Your Front Door

The Parking Garage and Why Maintenance Counts

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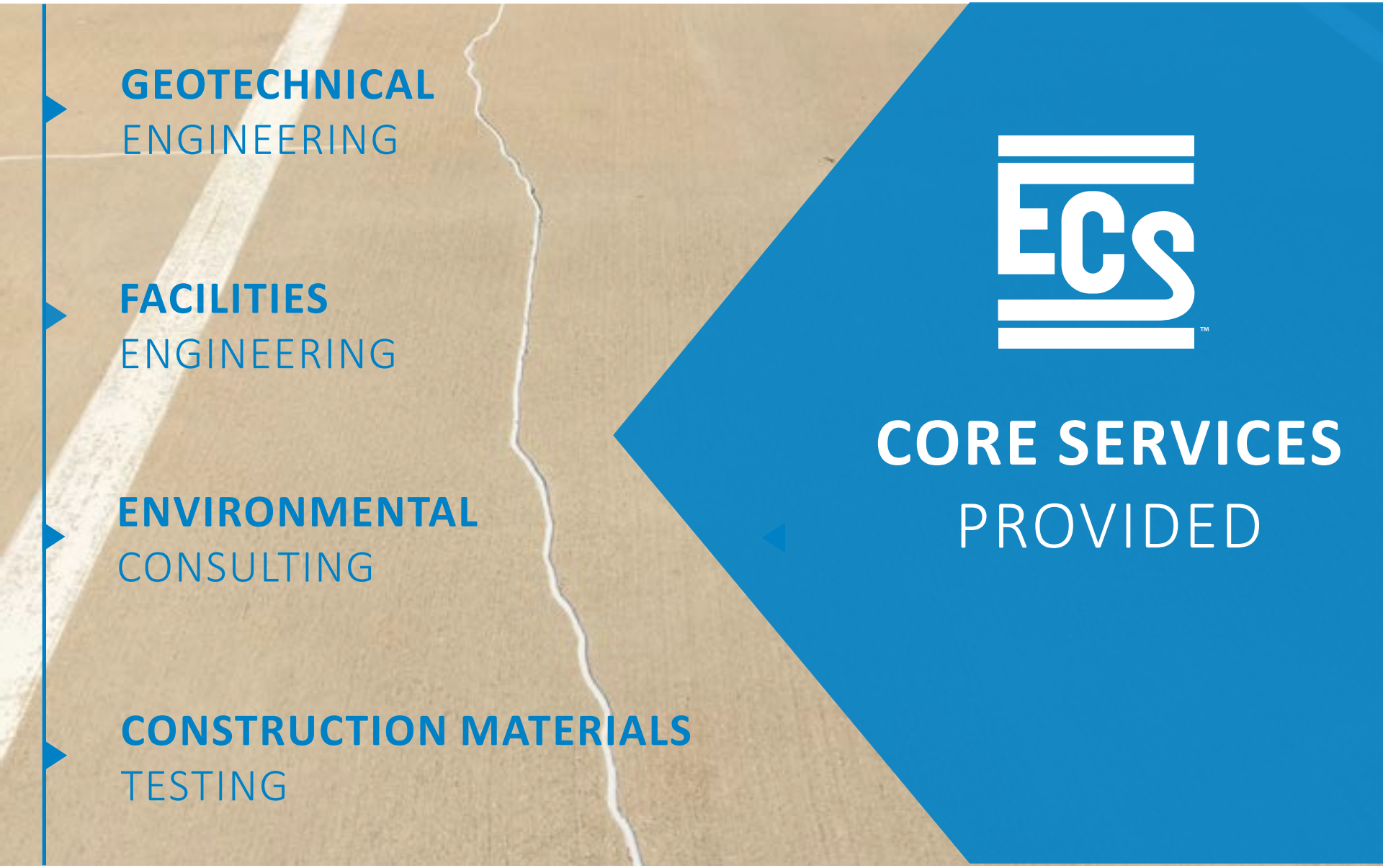
GEOTECHNICAL
