Bridge Load Rating and Inspection

Council of Forest Engineers, January 12, 2023, 3:00 PM

Ray Bottenberg, State Bridge Engineer

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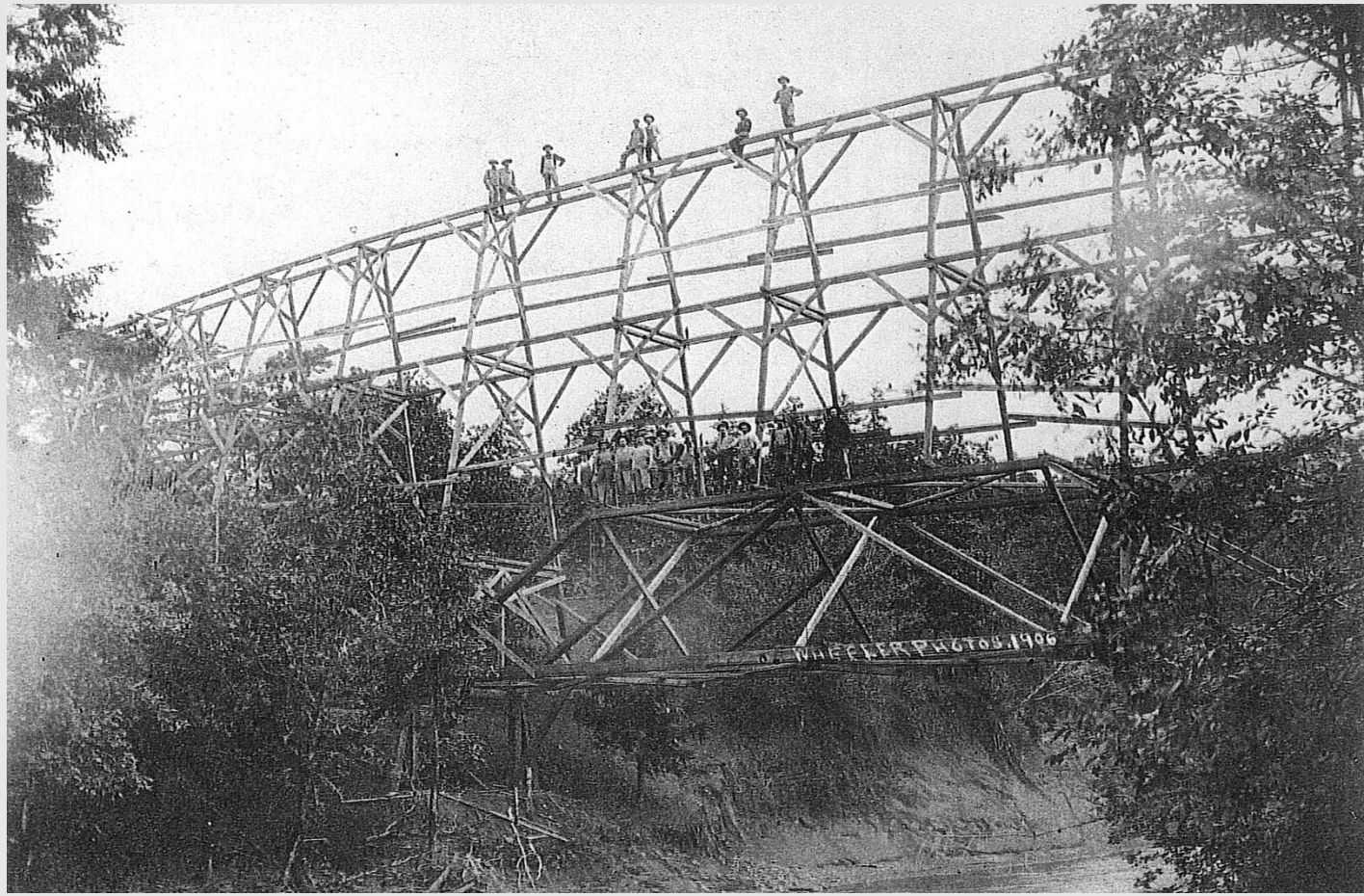
Welcome – History Moment

Lumber flume under construction 1906, crossing Mill Creek near Buell. Timber structure only lasted until 1919.

Illustrative of bridge challenges.

Photo courtesy John Cruickshank



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Objectives

- What law governs load rating & inspection?
- Why is the NBIS important in Oregon?
- What has changed in the latest NBIS?
- What is a load rating?
- What's up with Emergency Vehicles?

