


WHAT EVERY  
PARKING GARAGE  
OWNER NEEDS TO KNOW



**WALKER**  
PARKING CONSULTANTS



# HOW TO USE THIS GUIDE

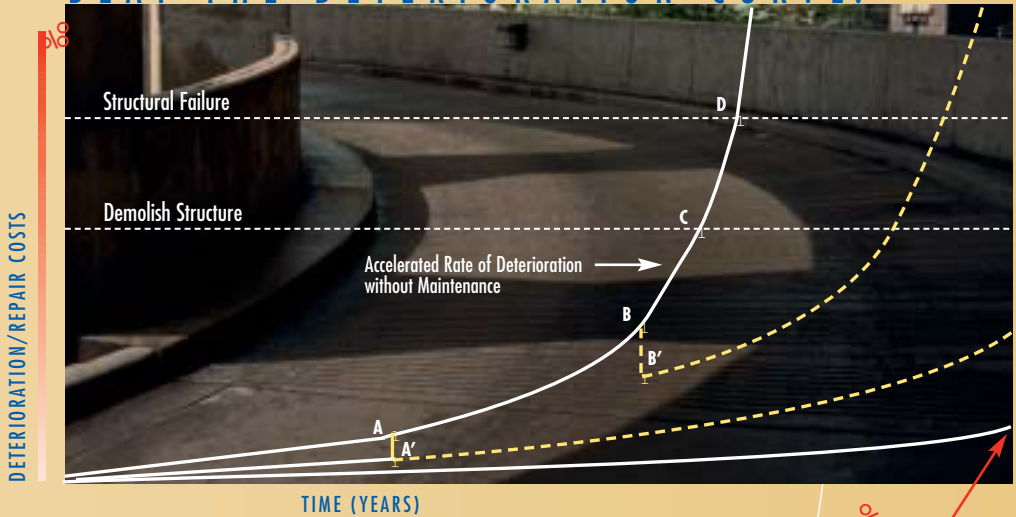


This guide is intended to provide you with a brief overview of the most common signs of advanced deterioration in parking structures and a very general idea of the costs associated with repairing the problems. And, because repairs have a life span, just like the parking structure, we have included the expected service life of the repairs.

Recognizing and dealing appropriately with these common types of deterioration at an early stage is very important for minimizing your overall repair costs. Better yet, properly and regularly maintaining your parking structure will help you maximize the service life of your parking structure and minimize the costs for repairs during that life.

Use this guide to learn about the common types of deterioration in your parking structure and the costs associated with repairing them. This guide is not intended to and will not tell you how to repair the problems. If you find any of these signs of deterioration in your parking structure, you should contact a restoration consultant and have them evaluate the problems and help you properly address needed repairs. The sooner you act, the better your chances for reducing your potential repair costs.

# BEAT THE DETERIORATION CURVE.



1. Points A-D represent stages of accelerated deterioration in parking structures.
2. Structures repaired at point A cost less overall and last longer than structures repaired at point B. Compare curve A' to B'.

**E**ach year, parking structure owners and operators all over the country face major unwanted “surprises” in their parking structures. Either through lack of knowledge, awareness, or budget, their parking structures have deteriorated to the point of needing major repairs. Repairs that cost a great deal. Repairs that, in many cases, would not have been necessary if the parking structure had been properly maintained on a regular basis since it was put into service.

**%**  
Normal  
Deterioration  
with Proper  
Maintenance



### *cracking*

Typical Repair Cost:  
\$40,000\*



### *scaling*

Typical Repair Cost:  
\$25,000\*



### *leaching*

Typical Repair Cost:  
\$125,000\*



### *expansion joints*

Typical Repair Cost:  
\$100,000\*



### *spalling*

Typical Repair Cost:  
\$500,00\* to  
\$2,900,000\*

- Many of these unwanted surprises could have been avoided if the owner/operator had understood the common “tell-tale” signs of deterioration in their parking structure and taken early repair and preventive action. Unfortunately, many owner/operators learn about the costs associated with the repair of typical types of advanced deterioration only when they are forced to deal with (and live through) the actual repairs.

## • CRACKING

**Typical Repair Cost:** \$40,000\*

Concrete cracking is caused by stress. This stress is either construction or service related. Cracking commonly attributed to construction is caused by improper concrete placement, consolidation, and/or curing; premature removal of forms; or by plastic shrinkage of the concrete. Service related cracking is usually due to the temperature changes, load, settlement, or internal stresses. Corrosion of reinforcement and aggregate chemical reaction are common causes of internal stress.

