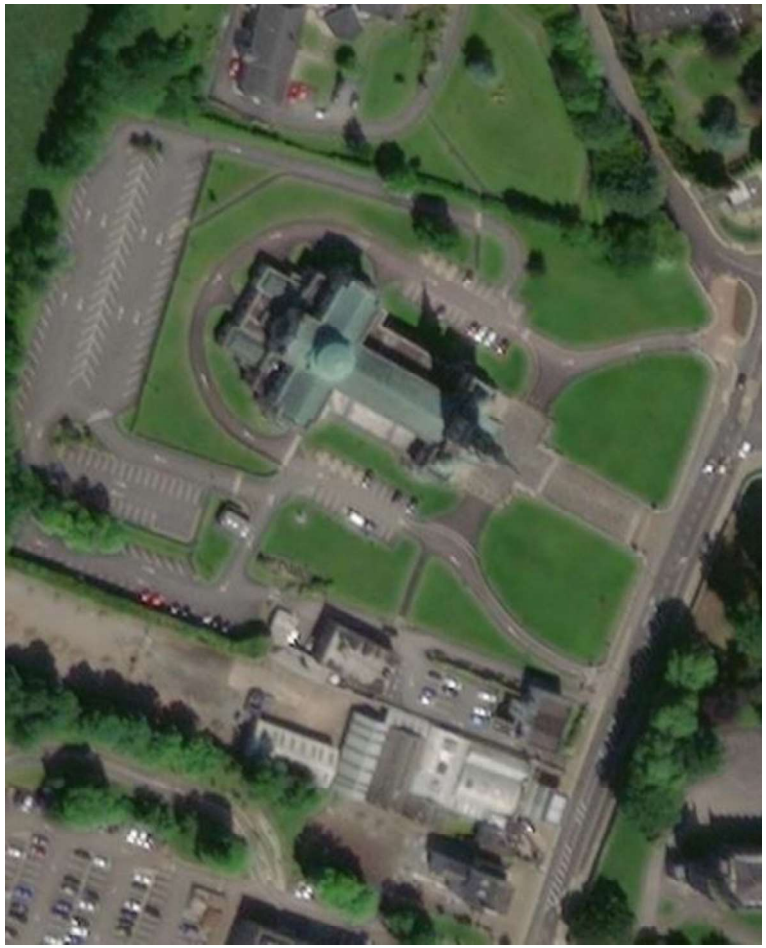
Cathedral of St. Patrick and St. Felim, Cavan

- Built 1935-1945
    - 7 Bay nave (14m high)
    - 2 single storey side aisles (6.7m)
    - 2 bay transepts with single story side chapels
    - Dome at crossing over sanctuary
    - Sacristy to the West

- Entrances
    - Pedimented main portico to the east, with central door flanked by 2no. Side entrances
    - Advanced side entrance to side aisles and transepts

Cathedral of St. Patrick and St. Felim, Cavan

- **Proposed scope of works:**
    - Upgrade heating system
    - Upgrade electrical system (including fire safety)
        - Upgrade of lighting
    - Install roof insulation
    - Enhanced draught proofing/airtightness
        - Ensure and improve accessibility



Principles of Heating a Church/Cathedral

- Ensuring the Cathedral is welcoming and usable.

- Focus on people and their activities, it is people who feel comfort or discomfort.
    - Heat the people, not the building.

    - Space heating at 18°C is considered comfortable, realistically unachievable and environmentally unsustainable.

    - Cathedral door are open 65hrs a week and occupied 22hrs a week.

- Not wasting energy
    - Insulation

    - Draught proofing
        - Accessibility

- Historic fabric and materials not being harmed

Area of Building Versus Area Occupied by People

- Total area of the building is 1945 m²

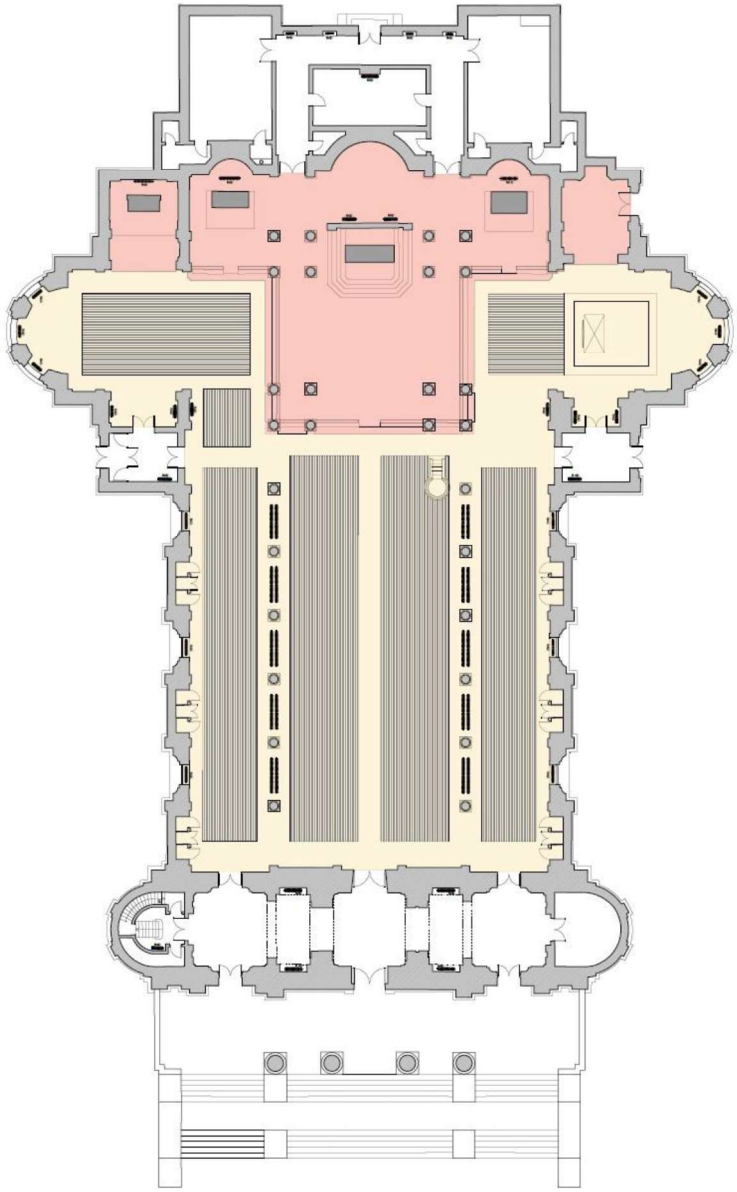
- Total area of the main body; nave, aisles, transepts and sanctuary is 1465 m²

- Total area of the seating for persons is 529 m² (36%)

- Total volume of the main body is 16,000m³

- Total volume occupied be persons is 1,000m³ (6%)

- Entrance = 153 m²
- Side entrances = 2x15 m²
- Sacristy area = 225 m²
- Sanctuary = 410 m²



