Rehabilitation of Historic West Monitor Truss Bridge

Western Bridge Engineers' Seminar
September 26, 2011

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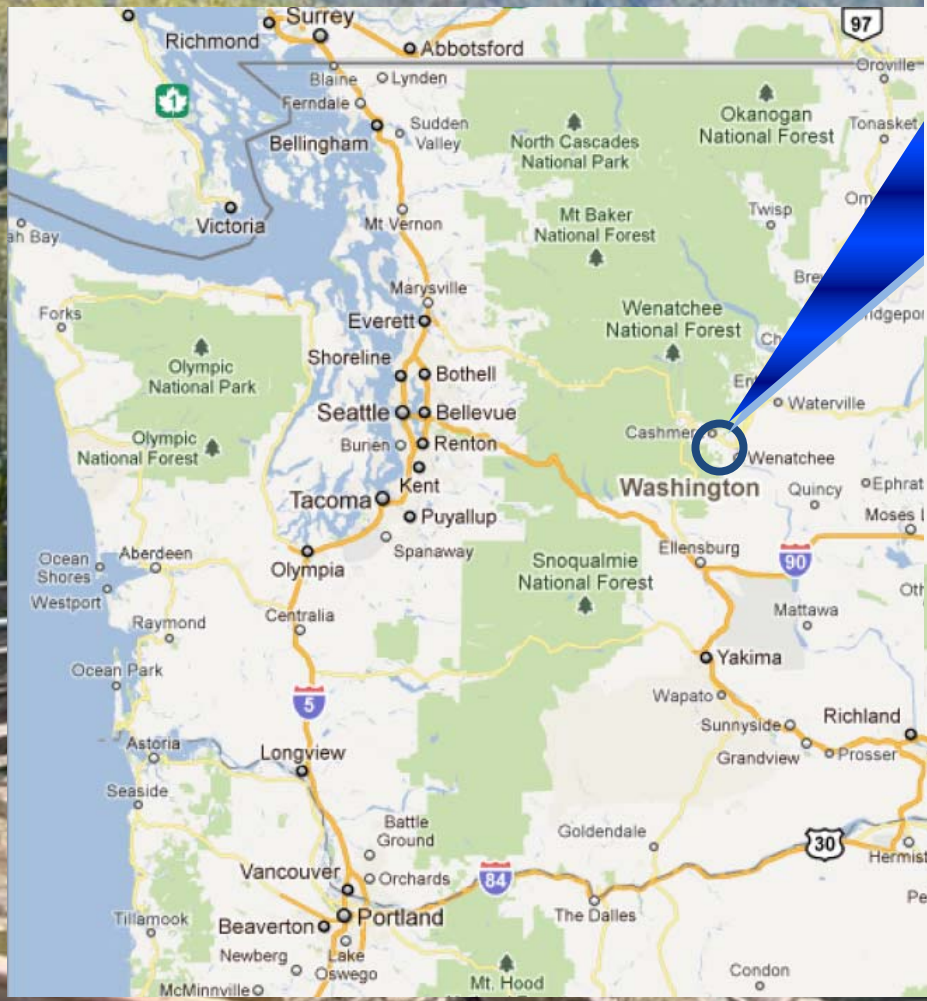
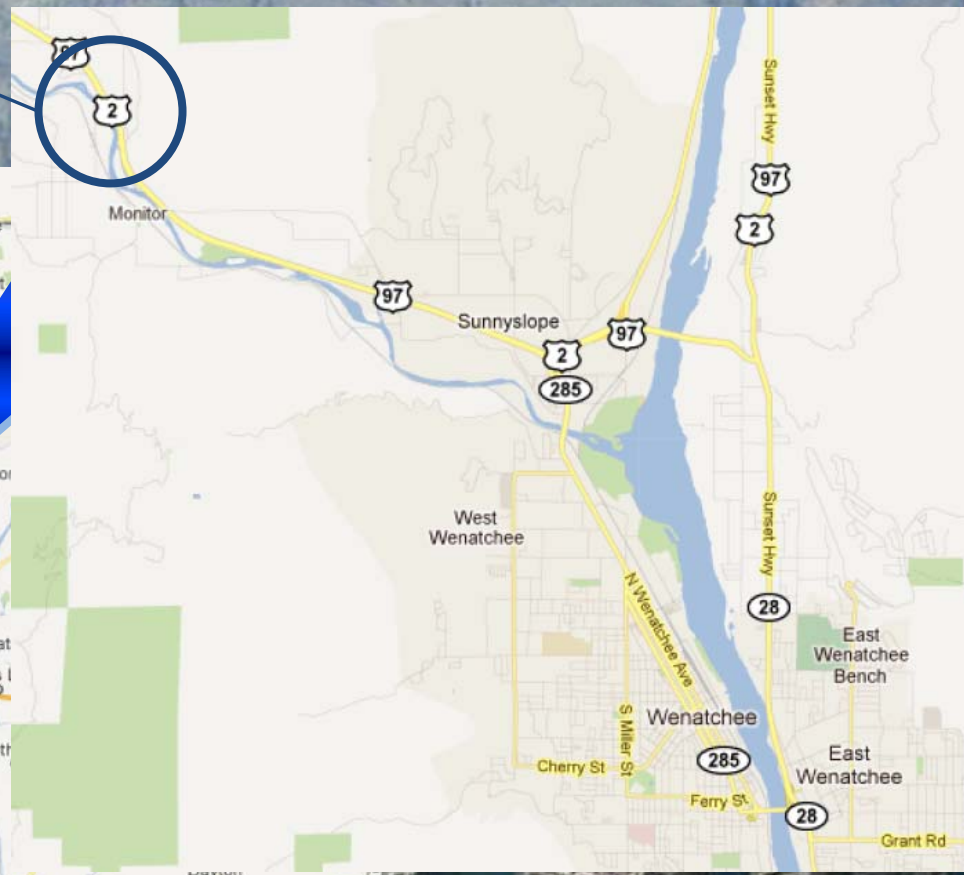
Location

