



MAINTENANCE OF PRECAST PRESTRESSED CONCRETE **PARKING STRUCTURES**



MAINTENANCE

OF PRECAST PRESTRESSED CONCRETE

PARKING STRUCTURES

1.0 INTRODUCTION

All parking structures, regardless of type of construction, require maintenance. Ordinary housekeeping, such as sweeping, changing light bulbs and oiling fans, is only a small part of the maintenance required. Precast concrete parking structures require minimum but specific periodic maintenance and care. This brochure has been prepared to serve as a maintenance guide to owners and operators of precast, prestressed concrete parking structures. It is recommended that the design engineer present a maintenance procedures manual to the parking structure owner and operator prior to occupancy.

2.0 TYPES OF MAINTENANCE

Maintenance which is required due to public use, weathering, and traffic wear is divided into three categories:

- Housekeeping
- Preventive Maintenance
- Repairs

2.1 HOUSEKEEPING

Housekeeping is usually performed by the parking structure operator and includes:

- Sweeping and trash pickup
- Window cleaning
- Elevator maintenance and cleaning
- Parking space restriping
- Lighting fixture cleaning and relamping
- Lavatory, office, and waiting area janitorial services
- Graffiti removal
- Cleaning, repair, and maintenance of signs
- Parking equipment and revenue control system maintenance
- Security systems check

These duties fall to the parking structure operator because he generally has a primary interest in maximizing operating revenues and keeping operating expenses within budget while providing safe and convenient parking to attract the user. The housekeeping items listed above should be performed by the operator on a periodic schedule, as suggested in **Table A** (back page). The following additional comments should be noted:

Lighting fixtures lose much of their effectiveness due to dirt accumulation in the lens or clear covers. Therefore, it is recommended that all fixtures be cleaned annually, immediately following the spring wash down.

Highly visible parking striping promotes centering of the parked car in the parking space, thus minimizing space overlap.



Joint sealants should be periodically inspected and replaced if necessary.

Security systems must be checked frequently to ensure proper functioning at all times.

Oil stains are generally not detrimental to the structure, but their removal improves facility appearance. Heavy stains may be slippery and hazardous.

2.2 PREVENTIVE MAINTENANCE

General preventive maintenance is performed on a periodic basis and includes:

- A twice-a-year wash down
- Sealing cracks
- Reapplying of floor sealers and cleaning necessary for reapplication
- Maintaining sealants (caulking)
- Maintaining roofing and related sheet material
- Painting/repainting
- Maintaining masonry, including repointing and recaulking
- Tightening guardrail bolts and guardrail strand

The owner has basic control over the durability of a parking structure. If the owner chooses to invest in durability features in the original construction, the future preventive maintenance and repair costs will be small. Therefore, it is prudent that the owner, not the operator, be responsible for preventive maintenance and repairs to protect his investment. The preventive maintenance items listed are all necessary to preserve the owner's investment.

The following preventive maintenance schedule, when used diligently, will help in extending the parking structure's useful life and minimize costly repairs.

2.2.1 PREVENTIVE MAINTENANCE SCHEDULE

The objective of preventive maintenance is to keep the parking structure protective system at a high level in order to minimize the intrusion of water and de-icing salts into the concrete.

2.2.1.1 SEMI-ANNUALLY

- Flush all floor surfaces (use a fire hose or 1 $\frac{1}{4}$ " hose; garden hose water volumes are not sufficient). Start from roof and work down. In de-icing salt areas, a spring flushing should be done immediately after the spring thaw.
- Inspect floor surfaces for excessive wear and cracking. Potholes should be patched and worn spots leveled with appropriate materials having



Expansion joints may require recaulking.



concrete-compatible thermal expansion properties such as latex-modified concrete or a fast-setting patch mix. Cracks should be routed and sealed with a high quality sealant. If reinforcing steel or steel plates are exposed in the pothole, they should be cleaned of rust down to bright metal by sandblasting or power wire brushing, then coated with epoxy paint prior to patching the concrete. If potholes and exposed reinforcing steel increase from year to year, a consultant should be brought in for independent analysis and recommendations.

- C.** Inspect floor expansion and control joints for deterioration, wear, or abuse (from snow plows, etc.) Repair as required.
- D.** Inspect and clean floor drains, and repair downspouts where required.
- E.** Elastomeric traffic-bearing membranes should be patched when visual inspection indicates ripping, tearing, and excessive wear.