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CONSTRUCTION MATERIALS
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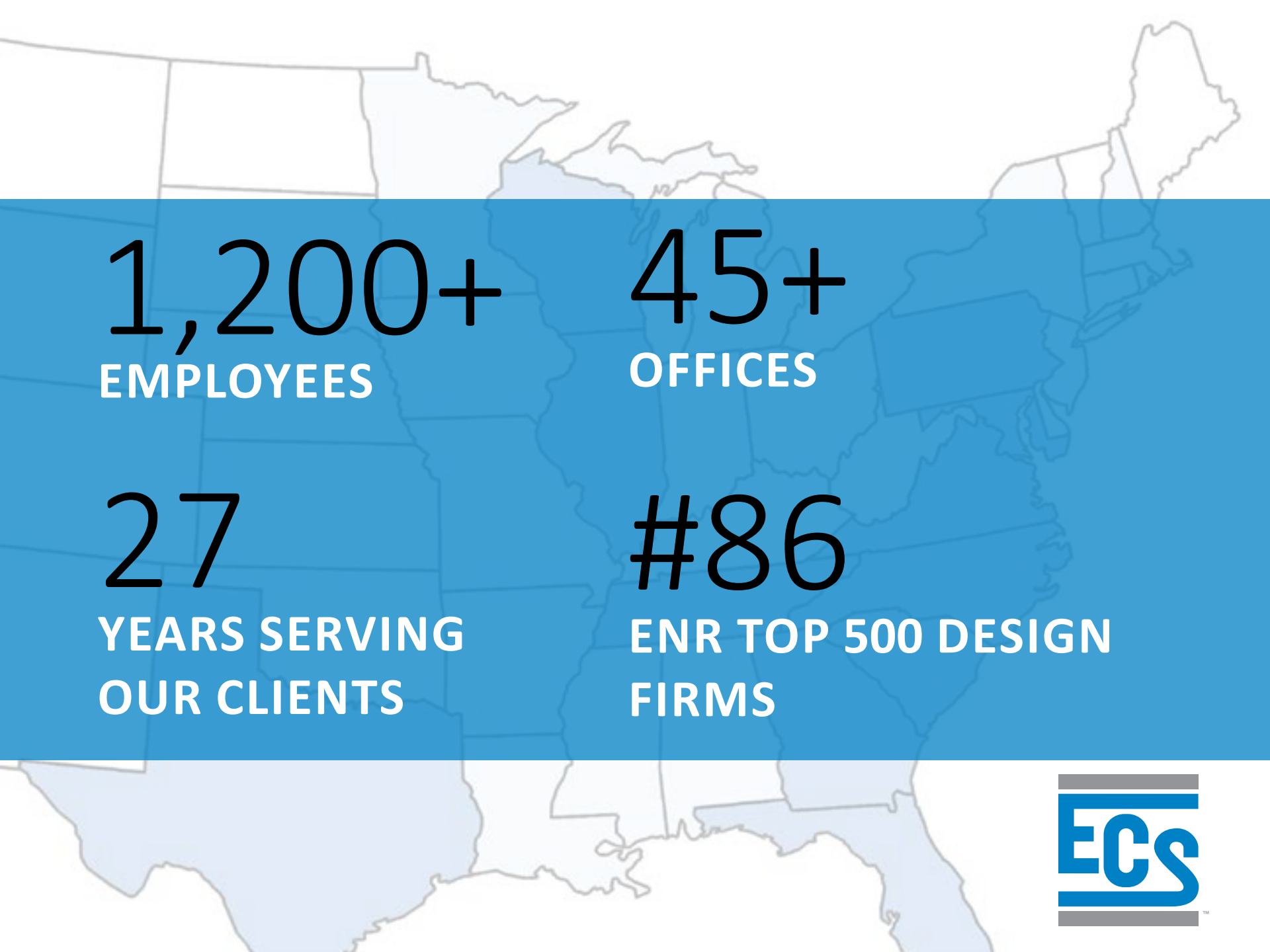


