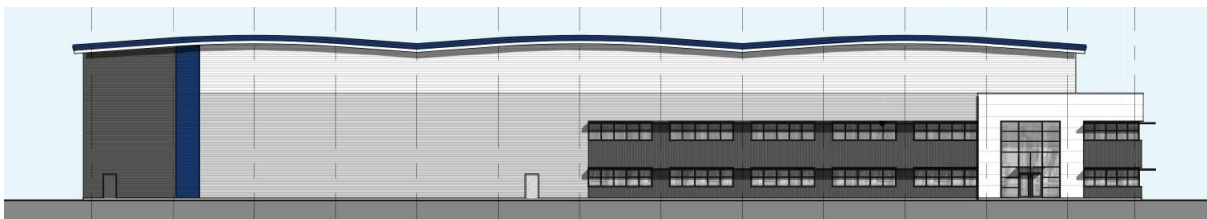


SPECIFICATION
FOR
INDUSTRIAL UNIT
AT

PLOT 6000, SEVERN BEACH, BRISTOL



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1. DEVELOPMENT DETAILS

1.1 Project

The Works as indicated on the drawings comprises the construction of a single storey warehouse/production unit together with office accommodation, external site works including hard standings, car parking, landscaping and drainage on an area of land at Plot 6000, Western Approach Business Park, Severn Beach, Bristol BS35 4GG

The warehouse building shall consist of a structural steel multi span portal frame having a clear height to the underside of haunch of 12m and alternate valley columns will be omitted.

1.2 Areas

The scheme shall provide the following gross internal floor area (as a minimum):

Warehouse	98,800 ft ²	9,178.74 m ²
Office Accommodation	6,700 ft ²	622.44 m ²
Total	<u>105,500 ft²</u>	<u>9,801.18 m²</u>

The gross floor area is deemed to be measured to the inside face of the internal wall without any deduction for columns.

1.3 Standards

All elements of the Works, materials and workmanship will be designed and constructed in accordance with all relevant 'Standards' current at the time of commencement of the Works, not confined to those scheduled below:

- i. The 17th Edition of the IEE Wiring Regulations with amendments (BS 7671)
- ii. Health and Safety at Work Act
- iii. Water Supply Regulations
- iv. The Gas Safety Regulation
- v. The Clean Air Acts
- vi. The Local Authority Building Regulations and subsequent amendments thereto, subject only to the relaxations sanctioned by the Department of the Environment
- vii. Specific requirements of the Utility Supply Local Authorities and Local Planning Authorities
- viii. The British Standards and Codes of Practice
- ix. The requirements of the Building Control Officer or approved inspector
- x. The CIBSE Guides including Technical Memorandum's
- xi. The Factories Act
- xii. Local Authority Byelaws
- xiii. The Electricity Supply Act
- xiv. Construction (Design and Management) Regulations (CDM) 2015
- xv. HVCA Ductwork Standard DW144
- xvi. BSRIA Commissioning Codes
- xvii. The Internal Drainage Board

For the avoidance of doubt, it is the responsibility of the contractor to comply with the above requirements and to obtain any necessary consents.

1.4 Building Research Establishment Environmental Assessment Method

The project shall be designed and constructed in accordance with the Building Research Establishment Environmental Assessment Method (BREEAM) to achieve a **Very Good** rating.

The Main Contractor shall appoint an Approved BREEAM Assessor within two weeks of instruction to proceed, to carry out the assessment. The assessor shall have an input to all design meetings and shall issue a monthly progress report.

1.5 Building Regulations Part L2A BER/TER Calculation and Energy Performance Certificate

A Building CO2 Emission model is to be carried out for the project using a government approved SBEM (Simplified Building Energy Model) or DSM (Dynamic Simulation Model) method and using a government approved software. If a thermal comfort/ overheating calculation is required under BREEAM and/or Part L2A Building Regulations, this is to be carried out by the Main Contractor before the construction and Main Contractor has to demonstrate that the building does not overheat as required by the relevant Building Regulations criterion and/or BREEAM. It is the Main Contractor's responsibility to meet compliance with the entire five criteria under Part L2A Building Regulations.

1.6 Compliance of the Building Envelope

The whole building envelope is to be tested to validate a maximum air leakage of 2.5m³/hr/m² at 50Pa positive air pressure (3.5m³/hr/m² for buildings under 100,000 ft²).

1.7 Building Log Book and Building User Guide

On completion of the project the Building Log Book shall be provided as required by and in accordance with the Building Regulations Part L2A, utilising the CIBSE TM 31 Guidance and any necessary additions to achieve the specified BREEAM rating.

An additional Building User Guide is to be provided as required by the 'Management' Section of the BREEAM Assessment. The Building User guide will contain the necessary details about the everyday operation of the building in a form that is relevant to the non-technical building user that will occupy the building.

1.8 Fire Strategy

If required a fire strategy for the **base works** shall be prepared to satisfy the Building Regulations and to the acceptance of the Building Control Officer based upon the agreed layouts and specification.

The shell works fire strategy excludes any implications of a tenant fit out, for example;

- i. Automatic detection system in the Warehouse upon occupation by the tenant (by others)
- ii. Sprinklers
- iii. Smoke venting

1.9 Exclusions

- i. Specific requirements of the tenant's insurer
- ii. Racking
- iii. Furnishings, Fittings, Blinds, Shelving, Lockers
- iv. Mechanical and Electrical installations within the Warehouse (with the exception of those specified)
- v. Burglar Alarm, Telephone and Data Systems
- vi. Process Machinery
- vii. Vehicle Wash Equipment and Fuelling Installation
- viii. Sprinklers

1.10 General

Where specific products or materials are listed in this specification, alternatives of a similar quality and standard may be offered for inclusion subject to the approval of the Employer's Agent.

2. SUBSTRUCTURE

2.1 Geotechnical Report

A Site Investigation including contamination testing will be provided and the recommendations/results used in the subsequent substructure and foundation design

2.2 Site Clearance/Bulk Earthworks

The site to be covered by the new building and pavings will be cleared of all undergrowth, invasive vegetation, buildings, hard standings and deleterious materials.

Site clearance will be carried out including removing as necessary to Contractor's tip off site. The formation level will be graded, trimmed and compacted prior to laying the hardcore bed.

The site will require to be filled up to the design levels by importing suitable material. The contractor should contact Bristol & Avon Transport & Recycling Ltd (contact James Wickenden Tel: 0117 982 9561) who have been in discussion with the Developer in this regard. Alternative quotations from different contractors will be acceptable.

2.3 Substructures

The whole of the substructure work will be carried out to the Structural Engineer's design and approved by the Local Authority. Concrete work will comply with BS8110 'The Structural Use of Concrete'. All foundations to be complete with holding down bolts for the structural frame.

The Contractor's Structural Engineer will be required to verify in writing that he has inspected at least 30% of excavations prior to commencement of construction of the foundations, and that he is satisfied with the construction of substructures.

Where required the bases will be designed to accommodate Fire conditions on boundaries.

2.4 Ground Floor Slab

A reinforced concrete ground slab with a power floated finish will be provided to all ground floor areas within the building.

The floor slab design will be based on standard wide aisle racking solution.

Should the tenant require an alternative racking arrangement to standard wide aisle, then the tenant will provide a racking layout within 4 weeks from the commencement of the project.

A ground bearing slab will be designed in accordance with the recommendations of TR34 4th Edition (2013). A suspended slab should be designed in accordance with TR34 4th Edition (2013), BS8110 or EC2 where traditional bar/mesh reinforcement is used, suspended slabs reinforced with a combination of traditional reinforcement and steel fibres or with steel fibres only should be designed in accordance with Clause 5.3 of TR63 and be based on the results of full scale testing. The slab is to be designed for a maximum loading of 50kN/m² and the rack

loadings stipulated in the following table placed in a back to back situation (with centre line base plates placed a minimum distance 150mm away from floor joints) anywhere on the floor. Considerations should also be made for piled floor slabs and the requirements for joints and base plates setting out as outlined in TR34 4th Edition.

Height to Haunch	Rack Leg Load
12.0m	7.00 tonnes

Loadings based on a rack height of 1.75m level and 1.0 tonne pallet loads.

Where joints are provided in the construction of the floor, they should be generally detailed in accordance with TR34 and designed so that no vertical movement occurs across the joint. Where possible the number of joints should be kept to a minimum. Day joints should be tied or reinforced with “Permaban” type edge plate reinforcement.

The concrete is to be in accordance with BS 8500 and have a minimum compressive strength of 35N/mm² at 28 days. The concrete will have a cement content of between 300kg/m³ and 450kg/m³; and a maximum water cement ratio of 0.55. The use of super-plasticisers will be permitted.

Prior to construction of the slab, the proposed concrete mix is to be tested to show that its coefficient of drying shrinkage is less than 0.0455. Tests are to be in accordance with BS EN 1367-4.

Prior to the slab concrete being placed, a full survey of the sub-base/pile cap levels must be undertaken and submitted to the Employer’s Agent for approval. Notice must be given to the EA and the opportunity for the survey to be checked must be afforded. The tolerance for sub-base placement is +0-20 to ensure the minimum design thickness is achieved.

The ground floor slab will be constructed so that the top surface is within the tolerances for **FM2** as defined in Concrete Society Technical Report No. 34. The floor is to be surveyed to prove its acceptance within fourteen days of construction.

The ground floor slab wearing surface shall have a minimum abrasion resistance of AR1 in accordance with table 2 or BS 8204. One abrasion test is to be carried out for each 2000m² of slab or part thereof, in accordance with BS 8204 to confirm that appropriate abrasion resistance has been achieved.

After the final power floating operation, the floor slab is to be sprayed with an acrylic based, curing, sealing and hardening membrane with a curing efficiency of 90%. The floor shall not be trafficked for a minimum of four days following the sealing operation.

The floor slab shall be capable of grinding (by others) to form tracks for VNA forklift trucks.

