

SETTING PRIORITIES

**Parking
structure
assessment
and putting
repairs in
order.**

By John M. Porter and Greggory G. Cohen

Parking structures are exposed to severe conditions such as rainwater, snow, de-icing salts, and temperature and moisture changes that can lead to structural deterioration and damage to other building systems. Owners can implement routine maintenance programs to repair damage and reduce the rate of deterioration. Before considering such a program, it is beneficial to understand a facility's existing conditions; this gives you a starting point from which to prepare a successful maintenance approach. A detailed condition assessment that identifies deterioration mechanisms, repair quantities, and maintenance needs is a useful tool that will help prioritize repairs and set realistic budgets.

The structural components of a parking facility account for about 75 percent of the initial construction cost. Maintaining those components can help protect an owner's long-term return on investment. Deterioration of the structural components is often caused by leakage, moisture, and chemicals.

Parking structures in cold climates are exposed to de-icing salts that are brought into the garage by vehicles. Structures in coastal environments are exposed to airborne salts from seawater. De-icing salts and salt-laden water can lead to corrosion of reinforcing steel embedded in concrete structures and subsequent concrete deterioration. While this is only one example of a common deterioration mechanism, it is critical to identify the cause of the damage to identify repair alternatives and estimate repair costs.

The Assessment

It is important that any structure assessment begin with a review of available construction documents and previously completed assessment reports. Valuable information regarding construction details, material properties, and deterioration progression can be obtained from past documentation. Interviewing on-site personnel will also provide useful information about the history of recurring maintenance issues.

The field assessment includes a visual inspection of the structure to record the location and extent of deterioration, distress, and leakage. Assessors may use a variety of testing methods to further investigate specific areas of concern or identify the cause of deterioration. Common testing techniques

include exploratory openings, concrete core sampling, chloride content testing, and petrography (microscopic analysis of concrete). Locations of severe distress may result in an engineering review to determine the safe capacity of a structure. Inspection data is then compiled on drawings and quantified in tables for estimating.

The Report

Condition assessment reports should include detailed information that can help an owner make informed decisions about the best repair and maintenance strategy. This should include detailed lists of all identified repair needs and their associated construction costs. Repair and maintenance items often include:

- **General maintenance:** Sweeping and washing of parking decks, stairs, windows, walls, lobbies, and offices.
- **Structural systems:** Repair of broken up, flaked, or pitted and delaminated concrete on the topside and underside of parking decks, walls, and columns. Repair of deteriorated structural steel members.
- **Waterproofing systems:** Repair of failed sealant joints, expansion joints, and repairs or complete replacement of vehicular-traffic-bearing waterproofing and other coatings.
- **Plumbing systems:** Cleaning of drains, drain lines, and separators. Replacement of failed and corroded piping and drains.
- **Electrical systems:** Replacement of corroded conduits and fixtures.



- **Mechanical systems:** Maintenance of exhaust fans, dampers, snow melt systems, and associated equipment. Replacement of equipment beyond its useful life.
- **Access/egress:** Maintenance of doors, access control equipment, devices, and gates.
- **Fire protection:** Replacement of deteriorated piping and maintenance of pumps and valves (see p. 20 in the June 2012 issue of *The Parking Professional* for more on garage fire risks).



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The Next Steps

Understanding the owner's goals and budget will help the assessment team prepare repair plans and alternatives. In the event the full repair program exceeds the owner's available budget, phasing the repairs in a prioritized order is often a viable option. Phasing is also practical to reduce the disruption, loss of parking, and potential loss of revenue associated with repair projects. The results of the assessment help the owner make informed decisions to plan for immediate and short- or long-term repairs, and develop a phased repair strategy.

Immediate repairs are necessary to address conditions that represent an imminent risk of personal injury. Imminent risks can include loose concrete and broken plumbing lines that are potential falling hazards, or severely deteriorated structural components that require immediate shoring. Immediate repairs are often addressed shortly after or during the condition assessment work to maintain public safety.

Short-term repairs are intended to address deteriorated components and systems for the purpose of extending the useful life of the structure. The assessment report often includes options and estimated costs

to implement corrosion mitigation measures, such as vehicular-traffic-bearing waterproofing, coatings, and sealants. Repairing building components that are distressed today usually takes precedence over preventative maintenance and improving the long-term durability of the structure. While this is a common approach, the assessment report should recognize that long-term repair costs will likely be higher due to deferred maintenance.

Long-term repair costs include general maintenance and periodic structural and waterproofing repairs. Predicting these costs and the long-term performance of parking structures carries some uncertainty, as deterioration typically continues at an ever-increasing rate until repairs are made and corrosion mitigation measures are implemented. Historic data regarding the performance and maintenance of the garage is useful to predict the expected life of the structure and future repair costs. A construction contingency is often included in cost estimates to account for uncertainty and provide some budget flexibility. A present value analysis will also help the owner determine which repair alternative best fits the long-term goals.

The assessment report includes a summary of the repair alternatives along with a breakdown of their immediate and short- and long-term repair costs. A clear explanation of the advantages and disadvantages will provide information regarding the implications of choosing one repair option over another.

The assessment process is a collaborative effort to establish a repair strategy and prioritize repairs. It is critical that the final report includes thorough information to help the owner develop future budgets and maintain a revenue stream while extending the useful life of the structure to protect their investment. **P**