1,200+
EMPLOYEES

45+
OFFICES

27
YEARS SERVING OUR CLIENTS

#86
ENR TOP 500 DESIGN FIRMS

LEARNING OBJECTIVES

1. Parking structure features and challenges
2. **Design Considerations**
3. **Construction Considerations**
4. Garage Maintenance
5. Garage Restorations
6. General repair cost information

PARKING GARAGE IMPRESSION

Parking Structures are often the **first** and **last** thing visitors to a facility see and experience.

Photo of Calvert Street P/G in Annapolis, MD by, Shockey Precast

Photo of Destin Commons P/G in Destin, FL by, Tindall Corporation

UNIQUE PARKING STRUCTURE CHALLENGES

Exposed Structure

- Snow, rain, sun (uv)
- Deicing salts
- Thermal movements
- Ground water

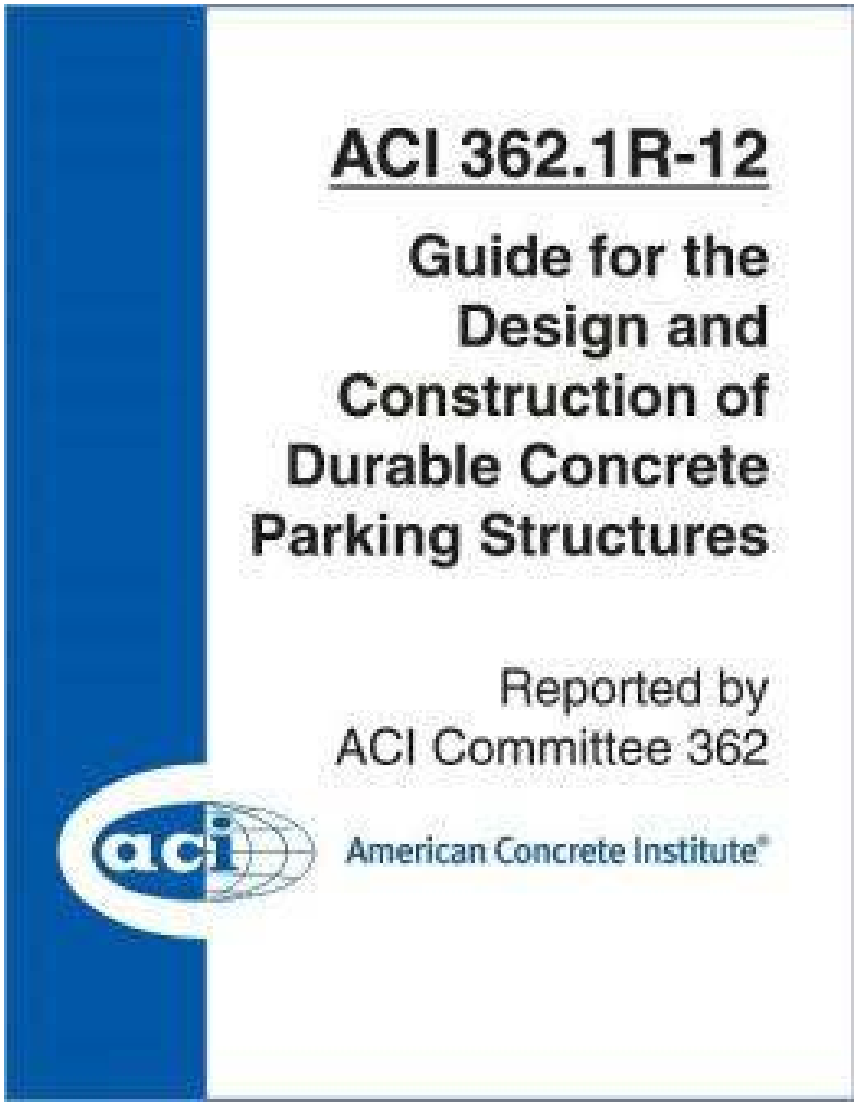
Aesthetic- exposed structure

Used Hard

Often Neglected