The ground slab is to be constructed on a 1200 gauge P.I.F.A. polythene damp proof membrane laid on a layer of hardcore with a minimum thickness as stipulated on the engineers’ drawings.

The hardcore shall be a crushed rock or similar material to be approved by the engineer and shall be graded in accordance with either DOT type 1, DOT type 2 or 6F2 as described in table 6.1 of the Specification for Highway Works.

The hardcore is to be laid to the specified minimum thickness in one layer and compacted using a 10 tonne dead-weight roller with a minimum of 4 passes in each direction perpendicular to each other. Where necessary, the hardcore layer can be blinded with a fine material to close the surface, sand must not be used. The surface tolerance of the hardcore layer will be +5mm and -10mm with an average of -5mm.

Prior to concreting the slab, all roof and wall sheeting and loading doors must be fixed to provide protection from wind and rain. If due to programme restraints this cannot be achieved, temporary sheeting must be used to seal all openings.

All saw cut joints are to be sealed prior to practical completion with Arboseal MP20. These joints are to be inspected at three monthly intervals during the defects liability period and checked for arris damage. Any significant arris damage must be repaired with an epoxy mortar placed in accordance with the manufacturer's recommendations. Armoured day joints are to be left unsealed at practical completion but sealed at the end of the 12 months defects period (where visible/accessible).

All efforts should be made in the construction and detailing of the floor to reduce the possibility of random cracking. If cracks do occur, they are to be pressure grouted with a low viscosity epoxy mortar if they are wider than 0.8mm.

The office ground floor slab to be designed to take an imposed loading of 15kN/m² with a surface tolerance and finish appropriate to the specified floor finishes.

2.5 External Steps

Where applicable the external steps to the dock level area will be constructed in reinforced in-situ or pre-cast concrete or galvanised steel, with a slip resistant finish. Handrails and balustrading will be provided in circular hollow, hot dipped galvanised mild steel sections.

2.6 Retaining Walls

Precast retaining walls including dock leveller pits and tail gate slots will be provided to the dock area of the building all to the structural engineers' details.

External retaining walls to the sides of the dock access will be also of fair faced concrete all to the structural engineers' details.

3. WAREHOUSE/PRODUCTION SUPERSTRUCTURE

3.1 Steel Frame

The steel frame will be portal frame with a minimum clear height to underside of haunch of 12m designed in accordance with BS5950 : Part 1 : 2000 and BS5950 : Part 2 : 2001 with dead plus super loading to BS6399 : Part 1 : 1996 and BS6399 : Part 3 : 1988, wind loading to BS6399 : Part 2 : 1997 and all relevant Codes of Practice in force at the time of construction and generally to the satisfaction of the Building Regulations Authority. Steel sections to BS 4 : Part 1 : 1993 and to BS EN 10025 : 1993 and BS EN 10210 : Part 1 : 1994 for weldable structural steel. All work will be carried out in compliance with the current edition of the National Structural Steelwork Specification.

The frame and purlins will be capable of supporting an internal service loading arising from mechanical and electrical installation plant, equipment and fittings of 0.25 kN/m² over the whole area of the roof. An option to increase the service loading to 0.35 kN/m² to cover solar PV panels should be costed by the contractor and included as an extra over cost in the CSA. Roof plant service load to be included in addition where required. The office floor will be designed for a superimposed loading of 2.5 kN/m² and an additional loading of 1.0 kN/m² for partitions. All plant areas will be designed to accommodate a loading of 7.5 kN/m².

The steelwork will be designed and constructed to allow the building envelope to achieve compliance to Part L2 of the Building Regulations. In particular, a substantial steelwork member will be provided in hipped roof areas to directly support the roof sheets. All purlins and rails will be fixed in accordance with manufacturer's recommendations and will have a minimum thickness of 1.45mm to assist a positive cladding fixing.

All steelwork will be prepared and protected in accordance with BS EN ISO 12944 for exposure class C2. Typically, this will be blast clean to Sa 2½, before painting with one coat of epoxy 2 pack high build zinc phosphate with a satin finish to a nominal dry film thickness of 80 microns to give 10 years lift to first maintenance, finished colour to be light grey. Cold formed sections will be manufactured from hot dipped galvanised coil to BS EN 10147 : 1992 and BS EN 10143 : 1993. Where steelwork is to be encased in masonry, it will receive two coats of bituminous paint, to a nominal thickness of 150 microns. Where remedial works are required to webs, flanges, beams, columns or other steelwork that is visible in the complete building the whole area of the affected steelwork will be coated to provide a uniform appearance.

The steel frame shall be designated to meet the following standards:

- i. All cold rolled steelwork shall have the standard Manufacturers galvanised finish to BS EN 10143 : 1993 or better
- ii. All frame bolts are to be zinc plated or galvanised finish
- iii. The roof and wind loads shall comply with BS 6399 : Part 3 and 5 including allowance for drifting snow on the valley of the structure and against parapets if provided
- iv. All doors shall be fully framed in steelwork, including all frame extensions necessary to support sectional door fittings and canopies
- v. Sag rods and tension wires shall be free from distortion, properly adjusted
- vi. The structure must be capable of carrying signage and door frames in the positions shown on the drawings
- vii. Protection bollards to be installed internally to level entry door openings

- viii. Fire protection where required will be provided. Where fire protection of the steel frame is necessary it must be resistant to impact damage up to 2m above finished floor level

3.2 Roofing

The roof will be the Twin-Therm® Quantum system utilising nominal 0.7mm thick Colorcoat HPS200 Ultra® coated steel external sheets supported by the Confidex® Guarantee of up to 40 years and fixed as per the system requirements. The roof, rooflights and rainwater goods are to provide a manufacturer's warranty for the entire installation for a period of 25 years. This will require the use of stainless steel fixings. The cladding must be installed by a cladding contractor trained in the installation of the roof and wall systems.

The CA LT 17 1000S liner panel will be minimum 0.4mm thick with the internal finish to be Colorcoat PE15 bright white to the exposed face of the cladding lining panel. The internal lining panel must be sealed at the side laps using 50mm Therma-Foil Plus tape.

The insulation to be non-combustible glass fibre and to achieve a minimum designed thermal U-value of 0.23W/m²K (180mm thick).

The roof system is to be covered by BBA Agrément Certificate 07/4428. The roof and wall cladding systems are tested in accordance with LPS1181 to achieve a minimum grade 'EXT-B' certification, certificate reference LPCB 443a. The internal lining to the main roof will be rated Class O (rooflights Class 1) for surface spread of flame as tested to B.S. 476 Part 7:1997. In accordance with the latest test standards all liner fillers to be flame retardant.

The minimum designed roof pitch will be 4.5° (3.0° after deflection). Where a Twin-Therm® Quantum or Griffon curved roof design is required the roof system will be designed to ensure the external sheet end laps (including in-plane rooflights) are to be minimum 4.0° design (2.5° after deflection) installed as per the system manufacturers recommendations. For project specific design roof pitch refers to project drawings.

The rooflight assemblies will be triple skinned GRP, with an 8oz (2.44kg/m²) inner and a 6oz (1.83kg/m²) outer skin, with a separate intermediate core and all relevant components to achieve a U-value of 1.30W/m²K. Rooflights will be provided to approximately 15% of the floor area, installed as per the system manufacturer's recommendations.

The installed roof and rooflight systems are to be minimum Class B Non-Fragile for a period of 25 years, tested in accordance with the HSE materials standard ACR(M)001:2011 'Test for Non-Fragility of Profiled Sheeted and Large Element Roofing Assemblies (fourth edition)'. The system will be tested for all spans up to a maximum of 1800mm. This only applies to tested roof assemblies where all of the roof components are supplied by the system provider. *Annex 'C' from the HSE Document ACR (CP)001:2007 Rev 3 "Recommended Practice for work on Profiled sheeted Roofs" is to be completed and submitted by the Appointed Roofing Contractor as part of the tender package for approval and acceptance by the Architect, Developer and Client.*

Detail work to ridge, eaves, hip and verge will be in accordance with the manufacturer's recommendations and standard approved design details. On pitched roof designs Cranked Ridge liner panels should be installed. Internal flat ridge flashings are not acceptable.

The disposition of roof lights over the warehouse/production area will be as even as possible, subject to constraints imposed by any applicable Fire and Boundary Conditions.

No roof lights are to be installed in the roof area directly above the main office accommodation.

Any roof light disposition shown on the drawings is notional only and may be varied by the Roofing Sub-Contractor, subject to approval, prior to construction so as to achieve the most economical and practical layout, provided that the disposition is fully in accordance with the requirements of the Building Regulations.

Alternative roofing systems will not be considered on this project.

3.3 Roof Access

A permanent roof access hatch, access ladder and horizontal life line system will be provided to allow safe roof access and maintenance to all roof areas, including two sets of harnesses and lanyards.

3.4 Rainwater Goods

The rainwater from the roof will be collected in 1.2mm thick pre-galvanised mild steel boundary wall and valley gutters, complete with 1.2mm PVC pre-laminated membrane, from CA Building Products, to ensure a minimum 25 year guarantee to match the roof.

Gutters will be the wrap-over type, factory insulated using rigid 50mm thick Rock-fibre insulation.

The water will be taken from the gutters by a siphonic drainage system.

The roof drainage system shall be designed and constructed to comply with BS EN 12056-3:2000 and the following criteria:

- The geographical location of the building
- A building design life of 25 years
- Category 3 risk protection

The system will be designed for a rainfall intensity which is the greater of:

- the amount properly calculated in accordance with the above
- 0.056 l/s/m²

All pipework shall be installed above the portal haunch level to maintain minimum clear height as stated in Clause 3.1.

All components of the system shall be in accordance with any relevant British or European standards.

Siphonic pipework shall be firmly attached to an engineered continuous railing system, using appropriate pipe clamps at a maximum of 2m centres and at the ends of the pipework

sections, to provide adequate and proper restraint against thermal movement of the pipe. Additional bracing will be provided at branch connections and where required.

