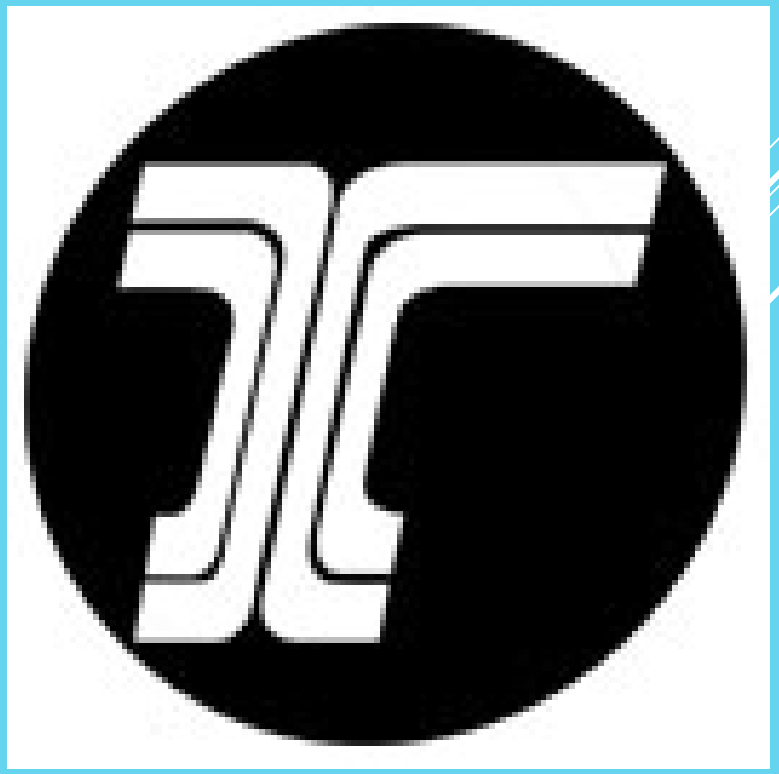
Oregon Highway Bridge Maintenance

A Pilot Training Course /Workshop



Timber Deck Replacement

Doug McLain
Clackamas County

Timber can be desirable for use as a bridge decking material because it is:

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- Resistant to deicing agents

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- Less expensive, faster to construct, and lighter weight than concrete

Timber can be desirable for use as a bridge decking material because it is:

- Resistant to deicing agents
- Easy to fabricate in any weather condition
- Less expensive, faster to construct, and lighter weight than concrete
- An abundant / renewable material source

Disadvantages of Timber Decks?

