Bridge Drift Removal and Scour Maintenance

Bridge Preservation Partnership
Local Agency Outreach Working Group

House Keeping

- Let us know what topic you'd like to see next.
- Add your contact info in the chat for future invites.
- Trainings every other month.

TYPE QUESTIONS INTO THE CHAT.

THE PRESENTATION WILL BE RECORDED AND MADE AVAILABLE.

Bridge Preservation Partnership (BPP)

Collaboration & Cooperation

- DOTs
- Local Agencies
- FHWA
- Academia
- Industry
- Consultants

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bpp

Bridge Preservation Partnership (BPP)

Collaboration & Cooperation

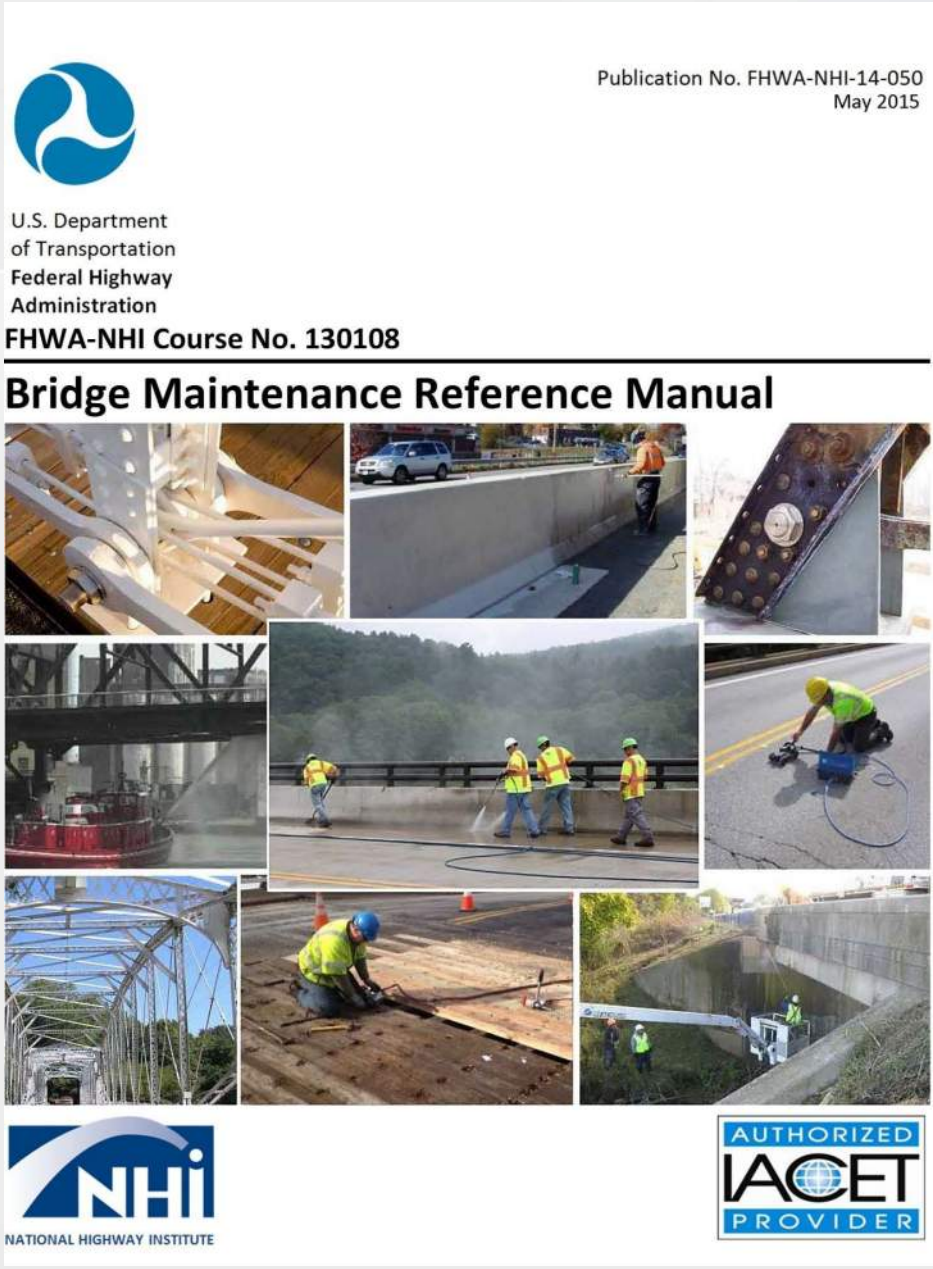
UPCOMING BRIDGE PRESERVATION PARTNERSHIP MEETINGS

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

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



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MIDWEST BRIDGE PRESERVATION PARTNERSHIP
NORTHEAST BRIDGE PRESERVATION PARTNERSHIP
SOUTHEAST BRIDGE PRESERVATION PARTNERSHIP
WESTERN BRIDGE PRESERVATION PARTNERSHIP