Heating strategy

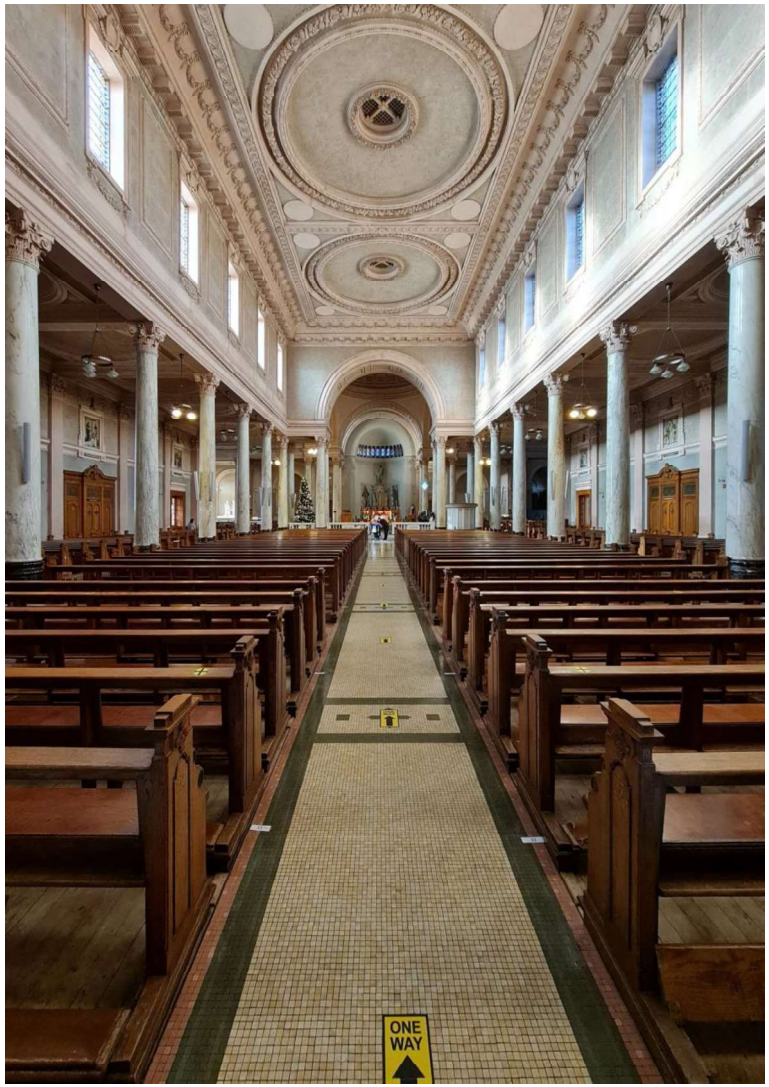
- Provide a base temperature of circa 12°C for fabric protection.
- Provide a comfortable environment for the people with temperatures at the lower levels at 18°C.
- Provide Heat to the Alter area, where there are decretive floors and no adjacent walls.
- Provide Efficiency and cost effectiveness.

This will be achieved by heating the people, not the building.

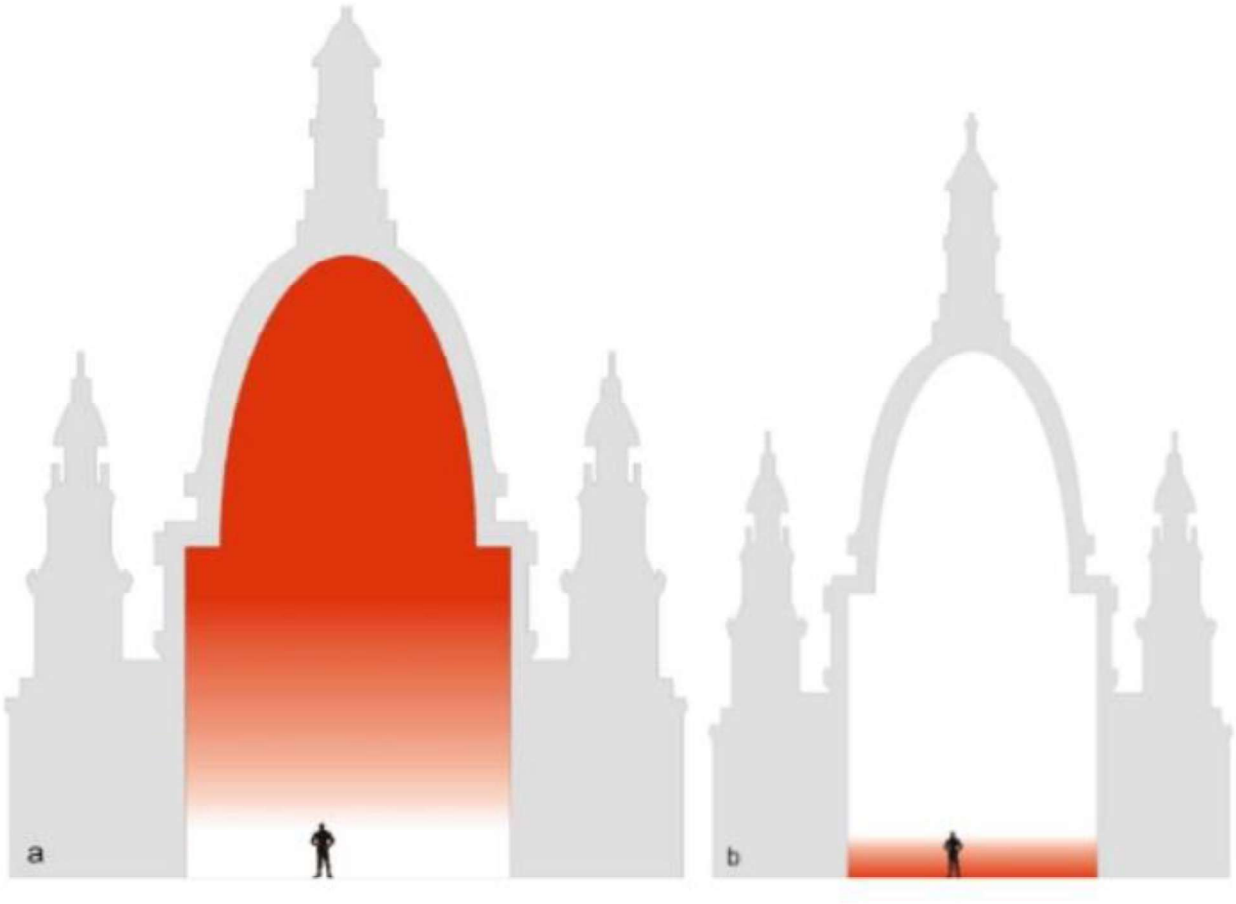
The building will be provided with:

- Trench heating within the pew seating areas.
- Radiators below the windows and below the high walls to counteract downdraft
- Radiant heaters to the alter area.

The heart of the heating system, the boiler, will be upgraded to the current high efficiency boilers.



HEAT THE PEOPLE NOT THE BUILDING



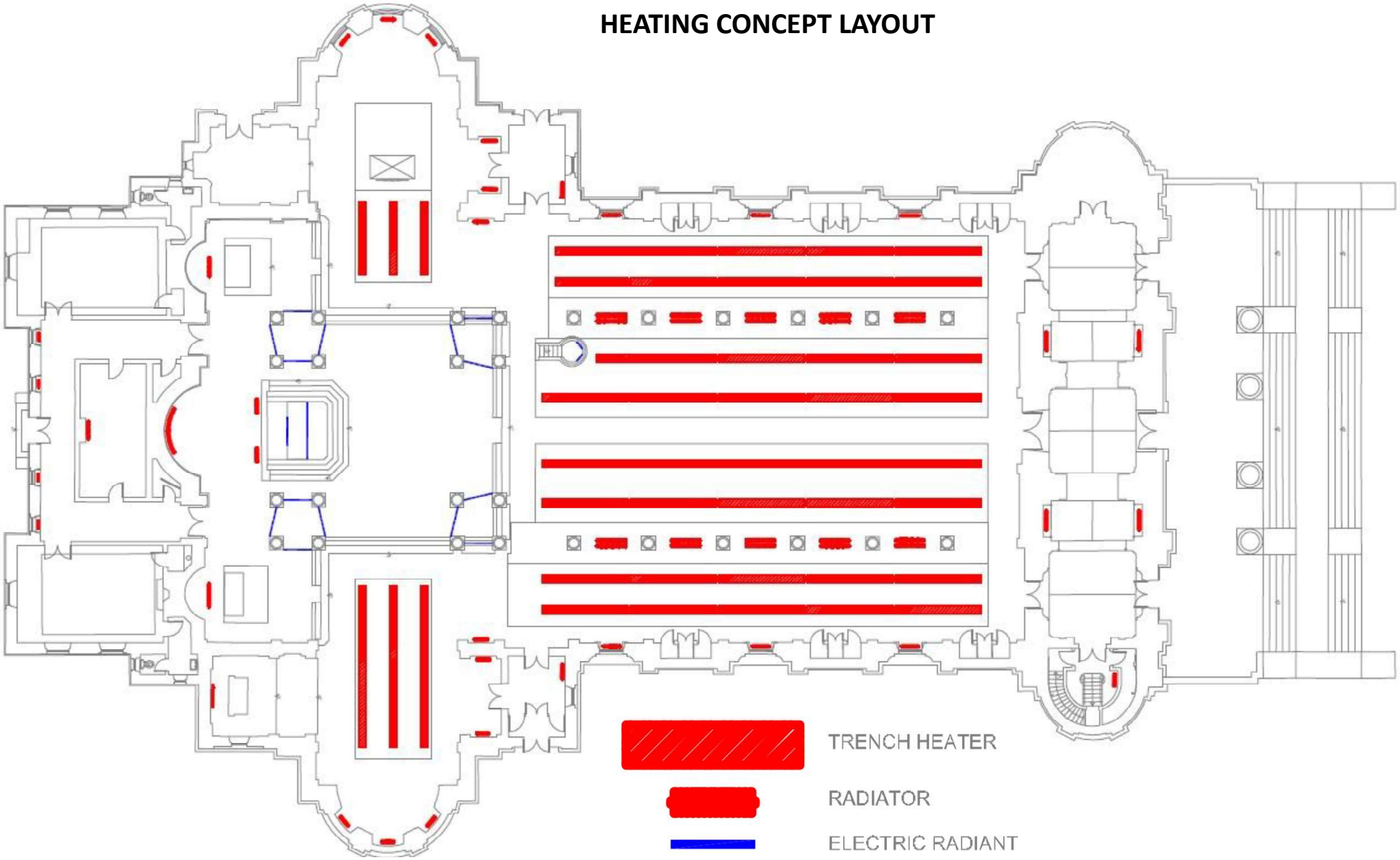
EXAMPLE A:

- Perimeter only
- Primarily convective type radiators
- Heat rises from edges and does not heat the people in the centre
- People at the edges will be heated

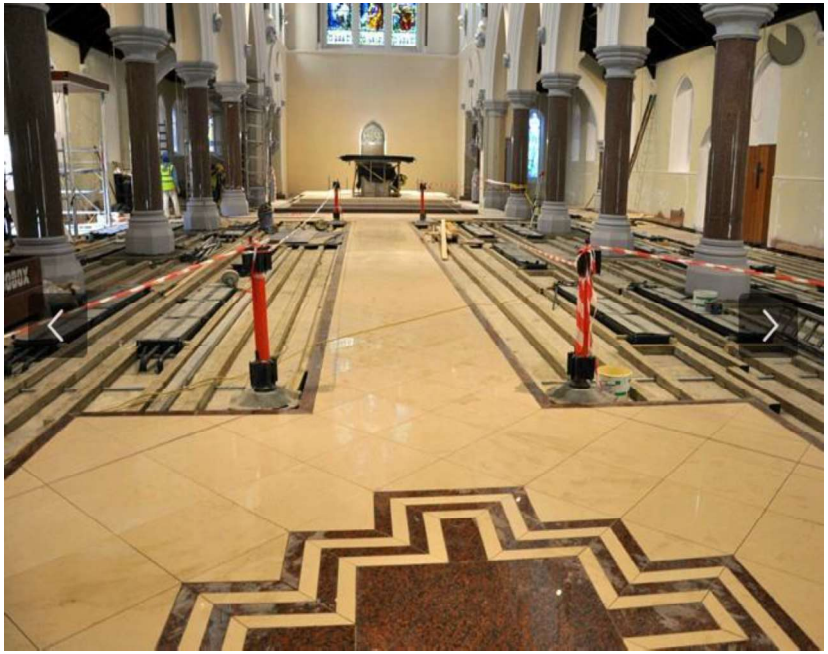
EXAMPLE B:

- Better distribution of heat at low level
- Both Pews and People will receive the heat first.
- Result is a comfortable environment and drastically reduced drafts.

