

Maintenance with Style Stadium Waterproofing Case Study

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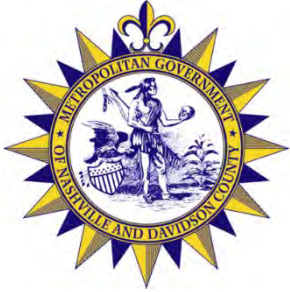
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University of Alabama



2019 Spring Convention | April 8-10 | Jacksonville, Florida

Waterproofing
with **Aesthetics**
making it dry and appealing to the eye

Acknowledgements



Owner / Operator



CM at Risk / GC



Specialty
Contractor



Primary Occupant



Engineer



Floor Coating
Installer



2019 Spring Convention | April 8-10 | Jacksonville, Florida

Waterproofing
with **Aesthetics**
making it dry and appealing to the eye

Overview

- General description
- Owner perspective and needs
- Distress
- **Waterproofing and Concrete Repairs**



Nissan Stadium

- Nashville, TN
- Constructed in 1999
- 65,000 + Capacity
- Year-round events
- Primarily precast concrete
 - Some cast-in-place



Construction

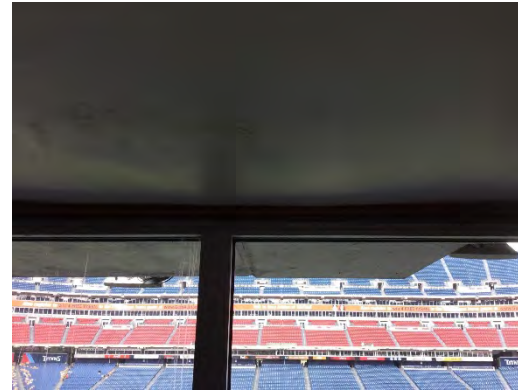


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Waterproofing
with **Aesthetics**
making it dry and appealing to the eye

Owner Goals

- Aging facility
- Extensive leaks in suites
- Repairs
 - Waterproofing
 - Safety
 - Aesthetics



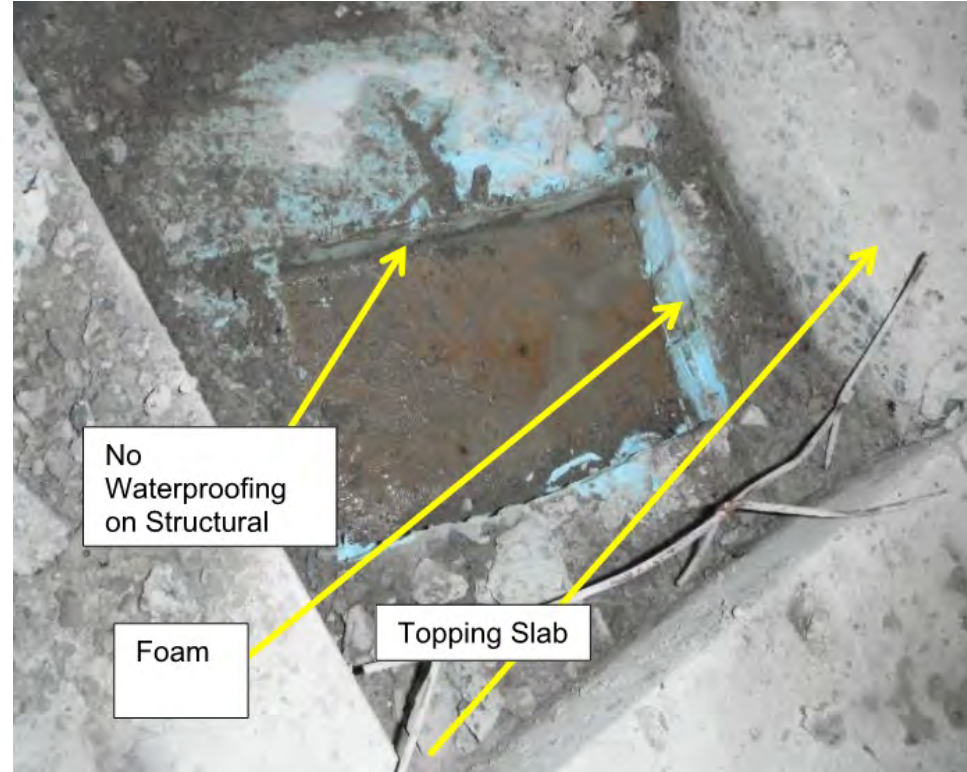
Overall Approach

- Construction manager led approach
- Condition assessment
 - Budgeting
- Design
- Multi-phase approach
 - Focus on Upper Deck and Upper Concourse

Problems

- Expansion joints
- Sealants
- Distressed concourse slab
- Restrooms & concession coatings
- Distressed steps and landings
- Bonded overlays, especially Row A
- Concrete and crack repairs
- Deck coatings
- Rails
- Failed precast connections
- **In conjunction with seat replacement**