OVERVIEW –

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

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MIDWEST BRIDGE PRESERVATION PARTNERSHIP

NORTHEAST BRIDGE PRESERVATION PARTNERSHIP

SOUTHEAST BRIDGE PRESERVATION PARTNERSHIP

WESTERN BRIDGE PRESERVATION PARTNERSHIP

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

- 4' Pole easily pushes into loose stream bed.

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

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.

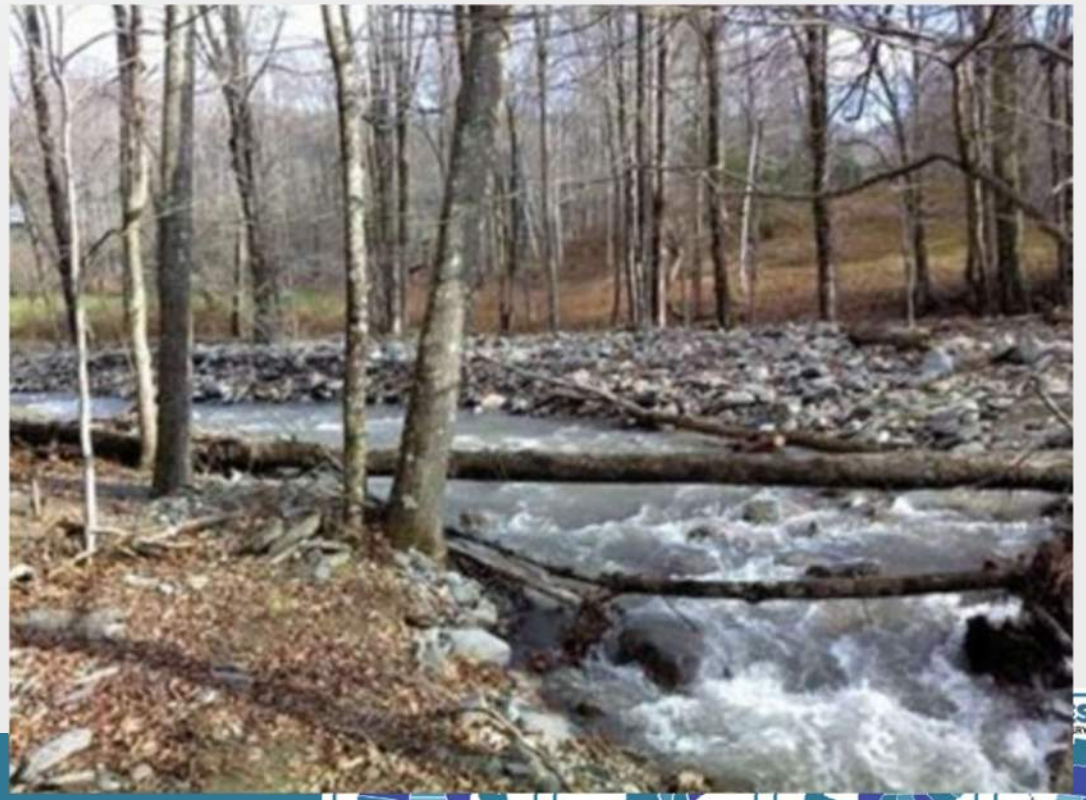
- Check your local state agency for other requirements.