2.2.1.2 ONCE EACH YEAR (SPRING)

- A.** Inspect mortar joints, remove loose mortar, and repair with new mortar or a sealant.
- B.** Inspect each sealant joint and replace sealant as required.
- C.** Inspect all structural connections and surrounding concrete area. Seal cracks with epoxy injection and/or clean out all loose concrete and rebuild



Polyurethane, epoxy and other surface sealers should be reapplied every 3 to 5 years.

with appropriate material. If the crack is a “moving” crack, an engineer should be consulted to determine if the crack has any structural implications.

- D.** Inspect parapets and guardrails for impact damage and repair as required. Tighten rail bolts and strand guardrails.
- E.** Inspect all elastomeric bearing pads. If the pads are deteriorating or if concrete is cracked in the vicinity of the pad, an engineer should be consulted.
- F.** Check for rust. Clean and recoat all exposed metals with epoxy or zinc rich coating. Rust is usually an indication that moisture intrusion is occurring in the vicinity.

2.2.1.3 PERIODIC MAINTENANCE

- A.** If a surface sealer such as a polyurethane, epoxy or other sealing material was applied during construction as a floor surface water repellant, it should be reapplied every 3 to 5 years. Areas of abrasion such as turns and acceleration areas may require reapplication more often.
- B.** If a penetrating silane or siloxene sealer was applied, it should be reapplied every 7-10 years with reapplication more often in abrasion areas.
- C.** Other elements to be inspected periodically in a parking structure are:

- Doors and hardware
- Stair rails
- Elevators
- Painting
- Plumbing system
- HVAC system
- Electrical system
- Landscaping
- Parking operating equipment
- Roofing and flashing
- Signs (Graphics)

See **Table B** (back page) for inspection schedule.

2.3 REPAIRS

Repairs are generally necessary due to the lack of a preventive maintenance program. Repairs may include patching of potholes, removal and replacement of reinforcing steel, floor slab overlays, replacement of expansion joints, and the replacement of bearing pads.

Repair procedures for parking structures are beyond the scope of this brochure. It is recommended that the owner secure the services of a qualified engineer experienced in parking structure restoration work for appropriate repair methods.

3.0 PERIODIC CONDITION AUDIT

It is strongly recommended that the parking structure owner retain an engineer experienced in parking structure design and restoration to periodically (e.g., once every three years) perform a condition audit of the parking structure. The deterioration of parking structures due to de-icing salts and ocean salts is a complex electrochemical phenomena. Some remedial actions, such as overlaying a slab with an asphalt-wearing course without an underlying waterproof membrane, can actually accelerate the deterioration of a parking structure slab. An engineer with confirmed capability in restoration of parking structures would see potential problems that will not be apparent to the inexperienced or untrained person. Some parking structure owners have a “walk-through” condition audit conducted by an independent consultant on an annual basis.



The area around expansion joints should be carefully inspected.

TABLE A

Housekeeping Schedule

	Daily	Weekly	Semi-Annually	Annually	As Required
Sweeping		■			
Trash Pickup	■				
Window Cleaning			■		
Elevator Cleaning	■				
Elevator Maintenance		●			■
Parking Space Restriping				●	■
Remove Oil Stains				■	
Relamping		●			■
Light Fixture Cleaning				■	
Floor Drain Cleaning			■		
Lavatory, Office, Waiting Room, Janitorial Service	■				
Graffiti Removal		■			
Graphics Cleaning				■	
Graphics Repair & Maintenance		●			■
Parking Equipment Maintenance	●				■
Security Systems Check		■			
Landscaping		●			

KEY
■ = Perform Operation
● = Inspect

TABLE B

Preventive Maintenance Schedule Inspect and Repair as Necessary

	Monthly	Semi-Annually	Annually	Periodically
Floor Wash Down		■		
Floor Potholes, Cracking			■	
Scaling		■		
Isolation Joints			■	
Joint Sealants			■	
Parapets and Guard Rails			■	
Bearing Pads			■	
Rust, Exposed Steel			■	
Floor Surface Sealer				■
Doors and Hardware		■		
Stairs		■		
Plumbing			■	
HAVC Equipment	■			
Roofing and Flashing			■	

Copyright © 1988 The Precast Concrete Institute