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- No composite action

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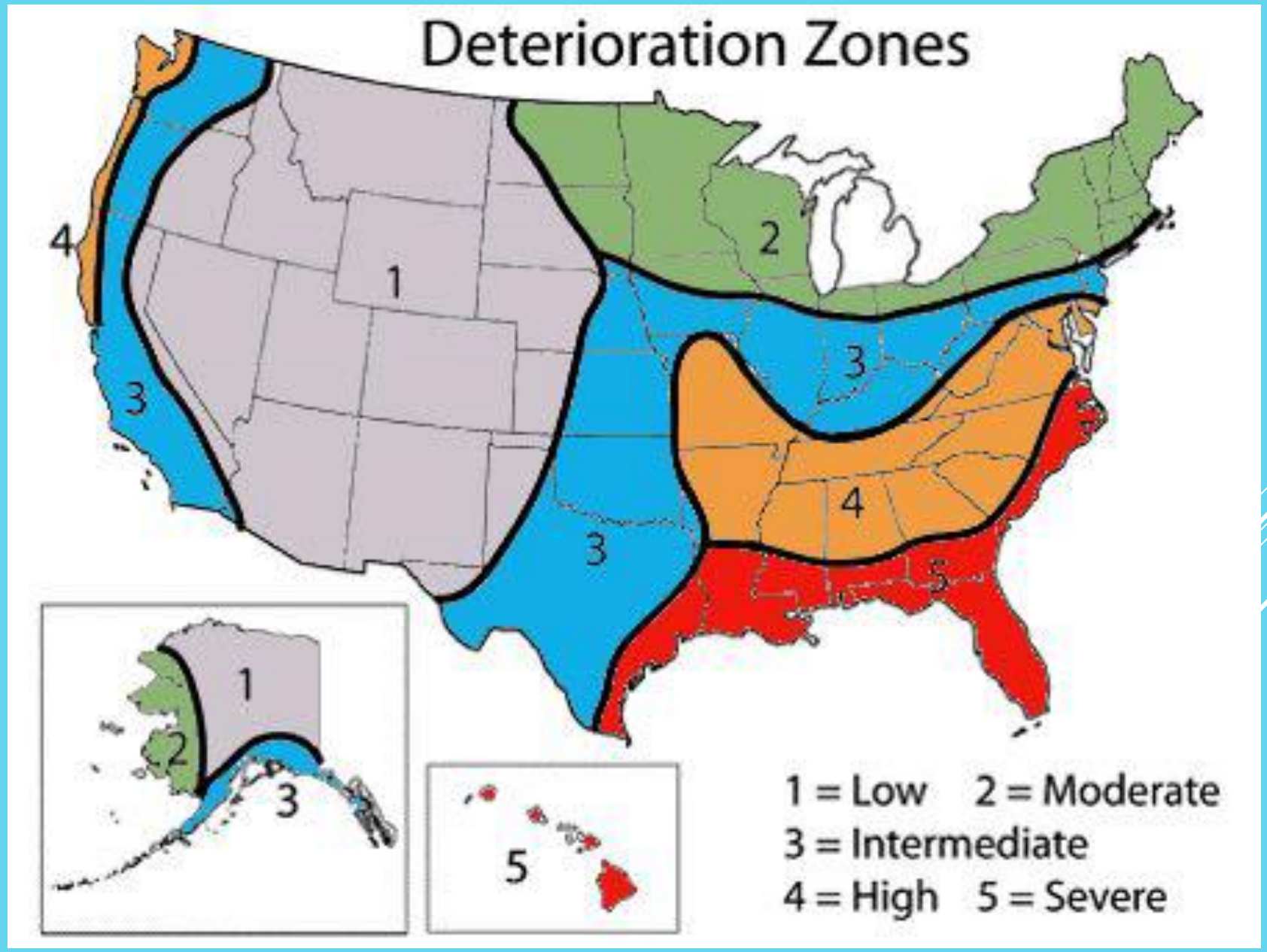
- Beam spacing limitations

Disadvantages of Timber Decks?

- No composite action
- Beam spacing limitations
- Deterioration from Decay / Insects

Decay


Deterioration Zones
1
2
3
4
5
1 = Low
2 = Moderate
3 = Intermediate
4 = High
5 = Severe


6. 13. 2001

Disadvantages of Timber Decks?

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- Beam spacing limitations
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Disadvantages of Timber Decks?

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- Deterioration from Decay / Insects
- Issue of reflective cracking in asphalt

Reflective cracking in asphalt can be reduced by:

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- The use of heavy timbers with strong anchors