Drift Removal – Environmental Considerations

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

Drift Removal – Environmental Considerations

- Side Note
  - This Webinar 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
- [x] High Debris Accumulation
- [x] Observed Structure Movement/Settlement
- [ ] Loss of Scour Countermeasures

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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 perfo
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 th
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 (E
scour depth at Pier 2 was 16.6 feet (EL 610.9) and 18.0feet (EL 609.5) respectively. The total scour depth at P
respectively. The bottom of footing elevation was 627.0 at both abutments and 626.0 at all of the piers. No pla
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

O Water Surface Elevation

O Overtopping of Road or Structure

X Pressure Flow

X High Debris Accumulation

X Observed Structure Movement/Settlement

O Loss of Scour Countermeasures

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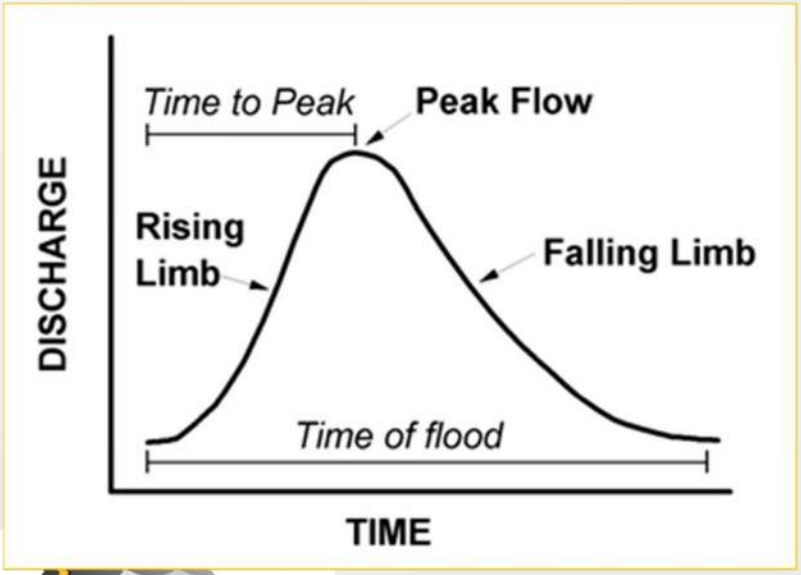
Drift Removal – Priority Considerations