Bathroom WP



Row A Drainage / Topping



Concourse Topping Slab Cracking



Concourse Topping Slab Cracking



Concourse Topping Slab Cracking



Poorly Sloping Overlay Slabs



Expansion Joints



Expansion Joints



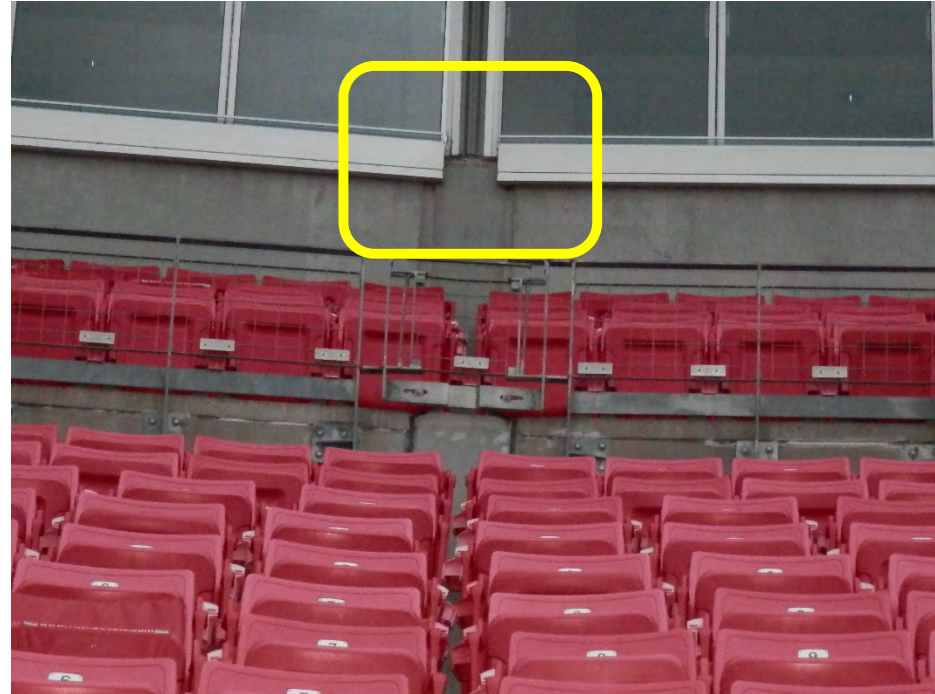
Expansion Joints



Expansion Joints



Expansion Joints



Guard Rail & Attachments



Guard Rail Attachments



Guard Rail Attachments



Distress of Landing Concrete

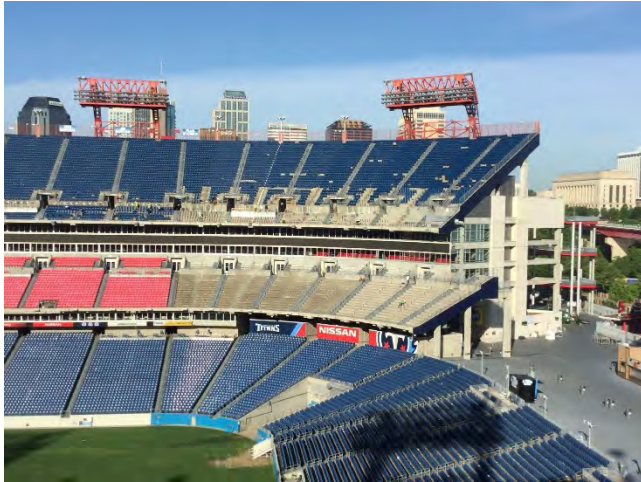


Precast Connections



Focus Areas

- Upper Decks

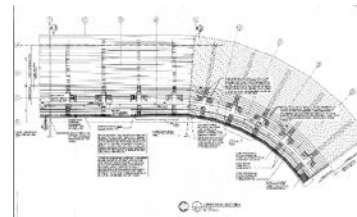
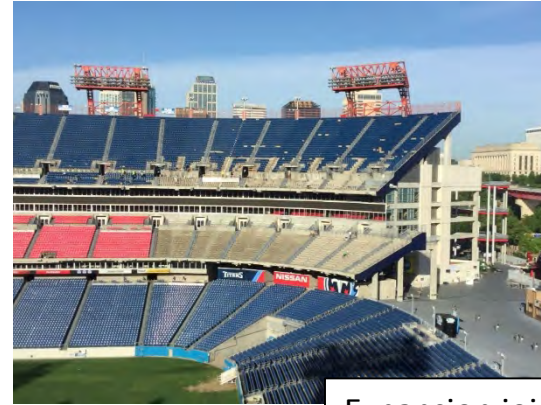
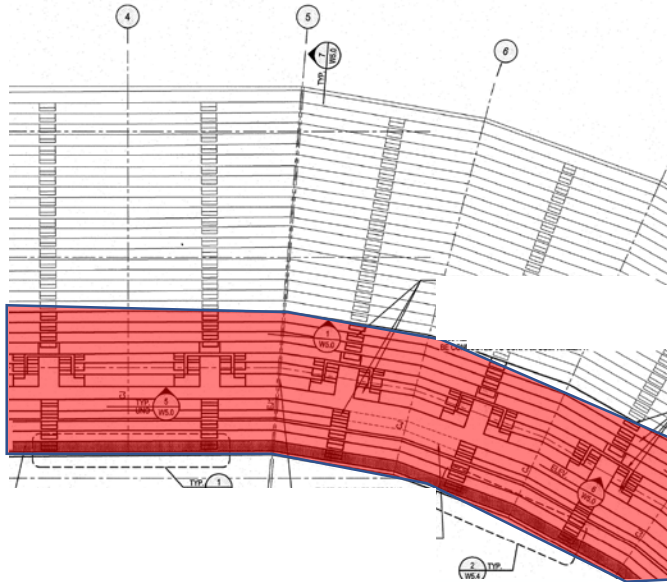