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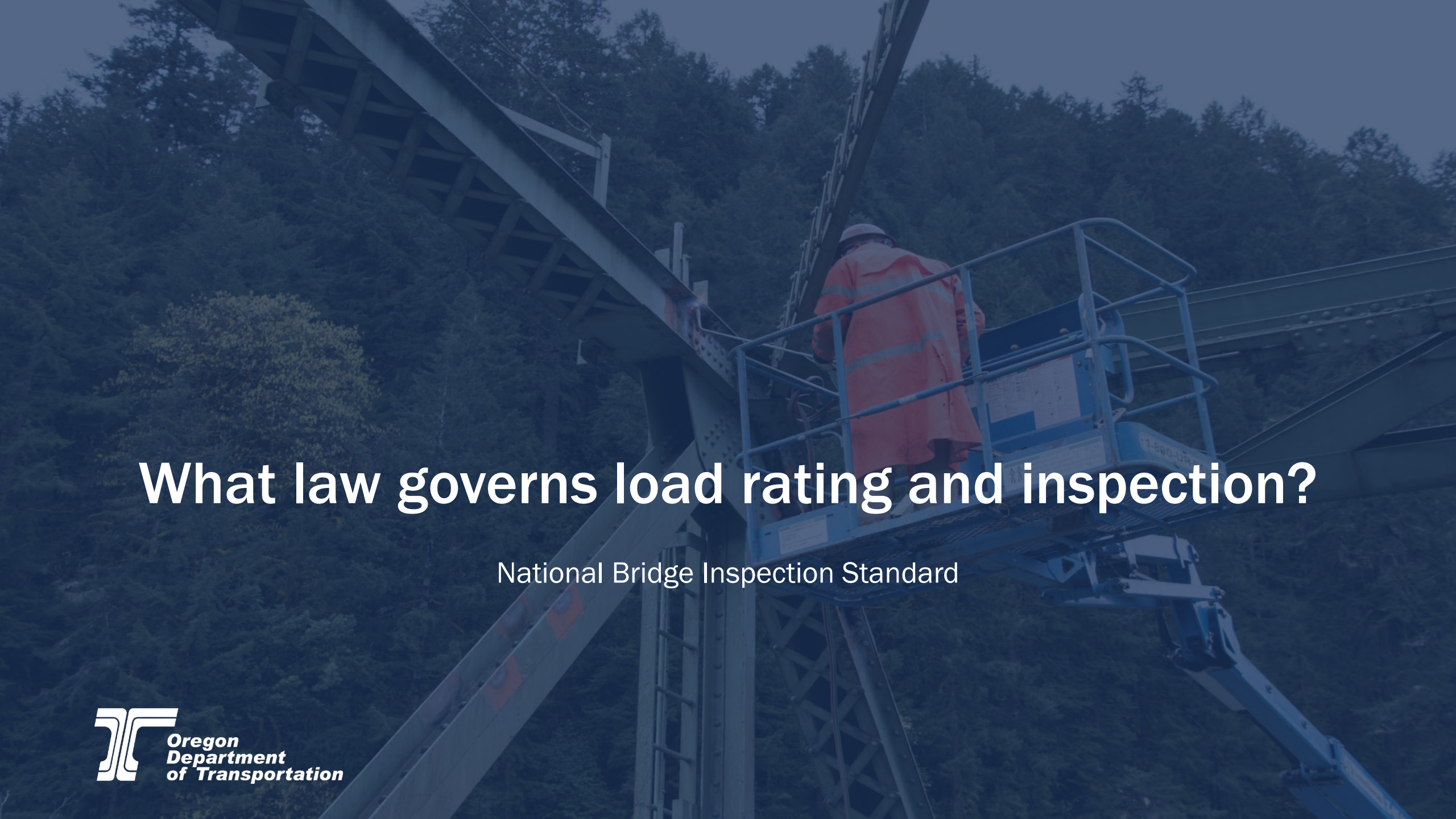

What law governs load rating and inspection?

National Bridge Inspection Standard

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National Bridge Inspection Standard

- Federal law governing inspection and load rating of public road bridges – 23 CFR Part 650
- Implementation regulations provided in SNBI (Specification for the National Bridge Inventory) created by FHWA
- Purpose is to maintain an adequate level of safety

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Entities Subject to NBIS

All owners or operators of public road bridges

Major owners of public road bridges include:

State Department of Transportation

County Road Authority

City Road Authority

Port Authority

Bureau of Land Management

U.S. Forest Service

Entities Subject to NBIS

All owners or operators of public road bridges

Other owners of public road bridges include (but are not limited to):

Tribes

Homeowners' Association

State Agencies

Federal Agencies

Corporations

What Does the NBIS Mean to Oregon?