DESIGN CONSIDERATIONS

NEW GARAGE DESIGN



NEW GARAGE DESIGN

Material Recommendations- Figure 3.1

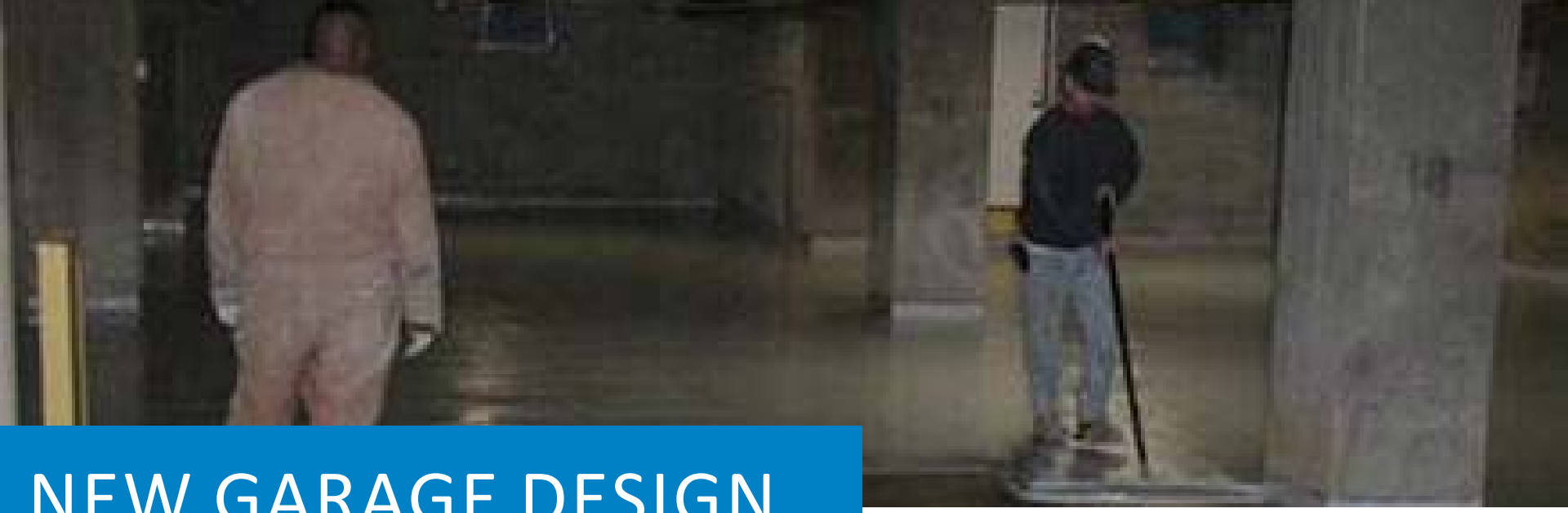
Zone III – Areas where freezing and the use of deicing salts are common.

NEW GARAGE DESIGN

Duke University; Hargreaves Associates

Plazas or planters above;

- Pitch structural slab
- Proper amount of drains (double drains)
- Waterproof
- Don’t Damage
- Limit Dowels



NEW GARAGE DESIGN

Traffic Bearing Membrane

- Always good idea, but expensive
- Extent depends on the configuration and use of the garage;

Drive aisle, entrance, main floor, etc.

CONSTRUCTION CONSIDERATIONS

DURING CONSTRUCTION

Epoxy Rebar

DURING CONSTRUCTION

Concrete Admixtures

- DCI or Corrosion inhibitor
- Wet curing
- Silica fume (to reduce permeability)

