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Parking Structure Structural Maintenance—Guide

Reported by ACI Committee 362

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Parking Structure Structural Maintenance—Guide

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Parking Structure Structural Maintenance—Guide

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This guide assists parking structure owners, operators, and the consultants who advise them and who develop maintenance recommendations as required by ACI 562, in developing preventive maintenance programs for parking structures. It presents typical maintenance concerns and suggests ways of addressing them. The guide summarizes information regarding structural, operational, aesthetic, and routine maintenance for parking structures. Design suggestions to minimize maintenance are also included. A structural maintenance checklist of specific recommended tasks and references to other publications with information related to the structural maintenance of parking structures is included. Refer to ACI 362.1R for more complete information regarding design issues related to the performance of a parking structure.

Keywords: condition appraisal; construction joints; contraction joints; corrosion; cracking; durability; expansion joints; isolation joints; leakage; maintenance; membrane; parking structure; post-tensioning; precast; prestressed; ramp; scaling; sealant; sealant snow removal; spalling.

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CHAPTER 1—INTRODUCTION

This guide is intended for owners, operators, and consultants of parking structures who seek advice on developing and implementing a proper maintenance program. All parking structures require regular maintenance to provide a satisfactory level of service and to meet service life expectations without premature deterioration, such as staining, spalling, leaking, and cracking. Deterioration and distress due to inattention to maintenance increases the likelihood of further distress and deterioration to the structure, which can lead to undue repair expense, interrupted service, inconvenience to patrons, damage to vehicles, personal injury, and loss of revenue. Parking structures can develop more distress and deterioration than most types of buildings because they are directly exposed to traffic, environment, deicing chemicals, and snowplows. An appropriate maintenance program includes timely preventive actions to reduce system failure and premature deterioration, which can reduce the need for significant and expensive repairs.

It is incumbent on an owner interested in maintaining the service life of a parking structure to see that appropriate maintenance is performed. The owner can have this maintenance performed under contract with the parking structure operator, or under contract with a third party. Maintenance actions typically recommended and performed for parking structures are itemized and discussed in Chapters 4 and 5, which also provide a recommended frequency and timeframe for these actions. For a structure that has been repaired, ACI 562 requires that maintenance recommendations be developed by the design professional. These recommendations can be developed through the use of this

document in conjunction with the repair documents for a parking structure.

The use and management of deicing chemicals are an important part of routine parking structure maintenance, as they can directly affect long-term structural maintenance. Unless protection from deicing chemical intrusion is provided, the use of chloride-bearing chemicals such as deicing salts on a parking structure may accelerate corrosion of the embedded reinforcing steel and hasten its deterioration. Deicing salts that are used on streets and highways can also be carried into parking areas by vehicles. If the owner chooses to defer maintenance, improperly manage deicing chemicals, or both, the service life of the structure can be shortened, and costly repairs will become more likely.

This guide emphasizes the maintenance of structural components of parking structures to reduce risks associated with structural deterioration. The type and frequency of maintenance recommended for a structure are directly related to the durability features incorporated into the structure during design and construction. Deterioration problems commonly associated with parking structures are discussed in Chapter 2, while protection systems available for use in parking structures are reviewed in Chapter 3. Operational maintenance, housekeeping, and aesthetic maintenance are discussed in Chapter 4. Chapter 5 provides guidance on developing a maintenance program and a checklist for maintenance tasks and recommended frequencies of these maintenance tasks. Service life considerations and the effect of maintenance on service life are discussed in Chapter 6. Appendixes A and B contain information about snowplowing and deicing procedures. Appendix C contains a worksheet that can be used as a guide for making a visual inspection.

Each type of structural system commonly used in parking structures can develop different deterioration-related problems and may have unique maintenance requirements as a result. By following the recommendations of this guide, a maintenance program can be tailored to address the typical and unique deterioration issues of a particular parking structure. Following such a program will extend the service life of the facility. Further discussion of durability considerations for parking structures can be found in ACI 362.1R. An understanding of these considerations will prove helpful in developing an appropriate maintenance program. Refer also to Bhuyan (1993), Chrest et al. (2001), ACI 562, ACI 546R, and the *Maintenance of Precast Concrete Parking Structures* (PCI 2004).

CHAPTER 2—DETERIORATION ASSOCIATED WITH PARKING STRUCTURES

The implementation of a proper maintenance program is important to provide for the long-term durability and performance of a parking structure. This chapter is intended to provide an understanding of the reasons for a maintenance program and the potential deterioration that can occur without proper maintenance for parking structures. Chapter 5 provides detailed information regarding the development of a maintenance program.