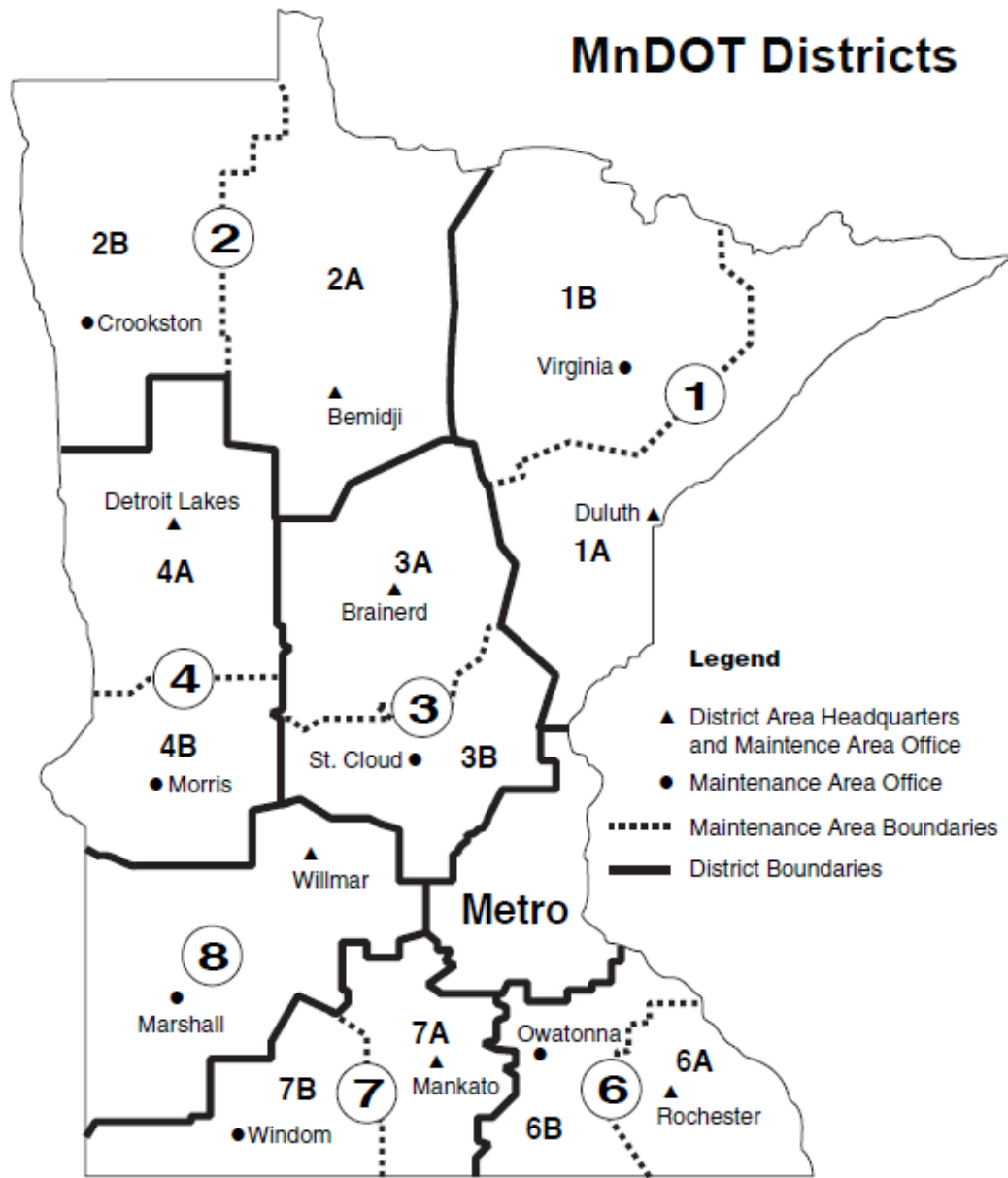


Bridge Maintenance Training for State and Local Agencies

Sarah Sondag, PE

Minnesota Department of Transportation
Bridge Operations Support



- 8 Districts
- 18 Bridge Maintenance Supervisors
- 20 Bridge Maintenance Crews



Why create a training program?