- Upper Concourses



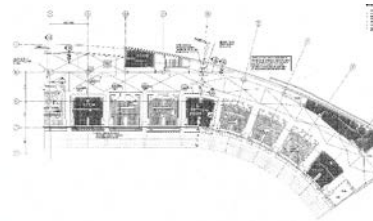
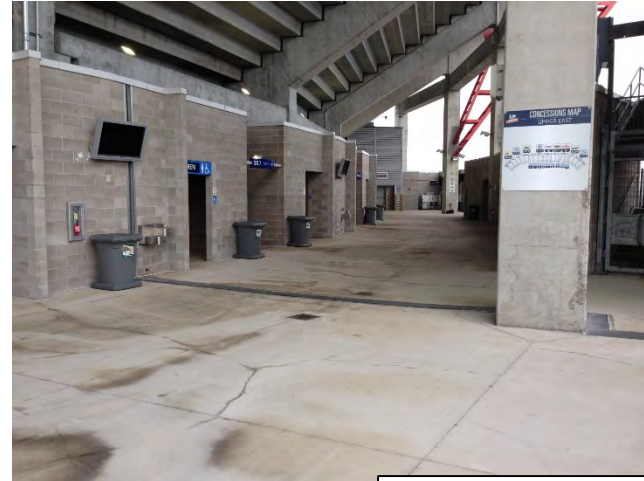
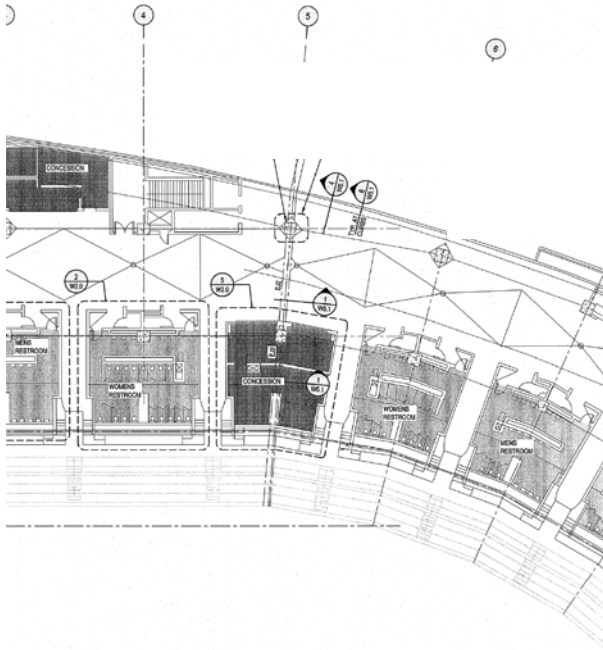
Areas over occupied space

Upper Deck Areas over Suites



Expansion joints
Sealants
Steps and landings
Overlay at Row A
Concrete repairs
Deck coatings
Rails
Connections

