Forest Bridges & Other Structures

2017 Western Region COFE Seminar

January 19, 2017

McGee Engineering Inc.

Alex Dunn, PE

- Graduated OSU 2003
  - BS Forest Engineering
  - BS Civil Engineering
- McGee Engineering 2003-present
  - Bridge Engineer, Vice President

McGee Engineering

- Founded 1994 by Dennis McGee
- Bridge Engineering Specialists
  - Permanent Bridges & Structures
    - Design
    - Inspection
  - Contractor Engineering
    - Falsework
    - Work Bridges, Detour Bridges
    - Shoring
    - Cofferdams
    - Fabrication Engineering
- Structural Engineering

Overview

- What role do Engineers play in the woods?
- Industry trends
- What tools are in your Toolbox?

What is Engineering?

- ORS 672.005 “Applying special knowledge of the mathematical, physical and engineering sciences to such professional services or creative work as…design…in connection with any public or private…structures…”
- The practical application of science
- Use calculations to predict structural behavior

Why do we have Engineers?

- Societal Expectation: Structures are Safe
  - Design Codes provide minimum standard
  - Material Specifications and Testing
  - Construction Inspection
  - Periodic Inspection & Maintenance
- Engineers ensure LIFE SAFETY
- Engineers are expected to know better

How do we apply this to our work?

- Identify the problem
  - Observations
  - Experience
- Solve the problem
  - Technical Skills
  - Experience
- Know when to get help
- Do not assume: VERIFY
- Use your ENGINEERING JUDGEMENT to identify and react to LIFE SAFETY concerns

Industry Trends

- Landowners have less technical depth
  - Subcontractors fill in
- Durability, maintenance, life span are driving structure decisions
- Fewer bridge specialty contractors available
  - High-skill road builders fill in
  - Must be considered during design

Forest Bridges & Other Structures

- Primarily stream crossing structures
- Most visible environmental impact projects
  - Regulatory requirements
- Expensive
  - Construction Costs
  - Legacy Costs: maintenance and replacement
- Require specialty contractors
- Many structure options (tools in your toolbox)

Inspection

- Why do we inspect structures?
  - To protect public safety
  - Assist maintenance planning
  - Ensure reliable performance
  - Regulatory requirements

- How often to inspect?
  - Public structures > 20’: Every 24 months (maximum)
  - Washington (WAC 296-54-531): Annually
  - Pre-operation

- Who should perform the inspection?
  - Public structures: Trained bridge inspector
  - WAC 296-54-531: Competent Person

McGee Inspection

- Typically 4 year inspection cycle
  - 2 years if any wood elements
  - More frequent if necessary
- Inspection Team
  - At least one PE
  - NHI/FHWA 2-week Bridge Inspector Training
  - 1-week Fracture Critical Inspection Training
  - Average 200 inspections annually

What to do if you find a problem

- If LIFE SAFETY issue is found, physically CLOSE THE BRIDGE
- Load restriction (analysis required)
  - Post load limit signs
- Perform maintenance or repairs

Toolbox

- Culvert
  - Round
  - Squash
  - Bottomless Arch
  - Box Culvert
- Bridge
  - Concrete
  - Steel
  - Timber


01/29/2012 02:13


KOBELCO


R
L

How do you decide which tool to use?

- Budget
- Schedule
- Geometry
- Detour/re-route options
- Foundation/geotechnical
- Regulations
- Construction limitations
- Lifespan
- Maintenance

Why not a Railcar?

- Not designed as bridge
- Difficult to analyze
- Too narrow – 7’-6” wide
- Undesirable load path
- No redundancy
- Stability concerns
- Why isn’t the railroad using it?

What if you have a railcar?

- Make sure it is properly supported
- Make it easy to get on/off – good approaches
- Upgrade deck & rail system
- Restrict loading & vehicle width
- Replace with engineered structure


Questions?
www.mcgee-engineering.com