

# Common Bridge Issues and Solutions

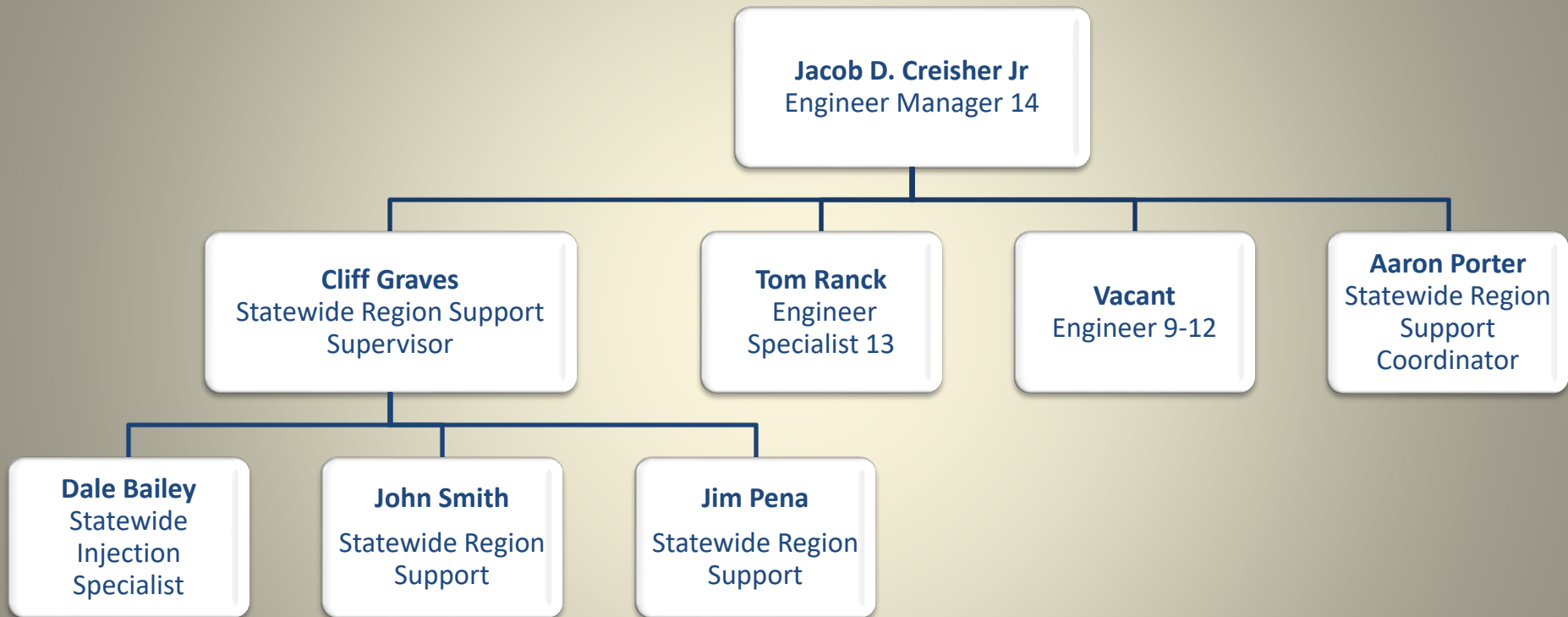
Overview of deterioration, maintenance, and prevention

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Bureau of Bridges & Structures

# Agenda

- Talk about Region Support Unit
- Common Bridge Issues
- Proactive Solutions
- Preservation Solutions
- Conclusion

# STATEWIDE REGION SUPPORT UNIT



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- Region Support
  - Provide alignment and oversight on reactive and preservation maintenance activities on bridges.
  - Share Resources within the State
    - Personal
    - Equipment
    - Ideas
  - Initiate new product trials, monitor performance, and then implement statewide
  - Special Provision Updates
  - Statewide Contracts for products & services
  - Work with the 7 regions and Bridge crews, local agencies, and International bridges.
  - Respond to region concerns and help mitigate temporary fixes.
  - We act as a liaison to Design and Construction to eliminate recurring concerns.

