

PROJECT | ROYAL BERKSHIRE HOSPITAL
UROLOGY
ENGINEERING SERVICES STRATEGY

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1 INTRODUCTION

This strategy document is for the engineering services proposals associated with the modular Urology development.

The modular development consists of

- Offices/seminar rooms
- Consult Exam Rooms
- Treatment laboratories
- Minor ops room
- Ancillary accommodation

2 INFRASTRUCTURE CONNECTIONS

The proposed development will be linked into the adjacent building.

Primary services will be required to serve the development, namely:

- Electrical supplies
- Domestic cold water services
- Drainage
- Communications
- Fire alarm

2.1 Domestic Cold Water Services

Domestic cold water will be served to the building via a new split sectional tank and associated booster set.

A new mains connection shall be taken from the existing site main and routed to the new external domestic plantroom located at ground level. This shall be complete with new water meter and valve arrangement linked to the BMS system.

2.2 2.2 Medical Gases

No Medical gases required within this building.

2.3 2.3 Above Ground Drainage Services

Internal drainage will be collected at a number of connection points, and connect locally to the below ground system. Connections to the below ground drainage has been considered by others. Where new drainage cannot be connected into the existing drainage system, further surveys will be required

to identify new connection points onto the below ground system.

2.4 2.4 Electrical Distribution

A new electrical supply shall be brought into the development. It is envisaged that this will be from the existing hospital site network.

The distribution arrangement within the building will be split to suit the capacity of the available supplies.

The submain cables serving the building will be multi-core FP400 Armoured cables.

A load assessment will be carried out to ascertain the exact supply requirements but provisionally it is estimated that a 400A supply will be required.

2.5 2.5 Communications

It is proposed that a new hub cabinet on level 0 will be provided to serve all data requirements for the modular building. These will be connected to the Hospital Main Frame with fibre optic cabling subject to confirmation by the Trust.

All final connections onto the data network and associated active equipment required will be provided by the Trust IT department. Exact distinction of responsibilities associated with the data installation to be agreed, but is proposed as follows:

Outlets, internal Cat 6 UTP cabling and basket containment by MTX.

Extension of the fibre network by The Trust.

Connections onto existing network by The Trust.

Active equipment by The Trust.

2.6 2.6 Fire Alarm

A new fire alarm panel will be provided to serve the development.

The new system will be linked back to the wider hospital estate.

3 3 DEPARTMENTAL STRATEGY

The engineering services design will be developed generally in accordance with HBN 04-01 and HTM guidance for each specific service will be applied as appropriate.

The power distribution system will be accordance with BS7671 and HTM 06-01.

The Fire alarm system will be designed to Category L1/M as described in BS5839 and HTM05-03.

The emergency lighting will be design in accordance with BS5266.

Where it is agreed that guidance is not appropriate for this development this will be discussed and

agreed with the Trust and a derogation noted.

3.1 Ventilation and Air conditioning

Mechanical ventilation will be provided throughout the building to offset heat gains, meet clinical needs and in compliance with required dilution of contaminants. The air changes will be designed in accordance with HTM 03-01.

Where suitable, the rooms heating and cooling demands will be met via the air system. These areas are:

- Procedure rooms
- Treatment rooms

Clinical rooms such as the consult/exam rooms will be provided with tempered air. The air will be suitable to meet the summer space cooling demands and will be zoned to suit the room orientation, function and size. As rooms are to be grouped and zoned, individual room temperature adjustment will not be provided and the rooms will fall within a pre-agreed temperature range of 23-25°C. Room heating will be met ceiling mounted electric radiant heating panels.

The ancillary and support areas will be provided with tempered air. The heating and cooling to each space will be provided via a combination of radiant ceiling panels and a variable refrigerant flow system, dependent upon the room requirements.

The office accommodation will be provided with background ventilation from the central air handling unit. The air will be delivered at circa room temperature.

The ventilation distribution method is split per floor and comprises the following:

The accommodation shall be served via 2x air handling units, located within the plantroom. One AHU shall serve the clinical areas and the other shall serve the non-clinical areas.

The air handling units will be HTM compliant and located within the roof plantroom. Humidification has not specifically been requested and we do not propose to provide a spare section for future given the clinical function of the spaces.

