Electrical Performance Specification

For

Merseytravel

At

Passenger Facilities Building, Queens Square, Liverpool

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Document History

Issue	Date	Purpose	Author
T1	March 2019	Tender Issue	David Corrigan

Approvals

This document requires the following approvals.
Signed approval forms are filed in the Management section of the project files.

Name	Signature	Title	Date of Issue	Version
Andy Morris	Andy Morris	Principal Eng	March 2019	T1

Distribution

Name	Organisation	Role
Gareth Denton	Merseytravel	Client
Alex Martinez	Ellis Williams	Architect

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1 MANAGEMENT AND INSTALLATION

1.1 PROJECT ESTABLISHMENT

1.1.1 Definitions

Contractor	Means the electrical and/or mechanical contractor or Sub-contractor carrying out the design and installation of the works.
Main Contractor	The Contractor whose tender is accepted for the building works.

1.1.2 Supervision

The Contractor shall appoint a competent design management and supervision team to execute works. All personnel shall have the appropriate qualifications training and experience to execute their tasks safely and to the highest professional standards. Each operative level shall be adequately supervised and controlled. The Contractor shall provide a management structure chart showing the key personnel accompanied by a CV for each member.

1.1.3 Site Conditions

Contractors should visit the site to gain knowledge of the accessibility and of the existing site conditions affecting design, labour, protection of existing services, carriage, unloading and storage of materials.

Contractors shall satisfy themselves as to the staging, scaffolding, tools, storage, and accommodation etc., required for the proper execution of the contract.

Any claims by the Contractor arising from lack of knowledge of the above shall not be allowed.

1.1.4 Drawings

The contractor shall be proficient in the use of AutoCAD MEP software and have a good working knowledge of these protocols along with any supporting customisation and configuration that supports them.

All drawn information is to be completed using AutoCAD MEP.

1.1.5 Design Drawings and Calculations

The Contractor shall prepare and submit design calculations, schedules and drawings for the whole installations covered by this contract.

1.1.6 Working Drawings

The Contractor shall provide working drawings for the whole installations covered by this contract. The drawings shall be prepared using the current release of Revit as agreed with the Architect and the contractor shall provide 3 paper copies and digital copies of each drawing and any subsequent revision.

Working drawings shall include:

General dimensioned layout drawings of the complete works.

Detailed layouts showing the location of all plant and equipment including service routes, switch rooms and plant rooms.

Key area sectional layouts in risers, floor and ceiling voids.

Assembly drawings of all factory built equipment and site built assemblies.

System diagrams and circuit wiring diagrams for all installations and equipment.

The Contractor shall also prepare detailed dimensioned layout drawings showing final connections to equipment.

The Contractor shall ensure that adequate space is provided for servicing and maintenance of all equipment and indicate this on the drawings.

If during the progress of the contract, modifications are required to be made to the works, the Contractor shall submit revised drawings the modifications.

The Contractor shall be responsible for any discrepancies, errors or omissions in the above mentioned drawings, whether these drawings have been commented on by the employer or not.

Comments given by the employer to any drawing shall in no way relieve the Contractor from his liability to complete the works in accordance with the tender specification and drawings or exonerate him from any of his guarantee.

1.1.7 Construction Drawings

Once the design calculations, working, manufacturers and builders work drawings have been commented upon and finalised, they shall be issued marked as 'For Construction' and circulated to all relevant parties. The Contractor shall include for six paper and one digital copy of all drawings.

2 DESCRIPTION OF WORKS

2.1 Scope of works

2.1.1 Project Description

The works covered by this specification are those required for the electrical engineering services associated with the with Merseytravel, Queens Square, Liverpool.

The Contractor shall note that this is a Design and Build project and full responsibility for the design of the installed systems shall remain with the Contractor. The Contractor shall provide the complete installation as detailed within the performance tender documents, including design, supply, installation, setting to work, testing and commissioning.

This project includes the reconfiguration of the travel centre ground floor space to create a new travel centre, ticket sales, private lobby, back office, entrance lobby, police interview room and provide retail space for a tenant.

Where the term 'Provide' is used within this specification, it will be taken to mean 'design, supply, install, set to work, test and commission'.

2.1.2 OUTLINE OF KEY SYSTEMS

The works shall comprise but are not limited to the following:

- Stripping out of existing and redundant electrical services.
- Modifications to mains distribution, final distribution boards.
- Containment systems.
- Small power installation.
- Power supplies to equipment.
- Power supplies to the mechanical plant.
- General and emergency lighting Installation.
- Automatic and manual lighting controls.
- Structured wiring installation.
- Fire detection and alarm system.
- Intruder detection and alarm system.
- Electronic door access systems.
- CCTV system.
- Earthing and bonding.
- Testing and commissioning.
- Building Logbook
- As fitted drawings and O&M Manuals

2.1.2 Tender Information

This Performance Specification shall be read in conjunction with the following:-

- Main Contractor's Preliminaries and Enquiry Documentation.
- Futureserv Standard Mechanical Specifications.
- Futureserv Standard Electrical Specification.
- Full Set of Architects Drawings, and Specifications.
- Set of Structural Engineers Drawings and Specifications.
- Futureserv drawings.
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2.1.3 Architectural Drawings

Architectural drawings for the building, prepared by Ellis Williams Architects are to be provided by the Main Contractor.

2.2 Design and Performance Criteria

2.2.1 Design Philosophy

The new installation shall provide energy efficient, flexible accommodation to meet the client's requirements both now and in the future which includes expansion of the building.

Each building service product must be selected to meet the specification requirements, maximise energy savings and reduce the requirement for future maintenance.

Flexibility by way of a minimum of 25% spare capacity within distribution and containment systems must be provided as defined within the individual sections of this specification.

2.2.2 Regulations and Standards

The Contractor shall ensure that the design and installation complies with and are certified in accordance with all relevant regulations and standards as follows:

The Contractor shall note that the Futureserv Mechanical Standard Specification includes all services systems applicable to this project but may also contain details of services systems that are not relevant to this specific project.

- Futureserv Performance and Standard Electrical Specifications
- All applicable British Standards
- Health and Safety Executive Guidance Notes
- BSRIA Design Guidance and Commissioning Codes
- The Control of Substances Hazardous to Health Regulations.
- Building Regulations
- CIBSE Guides and Commissioning Codes
- Electricity at Work Regulations
- BS 7671 Wiring Regulations
- BS 7430 Code of Practice for Earthing

- G59/1 Embedded Generating Plant Recommendations (scope for provisions for future integration of renewables, subject to BREEAM and planning requirements)
- BS EN 60439 Low Voltage Switchgear and Control Assemblies
- BS 5266 Emergency Lighting
- CIBSE Code for Lighting 2012
- CIBSE LG6
- CIBSE LG7
- CIBSE TM39 Building energy metering
- BS 5489-1:2003+A2:2008 Lighting of roads and public amenity areas 6
- ILP Guidance notes for the reduction of obtrusive light, 2011
- ILE Technical Report 5 – The Brightness of Illuminated Advertisements
- BS EN 12464-1 2011 Lighting of indoor Workplaces
- BS EN 12464-2 2014 Lighting of Outdoor Workplaces

The Contractor shall include for any necessary liaison, submissions and certification together with any associated works to achieve approvals with the relevant Authorities including the Building Control, Fire Officer and Environmental Health.