The railing system shall be fixed within 100mm of the closest edge of the pipework and shall be securely fastened back to the main structure at appropriate intervals.

Both primary and secondary siphonic systems will be provided. The primary system shall drain 50% of the design rainfall intensity and the secondary system shall drain the balance.

The primary system will be connected to the storm drainage system. The secondary system will discharge to hard paved areas external to the building. The main contractor shall provide suitable protection to any parts of the building or landscaping that might be damaged by the flow of water from the secondary system.

The secondary system rainwater outlets will be evenly distributed along the total gutter length and secondary discharge points shall be located at either end of the gutter and will generally be located approximately 300mm above FFL. Discharge locations to be agreed with the Employer/Architect. Secondary eaves downpipes intermittently spaced along the eaves are not acceptable.

The external drainage will be designed with regard to the peak flows from the primary siphonic system and connection between the siphonic system and the underground pipework will provide a break at atmospheric pressure.

High level tell-tail indicators to be provided for Siphonic systems.

All pipework to be installed above the portal haunch level to maintain minimum clear height as stated in Clause 3.1. Internal rainwater pipes are to be located within the web of the steel and suitably protected against accidental damage.

Internal rainwater pipes are to be located adjacent to the web of the steel and protected against accidental damage.

3.5 Vertical Cladding

The cladding will be the Twin-Therm® Wall system utilising either Colorcoat HPS200 Ultra® or Colorcoat Prisma® coated steel external sheets (gauge 0.5/0.7mm thick nominal subject to orientation and/or colour) supported by the Confidex® Guarantee of up to 40 years and fixed as per the system requirements. The wall systems are to provide a manufacturer's warranty for the entire installation for a period of 25 years. The cladding must be installed by a cladding contractor trained in the installation of the roof and wall systems.

Profile choice, colour arrangement, orientation and layout of panels to be as agreed with Planning Authority to suit the approved elevational treatment. Refer to drawings for project specific information.

The CA LT 17 1000S liner panel will be minimum 0.4mm thick with the internal finish to be Colorcoat PE15 bright white to the exposed face of the cladding lining panel.

The insulation to be non-combustible glass fibre and to achieve a minimum designed thermal U-value of 0.35W/m²K (120mm thick).

The wall cladding systems are tested in accordance with LPS1181 to achieve a minimum grade 'EXT-B' certification, certificate reference LPCB 443a. The internal lining to the main roof will be Class O rating for surface spread of flame as tested to BS 476 Part 7:1997. In accordance with the latest test standards all liner fillers to be flame retardant.

Where required, under the Building Regulations, to provide enhanced fire protection to the external wall the build-up will be upgraded to a FW15 or FW30 FireWall status (subject to specific requirements) as required by Twin-Therm system®.

Alternative cladding systems will not be considered for this project.

3.6 Trimotherm Composite Cladding

The composite cladding will be the Trimotherm Invisio horizontally laid wall system as indicated on the drawings utilising either Colorcoat HPS200 Ultra® or Colorcoat Prisma® coated steel external sheets, supported by the Confidex® Guarantee of up to 40 years and fixed as per the system requirements. The wall systems are to provide a manufacturer's warranty for the entire installation for a period of 25 years. The cladding must be installed by a cladding contractor trained in the installation of the roof and wall systems.

Colour arrangement and layout of panels to be as agreed with Planning Authority to suit the approved elevational treatment. Refer to drawings for project specific information.

The wall cladding systems are tested in accordance with EN 13501-2 to achieve a minimum fire resistance of 60 minutes. The internal lining will be Class O rating for surface spread of flame as tested to BS 476 Part 7:1997.

Alternative cladding systems will not be considered for this project.

3.7 Air-Tightness

An air-tightness test is to be carried out by the Main Contractor prior to the Employers Agent granting tenant access. This test is to be carried out by a UKAS-accredited specialist company who are a member of the Air Tightness Testing & Measurement Association (ATTMA) and the British Institute of Non-Destructive Testing (BINDT) and must confirm to all current legislative requirements and Building Regulations.

The Main Contractor is to allow for all works in association with this test as required by ATTMA Technical Standard L2. The air test should, as a minimum, comply with BS EN 13829:2001 and be to a minimum requirement of $2.50\text{m}^3/\text{hr}/\text{m}^2$ @ 50 Pa to comply with (and improve on) ADL2A. A copy of the resultant report is to be provided to the Employers Agent.

Any defects, etc., highlighted by the test are to be rectified by the Main Contractor prior to practical completion. When attending site to carry out the air-tightness test, the specialist company are to bring with them all equipment to carry out a smoke test, thus aiding the rectification of any defects. This test, if required, can be carried out on the same day as the air-tightness test, therefore, causing minimum disruption to progress on site. This test is to be carried out whether or not required by the Building Control Officer.

3.8 Plant Room/Area

Within the allocated area, a plant room/area will be provided of adequate size to accommodate the necessary plant and equipment to serve the unit. This area will be in addition to the lettable area or the unit.

All plant areas must minimize impact on warehouse floor area.

[OR]

3.9 Plant Platform

At high level within the warehouse area, adjacent to the compartment wall of the offices a steel plant platform will be provided of sufficient size to accommodate the necessary plant and equipment to serve the unit.

All plant areas are not to impinge on warehouse floor area.

3.10 Prowall

To docking areas Insulated Concrete wall panels, Buchans ProWall® or similar approved walling system will be required. Walls to be fully insulated to meet $0.27W/m^2K$ or better as required under current Building Regulations and for compliance with the overall SBEM requirements for the building. The wall will provide support for both dock doors and dock shelters with steel door track supports only being required above panels. Holes for traffic lights and other electrical installations will be provided if required. Wall units to be manufactured from C50 reinforced concrete.

3.11 Level Access Doors

The external level access doors indicated on the drawings will be manufactured by Stertil-Stokvis reference Thermadoor model 640 and are electrically operated (with manual over ride facility), vertical lift doors with spring support by door supplier at low level for ease of maintenance and K.A. continuous thermal break is to be provided between inner and outer skins. Size 4000mm wide x 4800mm high (Note structural steel size 4140mm wide x 4870mm high), with neutral acrylic double glazed vision panels as indicated on the drawings. Doors complete with sliding bolts electrically interlocked and anti-fall devices.

The doors will be of composite construction comprising galvanised steel inner and outer faces with door panels filled with polyurethane foam insulation to achieve an optimum 'U' value of $0.4W/m^2K$. EPDM seals to be fitted to the top, bottom and sides of the door to prevent rain penetration and minimise draughts. To BS EN 12425 and compliant with building regulations April 2010-04-30. Compliance with BS EN 12453: 2001 (requirement for safety in use of power) and BS EN 12604: 2000 (mechanical aspects). Finger trap protection to panel joints inside and out. The surface finish to the external face of the doors will be polyester colour to our standard range of colours with internal face RAL 9002.

3.12 Dock Access Doors and Equipment

Where shown on the drawings, doors as manufactured by Stertil® reference Thermadoor model 640 and are electrically operated (with manual over ride facility), vertical lift doors with spring support by door supplier at low level for ease of maintenance and K.A. continuous thermal break is to be provided between inner and outer skins. Size 2860mm wide x 3000mm

high (Note structural steel size 3000mm wide x 3070mm high), with neutral acrylic double glazed vision panels as indicated on the drawings. Doors complete with anti-lift automatic locking device.

The doors will be of composite construction comprising galvanised steel inner and outer faces with door panels filled with polyurethane foam insulation to achieve an optimum panel 'U' value of 0.4W/m²K. EPDM seals to be fitted to the top, bottom and sides of the door to prevent rain penetration and minimise draughts. To BS EN 12425 and compliant with current building regulations. Compliance with BS EN 12453: 2001 (requirement for safety in use of power) and BS EN 12604: 2000 (mechanical aspects). Finger trap protection to panel joints inside and out. The surface finish to the external face of the doors will be polyester colour to manufacturer's standard range of colours with internal face RAL 9002.

To each dock access door location will be fitted a Stertil® reference SF 2520 (2500mm long x 2000mm wide x 650mm deep) hydraulic dock leveller with 450mm long self-cleaning OPEN HINGE swing lip (not piano hinge) for heavy duty use. Rated capacity 6000kg single axle loading (100% to be calculated on front axle, e.g. 3000kg on each of the front wheels acting over two 150mm x 150mm contact areas at 1m lateral centre distance) with 8/10mm thick 1-PIECE deck plate, lip and 'reinforcement cross beams manufactured from FE- 510D high tensile steel. Automatically operated galvanised TWIN cross traffic safety support legs supporting the unit without reliance on lip saddles/cradles. Operating range of 300mm above dock and 300mm below dock. Panic stop facility to prevent free fall in the event of vehicle pull away. Emergency stop. Full range safety toe guards, all fully compliant to EC directive EN1398 and adjustable integral pit frame for suspended type dock levellers in conjunction with pre-cast tail lift arrangement. Deck, lip and front beam Gloss black RAL9011 with sub-frame and integral curb angles hot dipped galvanised finish.

Perimeter brush seals to reduce draughts and interlock safety device to prevent dock leveller from operation when door is in the closed position.

To each dock access door location will be fitted a Stertil® reference WE 574 heavy duty steel frame collapsible dock shelter 3400mm wide x 3600mm high x 550mm projection from building line with 3mm thick (3500gm/m²) PVC front flaps with single white chevron markers, top section of the shelter designed to assist rain water drainage with 100mm sloping roof from back to front.

External 24V DC 100mm dia red and green LED traffic light system with directional arrows and resin encased to IP68 for heavy duty use. To be fitted between each dock shelter on reversing driver's side compliant to BS 873 standard with mimic/repeater lights incorporated into Stertil® SMC composite control panel.

For illumination to inside of trailers fitted adjacent to door internal angle-poise dock light reference K1080LED with transformer to reduce from 240v supply, bulb to be cool white 6w LED with 60° lighting array. Angle poised arm to incorporate vertical pivot function.

Below each dock leveller position are to be fitted energy absorbing polyethylene low friction PE450 dock bumpers (not plain rubber bumpers) incorporating rubber shock absorbers to reduce collision damage. Bumper size; 220mm wide x 520mm high x 140mm projection fitted with special front plate to be manufactured using high molecular polyethylene which can simply be rotated onsite and interchanged to give four times the life of each buffer. All fixing to be located in rear galvanised housing to ensure uninterrupted flat surface, and

removable bottom section are to be provided. Based on 150mm deep bumpers a lip projection of 250mm is required for suitable engagement of trailer beds.

Bumper housings are to be bolted to special front mounting plates 220mm wide x 520mm high x 10mm deep welded to dock leveller frame and angled over the front PC retaining wall with pins/tangs for casting into the finished internal dock slab for added strength and edge of dock protection. Plates to be finished Gloss Black RAL9011

Each dock location is to be operated using single composite control panel model Stertil® SMC incorporating door up/down/e-stop buttons, dock leveller raise push button, red-green mimic lights, power and auto switch Red-Green traffic lights, power and auto switch LED loading light and equipment interlocks.

Below each dock access bolted down into external service yard slab 1-pair of 2000mm long x 170mm dia galvanised tubular steel wheel guides with FLARED entrance for ease of parking.

Alternatively equal or approved systems from Hormann, Loading Systems or Assa Abloy would be considered subject to client approval.

3.13 Fire Exit Doors

Number and size of doors to be provided to ensure compliance with Building Regulations and Fire Authority requirements. Doors to be designated and installed to meet the following requirements:

- i) provided with external landings extending to the internal floor level. Size to accommodate swing of door
- ii) 1,100m high galvanised steel tubular barriers externally to two sides, primed prior to delivery to site and painted to match feature colour to building where exit provided to areas where vehicles are present
- iii) galvanised mild steel frames – powder coated
- iv) steel personnel doors (double or single as required) – powder coated
- v) panic bar, hinges and all other associated ironmongery
- vi) colour to be confirmed, but generally to match loading door

4. OFFICE SUPERSTRUCTURE

4.1 Structure

The office block structural frame will be constructed in structural steelwork. The frame designed to BS 5950: Part 1 and 2 will be fire protected to achieve a fire resistance as required under the Building Regulations. All generally in accordance with Clause 3.1

4.2 Roofing

If external, all as clause 3.2 except that roof lights will not be provided.

If internal, the roof construction to the offices to be constructed in insitu concrete on permanent metal decking or pre-stressed concrete floor units grouted in position designed in accordance with BS 8110 and BS 6399: Part 1:1984 to carry a superimposed load of 3.5kN/m². A nominal 1 hour fire resistance in accordance with Table 4.4 of BS 8110: Part 2: 1985 will be achieved.

All plant areas will be design to accommodate a loading of 7.5kN/m².

4.3 Rainwater Goods

1.23mm pre-galvanised steel membrane lined boundary-wall gutters with 3mm polyester powder coated aluminium secretly fixed fascia soffit and capping. Rainwater pipes to be similarly colour coated.

4.4 External Walls

The external skin will be Trimotherm Invisio horizontal composite panels and are to be as indicated on the Architects drawings and as described in section 3.6.

The internal lining to any cladding is to be Class O rating for surface spread of flame as tested to BS 476: Part 7.

4.5 Windows/Curtain Walling

A curtain walling system shown to the office block elevations will be a fully thermally broken system comprising polyester powder coated aluminium mullions and transoms complete with factory sealed double glazed units and glazed and insulated spandrel panels, where necessary. The system to be Kawneer, Technal or Senior sections or similar approved design to be provided by a glazing specialist.

Glazing will be in 6 mm Antisun Grey on clear glass outer pane or similar approved, 16 mm argon filled space and 6 mm 'low e' clear inner pane to achieve a 'U' value of 1.50W/m²K or better for compliance with Building Regulations Part L2A and for compliance with the overall SBEM requirements for the building. Spandrel panels, where necessary, will be in ultra-warm Permawall or similar, insulated panels.

Where shown on the Architects elevations or if deemed necessary as part of the building modelling exercise to demonstrate limiting of Solar Gain for Building Regulations Part L2A; Brise Soleil will be integrated with the curtain walling and will be powder coated aluminium.

Double glazing units (thermally broken) and spandrel panels (with thermal check) are to be fitted to facilitate replacement externally.

Locks to be installed to all ground floor windows to comply with British Standard 3621.

4.6 Upper Floor Construction

The upper floors of the offices to be constructed in either in-situ concrete on a permanent metal decking or pre-stressed concrete floor units designed in accordance with BS 8110 and BS 6399: Part 1 to carry a superimposed load of 2.50kN/m², with an additional 1.00kN/m² for lightweight partitions. A nominal 1 hour fire resistance in accordance with Table 4.4 of BS 8110: Part 2 will be achieved.

Where pre-cast units are used, they will be grouted in position and sealed to receive proprietary raised floor. Areas not specified with a raised floor will have a minimum 50mm thick fine concrete screed laid over the floor and include a layer of D.49 structural fabric reinforcement. The top surface of the floor will be trowelled to receive floor finishes.

4.7 External Doors

The front entrance to the office will be manufactured using Kawneer, Technal or Senior sections or similar approved in polyester powder coated aluminium sections with concealed overhead door closer to match curtain walling system. The door will be glazed to the recommendation of BS 952 and BS CP 6262 in laminated or safety glass to match windows.

A letter plate is to be provided in or adjacent to the main entrance door.

The door to be fitted with locks to comply with British Standard 3621 and five lever mortice deadlocks.

4.8 Internal Walls

Internal dividing and partition walls to the reception, staircase and welfare areas are to be built in GTEC Siniat Megadeco partition system or similar approved.

Where shown on the drawings, compartment walls between the offices, warehouse and production areas will be constructed from a whitewall composite panel with 1 hour fire integrity to satisfy Building Regulations.

Any door or window openings within the wall will be afforded the same degree of fire protection as required for the wall.

If the warehouse is unheated, then the compartment wall will be insulated to comply with the requirements of Part L2A of the Building Regulations and for compliance with the overall SBEM requirements for the building.

Partitions generally throughout the other office areas to be proprietary, metal stud partitions with plasterboard facings. Moisture resistant boards to be used in areas subject to moisture.

4.9 Main Staircase

The staircase and landings from upper floor offices will be designed and constructed in precast concrete or steel with concrete infill treads to the Structural Engineer's details.

Stair treads and risers shall be finished with carpet tiles and appropriate contrasting nosings with stainless steel strings and the stair soffit will have a painted plaster finish and a shadow gap between soffit and string.

Balustrades and handrails shall be formed in stainless steel circular hollow sections with a brushed finish. All joints and intersections to steel / stainless steel shall be fully butt-welded ground, filled and polished to provide a smooth finish.

4.10 Ceilings

Suspended ceilings will be provided as follows:

- i) generally throughout the offices and ancillary areas, Armstrong Dune Supreme 600 x 600mm Tegular tiles in lay-in grid system with a stove enamelled finish on wire hangers
- ii) a 25/50mm shadow edge trim will be included to all office/circulation areas. The suspended ceiling system is to be earth bonded in accordance with I.E.E. regulations and the suspended ceiling manufacturers recommendations
- iii) a metal shadow edge trim to all tiled areas – i.e. toilet areas, etc.
- vi) the floor to ceiling height to the ground and first floor office and ancillary areas will be 2.70m and 2.40m in the welfare and toilets areas. A consistent level floor will be provided throughout the office and ancillary areas
- v) all ceilings shall have a minimum void of 250mm complete with all necessary cavity barriers and a minimum clear void under beams of 100mm.

4.11 Wall Finishes

All internal walls unless specified otherwise throughout the offices, ancillary and circulation areas will be plastered/dry lined and fully sealed and then painted with one mist coat and two coats vinyl matt emulsion paint.

The tea rooms will have a tiled splashback with ceramic tiles.

4.12 Floor Finishes

Generally throughout the main office areas a raised access floor medium grade system as Kingspan RMG600 or similar, to MOB Construction and installation standards to provide a minimum 150mm clear void. The standard medium grade 600 x 600mm panels to receive carpet tile covering. The raised access floor to be earth bonded in accordance with I.E.E. regulations and the raised floor manufacturers recommendations.

Main entrance reception area, the stores and generally throughout the Ancillary, Amenity and Welfare areas will be power floated concrete or screed finish to receive carpet tile, vinyl or ceramic floor coverings.

Generally throughout the office areas and unless specified otherwise, **Interface** Transformation carpet floor tiles coverings will be provided. Contact details; enquiries@interface.com , www.interface.com, Tel: 08705 304030.

4.13 Ceramic Tiling

i) Toilet Areas

Walls will be tiled full height with ceramic tiles in a range with a choice of colours to be approved by the Employers Agent.

The floors will be fully tiled with ceramic tiles in a range with a choice of colours to be approved by the Employers Agent. Tiles in wet areas will be slip-resistant and suitable for the location.

ii) Reception Areas

The feature wall tiles – applied to one nominated wall in elevation, 2.7m high - will be porcelain tile (natural finish) range with a choice of colours to be approved by the Employers Agent (e.g. Granitogres or similar).

The floor tiles will be porcelain tile (natural finish) range with a choice of colours to be approved by the Employers Agent.

4.14 Doors and Joinery

Internal doors throughout the offices will be solid core flush doors with American light oak hardwood veneers and concealed lipping all round. Frames and architraves to be hardwood to match door veneers. The source of all hardwoods to be incorporated within the works is to be disclosed and approved.

Where required by the Building Control Officer, doors will have an appropriate fire rating and be fitted with intumescent strips, smoke seals, door closers and vision panels of size 150mm x 750mm.

