MECHANICAL AND
ELECTRICAL ENGINEERING
CONSULTANCY

Noel Lawler
CONSULTING ENGINEERS

Project Title: Restructuring and Renovation of The Tholsel, Kilkenny

Proposed Strategy of M&E Services

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Executive Summary of Proposed M&E Strategy

Kilkenny County Council appointed an architect lead design team under architects 'Reddy Architecture and Urbanism' to carry out an assessment of the Tholsel building. As part of the appointed design team, Noel Lawler Consulting Engineers (NLCE) have prepared a mechanical and electrical (M&E) Strategy for the proposed changes to the Tholsel building.

The proposed building services use will incorporate a new lift shaft on the north-east of the building serving the basement to fourth floor, with an exhibition space in the basement. The ground floor arcade will accommodate a floor to ceiling glass room for tourist information. The upper council offices will be refurbished with structural changes to the Mayors office and council reception on the second floor.

The strategy proposed is for the most part divided into two sections, one for the public spaces and one for the private office space.

The M&E strategy for the public space proposes the use of an air source heat pump to provide low temperature hot water to the underfloor heating system in the basement and radiators in the offices and second floor exhibition space. Mechanical ventilation will be installed to serve the basement area and internal toilets. New lighting will be LED's with PIRs where possible. All new cabling and infrastructure will be designed not to affect the historic nature of the structure.

The M&E strategy for the private office space on the fourth floor proposes the use of an air source heat pump (ASHP) to serve new radiators within the space. The proposed office space shall be naturally ventilated through openable rooflights, with mechanical extract ventilation within the staff canteen and staff WCs. The lighting and small power will be upgraded to suitably serve the needs of the space.

1.0 Proposed M&E System Strategy

1.1 Heating System Strategy

Following a detailed optimal analysis of the heating system options available, NLCE have determined that an ASHP is the recommended option for the Tholsel building. The heat pump will be used to serve both the public and private spaces of the building. The heat pump is environmentally friendly and represents significant economic savings on energy bills in the long term.

The renovation of the Tholsel will retain and enhance the civic function as well as providing tourist exhibition spaces. This increased usage of the building will increase the heating demand and running hours of plant. This will emphasise the need for an efficient and functional heating system. An ASHP can provide this, while reducing building CO_2 emissions at the same time, which is the best option for the environment. The private offices, staff canteen and staff WCs shall be heated via new radiators served by the ASHP.

The exhibition spaces and council spaces shall be heated via radiators and it is proposed to heat the basement though the use of underfloor heating. All the areas of the building will be heated via the ASHP.

The proposed ASHP is to be located to the rear of the building, adjacent to Alms house. From this location, the distribution pipework will be returned to the building underground and into the new proposed mechanical and electrical riser.

1.2 Mechanical Distribution

A new mechanical and electrical riser shall be installed to serve the building. Distribution between rooms, allocation of space for ducting and conduit for proposed services and an allowance for future services, have all been considered.

Each space will be designed to accommodate the intended purpose and a detailed mechanical design tailored to accommodate occupant comfort conditions will be prepared.

Outdoor conduit and ducting on the roof will be concealed in outdoor weather proof enclosures, out of the elements and in-line with best practice.

In public space, service finishes will be reflective of Kilkenny's commitment to provide impressive and functional tourist experiences in the heart of the Medieval Mile. In terms of services, the strategy, in so far as is practical, is to conceal and discreetly place 'invisible' services. These services would include wireless switches, wireless (infrared) fire alarms and CCTV systems. This service would also extend to cabling for lighting and Audio/Video (AV) services. It is proposed that most of the electrical distribution within the basement to be ducted underfloor, below the insulation.

For the modern government offices, the strategy will encompass services which are easily accessible, neatly distributed and will meet the comfort conditions of the occupants. The services infrastructure will be completely upgraded & redesigned.

1.3 Fabric Upgrades

The building shall be upgraded where it is possible to do so whilst maintaining the architectural, artistic, historical and social importance of the building.