2.2.3 Access to Plant

Plant arrangement shall be designed in such a manner that components may be installed, accessed, maintained, removed and replaced without difficulty and without compromising the safety of personnel.

All maintainable items of plant shall be easily accessible from floor level, access platforms, walkways or upper plant deck using standard access equipment.

All items or parts of plant which are likely to be replaced within the life of the building shall be arranged such that they can be removed without dismantling any elements of permanent structure and without compromising normal access and escape routes. For the purposes of this requirement permanent structure shall be defined as any building components which cannot be removed or reassembled within a time limit of two hours.

2.2.4 Design Calculations

The Contractor shall submit for comment, fully detailed design calculations for all of the systems proposed to be installed. The design calculations package shall present the information in a clear concise and logical manner undertaken using industry standard software (Amtech, Cymap, Hevacomp, Relux, Dialux or similar)

As a minimum the following tabulated calculations must be provided:

- LV circuit power, volt drop, fault & earth fault level, for the main and final circuit distribution.
- Sample circuit discrimination study.
- Lighting calculations for each size/type of internal room.
- Emergency lighting for escape routes, anti-panic areas and external threshold.

2.3 Description of Installation

2.3.1 Existing Switchgear

The Contractor shall include for utilising existing main switchboard within the switchroom to cater for the lighting, small power and equipment loads supplied from the main LV switchboard.

BS EN 62305 transient voltage surge suppression shall also be included within main switchboard and also with each distribution board serving external equipment.

The distribution boards shall include 25% additional fully furnished spare ways populated with a selection of device ratings and meters generally as indicated on the schematic arrangement drawing.

All switchgear must be new: under no circumstance will second-hand or reconstructed equipment be accepted as part of any section of the distribution system.

Protective device ways for life safety equipment shall be coloured red and labelled 'Life Safety equipment - Do not switch off'.

The Contractor shall provide a safety insulating rubber mat to the full width of each main distribution panel and provide a rechargeable wall-mounted LED torch within the switchroom.

2.3.2 Labelling

The Contractor shall provide suitable labels on every switchboard, switchgear cubicle, controller, pilot lamp, push button, switch, relay, socket outlet, isolator, connection unit, lighting control module and fixed equipment.

Main and sub-main cables shall be identified at each end by approved proprietary labels fixed to cable sheaths or conduit and identifying the cable size, type and purpose. Labels shall be flat, rigid, and non-adhesive and applied to cables with cable ties.

All final circuits shall be individually labelled within all distribution boards, extension boards, contactor boards etc.

All isolators shall be fitted with an engraved label indicating function, voltage, current rating and circuit reference number.

Strict compliance with the latest edition of BS 7671 (including any amendments) shall be observed and for this purpose the contractor shall include for the labelling of all distribution boards, switchgear etc.

The labels shall indicate the following:

- The Circuit Reference Number
- The Cable Size
- The Fuse Size
- The Designation.

All labels on switchgear shall be laminated traffolyte engraved with black machine engraved lettering on a white background and shall not be less than 75mm x 50mm in size. Fire services labels shall have a red face with white lettering. Labels provided for safety and danger purposes shall have black lettering on yellow background. The lettering shall not be less than 6mm high. All labels shall be securely fixed by means of self-tapping stainless-steel screws or aluminium rivets to their respective equipment. Labels fixed to switchgear by adhesives will not be accepted.

On wiring accessories i.e. 13A socket outlets, lighting switches etc. adhesive labels may be accepted with black lettering not less than 4mm high on a clear background.

The specifics of the labels shall be discussed in detail with the Engineer for each installation and a sample label must be provided from the Contractor to the Engineer for comment prior to final manufacture of the labels.

Switchgear and control panels shall (in addition to the identification labels) be fitted with an additional warning label fixed in a prominent position and engraved 'DANGER VOLTS' together with the generally adopted 'double flash' danger signal. A number indicating the nominal systems voltage shall prefix the word 'VOLTS'. The letters shall be 6mm high in signal red code (Double flash warning symbol to black flash contained within a black triangle on a yellow background).

In addition, each distribution board shall have a typed chart detailing particulars of the circuits controlled, which shall be fixed to the inside of the door. This sheet shall be contained within a transparent wallet where all circuit information is readily visible without removal from the wallet.

Within the switch-room in each unit, the Contractor shall provide a framed full-size schematic drawing updated to 'As Fitted' status to illustrate the building distribution system from iDNO service head through to final circuit distribution boards and equipment.

2.3.3 Earthing and Bonding

Main Earthing, equipotential bonding and supplementary bonding shall be provided in accordance with BS7671, BS7430 and BCO respectively in each unit.

Main equipotential earth connections shall be provided from the main earth bar in each unit to the following systems as a minimum, using suitable sized copper stranded cable covered with green / yellow LSF sheathing:

- Lightning Protection system
- Building steelwork
- Lightning protection system
- Cable containment
- Suspended ceiling grids
- Mechanical ductwork
- Mechanical main pipework
- Heating pipework
- Incoming gas main
- Incoming mains cold water main

A separate and dedicated low impedance earth shall be run from the main earth connection point to the server room, terminated onto a bar, mounted on isolators. This earth is for the purposes of 'grounding' IT equipment and shall not form part of the safety electrical earthing system

Supplementary equipotential bonding (SEB) shall be provided throughout the premises as necessary. SEB conductors shall be a minimum of 4mm² LSF insulated, green/yellow with stranded copper conductors. It shall be the electrical contractor's responsibility to establish the full requirements at tender stage and include all appropriate costs.

The main bonding and SEB cables shall generally be bunched and clipped to the sub main cable trays and building fabric. Where cables drop flush in wall chases or on the surface of walls they shall be enclosed within a galvanised conduit.

Each earth bar shall be of a proprietarily manufactured type complete with pre-drilled holes, test link and spaced off the wall on insulators. Each connected cable shall be fitted with a descriptive identification label to indicate function.

High integrity earth shall be provided to all socket outlet circuits feeding equipment with inherent earth leakage in accordance with Part 6 of BS7671 and numbers of outlets limited to prevent nuisance tripping of RCBO's.

2.3.4 Energy metering

The contractor shall develop a metering strategy in line with the recommendations within CIBSE TM39 Building energy metering.

The following major energy consuming systems (where present) shall be monitored using an Energy Management System (EMS):

- Fans (major)
- Lighting
- Small Power
- Heating and Cooling Systems
- Other major energy-consuming equipment where appropriate.

2.3.5 Distribution boards

The Contractor shall provide all LV final circuit distribution boards complete with all required protective devices, control devices, extension boxes etc. All electrical distribution shall be compliant with BS7671.

From main LV switchboard the Contractor shall install XLPE/SWA/LSZH sub-main distribution circuits, routed on heavy duty cable tray to final-circuit MCB distribution boards, located at strategic positions to serve the installation, generally as indicated on the schematic and layout drawings.

Each distribution board to all areas shall be affixed to the wall supported by a Unistrut mounting frame securely fixed to the wall at a height to provide easy access for maintenance.

All distribution boards shall be located such that clear access can be maintained within the switchroom and suitably protected via barriers.