HEATING CONCEPT LAYOUT



TRENCH HEATING TO HEAT THE PEOPLE



St. Mary's Carrick on Shannon

Trench Heater

St. Mary's Carrick on Shannon

RADIATORS

DISCREET RADIAOTR

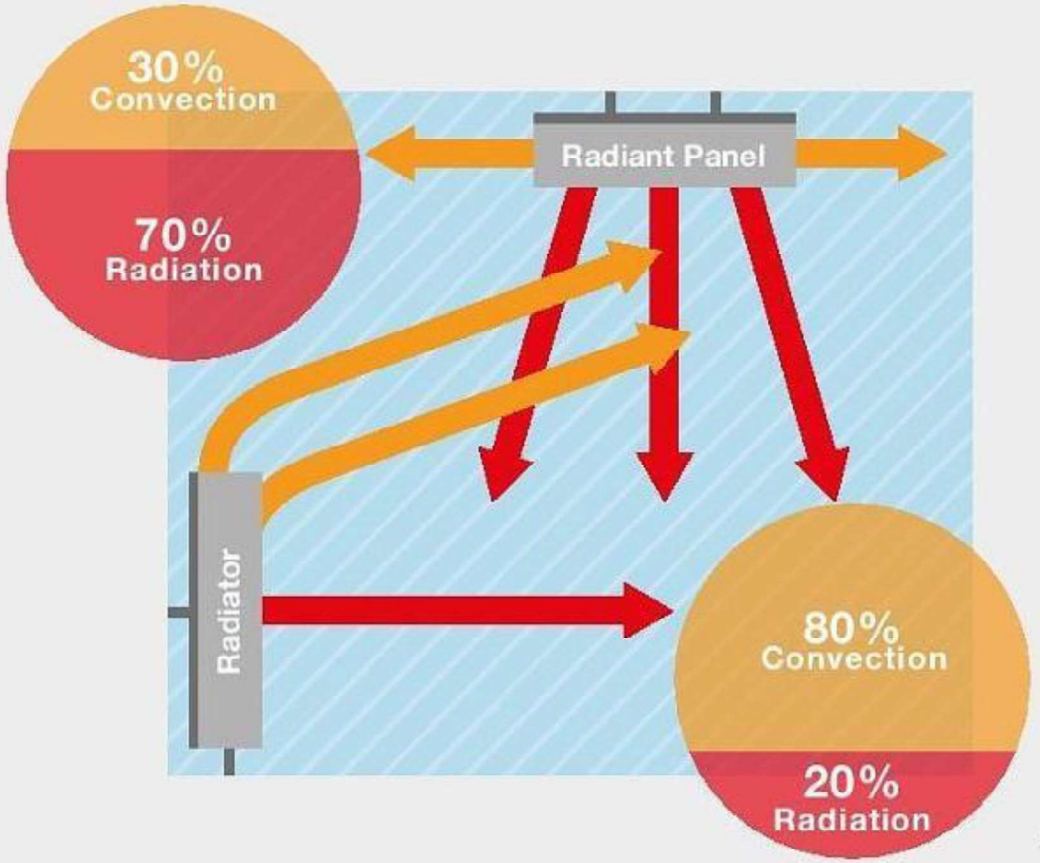
DISCREET & CURVED RADIAOTR

CURVED RADIATOR

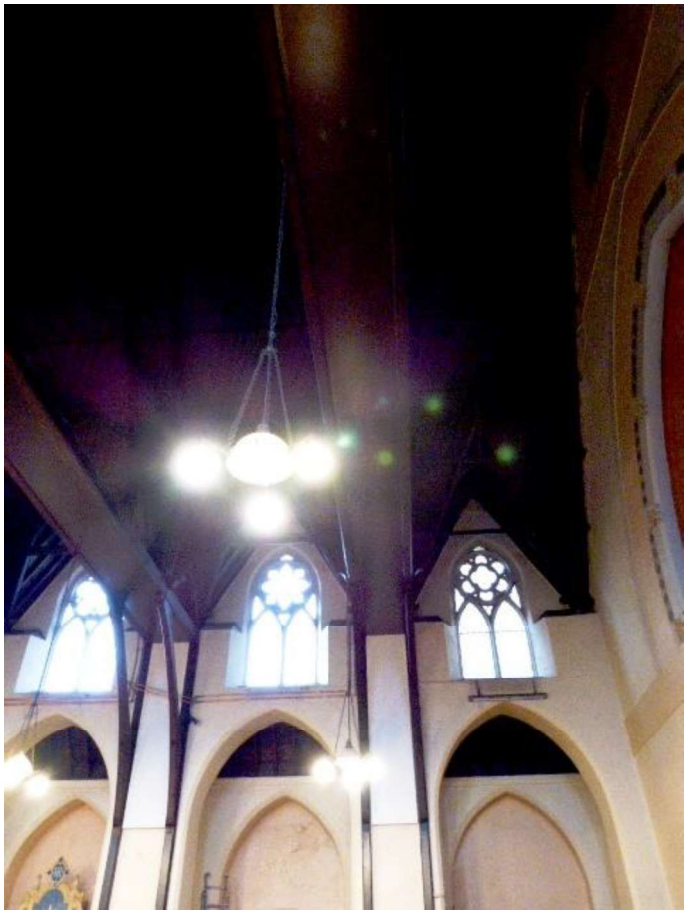
RADIANT HEATING

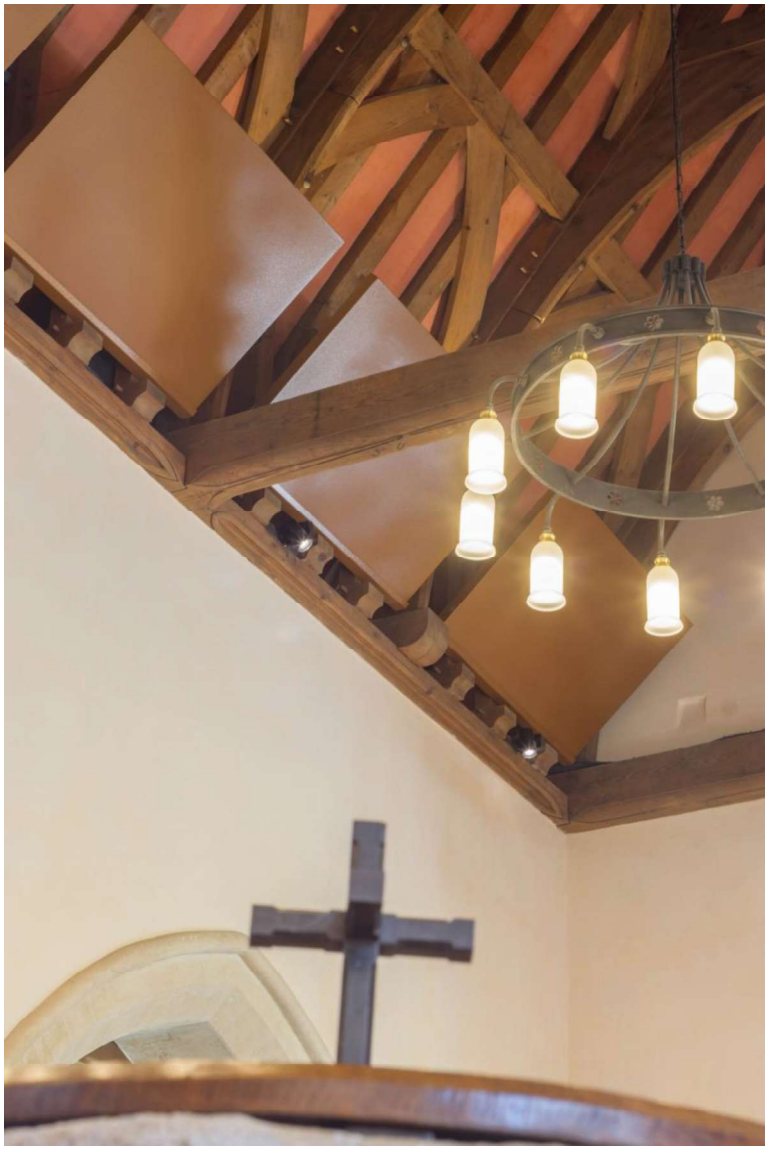
Radiant heating explained

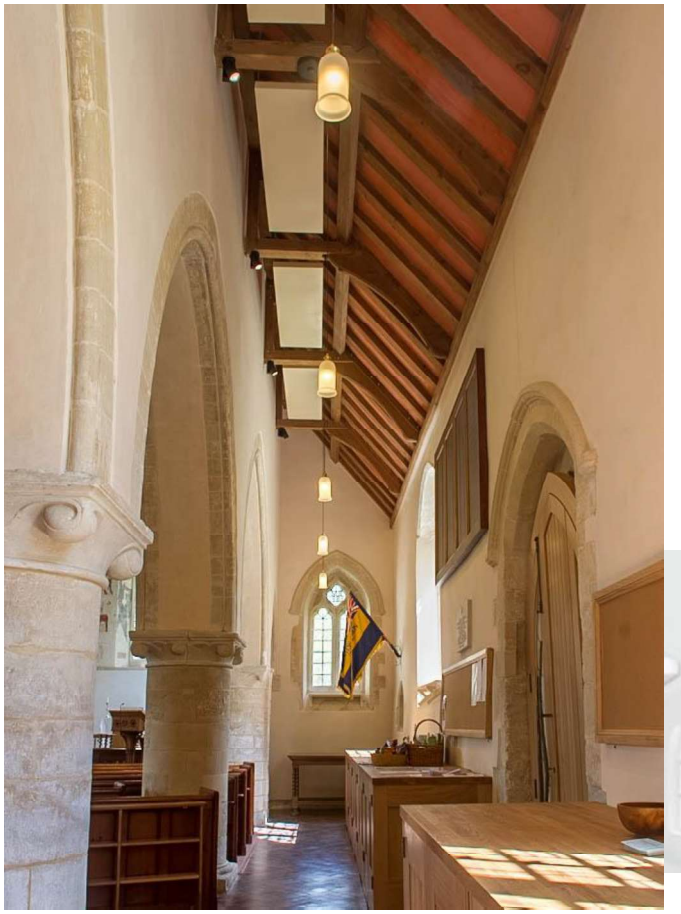
Try to think of it like the sun on a clear day in winter. The air temperature may be cold but when the sun shines on you, you feel warmth even though the air temperature hasn't changed. It's like the sun needs to be in the line of sight so that you feel its direct warmth, radiant panels also need to be in line of sight to the objects in a room for it to be fully effective.