- 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

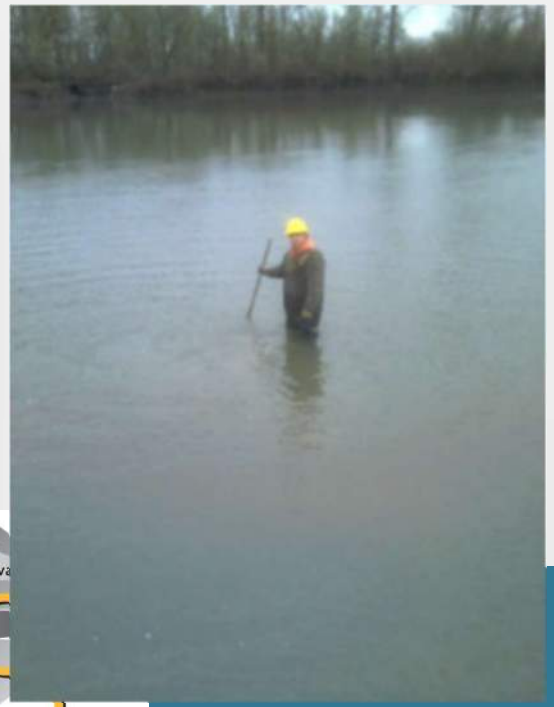


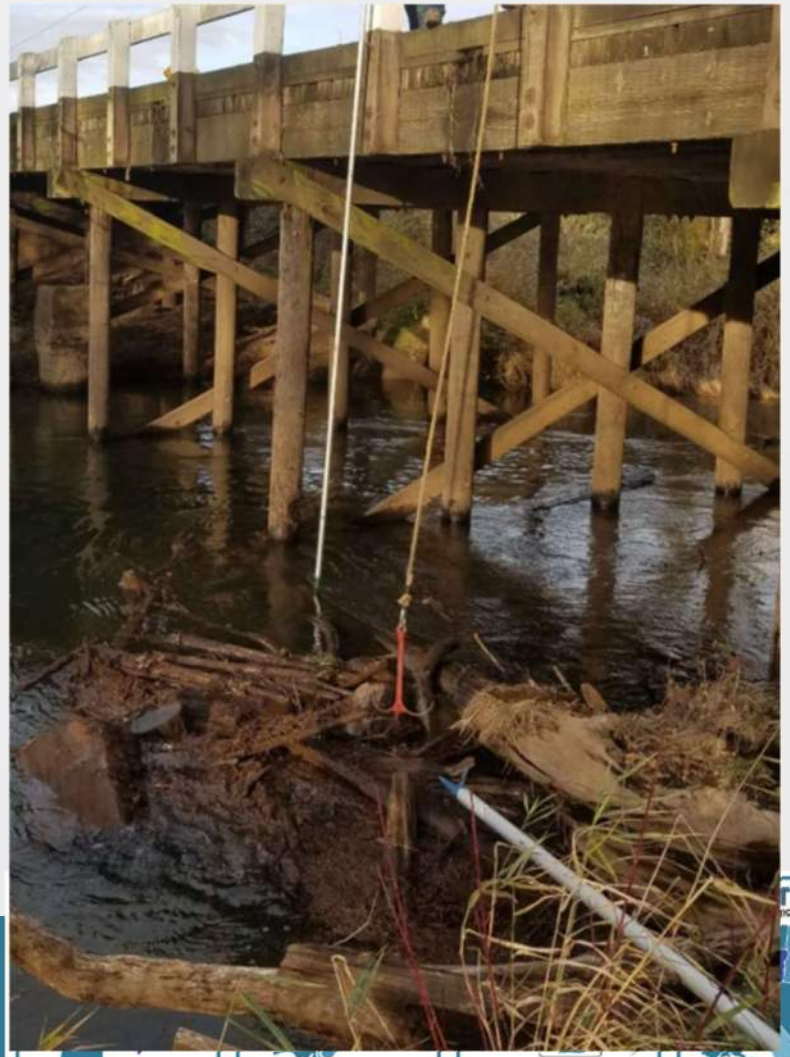
Drift Removal – Best Practices

- 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?





Drift Removal – Best Practices

- Set it Free or Remove?
  - 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.

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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
  - Weephole Repair
- Riprap Innovation

Other Practices

- Silt Removal
  - Flushing
    - Fire Hose
    - Water Jets

Backflow Preventer

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.

Other Practices

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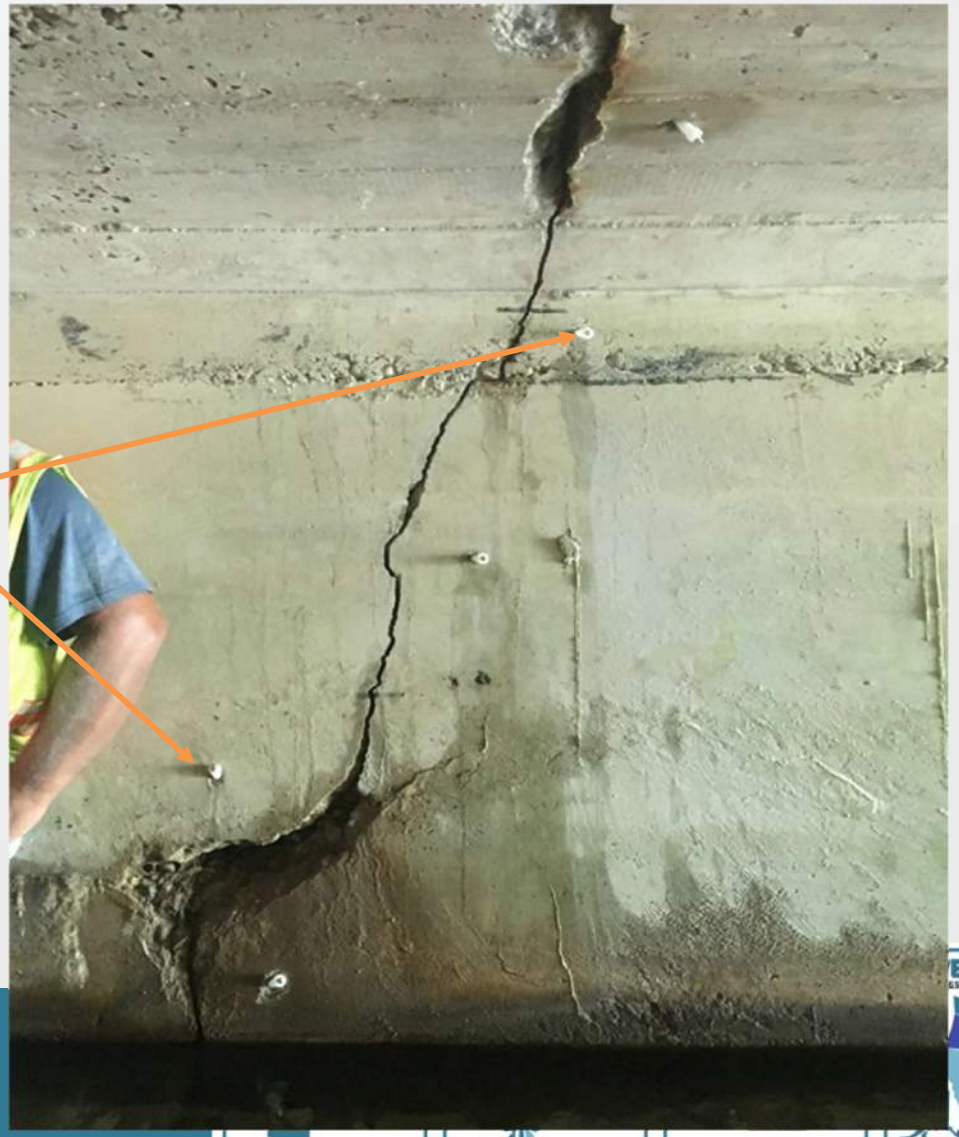
Other Practices