All distribution and section boards shall be provided with the following:

- MCCB, MCB/RCBO sub and final circuit protection.
- Integral barrel type lock with suited key across the building.
- Integral 4-pole isolators with the facility to be locked in the 'Off' position using a padlock.
- Functional labels.
- Danger labels.
- Typed Laminated Circuit Reference Charts (in robust holders within the DB door).
- Labelling to all outgoing devises.
- Metal construction.

Each distribution board shall be installed complete with a suitably rated 4-pole integral isolator and must be sized to provide both 25% physical and electrical spare capacity upon project completion.

The Contractor will ensure that RCBO/RCD circuit protection is provided in accordance with BS7671, with particular reference to clauses:

- 314 - Division of circuits to reduce nuisance tripping
- 411.3.3 - for socket outlets
- 522.6.6/7 - for cables concealed in walls
- 421.1.7 - recommendation to provide AFDD's to provide additional protection
- 522.6.8 - for cables within metallic partitions

Individual circuit AFDD protection shall be grouped and mounted within a separate enclosure adjacent to the supplying distribution board.

Where distribution boards are intended to supply computer equipment and other equipment with inherent high earth leakage (i.e. all power distribution boards), they shall be provided with dual earth bars to satisfy the requirement for High Integrity Earthing as defined by the IET Wiring Regulations Sections 543 and 607.

Upon completion of the works, the Contractor shall provide fully detailed, typed up circuit charts for each distribution board, and fit blank plates to each unused way.

2.3.6 Containment Systems

Final circuit wiring to lighting and power within the various areas shall be carried out using XLPE/LSZH single core cable enclosed within galvanised steel trunking and conduit drops to flush outlets and accessories forming a rewireable installation.

All containment systems shall be sized to include 25% spare capacity upon project completion.

Cabling sizing shall take full account of de-rating factors associated with worst case grouping, ambient temperature and installation method.

The Contractor shall provide and install sufficient cable containment to service the new industrial units and provide spare capacity for future use. The Contractor shall note that the drawings indicate suggested primary containment routes only, which require further development to determine secondary containment and cater for the final circuits and equipment locations.

Unistrut brackets shall be provided as necessary to adequately support all trunking, tray and basket containment systems, securely suspended using 10mm screwed rod drops, with cut ends treated and fitted with PVC end caps.

From the main containment runs, the Contractor shall install steel conduit links to dado trunking risers within the offices and conduit drops within the partition walls to final outlet position to form a rewireable installation.

The Contractor shall install a 3-compartment dado/skirting system throughout the back office and police interview rooms with vertical trunking risers to containment in ceiling voids.

Within all areas the wiring systems shall take the form of single core LSZH insulated copper core cables installed within galvanised steel conduit and trunking to form a neat installation.

All trunking, tray and basket systems must be sized to provide a minimum of 25% spare capacity upon project completion and be fully coordinated with the proposed mechanical services.

Cross bonding using G/Y Cu cable of 'isolated' section of cable tray or basket with connections back to the serving distribution board shall be provided throughout the facility. Proprietary steel covers/lids shall be fitted to all open containment systems located at low level where they are susceptible to damage from mobile equipment.

All dado/skirting trunking systems must be of a type compatible with Cat.6 structured wiring systems and when complete provide a minimum of 25% spare capacity for additional cabling.

2.3.7 Small Power

The Contractor shall provide a complete small power installation to service the new with outlets provided generally as indicated on the drawings and described within this specification.

Power to fixed and mobile equipment shall be provided throughout the various areas via fused connection units and switched socket outlets fixed to the perimeter walls. Accessories shall be flush mounted white plastic type within various areas and surface fixed metalclad within ceiling voids and plant areas.

Where multiple outlets are to be provided in close proximity, they shall be integrated within a multi-compartment Cat 6 compatible 3 compartment dado/skirting trunking.

The Contractor shall note that the drawings are indicative and do not show all components and outlets required to complete the installation (e.g. specialist system and mechanical power supplies).

The completed installation shall include but not be limited to the following parameters:

- Wall, column and dado trunking (Cat 6 compliant) mounted 13A switched socket outlets
- Radial power supplies to items of fixed equipment
- Radial/ring main circuits to 13A switched socket outlets

- Radial or ring circuit power supplies to heaters and fans
- Radial circuit power supplies to auto doors and door access PSU's
- Radial circuit power supplies to roller shutter
- Power supplies to Mechanical plant (see section 2.4.7 for requirement)
- Radial circuit power supplies to TM's
- Radial circuit power supply to photo booth

Where ring mains are to be used, no ring shall cover an area exceeding 100m2, with all Ring main circuits shall be protected by a 32A Type B 30mA RCBO. All small power radial circuits shall be protected by MCB's rated at 20A. Design currents shall be limited to 75% of the protective device rating.

The installation method to be achieved within the various areas shall form a concealed installation using flush mounted white plastic accessories.

The quantity and location of socket outlets shall generally be as indicated on the tender drawings however it shall be the Contractors responsibility to ensure that adequate power is provided to all desks, fixed equipment and items of equipment.

Within the various areas all circuit wiring shall be carried out using single core LSZH cable installed within galvanised trunking and conduit and shall be complete with separate earth conductors.

Sockets for the specific use of cleaning equipment shall be provided as generally indicated on the tender drawings, located no further than 10mtrs apart throughout the facility and engraved 'Cleaners Only'. Cleaner's sockets shall be connected via circuits separate from the general power.

The Contractor shall supply, install and commission new warm air hand driers to each of the locations indicated within the WC's, final locations must be coordinated with the Architectural elevations.

Radial power supplies shall be provided to all new auto doors and door access PSU units which shall be of an un-switched type and be located on the secure side of the controlled door at high level. The final electrical connection to each door PSU shall be installed within ceiling voids to form a concealed installation.

Outlets flush mounted on dividing walls within the office accommodation shall be fitted with 'putty pads' to maintain acoustic separation between rooms.

All wall mounted socket outlets shall be mounted at a minimum of 450mm AFFL to provide compliance with Part M of the Building Regulations. Where socket outlets for general use are to be mounted on a White background they shall be fitted with a high contrast bezel surround to assist visually impaired users.

2.3.8 Mechanical Services Supplies

The Contractor shall design, supply and install mains power supplies as required for all items of mechanical plant and equipment proposed within the new facility.

This requirement shall include mains power supplies of both single and three phase including (but not limited) to the following:

- SP+N supplies to A/C indoor units.
- SP+N/TP&N Supplies to local extract fans.
- SP+N supplies to natural ventilation system controllers.

The Contractor shall note that it shall be their responsibility to liaise with the Mechanical Design Contractor to determine the exact mechanical equipment supply requirements, and that all items of new mechanical equipment are not indicated on the electrical tender drawings.

The Contractor must liaise with the Mechanical Contractor to determine items of equipment which require a dedicated radial power supply from the general electrical distribution system.

Power shall be provided to mechanical plant associated with the office block from a designated mechanical services distribution board.

Each circuit shall utilise utilise single core, LSZH insulated cables installed within conduit and trunking.

Supplies to A/C indoor units shall be taken from the closest mechanical services distribution board and form radial circuits with the maximum number of units being served from a single circuit being limited to four.

Final connection to each A/C indoor unit shall be made via a switched fused connection unit c/w neon indicator positioned adjacent to the equipment connection box within the ceiling void.