# STATEWIDE REGION SUPPORT UNIT

- Specialty Maintenance Activities
  - Deck, Concrete Beam, Substructure Epoxy Injections
  - Culvert Polyurethane Injection
  - Soil Stabilization
  - Slab lifting ( 2026)
- Specialty Equipment
  - Injection Pumps
  - Epoxy Injection Trailer
  - Shot Blasters
  - Slab Lifting and Soil Stabilization Trailer (Almost finished)
  - Improved Epoxy Rig (Almost finished)

# Common Issues on Bridges

- Dirt from the winter season on bridge decks and along brush block and barriers
- Debris in Joints, leaking joints
- Vegetation near bridges
- Chloride exposure left on deck
- Deck deteriorates by cracking, delamination, or spalling.

# Common Issue on Bridges

- Chloride Dirt on Bridge Decks & Barriers



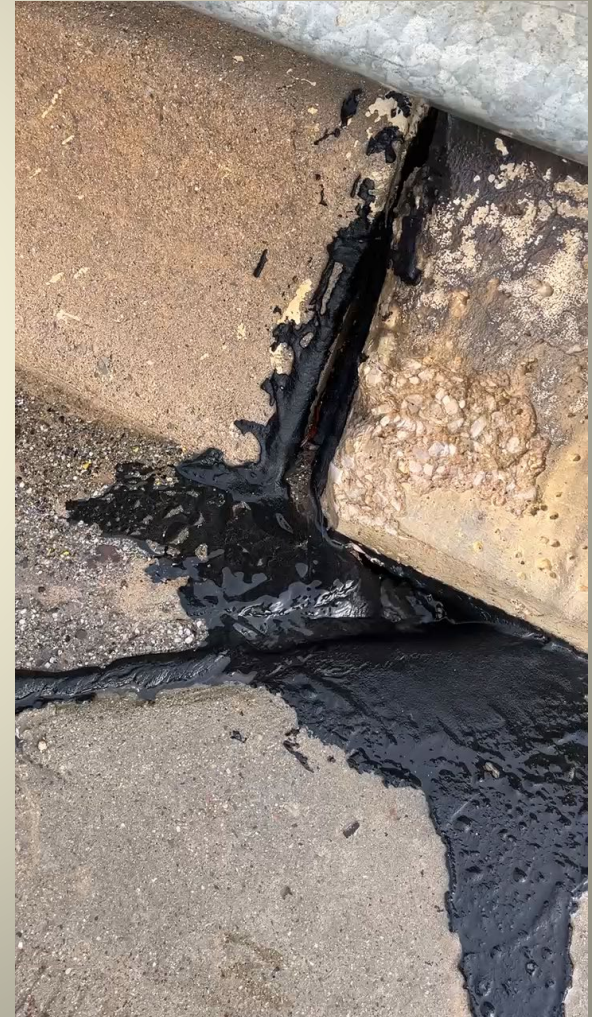
# Common Issue on Bridges

- End joint repair



# Common Issue on Bridges

- Debris in Joints, leaking joints



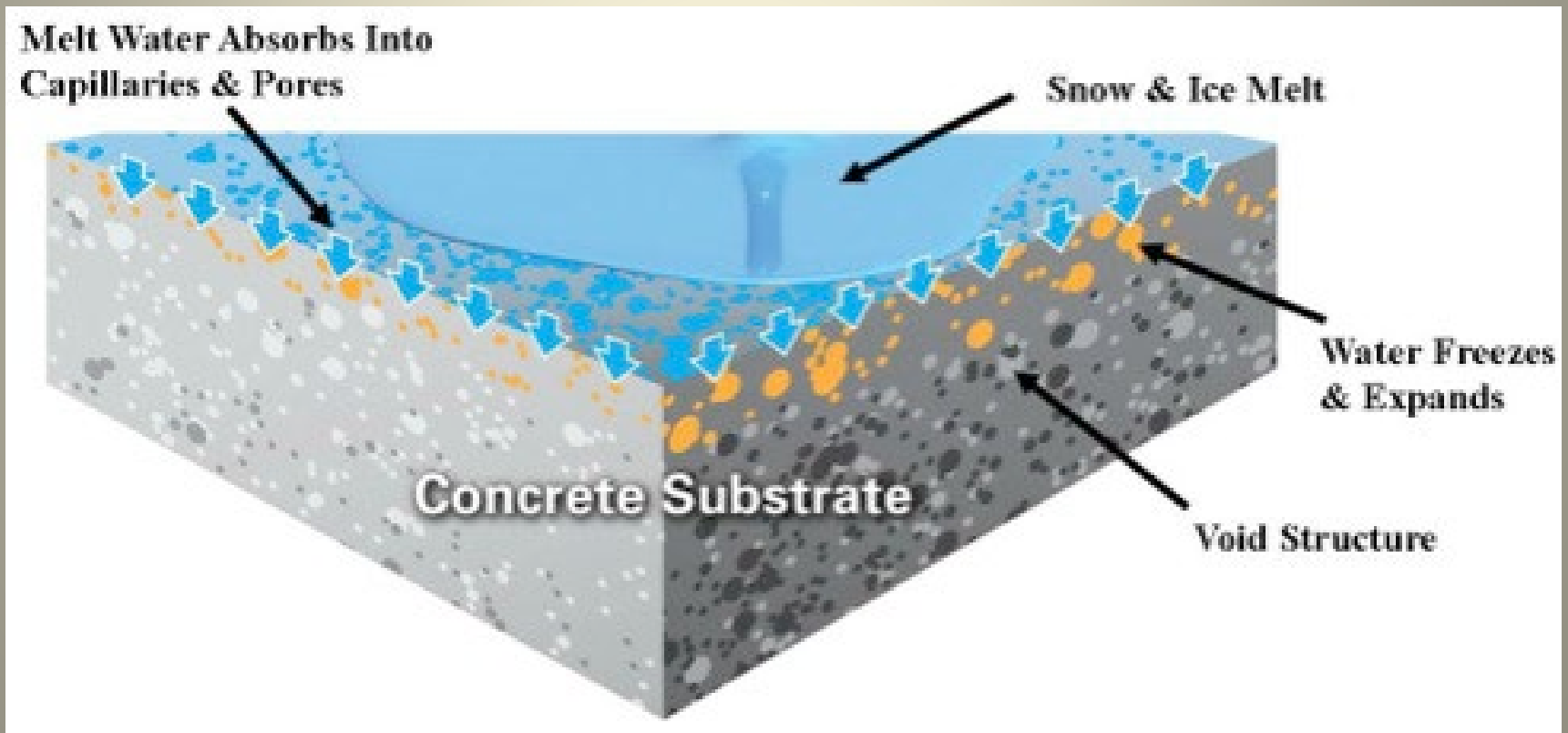
# Common Issue on Bridges

- Vegetation near bridge



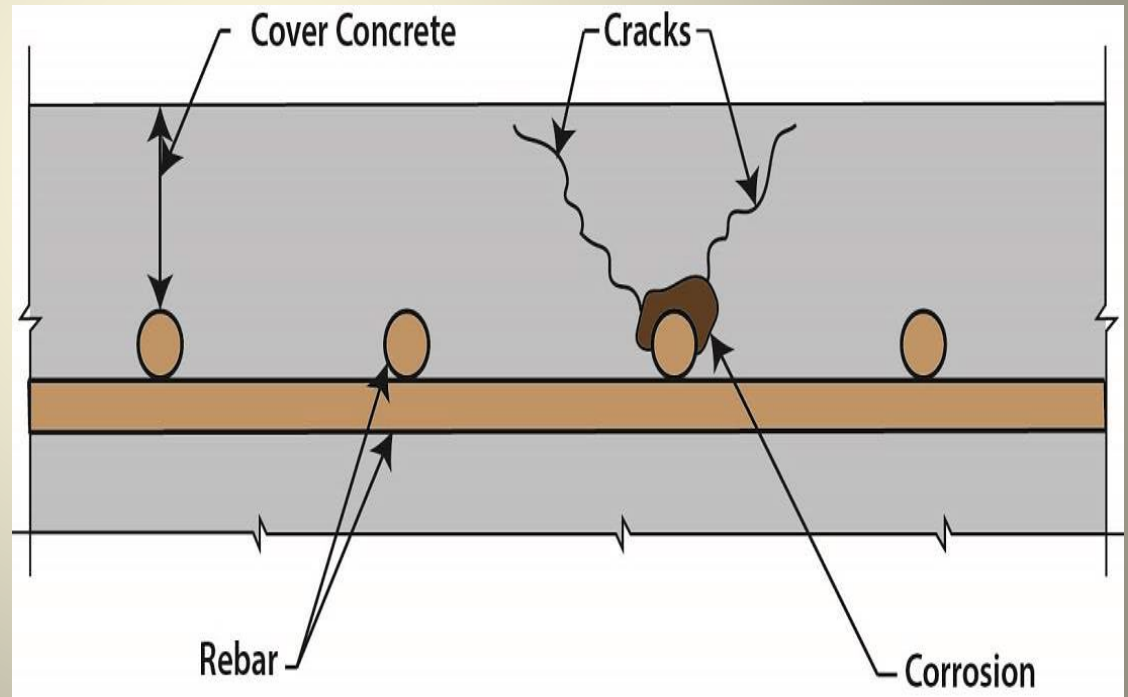
# Common Issue on Bridges (All Concrete)