- 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

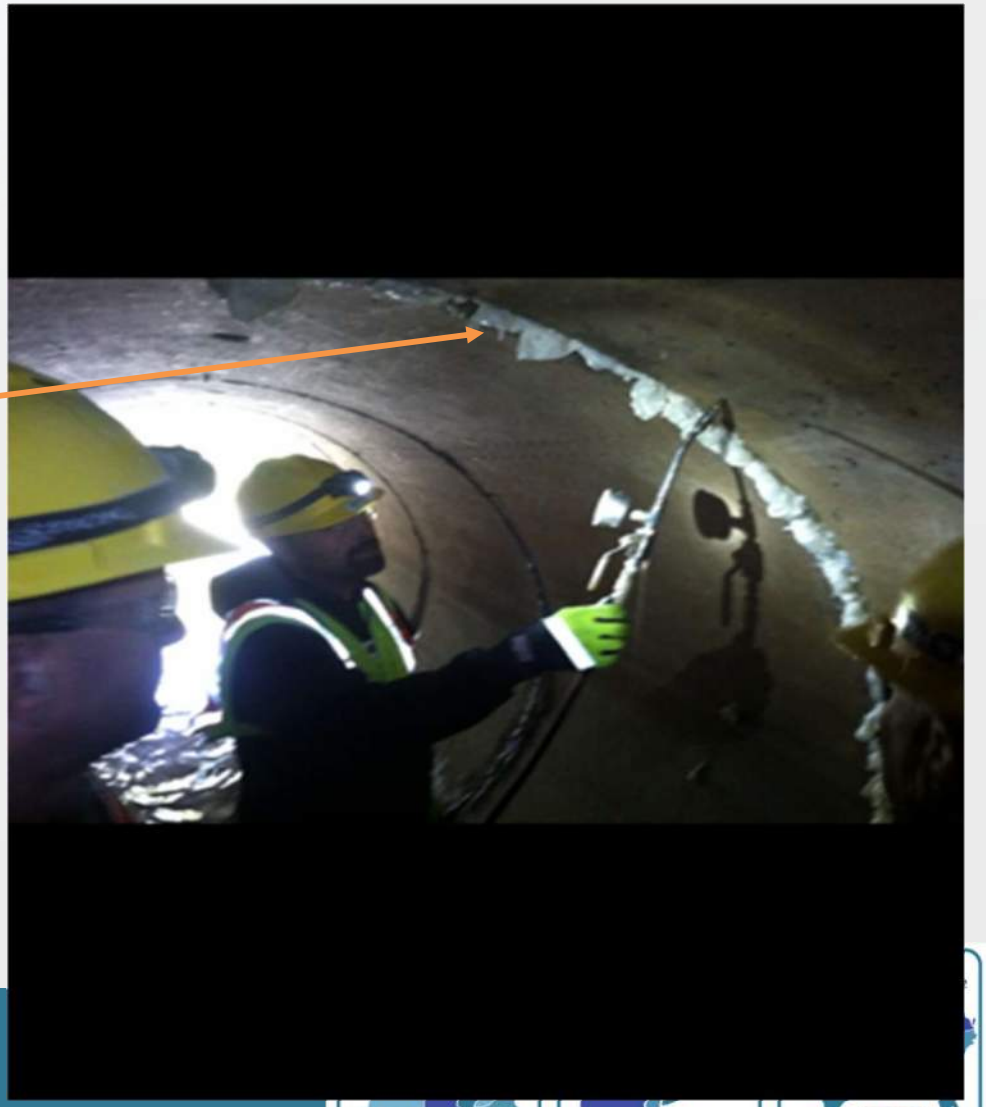
- Culverts - Mitigating infiltration and exfiltration.
  - Grout Injections