The Contractor shall note the inclusion of a number of active louvres mounted within the building façade and roof lights which form part of the natural ventilation system provided by the Mechanical Contractor. The Contractor shall liaise with the Mechanical Contractor to determine the power and control requirements for this equipment based upon final system selection.

Supplies to local extract fans may be taken via the local general lighting circuit with final connection being made via a 3-pole (phase, switched phase and neutral) fan isolator switch positioned adjacent to the fan, flush mounted and enclosed within flush fixed conduit.

Each switch disconnector supplying an item of mechanical plant shall be capable of being locked in the off position and be labelled to indicate function and supplying circuit reference number.

2.3.9 General Lighting

The Contractor shall provide a new lighting installation throughout the various areas to achieve the lighting levels detailed on the Stage 3 drawings.

The Contractor shall develop the scheme indicated on the tender drawings to meet the design criteria to provide a low energy, flexible, high quality lighting solution using luminaires with LED light sources.

Illumination levels shall be calculated at the working plane height as detailed on the Stage 3 drawings

All lighting shall be specified in accordance with the CIBSE Code for Lighting 2012 and any other relevant industry standard. For areas where computer screens are regularly used, the lighting design shall comply with CIBSE Lighting Guide 7, sections 3.3, 4.6, 4.7, 4.8 and 4.9. This gives recommendations highlighting:

- Limits to the luminance of the luminaires to avoid screen reflections. (Manufacturers' data for the luminaires shall be provided to confirm this).
- For up-lighting, the recommendations refer to the luminance of the lit ceiling rather than the luminaire; a design team calculation shall be required to demonstrate this.
- Recommendations for direct lighting, ceiling illuminance, and average wall illuminance.
- The zoning of occupant controls for internal lighting.

In areas provided with MF/ suspended ceilings, lighting shall typically be recessed LED 600x600mm luminaires in back office, police interview room and ticket sales areas.

In areas with MF/suspended ceilings, lighting shall typically be recessed LED downlighters in private lobby and entrance lobby areas.

Led colour temperature shall be 4000k, Ra 80 in all areas.

The travel centre area shall be served with recessed linear LED luminaires, LED projector luminaires to MF upper ceiling and recessed LED feature downlighters to MF ceiling bulkheads.

Circuit wiring within the various areas shall take utilise single core, LSZH insulated cables installed within galvanised steel conduit and trunking to form a concealed rewireable installation throughout.

Final connections to luminaires and PIRs shall be made via DALI addressable Lighting Control Modules (LCMs) in office areas.

All luminaires shall utilise integrated LED light sources and high efficiency DALI addressable drivers, which shall be fully compatible with the lighting control systems employed.

Control of lighting systems shall be as described within the following section of this specification and indicated on the Stage 3 drawings.

The Contractor shall note the construction of the building incorporating louvres, glazing and structure shall limit locations for routing of containment and service drops. Detailed coordination must be undertaken to coordinate services into the new facility to for a neat unobtrusive finish.

To areas fitted with an accessible ceiling, lighting circuits shall terminate at multi-way, intelligent lighting control marshalling boxes, with output sockets to serve individual luminaires c/w associated controls. Final power connections to luminaires to be via 3-core (or 4-core for emergency) double insulated heat resistant flex with additional cores provided for controls.

The Contractor shall asses lighting levels within the upper light well area and provided local lighting if required.

Refer to APPENDIX C: Schedule of Luminaires for the details of the required equipment types and manufacturer ranges.

2.3.10 Emergency Lighting

The Contractor shall provide emergency lighting throughout the new facility to comply with the latest edition and any amendments of BS 5266, BSEN1838, the fire strategy, and also the Local Authority & Fire Officers particular requirements.

Target Illumination Levels:

Defined escape routes, including but not limited to stairs, corridors etc.	- 1 lux at floor level (min. on centre line), 0.5 lux across
Anti-panic areas, including but not limited to areas greater than 60 sq.m., warehouse etc.	- 0.5 lux at floor level
Windowless accommodation, disabled WCs, WCs > 8 sq. m, offices etc.	- 0.5 lux at floor level
Firefighting call-points & firefighting equipment, disabled refuge points and first aid points	- 5 lux
High risk areas including but not limited to plant and switch rooms	- 15 lux, or 10% of general lux level (whichever is the greater)

Emergency lighting shall generally comprise of 3hr conversion packs integrated within the general lighting fixtures and internally illuminated LED emergency escape signage.

Emergency lighting to facilitate safe access throughout the warehouse shall be provided using 3hr emergency conversion packs integrated into the LED fittings. Building threshold IP rated emergency lighting shall be provided externally to facilitate egress from the building to a place of safety.

Circuit wiring for the emergency luminaires shall be generally as described for the general lighting installation.

Testing of the emergency lighting system shall be achieved via a fully automatic, self-test facility integrated into the lighting control system to simplify the identification of faults and maintenance requirements.

All luminaires shall incorporate status and charging LEDs, which are clearly visible when viewed from floor level below the luminaire. Operation of the emergency luminaires shall be fully automatic upon failure of the main, sub-main or final circuit lighting supply.

On all routes to and above each final exit door, LED emergency pictogram escape signage shall be provided, complete with appropriate legend panel, to clearly an unambiguously identify emergency escape routes from the building. The Contractor shall select appropriate size of signage to suit the resultant viewing distances as defined within BS5826.

Upon completion of the works, the Contractor shall record lux levels within each area or room and provide test and completion certificates as defined within BS5266 as sample certificate ECM2 Forms 1 – 4.

2.3.11 Lighting Controls

The Contractor shall provide a lighting control system based on the digital addressable lighting interface (DALI) to IEC62386. The system shall be a true DALI (Conversion protocols/interfaces shall not be permitted) fully networked lighting control system, which shall provide control to all luminaires, throughout the office areas.

The system shall utilise absence/presence detectors, daylight sensors, time clocks, photocells and local wireless standard wall plate switches in back office and interview rooms and retractive wall plate switches.

All luminaires in back office and interview room shall be fitted with DALI control gear and be capable of dimming.

Upon completion of the works the contractor shall include to commission and limit the general lighting within each area to deliver the required illumination levels specified on the Stage 3 drawings.

Ceiling mounted presence detectors shall be provided to control the luminaires in back office, interview room and private lobby. Office areas and meeting room lighting shall be automatic with absence control incorporating manual switching via wall switches. The system shall utilise combined PIR/Photo cells to achieve absence detection and automatic dimming control of lighting levels when daylight is available. Lighting within travel centre and other public areas shall be manually switched to reduce risk to occupants.

Within the rooms indicated and where natural daylight exists, combined presence & daylight sensors shall be provided to dim the luminaires to compensate. Daylight dimming shall be graded for all luminaires from the window into the room.

Multiple light switches shall be combined together within a single multi-gang switch plate which shall be descriptively labelled to indicate area to be controlled.

In areas with accessible ceilings, addressable LCMs shall be utilised and installed securely supported within the ceiling void from the soffit using brackets and positioned to ensure that it is easily accessible without removal of the ceiling grid. Connections from the LCM to each individual luminaire shall be made using plug-in luminaire leads incorporating sufficient cores to allow diming controls to be incorporated.

Excess flex length when connecting to luminaires and sensors must be minimised with flexes adequately supported above the ceiling using cable ties from containment systems.