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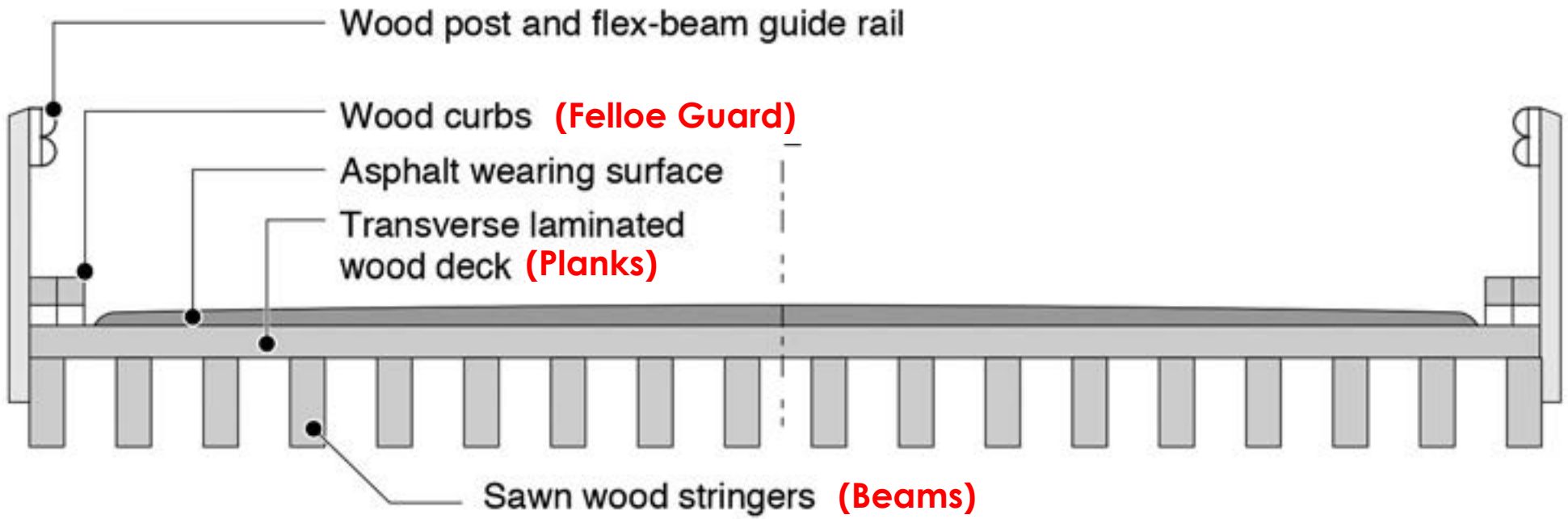
- Additional Beams / Stringers

Reflective cracking in asphalt can be reduced by:

- The use of heavy timbers with strong anchors
- Additional Beams / Stringers
- Special asphalt mixes


Transverse
Longitudinal

Cross section of a sawn wood stringer bridge



Transverse flat-laid heavy planks on closely spaced longitudinal stringers

Occasional use of 2nd layer on top

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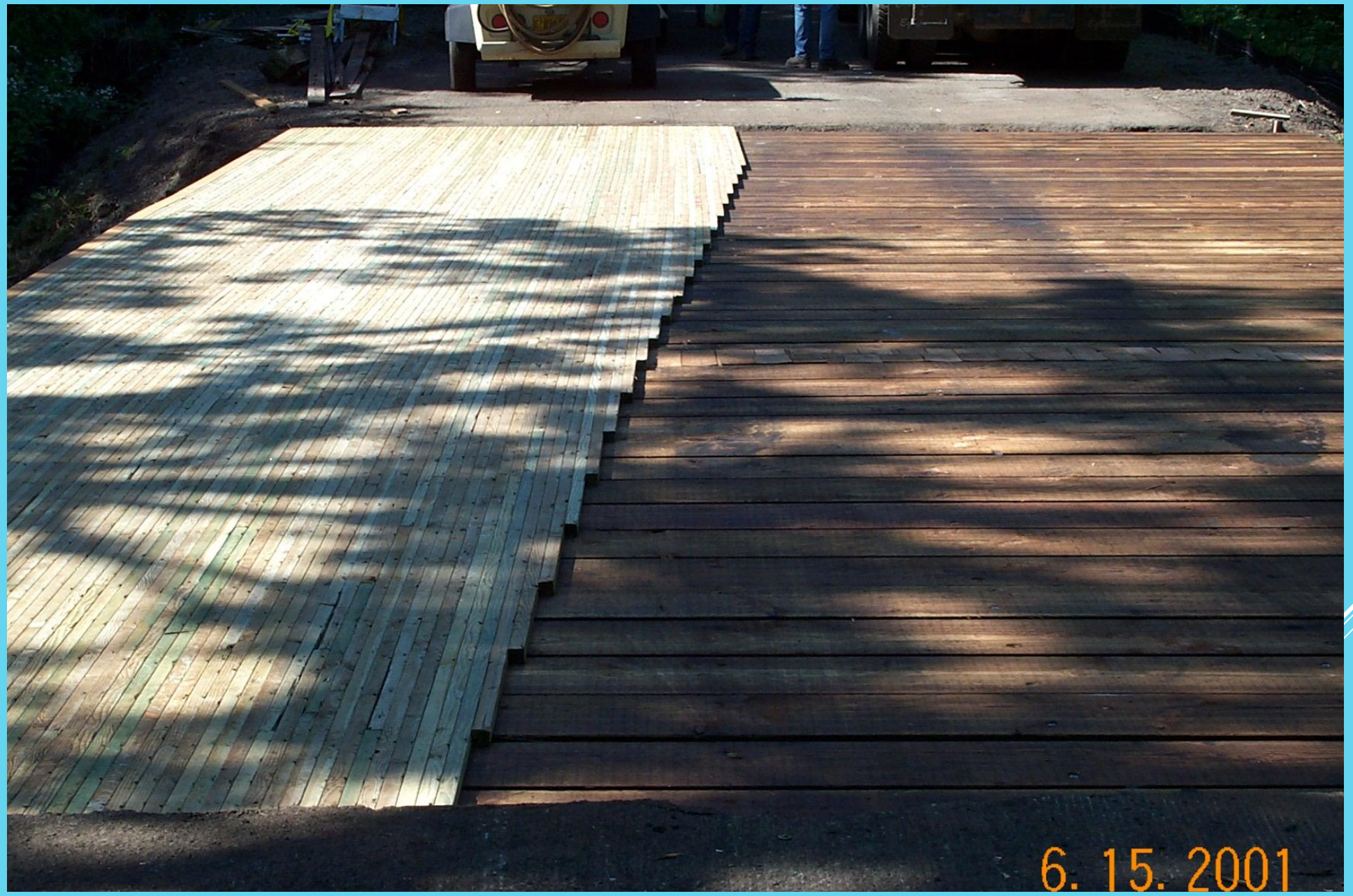
Occasional use of 2nd layer on top