3.2 Heating and Cooling

It is intended the building heating and cooling demands be met by all electric means.

The office areas are provided with ceiling mounted cassettes connected to a VRF system to meet the heating and cooling demands. Ancillary areas will be provided with ceiling mounted electric heating panels for winter heating.

The clinical areas are provided with a mixture of systems depending on the function and air change rates.

To the treatment and minor ops rooms, electric duct mounted heater batteries are provided. Each

room will be equipped with a dedicated battery which will allow local set point adjustment.

All other spaces will be provided with tempered air from the central plant, complete with a zonal trimmer battery to avoid over cooling of the spaces and ceiling mounted electric heating panels to meet the winter heating loads. The electric ceiling panels will be complete with a local room controller to allow set point adjustment.

The air handling units will be provided with multi-stage DX coils to provide air heating & cooling.

Single DX heat pumps will be provided for IT hub rooms.

3.3 Water Services

Hot & Cold water services will be derived from new plant equipment located in a new domestic service plantroom.

The cold water service for the building will be supplied via a new sectional split tank and associated booster set. The storage will be based on half a day storage.

Hot water shall be generated via 2x new electric hot water storage vessels. This shall be served via the boosted cold water system and be complete with return pump.

Hot water distribution will be taken to each sanitary appliance and will be distributed via the ceiling void of the building with temperatures maintained during periods of no draw-off by means of a single pipe loop return circulation system to maintain 55°C throughout.

Temperature monitoring will be provided at key points within the system in accordance with the BEMS schematics.

The system shall be balanced utilising Thermal balancing valves. Each appliance shall also have its own inline thermal disinfection unit.

3.4 Internal Drainage

Drainage from each sanitary fitting will be provided via 2 methods. WHBs and sink stacks shall utilise air admittance valves. Any stacks with WCs shall be local vented stack within the IPS panel discharging to the below ground drainage system.

Similarly, the rainwater drainage from the new extension is anticipated to connect to the existing disposal system via the existing below ground surface water system.

It is assumed that rainwater down pipes will be external and designed by the architect, however if required any internal rainwater pipes will be included within the internal drainage design.

The drainage material will be dependent on the exact function of the space.

3.5 3.5 Medical Gases

N/A.

3.6 3.6 Electrical Distribution

The availability of electrical supplies will need to be determined following completion of the load assessment.

A new Main LV switchboard panel board for the facility shall be located in a dedicated LV switch room to be located within the plantroom on level 01. The panel board will service general Lighting and power switchboards and also supply the main items of mechanical plant.

The new Main LV switchboard shall conform to Form 4 Type 6 and will be provided with incoming meters with modbus connectivity and electronic surge protection.

It is proposed that the LV Switchboard will be located within dedicated room and it be serving the following: -

- Departmental lighting and power distribution boards
- Plant loads

All submain cabling will be multi-core FP400 armoured and will be subject to designation of safety circuits.

Equipotential bonding bars (EBBs) will be required to each medical location in accordance with BS7671.

The new final circuit distribution boards will be mixed capacity, serving lighting and power circuits, complete with integral isolator, electronic surge protection, final circuits protected by suitably rated RCBO circuit breakers.

The distribution boards for departmental lighting and power will be split load lighting and power boards with separate integral digital meters and with mod-bus port that can be linked back to the existing site network. Boards for mechanical services loads shall not be split type. The distribution boards shall be allocated as follows:

- DB-00-LP1 (lighting & power load for level 00 non-clinical areas)
- DB-00-LP2 (lighting & power load for level 00 clinical areas)
- DB-00-Mech (mechanical services loads on level 00)
- DB-01-Mech (lighting, power mechanical services loads on plant room)

All distribution boards will have 25% spare capacity.

Each distribution board will have an external earth bar.

The general small power will be wired using single core LSF FP100 cables in trunking and conduit, protected by suitably rated RCBO's.

As stated in BS 7671:2018 section 710.421.1.201 group 1 & group 2 medical locations are not required

to have arc fault detection devices installed. However, for rooms within the new building that are not group 1 or 2 are considered no to need Arc fault detection due to the following: -

Low risk of fire due to the nature of processed or stored materials

Steel frame structure

Structure isn't flame propagating

No irreplaceable goods

Managed building

Regular testing and inspection of mechanical and electrical systems

3.7 UPS & IPS

It is not envisaged that IPS/UPS will be required based on the Clinical function.

