Concrete Deterioration and Repairs in Parking Garages

Contributed by: Stephenson Engineering
Corrosion is the electro-chemical reaction between a metal and its environment (ex. road salt and water).

Corrosion results in the deterioration of the metal and its properties.

Metal in concrete slabs is called “rebar”, which is composed of iron and carbon.

When rebar corrodes, it forms iron oxide, which is also known as “rust”.

Rust is 2x to 4x the volume of original rebar.

When rebar rusts inside concrete slabs, it results in concrete delamination and spalling, ultimately affecting the structure.
WHAT IS CONCRETE DELAMINATION?

**Figure 1**: Concrete delamination at corroded reinforcement.
Engineer reviews building drawings, previous reports and performs condition assessment

Methods of condition assessment evaluation:

• Visual and acoustic; and
• Testing (destructive & non-destructive)

Engineer determines repair method and strategy
Visual and acoustic review identifies locations of delaminated concrete at concrete surfaces, including:

- Topside;
- Vertical (walls/columns); and
- Soffit

Visual and acoustic review identifies locations of deteriorated and damaged waterproofing system at slabs and expansion joints

Rebar expands when it corrodes, causing pressure on the surrounding concrete, causing concrete to delaminate
Visual reviews also includes noting locations of cracks (leaking and structural), peeling paint, leaking drains and cracked drain plumbing.

At leaking cracks, often salt deposits are present on the underside of concrete slabs, known as “efflorescence.”
During garage restoration projects, contractor may locally repair concrete slabs by means of:

• Topside repair;
• Through-slab repair; or
• Soffit repair

In some circumstances, extent of concrete deterioration requires a full slab replacement.
Following concrete repairs, repairs are required to the waterproofing system and expansion joints.

Replacement of drains is required at concrete repair locations, along with the drain plumbing.
DISCLAIMER

The information contained in this ACMO Tech presentation has been prepared by a content contributor and is for general guidance only. While we have made every attempt to ensure the information contained in this presentation is from a reliable source, ACMO is not responsible for any errors or omissions, or for the results obtained from the use of this information.

All information in this presentation is provided “as is”, with no guarantee of completeness, accuracy, timeliness or of the results obtained from the use of this information, and without warranty of any kind, express or implied, including, but not limited to warranties of performance, merchantability and fitness for a particular purpose.

In no event will ACMO, its related partners, agents or employees thereof be liable for any decision made or action taken in reliance on the information in this presentation or any consequential, special or similar damages, even if advised of the possibility of such damages.
Stephenson Engineering Limited
Toronto Head Office: 2550 Victoria Park Avenue, Suite 602, Toronto
Ottawa Branch Office: 1730 St. Laurent Blvd., Suite 800, Ottawa
Calgary Branch Office: 138 - 4th Ave. SE, Suite 710, Calgary

Telephone: (416) 635-9970
Website: www.stephenson-eng.com

Contact: Alon Gold, P.Eng.
agold@stephenson-eng.com