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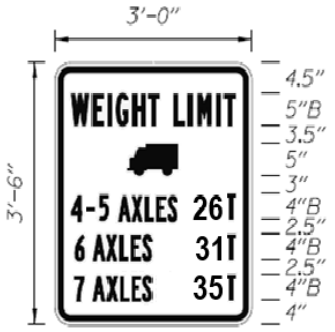
What Does the NBIS Mean to Oregon

Public safety – Load Ratings and Condition Inspections

Federal funding for bridges and highways can be affected by failure to comply

Significant cost and effort to comply

Weight Limit Signs from ODOT Sign Policy and Guidelines, Chapter 3, page 3-112



Sign No. OR12-5g

Pre-2022 Cost to Comply With NBIS in Oregon

- 21 permanent and 3 temporary ODOT positions
- Contracted services costs per biennium:
  - State (2726 bridges) - $3.3M for load rating, $3.5M for inspection
  - Local Agencies (4128 bridges) - $7.7M for load rating, $4.7M for inspection
- ODOT has agreements with AOC & LOC to use some of their federal funding to comply

Changes in the June 6, 2022 NBIS

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Changes in June 6, 2022 NBIS

- Bridge Inspector Qualifications & Registry
- Handling of Critical Findings
- Revamped Annual Data Submittal to FHWA
  - Specifications for National Bridge Inventory (SNBI) governs
  - 154 items on 19,731 bridge spans (3,038,574 items)
  - Was 113 items on 6997 bridges (790,661 items)
- Scour
- Seismic Assessment - New Requirement

New Scour Requirements – Oregon Impacts

Scour Critical Bridges to be inspected on 12 month interval

- Up to 3272 bridges may be scour critical
- Inspection interval was 24 months

Scour documentation requirements

- “Easy” transition
- Forms don’t crosswalk
- 5774 Bridges over water

Field observation of actual conditions

Added Cost for Compliance

The added cost to achieve and maintain compliance is still being evaluated, at this point it appears to be:

- 3 FTE + $16.5M contract services to achieve compliance.
- 6 FTE + $850k per year contract services to maintain compliance.

