

Western Canadian Place Requirements for Floor Structure Penetrations

Section 1 – Introduction

The proposed placement of any critically located or significantly sized opening, such as the opening required for a duct, stair, plumbing riser, etc. will be evaluated by the base building structural engineer. The structural engineer will review the effect of the opening on the building structure, define the method to be used for the penetration, and highlight any precautions to be taken during construction of the opening.

The proposed placement of smaller openings is to follow the requirements outlined below.

Special permission from the Structural Engineer is required for coring (wet and dry), or saw cutting, which may be withheld. **All penetrations in PT slabs are to be dry chipped** and subsequently sealed. The only approved sealing materials are listed below.

The Tenant and/or Tenant contractor and/or General Contractor assume all risks in coring and chipping the floor slab. Structural elements, cast in slab services, or PT tendons damaged by the contractor will be repaired by QuadReal Property Group LP at the appropriate party's expense. The Contractor may also be responsible for consequential damages if they fail to follow these regulations.

All coring and chipping requires prior approval from QuadReal Property Group LP. Provide a dimensioned floor plan showing the location and size of the proposed holes, and retain the base building structural consultant for specific instruction prior to slab work.

Section 2 – Conventionally Reinforced Structures

a. Penetrations into Beams

All proposed hole locations at beams are to be x-rayed and reviewed by the base building structural engineer. Additional x-rays may be required. The holes may be drilled upon receipt of written verification from the engineer.

b. Penetrations into Slabs

If the opening is within 3 meters of an existing slab opening, is greater than 200 mm in diameter, or must be cored or saw cut, the Structural Engineer must review and issue penetration instructions. The locations of all proposed penetrations into slabs are to be x-rayed to locate in-slab building electrical and alarm systems and structural reinforcing steel.

If the opening is less than 200 mm in diameter, more than 3 meters from any other opening, and is to be dry chipped, a review of the x-ray images by the Manager of Construction Services or Manager Operations may be the only review required. Additional x-rays or a further review of the x-ray by the structural engineer may also be required. Either Manager may require a further review of the x-ray by the structural engineer.

c. Installation of drilled inserts or power actuated fasteners

For penetrations less than 2 inches deep, the contractor must use radar or a perferometer to locate in-slab steel. All inserts or fasteners must not contact or damage in-slab steel items i.e.: conduit, rebar or dowels

Section 3 - Post Tensioned Cable Structures

a. Penetrations into Floor Slabs for Fasteners

All openings are to be constructed by a contractor who is approved by the Manager of Construction Services. Approved contractors will be required to demonstrate the competent use of equipment used to locate existing in-slab steel. It is important to note that concrete coverage for PT cables is often much less than the initial construction specifications, and have been found at less than a ¼ inch below the surface.

Prior to installing power actuated fasteners or inserts in the existing floor slab, post-tensioning cables and other steel are to be located using electromagnetic, radar or x-ray equipment. No power actuated fasteners or inserts are to be installed vertically in-line with post-tensioning cables.

Power actuated fasteners up to 20 mm long may be installed 75 mm or greater from the located line of post-tensioning cables.

b. Penetrations Through Floor Slabs

If the opening is within 3 meters of an existing slab opening, is greater than 200 mm in diameter, or must be cored or saw cut, the Structural Engineer must review and issue penetration instructions.

The locations of all proposed penetrations into slabs are to be x-rayed to located post-tensioned strands, in-slab building electrical and alarm systems, and structural reinforcing steel.

If the opening is less than 200 mm in diameter, more than 3 meters from any other opening, and is to be dry chipped, a review by the Manager of Construction Services or Manager Operations of the x-ray images may be the only review required. Additional x-rays or a further review of the x-ray by the Structural Engineer may be required. Either Manager may require a further review of the x-ray by the Structural Engineer.

c. Penetrations Into Beams

All proposed hole locations at beams are to be x-rayed and reviewed by our base building structural engineer. Additional x-rays may be required. The holes may be drilled upon receipt of written verification from the engineer.

Section 4 - Slab Sealing Requirements

Upon completion of the installation, a watertight and fire/smoke seal must be installed between the existing floor slab and the newly installed conduit or pipe. Chipped areas and concrete spalls must be patched.

Patch materials shall be polymer modified, cementitious, fast-setting gel mortar formulated especially for repair of overhead and vertical surface concrete patching (28 day strength of 30 Mpa). Linear shrinkage shall conform to ASTM C157, 0.10% maximum.

Manufacturer's latest product data sheets must be submitted for patch materials to be used, certifying the patch material conforms to the specified requirements.

Patch materials:

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| .1 | MASTERPATCH 230 VP |
| .2 | Vulkem 2302 |
| .3 | EMACO s88-ca |
| .4 | Patchmate o.v. |
| .5 | Renderoc hb2 |