Ironmongery will be appropriate to the location of the door and will be Grade 316 polished stainless steel door furniture with ancillary fittings.

Internal circulation doors will be fitted with swing free self-closers linked to the fire alarm in compliance with Part M of the Building Regulations.

Locks will be suited as follows:

Master Key to all doors

The Ironmongery will be Datim (Tel 01246 572277) or similar approved.

Toilet partitions will be manufactured by Total Laminate Systems (Tel 01202 877600) or similar and approved, to be fully co-ordinated to vanity units and laminate faced boxing. All access panels within the W.C. areas will be hinged and lockable. Each cubicle to have toilet roll holder and coat hook fitted.

4.15 Fire Precautions

The requirements of the Building Control Officer will be incorporated, as indicated on the drawings, in respect of means of escape, fire resisting doors and partitions, fire exit doors and fittings and all associated signs and notices.

Signs and notices will comply with Associated Signs and BS.5499 'Fire Safety Signs, Notices and Graphic Symbols'.

Any other requirements or recommendations of the Local Authority Building Control Department, incorporating the Fire Prevention Officer with regard to provision of hose reels, sprinkler systems, heat sensors, smoke ventilators, extinguishers and other fire fighting equipment are specifically excluded.

4.16 Finishings General

In the main entrance lobby area to the full width of the reception area a mat well and frame consisting of an aluminium frame fixed into the concrete sub floor will be provided together with a barrier mat or good quality proprietary mat consisting of aluminium runners and brushes.

Internal cill boards to be hardwood veneered ply or blockboard to match the door veneer.

Ex 100 x 25 hardwood to match the door veneer, splayed skirtings for clear finishing will be provided throughout except where ceramic or vinyl skirtings have been specified.

Approximately 750 x 400 mirrors (to coordinate with wall tiling) with concealed fixings to the walls above the wash hand basins in all toilet areas.

4.17 Plumbing and Sanitary Ware

All toilet areas and cleaners store will have Armitage Shanks or similar white vitreous china sanitary ware. All horizontal and waste pipework within toilet areas are to be concealed with suitable maintenance access.

Armitage Shanks 'Back to Wall' W.C. suites or similar will be provided with plastic seat and cover and dual flush plastic cistern located behind plastic laminate covered boxing and shall be complete with overflow indication.

Armitage Shanks china single bowl urinals or similar will be provided with matching high level cistern and stainless steel flush pipes and fittings.

Washbasins to toilets will be 550 x 470 Armitage Shanks self-rimming basins or similar with mixer taps will be fitted into plastic laminate covered blockboard vanity units.

Cleaner's sinks, with bucket stand, will be provided with hot and cold water services. A tiled splash back will be provided.

A toilet compartment will be provided for the use of disabled persons, all in accordance with the Building Regulations (Doc M), the disabled alarm shall be provided adjacent to the toilet and will be both visual and audible. Sanitary ware will be Armitage Shanks Document M pack with contrasting handrails etc..

4.18 Kitchenette/Tea Room

The Kitchenette/Tea Room areas will be fitted with Howden Joinery or similar base units with worktops over and wall cupboards. A single drainer stainless steel sink top with mixer taps will be provided along with the space, plumbing, and electrical services for a standard size (600mm by 600mm) dishwasher and fridge units.

4.19 Passenger Lift

The lift to facilitate disabled access to the upper floors will be a ten person/800kg capacity hydraulic or electric traction passenger lift to meet the requirements of EN81-2 and Part M2 Building Regulations for disabled access.

The lift will be a Schindler, Kone or similar approved by the client.

Each landing will have stainless steel lift entrance doors and surround. Stainless steel push button controls will be located adjacent to the lift entrance doors. Should the building layout be such that fire resistant landing doors are required to the lift the doors will meet the fire resistance required by the Local Authority. Jamb protection by way of a hardwood lining will be provided to the lift opening on all floors.

The lift car will have plan dimensions of 1350 wide x 1400 deep, constructed of steel and complete with stainless steel car doors carpeted floor, decorative laminate walls, stainless steel ceiling and half-height rear mirror. A full set of car controls incorporating floor selection buttons will be fitted at a height to comply with Part M2 Building Regulations.

Where required, a hydraulic tank, motor and control panel will be housed in a lift motor room located adjacent to the lift shaft.

The electrical contractor shall supply and install a local distribution board suitable for the size of lift and shall carryout lighting to the lift motor room. It shall be the lift manufacturer's responsibility to connect to this board for all necessary supplies and lighting to the lift shaft.

A dedicated wire way must be provided from the BT intake point to the lift controller for emergency line. Provision of the telephone line will be the responsibility of the occupier/client.

5. EXTERNAL WORKS

5.1 Service Yard Area

The service yard and associated access areas will be designed in accordance with TR66 and excavated to the required formation level trimmed and compacted with a layer of hardcore to the engineers' details blinded with fine chippings or clinker ash.

Sand or rock sand will not be acceptable material for finishing the hardcore layer.

Where the slabs are constructed in phases, the compacted hardcore layer must be constructed at least 1m beyond the relevant shutter lines to ensure that infill bays can be adequately compacted and finished.

The surface tolerances to the sub-base layer should be +5mm or –30mm.

A minimum 190mm thick bed of concrete will be laid on 1000 gauge polythene or similar using air entrained concrete with a minimum cube strength of min 35N/mm² at 28 days, reinforced with one layer of structural fabric to the engineers details. The use of steel fibres may be considered as an alternative to reinforcement.

Bay sizes and all longitudinal, contraction, induced, expansion and isolation joints will be formed in accordance with the recommendations of the structural engineer. The slabs will be laid to maximum falls of 1:30 (except for level and localised access ramps) and minimum falls of 1:80 with the gradients generally sloping away from the building.

The surface of the concrete is to be finished using a serrated float or wire brush, to provide grooves parallel to the slope of the pavement, with 100mm trowelled margins adjacent to the shutters.

As soon as excess moisture has evaporated from the surface of the concrete a resin curing compound should be sprayed uniformly over the still plastic concrete. During hot sunny periods a curing compound containing a suspension of fine particles of Aluminium or other white pigment should be used.

During adverse weather conditions including hot sunny periods, winds in excess of 10mph and rain, the slabs should be protected with suitable tents of polythene or similar, in addition to the curing compound.

Bollard protection will be provided externally to the warehouse level access doors. Bollards are to be metal sleeved to facilitate easy replacement. Bollards to be positioned with centre of bollard in line with door reveal; and min 300mm away from cladding. Armco protective barriers will be provided in the service yard area to protect vulnerable areas of the building from vehicular or similar impact damage.

Drainage channels with steel gratings will not be used in areas of the service yard where they can be trafficked by turning vehicles.

5.2 Car Parks

The car parking area indicated on the site plans will be Tarmacadam car parking spaces and block paving access and circulation areas designed and constructed to the following standards and requirements:

- i) 80mm thick coloured concrete block paving laid 90o herringbone to car parking areas roadways serving the car park areas, laid on a 50mm bed of sand, on a hardcore bed, vibrated with joints filled with dry washed sand
- ii) Macadam surfacing to roadways areas, where indicated on the drawings, will be laid on a prepared hardcore bed thick with a 100mm consolidated thickness of two course bituminous macadam, consisting of a 75mm base course with a 35mm wearing course both to BS4987
- iii) Thermoplastic white lining and car parking lining will be provided

5.3 Kerbs

Where indicated, 254 x 127 half battered precast concrete kerbs to BS 340 bedded onto a 325 x 150 concrete base and haunches with concrete will be laid.

5.4 Footpaths

Footpaths will be excavated to formation level, trimmed and compacted and provided with minimum 100mm thick stone hardcore base blinded with fine stone sand or clinker ash and finishes as:

- i) 60mm thick contrast colour concrete block paving, to the office elevations and entrances will be laid on a 50mm bed of sand, well vibrated, with joints filled with dry wash sand
- ii) Where indicated on the drawings -60mm thick precast concrete block paving to ancillary paths and margins around the warehouse will be laid on a 50mm sand lime bed, well vibrated, with joints filled with dry wash sand

5.5 Landscaping

The landscape scheme, inclusive of all planting, is to be designed and completed by the contractor to the approval of the Local Authority, including the following:

- i) landscaped areas will have all rubbish removed, subsoil graded to contour 150mm topsoil spread and rotovated, stones removed, raked, prepared and turfed
- ii) 300mm topsoil will be provided for shrubs and planting beds and 750-1,000mm² cube topsoil in tree pits
- iii) trees, shrubs and other plants to be detailed and described on a landscape plan and agreed with LA, will be planted, with bark mulching, watered, staked and supported as necessary

- iv) one-year maintenance of trees, shrubs and landscaped areas will be by the Contractor, including the replacement of all plants dying within the period. It will be the Contractor's responsibility to ensure that grass, shrubs and trees are adequately maintained and watered during the maintenance period. Notwithstanding that responsibility, the tenant will be required to water the beds on a reasonable basis
- v) a minimum of 2 No. external landscaping watering points will be provided to agreed positions within 30m of existing supplies

5.6 Drainage

a) General

Connections from the site boundary to main foul and surface water sewers will be made in accordance with the requirements of the Local Authority and IDB.

Any tenant requirements for process drainage is excluded and requirements are to be presented by the tenant within 2 weeks from commencement on site.

The general design criteria will be based upon a 1 in 2 year return and a rainfall intensity of 55mm per hour and no flooding in a 1 in 30 year storm condition.

Undertake a CCTV survey of all drainage two weeks prior to Practical Completion.

b) Pipework

Foul and surface water drainage will be constructed to the details shown on the drainage drawings.

Where required, pipework will be protected in accordance with the 'Simplified Tables of External Loads on Buried Pipelines'.