RADIANT HEATING EXAMPLES

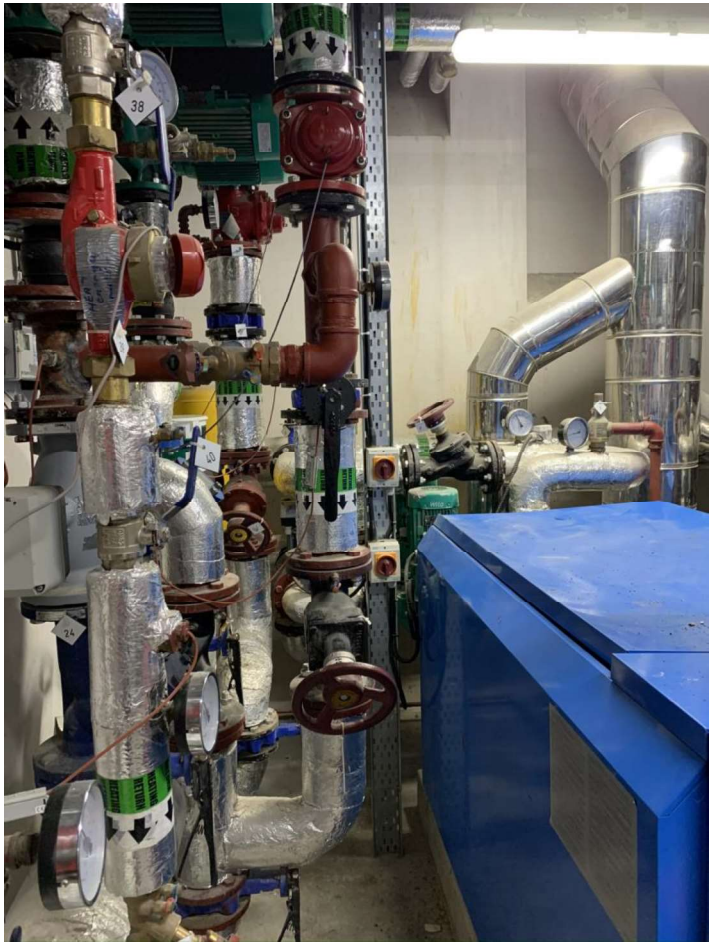






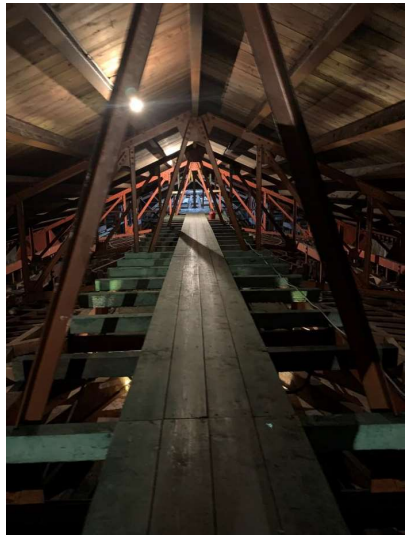
EXISITNG BOILER ROOM

EXAMPLE OF NEW BOILER ROOM



Insulation of ceiling space

- Insulation above and between the existing ceiling joists.
- Requires a breathable product sensitive to the historic fabric of the building, with the ability to absorbed and release moisture without compromising the thermal performance.
- Proposed 200mm to maintain a more stable indoor temperature, carried out so as to not compromise the ventilation of the roof structure.



therma fleece®
Nature's finest insulation

Case Study...

Bodleian Library

Client
Oxford University Estates

Project Location
The Bodleian Library, Oxford - Upper Reading Room South Wing.

Product Details
Thermafleece – sheep's wool insulation slabs installed between and over joists.

Design and Installation Criteria

- Materials to act in sympathy with structure and durable within the life expectancy of the roof.
- Above average level of thermal insulation performance and hygral stability.

Project Outline
The library was insulated using Thermafleece sheep's wool in the roof of the South Wing of the Upper Reading Room which is the principal research reading room for access to printed books and periodicals published after 1640.

Project Details
The Bodleian Library is one of the most prestigious buildings in Oxford. The Bodleian first opened to scholars in 1602 and is still actively used by students and scholars. The library now houses over 8 million books and manuscripts including rare and incomparable collections.

The building was entirely re-roofed using copper with a lifespan of approximately 150 years. The existing timbers were in good condition and didn't need replacing. Repairs to stonework were made when the scaffolding was in place. The historic references for the building meant that the Surveyors could determine where the original stone was sourced and obtain similar stone from the relevant area.

250mm Thermafleece was installed between the timber roof joists over an area of 500 m^2. A spokesperson for Oxford Estates reported the ease of installation of Thermafleece within the uneven spaces of the roof. The compatibility of Thermafleece, as a natural product, fitted with the historic fabric of the building. This, along with the breathability of the insulation, absorbing and releasing moisture was a significant factor in choosing Thermafleece.

Benefits

- 21st century energy efficiency using materials that worked within a 17th century structure.
- Insulation designed to last the life of the structure.
- Natural fibres provide a moisture buffer helping regulate humidity levels.

Draught proofing

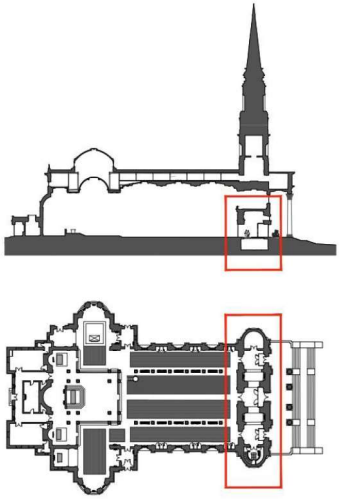
- Draught-proofing is one of the most cost effective and least intrusive ways of improving the comfort of occupants and reducing energy used for heating with little or no change to a building's appearance.

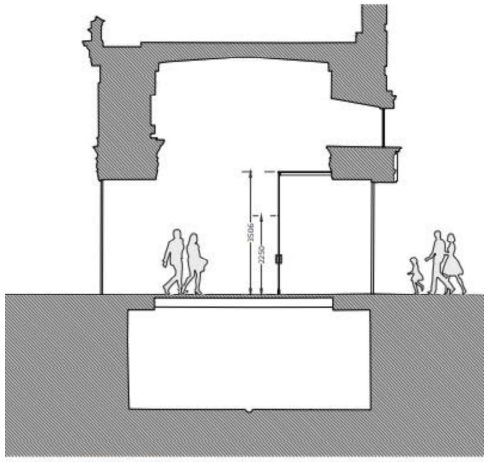
- Older buildings are prone to heat loss through cracks and gaps which develop as various building elements move and distort over a long period. This is often the case for windows and doors which can be a major source of heat loss. However, less than a quarter of the heat lost through a typical traditional window escapes by conduction through the glass, the rest is by draughts (air infiltration).

