

**St ANDREWS PARISH CHURCH, KEIGHLEY**

**CHURCH AND CHURCH HALL EXTENSION AND REFURBISHMENT**

**MECHANICAL AND ELECTRICAL SERVICE OPTIONS**



**DESIGN ENGINEERS/CONTRACTORS**

**HEATING ■ VENTILATION ■ AIR CONDITIONING ■ ELECTRICAL**

**WATSONS BUILDING SERVICES LTD WATSON HOUSE HOWDEN ROAD**

**SILSDEN KEIGHLEY WEST YORKSHIRE BD20 0HD**

**Document Status – Rev A**

**Date: 25 OCTOBER 2024**

## **Contract No. MW0255**

## **Mechanical Services**

### **Preliminaries**

The existing heating installation comprising of the cellar plantroom boiler equipment and low temperature hot water (LTHW) heating systems struggle to maintain a comfortable temperature within the Church. The location of the existing plantroom does not suit the newly proposed layout and the radiators and pipe coils are inefficient for the height of the space.

It is therefore recommended a whole system replacement is carried out as part of the refurbishment work.

### **Strip Out & Enabling Works**

The existing installed mechanical services throughout would be removed as part of the refurbishment and construction work of both buildings.

The Church Hall building is fed from separate systems, so both buildings can function independently to each other at present.

### **Heating Services**

#### **Considerations**

The intention is to improve the operation and efficiency of the building and provide a fully functioning and controllable heating system throughout whilst also reducing energy consumption and reducing carbon emissions.

#### **Option 1**

Replace the existing heating boiler plant within the Church cellar plantroom with new equipment and provide the Church with new underfloor heating and radiators. This would slightly reduce energy consumption but prove difficult to integrate within the new building layout to incorporate the flue system rising through the Church tower roof. It would also not allow the incorporation of an air source heat pump system (ASHP) due to the location of the plant. The Church Hall could remain operational as existing during the Church refurbishment work and systems replaced during the construction phase.

#### **Option 2**

Provide temporary boiler plant to supply the Church new heating systems during the Church Hall construction to allow operation of the services. The new boiler plant and ASHP equipment could

then be installed during the Church Hall construction phase. This will allow the installation within the Church to be completed as intended but will incur high costs for the temporary boiler plant required for the duration between phases.

### **Option 3**

Provide final boiler plant in a temporary building to supply the Church new heating systems during the Church Hall construction to allow operation of the services. The new boiler plant could be relocated, and ASHP equipment installed during the Church Hall construction phase. This will allow the installation within the Church to be completed as intended but will incur high costs for the construction of the temporary boiler room and relocation and recommissioning of plant and equipment.

### **Option 4**

Carry out first phase of construction to the Church Hall. This would allow installation of new complete LTHW boiler plant and ASHP equipment during the first phase. Heating and water supplies to the Church could then be extended to feed the newly installed equipment during the Church refurbishment without any additional costs.

### **Summary**

Option 4 would provide the buildings with the preferred LTHW boiler and Air Source Heat Pump systems on completion and would incur minimal additional costs for temporary or relocated plant and equipment.

### **Domestic Water Services**

New mains cold water feed to the building, distributing to the required outlets in copper pipework. Hot water will be provided from a large capacity storage cylinder to the Church Hall and Toilet facilities, and to the Church WCs from a local electric water heater.

### **Ventilation**

Mechanical heat recovery ventilation will be provided to the high occupancy Meeting room, Hall and Hall Meeting areas for occupant comfort. Local mechanical extract ventilation will be provided to the WCs, Cleaners, Changing Places and Shower room.

## **Electrical Services**

### **Preliminaries**

The existing electrical installation within the existing buildings, although compliant at the time of installation, the installations do not fully meet the requirements of BS7671:2018 7671 IET Wiring Regulations.

It is therefore recommended that the whole of the electrical installation be replaced as part of the works.

### **Strip Out & Enabling Works**

The existing electrical services throughout the buildings will be removed as part of the of the phased works.

Where services are removed and isolated, any work required to maintain areas in the building not being stripped out will be made.

### **Mains Low Voltage (LV) Distribution (LV is what is commonly known as mains voltage)**

#### **Incoming Electrical Service**

#### **Considerations**

The existing supply authority incoming electrical mains and meter position is located on the half landing of the north stairs leading to the basement. At this position there are several switch fuses and consumer units which feed the consumer units and distribution boards located throughout the building.