Light switches throughout the office areas shall be of a White Logic type, flush mounted. Light switches within the warehouse and plant areas shall be of a surface mounted Metalclad.

All light switches shall be of a grid switch assembly type and incorporate modular 20A rated switches. Mounting height of light switches shall generally be 1200mm to the top of the plate to satisfy Building Regulations & DDA requirements.

The Contractor shall include for a minimum of 4 (post completion) half day commissioning visits to fine tune the lighting control systems to meet the client's exact requirements.

2.3.12 Structured Wiring System

The structured wiring system shall be undertaken by the Contractor. The Contractor shall provide all primary and secondary containment and RJ45 data outlets to the requirements of this specification and the room data sheets. The Contractor supply install and terminate the required structured wiring installation, including provision and termination of single, dual and quad RJ45 data outlet plates.

The installation of active IT system equipment, cabinets, wall frames, incoming fibres and final patch wiring shall be carried by the Client's IT specialists.

The new structured wiring to be installed by the Contractor shall take the form of Cat 6A LSZH cables installed on a dedicated containment system installed by the Contractor to form a concealed installation within the offices and a neat surface installation within the travel centre. The contractor shall ensure that all underfloor ducting, dado trunking, conduits, back boxes and containment systems provided are suitable to accommodate bending radiuses required by Cat 6A structured cabling.

To support the structured wiring, dedicated galvanised medium duty cable basket is to be provided supported on threaded rod and unistrut brackets, generally within the ceiling voids or to the perimeter of the warehouse areas. The cable baskets shall be sized to provide a minimum of 25% spare capacity upon project completion, positioned to minimise unsupported cable length, and segregated 300mm away from mains cable routes where possible.

From the aforementioned main containment routes, conduit drops to the final outlet positions shall be provided unless the outlet is located within dado trunking. All conduit systems to be used for structured wiring shall be of a minimum 25mm diameter, with galvanised conduit utilised.

The Contractor shall provide all necessary deep section (minimum 46mm) back boxes both fixed to the building fabric and within dado trunking and all containment systems for the structured cabling to the outlet positions indicated on the drawing.

The Contractor shall include for the supply only of appropriate length patch leads to enable connection between all RJ45 outlets within the in-screed floor outlet box to each desk position. Installation of patch leads will be carried out tenant fit-out works.

The Contractor shall provide containment to facilitate the provision of the following data outlets:

- At each RJ45 outlet position
- At each WiFi access point position
- At each CCTV point position
- At access controlled door controller locations.
- For each ticket machnine.

The Contractor shall be responsible for carefully co-ordinating the data containment systems with all other services and the building structure, ensuring installation of the containment is complete at the key programme dates.

On completion of the works the system shall be tested to demonstrate signal strength and quality and a completion certificate provided within the O&M documentation.

2.3.13 Automatic Fire detection and Alarm System

The Contractor shall include for reconfiguring the existing analogue addressable fire alarm system to suit new interior layout. The system shall utilise addressable smoke/heat multi sensors and manual call points positioned throughout the various areas. The system shall comply with BS5839, BS3116 and the local Fire Authority requirements to classification L1/P1+M.

The existing fire alarm panel is located in the first floor security control room and a repeater panel is located in the access/escape/lobby.

For tender purposes the fire detection and alarm system shall be configured for single knock, one-out-all-out evacuation. Prior to project commencement the Contractor shall allow to develop a fire alarm 'Cause and Effect' schedule and submit it for approval to the fire officer and Clients consultant.

Circuit wiring shall be carried out in enhanced fire resisting cabling with red LSZH coloured sheath and all loop cabling in enhanced grade cables complying with the requirements of BS 5839-1. All fire alarm cabling shall be routed on dedicated medium duty galvanised cable tray for multiple runs, or clipped directly to the building fabric for single runs. The wiring shall form a concealed finish within the office accommodation and neat, robust, surface installation within the warehouse areas. Where fire alarm cables are routed on cable tray adjacent to other services, a proprietary steel divider system must be installed to provide segregation in accordance with BS5839.

The system shall be wired and connected on the existing loop(s) from the fire alarm panel to form zones.

Within the office areas the sounders shall be of a detector base type with integral flashing indicators provided within the changing areas and WCs. All sounders shall be adjustable via the control panel to allow output levels to be pre-set according to ambient noise levels and be commissioned to achieve sound levels of 65 dB(A) or 5dB(A) in inherently noisy locations.

Automatic point detectors shall be provided throughout the various areas.

Detectors shall be selected and positioned to minimise the likelihood of false alarms by use of combined smoke/heat detectors particularly within amenity and shower areas which are liable to generate steam during normal operation.

The fire detection and alarm system shall be interfaced with other systems to initiate automatic fire mode control of the following:

- Automatically release all magnetic and electronic door locks on escape routes.
- Shut down of the heating and ventilation systems.
- Natural ventilation system to enable louvres to automatically close upon fire alarm activation.

Connections to the systems described above shall be wired from the addressable interface devices on the appropriate fire detection loop with a disable facility provided to allow periodic testing of the system.

The Contractor shall include a new engraved fire alarm zone plane (A3 size) fixed to the wall adjacent to the main panel. The Contractor shall hand over upon project completion 3no. of each detector head type and 5 no. call point replacement glasses to be retained by the client as spares.

2.3.14 Security Systems

2.3.14.1 Design Standards

All security works carried out will comply with the following design standards, recommendations and guidance:

- BS8418: 2010 'Installation and remote monitoring of detector-activated CCTV systems. Code of practice.'
- BS EN 50131-1:2006+A1:2009 'Alarm systems. Intrusion and hold-up systems. System requirements.'

The intruder alarm will be security Grade 3 with environmental Class 2 equipment indoors and class 4 outdoors to BSEN 50131 with dual path transmission.

High definition colour CCTV cameras will provide full coverage of the internal areas.

2.3.14.2 Intruder detection and alarm

The Contractor shall employ a NSI or SSAIB registered and accredited installer to provide a complete, intruder detection and alarm system.

The system shall operate with an open protocol programming language and shall be provided with all necessary interfaces to allow any future requirements for interrogation and monitoring.

All system wiring shall be installed concealed to form a flush installation throughout the office areas and supported on basket/enclosed within conduit. The use of mini-trunking will not be permitted.

All system equipment shall be supplied via un-switched fused connection units and be located with secure plant areas or within ceiling voids.

The system will include a centralised control panel and power supplies located within a designated secure area, field wiring will form a concealed installation where possible and intruder detection by the following devices:

- Dualtech movement detection within each area/room with window.
- Dualtech movement detection to office & amenity circulation corridors.
- Glass break acoustic detection within each room with window.
- Magnetic door contact to each external personnel, roller shutter door.
- Long range microwave detectors to the internal perimeter and main circulation routes.
- Concealed Personal Attack buttons at each ticket sales desk.

Set/Unset keypads will be provided at the staff entrance. The keypad will allow both 'full set' and 'part set' of the system which will be arranged in individual detection zones.

All external doors shall be fitted with magnetic door contacts with tamper detection installed flush within the door casing.

All areas/rooms with windows shall be fitted with Dual tech sensors and glass break sensors.

Within the warehouse areas movement detection shall be provided to all perimeter and main circulation corridors with detectors carefully positioned to avoid mechanical damage.