West Monitor Bridge





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West Monitor Bridge

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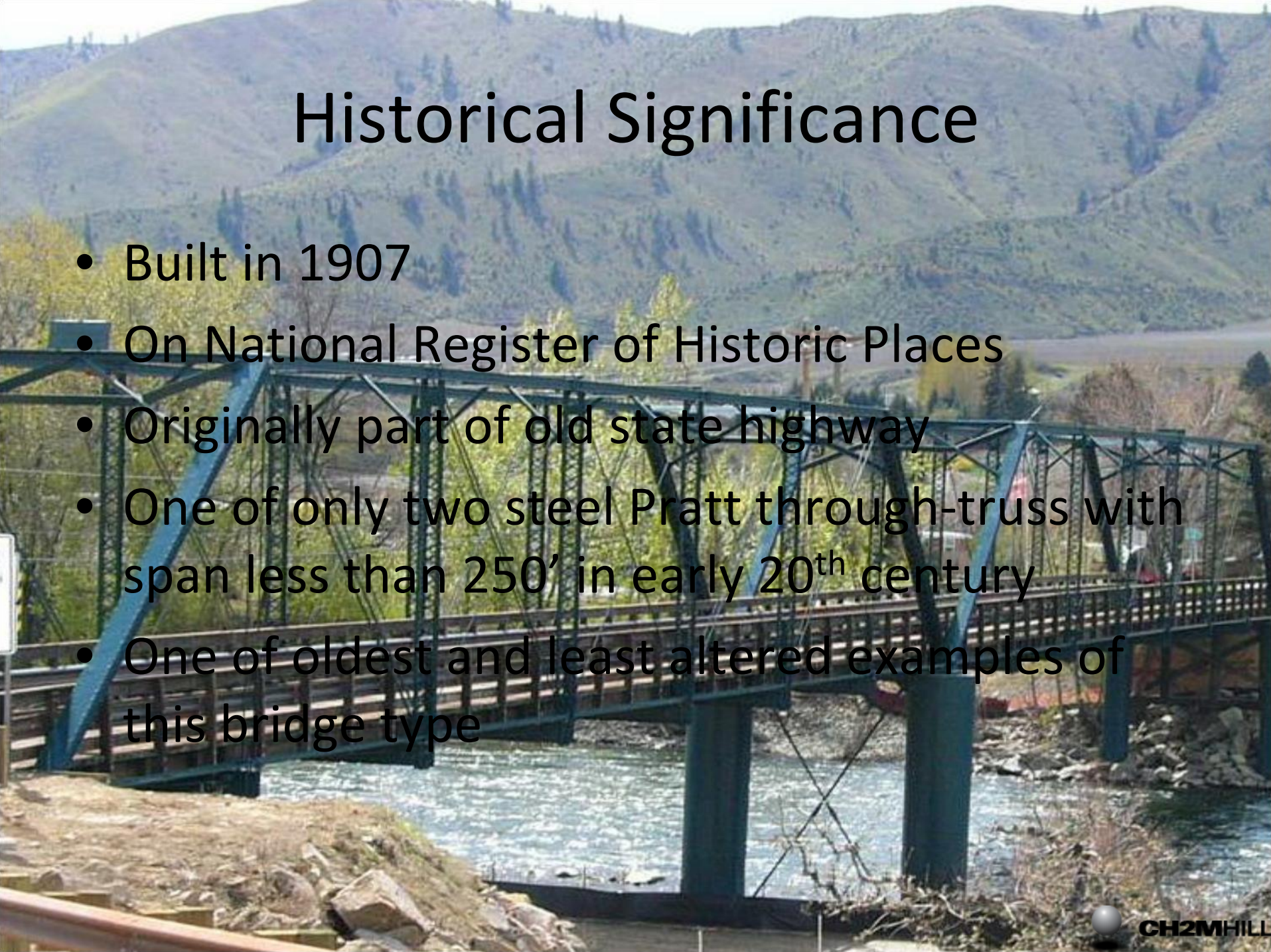
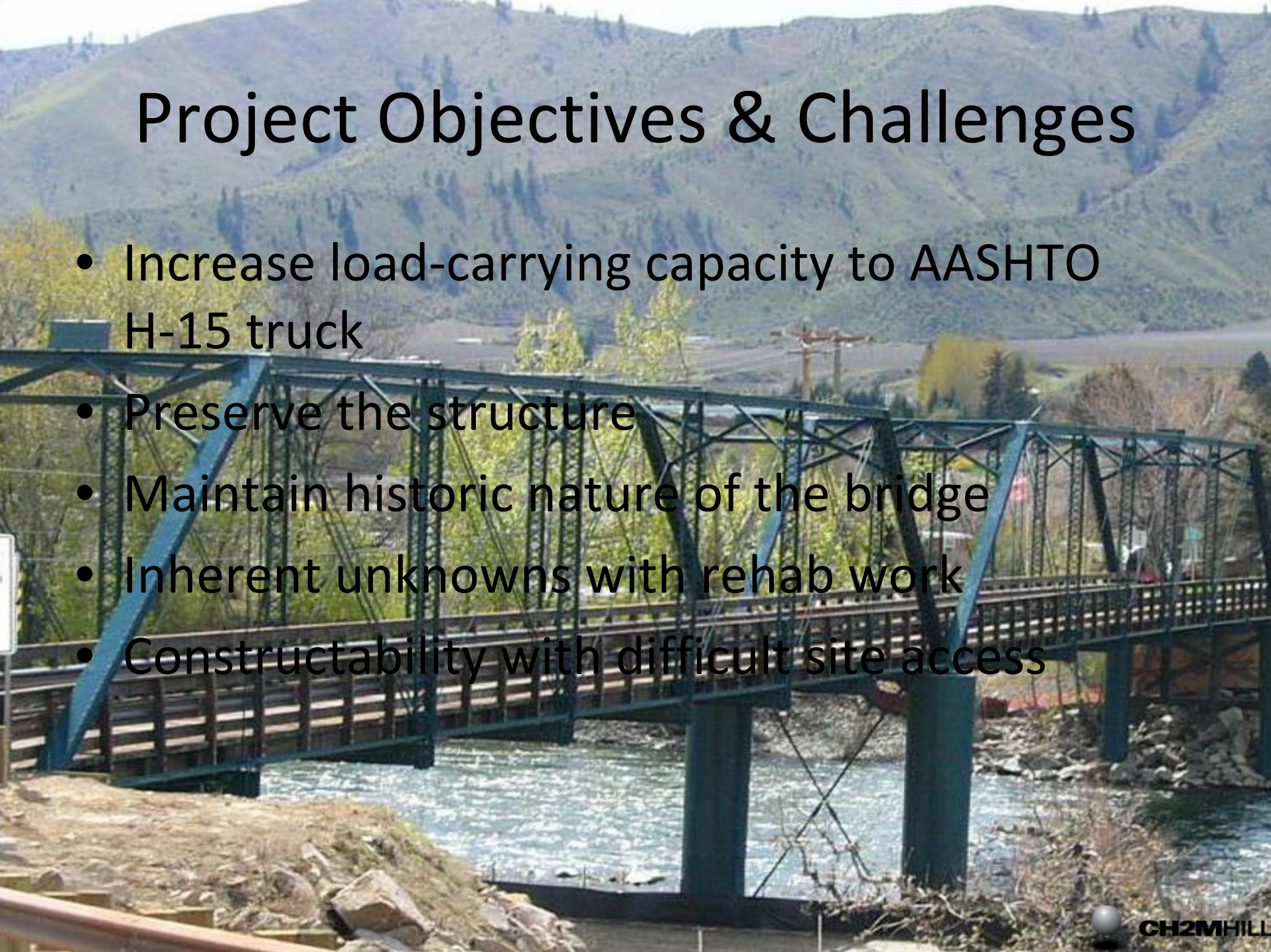
Historical Significance