Not all cracking is detrimental to the concrete member. In many cases, cracks are anticipated and reinforcement is provided to transfer stress across the cracks. Properly positioned reinforcement arrests crack development by keeping cracks short and tightly closed. Cracking can be detrimental when it occurs to an extent and with a frequency not expected. If this happens, steps are necessary to minimize the effect cracking has on long-term structure durability.

**Expected Service Life After Repairs:**

5-10 years



## • SCALING

**Typical Repair Cost:** \$25,000\*

Scaling is characterized by progressive deterioration of the concrete surface through paste (sand/cement) failure. It results from the disruptive forces generated in the paste when the concrete freezes. Scaling is common in those areas of the continent subject to freeze/thaw cycling.

Scaling begins with a slight surface flaking, which becomes deeper with continuing exposure. Initially, only the surface texture and small amounts of paste are eroded. Eventually, however, coarse aggregate is exposed, and larger surface areas are affected. Scaling can significantly impair the serviceability of concrete intended as driving or walking surfaces.

**Expected Service Life After Repairs:**

5-8 years

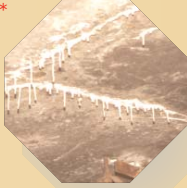


\*Typical repair costs stated here are estimated, based on a 500-750-space, concrete parking structure that is 15-20 years of age and has had little or no maintenance during its life. Actual costs will vary depending upon the quality of design, construction, and the level of operational and structural maintenance performed on the structure.

## • EFFLORESCENCE/LEACHING

**Typical Repair Cost:** \$125,000\*

for Concrete floor sealer and joint sealant; \$495,000\* for Traffic topping membrane



A deposit of mineral salts, usually white in color, formed on a concrete or masonry surface.

Leaching is caused by frequent water migration through cracks. As water migrates through, it carries along part of the cementing constituents, depositing them as a white film, stain, or in extreme cases, stalactites on the ceiling below. This process will weaken the concrete over a period of years and is accelerated by porous or perpetually moist concrete. Leaching frequently occurs from cracks at gutter lines.

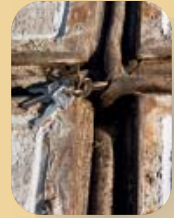
**Expected Service Life After Repairs:**

5-10 years

## • EXPANSION JOINTS

**Typical Repair Cost:** \$100,000\*

The two most common provisions made for crack control (relief of restraint) in concrete slabs are control joints and expansion joints. Such joints have long been a cause of maintenance problems. Joints on supported floor slabs must be sealed against water leakage and against intrusion of sand and dirt. Both situations are damaging to the joint system.



Expansion joints are also susceptible to premature deterioration. The most common causes of early deterioration are joint design or sealant material selection, incorrect installation of the expansion device, and/or in-service damage from traffic, snowplows or vandalism.

**Expected Service Life After Repairs:**

10-12 years

## • SPALLING

### Typical Repair Cost:

Patching \$500,000;\*

Partial Depth \$1,300,000;\*

Full Depth \$2,900,000\*



Spalls in reinforced concrete surfaces are usually dish-shaped cavities with varying depths and surface areas. Spalls can occur individually or in groups covering several hundred to thousands of square feet. Spalling is preceded by fractures called delaminations. Delaminations are horizontal splitting, cracking or separation of the concrete slab in a plane roughly parallel to, and generally near, the upper surface of the concrete. The delamination is generally caused by the corrosion of reinforcing steel. Fractures originate at corrosion damaged reinforcement or other embedded metal and migrate to the nearest surface. Freeze-thaw, traffic action and additional corrosion influence the rate of fracture migration and spall development.

### Expected Service Life After Repairs:

Patching 3-5 years

Partial Depth 10-20 years

Full Depth 20-40 years

## • AT WALKER, WE SOLVE PROBLEMS.

We've been in the parking business since 1965 and aren't surprised by what we see anymore. Seriously deteriorated concrete, broken connections, cracked beams and columns, ruined expansion joints, drainage problems, and severely-corroded rebar — you name it, we've designed repairs for it. We know what can happen when these conditions are not dealt with properly.

If you have any questions or need any additional information, please visit us on the web at [www.walkerparking.com](http://www.walkerparking.com) or call us at 1-800-860-1579.





VISIT US AT

[www.walkerparking.com](http://www.walkerparking.com)

OR CALL US AT

1.800.860.1579



**WALKER**  
PARKING CONSULTANTS