Fault signals shall be relayed to the remote alarm reception centre in event of:

- AC fail
- Battery lock voltage
- Battery fail
- Low output voltage

The system will be interconnected to the CCTV monitoring system to facilitate automatic viewing and recording via the closest CCTV camera to the source of activation.

Local indication of alarm will be made via high output sounder units incorporating high intensity xenon beacons fitted at high level to each elevation of the building, and also a Redcare line to allow interface to a remote alarm receiving centre.

2.3.14.3 Electronic Access Control System

The Contractor shall provide an Electronic Access Control System (EACS) within the private lobby to restrict public entry into the staff areas. The EACS system shall have App based control and monitoring capability.

The system shall comprise of:

- Combined power supply units (PSU)/Door control units positioned, on the secure side of the controlled door, generally within the ceiling void.
- Proximity reader (non-secure side).
- Push to exit button (secure side).
- Emergency break glass (secure side).
- Fire alarm interface (to instigate release upon fire alarm activation).
- Door Maglock unit.

The EACS shall restrict access in and around the building and protect against unauthorised entry into sensitive areas. The EACS shall be fully integrated with the intruder detection system - the EACS shall be used to set and unset the intruder detection system.

Wiring associated with the door access system shall be installed to form a flush concealed installation within the office installation and a neat surface installation within the warehouse enclosed within conduit and laid on basket.

The system shall utilise standard token/card readers positioned on the unrestricted side of each controlled door and handle release or push to exit buttons on the secure side. Mounting height and location of all door controls shall be in accordance with Part M of building regulations and DDA requirements.

Each pair of controlled doors shall be supplied via a PSU/IDC unit located on the secure side of the doors located within an accessible ceiling void, fed via an un-switched fused connection unit. The

door controllers shall be double reader units designed to accept all necessary door devices and proximity readers as well as providing visual indication of mains healthy/failure. They shall be of the steel enclosure type with key operated lid and back-up battery facility to operate for 8 hours continuously in the event of mains failure.

Each door controller shall be interfaced with the fire alarm system to fail open upon fire alarm activation if required by the fire strategy.

Wiring associated with the door access system shall be installed within the ceiling void and wall fabric to form a concealed system throughout, without the use of mini-trunking or similar. The Contractor shall install all containment systems to each of the door operating devices as well as conduit terminating to a one gang steel flush box for each of the readers. Conduit wire ways are also required to accommodate cabling back to each controller.

The door access system shall be installed to the door positions as indicated on the contract drawings. The system is to comprise of several standalone door controllers networked back as part of the structured wiring system to allow interface control of the entire system.

The Contractor shall ensure all cabling is installed upon and within the above detailed wire way systems in a neat and non-obstructive manner, group tied using one piece black steel PVC covered fire rated cable ties at intervals of no more than 300mm.

A separate end user demonstration for the client shall be included for and carried out upon completion of the works at a pre-arranged date to enable the end users to become fully familiar with the installed system.

The Contractor shall provide all required power supplies and containment necessary to allow the specialist to complete their installation.

2.3.15 CCTV

The facility shall be provided with a comprehensive CCTV monitoring and recording system comprising of internal cameras linked to the existing digital recording system and a link to offsite monitoring.

The system shall provide clear visual coverage of the following designated areas as a minimum:

- Lobby entrance.
- Travel centre entrance.
- Travel centre area.
- Ticket sales area.

The system shall be IP TCP based with a minimum 4Mega pixel HD resolution, operating over the structured wiring system, with the cameras supplied from PoE switches. Software shall provide for full access of the CCTV system and control of any PTZ or fully functional cameras from a PC. The system shall be capable of local or remote monitoring via the internet from any authorised PC.

Data connections shall be routed from the communications room to the cameras following segregated containment systems and ducts. Any cable lengths greater than permitted by Cat 6 standards shall be provided with PoE extenders.

A rack mounted NVMS shall be provided to record up to 30 days footage at 25frames per second with H264 compression, with modular hot swappable hard drive units located within the office comms room. All recording shall be motion detection activated with hard disc storage included on the basis of 1TB per camera. The NVMS shall be capable of Video export in accordance with the UK Home Office Scientific Development Branch (HOSDB) comprehensive Digital Imaging Procedure, complete with encryption and watermarking.

The solution shall also facilitate full access and control of the CCTV cameras from both main comms room and also off-site monitoring station via a dedicated Redcare line.

The Contractor shall include for all required statutory signage, in compliance with the Information Commissioner recommendations.

The NVMS and PoE switches shall be complete with back-up UPS to enable the system to continue operating for a minimum of 60min in the event of normal mains failure, and shutdown in a controlled manor. Power loss to the CCTV system shall be indicated via the BEMS as an alarm function.

Access to the operating system and programming of the system should be security limited via password. The system shall be compliant with the Data Protection Act regarding monitor locations and hardware locations to prevent unauthorised access/viewing.

Where 230 volts are present the relevant warning signage shall be fitted to all exposed enclosures.

All pictures shall be free from hum, noise, and distortion when viewed at the commissioning hand-over stage.

Final commissioning shall include testing of all cameras to confirm the quality of images recorded meets industry standard. Full test records and test criteria shall be included in the O&M Manuals to provide a reference and record for future testing.

The installer shall include TVSS when cabling goes outside the main building lighting protection zone.

The installer shall include for 25% future expansion in all hardware, multiplexor and storage system.

2.3.16 Stripping Out Existing Services

The Contractor shall include for the safe isolation, disconnection and removal of all existing services that will be redundant as a result of these works within the existing Merseytravel areas at the appropriate time during the contract.

The Contractor shall note that any existing services which are disconnected/removed inadvertently must be reinstated at the Contractors own expense to the satisfaction of the Client.

The Contractor shall note that the existing fire alarm and security systems must under no circumstances be stripped out until the new fire alarm and security systems are fully operational and have been signed off.

2.3.17 Inspection and Testing

A full, final inspection shall be undertaken prior to Handover, and testing of the complete installation in accordance with the 18th Edition of the IET Wiring Regulations and relevant codes of practise shall be carried out and recorded. The information shall be recorded, but not limited to the following:

- Prospective short circuit measured at the origin of the installation and at each section board and distribution board.
- External Earth fault loop impedance.
- Location of each earthing and bonding connection (to be indicated on the final electrical "As Installed" drawings)
- For each ring circuit, the midpoint of the circuit used when testing conductor continuity.
- Insulation resistance of each final circuit.
- Testing of emergency lighting system in accordance with BS5266
- Testing of fire alarm and refuge systems in accordance with BS5839
- Testing of disabled assistance alarms in accordance with BS8300
- Testing of Access control, intruder alarm, access control systems shall be carried out by system installer and certification provided to meet the relevant industry standards.
- Testing of the Lightning Protection system in accordance with BS EN 62305-1:2011.

2.3.18 As Fitted Drawings and O&M Manuals

The Contractor shall employ the services of a specialist document provider to compile O&M manuals for the project for the building services installation. The documentation shall be provided in both electronic (PDF) format on disk and hard paper copies with A4 bound and indexed manuals.

3 copies of the electronic and hard copies of the documentation shall be provided and contain as a minimum:

- Index and contents page.
- Full set of 'As Fitted' drawings
- Test Certification and results.