- Built in 1907
- On National Register of Historic Places
- Originally part of old state highway
- One of only two steel Pratt through-truss with span less than 250’ in early 20th century
- One of oldest and least altered examples of this bridge type



Project Objectives & Challenges

- Increase load-carrying capacity to AASHTO H-15 truck
- Preserve the structure
- Maintain historic nature of the bridge
- Inherent unknowns with rehab work
- Constructability with difficult site access



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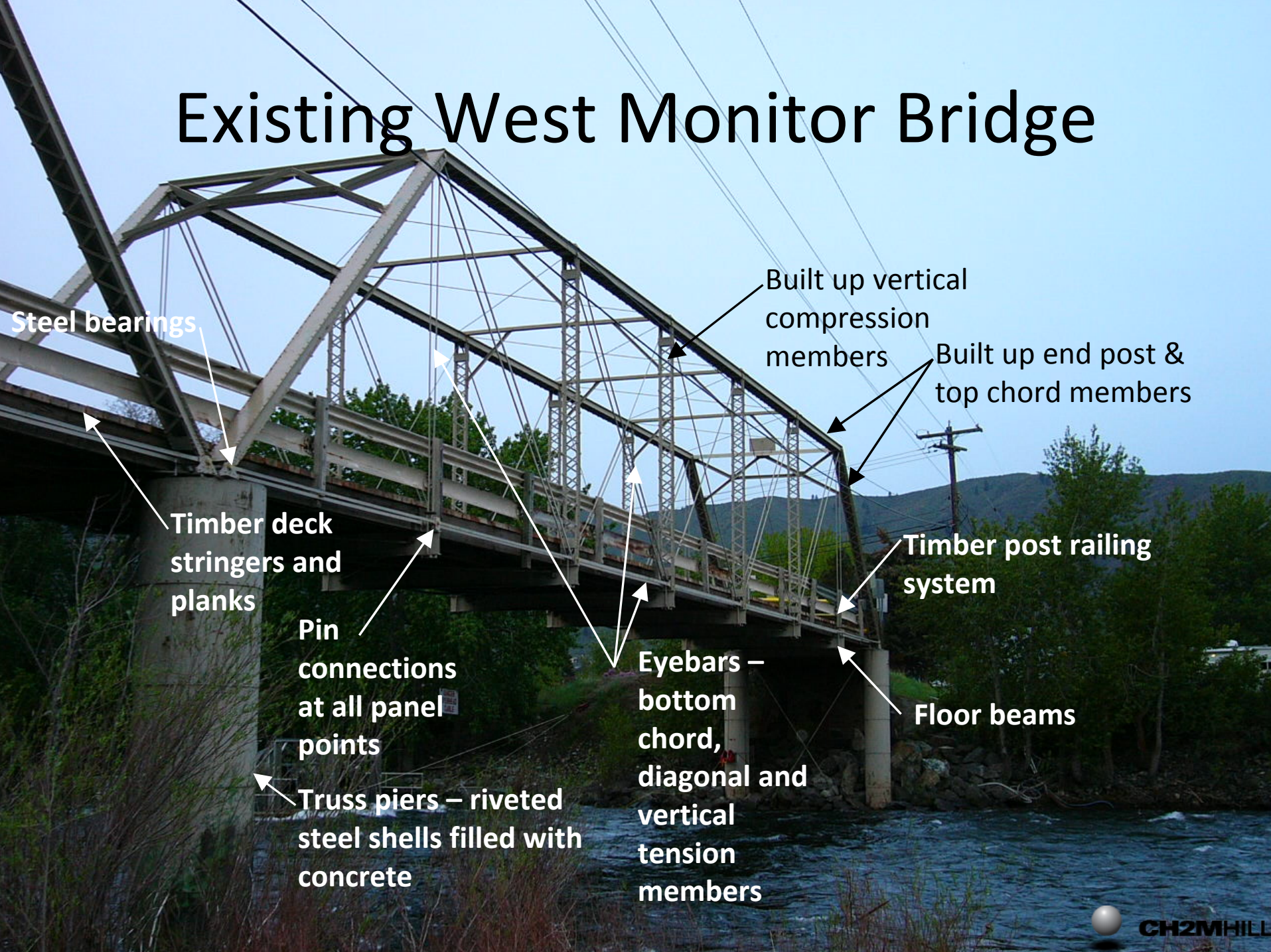
Existing West Monitor Bridge



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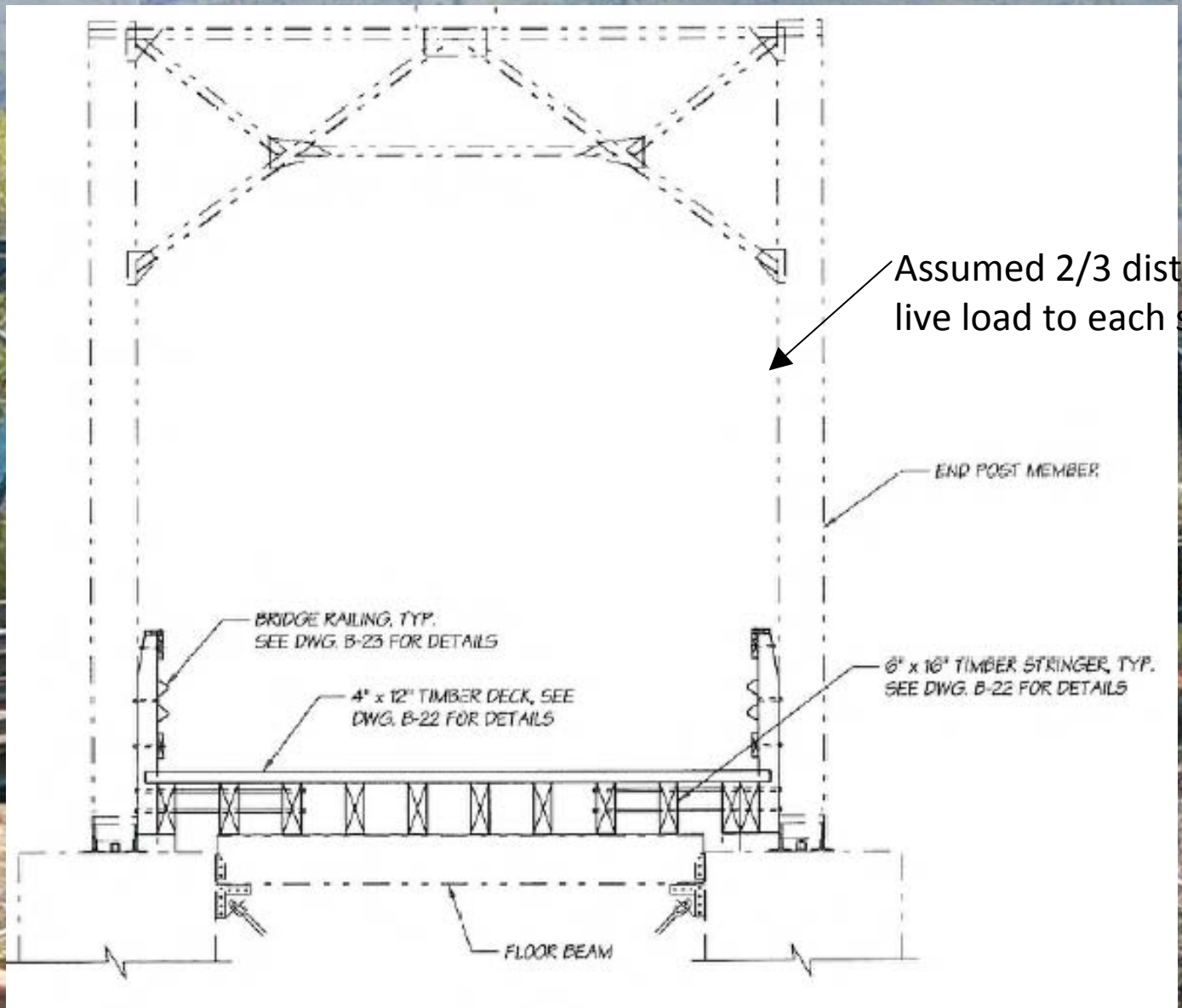