#### **Option1**

As the existing electrical equipment at this location is below floor level it could remain in position. However, with access being limited it would not comply with BS 7671 IET Wiring Regulations. The location would not give adequacy of working space/accessibility to switchgear and consumer units/distribution boards.

#### **Option 2**

An application could be made to Northern Power Grid to relocate the existing supply or install the new supply into the basement. This would also afford limited accessibility and not comply with BS 7671 IET Wiring Regulations.

### **Option 3**

An application could be made to Northern Power Grid for the new supply to be in the store room behind the welcome desk. The meter and switchgear arrangement would require circa 75% of the wall to the right of the door and circa 1.5M depth in a cupboard with full height and width opening doors.

### **Option 4**

An application could be made to Northern Power Grid for the new supply to be in the external store/plant room in the new community building. This would require the community building being carried out as phase 1.

### **Summary**

Options 1 & 2 do not meet current British Standards and as such should not be considered.

Dependant on the phasing both options 3 & 4 from a purely electrical regulations perspective are acceptable.

Option 3 would require a sub main being installed to a position to the south east of the building with sufficient length left on the cable coiled to feed the community building.

Most major loads for the building will be fed from the community building i.e. external lighting, electric vehicle chargers, mechanical plant and kitchen, which will result in a large sub main cable being required.

There is at present a sub mains cable feeding the existing building, which would need to be temporarily connected to the new distribution network in the church to maintain the electrical supply.

Option 4 would be a cleaner simpler solution as the new supply would be installed into the new building, leaving the existing supply to feed the church until such time as work started in the church.

### **Sub mains Distribution**

#### **Option 3**

At the incoming mains position in the store behind the welcome desk a Molded Case Circuit Breaker (MCCB) panel board would be installed with sub mains distribution boards to feed the first floor, ground floor west area, the nave/chancel/alter the east meeting rooms and WC's and community building. A panel board is a large distribution board (fuse board but with MCCBs instead of fuses). An MCCB is a circuit breaker (like a fuse), which can take a larger load than a Miniature Circuit Breaker (MCB).

The supply to the community building would be terminated in the external store/plant room an MCCB panel board to feed the external lighting, electric vehicle chargers, mechanical plant, kitchen and general areas lighting and power.

To comply with Part L2 energy efficiency standards, split metered lighting and power distribution boards should be installed to allow the monitoring of electrical energy consumption.

#### **Option 4**

At the incoming mains position in the external store/plant room an MCCB panel board to feed the external lighting, electric vehicle chargers, mechanical plant, kitchen, general areas lighting and power in the community building and the church.

The supply to the church would terminate in an MCCB panel board in the utility room to feed the general lighting and power in the first-floor west area, ground floor west area, the nave/chancel/alter, the east meeting rooms and WC's.

To comply with Part L2 energy efficiency standards, split metered lighting and power distribution boards should be installed to allow the monitoring of electrical energy consumption.

#### **Conclusion**

Option 3 would take up a considerable area of the store behind the welcome desk and without forming a separate room appears to be the only suitable area for the incoming electrical supply and meters.

The sub mains required from the furthest point of the buildings required to feed the largest loads in option 3, would be substantial and costly compared to having the incoming mains local to these loads in option 4.

Option 4 would be from an electrical perspective the preferred option.

#### **Internal Lighting & Emergency Lighting**

The existing lighting although functional would not meet the requirements of Part L2 energy efficiency standards and does not give flexibility in setting different scenes for the proposed multi use of the building.

The link space, Hall, entrance lobby and narthex area need to give bright welcoming illumination, with flexibility to offering a more subdued level of illumination.

The balcony/nave/chancel/alter will at times need different levels of illumination in different areas.

The above flexibility can be achieved with the use of lighting control system and dimmable light fittings, positioned such that a uniform level of illumination can be achieved for general services when required.

Additional specialist light fitting should be considered to illuminate architectural features as identified by the architect.

Office areas and meeting rooms to be standard LED panel lights installed in 600x600 suspended ceilings.

Toilet areas, circulation spaces and store rooms to have functional bulkheads or down lights.

All light fitting should be high efficiency LED.

Emergency lighting and signage to be designed to meet the requirements of BS5266-1.