- Distribution board schedule.
- A detailed description of each installed system.
- Register of residual risks.
- Maintenance requirements for each installed system.
- List of manufacturers part numbers and spare parts.
- Manufacturer's operating instructions.
- Manufacturers details part specific catalogue extracts

Upon completion of the works the Contractor shall site check all drawings issued, update as necessary to accurately reflect the completed installation and reissue as 'As Fitted' drawings.

2.3.19 First 12 months Maintenance

The Contractor shall provide Planned Preventative Maintenance (PPM) and remediation of breakdowns or faults of all electrical services for a period of 12 months from issue of the Practical Completion Certificate.

The maintenance regime and standard shall be in accordance with SFG20 standard maintenance specification as published by B & ES. All plant and equipment shall be maintained in accordance with the requirements and frequencies of SFG20.

The contractor shall produce an asset register of all electrical plant and equipment and a programme of scheduled maintenance for the year.

The Contractor shall include for costs and carrying out all the necessary maintenance required for a minimum 12 month period after practical completion/handover including all labour, parts, materials and consumables.

The Contractor shall ensure that they employ the manufacturer or manufacturers approved installer to maintain any major plant or specialist equipment. The cost for providing 12 month maintenance of the electrical services installations shall be clearly identified in the tender submission.

If the Contractor has to be called out at any time during the first 12 months after Practical Completion the cost(s) of the work shall be covered either by the 12 months Defects Warranty or the Planned Maintenance Agreement.

All work included within the Planned Maintenance Agreement shall be strictly in accordance with the manufacturers' recommendations, SGG 20 and British Standards.

All faults shall be reported back to the Client

At the end of the 12 month maintenance period, the Contractor shall ensure that the Client is issued with all asset registers, maintenance reports, records of any system or controls modifications carried out. Any changes to the systems shall be included in the Operation and Maintenance Manual.

APPENDIX A: Schedule of Accessory Finishes

Area	Surface/Flush Installation	Accessory Plate Finish
Back Office	Flush	White Logic
Police Interview Room	Flush	White Logic
Ticket Sales	Flush	White Logic
Travel Centre	Flush	White Logic
Entrance & circulation areas	Flush	White Logic
Switch room	Surface	Metal Clad

APPENDIX B: Schedule of suggested Manufacturers and Suppliers

THE FOLLOWING SCHEDULE IDENTIFIES ALTERNATIVE APPROVED MANUFACTURERS/ SUPPLIERS AND THE TENDER OFFER SHALL BE DEEMED TO INCLUDE FOR EQUIPMENT PROVIDED ONLY BY THOSE COMPANIES LISTED.

EQUIPMENT	MANUFACTURER/ SUPPLIER
General Lighting & Emergency Lighting	Refer to APPENDIX C: Schedule of Luminaires for further details
Final Circuit MCB Distribution Boards	ABB, Schneider, Eaton with integral isolators
Isolators	Eaton
Digital Multi-Meters	Autometers
Contactors	ABB, Schneider, Eaton
Electronic Surge Protection	Furse Electronic Protection or equal
General Lighting Controls	Ex-Or or CP Electronics
General Light Switches	MK, Crabtree or Schneider as per finishes schedule.
General Socket Outlets and Accessories	MK, Crabtree or Schneider as per finishes schedule.
Dado/skirting Trunking	MK Prestige or equal by Legrand or Schneider to be Cat.6 compatible
Industrial Power Sockets	MK Commando Legrand or Mennekes
General Cables	BASEC Approved, all internal cables to be LSZH By Pirelli, Prysmian, Draka, AEI or equal utilising copper cores and LSF oversheath
Data & Communications Installation	Installation of active and system equipment and network configuration shall be undertaken by tenant as part of their fit-out works. Contractor to install all necessary containment, power supplies.
Structured Wiring	Installation of Cat.6 cabling shall be undertaken by tenant as part of their fit-out works. Contractor to install all necessary containment, power supplies.
Fire Detection and Alarm System	Match existing

EQUIPMENT	MANUFACTURER/ SUPPLIER
Access Control System, Manufacturer (App based system)	Match existing
Access Control System, Installer	Advance Security Limited or equal and approved NACOSS approved installer.
Intruder Detection and Alarm System, Manufacturer	Match existing
Intruder Detection and Alarm System, Installer	Advance Security Technologies or equal and approved NACOSS approved installer.
CCTV - manufacturer	Match existing
CCTV - installer	Advance Security Technologies or equal and approved NACOSS approved installer.

APPENDIX C: Schedule of Luminaires

THE FOLLOWING SCHEDULE IDENTIFIES APPROVED MANUFACTURERS/ SUPPLIERS AND THE TENDER OFFER SHALL BE DEEMED TO INCLUDE FOR EQUIPMENT PROVIDED ONLY BY THOSE COMPANIES LISTED.

EQUIPMENT	MANUFACTURER/ SUPPLIER
Internal General Lighting	
Entrance Lobby	Mirage LED - Recessed LED downlight with cast aluminium body, white polycarbonate bezel and integral 1100 / 2000 / 3000 lumen light engine. For ceiling thicknesses of 5-50mm, cylinder ring satin side - as Whitecroft Lighting MIRAGE LED or equal and approved
Private Lobby	Mirage LED - Recessed LED downlight with cast aluminium body, white polycarbonate bezel and integral 1100 / 2000 / 3000 lumen light engine. For ceiling thicknesses of 5-50mm - as Whitecroft Lighting MIRAGE LED or equal and approved
Ticket Sales	Direct/indirect LED 600sq module luminaire. Advanced Hexaprism optic for excellent uniformity and glare control. Intermediate brightness zone technology; reducing the contrast between the luminaire and ceiling plane. Optional air handling facility of 35 litres per second – as Whitecroft Lighting CASCADE LED HEXAPRISM or Equal and approved
Ticket Sales (counter)	Recessed LED downlight with cast aluminium body, white polycarbonate bezel and integral 1250 / 2000 / 3000 lumen light engine and driver, opal glass disc – as Whitecroft Lighting CONCERT XL or Equal and approved
Travel Centre (Bulkhead)	Recessed LED downlight with cast aluminium body, white polycarbonate bezel and integral 1250 / 2000 / 3000 lumen light engine and driver installed with plaster in kit – as Whitecroft Lighting CONCERT XL or Equal and approved
Travel Centre (MF Ceiling)	Slim-line recessed linear LED luminaire for continuous or standalone application in ceilings or walls. Micropolymer diffuser – as Whitecroft Lighting AVENUE MICRO RECESSED or Equal and approved.
Travel Centre (Upper MF Ceiling Projectors)	IP66 LED floodlight with small or medium die cast aluminium body and integrated cooling fins. With symmetric, asymmetric or wide beam

EQUIPMENT	MANUFACTURER/ SUPPLIER
	distribution and zero upward light when mounted horizontally. Electronic control gear with temperature regulator to operate 4000K LED light engines producing between 2654-8911 lumens - as Whitecroft Lighting SELISE or Equal and approved
Offices and Police Interview Rooms	Direct/indirect LED 600sq module luminaire, DALI dimming. Advanced Hexaprism optic for excellent uniformity and glare control. Intermediate brightness zone technology; reducing the contrast between the luminaire and ceiling plane. Optional air handling facility of 35 litres per second – as Whitecroft Lighting CASCADE LED HEXAPRISM or Equal and approved
E suffix	As general luminaire specification except with integral 3hr emergency conversion pack
Emergency Lighting	
Emergency Exit luminaires above all exit doors	Recessed LED exit luminaire with 15 long life LEDs - as Whitecroft Lighting CONCERT EX1R or Equal and approved