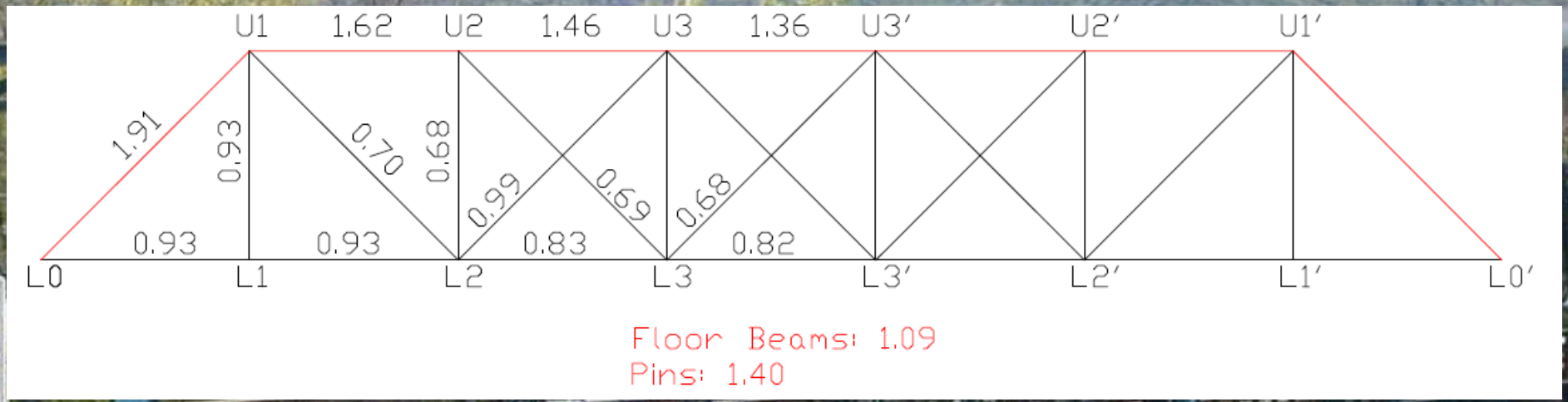
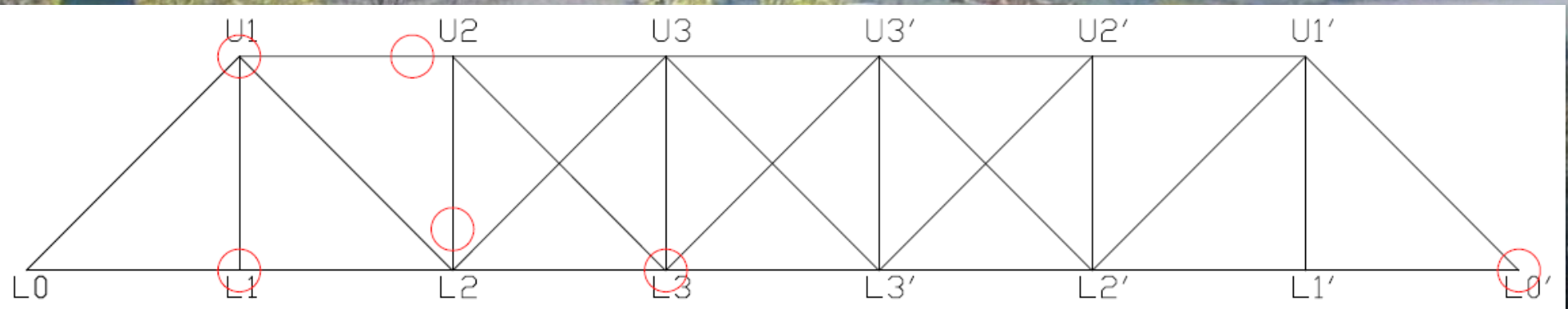
Analysis of Existing Structure



