Accessibility / Inspectability / Maintainability

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Oregon Department of Transportation
Purpose of this Presentation

- Case Studies that could be referred to by some as “DUH” moments.

- An opportunity to reflect on your operations and design standards.

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Objective of this Presentation

1. Re-organizing an agency and increased outsourcing can be perilous.

2. Bottom-line, we need:
   - Bridges that are Accessible,
   - Inspectable, and
   - Maintainable.
Presentation Outline

1. Our legal responsibilities
2. Who has a vested interest in these decisions
3. Access Methods
4. Bridge Safety / Maintainability Issues
5. Bridge Materials
6. Complex Structures

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Who has a vested interest in these decisions?
Transportation Interests

- Vehicular Traffic
- Pedestrians
- Trains
- Buses
- Freight
- Navigation
Agency and Other Agency Personnel

- Bridge Inspection Personnel

- Maintenance Personnel

- Bridge Maintenance

- Electricians

- Traffic Signs

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Agency and Other Agency Personnel

- Bridge Engineers

✓ Load Raters

✓ Bridge Repairs / Rehab Designers

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First Step

✓ Understand the distinction between process safety (bridge features) and personal safety (PPE and procedures).

✓ Understand the total impacts associated with site-specific trade-offs.

✓ Understand the value and content of a Bridge Specific Job Hazard Assessment (JHA).
Job Hazard Assessment (JHA)

✓ List step-by-step procedures that have to be performed in order to complete the assigned task.

✓ Identify the safety hazards that are associated with each step.

✓ Describe how each hazard is going to be mitigated.
Accessing Bridge Components

#1 - - - No Parking / Work Staging Area
Parking / Work Staging Area
Parking / Work Staging Area

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Accessing Bridge Components

- Using a Ladder (low tech)
- Using a UBIT / Man-lift
- Using Climbing Techniques
Access Using a Ladder
Access Using a Ladder
Access Using a Ladder / Man-lift
Access Using a Ladder / Man-lift
Access Ladder Pad
Access Using a Ladder vs Man-lift
Accessing Bridge Components

- Using a UBIT / Man-lift
- Using Climbing Techniques
Access Using a Man-lift (UBIT)
Access Using a Man-lift (UBIT)
Access Using a Man-lift (UBIT)
Inspection / Maintenance Access

Concrete Segmental Bridge
– Limited Access
Dealing with Freight Corridors
Dealing with Railroads
Access Using Climbing Techniques
Access Using Climbing Techniques
Access by Climbing
Access Using Climbing Techniques
Accessing Other Bridge Components
Accessing Bridge Components

3. Fall Restraint Systems

4. Catwalks / Railings

5. Accessing component interior

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Access Using Climbing Techniques

Fall Restraint System
Providing Access can be a Challenge

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Use of Fall Restraint Systems
Use of Fall Restraint Systems
Use of Fall Restraint Systems

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Access Case Study
Access Case Study

Steel Tied Arch Channel Span

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Access Case Study

Completed Structure
Access Case Study

Hanger Cable Systems

- Vertical cables
- Simplicity
- Cross cables
- Reduction in deflections and moments
- Radial cables
- Aesthetics

Vertical cables

Cross cables (network)

Radial cables
Access Case Study
Bridge Inspection / Maintenance
Safety Issues

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Bridge Inspection / Maintenance Safety Issues

- Transients
- Bridge Railings
- Utilities
- Confined Space Entry

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Build a Flat Area and They Will Come
Bridge Inspection / Maintenance
Fall Restraint Issue – Bridge Railings
Utilities Located on a Bridge

Sewer Line
(Utilities - APWA Color Code)

- Electrical
- Gas
- Communication
- Potable Water
- Irrigation
- Sewer

- Company & Phone No.
- Red
- Company & Phone No.
- Yellow
- Company & Phone No.
- Orange
- Company & Phone No.
- Blue
- Company & Phone No.
- Purple
- Company & Phone No.
- Green

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Utilities

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Utility Exposure
Utility Maintenance
Confined Space Entry

Permit Required Entry

Vs

No Permit Required Entry

Huge difference in entry requirements

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Inspectability & Maintainability
(Safety Issues)

Confined Space
Air Quality inside of a Box Girder
Air Quality inside of a Box Girder
Animal Habitat
Provide access to Potential Nesting area
They will come.
Animal Habitat - Bats
Proactive promotion of Bat Habitat
Animal Habitat - Bats
Bridge Materials

All Materials are not Created Equal

✓ Design Standards
✓ ODOT Qualified Products List
✓ Bridge Maintenance Personnel Expertise
✓ Bridge Deterioration Modeling

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Bridge Maintenance
Maintenance
Graffiti Management
Complex Structures
Complex Structures

Identify and Location of Critical Features

✓ Operational Features

✓ Unique Details

✓ Owners Manual Needed

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Owners Manual Information

✓ Procedures to Access each Unique Detail?

✓ How should the condition of the feature be assessed?

✓ How Frequent should the component be assessed?

✓ What are the maintenance procedure?

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Complex Structures
Legal Responsibilities

Bottom-line Solution:

Get involved in the bridge plan review process throughout the bridge design phase.

You will find Designers are much more receptive Early-On than Later-On.
Questions ? ? ?