Upper Concourse Areas

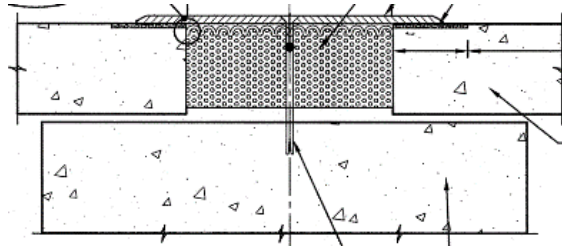


Expansion joints
Sealants
Topping slab
Concession stands
and restrooms

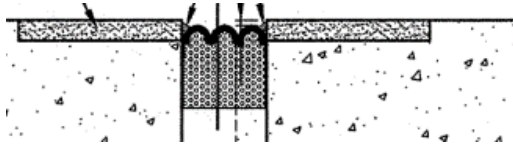
Concurrent Seat Replacement



Upper Deck Expansion Joints



Joints Between Risers



Expansion Joint Protection



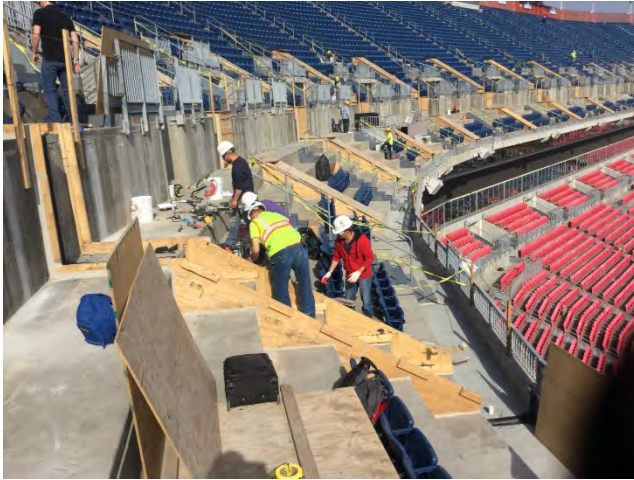
Preparation of Joints



Preparation of Joints



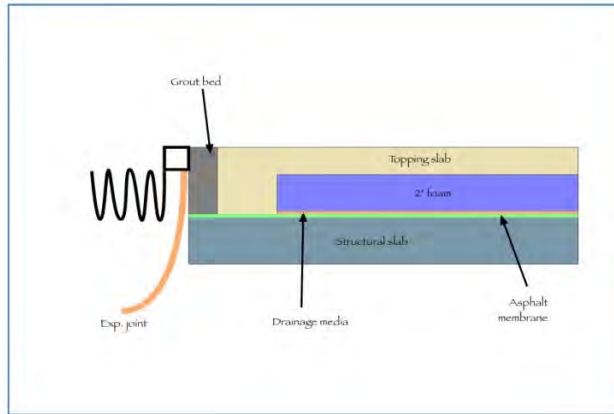
Upper Deck Joint Replacement



Upper Deck Expansion Joints



Expansion Joints at Concourse



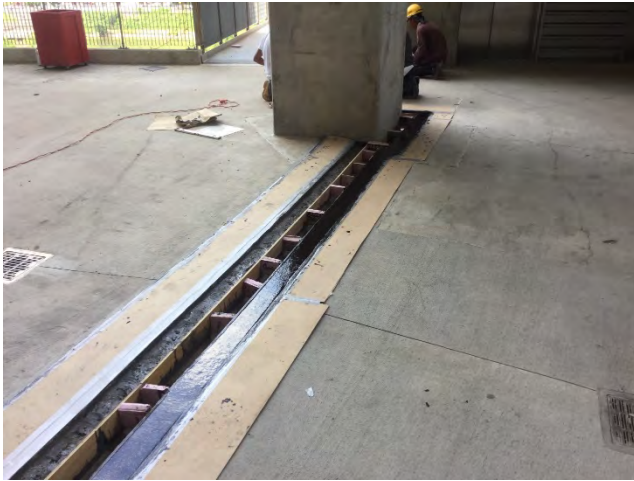
Expansion Joints at Concourse



