Timber Bridge Preservation

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Deck Preservation and Repair

Decks

- Concrete decks are easier to maintain.
- Timber decks with bolting strips are better than nailing to stringers.
- Bolting strips require tightening as the deck ages. (10 years or as needed)
- Timber decks need running boards or overlays.

Overlays

- Three inches of HMA over three inches of crushed rock works well.
- With just HMA reflective cracks are a problem.

REPAIRS

Split Pile Repair

Cap Repair

- Step 1 lift superstructure off cap.
- Methods
  - Build temporary bents under bridge to jack up the bridge.
    - Doesn’t work over water
    - Difficult on slopes
    - Difficult on high bridges
    - Time consuming
    - Minimum traffic impact

Alternatives to temporary bents

- Jacking beams on road deck.
- Jacking blocks chained to piles
- Jacking blocks clamped to piles

Jacking blocks clamped to pile

Cap replacement

- Replace cap in kind
  - Lower cost
  - Difficult to obtain permit for creosote
  - New timber not as good as old growth
  - Requires traffic control and temporary road closures
  - Requires a crane

Replace with treated timber. Note 14 inch wide roof flashing to keep water out

Replace with Steel Beam

- Longer lasting repair
- May be difficult to match existing beam size
- Cost more than replace in kind
- Requires traffic control and temporary road closures

Steel Cladding

- Long lasting repair
- More expensive than replace in kind
- No crane needed, (150 lb modular units)
- No disposal cost for creosote treated timber.


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Jack boxes to restore bearing


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Substructure Repair
Scissor truss leg


APR 5 2011


APR 5 2011


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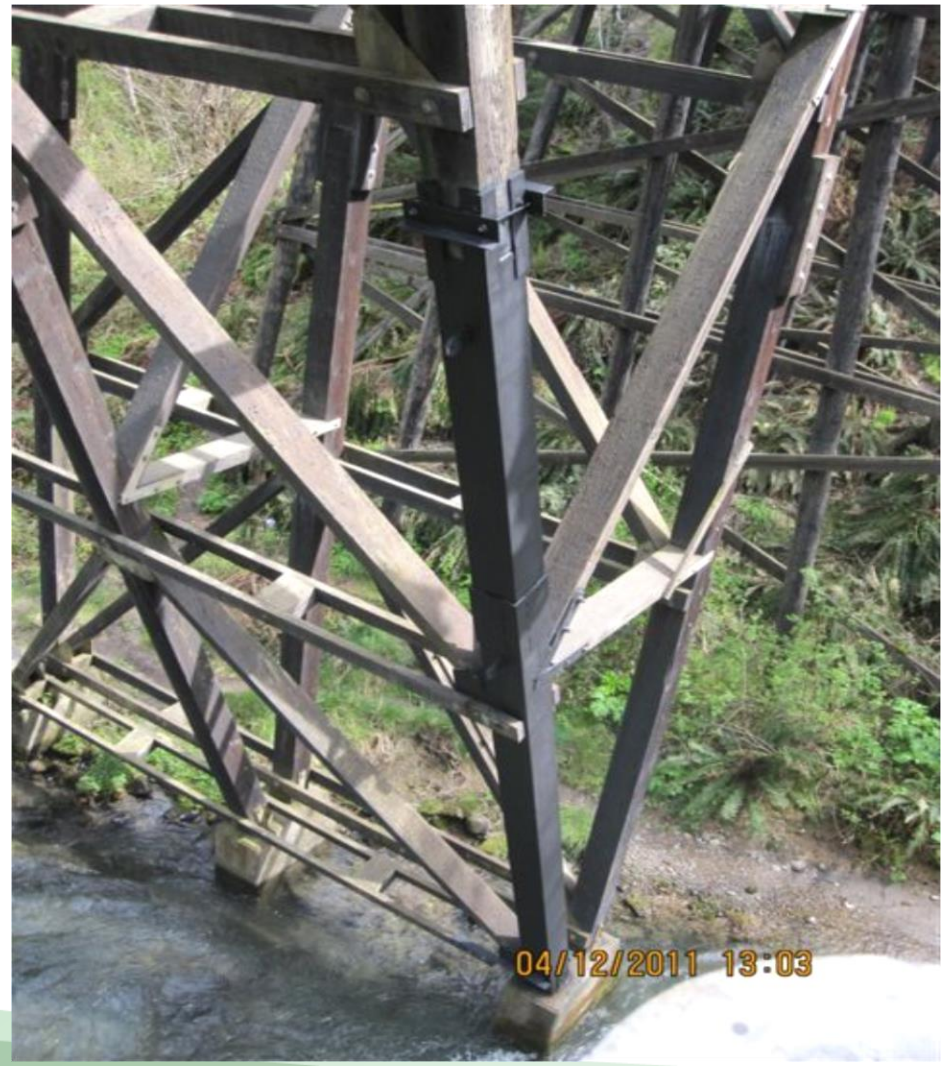
New steel post in place

