LBC External Façade Lighting Cabling & Penetration Methodology

Introduction:

To install external facade lighting cables (not exceeding 20mm in diameter) in a listed/historic building using a strictly non-intrusive approach, leveraging only existing cable routes and containment systems for internal distribution.

The methodology permits exactly three penetrations through the external Portland stone facade, each meticulously positioned within mortar beds to minimize impact on the building's heritage fabric while ensuring compliance with electrical safety and heritage conservation standards.

Shown on drawings as:



PENETRATION

NOTE: MYCO are awaiting further information from SignBox regarding the Signage penetrations required.

Scope:

This methodology provides a process for routing external lighting cables through the Sunlight House building, prioritising non-invasive techniques, heritage preservation, and adherence to regulatory requirements.

Emphasis is placed on utilizing existing containment systems (e.g., conduits, trunking, service voids) for internal distribution and limiting external interventions to three mortar-bed penetrations.

1. **Preliminary Assessment and Planning**
    a. **Comprehensive Site Survey**

- Objective: Identify and map all existing cable routes and containment systems to ensure a fully non-intrusive internal distribution strategy.

- Actions:
    - Conduct a detailed, non-invasive survey using historical building records, as-built drawings, and physical inspections to locate existing containment infrastructure, such as:
        - Underfloor ducts or channels embedded during original construction.
        - Ceiling voids or false ceilings containing pre-installed conduits.
        - Wall-mounted trunking or chases hidden behind decorative elements (e.g., cornices, skirting boards).
        - Service voids or risers used for historical utilities (e.g., plumbing, heating, or earlier electrical installations).
    - Use non-destructive tools, including:
        - Utilising existing information / MYCO site experience on understanding the external wall and cavity.
        - Laser measuring devices for precise mapping of routes and containment dimensions.
    - Verify that existing containment systems can accommodate 20mm-diameter cables by assessing internal dimensions, bends, and junctions.
    - Identify three optimal exit points on the external Portland stone facade, ensuring each aligns with a horizontal mortar bed to avoid cutting stonework.
    - Document all findings in a detailed survey report, including photographs, sketches, and measurements of existing routes and containment.

- Collaboration: Engage a heritage consultant has understood our plan to minimalise disturbing the existing fabric where practical.

b. Heritage and Regulatory Compliance

- Objective: Secure approvals and ensure all works adhere to heritage and electrical regulations.

- **Actions:**
  - Prepare this heritage impact assessment / methodology outlining the non-intrusive approach, emphasising zero internal structural modifications and limited external penetrations.
  - Specify that internal distribution will exclusively use existing routes and containment, with no drilling, cutting, or fixing into internal walls, floors, or ceilings.
  - Detail the three external penetrations, including their precise locations within mortar beds and measures to protect the Portland stone facade.
  - Ensure compliance with:
    - BS 7671 (IET Wiring Regulations) for electrical safety.
    - Building Regulations Part L (conservation of fuel and power) for energy-efficient lighting.
    - Local authority guidelines for listed buildings.
  - c. Obtain written approval from heritage authorities before commencing work, ensuring all conditions are integrated into the installation plan.

2. Cable and Equipment Selection

- Objective: Choose cables and accessories that are compatible with existing containment, heritage constraints, and external environmental conditions.

- **Actions:**
  - Select low-smoke, zero-halogen (LSZH) cables with a maximum diameter of 20mm to ensure fire safety and compatibility with confined containment systems.
  - Use armoured cables (e.g., XLPE/SWA/PVC) with UV-resistant and weatherproof sheathing for external sections to withstand exposure to sunlight, rain, and temperature fluctuations.
  - Specify flexible cables (e.g., multi-core, stranded conductor cables) to navigate bends and junctions in existing containment without requiring modifications.
  - Choose cable glands, junction boxes, and fixings that are discreet, corrosion-resistant (e.g., stainless steel or brass), and visually compatible with the building's aesthetic.
  - Verify that all materials comply with BS EN 50525 (electric cables) and are suitable for heritage environments.

3. Non-Intrusive Internal Cable Distribution

a. Utilising Existing Containment Systems

- Objective: Route cables exclusively through pre-existing containment systems to eliminate any need for new penetrations or fixings within the building.

- **Actions:**
  - Access existing containment systems identified during the survey, such as:
    - Conduits embedded in floors or walls from previous electrical or utility installations.
    - Trunking hidden behind skirting boards, cornices, or decorative panels.
    - Service voids in ceiling spaces or risers used for historical plumbing or heating.
  - Use fish tapes, draw wires, or flexible rods to pull cables through existing conduits or trunking, ensuring no damage to the containment or surrounding fabric.
  - Employ cable lubricants (heritage-approved, non-corrosive) to facilitate smooth pulling through tight or complex routes.
  - Secure cables within containment using pre-existing fixing points or non-invasive methods (e.g., cable ties or clips that attach to existing trunking without drilling).
  - Calculate containment fill capacity per BS 7671 to prevent overcrowding, ensuring adequate space for heat dissipation and future maintenance.
  - Route cables from the main power source (e.g., distribution board) to the three designated external exit points, following the shortest and most accessible existing paths.
  - Avoid any modifications to containment systems, such as cutting, extending, or reconfiguring, to maintain the building's historical integrity.

b. Junctions and Connections

- Objective: Manage cable connections within existing containment without structural alterations.

