INTRODUCTION

The consequences of falling through a poorly protected hole or void during construction, refurbishment or demolition can be extremely serious. Similar dangers can arise from materials and/or debris falling through such holes.

Designers and specifiers have a responsibility under the CDM regulations to try to eliminate the need for potentially hazardous holes and voids in a structure. (For example, they may relocate services and service risers or may detail the use of temporary cast-in structural mesh in riser shafts or specify post pour core drilling of structural floors or apply more comprehensive solutions). Failing that, designers can reduce the risk by designing in either permanent or temporary protection.

During construction, Laing O’Rourke companies must ensure that all holes or voids are protected and that protection is maintained to the highest possible standard.

This standard shall apply to holes, openings in floors, floor slabs, risers, inspection chambers, valve chambers, lift shafts, stairwells, manholes, storage tanks or any other type of opening where there is a risk of persons and/or materials falling through.

The size and type of holes will determine the type of protection to be used and the need to place loads or traffic plant or vehicles over holes will require additional protection measures. These must be addressed by the Temporary Works Co-ordinator.

PLANNING

- To avoid forming holes in slabs, where possible, the design should be reviewed by the design team and the construction team, with the assistance of the CDM Co-ordinator.
- Programmes must be reviewed to minimise periods when voids have to remain open.
- The Project / Establishment Manager must ensure the coordination of hole and void protection involving the management team and Temporary Works Co-ordinator.

MANAGEMENT

- The Project Manager will nominate (and record in the safety plan) the staff member/s appointed to take responsibility for the on-site management of the procedures i.e. identifying location, hazards associated with the installation/removal of protection, ongoing inspection and maintenance of the protection.
- There will be a “hole register” system used following which will identify the number, size and location of holes/openings and the agreed protection solution.
- Ongoing maintenance of protective measures is vital. Hole protection must be inspected daily by the Supervisor nominated for that area and any deficiencies must be rectified immediately. (See page 7 for more information on maintenance).
- Records of inspection will be formally recorded. The ‘Hole / Duct /Shaft Opening Inspection Sheet’ on page 8 at the end of this standard can be used.
- When access through holes is required, specific arrangements must be made by the supervisor for the removal / modification / replacement of the protection as necessary, ensuring that holes are never left unprotected. (Any Risk Assessment for an operation must cover the removal and replacement process)
All persons must be warned at induction not to interfere with any protective measures and to immediately report any damaged or missing protection to their Supervisor. This should be reinforced in subsequent toolbox talks.

Where risers etc are handed over to another contractor or trade, there must be a clear handover of responsibilities with protection standards specified and understood.

The controls established must be detailed in the Project Health and Safety Plan, communicated and agreed with those involved in the work.

GENERAL HOLE PROTECTION STANDARDS

1. Holes in Slabs
   - Where detailed reinforcement is not continuous across a hole, then, as a general rule a minimum of one layer of A142 mesh should be incorporated prior to concreting to guard against fall and should be properly covered to avoid trip hazard or leg traps.

   A142 Mesh in Void
   (Note additional perimeter barrier)

   - Where mesh is not an appropriate solution, then covers must be provided to be:
     - Sufficiently strong, robust and designed for the size of hole and any impact and point loads that could be imposed.
     - Securely fixed in place e.g. plugged and screwed;
   - As an alternative to mesh, profiled metal deck permanent formwork can be allowed to ‘run through’ and perforated at a later date.

2. Covers to Holes from 250 - 750mm, not subject to vehicle/ plant movement:
   - 19mm plywood cover secured to a frame of 50mm battens fabricated as follows:
     - The frame of the made-up cover shall fit into hole to be covered.
     - The plywood covering the frame shall be at least 150mm wider than the void on all sides to provide bearing outside of the hole and must be firmly secured.
     - The ply shall must be either new or in very good condition and carefully checked to ensure it is structurally sound and with no damage or de-lamination.
     - The hole shall be identified with signage, minimum size of sign 300 mm x 300.
- Clearly identifiable as a hole cover, e.g. brightly painted and marked “WARNING – HOLE BELOW” usually in black on a yellow background.
- Trim pieces also to be painted yellow and must not present a trip hazard.

3. Holes over 750mm not subject to vehicle/plant movement:

   **Method 1**
   a) Fully secured scaffold boards, adequately supported at 1.2m centres.
   b) The hole shall be identified with signage as previously stated.

   **Method 2**
   a) Securely fixed joist hangers with appropriate size timber joist, 19mm plywood cut 10mm smaller than the hole size on all sides set in the opening making the edges visible.

4. **Large Holes which are required to remain open:**
   a) Proprietary system or scaffold double guardrail with 1m high top rail, toeboards and brick guards securely fixed around all open sides of the hole.
   b) Toe-boards must be a minimum height of 150 mm (225mm recommended) and no gap between boards or rails may exceed 470 mm.
   c) Fall prevention netting and debris netting must be placed across the hole at every floor level if mesh and edge debris guarding cannot be incorporated.
   d) The hole shall be identified with signage as previously stated.
5. Holes where plant movement is required

Special consideration must be given to the protection of holes that may be trafficked by plant and vehicles e.g. scissor lifts, cherry pickers, forklift trucks.

- Steel plate of sufficient strength to support 1.5 X the maximum load imposed must be placed across any holes that will be trafficked by plant and vehicles. This must be checked and approved by the Temporary Works Co-ordinator.