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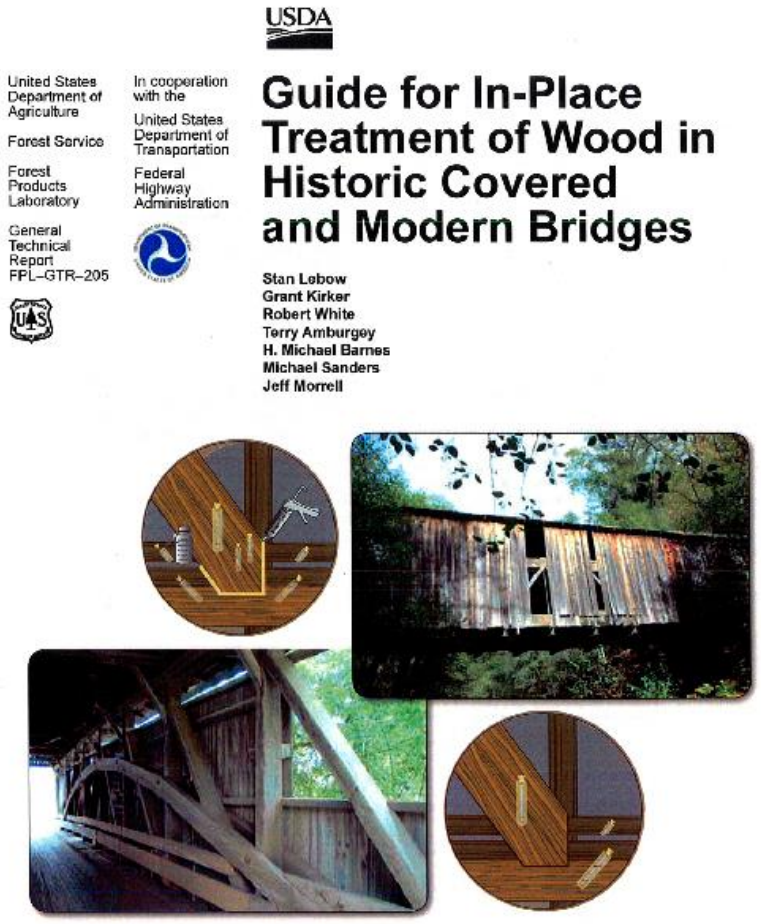
Fiberglass wrap and epoxy injection

Epoxy injection of pile voids

Timber stringer replacement with steel

PREVENTION


USDA
United States Department of Agriculture
Forest Service
Forest Products Laboratory
General Technical Report FPL–GTR–205
In cooperation with the
United States Department of Transportation
Federal Highway Administration
Guide for In-Place Treatment of Wood in Historic Covered and Modern Bridges
Stan Lebow
Grant Kirker
Robert White
Terry Amburgey
H. Michael Barnes
Michael Sanders
Jeff Morrell