Concourse Expansion Joints



Concourse Expansion Joints



Concourse Expansion Joints



Concourse Expansion Joint in Restroom Through Wall



Concourse Expansion Joints



Concession Stand Expansion Joints



Precast Sealants



Guard Rail Temporary Removal



- Provide access
- Coordination with events critical

Existing Anchors – Near Joints



Distressed Stair Landings



Existing Anchors - Substrate



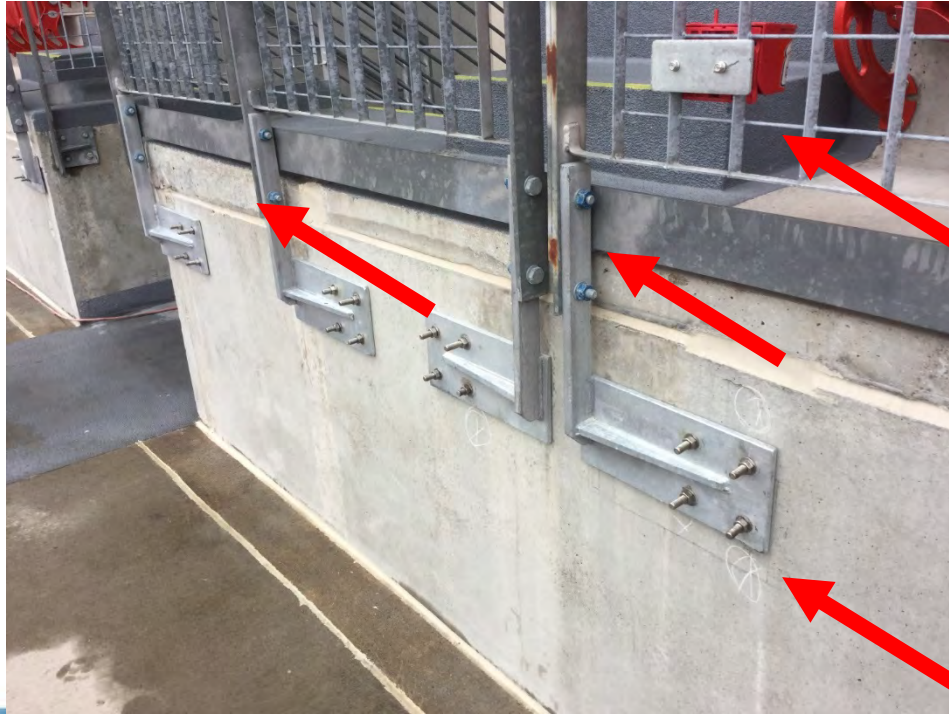
Existing Anchors - Variability



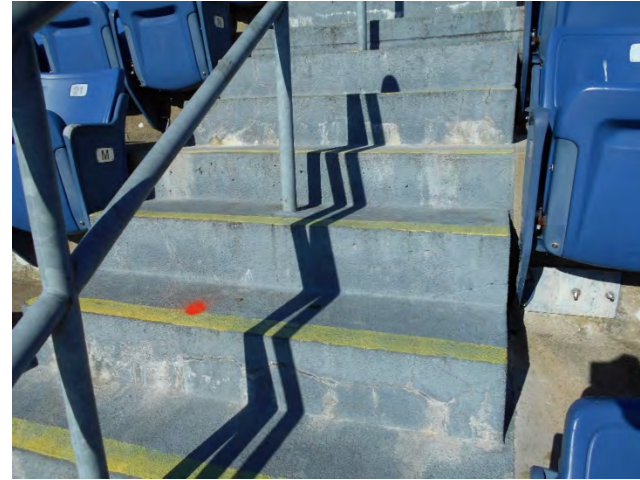
Existing Anchors - Installation



New Guard Anchorages