- Rapid bridge maintenance turnover
 - Over 50% of MnDOT bridge crews had less than 5 years experience
- No formal process to transfer knowledge

Succession Planning



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PRACTICES WE CAN NOT AFFORD TO DEFER

Where do we start?

Preventive Maintenance <ul style="list-style-type: none"> Demonstrates knowledge and exhibits proficient skills in bridge preventive maintenance 		1=Exceptional 2=Meets Expectations 3=Needs Improvement N/A = Not Applicable	If improvement is needed, indicate the level of urgency for training. 1 = Most Urgent – Training needed immediately 2= Urgent–Training needed in the next 6 to 12 months 3= Least Urgent – Can be trained at a later date
Bridge Flushing <ul style="list-style-type: none"> Bridge Deck Flushing Bridge Joint and Drain Flushing Superstructure Flushing Substructure Flushing 	P1	N/A- Not Applicable	N/A- Not Applicable
Crack Sealing <ul style="list-style-type: none"> Deck Crack Sealing Flood Sealing Bridge Rail Sealing Epoxy Injection 	P2	N/A- Not Applicable	N/A- Not Applicable
Bridge Painting <ul style="list-style-type: none"> Bridge preparation Spot painting beam ends/gusset plates 	P3	N/A- Not Applicable	N/A- Not Applicable
Bridge Expansion Joint Maintenance <ul style="list-style-type: none"> Gland Repair and Replacement Cover Plate 	P4	N/A- Not Applicable	N/A- Not Applicable
Cleaning and Lubricating Bearing Assemblies <ul style="list-style-type: none"> Proper Jacking Procedures Cleaning and Lubricating Bearing Assemblies 	P5	N/A- Not Applicable	N/A- Not Applicable
Poured Joint Resealing <ul style="list-style-type: none"> Resealing poured joints Sealing center median joints 	P6	N/A- Not Applicable	N/A- Not Applicable

- General Bridge Knowledge
- Preventive and Reactive Maintenance
- Tools and Equipment

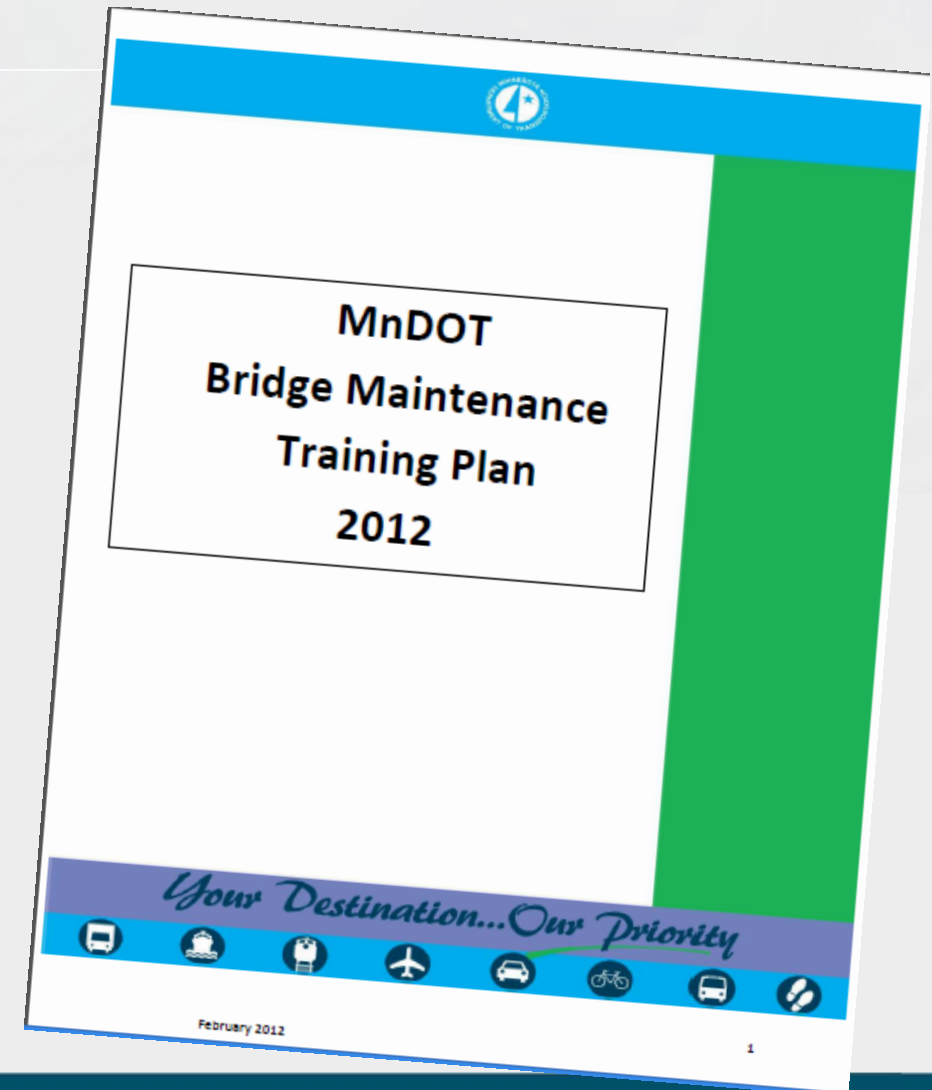
What did we find out?

