showers, toilets and associated external areas shall include, but not necessarily be limited to the design, supply, installation, testing and commissioning of the following works: -

- 6.02.01 The Contractor shall carry out the design and provide the entire public health services associated with the works.

6.03 Existing Services and Strip Out Works

- 6.03.01 The existing sanitary plumbing pipework with connections to the existing sanitaryware throughout the unit shall be stripped out and removed from site. Note: The existing stack connections into the below ground drainage system shall be retained and protected for reuse.
- 6.03.02 The existing mains incoming cold water service and water meter shall be retained and reused.
- 6.03.03 The Contractor shall strip out and remove all the internal domestic hot and cold water pipework serving the various sanitary fittings in the unit.
- 6.03.04 The Contractor shall provide a new stop cock, double check valve and drain valve on the main incoming water supply at the point of entry.
- 6.03.05 The Contractor shall strip out all existing sprinkler installations throughout the premises including all storage tanks, pump room plant and equipment, pipework, isolation valves, control, etc.
- 6.03.06 The Contractor shall strip out all tenant installed services throughout the building.

6.03.07 The existing mains water supply serving the external sprinkler tank shall be retained and modified. The contractor shall disconnect the existing sprinkler mains water supply to the tank and terminate the existing water supply within a below ground accessible chamber. The water supply shall be fitted with a stop valve and capped in the chamber.

6.03.08 The existing sprinkler installations on site and in the building shall be stripped out in its entirety.

6.04 Hot and Cold Water Services

6.04.01 The Contractor shall note that all water systems shall be provided in accordance with the requirements of HSE Approved Code of Practice (ACoP) Guidance L8, Legionnaires Disease: The Control of Legionella Bacteria in Water Systems, 2013, and CIBSE TM13, Minimising the Risk of Legionnaires Disease, 2013.

6.04.02 All fixtures/fittings and plant associated with the hot and cold water systems shall be WRAS approved.

6.04.03 The existing incoming mains cold water supply pipework serving the main office and warehouse shall be retained and reused.

6.04.04 New cold water service (CWS) pipework installations directly fed by the mains water supply shall be provided as shown on our drawings to serve all the cold water points in the toilets, tea points and showers.

6.04.05 The CWS connection to each wash hand basin, sink and draw off point shall be provided with a service valve and flow regulation valve.

6.04.06 The connection to each wash hand basin shall incorporate a TMV3 mixing valve (1 No. per wash hand basin) per tap.

6.04.07 The hot water service (HWS) and electric hot water heater installations to serve all the hot water outlets in the toilets, tea points and showers shall be provided as shown on our intent drawings.

6.04.08 The hot water service shall be pressurised by the mains cold water supply. The system shall operate with flow only pipework fitted with heat maintenance tape and be distributed as shown in our drawings.

6.04.09 The hot water calorifier shall be located in the 2nd floor plant room as shown on our drawing.

6.04.10 All hot water services shall be fitted with temperature maintenance tape ensuring a distribution temperature of 55°C. The temperature maintenance tape shall be installed to within 500 mm of each hot water outlet, shutoff valve or TMV valve.

6.04.11 Where a Doc M compliant WHB and tap are installed (lever tap and WHB with no plug), flow restriction valves shall be installed on the HWS supply to the tap so as to limit the flow to no more than 0.06 l/s.

6.04.12 The hot water heater shall be provided as a packaged unit and shall incorporate the following:

- A suitably sized expansion vessel
- A pressure/temperature relief valve
- An expansion relief valve
- An expansion isolating valve.
- A drain cock.
- Anti-vacuum valve

6.04.13 The hot water calorifier installation shall be complete with all necessary overflow and pressure relief pipework, tundish, associated safety valves, pressure relief valves, check valves, expansion vessel, etc.

- 6.04.14 All the equipment shall be selected and installed in accordance with the manufacturers' requirements and recommendations and the Building Regulations. The discharge point for the pressure relief overflow pipework shall be strictly in accordance with the Building Regulations requirements.
- 6.04.15 A high temperature water heater discharge drainage pump shall be provided local to the water calorifier. The pressure relief discharge waste from the hot water calorifier shall drain into the discharge pump via waterless trap. The safety discharge pipe from the hot water calorifier shall be run in copper tubing. The temperature pressure relief discharge from the hot water heaters in a conspicuous location and in accordance with the Building Regulations Part G.
- 6.04.16 The valve assemblies for the CWS and HWS system shall be provided as shown in our intent drawings. The valve assemblies shall be installed so that they can easily be accessed for future maintenance. The CWS and HWS connections to each fitting served and draw-off point shall be provided with a service/isolation valve. Each wash hand basin shall be provided with a TMV3 mixing valve to limit the maximum flow temperature. Each shower shall be provided with a thermostatic shower mixing valve to limit the maximum flow temperature. Each individual vertical pipework riser shall be provided with isolating valves and drain-off facility at the base of the riser. The vertical rising CWS pipework rising main shall be provided with a 'Vent O Matic' Air Release Valve at the top. All branches shall be fitted with isolation valve (IVs) as near to the main riser as possible to allow for future maintenance.
- 6.04.17 The complete CWS and HWS system shall be labelled, flushed, cleaned and chlorinated and insulated.
- 6.04.18 WRAS approved flow restrictors (combined flow regulator and isolation valves) shall be provided to the wash hand basins, showers and sinks to regulate the sanitary fitting water flow rate. Flow rates to set to manufacturer's recommendations.
- 6.04.19 All hot and cold water service pipework shall be Copper pipework to BS EN 1057 with lead free 100% solder and flux with capillary fitting.
- 6.04.20 All hot and cold water services pipework shall be insulated with foil faced mineral wool insulation. The Insulation thicknesses shall comply with BS 5422. Hot and Cold water pipework subject to external ambient temperature shall be trace heated for frost protection.
- 6.04.21 Any hot and cold water services pipework and fittings exposed to view in the toilet and office areas level shall be chromium plated.

6.05 Sanitary Waste and Drainage Installations

- 6.05.01 A new ventilated sanitary plumbing installation shall be provided to serve all the new sanitary appliances and drain points within the ground and first floor toilet, shower and tea point areas.
- 6.05.02 The new soil and waste pipework from the sanitary appliances shall discharge to the existing below ground drainage system via the existing soil vent stack locations.
- 6.05.03 A CCTV survey has been carried out on the underground drainage pipework to establish its condition. The survey was carried out by WJ Shirley and the main report is attached in the appendix. Any defects, blockages and scaling identified in the report shall be rectified with all remedial works carried out to return the system to full working order. Drainage pipework found to be beyond repair shall be replaced with new equivalent pipework.
- 6.05.04 Where existing vertical soil vent stacks are being retained, these shall be wire brush cleaned.
- 6.05.05 The sanitary plumbing installation shall be laid to fall with rodding eyes and access panels throughout the installation. The sanitary appliances shall be connected into the ventilated sanitary plumbing system.

- 6.05.06 Access shall be provided to the sanitary plumbing pipework installation to facilitate future maintenance. The general philosophy of the access provision is as follows: -
- At all changes of direction
 - At the end of horizontal soil or waste floats (1200 mm above FFL)
 - Within the vertical soil and waste pipes at each floor level
 - A large square access door at the base of each stack
- 6.05.07 Changes in direction at the base of stacks shall be fitted with slow radius bends with the rodding access provided after the bend as generally shown on our drawings.
- 6.05.08 The WCs shall be connected with a soil float manifold with multi-kwik pan connectors. All WCs shall be fitted with 104 degree connectors.
- 6.05.09 All traps to the sanitary fitting shall be of the deep seal type.
- 6.05.10 Any drainage pipework and fittings exposed to view in the toilet and office areas at low level shall be uninsulated and chromium plated.
- 6.05.11 The ground floor undercroft warehouse area shall be provided with a 54mm diameter capped off waste connection on the wall backing the toilets for future tenant's tea point connection.
- 6.05.12 The Contractor shall coordinate the sanitary drainage pipework with other services. This co-ordination shall be carried out at an early stage such that the working drawings fully detail a suitable route for the drainage pipework.
- 6.05.13 Any new external drainage shall connect to the existing site drainage system and be installed in accordance with BS EN 752.
- 6.05.14 All new internal drainage pipework shall be installed and tested in accordance with BS EN 12056. The main horizontal and vertical soil vent pipes shall be uPVC to BS EN 4514 and BS EN 1329-2 (as manufactured by Polypipe Terrain Series 100 and 200 or equal and approved). Horizontal branch waste, soil float and anti-siphon pipe shall be uPVC to BS 4514 and BS EN 1329-1 (as manufactured by Polypipe Terrain Series 100 and 200 or equal and approved)
- 6.05.15 Upon completion of the works, the below ground foul and surface water drainage pipework shall be pressure jet cleaned up to the main building outfall and followed by CCTV survey to confirm the pipework is clean and free flowing.

6.06 Rainwater Drainage Installations

- 6.06.01 The existing rainwater pipework system shall be retained with the existing pipework integrally tested. The Contractor shall CCTV survey, repair as necessary and cleanse the entire existing above ground rainwater collection system. Minor repairs shall be undertaken to pipework to suit.
- 6.06.02 Pipework routes are to remain as existing where possible however, the contractor shall allow for coordination with other services. This co-ordination shall be carried out at an early stage such that the working drawings fully detail a suitable route for the rainwater pipework.
- 6.06.03 Upon completion of the works, the entire above and below ground drainage system shall be subject to CCTV survey to verify its condition. Any defects found shall be rectified and a following CCTV survey conducted to confirm the system is in full working order.