Steps Selected Replacement



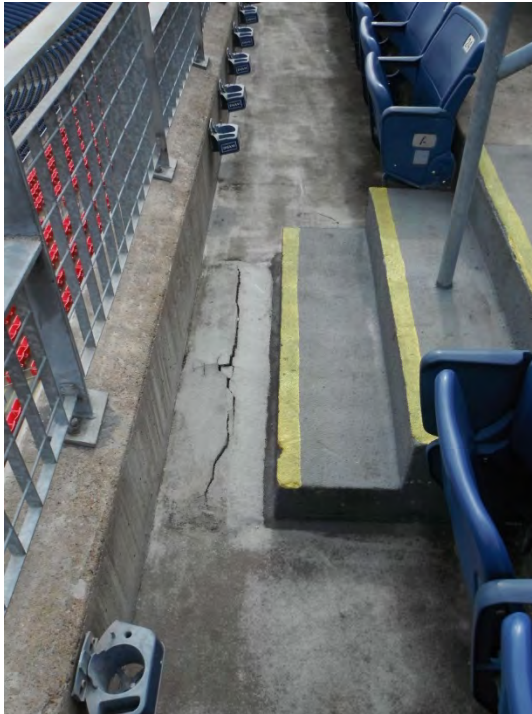
Step Replacement



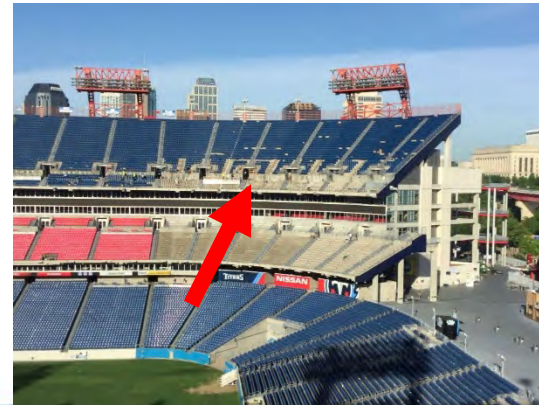
Step Coating



Row A Repairs



- Distress
- Ponding
- Insufficient slope



Row A Bonded Overlay Prepared Substrate



Row A Overlay Aggregate Preparation



Row A Sloped Overlay

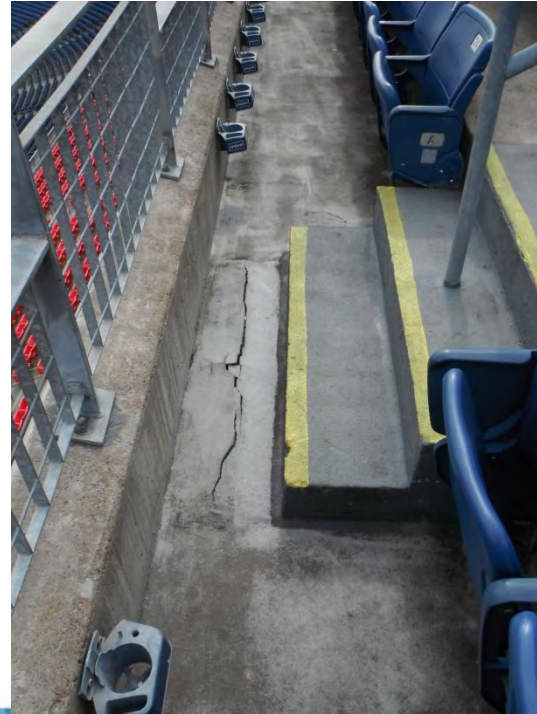


Row A Deck Coating

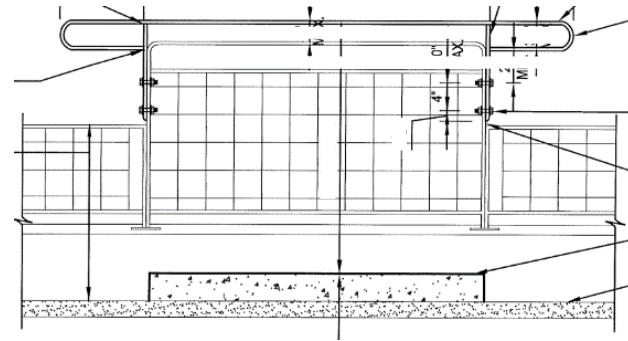
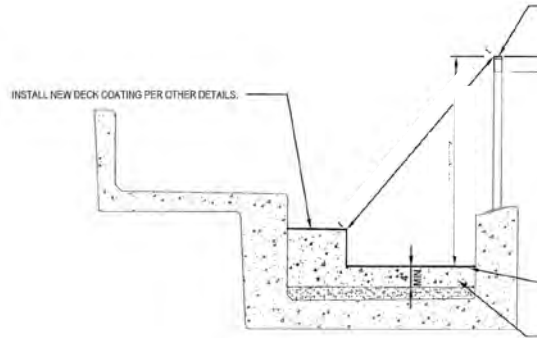


Row A Constraints

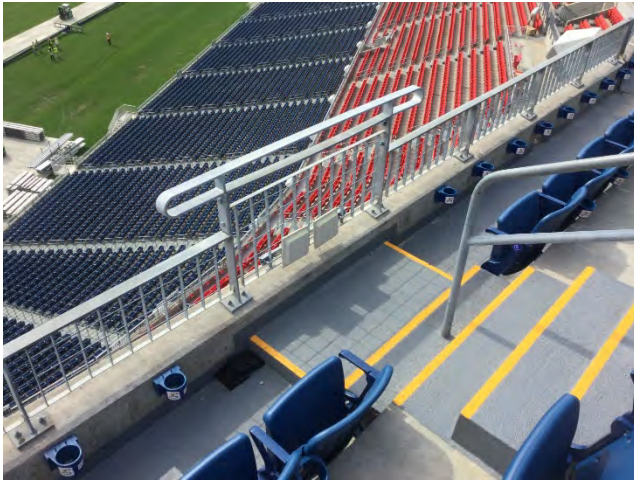
- Sloped overlay made landing necessary
- Landing made rail modifications necessary