Pile Preservation

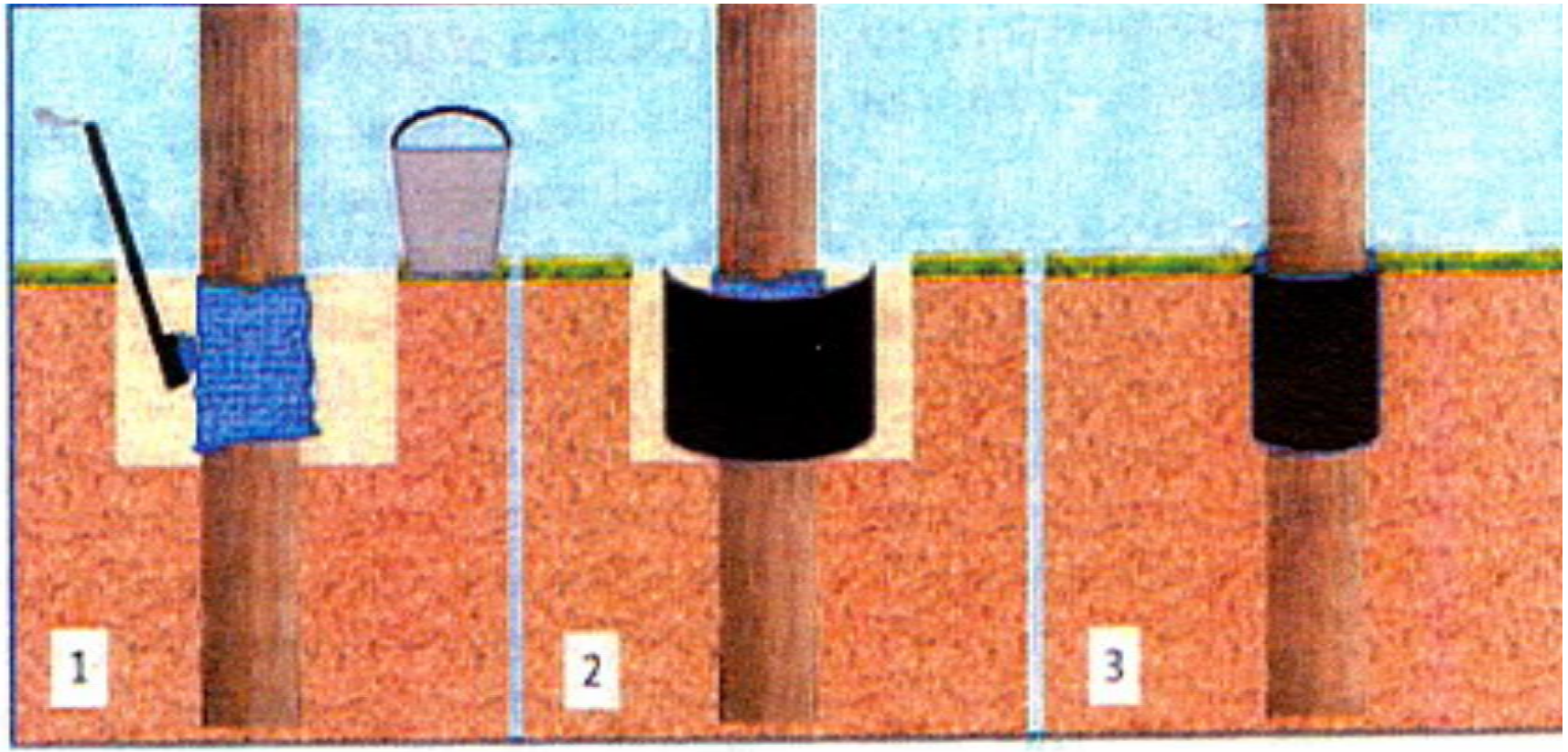


Figure 45. Steps in application of an external groundline wrap treatment.

In Place Preservatives

- Diffusibles
  - Water soluble, Diffuses 1 to 3 inches across the grain, and 3 to 9 inches with the grain.
  - Comes in powder, liquid, paste and rods.
  - Most common type is Borate
  - EPA label is a caution for Borate
  - Lasts up to ten years in place
  - Activates at same wood moisture content as rot fungus.
  - Kills the rot fungus, termites, and carpenter ants.

In Place Preservatives

- Non Diffusibles
  - Not as water soluble
  - Used to treat surface damage to treated wood
  - Useful in sealing bolt holes
  - Used in timber construction
  - Copper Napthanate is a common non Diffusible.

In Place Preservation

- Fumigants
  - Activated by moisture in the wood
  - Diffuse as a gas
  - Require checks and bolt holes to be sealed.
  - Can move several feet through the wood
  - Kills rot fungus, termites, and carpenter ants
  - MITC is a common fumigant
  - EPA label Dangerous, may require a license

Use of borate rods

- Low cost means to prevent rot by killing the fungus that causes the rot.
- In use by the log home industry, railroads, utility companies
- Activated at 25% moisture content same as when fungus activates.
- Protection lasts about ten years.
- Insert rods 6 to 8 inches apart, for quick activation, squirt liquid borate in hole prior to inserting rods. (Not for in-water piles)