3.8 Containment

The electrical containment system will comprise the following: -

Primary Routes

- Sub main cable tray
- Low voltage final circuit wiring trunking
- Earthing basket
- Communications basket
- Extra low voltage basket
- Fire alarm basket

All tray, basket & trunking will be galvanised steel.

Secondary Routes

- LV final CCT wiring galvanised conduit.
- Communications final CCT wiring galvanised conduit.
- ELV CCT wiring galvanised conduit.
- Fire Alarm CCT wiring galvanised conduit. (FP 200 enhanced cabling)

Primary electrical containment will run within ceiling void.

Dado trunking will be 3 compartment uPVC and will be a DDA compliant with colour contrast inserts between outlets.

Medical vertical trunking shall be provided at all bedheads.

3.9 Earthing

An earthing system will be provided to comply with BS.7430: 1998, and BS.7671 IEE Wiring

Regulations 18th Edition and relevant HTM's.

The principle elements of the earthing system comprise the following: -

- LV System Earthing - The LV system earth will ensure that a protective conductor connects all exposed conductive parts to one of the main earth bars. The main earth bars will be located adjacent to the main LV switch panels. Each distribution board will have its own integral earth bar and a dedicated separate wall mounted earth bar.
- Sub main cables will have separate circuit protective conductors.
- Equipotential Bonding - Main equipotential bonding will ensure that extraneous conductive parts are bonded to the main earth bars. This will generally consist of bonds to the main water pipes, air ductwork, pipework, exposed metallic parts of the building structure, metallic cable sheaths of all cables (except Telecoms) and the lightning protection systems. All will be bonded to earth.
- Supplementary Bonding - Supplementary equipotential bonds will be made to interconnect all simultaneous accessible conductive parts to the protective conductor system. This will generally be undertaken in bathrooms, shower rooms, and wet and damp process areas such as kitchens.
- Voice & Data Systems Functional Earth – Functional earth cables will also be installed from the main earth bar to the main IT equipment rooms around the building.
- Connection to the Lightning Protection Installation
- Final Circuit Earthing - All final circuit lighting and individual power circuits will be provided with separate protective conductors. All general-purpose socket outlet circuits will be provided with high integrity earthing.
- Equipotential earth sockets will be provided in medical locations as described in BS7671 section 710.
- In each medical location of Group 1, supplementary bonding connected to an equipotential bonding bar (EBB) for the purpose of equalizing potential differences between conductive parts within the patient environment. This will be as described in BS7671 section 710.415.2.1

3.10 Lighting and Emergency Lighting

General lighting will be provided to suit the application area and to achieve the recommended lighting

levels as published in BS EN 12464 and CIBSE LG2.

Method of lighting control for each space will generally be in accordance with CIBSE LG2 and will be agreed as the design develops.

Generally, the lighting control will be as follows: -

- Treatment rooms – manual switching and manual dimming control.
- Consult/Exam rooms – manual switching and manual dimming control.
- Utility rooms, Store rooms, Cleaners, WCs – Automatic using presence detection.
- Staff room – Manual on/dimming, automatic off using absence detection.
- Office - Manual on, Automatic off using Absence detection.
- Corridors, Lobbies – manual on/off control

Emergency Lighting will be provided in accordance with BS 5266.

Emergency lighting will be tested by means of key switches located at distribution boards.

All new luminaires to be used on this project will be LED and will have DALI dimmable drivers.

The general lighting will be wired using single core LSF FP 100 cable in trunking and conduit, protected by Type C 10A RCBO in the local distribution boards. Lighting fittings to be deployed shall be from Thorlux Lighting ranges of products as per Trust's preference.

3.11 High Risk Task Lighting

As identified on the lighting drawings and strategies 50 lux for a minimum of 1 hour is required in selected areas of the building. The 50lux critical task lighting will be achieved using emergency versions of the mains luminaires and will be provided over the specific task area

3.12 Escape & Safety Lighting

Emergency Escape Route & Safety Lighting designs shall be in accordance with BS 5266 and Health Technical Memorandums to give illumination in the event of a failure of the local main electrical supply, to enable the occupants of the building to be safely evacuated.

The system will consist of integral non-maintained self-contained battery-operated lighting units suitable for 3-hour non-maintained operation, and shall be provided as required by the Local Fire Authority Prevention Officer. A local test facility (key switch) will be provided.

3.13 General Purpose 13A Socket Outlets

A method of fire protection should be considered for essential distribution circuits and associated distribution board equipment. Essential circuits associated with life-safety systems should be either fire-rated or fire-protected, in accordance with HTM 06-01 section 7.44. This includes safety circuits as defined in BS 7671. This will be achieved by utilising suitably fire rated cabling.

Generally, each circuit will be wired as a ring protected by Type C 32A miniature circuit breakers

incorporating overcurrent protection and Type A 30mA RCD protection.

Electrical outlets in clinical areas will be mounted on either medical trunking, pendants or directly within partitions dependant on the location.

Metal clad sockets will be provided to Clinical Risk Category A, B & C and above - As defined in HTM06-01

Socket outlets will be colour coded to establish which power source they are supplied from e.g.

Normal Mains - White (Grey will also be considered where colour contrasting with walls / dado trunkings is essential)

Critical - Red

FM Sockets - White (Engrave Socket for Use)

All final circuits supplying general purpose socket outlets will be provided with high integrity earthing.

All socket outlets will be labelled to give a minimum of distribution board ref, way No. and phase.

The general power will be wired using single core FP100 cable in trunking and conduit.

Multi compartment PVC dado trunking will be utilised within office areas where multiple twin switched sockets & data points are to be provided.

General power, lighting, nurse call, medical gases, earth jack points etc in accordance with HTM 08-03 Bedhead Services.

Supplies to fixed equipment i.e. fridges etc, will be via unswitched fused spur unit's c/w low level outlet plates. In areas where invasive procedures are carried out power supplies to specific sockets will be derived from isolating transformers as identified in Guidance Note 7 of BS.7671

3.14 Fire Alarm

Automatic detection, sounders and visual alarm devices will be provided in accordance with BS5839 and HTM05-03.

Fire alarm interface units will be provided to any door access control systems, mechanical systems, hold open doors and smoke fire dampers.

Manual call points will have clear plastic hinged covers to minimise risk of accidental operation.

Ceiling void detection is currently excluded. A ceiling void risk assessment will be produced for review by the Trust fire officer.

The fire alarm system will be wired using enhanced soft skin fire resistant cabling as FP Plus or Firetuf FT120.

All loop connected devices shall have integral short circuit isolators.

Commissioning of the fire alarm system shall include necessary site wide reprogramming.

Smoke Damper Control Panel Supplies

The electrical contractor will be required to provide the addressable smoke damper control panel to be located at the entrance to the ground floor entrance department.

Ventilation Smoke Dampers (supplied and installed by Mechanical Contractor) shall be connected/interfaced with the new smoke damper control system utilising multicore FP200 white enhanced cables, include adjacent the new smoke damper a 230v ac unswitched fused connection unit.

3.15 Communications

New voice and data outlets will be served from the new hub cabinet.

All new data wiring, containment, RJ45 outlets, hub cabinet and patch panels within the building will be provided as part of the works.

Active data equipment including switches and POE equipment, required for the development will be provided by the Trust.

Wireless data will be provided to meet the Trust requirements. Wireless access points and any associated POE equipment will be provided by the Trust.

All data wiring from the new hub cabinet to the final outlets will be Cat 6 UTP and run on dedicated containment. No final outlet will be further than 90 metres away from the hub cabinet.

3.16 Security

Door access/security system shall consist of maglock devices with fob entry and push button release with emergency green break glass to release on fire alarm fire alarm and interfaced onto the existing hospital door access network system.

The provision of audio/visual entry systems to be located at the respective entrance department/reception.

Panic attack buttons to be provided at reception locations.

CCTV internal and external cameras shall be provided and connected to the site wide CCTV system via network video recorders serving each level onto the new hub data/IT cabinet, the systems to be programmed and commissioned.

3.17 Nurse Call

A new stand-alone nurse call system will be provided to serve the unit in accordance with HTM 08-03.