- Top training needs identified:
 - Welding
 - Safety Training (Rescue)
 - Bridge Principles, Practices, Procedures and Materials
 - Concrete Finishing/Flatwork
 - Carpentry
 - Masonry
 - Repair (Steel, Concrete, Joints)



How do we implement?

- Develop a Training Plan to address top training needs:
 - Welding
 - High Angle Rescue (HAR)
 - Bridge Maintenance Academy
 - BMA 1
 - BMA 2
 - BMA 3
 - Just in Time Training





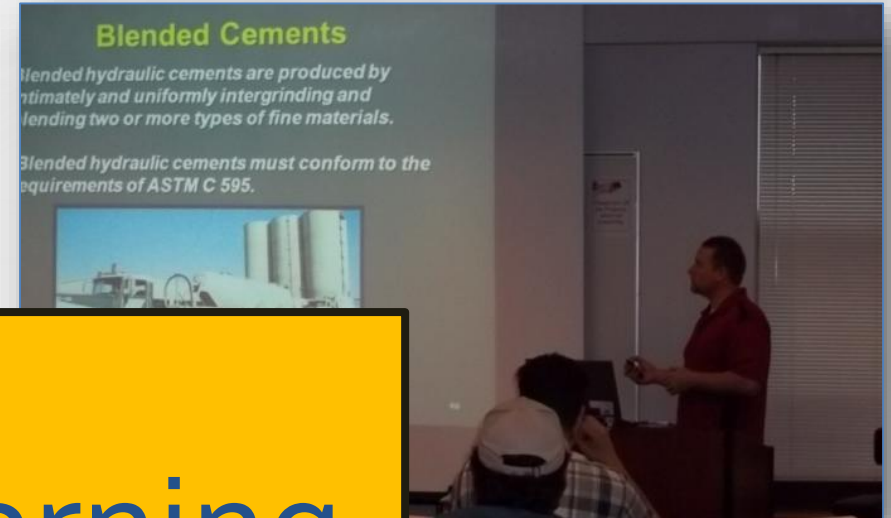
Bridge Maintenance Academy 1

Bridge Maintenance Academy 1

- Taught by Lake Superior College and MnDOT
 - Bridge Components and Elements
 - Bridge
 - Design
 - Plan R
 - Concrete
 - Safety and Traffic Control
 - Introduction to Bridge Preservation