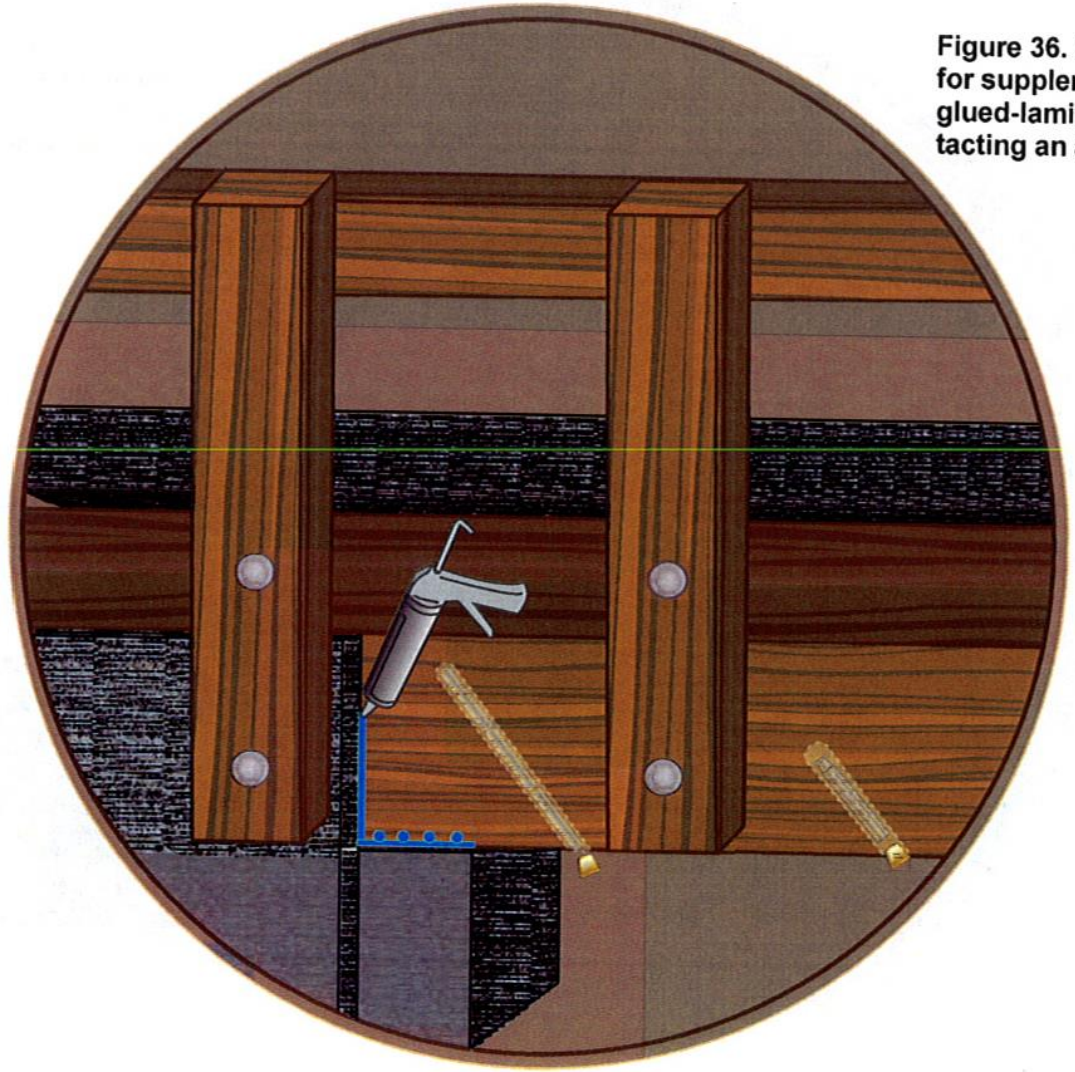


Figure 36. Example approach for supplemental treatment of glued-laminated beam contacting an abutment.