- Provides wear protection of primary transverse decking
- Longitudinal very common – wear protection only
- Diagonally for wear protection and some additional strength


6. 15. 2001


STOP

Transverse Nail-lam Vertical Planks on-edge placement (Individual)

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- 2-inch nominal thickness boards – 4, 6, or 8-inch wide

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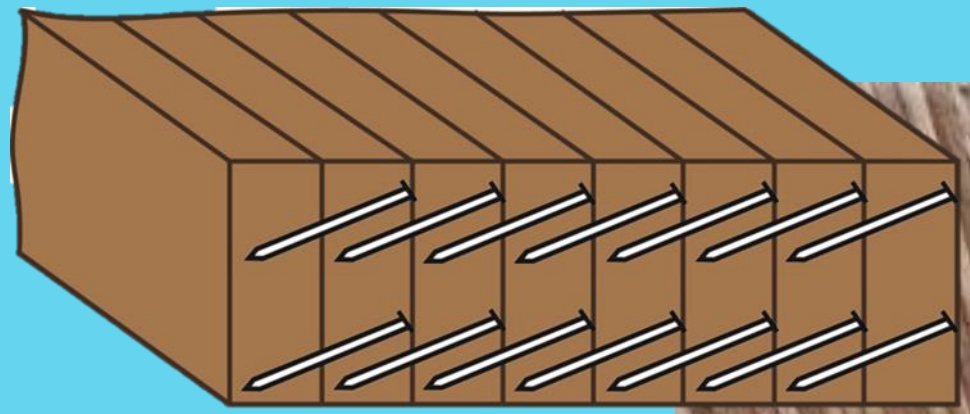
- 2-inch nominal thickness boards – 4, 6, or 8-inch wide
- Each lamination is toenailed to the beam
- Can be used with or without overlay