DURING CONSTRUCTION

Control Joint Design

- Aesthetics

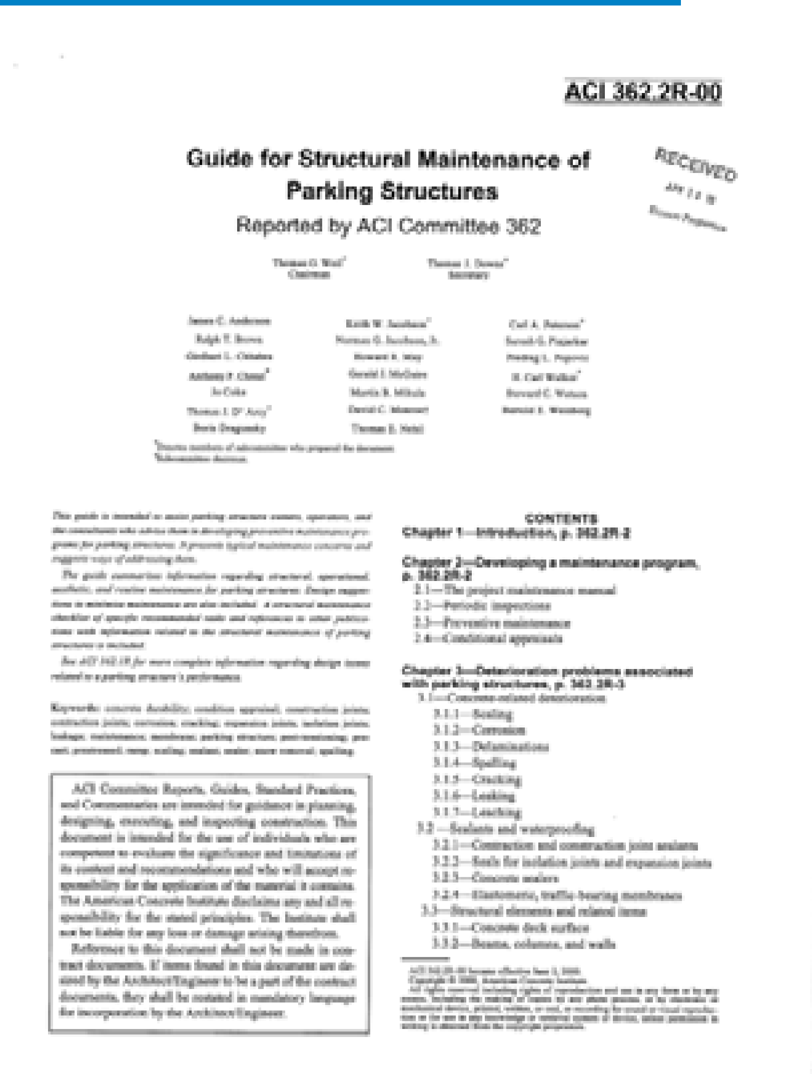
DURING CONSTRUCTION

Conduit in slab

- Allowed if not impacting load capacity
- Pros: increased headroom
- Cons: Can’t repair easily, water infiltration

GARAGE MAINTENANCE (RECOMMENDED)

ROUTINE MAINTENANCE
BY OWNER



ACI 362.2R-00

Guide for Structural Maintenance of Parking Structures

Reported by ACI Committee 362

RECEIVED

CONTENTS

ROUTINE MAINTENANCE
BY OWNER

From ACI 362.2:

- Regular Cleaning/Removal of Debris
- Washing Down
- Sealing Cracks

ROUTINE MAINTENANCE BY OWNER

Spot Repairs of sealants and expansion joints

Protective Coating and Membranes

-10 years per ACI

Periodic reapplication of sealers

– 3-5 years per ACI

ROUTINE REPAIRS BY OWNER

Other suggestions:

- Maintain Drains

- Bearing Conditions (engineer to review)

- Miscellaneous Conditions

PARKING STRUCTURE INVESTIGATION
(FIELD WORK)

INVESTIGATION
EYES & EARS

DEPTH OF CARBONATION

CHLORIDE-ION TESTING

PARKING STRUCTURE RESTORATION **OVERVIEW**

WHY CONSIDER RESTORATION?

Safety.

User Security and Comfort.

Extend Service Life.