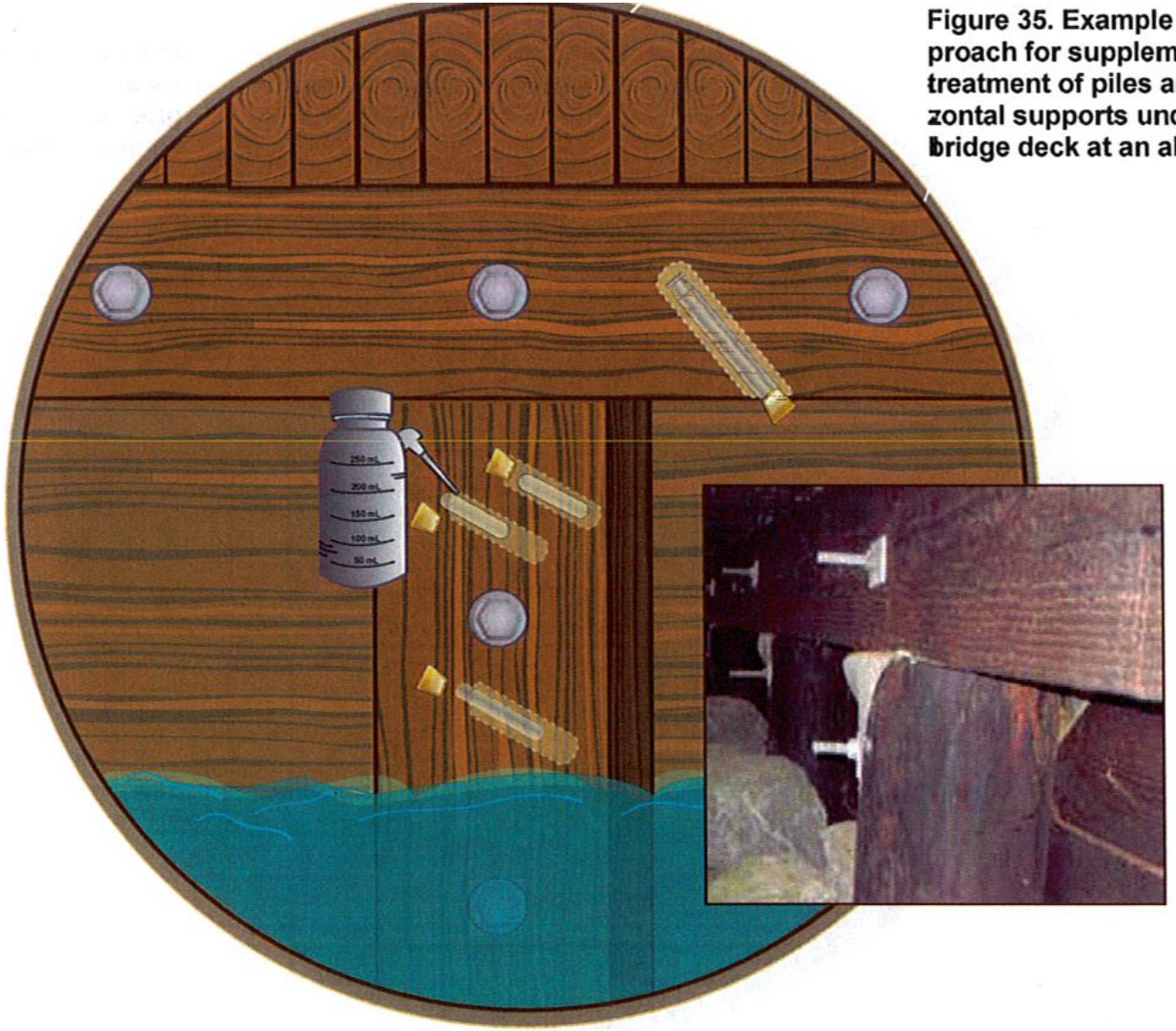


Figure 35. Example approach for supplemental treatment of piles and horizontal supports under the bridge deck at an abutment.

Drilling the holes

Inserting the rods

Tracking the Usage

Bridge number	Repair Date	Bridge Name	Repair Number	Borate installed
105/110	4/30/2013	1. O'Leary Creek	S13127	N Abutment Cap
101/140	5/28/2013	W Fork Hoquiam River	S13530	S Abutment cap
165/13	6/4/2013	Gulch # 1	S10002	Cap over pile 6D
101/254	6/6/2013	Little Quilcene	S12407	Pile 1F
108/106	5/23/2013	Skookum Creek	S12583	Cap pier 4
109/9	10/10/2013	Gillis Slough	S12798	Pile 1F
109/25	10/10/2013	Wreck Creek	S12426	Pile 1C

Thank You

- Any Questions?