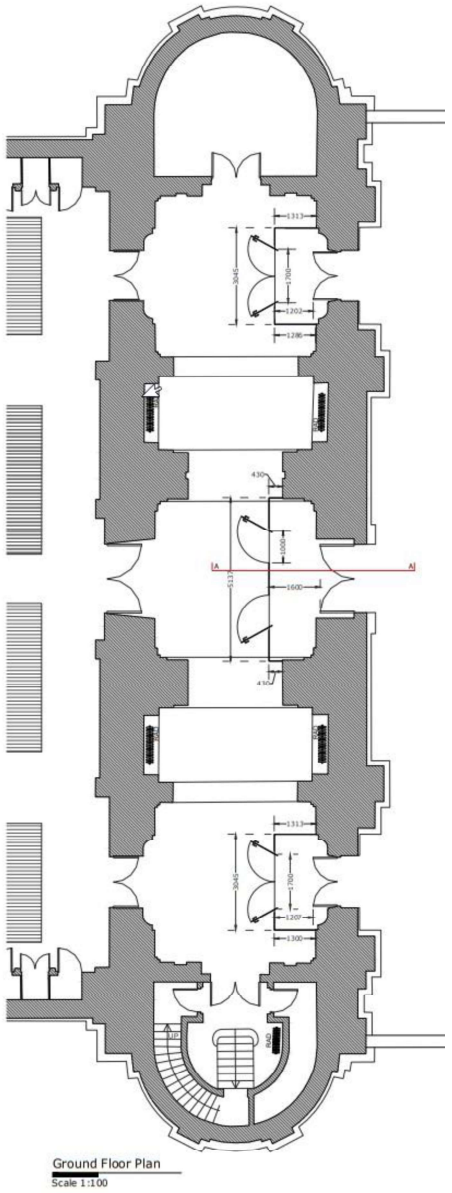
- Aims
  - Installation of draught lobbies
  - Airtight detailing to the attic space
  - Glazing to the elevated balcony over the entrance porch
  - Door actuation of internal doors

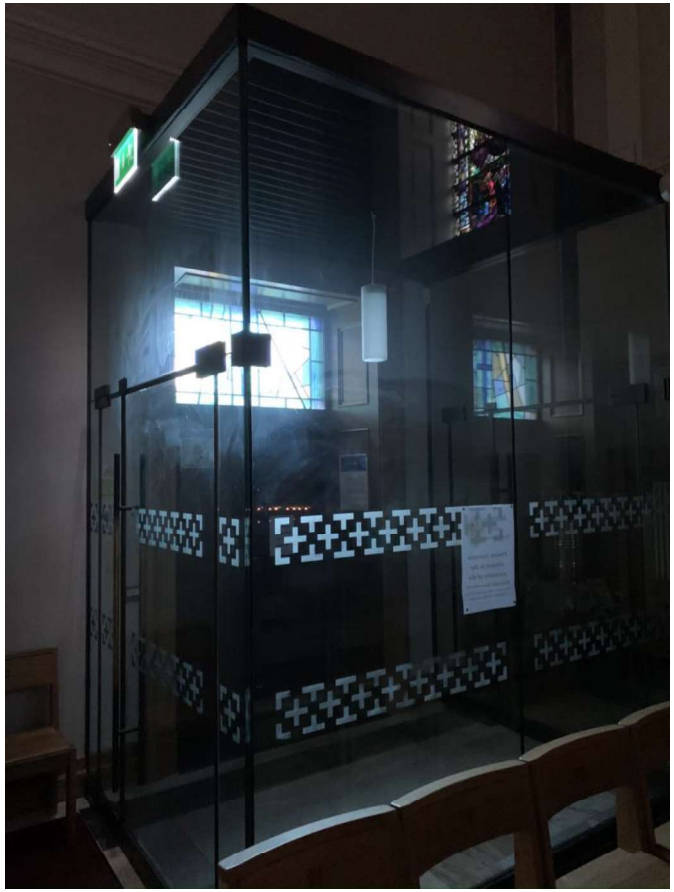
Draught lobbies

- Allow the front doors to remain open and create a sense of openness and welcome.
- Enhanced draught, wind and weather resistance
- Unimpeded view upon entering the Cathedral
- Minimal impact or disruption to the original architecture
- Glass doors to be fitted with ergonomically designed push/pull handles and open smoothly on hydraulic floor springs with a hold option function and adjustable closing speed.
- Doors can be automated.