BMA 1 eLearning



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Bridge Maintenance Academy 2

Bridge Maintenance Academy 2

- Hands on Training
 - Forming
 - Plan reading applications for a concrete slab and abutment
 - Placing, curing and finishing concrete
 - Placing, bending and tying rebar
 - Detecting, removing and patching delaminated areas
 - Installing a steel beam stiffener
- Classroom Presentations
 - Structural Steel
 - Formwork and Timber Bridge Maintenance

Bridge Maintenance Academy 2

Build and set forms



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Bridge Maintenance Academy 2

Practice
techniques



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Bridge Maintenance Academy 2



Cut, Bend and Place Reinforcing Steel



Set forms



Place concrete

Bridge Maintenance Academy 2

Place and Screed Concrete



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Bridge Maintenance Academy 2

Finishing



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PRACTICES WE CAN NOT AFFORD TO DEFER

Bridge Maintenance Academy 2

Tining, Brooming, Cutting a Relief Joint



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PRACTICES WE CAN NOT AFFORD TO DEFER

Bridge Maintenance Academy 2



Deck Repair



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PRACTICES WE CAN NOT AFFORD TO DEFER

Bridge Maintenance Academy 2



Steel Repair



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PRACTICES WE CAN NOT AFFORD TO DEFER

Bridge Maintenance Academy 2

Steel Repair



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Bridge Maintenance Academy 2

Turn of the nut method vs. DTI



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Bridge Maintenance Academy 2

- Goals
 - Transfer knowledge and skills from experienced bridge workers to the next generation of bridge workers
 - Ensure that uniform bridge maintenance practices are applied statewide



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Bridge Maintenance Academy 2

- Challenges
 - Training location
 - Sequence of Events
 - Materials
 - Tools and Equipment
 - Instructors
 - Group Leader Volunteers
 - Curriculum Development



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Bridge Maintenance Academy 3

Bridge Maintenance Academy 3

- Construct three small bridges from BMA 2 slabs and abutments
 - Set bearings
 - Set beams
 - Form and pour a deck
 - Set a strip seal expansion device
- Jacking techniques



Bridge Maintenance Academy 3

Set Bearings and Beams



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PRACTICES WE CAN NOT AFFORD TO DEFER

Bridge Maintenance Academy 3



Construct
Deck
Falsework



Install Strip Seal Extrusion



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Bridge Maintenance Academy 3

Place and
Tie Deck
Reinforcing
Steel



Place Deck
Concrete



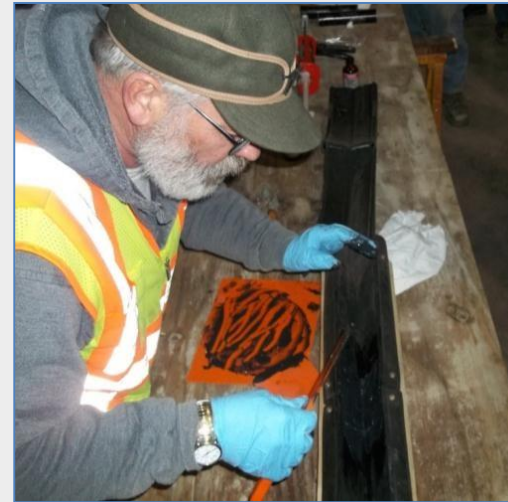
Bridge Maintenance Academy 3

Presentations

- Strip Seal Joint Maintenance
- Bearing Maintenance
- Bridge Jacking Considerations



Strip Seal
Gland Repair
Demonstration



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Bridge Maintenance Academy 3

Remove Deck Falsework



Full Depth Deck Patching



Bridge Maintenance Academy 3

Install Strip Seal Gland



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Bridge Maintenance Academy 3