Row A Guard Modifications



Row A Guard Extension



Row A Rail Supplements



Failed Precast Connections



Precast Connection Failures



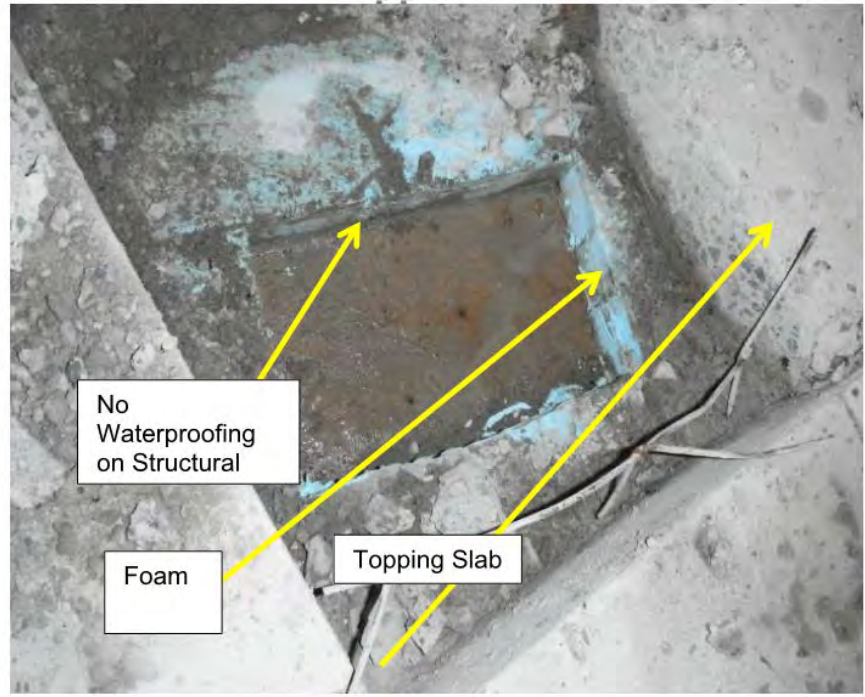
Precast Connection Failure



Precast Connection Repairs



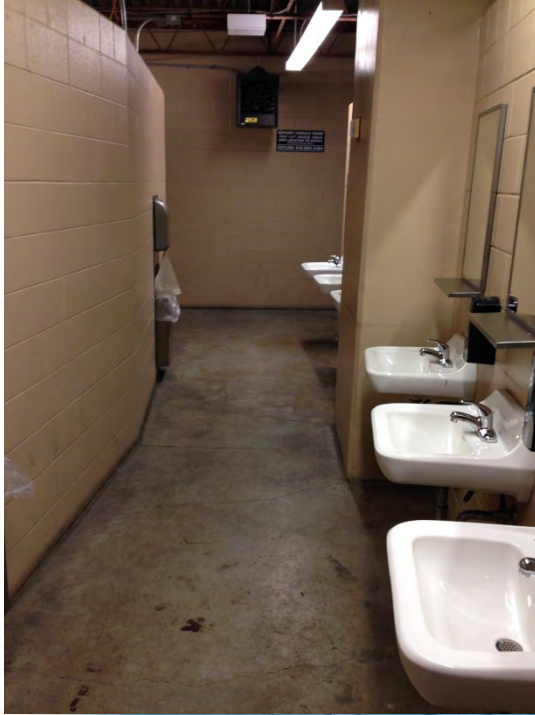
Lack of Waterproofing at Restrooms and Concession Stands



Concession Stands – Existing Conditions and Equipment



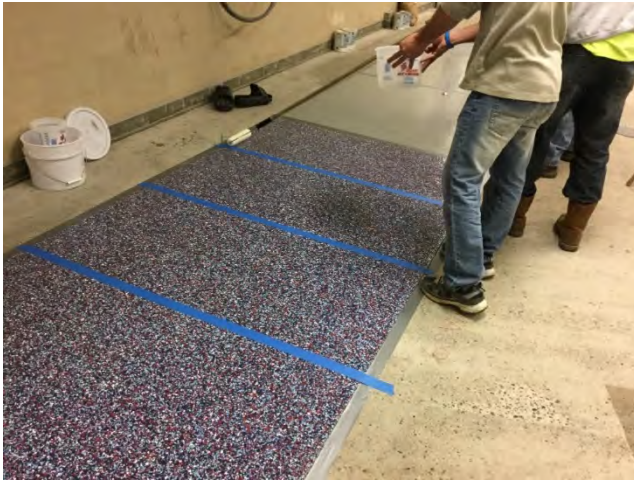
Restrooms – Existing Conditions



Resinous Coating Mockups



Resinous Coating Mockup



Friction Testing

ANSI/NFSI B101.3-2012

American National Standard

B101.3 Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials (Including Action and Limit Thresholds for the Suitable Assessment of the Measured Values)



Approved January 18, 2012
by
American National Standards Institute, Inc.