- **Actions:**
  - Use existing junction boxes or access points within containment for any necessary connections or branching.
  - Install compact, fire-rated junction boxes if additional connections are required, ensuring they fit within existing voids or trunking without modifications.
  - Ensure all connections are made using insulated, heritage-compatible connectors that do not require drilling or fixing into the building fabric.

4. **4. External Wall Penetrations**
    a. **Planning and Approval**

- Objective: Limit external interventions to three carefully positioned penetrations within mortar beds of the Portland stone facade.

- **Actions:**
    - Identify three horizontal mortar joints (beds) on the external facade, selected for:
        - Accessibility to external lighting fixture locations.
        - Minimal visual impact, avoiding prominent or highly visible areas.
        - Structural stability, confirmed by a structural engineer and heritage consultant.
    - Mark penetration points precisely using laser guides to ensure alignment with mortar beds, avoiding any cutting of Portland stone blocks.
    - Submit detailed drawings and photographs of proposed penetration locations to heritage authorities for approval, including specifications for drilling and sealing methods.

b. Drilling Process

- Objective: Execute three penetrations with minimal impact on the Portland stone facade.

- **Actions:**
    - Use a precision diamond core drill with a diameter of 22–25mm (slightly larger than the 20mm cable to accommodate glands or sleeves).
    - Employ low-vibration, low-impact drilling equipment to prevent cracking or spalling of the surrounding stonework.
    - Attach a dust extraction system to capture debris and protect the facade's surface.
    - Drill at a slight downward angle (5–10 degrees) to prevent water ingress into the building.
    - Monitor drilling progress with a heritage consultant on-site to ensure compliance with approved plans.
    - Clean the drilling area immediately after each penetration to remove dust or residue, using heritage-approved cleaning methods (e.g., soft brushes and water).

c. Sealing and Finishing

- Objective: Protect penetrations and maintain the aesthetic integrity of the facade.

- **Actions:**
    - Install weatherproof cable glands or conduits at each penetration to secure cables and prevent moisture ingress.
    - Use lime-based mortar, chemically and visually matched to the existing Portland stone mortar, to seal around glands or conduits.
    - Apply mortar with precision to blend seamlessly with existing joints, ensuring no visible disruption to the facade's appearance.

- Inspect and clean the sealed penetrations to confirm aesthetic and structural compatibility, with approval from the heritage consultant.

5. **Testing and Commissioning**

- Objective: Verify the safety, functionality, and compliance of the installation.

- **Actions:**
  - Conduct electrical tests per BS 7671, including:
    - Insulation resistance to confirm cable integrity.
    - Continuity and polarity checks to ensure correct wiring.
    - Earth fault loop impedance to verify protective measures.
  - Test external lighting fixtures for functionality, ensuring alignment with design specifications (e.g., lumen output, beam angle).
  - Inspect all internal and external cable routes to confirm non-intrusive installation and proper securing within containment.
  - Document test results in an electrical installation certificate, submitted to the client and heritage authorities.

6. **Documentation and Handover**

- Objective: Provide comprehensive records for heritage compliance and future maintenance.

- **Actions:**
  - Produce as-installed drawings detailing:
    - Exact routes of cables through existing containment systems.
    - Locations of the three external penetrations, including mortar bed specifications.
    - Positions of external lighting fixtures and containment.
  - Compile a maintenance manual including:
    - Cable specifications (e.g., type, diameter, ratings).
    - Inspection schedules for cables, fixings, and penetrations.
    - Procedures for non-invasive repairs or replacements using existing routes.
  - Provide a photographic record of the installation process, including before-and-after images of penetration points.
  - Submit all documentation to the client and heritage authorities, ensuring approval for record-keeping.

Risk Mitigation

- Heritage Damage: Strictly adhere to non-intrusive internal routing, using only existing containment and limiting external interventions to three mortar-bed penetrations.

- Structural Integrity: Engage a structural engineer to verify the stability of penetration points and ensure no risk to the Portland stone facade.

- Electrical Safety: Employ qualified electricians with experience in listed building projects, ensuring compliance with BS 7671.

- Environmental Protection: Implement dust control and weatherproofing measures to protect the building fabric during and after installation.

Conclusion:

This methodology ensures the installation of external lighting cables in a listed/historic building is achieved with zero intrusive modifications to the internal structure, relying entirely on existing cable routes and containment systems.

The three permitted penetrations through the Portland stone facade are executed with precision within mortar beds, minimizing heritage impact while meeting electrical safety and regulatory standards. The approach prioritizes conservation principles, aesthetic compatibility, and long-term durability, with comprehensive documentation to support future maintenance and compliance.