- Bridge Deck Issues
  - Weathering and Chloride Exposure



# Common Issue on Bridges

- Bridge Deck Issues
  - Deck Cracking



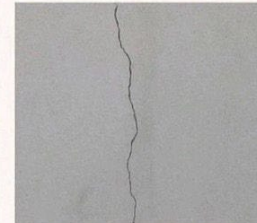
# Common Issue on Bridges

- Bridge Deck Issues
  - Deck Cracking

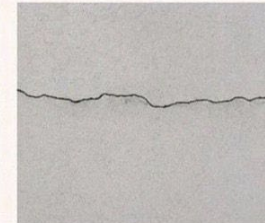
## TYPES OF CONCRETE CRACKS



**PLASTIC SHRINKAGE  
CRACKS**



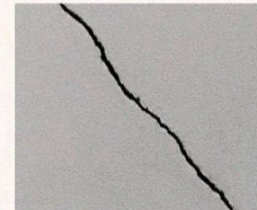
**SETTELEMENT  
CRACKS**



**DRYING SHRINKAGE  
CRACKS**



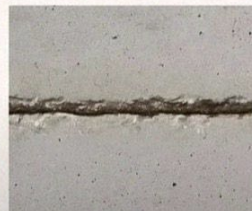
**THERMAL  
CRACKS**



**STRUCTURAL  
CRACKS**



**CRAZING  
CRACKS**



**CORROSION  
CRACKS**



**ALKALI-SILICA  
REACTION (ASR)  
CRACKS**



**OVERLOADING  
CRACKS**

# Common Issue on Bridges

- Bridge Deck Issues

- Delamination:

refers to the separation of layers within a concrete structure. It typically occurs horizontally, parallel to the surface, and is often caused by poor bonding between layers or the presence of moisture.

Delamination can be observed as a series of thin, flat cracks that run parallel to each other, resembling the layers of an onion.

# Common Issue on Bridges

- Bridge Deck Issues
  - Delamination



# Common Issue on Bridges

- Bridge Deck Issues

- Spalling:

refers to the breaking or chipping of the concrete surface. It occurs when the top layer of concrete separates from the underlying layers. This can occur on top of the deck or along the bottom of deck.