Patient to nurse and nurse to nurse call facilities will be provided to locations as defined in HTM 08-03.

The nurse call system will be fully digital, IP based addressable system with inherent flexibility and

capable of expansion. As a minimum, the system will be designed and installed in accordance with the NHS HTM 08-03.

The nurse call system will prioritise the calls. The sound level of the nurse call audio alarms will be 45 dB or 5 dB above the background noise level (whichever is greater). To achieve this every overdoor light in the circulation spaces will have a tone unit.

Lamp tone units will also be provided in the following locations: -

- Clean Utility
- Dirty Utility

Nurse call indicator panels will be colour touch screens located at the Nurse Base.

Nurse call system will have a dedicated power supply unit (PSU) complete with an integral 3-hour battery pack. This will be located in the local distribution board cupboard. The PSU will be sized to support the complete nurse call system.

In addition to the basic requirements the nurse call network can also support the following enhancements: -

In addition to the basic requirements the nurse call network can also support the following enhancements:

- i. Follow the Light
- ii. Call Transfer – to be included if confirmed to be required
- iii. Personal Attack Alarm – to be included if confirmed to be required
- iv. Staff Paging – to be included if confirmed to be required
- v. Controlled drugs cupboard alarm – to be included if confirmed to be required
- vi. Access control – to be included if confirmed to be required
- vii. Cardiac Call – to be included if confirmed to be required

The following call switch and reassurance light colours will be used:-

Patient call switch and indicator	Amber
Patient call reset switch and indicator	Grey
Over door indicator	Amber
Emergency call switch	Red
Cardiac alarm switch	Blue
Attack alarm switch	Black
Controlled drugs cupboard indicator	Red
Ceiling mounted pull cords	Red

The nurse call system will prioritise the calls as above. The sound level of the nurse call audio alarms will be 5 dB above the background noise level. To achieve this every second overdoor light in the circulation spaces will have a tone unit.

3.18 TV Aerial System

It is not anticipated that any TV aerial systems will be required in the building.

3.19 3.16 Lightning Protection

The building will be provided with a lightning protection system consisting of an air termination network system of down conductors and an earth termination network to BS EN 62305.

The lightning protection specialist will carry out a risk assessment in accordance with BS EN 62305, to establish the level of protection required.

Surge Suppression will be included to reduce the likelihood of significant damage to electrical and electronic equipment in the event of a lightning strike by the provision of surge suppression devices fitted to main switchboards and within the termination arrangement for incoming communication cables.

4 4 BEMS AND AUTOMATIC CONTROLS

4.1 General

Dedicated BMS panels will be provided to suite the systems proposed. The quantity and location of panels will be confirmed as part of the detailed design to suite the final location of plant.

5 5 PNEUMATIC TUBE

Excluded.

6 6 SUSTAINABILITY STATEMENT

Energy use and CO₂ emissions pose a significant impact on today's-built environment; therefore, buildings are required to minimise these impacts through Lean, Clean and Green design. The proposed modular building will therefore be designed to achieve and where possible exceed the minimum standards of Part L: Conservation of Fuel and Power by using this methodology.

As part of this strategy an initial assessment has been undertaken to ascertain the optimum energy efficient solution for the building. The outcome of which utilises the following low/zero carbon technologies:

- Air Source Heat Pumps

- Photovoltaic panels

In addition to the incorporation of LZC technologies, the following energy reduction measures will form the basis of design with a view to achieving a reduction in Energy and CO₂ emissions, the following energy hierarchy has been followed:

Be Lean – Optimise the building fabric and architectural design to reduce energy demand.

Be Clean – Supply energy at source, whilst burning fuel to maximise distribution efficiency.

Be Green – Use renewable and low zero carbon technologies to maximise the site energy production with minimal Fossil Fuels being burnt.

We propose to incorporate the following:

LED Lighting;

Lighting Control;

Daylighting Control;

Heat Recovery on Ventilation Systems via plate heat exchangers;

Lighting control proposals will be submitted to the Trust for agreement prior to implementation as it is understood that control strategies must be appropriate for each type of room use.

All of which provide additional energy and CO₂ savings prior to Low Zero Carbon Technologies being considered.

7 BREEAM

BREEAM Excellent will be applicable to the development.