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

Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Grout Injections

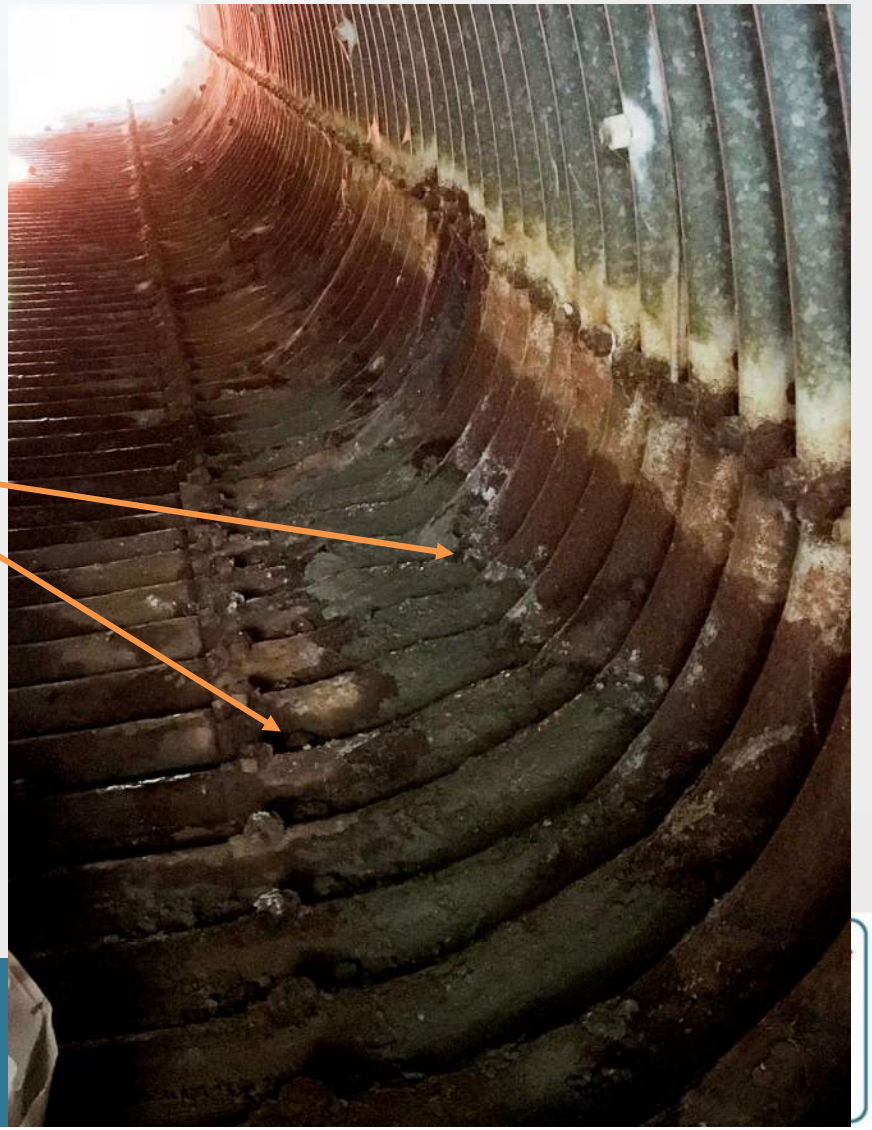
Use a swelling hydrophilic polyurethane grout to arrest active water flow such as AzoGrout 675 or 443-C