Bridge
Jacking



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e-LEARNING

Other Bridge Maintenance Training



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Welding

- Taught by Lake Superior College
 - Welding Basics
 - Intermediate Welding

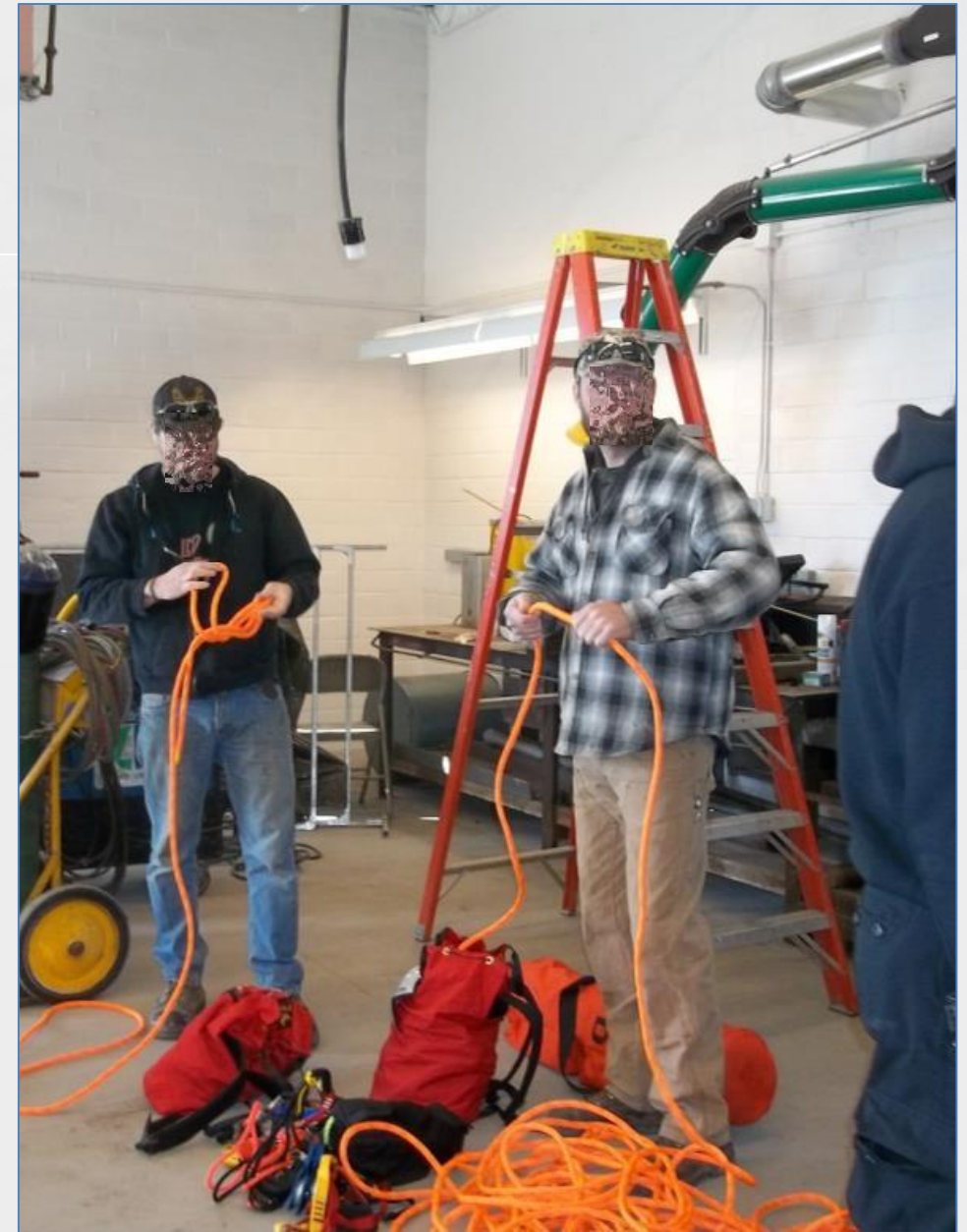


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PRACTICES WE CAN NOT AFFORD TO DEFER