D/C Ratios of Existing Structure



Condition of Structure



Condition of Structure

Condition of Structure

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Condition of Structure

Incomplete forging and defects (forge welds, cracks, gouges, and holes) at bottom chord eyebars

Condition of Structure

Pack rust and section loss underneath splice plate in top chord members

Condition of Structure

Pack rust and section loss at pin connections

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Condition of Structure

Condition of Structure

Significant section loss at bottom connections of vertical members

Condition of Structure

Lamellar rust at interface of floor beams and deck stringers

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Condition of Structure

Locked roller bearings

Condition of Structure

Condition of Structure

Corrosion in steel shell and lateral member at Pier 4

Condition of Structure

Project Constraints

- Preserve original fabric and historic nature of bridge with extensive repair and replacement of members
- Site access
- Working over environmentally sensitive river

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Preserve Historic Nature

Replace existing eyebars with new. Size and shape of new eyebars match existing to give appearance of no change.

Preserve Historic Nature & Fabric

Original end post and top chord members were reused and strengthened where required. New bolts were domed headed to match shape of rivets.

Preserve Historic Nature & Fabric

Original vertical compression members were reused and repaired where required. New channels were welded at bottom of member in locations with worst corrosion. New doubler plates were added.

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Preserve Historic Nature & Fabric

Existing piers cleaned and repainted. New steel plate welded to existing to repair corrosion at Pier 4.

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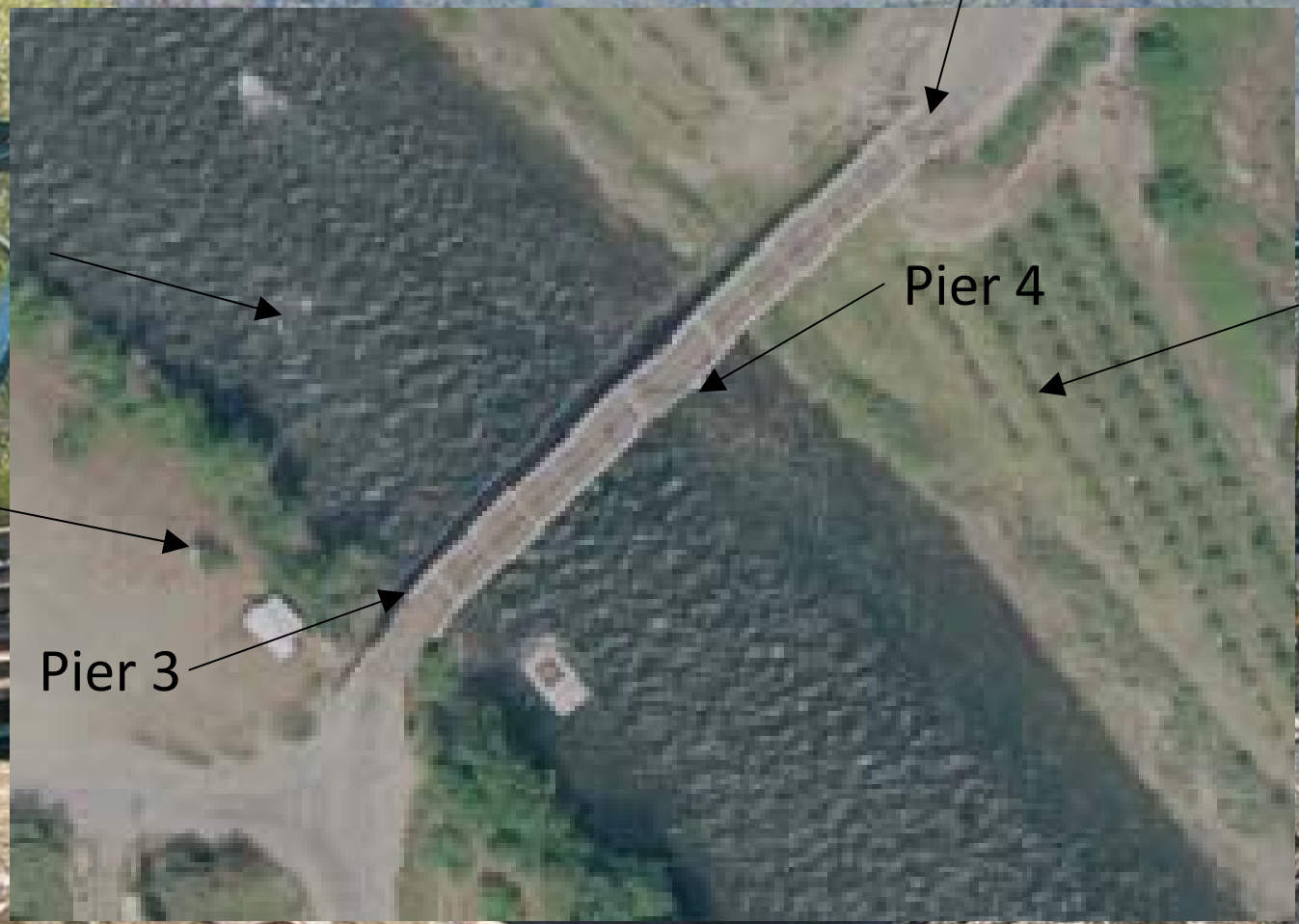
Preserve Historic Nature & Fabric

- Reused top chord members, replaced splice plates
- Reused original floor beams, strengthened with new plate on top flange
- Reused original bearing plates
- New pins match existing
- Replaced corroded floor beam and cross bracing connection at Pier 5 to match existing