# Common Issue on Bridges

- Bridge Deck Issues
  - Spalling



# Common Issue on Bridges

- Bridge Deck Issues
  - Spalling



# Common Issue on Bridges

- Bridge Deck Issues
  - Reinforcement Corrosion



# Common Issue on Bridges

- Bridge Deck Issues
  - Joint Failures



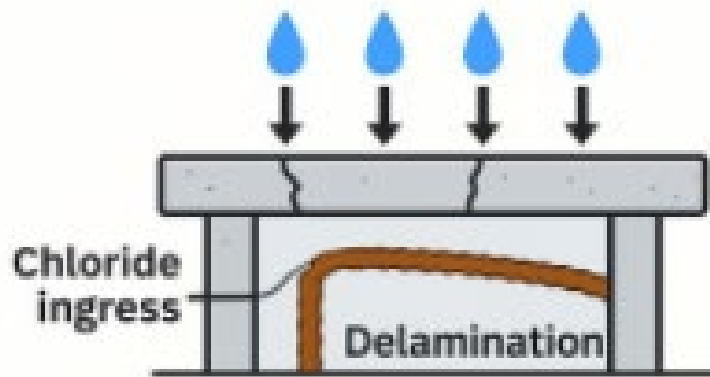
# Common Issue on Bridges

- Bridge Deck Issues
  - Joint Failures

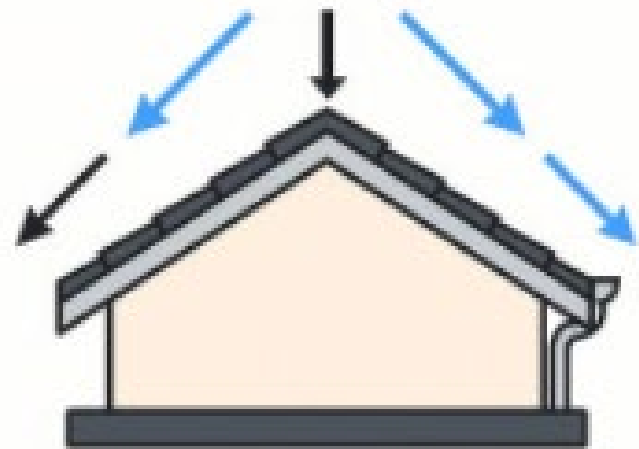


# Common Issues on Bridges

## Bridge Deck



## Roof



# Damages done by Common Issues

- Chloride Dirt on Bridge Joints & Barriers



# What are some Proactive Solutions

- Sweeping bridge decks
- Washing bridge decks and joints
- Removing vegetation near bridges
- Crack Sealing

# Proactive Solutions

- Chloride Dirt on Bridge Decks & Barriers



# Proactive Solutions

- Chloride Dirt on Bridge Decks & Barriers



# Proactive Solutions

- Vegetation near bridge



# Proactive Solutions

- Crack Sealing

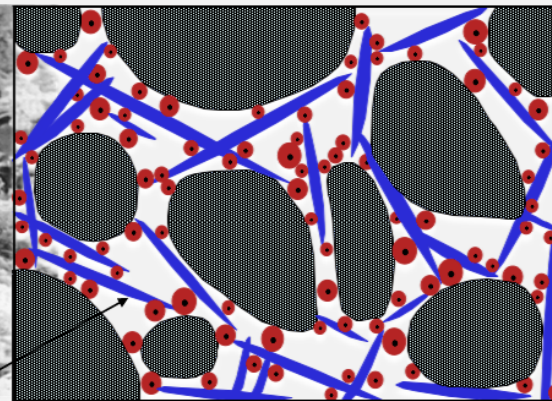
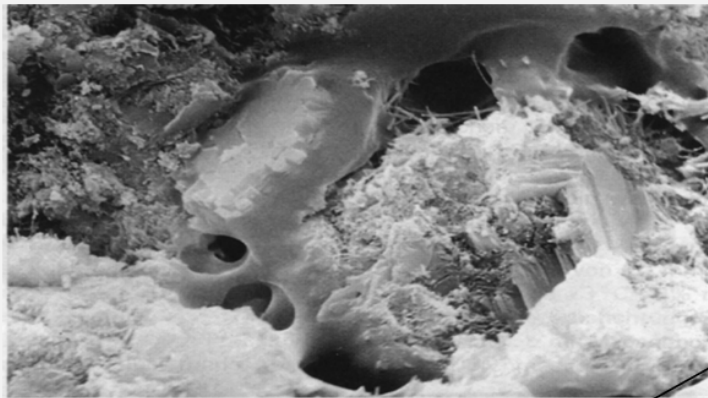
# What are some Preservation Solutions

- Silane concrete
- Silane and Healer Sealer Combo
- Silane and Thin Epoxy Overlay Sealer Combo
- Reseal End Joints (Pourable Joints)

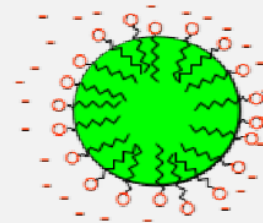
# Preservation Solutions

- Silane Treatment on Concrete

The process of hydrolysis and condensation of Alkoxy Silane and cement



Silane reacts with Silica in cement creating a covalent bond and a "hydrophobic tail"



The surface is changed from inorganic & porous to Hydrophobic with an organic interface

# Preservation Solutions

- Silane Treatment on Concrete



# Preservation Solutions

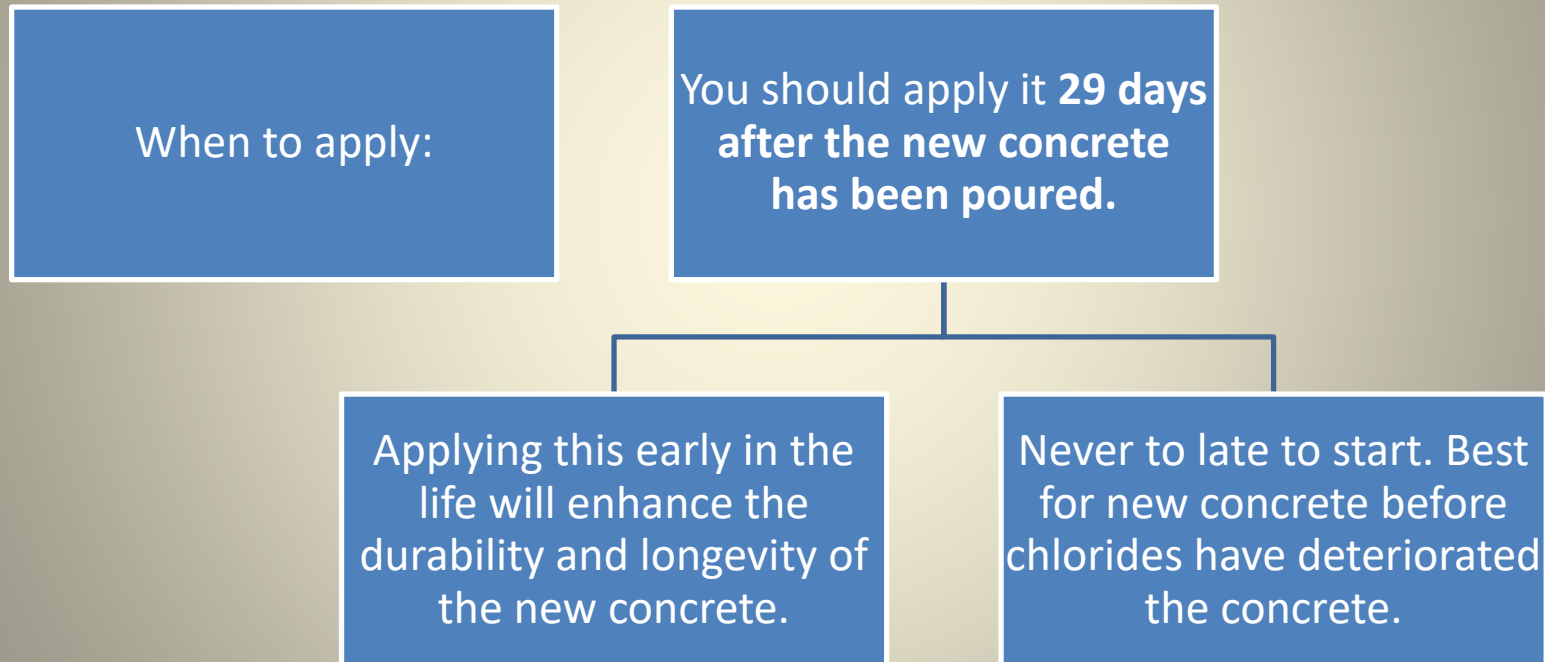
- Silane Treatment on Concrete

Silane – is a type of water-repelling sealer used to protect concrete surfaces.

- They act as a barrier against the ingress of moisture and water-borne salts into concrete
- It prevents deterioration caused by soluble salts in porous concrete.
- Can be used on horizontal and vertical surfaces
- Does not seal the crack so it must be applied prior to crack fillers
- Applying silane before crack fillers can enhance adhesion to the concrete.