High Angle Rescue (HAR)

- Performed by First Strike Safety through Lake Superior College
 - Three-day initial class
 - Two-day refresher
- Rescue Planning
- Knot Tying
- Equipment Familiarization and Inspection

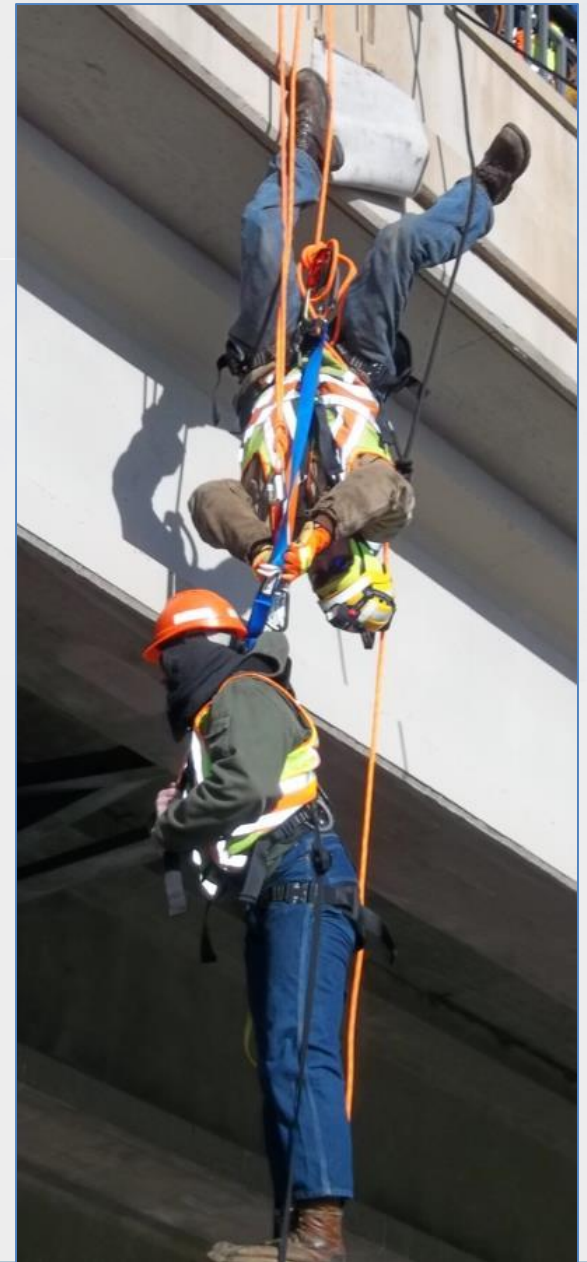


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PRACTICES WE CAN NOT AFFORD TO DEFER

High Angle Rescue (HAR)

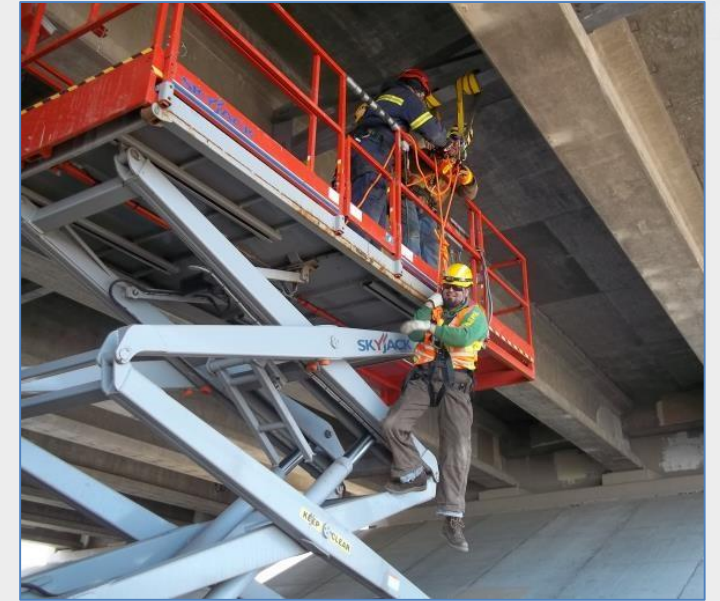
- Self Rescue Techniques
 - Anchorage Identification
 - Ascending
 - Descending (rappelling)
 - Pick-off Rescue