Site Access


Pier 5
Wenatche
e River
Pier 4
Private
Orchard
WDFW
Access
Pier 3

Site access

Site access


SPEED
LIMIT
10
ATTENTION
BRIDGE WILL BE CLOSED
TO ALL TRAFFIC FOR REPAIRS
JUNE THROUGH DEC. 2010
MOWAT

Site access

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Site Access

Site Access

All pins had to be removed in field one at a time

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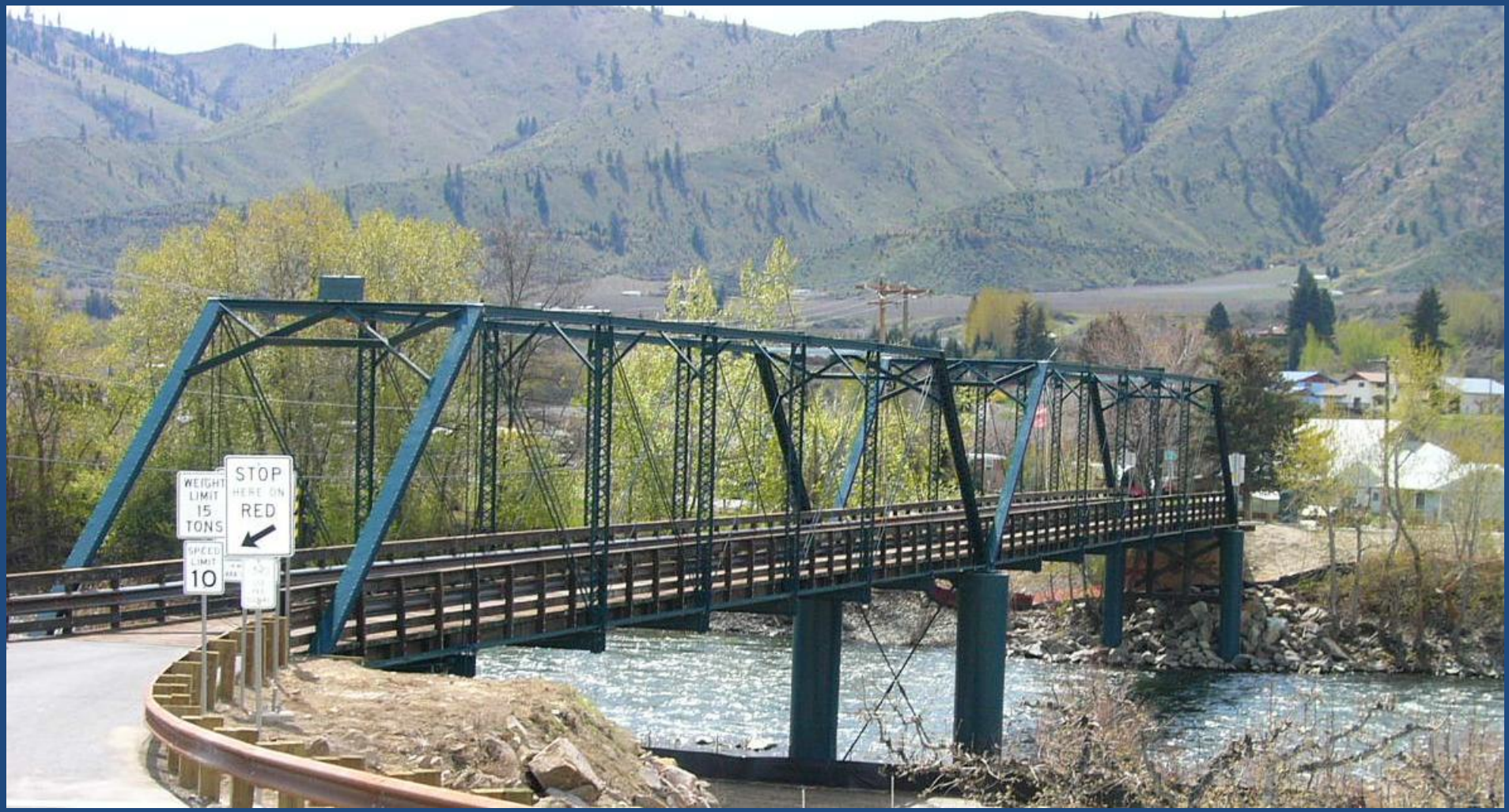
Lessons Learned

- With rehab work, try to anticipate all unknowns
- Build the schedule for the worst-case scenario
- Regular communication is key

Back Together Again!



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