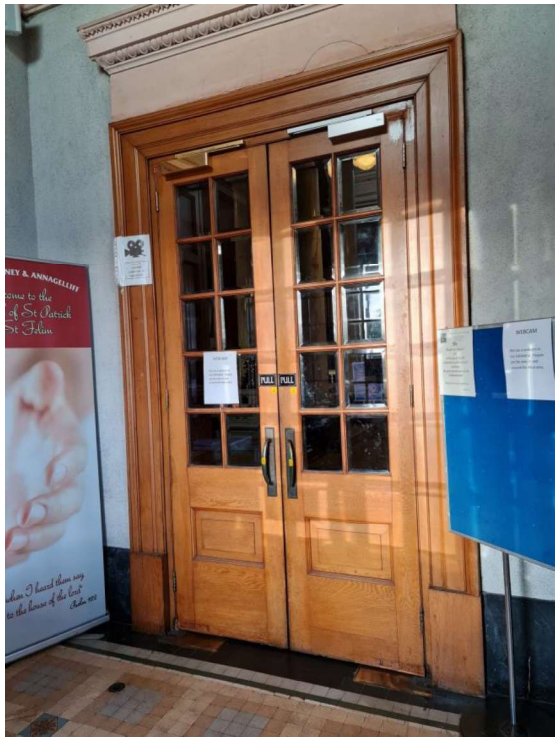


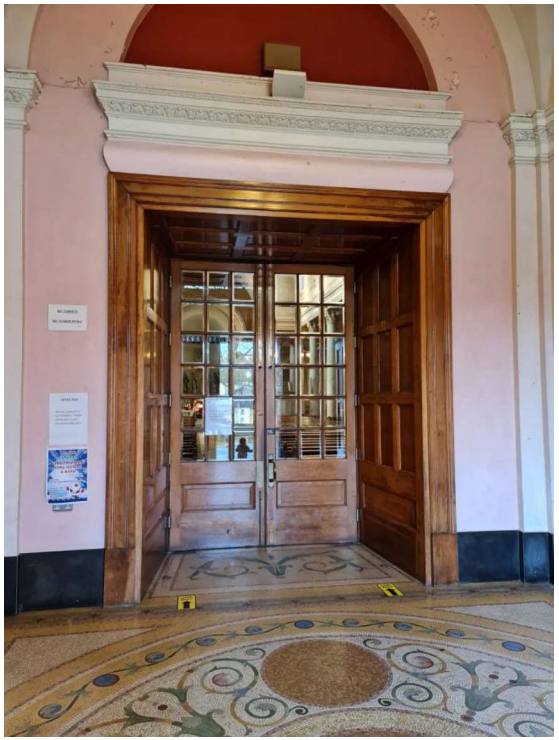




Draught proofing

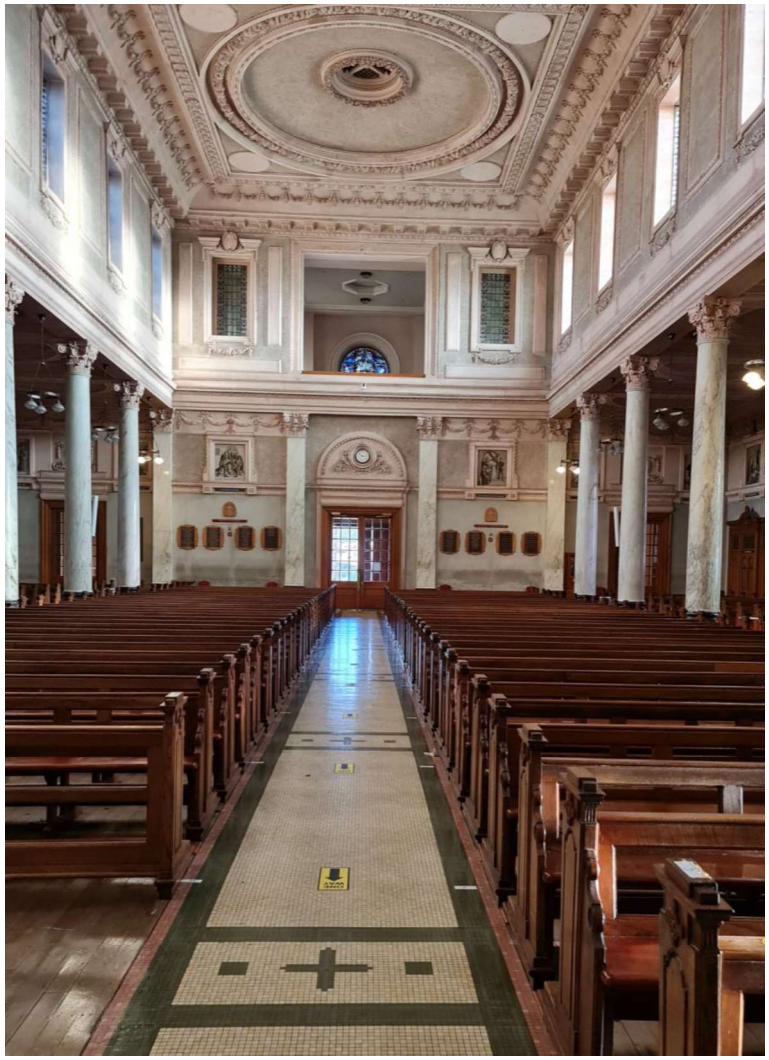
- Refurbishment of existing doors to enhance draught proofing measures.
- Incorporation of push button door automation for the elderly and the disabled.





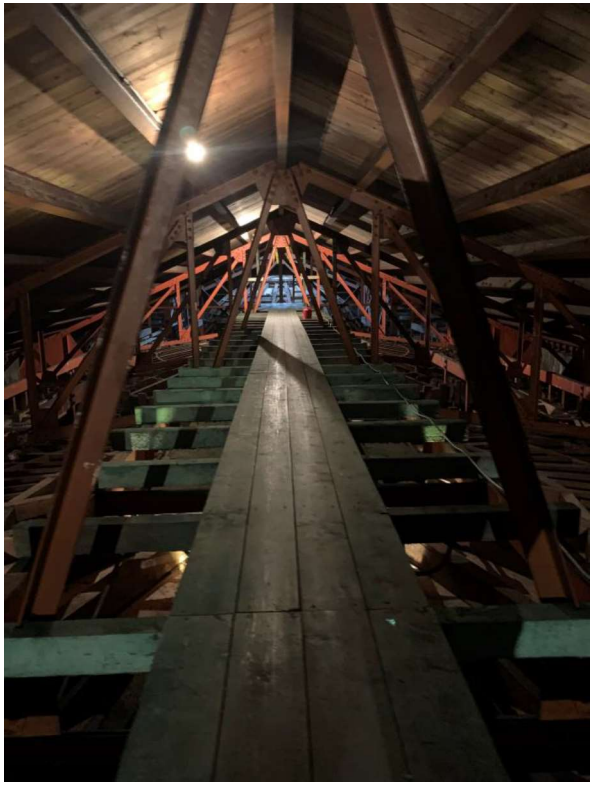
Glazing to elevated balcony

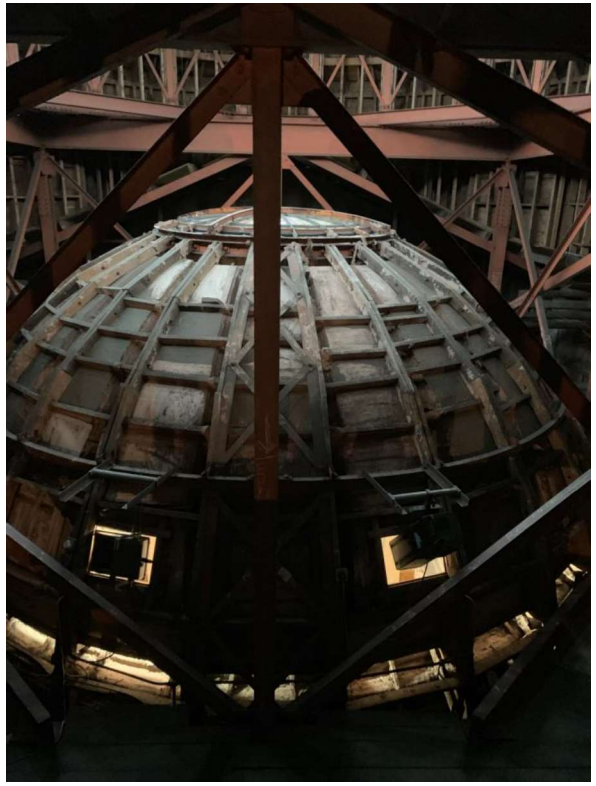
- Eliminate heat loss and draughts through the bell tower.
- 3.3x 4.2m ope.
- Frameless glazing so as not to impact on view to stained rose window



Airtight detailing

- Due to the decorative nature of the ceiling it is not possible to provide for an airtight barrier between the occupied volume below and the roof void.
- Significant compromises in the ceiling structure were identified as part of a roof inspection, the airtightness of these penetrations will have to be addressed on a localized basis.





AV Projector Screen

- Design install and commissioning AV projector screen
- Can be switched between clear and translucent – leaving a clear view when the projector is not in use.
- The projection screen is hung from main roof
- 4mx2.6m screen with rear projecting system.
- Typical installation cost per unit €7,000

Lighting

- Development of a lighting scheme using modern LEDs and intelligent lighting controls to create the atmosphere and reverence deserving of this historic house of worship.

- Flexible to fulfil a number of purposes:
  - to enable participants in the religious activity or ceremony to see what they are doing
  - for the congregation to see what is happening around them and provide sufficient light suitable for reading
  - to create a good visual environment
  - create an atmosphere which is conducive to worship subtle emphasis of architectural features
  - allow the clergy to pre-set specific lighting scenes for specific liturgical occasions

LED spot and flood lights

- LED spot and flood lights provide a good low energy solution with a very long life, reducing the need for maintenance.

- The concealment of the equipment has been made easier by the introduction of very compact narrow beam spotlights

- Variety of beam angles provide for different purposes
    - Wide beams for washes over surfaces
    - Medium beams for lighting over seating areas
    - Narrow beams for picking out altars or features such as the Stations of the Cross.

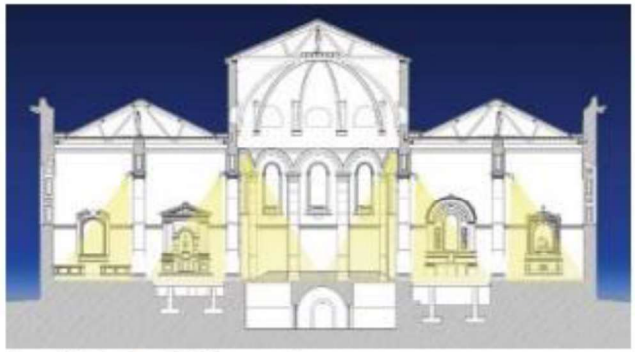


Figure 6: Functional lighting concept.