All necessary bends, junctions and other fittings required to complete the work will be provided. Flexible joint collars will be provided to drainage pipework when leaving the building areas.

c) Manholes

Manholes will be constructed to the depths required using either precast concrete rings and heavy duty cover slabs, pre-formed uPVC chambers or in Class B engineering brickwork. The bases of manholes will incorporate all necessary clayware channels and junction fittings and will be benched in fine granolithic concrete.

Galvanised step irons will be included in the walls of manholes and the manhole covers will be of galvanised steel or cast iron of an appropriate load bearing capacity.

d) Gullies/Drainage Channels to Yard and Roadways

The drainage of the yard areas to be laid falls to heavy duty drainage channels. Gattic / Qmax or equivalent approved and standard heavy-duty gully outlets where appropriate.

e) Petrol Interceptors

A petrol/oil interceptor, required by the Environment Agency, will be installed and ventilated to serve the surface water drainage system to external paved areas.

5.7 Rainwater Harvesting

Not required.

5.8 Ramps

Where ramps are required to be provided for access into the building for disabled persons or for trolley access, these will have a maximum gradient of 1 in 20 surfaced as shown on the drawings, complete with handrails as applicable.

5.9 Gatehouse

Not required.

5.10 Fencing

Where indicated on the site layout drawing to the perimeter of the service yards 2.40m high weldmesh V-mex fencing, paladin or similar and approved, complete with a pair of manually operated lockable gates and necessary pedestrian gates will be provided.

5.11 Sprinkler Base

Provisional space to be provided for a concrete slab suitable for future fit out installation of sprinkler tanks and pump house. Size and location to be agreed with the Architect. Structural design to be agreed with the Structural Engineer.

Provision to be made for a sufficiently sized infill main for future water supply to serve the sprinkler system – taken from point of connection to sprinkler tank base location.

In addition provide suitable cable way ducts with draw ropes for all associated electrical supplies and communication cabling from the Pumphouse (by tenant) to the building as required.

The electrical supplies and communication cables will be installed as part of the fit out works.

5.12 Refuse Store

Refuse stores shall be provided as identified on the drawings and shall have solid concrete bases and suitably treated timber enclosures of hit and miss stained timber constructed to a chevron pattern, complete with lockable gates.

5.13 Cycle Shelters

Provide and fix IAE or similar and approved, cycle shelters with end panels. Number of cycle shelters as required by planners.

6. EXTERNAL SERVICES

6.1 General

The Main Contractor shall apply for and organise for the peak site loadings for Gas, Water and Electricity as detailed below; from the Local Utility Authorities and designated utility suppliers for the site.

The Main Contractor shall organise for the Main Billing Meters for Gas, Water and Electric be ordered and installed all to suit the peak loads, subject to the necessary legal arrangements with the Utility Authorities undertaken by the client / tenant.

6.2 Electric

The electricity supply to the building will be drawn from the Electricity Board supply network and will be metered at LV with a capacity in the region of **500 kVA**. The main intake and meter will be located within the switch room together with the main building panel board.

Loads of up to 275kVA (as limited in Central Networks Load Guidelines) shall be provided at Low Voltage. Loads in excess of 276kVA will need to be provided by a High Voltage solution.

For an LV Solution the Contractor shall provide an incoming LV Electrical Substation in accordance with the Local Electricity Boards requirements. The Location of this will be in full compliance with the Local Electricity Boards requirements with regards to access etc. From this incoming substation the Main Contractor shall provide all cabling necessary, complete with ducts and any associated builders work to connect to the building's main LV distribution panel.

For an HV Solution the Main Contractor shall provide an incoming electrical substation in accordance with the Local Electricity Boards requirements. The Location of this will be in full compliance with the Local Electricity Boards requirements with regards to access and will likely be at the site boundary.

From this incoming substation the Main Contractor shall provide all cabling necessary, complete with ducts and any associated builders work to connect to the building's Transformer/s. The Transformers will be sized by the Main Contractor to meet the load detailed above. From the Transformers the Main Contractor will allow for all cabling necessary to connect to the Main LV distribution panel.

6.3 Gas

The Main Contractor shall organise for the gas supply from the Local Utility Authorities gas network to provide the peak site demand of **600 kW** at 3000Pa (30mbar) at the point of entry to the building. The peak gas demand makes allowance for full heating of the warehouse area (to +18 degrees C) and heating of all office areas via LPHW

In order to achieve the 30mbar entry gas pressure the gas supply shall be extended from a local medium pressure MP gas network where possible

Where this cannot be achieved and only low pressure LP gas supply is local to the site, the Main Contractor shall allow to size the incoming pipework infrastructure accordingly from the local network supply pressure to achieve the 30mbar inlet pressure as described above.

The Main Contractor shall include to provide a gas meter housing within an agreed position within the site boundary to accommodate the Main “Billing” gas meter, the Main Contractor shall include to install a suitably sized concrete plinth for the gas booster set.

The Main Contractor shall install all associated cable ducting and wiring from the external gas meter to the dedicated energy monitoring control panel.

The Main Contractor shall provide and install all necessary gas governors to achieve the required gas pressures.

The Main Contractor shall provide all trenching to the most current NJUG Standards to allow for the entire below ground installation of the gas supply pipe.

6.4 Water

The Main Contractor shall organise for the water supply from the Local Utility Authorities water network to provide the peak site demand of approximately 6 litres/second at minimum 1.5 bar pressure at the point of entry to the building.

The Main Contractor shall organise for the local water authority to install the water supply applied for; from the local water infrastructure to within the site boundary where it will terminate with a “billing” water meter within a purpose-built pit by the Contractor; to the local water authority requirements.

The local water authority water meter shall be complete with a Pulsed Meter.

The Main Contractor shall install all associated wiring from the external water meter to the dedicated energy monitoring control panel.

The Main Contractor shall extend from the metered domestic water supply from the site boundary/public supply within the site boundary, the entire installation sized accordingly for the buildings peak flow rate as detailed above.

Where required by Building Control, the Local Fire Authority, a separate un-metered towns water supply shall be provided off the local water authority infrastructure for fire fighting purposes in accordance with legislation requirements. This main will extend to the sprinkler compound as indicated on the drawings.

The Main Contractor shall provide all Trenching to the most current NJUG Standards to allow for the entire below ground installation of the water supply pipework.

6.5 Meters

It shall be the Main Contractor’s responsibility to arrange all necessary utility metering on behalf of the client / tenant.

Sub-metering is required to sub-divide each floor of the office, the warehouse area and any ancillary buildings or external plant and in accordance with the Building regulations Approved Document L2A and BREEAM credits targeted.

6.6 Communications

4 No. ducts will be provided from the site boundary to a designated intake point to serve the communications requirements of BT, Mercury and computer modem. Each set of ducts will enter the building and pass below ground to provide a system to cater for the future.

2 No. ducts not less than 75mm diameter will be provided to suit the required wire ways of a possible future CCTV installation and external signage provision being not less than one per corner of the building.

1 No. duct shall be provided to the water meter. All ducts will be left clear with draw cords.

All ducts will be left clear with draw cords and shall be PVC rigi-duct with smooth interior.

7. MECHANICAL SERVICES

7.1 General

The mechanical services works will be designed and installed in compliance with the recommendations of the CIBSE Guide, current British Standards and Codes of Practice, Building Control Officer's requirements, Clean Air Act, Gas Safety Regulations, Local Water Board requirements and Health and Safety at Work Act.

All services within the warehouse area will be located above the clear haunch height.

7.2 Design Conditions

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

External

Winter	-4°C (minimum) dry bulb, 100%RH
Summer	30°C dry bulb 20°C wet bulb

The above design conditions are to be taken as the minimum requirements however where Regional variances in accordance with CIBSE guidance are more onerous depending upon project location, then those shall be used

Internal

Office:

Winter	21°C ± 2°C
Summer	22°C ± 2°C [OPTION B only]

Toilets	19°C winter [summer not controlled]
Stairs	18°C winter [summer not controlled]
Stores	16°C winter [summer not controlled]
Other rooms/areas	to be based on recommendations contained in the CIBSE guides.

Frost Protection for Office: 12°C

Frost Protection for Warehouse: Not controlled *[Incoming gas infrastructure to be sized for full heating to warehouse at +18°C]*

Heating systems shall be designed to maintain the above temperatures taking into account targeted building air leakage / infiltration rates within the Part L CO2 Assessment Model.

Occupancy

Offices	1 Person/7.5m ²
Meeting Rooms	1 Person/4.5m ²

Ventilation

Offices	12L/S/Person (supply and extract)
Meeting Rooms	12L/S/Person (supply and extract)
Toilets	10Ac/Hr Extract, 8Ac/Hr Supply
Tea Rooms & Kitchenettes	10Ac/Hr Extract

Gains

Building Gains	All solar and conducted gains
Occupancy	90W/Person Sensible 40W/Person Latent
Lighting	15W/m ²
Small Power	25W/m ²

Infiltration

Offices	1Ac/Hr
Infiltration rates shall be taken for the relevant areas as detailed within CIBSE.	

Noise Criteria

Offices	40-45 db Laeq 20
Toilets	45-50 db Laeq 20
Plant Room	NR50
External	NR65 at 1m or site specifics as detailed by the Local Authority/ Planning

System Parameters

LPHW	
Flow & Return	82°C - 71°C
Flow Velocity	1.5m/s maximum
Pressure Drop	300Pa/m maximum

Hot & Cold Water services

Flow Velocity	1.5m/s maximum
Pressure Drop	to suit available head requirements
Temperature drop on secondary return circulation	10°C maximum

Chilled Water (where required)

Flow & Return	6°C - 12°C
Flow Velocity	2.5m/s maximum
Pressure Drop	300Pa/m maximum

Ductwork

General Supply and Extract systems:

Maximum duct velocities	Main Duct:	5m/s
	Branch Duct:	4m/s
	Flow Connections:	3m/s
Maximum louvre face velocities	Air Intakes:	1.7m/s
	Air Exhausts:	2.0m/s
Maximum duct pressure drop	1Pa/m	

7.3 Office Areas - Low Pressure Hot Water Heating

OPTION A

Throughout all office areas a gas fired low pressure hot water radiator heating system will be afforded throughout the Open Plan Offices, Meeting Room provisions, toilets and ancillary/welfare areas, staircases, landings and reception. The main plant will comprise a gas fired atmospheric sectional cast iron boiler, wall mounted control panel, duplicate heating circulating pumps in a duty and standby arrangement, twin wall metal flue to above roof, wall mounted control panel, pipes, valves, fittings and thermal insulation.