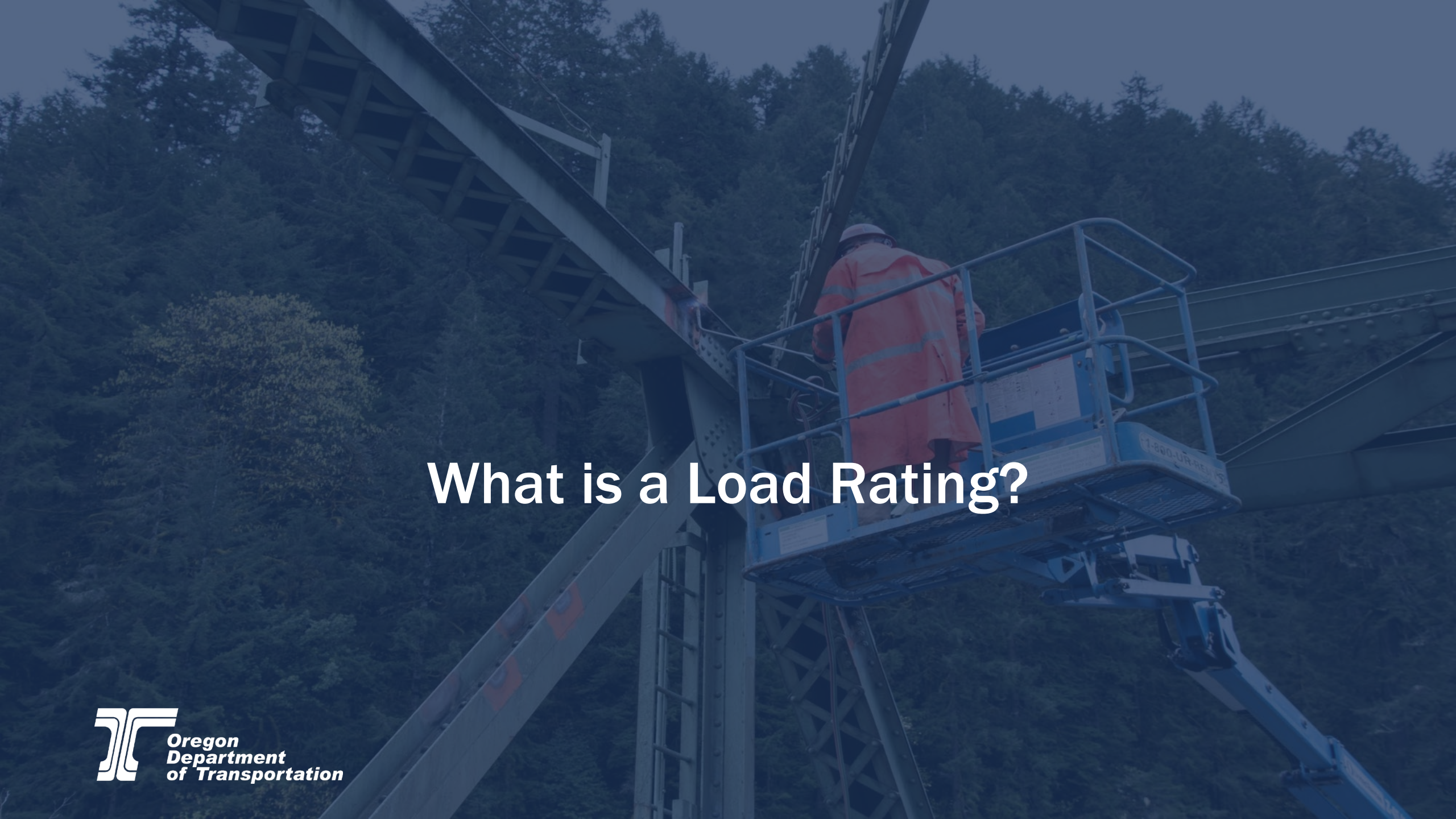
Compliance Deadlines

Scour Documentation: June 6, 2024

Scour Critical Inspections at 12 months: June 6, 2024

Seismic Assessment: Program in place June 6, 2024

Annual Submittal Larger Database: Full compliance 2028



What is a Load Rating?

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FHWA-mandated load ratings

- What is a load rating? Engineering analysis/safe carrying capacity
- Federal mandate to Load Rate all Public Access Bridges
- Federally mandated short window: 30 days to post

This is about safety!

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Why do Load Ratings?

- Compliance with federal law
- Bigger, heavier vehicles
  - Specialized Hauling Vehicles (SHVs)
  - FAST Act Emergency Vehicles
- More traffic
- Older bridge design and natural deterioration

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Weight Restriction

- If a bridge can’t safely carry legal vehicles, a weight restriction is necessary.
- If necessary, 30 days to post.
- ODOT reaches out to local agency bridge owners before issuing load restriction.

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Safety

- History does not guarantee future performance.

- Ratings now look at:
  - More and heavier vehicles.
  - New design and load rating philosophies.
  - More extensive analysis of parts and areas of bridges.
  - A better understanding of bridge failures.

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What's up with Emergency Vehicles?

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Emergency Vehicles

The FAST Act federal mandate:

- Evaluate all 1,175 bridges within one mile of an Oregon Interstate.

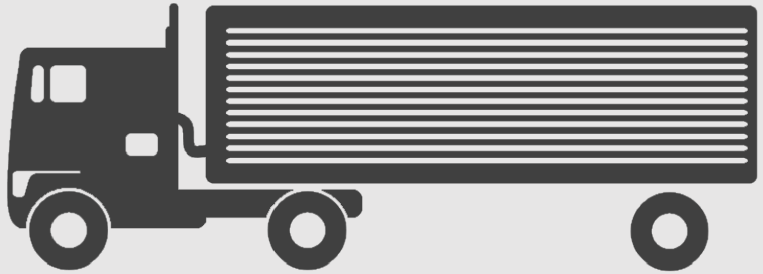
- Note: FAST Act emergency vehicle load ratings only affect emergency vehicles that exceed current legal axle weights.
  - Most emergency vehicles are within legal axle weights.

Why Emergency Vehicles?