The windows to the rear of the building shall either be reinstated or be replaced with new, both options will provide an improvement to the building fabric. The windows to the front of the building form part of the architectural and historical façade and therefore shall be retained and repaired where necessary. The rooflights to the fourth floor shall be replaced with conservation rooflights, which will have a better thermal performance than the existing rooflights. Repairing and replacing these windows shall improve the fabric performance of these areas.

The existing sloped roof to the front of the building is to be retained and repaired. The flat roof over the Cupola is to be replaced and the pitched roof to the rear of the building is to be reinstated. There will potentially be an opportunity here to increase the thermal performance of these roof sections and potentially upgrade them in line with recommended U values outlined within Part L of the Building Regulations.

The ground floor of the basement shall be upgraded to incorporate a new insulated limecrete floor with stone slabs, existing stone slabs will be reused where possible. See figure 1 below which shows an example of a limecrete floor structure. This shall have a significant positive impact on the thermal efficiency of the basement compared to the existing floor.

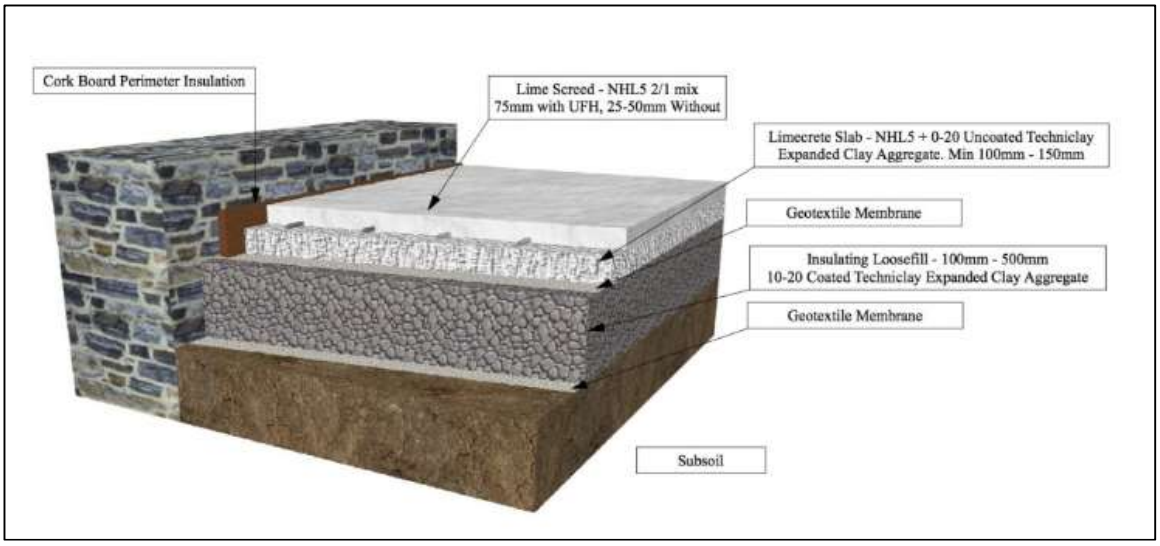

Figure 1. Example of a Limecrete floor construction

1.4 Ventilation Strategy

A new ventilation strategy for the Tholsel shall be developed as part of the works. Natural ventilation shall be used where it is appropriate. Mechanical ventilation will however be required in the basement area, kitchen area and internal toilets. Ducting for these areas will need access to an outer wall for extraction ducts.

Extract fans will be provided to each of the toilet facilities. The ducting from each toilet space to an outer wall will be accommodated in the design.

The proposed public entrance is a large glass room which may create issues with comfort for the occupants and present ventilation challenges. High performance glass will be installed and a system for distributing services and providing ventilation either at the top or the bottom of the frame or via glazed mullions will be designed.

The lift shaft will be designed with a permanently opened vent at the top of the shaft.

The Basement, as a public area, will need ventilation and fresh air which shall be provided via mechanical ventilation.

1.5 Lift Strategy

The proposed building services will incorporate a new lift shaft on the north-east of the building serving the basement to fourth floor.

The proposed lift location will have electrical ducts, ventilation and fire safety features. The proposed lift shall contain the motors within the lift car unit or shaft. The lift pit will require a form of drainage and a sump pump and will have a depth no greater than 1.4m. Adequate room for manoeuvrability from the lift for persons entering or exiting the lift car will be provided on all floors.