The boiler shall be a low NO_x fully condensing type with maximum CO₂ emissions of 0.4kg/kWh and efficiency greater than 95% at full output.

Main distribution pipework will be extended, where possible, in concealed ceiling void spaces to serve radiators of the pressed steel flat fronted panel type located generally below windows. All pipework within the voids will be thermally insulated to BS 5422 and identified in accordance with BS 1710.

Any pipework exposed to view will be chromium plated or stainless steel and run in a neat manner to serve radiators with thermostat radiator valves on the flow and lock shield valves on return connections.

7.4 Domestic Water Services

A mains cold water service will be extended from the intake point of the Offices to serve all fittings.

All outlets will be directly mains fed with all control devices, including back siphonage, as required complying with water regulations.

Distribution pipework will be extended to serve all draw off points in the toilets, all pipework within voids will be thermally insulated to BS5422 where pipework is exposed within fully tiled toilet areas it will have a chrome plated finish with matching fittings and brackets.

Domestic hot water to the toilets, cleaners sink, and tearoom will be provided by a gas fired hot water generator, having a minimum seasonal efficiency of 85%. Automatic timed operation will be afforded the generator and hot water service circulating pump serving flow and return copper pipework extending to all draw-offs.

2 No. mains cold water services will be provided for vending machines on each floor.

The complete system shall be sterilised and tested as required for a fully potable system and the prevention of Legionellae regulations.

As an alternative, local hot water generators may be utilised for smaller installations.

7.5 Ventilation

A Mechanical Supply and Extract Ventilation system shall be provided to the office areas.

Mechanical ventilation shall be provided from an air handling unit located on the designated plant area distributing air at room temperature for fresh air and general ventilation purposes, via galvanised ductwork installed to the requirements of DW144 through to ceiling mounted diffusers and grilles to enclosed spaces.

Supply and Extract fans incorporated within the air handling unit (s) shall be inverter driven such that fans may ramp up and down to the dictates of the control system and reduce energy consumption accordingly.

Attenuators shall be installed as part of the installation in order to maintain noise levels below those detailed within the “Design Conditions” section 7.2

Extract air shall be drawn from the offices spaces and exhausted to atmosphere via the heat exchanger section of the air handling unit so that maximum use is made of “free” heating from the return air.

Heat Recovery systems employed must be included on the ECA Scheme ‘Energy Technology List’.

Fresh air inlets shall be positioned so that entrainment of exhaust air from either general extract or the toilet extract systems is not possible. Wherever possible fresh air inlets and exhaust outlets shall be provided at building roof level via roof cowls or at high level on the building via louvres, dependent upon air volume requirements.

In connection with the above, the spacing between exhaust air and inlet air shall be provided to be compliant and satisfy the relevant BREEAM Credits.

The supply air shall be heated via heating coils within the supply sections of the Air Handling Unit drawing constant temperature LPHW from the main boiler plant. Frost coils shall be provided in air handling units to protect Air Handling Unit components (filters, etc) from freezing.

Supply air shall be filtered within air handling units with a final grade of filtration of EU6 provided. A panel type pre-filter shall be provided to protect the main filter.

Tempered air shall enter each zone at room temperature

Supply air diffusers shall be located in sufficient numbers so that down draughts and noise will not be a problem and that there is a complete distribution of supply air throughout the office areas.

Branches shall be taken from the main supply ductwork to feed make up air to the toilets as described below.

The complete system shall have all necessary fire dampers and VCDs for balancing purposes, and each of the fans shall be suitably attenuated at source.

All ductwork will be thermally insulated to BS 5422 and identified in accordance with BS 1710. Insulation shall be installed accordingly to achieve compliance and satisfy the relevant BREEAM Credits.

The ventilation equipment's specific fan power shall meet as a minimum the requirements as set out in the 'The Non-Domestic Building Services Compliance Guide 2010'

As an alternative to a central AHU, fresh air may be provided by the use of heat recovery VAM units by Daikin or similar. The units must be capable of providing the required volume of fresh air as specified above and must represent best value if this alternative is proposed. The contractor must make clear in his tender return which option for ventilation has been proposed.

Mechanical Ventilation to Toilet areas

Extract ventilation shall be provided within each of the toilet areas. Toilet systems shall be independent and shall comprise of extract fans drawing air via galvanised sheet metal ductwork installed to DW144 and ducted from ceiling mounted grilles.

Attenuators shall be installed as part of the installation in order to maintain noise levels below those detailed within the "Design Conditions". Cross talk attenuation shall be incorporated within the design to prevent noise transfer from one space to another.

Extract fans shall be installed on the designated plant area or above ceilings with discharge to outside in a location where entrainment in any of the building supply air inlets or openings (windows / doors) is not possible.

Subject to site constraints the spacing between exhaust air and inlet air shall be provided to be compliant and satisfy the relevant BREEAM Credits.

Each system shall have all necessary fire dampers, VCDs and shall be controlled from the main control panel also located on the designated plant deck with auto-change over and duty sharing.

The ventilation equipment's specific fan power shall meet as a minimum the requirements as set out in the 'The Non-Domestic Building Services Compliance Guide 2010'

Kitchenette and Lift Ventilation

The kitchenette and lift motor room shall be served by separate extract ventilation systems, the kitchenette system will be operated by interconnection with the lighting circuits, whilst the lift motor room will operate from a room thermostat. The lift motor room system shall be sized to meet the lift manufacturer's requirements, a shaft vent shall be provided.

The ventilation equipment's specific fan power shall meet as a minimum the requirements as set out in the 'The Non-Domestic Building Services Compliance Guide 2010'

7.6 Office Areas – Heat Pumps (Heating / Comfort Cooling System)

OPTION B

Comfort cooling/heating shall be provided to the following areas:

- Open plan office and reception, ground floor office/meeting room,
-

Comfort cooling/heating shall be provided by means of either a Mitsubishi Electric VRF City Multi system or Daikin VRV system, or equal and approved.

Indoor units shall be of the above ceiling ducted unit type, the ratio of indoor to outdoor units will be approximately 5:1.

Control of each indoor unit shall be by means of return air temperature sensors located within the occupied space or in the return air grilles.

Fresh air shall be provided from the supply system previously described.

Gravity condensate drains shall be installed for each indoor unit.

The necessary condensing units shall be located in an external compound, refrigeration pipework, power and control cables shall be routed between the condensing units and the indoor units as necessary.

Electrical power is to be provided by the electrical sub-contractor to isolators adjacent to each condensing unit.

Supply Ductwork from the Fan Coil units shall be thermally insulated and incorporate a vapour barrier. These ducts shall connect to 4-way louvre faced Supply Diffusers complete with Volume Control dampers and plenum boxes.

Return air is to return to the Fan Coil unit via either Air Handling Light fittings or similar diffusers to those used for the supply system.

Pipework installation shall be carried out by approved refrigeration engineers (certificate approval shall be submitted prior to the commencement of installation) and in accordance with BS 4434.

As an alternative to full VFV/VRF, comfort cooling and heating may be provided by the use of split and multi-split ceiling mounted cassette units and external condensers. The ration of internal to external units should be 3:1. The system must be controlled by wall mounted controllers and split into a logical number of zones to suit the space The contractor should make clear in his tender return which type of system has been included in the submission.

7.7 Controls

A central control panel will be provided within the plant room having the following:

- i. Weather compensation to radiator circuits
- ii. Boiler – Timed start/stop, lockout
- iii. Pump – Start/stop, select, trip

- iv. General Supply AHU – Timed start stop, fan selection, trip
- v. General Extract AHU – Timed start stop, fan selection, trip
- vi. Toilet extract – Timed start stop, fan selection, trip
- vii. Water heater – start
- viii. Pressurisation alarm
- ix. Comfort cooling main controller (Option B only)
- x. Lamp test

All plant will have controls of a suitable type to allow for the future connection of an 'Open Protocol' B.M.S. system (B.M.S. provided by others). The building will have electronic controls including an optimiser for the heating system. A remote panel with buzzer, mute switch and indicator lamp will be provided within the reception area to indicate any main mechanical plant failure.

All lamps shall be transformer type and the panel will be complete with door interlock isolator.

Energy Metering Monitoring

Energy and utility metering monitoring shall be provided, if required, to meet the requirements of Building Regulations and/or BREEAM.

All metering shall be able to be connected BMS (BMS provided by others).

The Sub Metering provided shall be compliant and satisfy the relevant BREEAM Credits.

7.8 Services Pipework

Pipework and fittings associated with the mechanical services installation will be as follows:

Pipework

Heating	-	Mapress press fit system or black mild steel heavy weight to BS 1387 and BS3600
Gas Internal	-	Black mild steel medium weight to BS 1387 and BS3600
Mains Cold Water, Hot and Cold Water Services	-	Light gauge copper half hard temper to BS 2871 Part 1, Copper Table X, BSEN 1057 R250
Mains Cold Water external	-	Blue polyethylene medium density to BS EN 12201 PE 80 or Durapipe Protectaline, WAVIN Trigon, etc (requirements to be agreed with local water authority)
Gas external below ground		Yellow polyethylene high density type SDR11

		Series 5 to BGC/PL2: Part 1
Overflows and Drains	-	Unplasticised polyvinyl chloride to BS 3505 Class D (white where exposed)
Refrigeration	-	Copper tube BS 2871: Part 2 ASTM 280 DIN 1754/8905 (Option B only)

Fittings

Heating and gas	-	Screwed black banded malleable iron to BS 143
Mains Water, Hot and Cold Services	-	Capillary or compression fittings to BS 864: Part 2: Type A. All fluxes soluble in water. All fittings lead free
Gas and Mains Water external	-	Heat fusion welded joints below ground
Overflows and Drain Lines	-	Unplasticised polyethylene chloride to BS 4346: Part 1:1969 solvent welded.