APPENDIX 'D' - Schedule of Fixing Heights For Electrical Accessories

Description	Fixing Height To CL Above Finished Floor Level	Comment
Light switches	1200 mm	100mm clear of door jambs
Socket outlets	400mm AFFL or 200mm above working surfaces	100mm clear of door jambs and corners
Spur units	General adjacent to equipment served	High Level denotes 150mm below ceiling line
Dado Trunking	1000 mm/ 150mm above worktop	To underside of Trunking
Telephone outlet	400mm	100mm clear of door jambs
Wall light (internal)	2000mm	
Wall light (external)	2200mm	
Photo electric cell	2750mm	
External alarm sounder	4800mm	
Movement detector		To underside of ceiling
Intruder alarm key pad	1200mm	100mm clear of door jambs
Intruder alarm panel	1500mm	
Distribution board	1500mm	1800mm to upper edges
Cooker unit	1200mm AFFL or 200mm above working surfaces	
Cooker outlet	400mm	
Fire alarm panel	1500mm	
Fire alarm sounder	2200mm min but generally 200mm below ceiling line	
Fire Alarm Manual call point	1200mm	100mm clear of door jambs
Fan controller	1200mm	100mm clear of door jambs
Shaver Outlet	1200mm AFFL or 200mm above working surfaces	100mm clear of door jambs
Access Control Keypad/Swipe Card/ Proximity Reader	1200mm	100mm clear of door jambs
Access Control Door release Access Control break glass	1200mm	100mm clear of door jambs

Description	Fixing Height To CL Above Finished Floor Level	Comment
Access Control Door release switch	1200mm	100mm clear of door jambs
Hand Dryers	1200mm – 1400mm	To underside of unit
Operating Handle, Fuse or Protective device	Not Greater than 2000mm Not less than 300mm	
Disabled WC Alarm Reset Unit	1050mm	100mm clear of door jambs
Disabled WC Alarm Indicator	150mm above head of door, else 150mm below ceiling line	Centred on centre of doorway

Notwithstanding the above, all equipment heights will comply with the requirements of Part 'M' of the Building Regulations and BS8300.

APPENDIX 'E' – Summary of Tender

Introduction

The Electrical Services Contractor will be selected based upon a thorough review of the information returned within this document and allied to any pertinent information contained within a submission letter.

The Electrical Services Contractor will include within his tender all rates, percentages etc. as deemed necessary to complete the works described within the specifications and drawings.

All costs, rates and percentages will be offered on a fixed price basis all as generally described within the Contract Conditions.

All parts of this tender documentation must be completed by the Electrical Services Contractor to deem the submission as compliant.

It is accepted that the Electrical Services Contractor will familiarise himself with all aspects of the main contract conditions and preliminaries together with the Engineering Services specifications and drawings.

The tender costs will be based upon the named manufacturers only; however, the tenderer may propose alternatives separately within the schedule of alternatives.

WILD THANG, BOOTLE
ELECTRICAL ENGINEERING SERVICES TENDER SUMMARY

Item	Services Description	Fixed Price
1	Preliminaries and General Conditions	£
2	Co-ordination of all Services Including Production of Working Drawings.	£
3	Electrical Installation Works	
a	Sub-Mains Distribution Cabling	£
b	Distribution Boards	£
c	Part L2 KWh Metering	£
d	Cable Containment	£
e	Lighting Installation, wiring and containment etc	£
f	Luminaires	£
g	Lighting Controls	£
h	Emergency Lighting Installation	£
i	External Lighting	£
j	Small Power Installation	£
k	Alarm Installation	£
l	Wiring Associated with Mechanical Services	£
m	Earthing and Bonding	£
n	Surge Suppression	£
o	Access Control System	£
p	Intruder Alarm System	£
q	IPCCTV System	£
r	Voice and Data Cabinets, patch panels etc	£

Item	Services Description	Fixed Price
s	Voice and Data Fibre cabling	£
t	Voice and Data Horizontal Cat5e Cabling and RJ45 outlets	£
u	Stripping Out Existing	£
v	Testing and Commissioning	£
w	As Fitted Drawings in Auto-Cad Format	£
x	Other ...	£
y	O&M Manuals	£
	Sub-Total	**£**
	Main Contractors MCD 1/39th	£
	TOTAL ELECTRICAL SERVICES SUM	**£**
	Provisional Sums	
	TOTAL ELECTRICAL TENDERED SUM INCLUSIVE OF PROVISIONAL SUMS	**£**

We hereby offer and undertake to supply, install, connect, test, commission, and leave in perfect working order the complete installations and services as detailed in the Contract Documents for the fixed price of (in words)

.....

.....

.....

.....

.....

(£ : p)

The foregoing figures are exclusive of VAT.

We hereby guarantee that when the works forming this Tender are complete, tested, commissioned and set to work they will comply in all respects with the requirements of the Contract.

We undertake not to modify or withdraw this offer within the period of three calendar months from the date of submission of this Tender and we agree that it will remain open for acceptance and binding upon us during that period.

We further undertake that on receipt of notification of the intention to accept this Tender we will complete the Schedule of Rates for Assessment of Variations and agree that the rates therein will be used only for the pricing of Variations.

Signed :..... Date :.....

Print Name :.....

Position Held :.....

For & Behalf of:.....

APPENDIX 'F' - Selected Manufacturers

Where a choice has been offered in terms of Manufacturer or Range, the Tenderer will confirm below which Equipment upon which his tender is based. **Failure to complete this section may void the Tender Submission**

Equipment	Manufacturer	Range/Details

APPENDIX 'G' - Alternatives

Should the Tenderer wish to submit alternative systems to those specified, he will complete the accompanying 'schedule of alternatives'.

Notes to be read in conjunction with the alternative sheets following: -

1) It will be clearly understood that where a particular system is specified, only alternatives of equal quality will be considered.

2) The Contractor will be permitted to offer alternatives **but only providing these are detailed on the Schedule of Alternatives and submitted with the Tender.** Any alternatives which are proposed will comply with the most recent British Standard Specification and will be equivalent in standard and operation to those which have been specified.

3) The Contractor will note that he will in preparing his Alternative Schedule, be deemed to have taken into account the fixed parameters of the building as represented on the Contract Drawings for that purpose and will be considered to have selected all items of plant accordingly.

4) Any costs given with proposed alternatives will be deemed to take into account any secondary costs associated with or involving provision to meet the requirements entered above including associated sub-contract, main contract, and professional design charges.

The Building Services Consultant reserves the right to object to any alternatives not considered acceptable and to require installation of specified items, at no additional cost.

Signed :..... Date :.....

Print Name :.....

Position Held :.....

For & Behalf of:.....

SCHEDULE OF ALTERNATIVES

Electrical Services

Spec/clause no.	Specified Plant	Proposed Alternative	Effect on Tender	
			Add	(Omit)
Sub-Totals			***£***	***(£)***
			Total	***£***