Truck/Vehicle Design Standards Used in Most Existing Bridges

1930's - 1940's: H 15 (15 tons)

1940's - 1990's: HS 20 (36 tons)

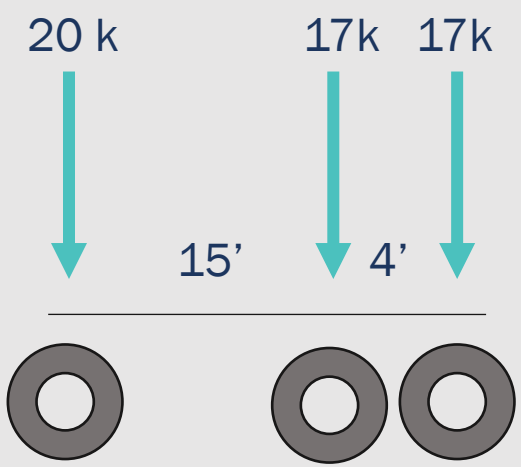


Modern Vehicles on the Roads Today

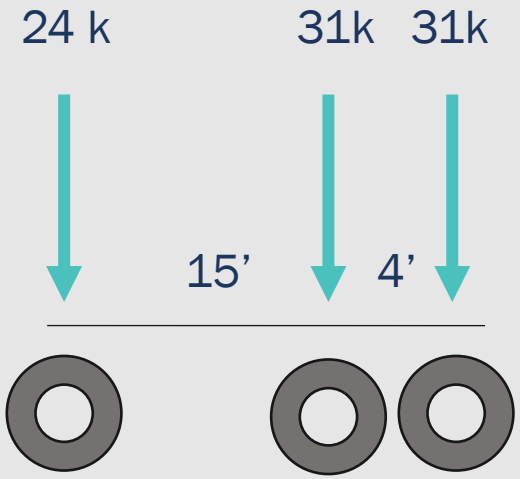
Emergency Vehicle (EV) (43 tons)

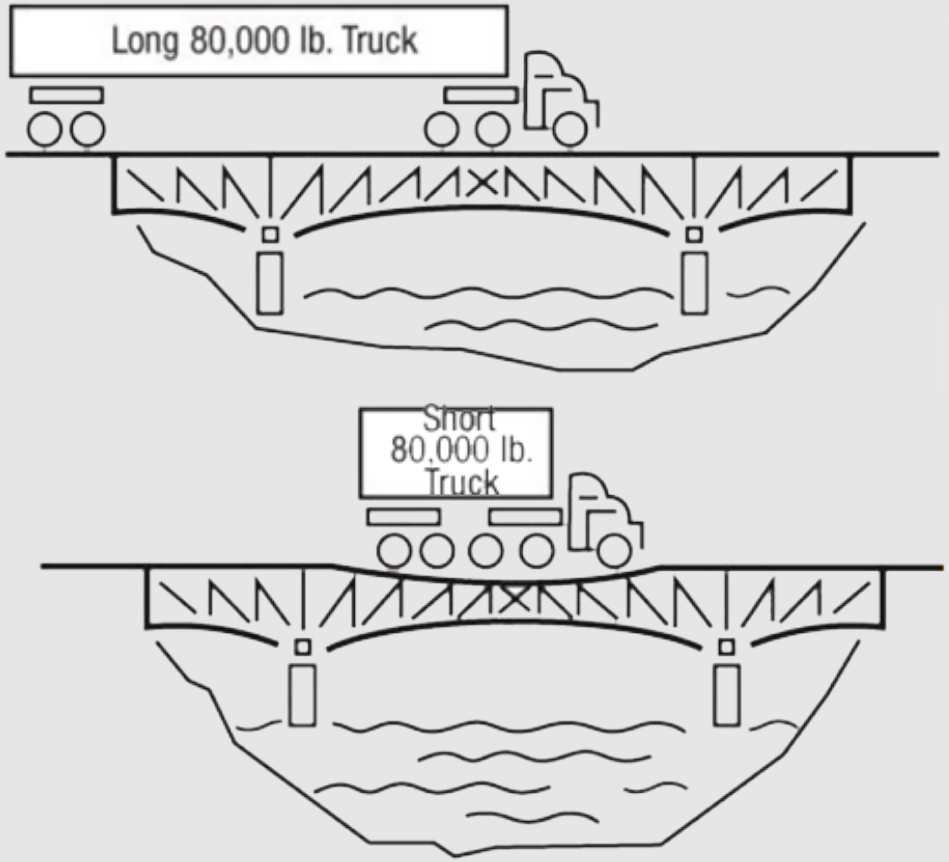
Different stress on the bridge!

Standard Legal Truck



Some Emergency Vehicles





Safety

- Safety is our primary concern
  - The laws of physics are the same – even in an emergency!

Los Altos, CA, April 2001: A 19-ton emergency vehicle on a bridge that had been rated for 18 tons in 1979.

Are Bridge Repairs/Strengthening Possible?

- Sometimes.
- It’s a case-by-case situation.
- Any repairs are responsibility of bridge owner.
- Strengthening not legally required.
- Detours may be possible.
- One-lane operation may be possible.

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Questions?

Further questions?

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