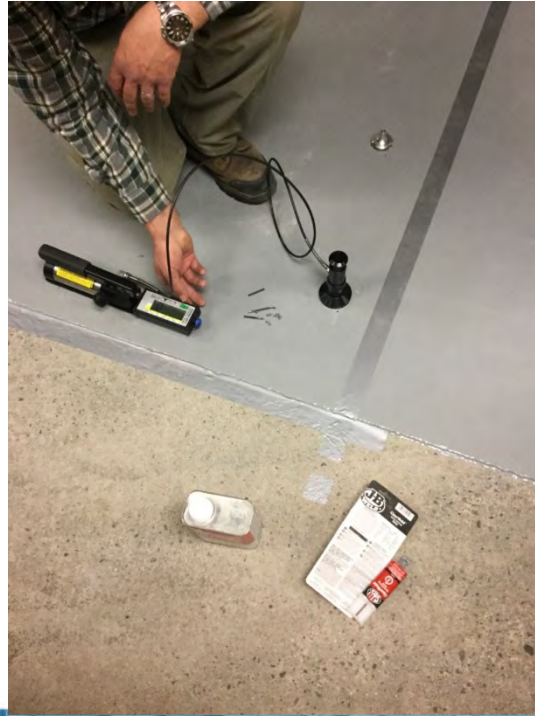
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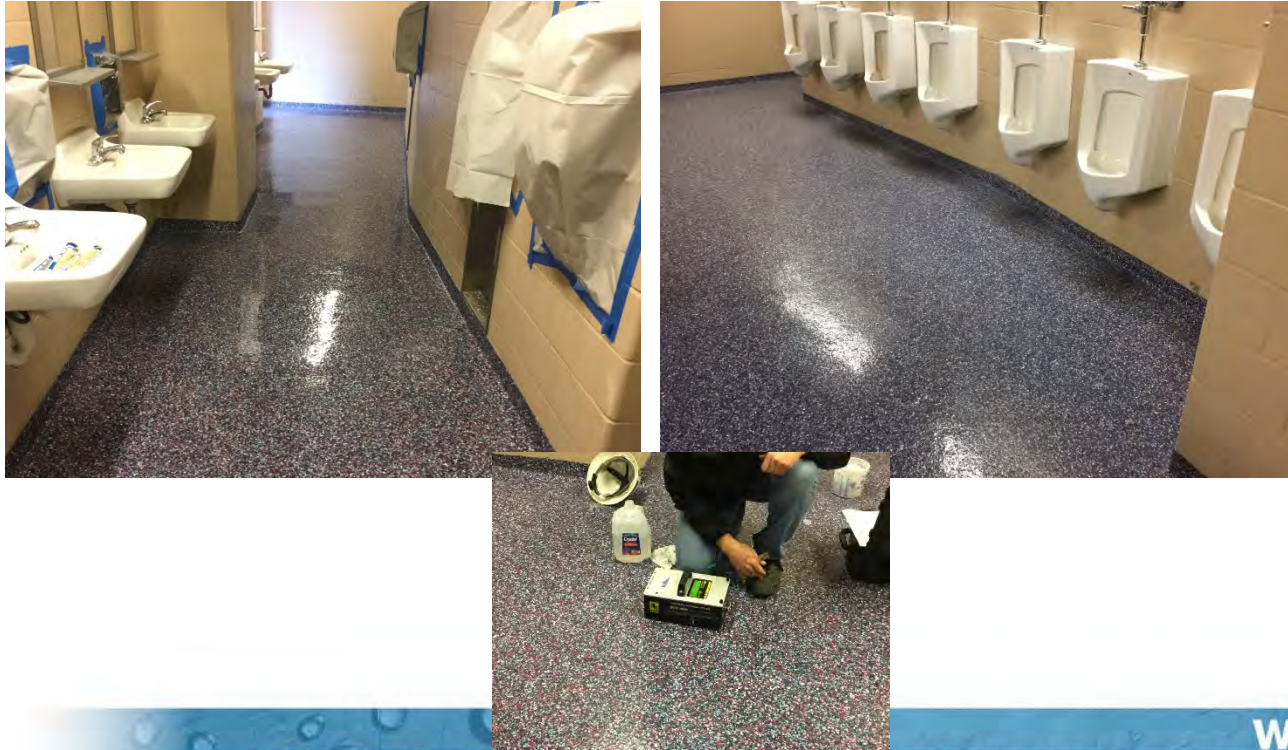
Table 1.

Wet DCOF Value (μ_D)	Slip Resistance Potential	Action
>0.45 (inclines) >0.42 (level)	High - Lower probability of slipping	Monitor DCOF regularly and maintain cleanliness.
0.30 - 0.45 (inclines) 0.30 - 0.42 (level)	Acceptable - Increased probability of slipping	Monitor DCOF regularly and maintain cleanliness. Consider traction enhancing products and practices where applicable for intended use
< 0.30	Low - Higher probability of slipping	Seek professional intervention. Consider replacing flooring and/or coating with high traction products.

Resinous Coating Mockup Bond Testing



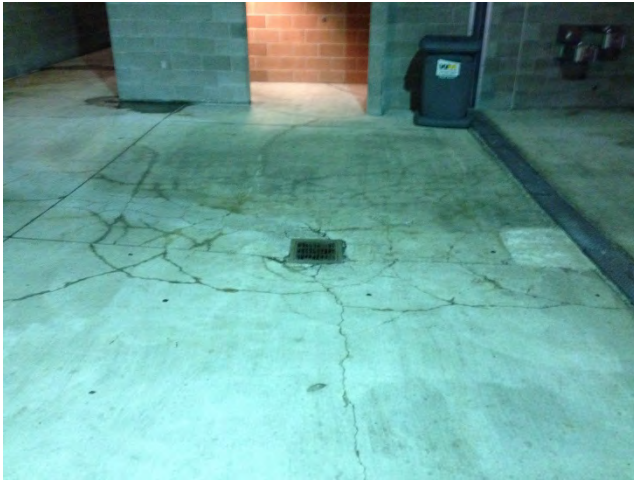
Restroom Floor



Concession Stand Resinous Coating



Concourse Topping Slab - Distress



Concourse Topping Slab Excavation



Concourse Topping Slab Demo



Topping Slab Concerns

- Very thin / weak
 - More heavily reinforce and make thicker where possible
- Additional load if thicker
 - Lightweight concrete and consideration of substrate
- Insulation / Condensation
 - Analysis to determine if board can be removed
- Loads
 - Stronger insulation board

Concourse Topping Slab Repairs



Project Challenges - Coordination

- Concurrent seat replacement
- Equipment storage
- Protection of interiors
 - Joints removed
- Periodic use
 - Guard rails in place



Project Challenges - Timing



- Black-out dates
- Overall time frame

Project Challenges - Technical

- Different constructions
- Overlay and rail
- Rail anchorages
- Joints
- Thin concourse slab
- Precast connections

thank
you

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