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PRACTICES WE CAN NOT AFFORD TO DEFER

High Angle Rescue (HAR)



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High Angle Rescue (HAR)

- Confined Space Rescue Options



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Rescue Exercises



Duluth/Superior
Fire Departments



St. Paul Fire Department

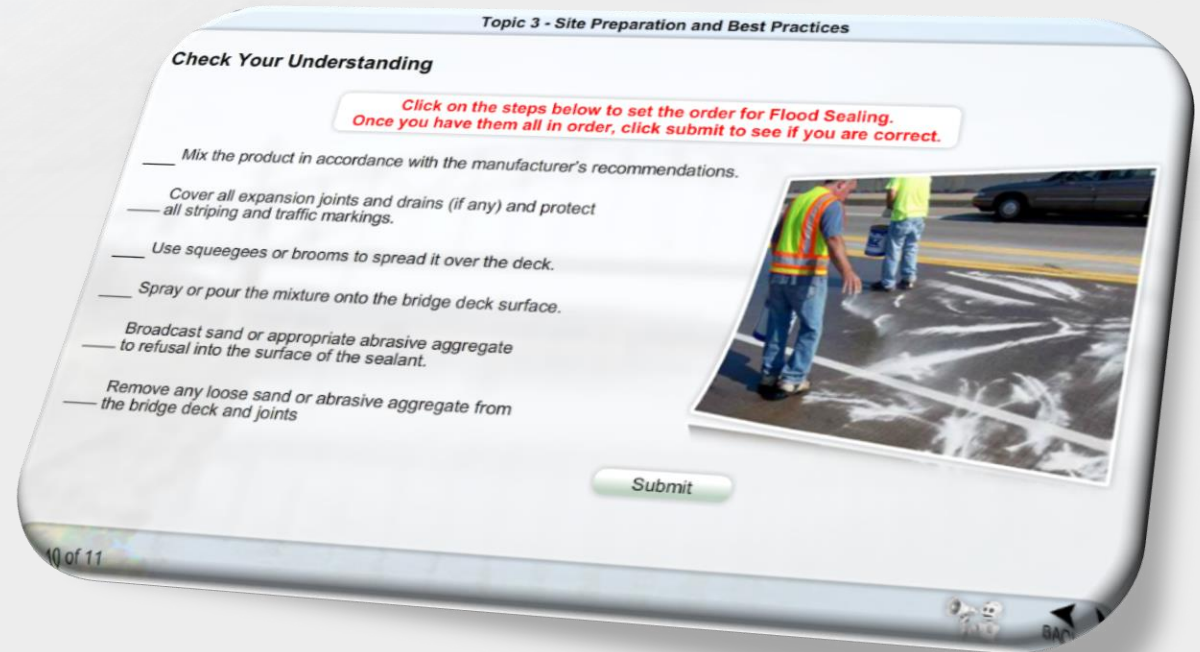


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PRACTICES WE CAN NOT AFFORD TO DEFER

Just In Time Training (JITT)

- Introduction to typical bridge preventive maintenance activities
 - Preparation and Planning
 - Equipment and Materials
 - Best Practices
- eLearning Modules
 - Bridge Flushing
 - Crack Sealing
 - Joint Sealing
 - Strip Seal Gland Repair



<http://www.dot.state.mn.us/bridge/training.html>

Thank You!

Questions?

Sarah Sondag, PE
Minnesota Department of Transportation
Bridge Operations Support