6.07 Testing and Commissioning

Building Services Performance Specification

- 6.07.01 The Contractor shall allow for testing and commissioning all of the public health services installations.
- 6.07.02 In accordance with the Water Regulations 1999, BS 8558 and ACoP L8 the HWS system shall be commissioned ensuring water at outlets reaches 50°C within 30 seconds and the required temperature within 1 minute.
- 6.07.03 All sanitary plumbing and drainage installation shall be tested in accordance with BS EN 12056: Part 2. As a minimum the sanitary plumbing system shall be subjected to air pressure test and shall maintain a minimum pressure of 40 mm water gauge (4 mbar) for a period of not less than 5 minutes.
- 6.07.04 All hot and cold water services pipework installation shall be pressure tested in accordance with BS EN 12828 and BESA TR/20, and in accordance with BS EN 806 for pipework conveying water for human consumption.
- 6.07.05 The public health services plant and equipment and associated controls shall be commissioned in accordance with the manufacturer's recommendations.
- 6.07.06 The Contractor shall allow for flushing, cleaning and chlorinating the hot and cold water services installations in the building in accordance with the Water Supply Regulations, BS EN 806 and BS 8558.
- 6.07.07 The hot and cold water services installations shall be designed, installed and commissioned to the following system parameter: -

System Pressures	
Floor Branch PRV Outlet	3.0 bar maximum
System Temperatures	
Cold Water System	The prevailing system temperature subject to the external ambient conditions
Hot water storage set point	60°C
Hot water distribution	55°C
Hot Water pasteurisation cycle set point	70°C
TMV3 valve blended outlet set point	41°C

- 6.07.08 All valves are to be labelled.
- 6.07.09 All pipework shall be colour coded in accordance with BS 1710 and WRAS Guidance Note No 9-02-05 Issue 2. All labels shall be blue (cold water down services) and red (hot water services) traffolyte labels, engraved with black lettering, drilled as necessary to accommodate a brass ring or for securing to walls. Labels shall be of appropriate size and shape to suit inscription required. The labels shall be mounted on the stem of the respective valve and be secured by means of a split brass ring.
- 6.07.10 A valve chart is to be provided and this chart to define the valve number, service, location and function. Valve charts shall be displayed in all relevant plant areas.
- 6.07.11 The Contractor shall supply operating and maintenance manuals, and all associated as built drawings on completion of the project. The As built drawings shall include the new and retained existing installations in the unit.

7.0 Tender Summary

7.01 General

a.	Preliminaries	£
b.	Strip out	£
c.	Design and co-ordination	£
d.	Record Documentation / O&M Manuals	£
e.	Secondary Supports	£
f.	Testing and Commissioning	£
g.	New TM31 Logbook	£
	Sub-Total:	£

7.02 Electrical Services

a.	Strip out redundant electrical installations	£
b.	Overhaul the incoming electrical supply.	£
c.	Provision of new panel boards	£
d.	Provision of new distribution boards	£
e.	Strip-out all data telephone cabling back to distribution points	£
f.	New Lighting and emergency lighting installation	£
g.	New small power installations	£
h.	New Under Floor power installations	£
i.	New fire alarm systems.	£
j.	New Disabled WC Alarm	£
k.	New PV installations	£
l.	New Electric Vehicle Charging Point Installations	£
m.	New Energy Metering System	£
n.	Overhaul existing lighting protection system	£
o.	Provision of containment	£
	Sub-Total:	£

7.03 Mechanical Services

a.	Strip-out redundant mechanical services plant and all associated equipment.	£
b.	New VRF heat recovery systems to office areas	£
c.	New split AC system serving the reception area	£
d.	New pipework, ductwork, grilles and diffusers	£
e.	New twin extract ventilation systems	£

Building Services Performance Specification

f.	New office mechanical ventilation system	£
g.	New ductwork installations	£
h.	New condensate drainage installation	£
i.	New electric heating for toilet areas and common parts	£
j.	New overdoor electric heater to reception entrance	£
k.	Services noise attenuation and acoustic treatment	£
	Sub-Total:	£

7.04 Public Health Services

a.	Terminate existing sprinkler mains water supply in an internal below ground accessible chamber.	£
b.	Extend and terminate existing sprinkler mains water supply into the warehouse building.	£
c.	Modify the existing mains water supply distribution systems.	£
d.	Electric water heater, associated expansion vessels	£
e.	New hot and cold water pipework installations.	£
f.	Sanitary drainage pipework installation	£
g.	Pressure jet clean and followed by CCTV survey of the drainage installation.	£
h.	Potable water pipework chlorination	£
	Sub-Total:	£

7.05 Provisional Sums

a.	Existing lightning protection system repairs	£ 10,000
b.	Existing retained drainage installation repairs	£ 4,000
	Sub-Total:	£ 14,000

7.05 Cost Options

a.	PV option 1 - new PV array system comprising minimum of 277.5 kWp of energy generating photovoltaic panels.	£
b.	PV Option 2 – removal, safe storage, reinstatement and commissioning of the existing PV array system	£
	Sub-Total:	£

7.06 Tender Cost Summary

a.	General	£
b.	Electrical Services	£

Building Services Performance Specification

c.	Mechanical Services	£
d.	Public health Services	£
e.	Provisional Sums	£ 14,000
	Total:	£