Alternative materials/methods may be offered for approval.

7.9 Building Services Insulation

Materials used for mechanical services insulation shall be as listed in the Green Guide and shall be responsibly sourced.

The building services insulation shall be selected to gain the required BREEAM credits

7.10 Testing & Commissioning

All services will be tested and commissioned in accordance with CIBSE technical memoranda and guides.

Services shall be left fully operational.

Note that the system will not be accepted as practically complete until a Test/Completion Certificate is presented unless otherwise agreed with the Employers Agent.

Quarterly "Seasonal" re-commissioning for the first 12 Months shall be provided.

The Building services commissioning shall gain the required BREEAM Credits

8. ELECTRICAL SERVICES

8.1 General

The electrical services work will be designed and installed in compliance with the recommendations of the 17th Edition of the IEE Wiring Regulations plus amendments, current relevant British Standards and Codes of Practice, Building Control Officers' requirements, the Electricity Supply Regulations and Health and Safety at Work Act.

All services within the warehouse area will be located above the clear haunch height.

8.2 Electricity Supply

The electricity supply to the building shall be taken from the intake point as described in Section 6. The main intake, meter switch room and main building panel will be located within the building as indicated on the drawings.

8.3 LV Panel Board and Distribution Board

The LV panel board and distribution boards will be in accordance with BS EN 60439-1: 1994, Form 4 separation type 2, suitable for the supply capacity and be complete with necessary MCCB's and MCB's together with a 25% allowance for spare ways.

The office distribution boards shall in accordance with BS EN 60439-1: 1994 and be complete with necessary MCCB's and MCB's together with a 25% allowance or 4 spare ways whichever is the greater. Spare ways shall be capable of accepting a 100A 3 Phase breaker.

Easy connection for future PFC connection by tenant is to be provided as part of the LV panel board construction / provision.

8.4 Sub Main Cables and Cables

Sub main cables will be provided from the LV panel board to sub distribution boards and busbar trunking feed points, extended in XLPE/SWA/PVC/LSF copper cables to BS 5467. All distribution systems will be continually rated and designed in accordance with BS 7671 Requirements for Wiring Regulations.

Sub-main cables will be supported on proprietary ladder rack and/or hot dipped galvanised steel medium return flange tray all secured on purpose made unistrut metal brackets at intervals not more than two metres. All cables will be evenly spaced and securely clipped to the cable tray and identified where necessary with cable markers.

8.5 System of Wiring

The lighting and power installation to the offices and ancillary areas will, in general, be carried out in PVC/PVC insulated cable run within ceiling voids and where necessary into galvanised steel trunking/conduit to provide a rewirable system that is concealed and flush with plug in roses at termination points for final connection to fittings.

The use of modular wiring systems for the office lighting will be acceptable.

External lighting supplies will be extended in XLPE/SWA/PVC/LSF cables run in ducts as necessary.

To the warehouse area the power installations serving the dock doors and levellers, small power, and battery charging will generally be carried out with XLPE/SWA/PVC/LSF cables to distribution boards, high level busbar to doors and docks with tap-offs to suit.

8.6 Lighting Installations

The lighting will comprise the following:

Offices General	600 x 600mm square LED recessed lay-in modular luminaires with low brightness diffusers consistent with LG3 to give an average of 400 lux at 850mm above floor level with uniformity not less than 0.85. . Marshalling boxes shall have 2 spare ways to each 8 gang box. A lighting efficiency of between 2.0 and 2.5W/m ² /100 lux shall be achieved.
Tea Room/Kitchen	600 x 600mm square LED recessed lay-in luminaires to give an average illumination level of 400 lux at 850mm above floor level with uniformity not less than 0.85.
Toilets and Ancillary	LED recessed down lights with spill ring to give an average illumination level of 150 lux at floor level, spotlights above mirrors to give an enhanced lighting level shall be GU10 LED.
Reception/Main Entrance	Uplighter/down lighter type feature lighting to give an enhanced effect. Generally to give an average luminance of 500 lux.
Emergency Lighting	Self-contained non-maintained three hour emergency luminaires to all fire exits, corridors, toilets and staircases both internal and external, reception and to the office areas all in accordance with Fire Officers' requirements and BS 5266: Part 1 and 2.22 Emergency lighting will be integrated into the main lighting fittings. All emergency lighting will be provided with test key switches

External Lighting	adjacent to switching positions.
	Metal halide floods to building periphery and on columns to provide a minimum of 30 lux with 40% uniformity within service yards as per BS EN 13201-2:2003, utilising Kingfisher Q3/Q5 fully horizontal fittings or equal and approved. Car parking and road areas from 4-5m high columns with Kingfisher Kaos II or equal and approved, utilising a Phillips Cosmopolitis White Lamp to provide an average of 15 lux, with a minimum of 5 lux at kerb lines all controlled by photo cells located in the gatehouse. Local increase to 50 lux to the staff entrances and loading bay area.
	Alternatively, a Holophane external lighting scheme can be proposed, to be of equal performance and quality to the above.
Warehouse Emergency Lighting	Self-contained non-maintained three hour emergency luminaries to all fire exits, corridors, toilets, reception and to the office areas all in accordance with the Fire Officers' requirements and BS 5266 : Part 1 and European Standards EN60 : 598 : 1 and 2.22. All emergency lighting will be provided with test key switches adjacent to distribution boards.

8.7 Lighting Control

All internal lighting shall be controlled via PIR's with a maximum of 6 fittings/PIR, daylight sensing shall override perimeter zones, consisting of 4m deep by 6m long to all external windows, down to 10% of maximum whilst occupied.

Daylight calculations in accordance with CIBSE shall be carried out for all offices.

8.8 Power Installation

Electrical power supplies will be provided generally as follows:

Signs	2 No 20amp SP supplies to external signs using PVC/SWA/PVC cable in duct. Supplies controlled by time switch in Office Entrance Lobby.
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Mechanical Service	All power and control supplies associated with mechanical services comprising heating boilers, fans, gas burners, pumps, etc. Local isolation to be provided to all items of equipment.
BT	1 No 13amp SP spur for incoming BT supply. This supply together with earth to a dedicated feed from main LV panel.
Main Office Areas	<p>Within the suspended cavity floor a busbar trunking system with 3 metre long flexible connections to three compartment recessed floor outlet boxes, to be provided on the basis of 1 No floor outlet box per 10m² floor area.</p> <p>Floor boxes will incorporate 1 No twin switched socket outlet, 1 No blank plate for telecom, 1 No blank plate for data.</p> <p>No allowance has been made for telephone or data cabling. All telephone and data cabling to be installed by future occupier.</p>
Stairways	1 No single SO at ground and first floor.
Corridors	1 No single SO per section of corridor.
Tea Room	2 No twin SO over work top. 2 No single SO below worktop.
Toilets	1 No FCU per 2 cubicles for hand dryer (by others) in each toilet area. 1 No alarm pull cord and sounder to 1 No disabled toilet.
Other Offices/Ancillary	1 No twin SO per ten linear metres wall girth (minimum 1 No per room/area).
Warehouse doors and Levellers	TP & N supplies to doors TP & N supplies to levellers
External Power	1 No TP & N board with MCB's to suit supplies to external lighting/pumping stations/interceptors etc..

8.9 Fire Alarms

An 'Open Protocol' fire alarm system will be provided to the offices of the fully automatic and fully addressable analogue type, all in accordance with the requirements of BS 5839 and the Building Control Officer. The equipment will incorporate a recessed type main fire alarm panel located in the reception area, break glass manual contacts on all escapes (including warehouse doors) to provide a complete system with zones being arranged to generally suit the

Employers Agent's requirements.

Spare zones will be provided to permit the future addition of warehouse areas. Sounders will be provided throughout the offices to accord with the standard. The system will be wired in red firetuf or equal cable extended in a concealed manner in the Main Offices. As a minimum a P1 system shall be installed in the office areas, capable of being extended as P1 to the warehouse.

If applicable, a fire alarm repeater panel is to be located within the gatehouse

8.10 Lightning Protection

A lightning protection system shall be provided to the building to satisfy requirements of BS EN 62305:2011 utilising the main steel structure as the earth conductor with ground level connections to earth electrodes.

Transient surge arrestors will be provided as required under BS EN 62305:2011

8.11 Bonding and Earthing

All necessary bonding an earthing in compliance with the requirements of the 17th Edition of the IEE Wiring Regulations will be provided with particular note to incoming gas and water services.

In addition, sinks in kitchens and kitchenettes shall be supplementary bonded including connection to the circuit protection conductors present in the room.

8.12 Testing and Commissioning

All services are to be tested and commissioned in accordance with CIBSE Technical Memoranda and Guides.

Services shall be left fully operational.

Note that the system will not be accepted as practically complete until a Test/Completion Certificate is presented unless otherwise agreed with the Employers Agent.

Quarterly "Seasonal" re-commissioning for the first 12 Months shall be provided.

The Building services commissioning shall gain the required BREEAM Credits.

9. OPERATION AND MAINTENANCE MANUALS

Two working weeks prior to Practical Completion a **draft copy** of the Operation and Maintenance Manual will be issued.

Supply on Practical Completion 3 No. hard copies and 5 No. CD copies of full Operation and Maintenance Manuals including:

- i. Equipment Manuals
- ii. Record Drawings
- iii. System Description
- iv. Contact Details
- v. Maintenance Procedures
- vi. Commissioning Data
- vii. Test Certificates