An assessment of the expected lift traffic and load/weight was carried out to determine the size of the car, motor and corresponding lift shaft required.

The lift shaft will require a permanently open vent at the top of the shaft.

1.6 Lighting Strategy

Lighting in public spaces will be used to enhance the user experience, through spot lights, LED strip lighting and dimmable/changeable lighting. Feature and wayfinding lighting may also be required in the public spaces, specialist lighting design will be required, based on the tourist attraction design and layout. The public spaces may change with time, and therefore a reasonable level of future proofing in these areas will be included for. In the glass reception, lighting cabling will be accommodated without distracting from the wooden ceiling mounted beams or visitor experience, see Figure 2 below for an example of discreet lighting. In the basement spaces, lighting cabling could potentially be accommodated underfloor below the insulation to avoid disturbing the basement ceiling and walls.

A separate optimal based exercise involved the lighting system upgrade has been undertaken and as a result, LED lighting with PIR / occupancy controls in all relevant areas shall be installed. Emergency lighting will be included in all spaces as part of the design.

Figure 2. Discreet Lighting within a glazed structure

1.7 Water Services Strategy

The fresh mains water currently enters the building from the basement area, this will be rerouted to accommodate the use of that space. The water storage tank shall be re-sized to account for the addition of new toilets and building function, the existing tank will be replaced. Provision for piping to new toilets and additional sinks will be accounted for via designated routes.

1.8 Electrical Distribution & Infrastructure

The current electrical infrastructure is unsuitable for the proposed building and therefore the electrical infrastructure in the Tholsel Building will be completely redesigned as part of the works. A strategy will be designed around cable management, cable services distribution, future cable diversity, enough power points, public areas power points, outdoor power points etc.

The proposed electrical wiring will be enclosed in concealed metal ducting, conduit and cable trays with lids. Particular attention will be paid in the public spaces to conceal electrical services, unless it is required to be designed to be aesthetically suitable for a public space.

A service shaft will be installed for the upper floor offices and a strategy of cable management will be designed. Cables which are distributed between rooms will be sufficiently allocated with the space needed for ducting, conduit and cable trays both for proposed services and an allowance for future services.

Cables will be terminated neatly and locally to the area of designated use. Network cables, fire services and security cables will be separated from electrical cables where possible during detailed design. Each room will be designed to accommodate a specific purpose and a cable plan will be designed around this to successfully accommodate the occupant.

Outdoor cabling will be concealed in outdoor weather proof conduits or in enclosed cabling trays, out of the elements and in-line with best practice. The lightening protection tape is to be rerouted.

In the glass reception and basement spaces; lighting, fire services, security and audio/visual cabling will be accommodated without distracting from the wooden ceiling mounted beams or visitor experience.

1.9 Other Electrical Design Elements

1.9.1 Access System

Given the proximity of the government offices to the tourist facilities and the differing functions of the two spaces an access system which is suitable for the proposed spaces will be designed. The two areas will function separately, and correct levels of clearance allocated to occupants within the building. Points for access control will be included.

1.9.2 Security

A CCTV security system will be installed in all public areas with adequate coverage and lack of blind spots. The CCTV cameras will be tamper proof and of reasonable durability. The security feed will return to a central location within a secure room of the building.

1.9.3 Audio/Video

The exhibition area in the basement will likely be interactive with intelligent screens and computer-generated images, holograms or videos. A suitable audio/visual design around the experience will be carried out by a specialist fit out consultant. Video and audio equipment (Speakers, TVs, Projectors, Fixed Screens, Dimmable LEDs etc.) will need ducting and permanent power points throughout the basement area. NLCE shall liaise with the fit-out consultant for the basement space.

1.9.4 Data

Public and office spaces will require data cabling for WI-FI and network. Interactive displays, computers, cashflow/pay points etc. will all have data requirements. A design strategy around where these points shall be located will be carried out.

1.9.5 Controls

Energy metering, heating controls and electrical services controls will all be incorporated into the new design. A small BMS system with network access for remote building control and energy management for the building manager shall be provided.

Points on actuators, lighting, ventilation and heating will be installed for BMS controls.

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