SIGNS FOR RESTORATION
NOT (NECESSARILY)-SO-BAD CRACKS

Plastic Shrinkage Cracks

Drying Shrinkage Cracks

Thermal Cracks


SIGNS FOR RESTORATION
BAD CRACKS

SIGNS FOR RESTORATION
VERY BAD CRACKS

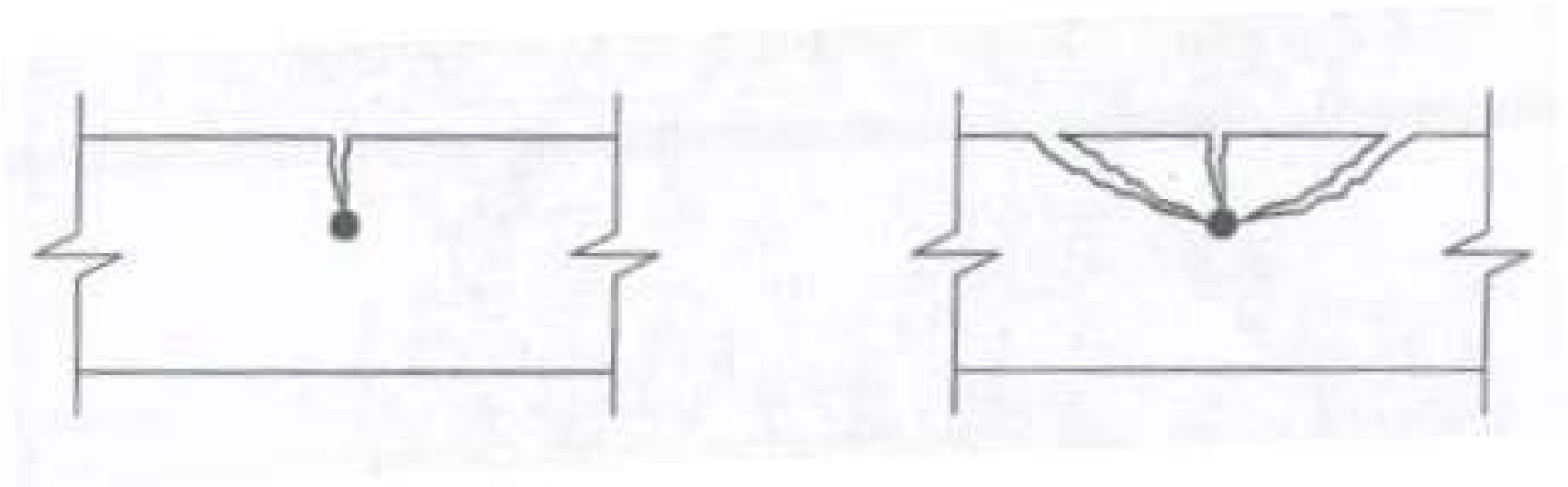
SIGNS FOR RESTORATION
BEARING DISTRESS

Distress at Bearing Conditions

Precast only

SIGNS FOR RESTORATION
SPALLS

Corrosion of Reinforcements



Crack Forms

Concrete Spalls

SIGNS FOR RESTORATION
SPALLS

Concrete Spalls
(rebar cover issue)

SIGNS FOR RESTORATION
DELAMINATION

SIGNS FOR RESTORATION
PONDING WATER

SIGNS FOR RESTORATION
EXPANSION JOINTS

SIGNS FOR RESTORATION
MOVEMENT ISSUES

SIGNS FOR RESTORATION
STAIRS



GENERAL REPAIR COST INFORMATION

(ACTUAL COSTS VARY ON A PROJECT-SPECIFIC BASIS)

MAINTENANCE/REPAIR COST ESTIMATES
ANNUAL MAINTENANCE

$0.10 to **$0.15** per square foot

OR

$30 to **$35** per parking stall

MAINTENANCE/REPAIR COST ESTIMATES TYPICAL EXAMPLES

$20 to **$25**/SF for partial depth slab repair

$40 to **$50** for overhead slab repair (part. depth)

$40 to **$50**/SF for full depth slab repair

$2 to **$4**/LF for crack repair w/ sealant

$25 to **$35**/LF for crack repair w/ epoxy-injection

$10 to **$15** to clean and paint corroded connections

MAINTENANCE/REPAIR COST ESTIMATES
TRAFFIC BEARING MEMBRANES (TBM)