- The steel plate must have a bearing surface of no less than 200mm on all sides of the hole and must have lugs welded to the underside at the dimension of the hole to secure it **firmly** in place.

- The hole shall be identified with signage as previously stated.

- In addition to signage, the plate must be clearly marked with its load bearing capacity

- Holes such as newly built manholes or access chambers must also have temporary covers fixed to prevent falls of people or traffic, until the permanent covers are fixed in place. Full consideration must also be given to possible loads or tendency to displacement due to traffic in both the temporary and permanent conditions.

![Typical Protection to Larger Opening.](image)

For fuller protection debris nets directly under the void or brick guards to the scaffold should be used.
6. **Vertical Openings to Lift Shafts & Risers**

Vertical holes and openings such as lift shafts and access to risers should be fitted with permanent doors as early as possible.

- Where this is not possible, lockable temporary doors must be installed, preferably covering the full height of the opening and must be secured and marked.
- Where scaffolding is used as a short-term solution the vertical opening must be protected by the following measures:
  - 4 guardrails (minimum) to a height of 2m including a minimum 150mm toe board (recommended 225mm) must be solidly fixed to the opening entrance.
  - Brick guards must be fitted to the guardrails to prevent the insertion of heads or limbs into the hole or shaft.
- Signage stating “**Warning - Open Shaft!**” must be securely fixed to the guardrails. Minimum size of sign 300mm x 300mm.
- For large risers, ducts or shafts a specific permit system for entry may be deemed necessary to limit uncontrolled access.

![Typical Proprietary Temporary Lift Shaft Protection](image)

7. **Holes used for lifting operations**

- Where holes in slabs etc are required to be left open for lifting operations then they must be protected by guardrails to a minimum height of 1m, with intermediate rails at spacing not exceeding 470mm, toe boards of minimum 150mm, (225mm recommended). This barrier should be fully meshed with brick guards or similar.
- Removal of guardrails for the passage of materials will only be acceptable on the basis that a risk assessment is in place, which addresses how guardrails are to be removed, how those involved in the operation will be prevented from falling, how people not involved will be prevented from accessing the area, how those below will be protected from the possibility of falling materials and how the location will be made safe once the lifting operation is completed.
8. Main Service Risers

- If the design can be challenged early enough and the position of the services installation is finalised within a riser shaft, we can optimise the size of the service hole and install a permanent metal deck floor to reduce the risk.

- The following photographs show how permanent holes may be formed including the provision of thin gauge metal perimeter upstands.

- The perimeter upstand can be a means for fixing protection and assist in the prevention of adjacent material falling through. Prior to permanent services being installed a plywood cover with 100mm x 50mm timbers can be tightly fitted over the upstand with the ‘Hole Below’ warning painted on top.

- The above process lowers the risk of working within the riser shaft, making temporary plywood hole protection removal much simpler and increasing safe access to install the permanent services and future Client maintenance.
9. Removable Protection to Concrete Placing Boom Holes in Slab

- Temporary removable covers of sufficient strength to support 1.5 X the maximum load imposed must be placed across any holes that will be trafficked by light plant and vehicles. This must be checked and approved by the Temporary Works Co-ordinator.
- The cover must have a bearing surface around the holes and have locating lugs which allow it to be firmly secured in place.

![Temporary Cover](Awaiting permanent fixing to slab)

10. Protection of Roof Slab Openings

- Designed joists and plywood fitted at top of upstand to roof void
- Temporary weathering protection in place and handrails to discourage people walking over the hole protection.

![Temporary Cover](Awaiting permanent fixing to slab)

![Typical Weatherproofed Roof Slab Opening](Awaiting permanent fixing to slab)

MAINTENANCE OF HOLE PROTECTION

- Materials can be damaged, de-laminate, fixings loosen or warning paints fade.
- A nominated individual for each area must inspect the hole protection on a daily basis recording their findings and immediately rectifying any faults found.
- All holes must be uniquely numbered and identified on drawings to ensure that the protection measures are effectively managed.
- Where several holes are closely grouped together, e.g. a lift motor room, they may be recorded under one reference and signed off as a group to minimise paperwork.
- A typical Inspection sheet is attached overleaf for guidance.
# TYPICAL WEEKLY HOLE / DUCT / SHAFT OPENING INSPECTION RECORD SHEET

<table>
<thead>
<tr>
<th>Project:</th>
<th>RECORDS OF ONCE/TWICE WEEKLY/DAILY INSPECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area:</td>
<td>MON</td>
</tr>
<tr>
<td>Week Commencing:</td>
<td>am</td>
</tr>
</tbody>
</table>

- Are all holes (incl manholes & voids) identified on drg?
- Has A142 or similar mesh been cast in as necessary?
- Do all protective covers meet LOR standards?
  - Secured in position?
  - Marked ‘Warning Hole Below’?
  - Strong enough to support persons or possible plant?
- Are barriers to the LOR standard?
  - Double guard rails and toe boards?
  - Brick guards where materials could fall on people?
- Any work adjacent to openings where falls possible?
- Are temp manhole covers to LOR standard & secure?
- Are vertical faces of all shafts & risers fully protected?

Location of any Defects Identified & details of Actions Taken to Rectify Problems: (list below)

| Key: ✓ Protection measures in good order | x Protection inadequate/ missing/defective |

Signed: Date: Name: Position: