

Bridge Drift Removal and Scour Maintenance



Michigan Bridge Week
Local Agency Outreach Working Group



Bridge Preservation Partnership (BPP)

Collaboration & Cooperation



DOTs



Local Agencies



FHWA



Academia

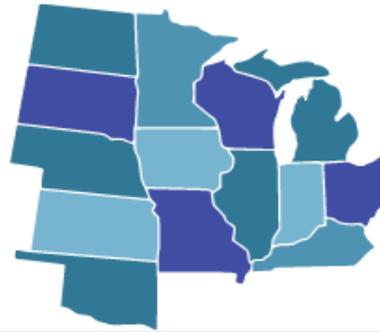


Industry



Consultants

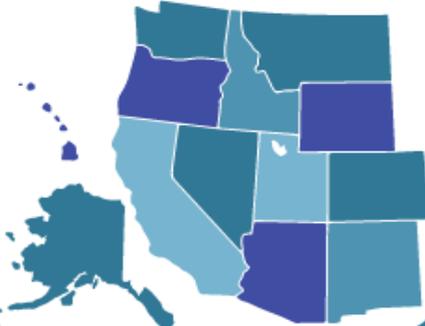
MIDWEST BRIDGE PRESERVATION PARTNERSHIP



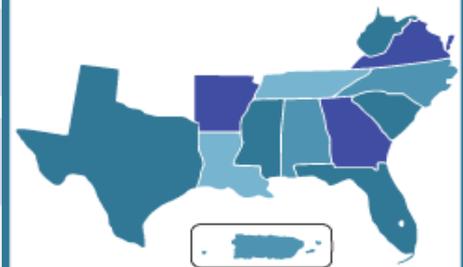
NORTHEAST BRIDGE PRESERVATION PARTNERSHIP



WESTERN BRIDGE PRESERVATION PARTNERSHIP



SOUTHEAST BRIDGE PRESERVATION PARTNERSHIP



Bridge Preservation Partnership (BPP)

Collaboration & Cooperation

UPCOMING BRIDGE PRESERVATION PARTNERSHIP MEETINGS

Bridge Preservation Partnership Conferences

Meeting	Date	Location
SEBPP & WBPP Joint Meeting	March 10-12, 2026	Denver, Colorado
NEBPP & MWBPP Joint Meeting	Fall 2026	Chicago, Illinois

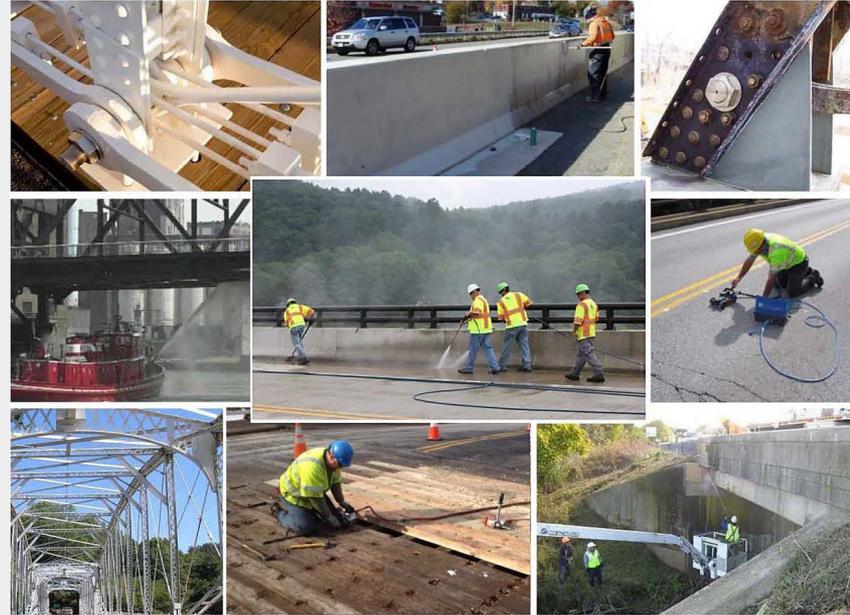




U.S. Department
of Transportation
Federal Highway
Administration

FHWA-NHI Course No. 130108

Bridge Maintenance Reference Manual



BMRM

- Bridge Maintenance Reference Manual
- Accessible on FDOT Website Below or Web Search – FHWA Bridge Maintenance Reference Manual
- <https://www.fdot.gov/maintenance/divisions.shtm/structures/bmrm.shtm>



LAOWG Webinar

- LAOWG's third training of 2026 will be **Bridge Preservation through Coatings** and will be held on March 26th
- The training will explain the basics of maintenance painting processes and how agencies can maintain their own structures with in-house crews.



OVERVIEW –

- What is the Issue?
- How do I spot the Issue?
- What about -
 - Environmental
 - Safety
 - Priority
- Best Practices
- Proactive Practices



Drift and Sediment Problems – What's the Big Deal?

- Debris
 - Reduces Hydraulic Capacity
 - Increases Velocity
 - Increases Sediment Transport
 - Increases Scour Potential
 - Increases lateral pressure on bridge



Drift and Sediment Problems



Sediment and Debris Cause

- Stream Migration



Drift and Sediment Problems – Not just for bridges.



- Sediment and Debris Cause
 - Piping Around Culvert
 - Overtopping
 - Roadway Failure



Drift and Sediment Problems

- Sediment and Debris Cause
 - Increased Velocity
 - Increased Sediment Transport
 - Perched Ends
 - Destabilized Headwalls



Spotting Problems – Not all Problems are Obvious



- Spotting Soil Ingress
 - Slope Depressions
 - Pavement Depressions



Spotting Problems – Not all Problems are Obvious

- Scour Holes
 - Some fill in with sediment after high flow event. Some do not.



- 4' Pole easily pushes into loose stream bed.



Spotting Problems – Not all Problems are Obvious

4' Void under Shoulder



- Spotting Soil Ingress
 - Hidden Voids under pavement

3' Void in Shoulder



Drift Removal – Environmental Considerations

- Schedule outside of fish restrictions 
- If navigable waterway, check for Army Corp Permit Requirements
 - CFR 322.2b - Structure = Any obstacle or obstruction. 
 - CFR 322.2c - Work includes removal of any material.
- Check your local state agency for other requirements.



Drift Removal – Environmental Considerations

- Check your local state agency for other requirements.
 - Michigan EGLE – Tree removal disturbs fish habitat and disturbs river bottom if embedded - permit required for debris removal.
 - Oregon - Removal-Fill Law – More than 50 CYDS of Debris or Debris removal in Salmon Habitat.
 - Kentucky – No permit if following best practice document.

Disclaimer – always check permit requirements prior to starting work.



Drift Removal – Environmental Considerations

- General Permits – Up to 5-year applicability
 - Michigan EGLE – Culvert Cleanout – General Permit Requirements – Part 301 and 303
 - Capture Sediment and remove from floodplain or wetland.
 - Low flow
 - Not during fish spawning
 - Cannot destabilize channel banks



Drift Removal – Environmental Considerations

- General Permits – Up to 5-year applicability
 - Michigan EGLE – Removal of Structures – General Permit Requirements – Part 31, 301, 303
 - Natural Structure (Log Jams).
 - Remove all material out of floodplain and dispose of at approved site.
 - Stabilize disturbed banks



Drift Removal – Environmental Considerations

- General Permits – Up to 5-year applicability.
 - Michigan EGLE – RipRap – General Permit Requirements – Part 31 and 301
 - Minimize to amount necessary to stabilize.
 - Not to be placed more than 25 feet upstream or downstream.
 - Broken concrete pieces cannot contain reinforcement.



Drift Removal – Environmental Considerations

- Side Note
 - This Presentation is only for debris and drift that poses a threat to public safety and infrastructure.
 - Otherwise – Let it lie



Drift Removal – Safety Considerations

- Accessibility
 - Traffic Control Requirements
 - Slope Condition



Drift Removal – Safety Considerations

- Accessibility
 - Utilities
 - Maintain Safe Distances



Drift Removal – Safety Considerations

- OSHA 1926.1408

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Drift Removal – Safety Considerations

- Structure Condition – Can Equipment be parked on the bridge?



Drift Removal – Priority Considerations

- Is the Structure Scour Critical? - High Priority

Metric #18: Inspection procedures – Scour

rev

NBIS Reference: 23 CFR 650.313 (e), (e3) Bridges that are scour critical

Criteria

- Bridges over water have a documented evaluation of scour vulnerability.
- Bridges that are scour critical have a scour plan of action (POA) prepared to monitor known and potential deficiencies and to address scour critical findings.
- Bridges that are scour critical are monitored in accordance with the POA.



Drift Removal – Priority Considerations

- Is the Structure Scour Critical And Debris is flagged as a factor? - Higher Priority

Calculated Values

Scour Analysis Frequency	25 Year	50 Year	100 Year	500 Year	
Anticipated Surface Elevation (ft)	0.0	0.0	729.13	731.53	
Distance Below Bottom Chord (ft)	0.0	0.0	3.95	1.55	
Anticipated Flow (cubic ft/sec)	0.0	0.0	1825.0	3105.0	
Anticipated Pressure Flow (Y/N)			N	N	

BRIDGE CLOSURE PLAN

Conditions To Consider Bridge Closure

- Water Surface Elevation
- Overtopping of Road or Structure
- Pressure Flow
- High Debris Accumulation
- Observed Structure Movement/Settlement
- Loss of Scour Countermeasures

Drift Removal – Priority Considerations

- Is the Structure Scour Critical And Debris is flagged as a factor and weir flow? - Highest Priority

05/26/2010 **BRIDGE EXPERIENCES WEIR FLOW IN THE 50 AND 100 YR** Scour calculations were performed. Scour depth at the left abutment was 29.8 feet (EL 603.7) for the 100 year event and 37.2 feet (EL 596.3) for the 50 year event. At Pier 1, scour depth was 34.5 feet (EL 600.4) and 42.0 feet (EL 592.9) respectively. The total scour depth at Pier 1 was 13.9 feet (EL 600.4) and 18.0 feet (EL 609.5) respectively. The total scour depth at Pier 2 was 16.6 feet (EL 610.9) and 18.0 feet (EL 609.5) respectively. The bottom of footing elevation was 627.0 at both abutments and 626.0 at all of the piers. No pile and foundation type was determined from pile records. Left and right abutments are referenced looking downs

Calculated Values

Scour Analysis Frequency	25 Year	50 Year	100 Year	500 Year
Anticipated Surface Elevation (ft)	0.0	649.56	650.71	0.0
Distance Below Bottom Chord (ft)	0.0	0.0	0.0	0.0
Anticipated Flow (cubic ft/sec)	0.0	12500.0	14000.0	0.0
Anticipated Pressure Flow (Y/N)		Y	Y	

BRIDGE CLOSURE

Conditions To Consider Bridge Closure

- Water Surface Elevation
- Overtopping of Road or Structure
- Pressure Flow
- High Debris Accumulation
- Observed Structure Movement/Settlement
- Loss of Scour Countermeasures



Drift Removal – Priority Considerations

- Is the Structure Scour Critical and has an existing foundation issue? - Highest Priority

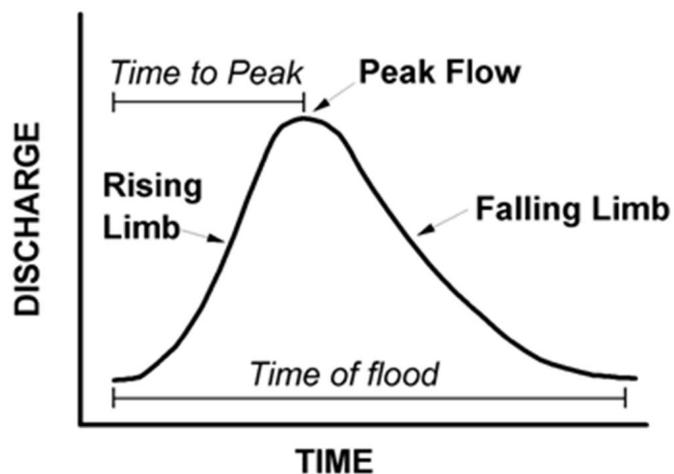


Piles ≠ Scour Stable
100% of Time.



Drift Removal – Other Considerations

- Other Considerations
 - Projected Flow
 - Water Depth and Velocity
 - Debris Size



Bridge Preservation Partnerships



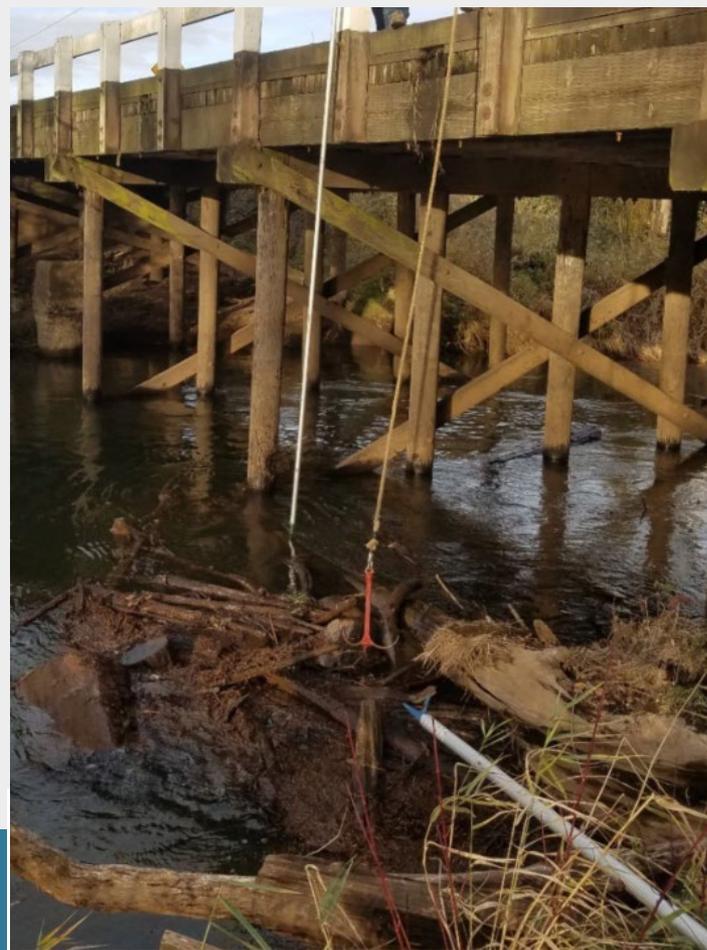
Drift Removal – Best Practices

- Equipment
 - Do not drive heavy machinery into stream
 - Minimize Stream Bottom Disruption
 - Minimize number of access points and disturbances to stream banks
 - Rubber tires reduce disturbance of soils over track driven equipment.
 - All vegetation on adjacent land minimizes erosion.



Drift Removal – Best Practices

- Hand Removal – From Water or Bridge
 - Low Flow – Wadable - Small Pieces
 - Break Loose and Set it Free or Remove? Check your permit.



Drift Removal – Best Practices

- Set it Free or Remove? Check your permit.
 - Check with local Environmental Regulations
 - If removing – place drift above the Ordinary High Water Mark or Remove Completely.
 - Set it free with cut, turn and float.



Drift Removal – Best Practices

- Other removal options
 - Run it through a woodchipper before hauling away.
 - Burn it - Do not use hazardous materials for kindling such as plastics, tires and fuel oils.



Drift Removal – Best Practices

- Set it Free or Remove?
 - If excavating debris and placing back in stream – do not drop it. This further disrupts the stream bottom.



Drift Removal – Best Practices

- Equipment
 - When using chainsaws above water or underwater, make sure environmentally friendly lubricants are used.
 - Innovate – INDOT hired large vehicle wreckers to assist in drift removal



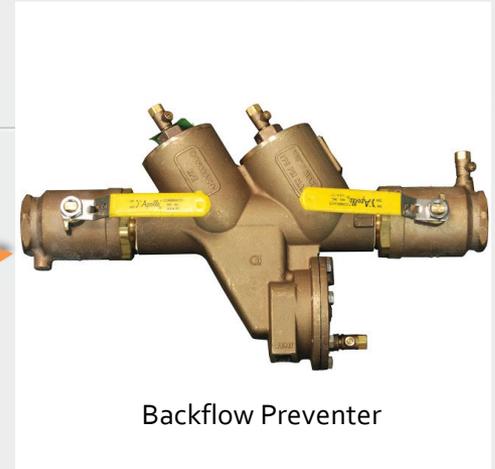
Other Practices

- Silt Removal
 - Jetting
 - Excavation
 - Vacuum
- Culverts - Mitigating infiltration and exfiltration.
 - Grout Injections
 - Concrete Cloth
 - Weep-hole Repair
- Riprap Innovation



Other Practices

- Silt Removal
 - Flushing
 - Fire Hose
 - Water Jets



Other Practices

- Silt Removal
 - Excavation – Stream Channel – Use Soil Erosion Sedimentation Control



Other Practices

- Silt Removal
 - Excavation – Through Culvert



Other Practices

- Silt Removal
 - Excavators come in mini size



Other Practices

- Silt Removal
 - Excavators come in mini size – with remote controls



Other Practices

- Silt Removal
 - Excavators come in mini size – with remote controls



Other Practices

- Silt Removal
 - Vacuum



Other Practices

- Silt Removal
 - Extreme Vacuum



Found the
Abutment

Other Practices

- Silt Removal
 - Vacuum

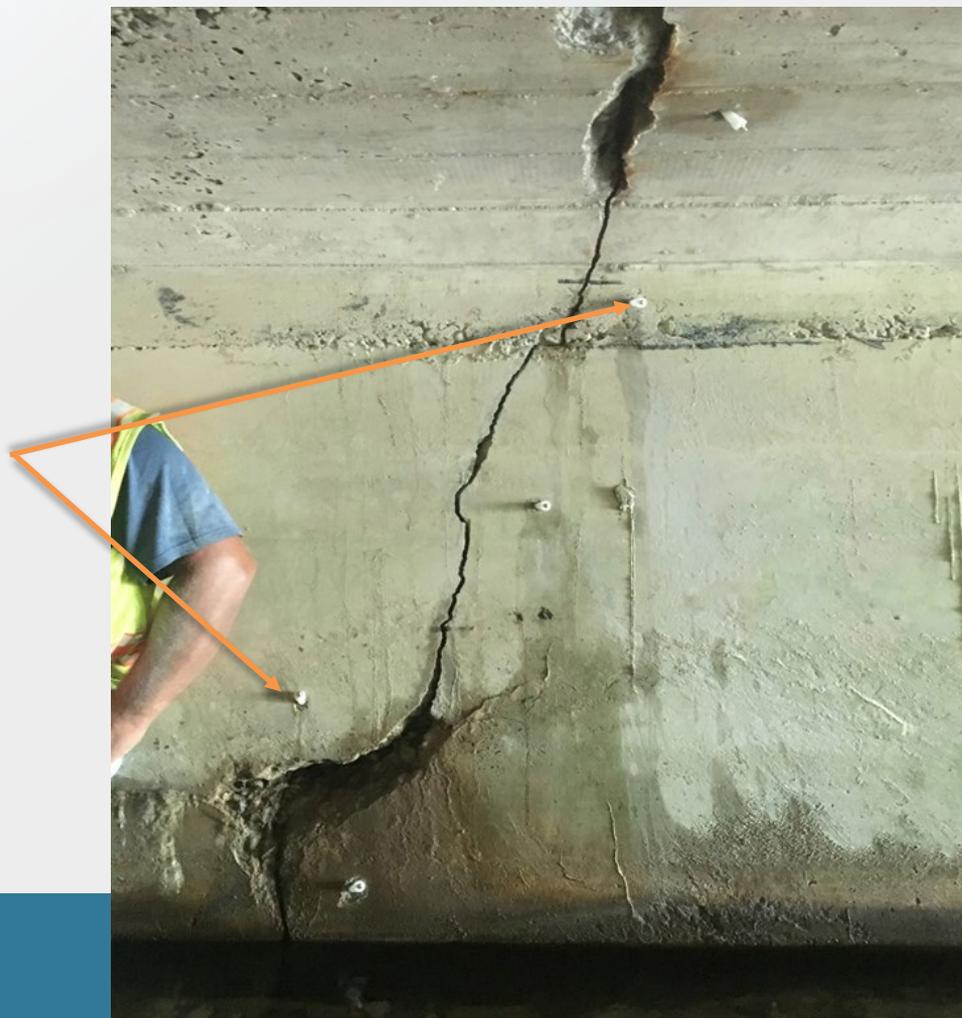


Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Grout Injections



Drill holes at an angle through crack intersection and pound in port



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Grout Injections

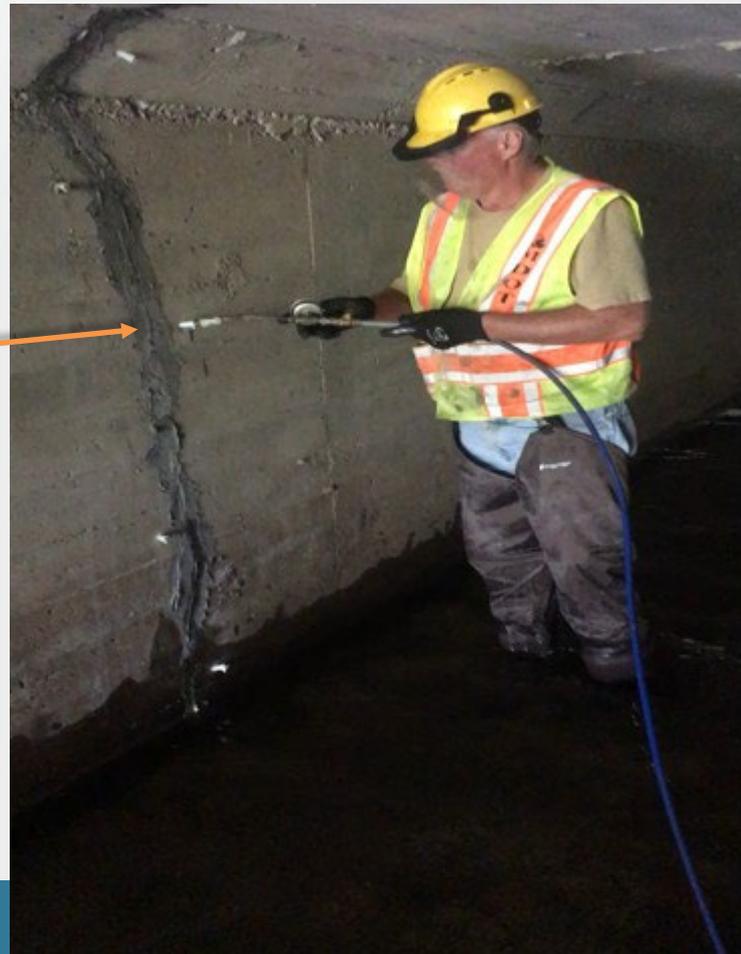
Trowel hydraulic cement on crack to seal and prevent grout from coming out.



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Grout Injections

Flush with water then inject the system.



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Grout Injections

If voids are suspected above culvert use an expansive, two-part hydrophobic polyurethane that forms a dense, closed cell foam such as AzoGrout 551



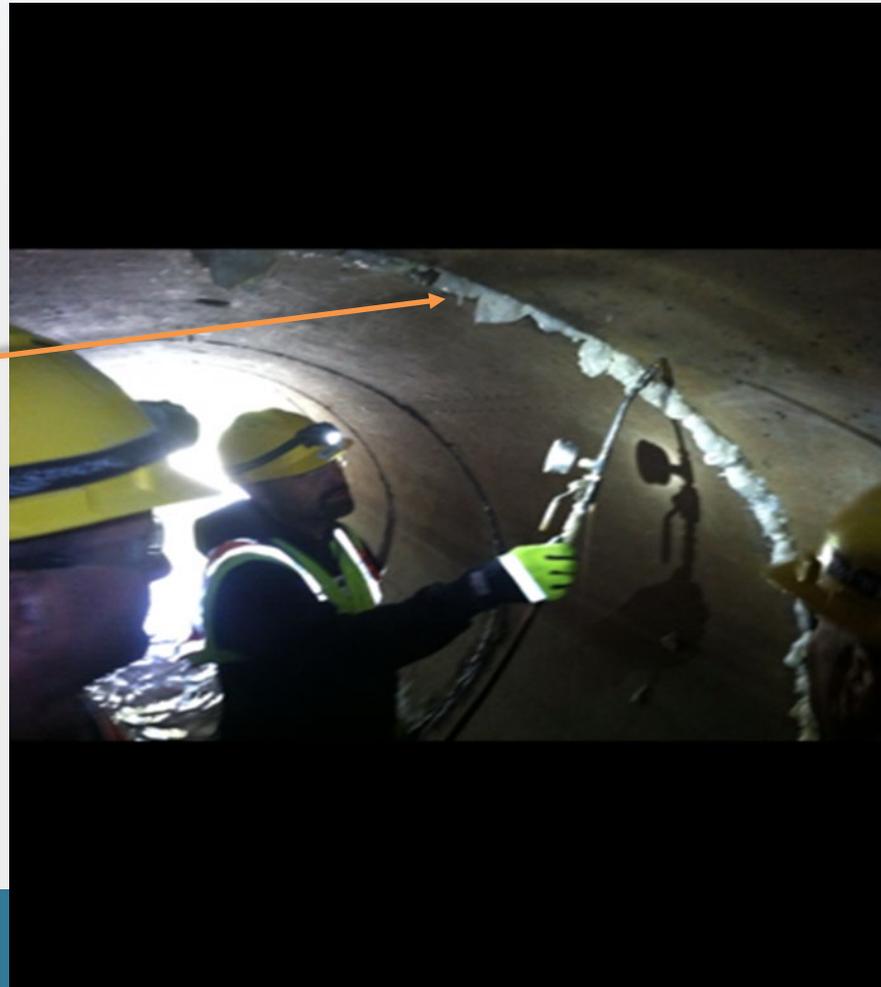
EAST
PARTNERSHIP

WESTERN
BRIDGE PRESERVATION PARTNERSHIP

Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Grout Injections

Use a swelling hydrophilic polyurethane grout to arrest active water flow such as AzoGrout 675 or 443-C



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Concrete Cloth

- Holes in Culvert Invert
 - Water flow can suck out culvert bedding causing undermining and destabilization



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Weep hole Repair



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Weephole Repair



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
 - Weephole Repair



Other Practices

- Riprap Innovation



Other Practices

- Riprap Innovation



Contracted Drift Removal

- Time and Material Contract.
- Meet onsite to discuss access and removal limits.
- Agency to secure any permits (if required).
- Consider having an on-call contract in place.



Ref: Pihl Excavating



Questions?

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