# Preservation Solutions

- Silane Treatment on Concrete



# Preservation Solutions

- Silane and Healer Sealer - Dual System on Decks



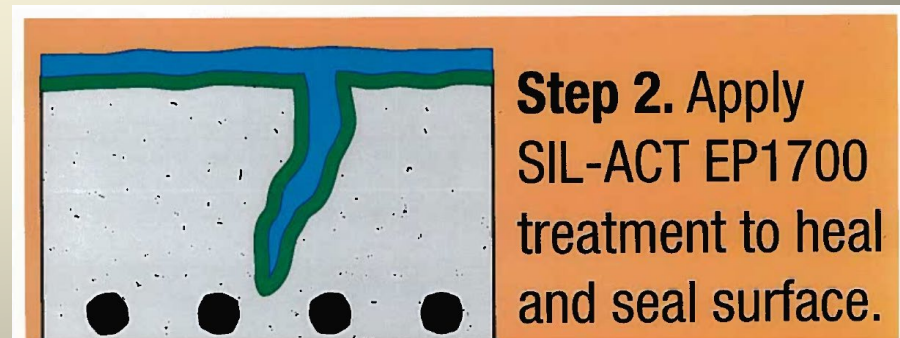
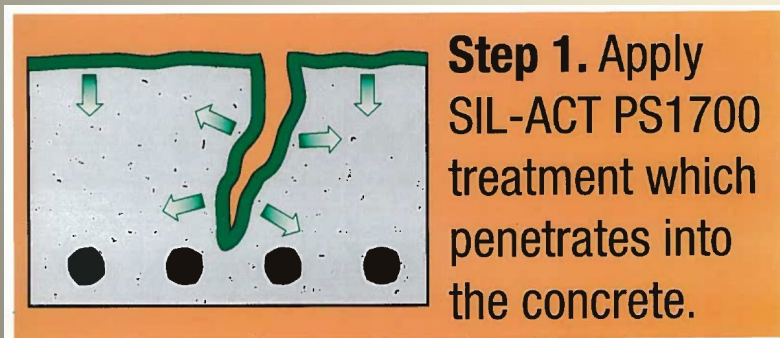
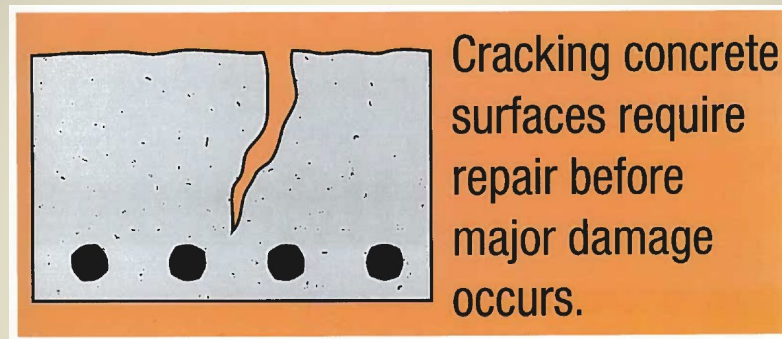
# Preservation Solutions

- Silane and Healer Sealer - Dual System on Decks



# Preservation Solutions

- Silane and Healer Sealer - Dual System on Decks



# Preservation Solutions

- Silane and Healer Sealer - Dual System on Decks



# Preservation Solutions

- Silane and Epoxy Overlay - Dual System on Decks



# Preservation Solutions

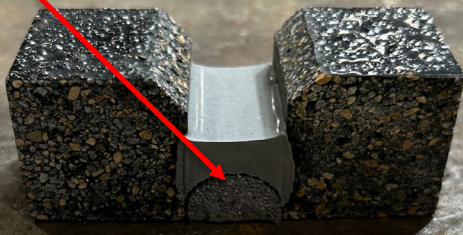
- Silane and Epoxy Overlay - Dual System on Decks



# Preservation Solutions

- Reseal End Joints
- Asphalt to concrete-> Hot Poured rubber or mastic
- Concrete to concrete-> Polyurethane or silicone joint sealing material
- Include upturns

Conical Shape

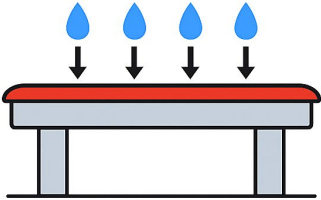


# Conclusion

- Bridges deteriorate due to lack of routine maintenance.
- Proactive maintenance and timely repairs significantly reduce deterioration and ensure long-term bridge safety and performance.
- Preventative maintenance provide longer service life, minimizes downtime, and lower life cycle costs.

# Questions

**Bridge Deck**



**Roof**