### **External Lighting**

The external lighting will include column mounted lights to the car park, bollards to walk ways, wall mounted lights to the ramp.

Consideration will also be given to ground mounted up lights to light wash the existing church walls and soffit lights to light the building entrances.

### **Small Power**

Socket outlets to the perimeter walls for general purpose and cleaning.

Office areas and meeting rooms to be complete with socket outlets for computer, printers etc.

Consideration will also be given to power for monitor/projector in meeting rooms.

AV Desk, organ, projector/s, screen/s sound equipment etc to have power as required.

### **Kitchen**

Electrical supplies to be designed to accommodate the requirements of the specialist kitchen designer.

### **Fire Alarm**

The fire alarm system to be designed in accordance with BS5839: Part 1: 2017, BS EN 54 to provide a level of cover which meets L1.

The system shall be controlled by an addressable fire alarm panel.

Automatic detection shall be provided by fixed heat, rate of rise heat, optical smoke, multipurpose devices, aspirating systems, optical beam and duct probe sensors as appropriate to a particular area.

Electronic sounders, LED beacons and visual audio devices (VAD) shall be provided throughout the building providing a common sound output.

The system will activate secondary systems in the event of an alarm via means of remote devices and interfaces to the following, but not limited to, those listed:

- Plant to shut down. [Via isolation switch]
- Release Hold Open devices to close doors.
- Audio / Audio Visual systems
- Access Control System

### **Intruder Alarm**

The intruder alarm installed by installers who are subject to inspection by the National Security Inspectorate (NSI), and who hold their Gold or 'Silver accreditation, or by the Security Systems & Alarms Inspection Board (SSAIB).

The system shall be designed to conform to PD 6662:2010 (which is the UK implementation of the European Standard EN 50131), BS 8243:2010, and Code of Practice. The system may be capable of generating Sequentially Confirmed Alarms, for the purposes of obtaining key holder or Police response should it be required.

The security alarm shall be provided with Dual com autodial facility, on activation the alarm shall automatically dial the remote to either a security manned control room or user confirmed by the client.

### **Disabled WC Alarm**

Disabled Alarm shall include the following equipment.

- Overdoor audible/visual indicator
- Pull cord.
- Reset / reassurance unit.
- Power supply unit located in the ceiling void or at high level.

### **IT and AV Cabling**

Consideration shall be given to the level of connectivity and Audio-Visual wiring which should be installed to facilitate present needs and possible future requirements.

The following should be considered.

Location for a Comms room, in which all IT & AV equipment can be installed into a floor mounted cabinet, by the church's AV and IT specialists.

Hard wired data outlets to be installed throughout the buildings to allow the provision of Wi-Fi in all public and back-office areas.

Meeting rooms to be provided with power and connectivity for wall mounted monitors (TVs) and/or projectors.

Monitors in the Narthex and link space for welcoming visitors, displaying future events and the like.

Monitors in the nave on pillars facing into North and South aisles and top half of the 2 pillars at front of balcony, facing seats in balcony.

Wiring to be installed as detailed by a sound system specialist to facilitate a multipurpose system for services and events.

Inputs for microphones, broadcast equipment etc located on the Chancel (6 No) and in the wings.

Inputs for microphones may be considered on the balcony, adjacent the alter and at the rear of the nave.

Drop down screens and projectors and or monitor in the Nave.

Power requirements for the musical instrument i.e. socket outlets some of which will be in floor boxes.

Power requirements is the for the organ.

### **Electrical Supplies to Mechanical Equipment**

Electrical supplies to be installed to all mechanical plant and equipment as identified by the mechanical design.

### **Testing & Commissioning**

The whole of the electrical installations will be tested and commissioned in line with current Building Regulations, BSRIA & CIBSE guidelines and as set out in BS 7671:2018.

### **Health & Safety File (O&M's)**

As Installed Drawings and Operating and Maintenance manuals shall be submitted prior to handover.

**Document Sign Off**

Issued on 25 October 2024

A handwritten signature in black ink, appearing to be 'P. Cowling', written over a horizontal line.

Signed

Paul Cowling

Mechanical Design / Project Engineer

A handwritten signature in blue ink, appearing to be 'D. Speed', written over a horizontal line.

Signed

Dominic Speed

Electrical Manager

For and on behalf of Watsons Building Services Ltd