$3.00/SF

10 year life

$0.07 to $0.10/SF

for re-striping

PARKING GARAGE

First and Last Impression on Visitors

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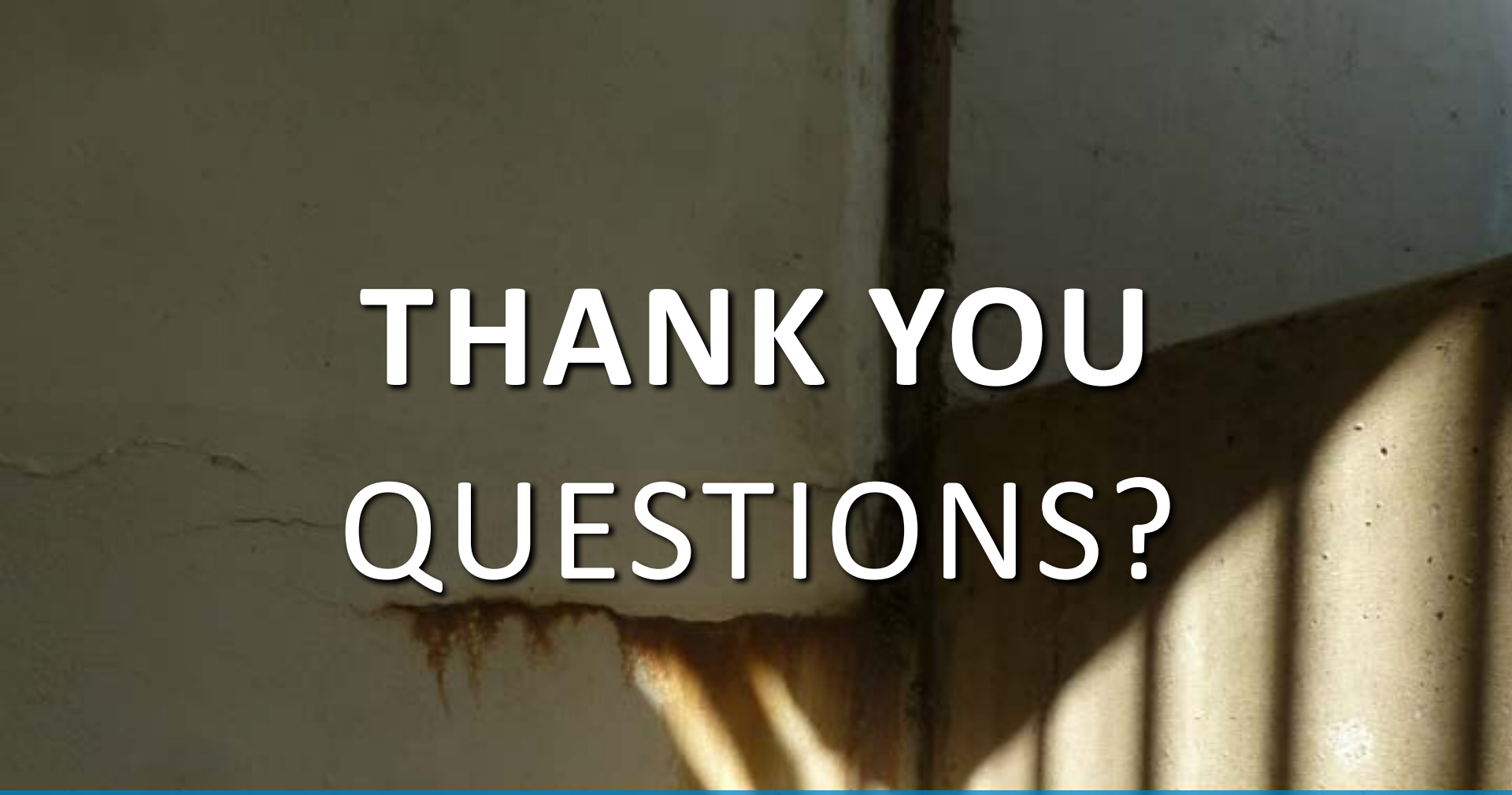
Photo of Destin Commons P/G in Destin, FL by, Tindall Corporation



THANK YOU

QUESTIONS?

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