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Concrete Cloth

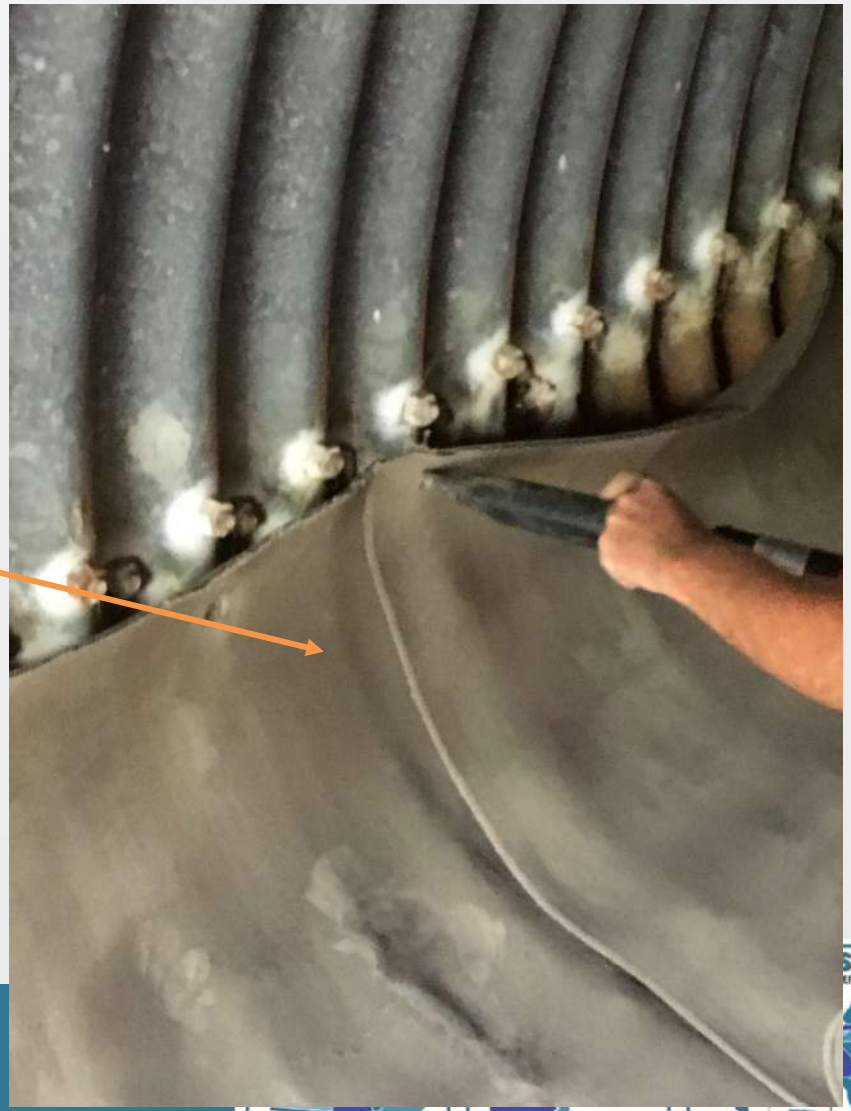
- Holes in Culvert Invert
  - Water flow can suck out culvert bedding causing undermining and destabilization



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Concrete Cloth

- Milliken Concrete Cloth

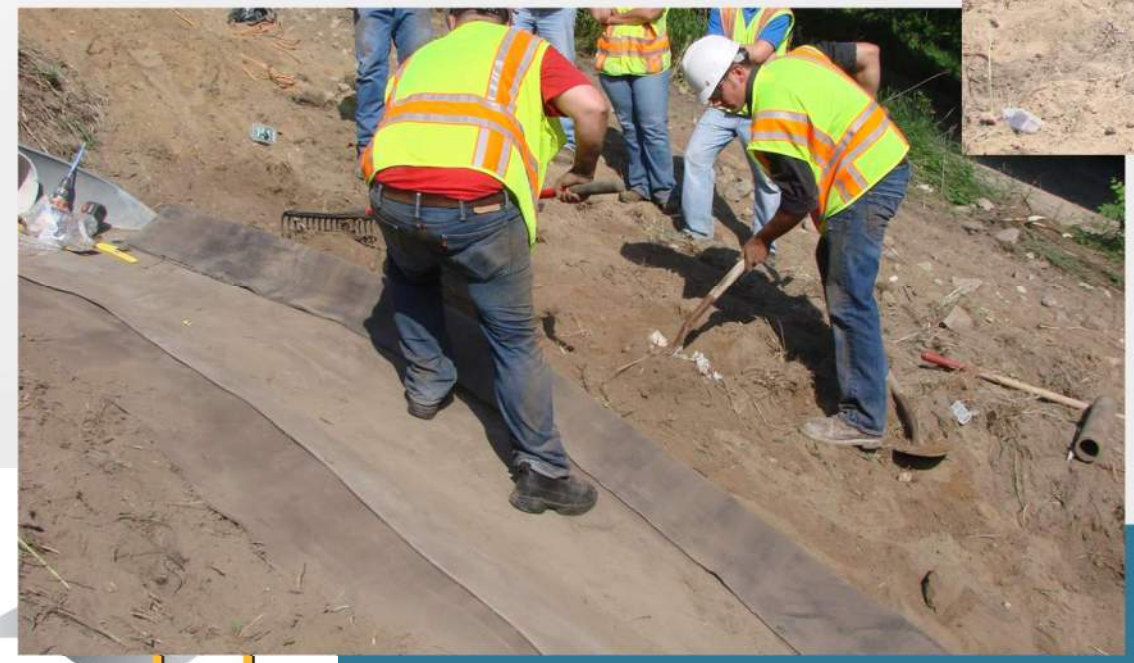


Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Concrete Cloth
    - Stabilize Slopes
    - Line Ditches

Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Concrete Cloth
    - Underdrain Outlets



Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Concrete Cloth
    - Just add water

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Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Concrete Cloth

- Milliken Concrete Cloth

Other Practices

- Culverts - Mitigating infiltration and exfiltration.
  - Weephole Repair

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WESTERN BRIDGE PRESERVATION PARTNERSHIP

Other Practices

- Culverts - Mitigating infiltration and exfiltration.
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Other Practices

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Other Practices

- Riprap Innovation

Other Practices

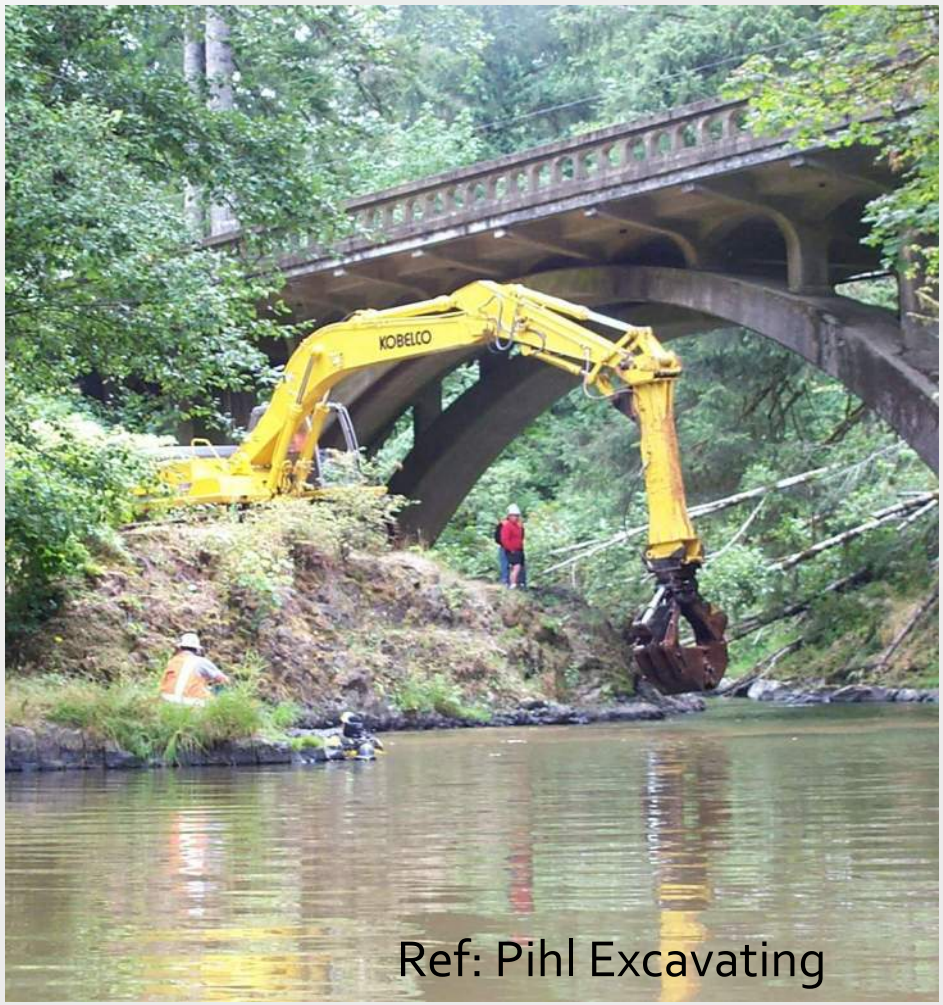
- Riprap Innovation

Other Practices

- Rip

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?

Travis Kinney
Travis.Kinney@DEAinc.com

Jason DeRuyver
Jason.DeRuyver@HDRinc.com

Jonathan Boyle
jonathan.boyle3@dot.nm.gov

Arisa Prapaisilp
arisa.prapaisilp@modot.mo.gov