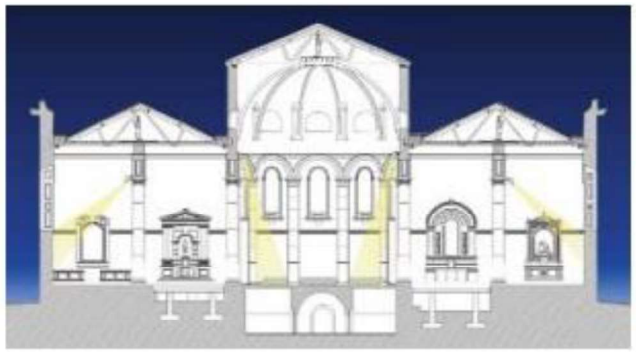


Figure 7: Accent lighting concept.

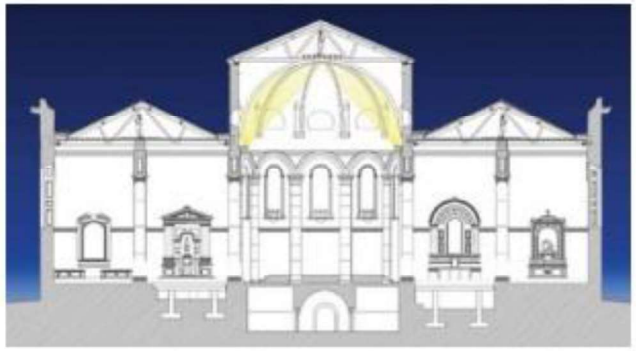
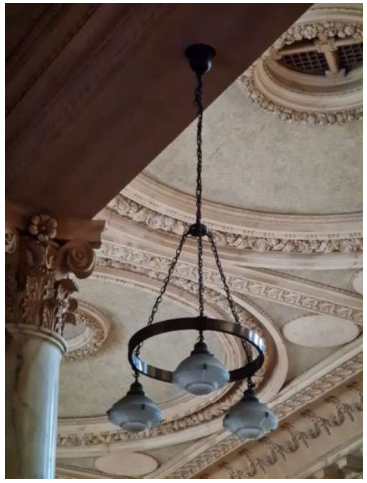
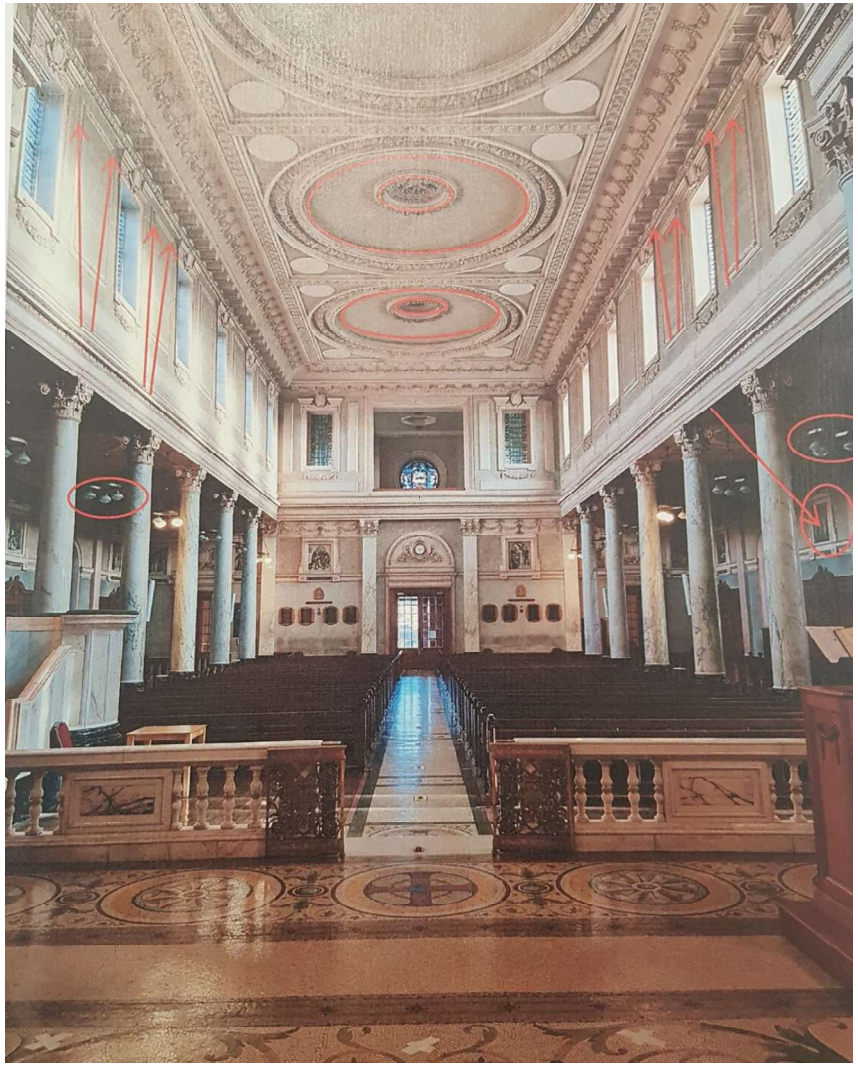


Figure 8: Uplighting concept.

Lighting Proposal

- LED upgrade of existing pendants for general lighting
- LED spot lighting in circular ceiling feature to light the main body of the building
- LED perimeter lighting to the circular ceiling feature to highlight the ceiling
- LED wall mounted floodlights to highlight upper windows
- LED wall mounted spot lighting to highlight the Stations of the Cross





CORO

IP20

A range of cornice, capital and shelf projectors particularly suitable for installation in prestigious architectural environments. Available in two different sizes - LARGE and SMALL - each with two different length arms.

OPTICS

NSP (only for SMALL version)
SP • FL • MWFL • WFL
DBS Ottica variabile (only for LARGE version)

POWER SUPPLY

Electronic
DALI
CASAMBI on board

LED

From 200lm to 7130lm
3000K
Ra 80 (only NSP optic)
Ra84 • R184 • Rg98
Ra97 • R196 • Rg102

FINISHES

- Bianco fiorentino
- Sandstone grey

INSTALLATION

A Mounting rail for surfaces up to 900mm long. The projectors can be fixed to any point on the rail which can also house all the electrical conduits of the system.

B Base for surface mounting

C Base for surface mounting with an integrated drivor also available in a Casambi version.

EFFECTS

Optics with reflector
Wide, soft beams suitable for uniform lighting of walkways and vaulted ceilings.
CORO LARGE: SP • FL • MWFL
CORO SMALL: MWFL • WFL

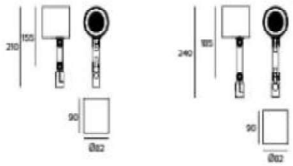
Hybrid optics
Excellent ratio between efficiency and beam definition for lighting particular architectural details even from long distances.
CORO LARGE: SP • FL

Optics with lenses
Narrow, defined beams suitable for lighting works of art or where a stark contrast between light and shadow is required.
CORO SMALL: NSP • SP • FL

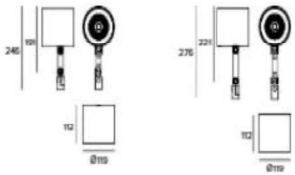
CONTROL

Remote control
Variation of beam opening thanks to the DBS system with a variable optic and variation of emission intensity using Casambi.

CORO SMALL



CORO LARGE



St. Mel’s Cathedral