Transverse Glulam or Nail-Lam Panels on Longitudinal Beams

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- Faster erection

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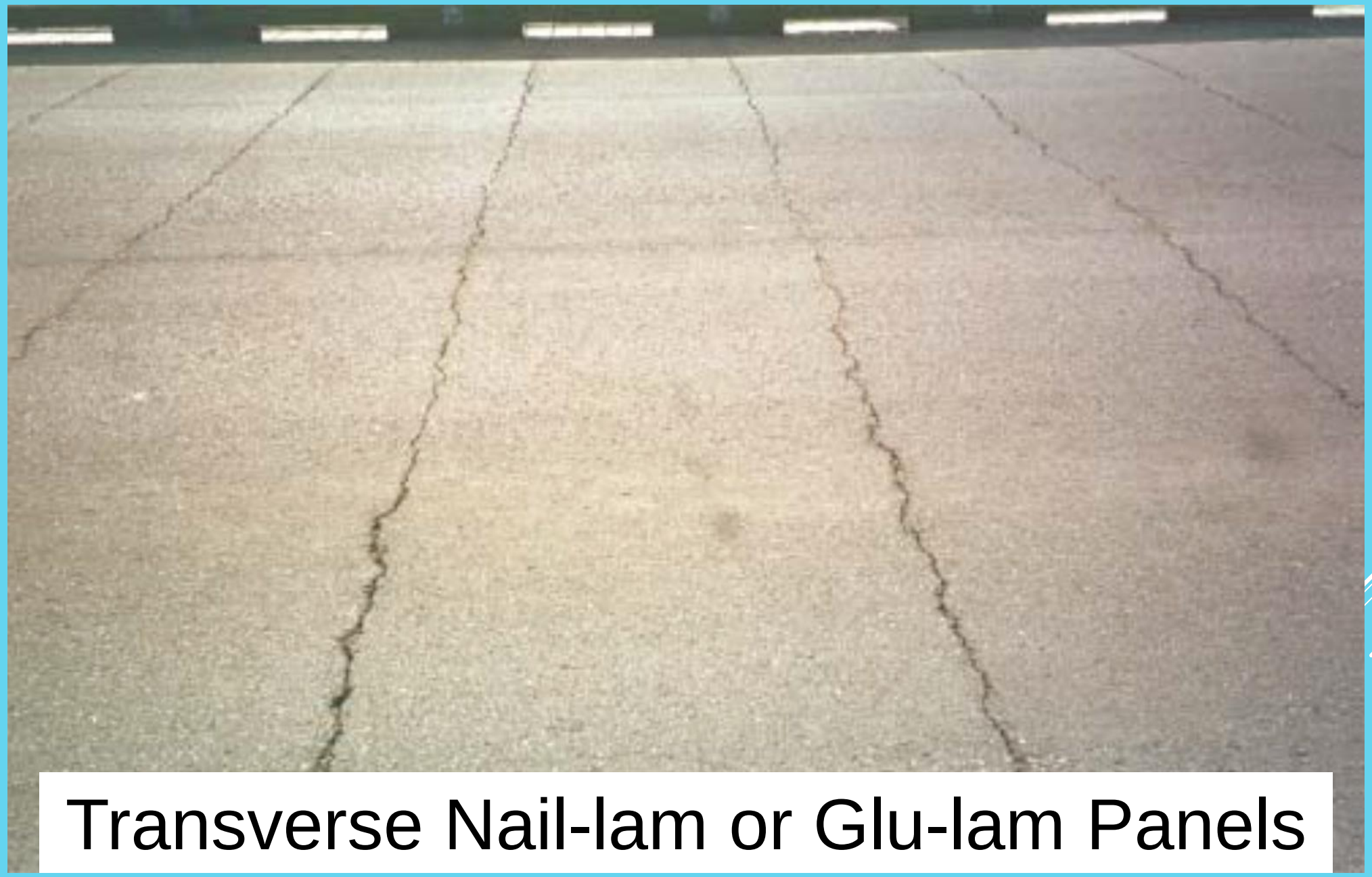
- Faster erection
- Each panel is fastened to the beams
- Can be used with or without overlay
- Differential displacement between panels leads to reflective cracking through wearing surface

Transverse Nail-Lam or Glu-Lam Panels


03/14/2009

Transverse Glu-lam Panels

(There's glue visible between the boards)



Transverse Nail-lam or Glu-lam Panels

Longitudinal Glulam Panels

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- Cost-effective for spans – 20 to 30+ ft

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Longitudinal Glulam Panels

- Cost-effective for spans – 20 to 30+ ft
- Differential displacement between panels may lead to reflective cracking through wearing surface
- Transverse distribution beam beneath the panels helps, BUT beware swelling of the panels


5. 3. 2007

Stress Laminated Timbers

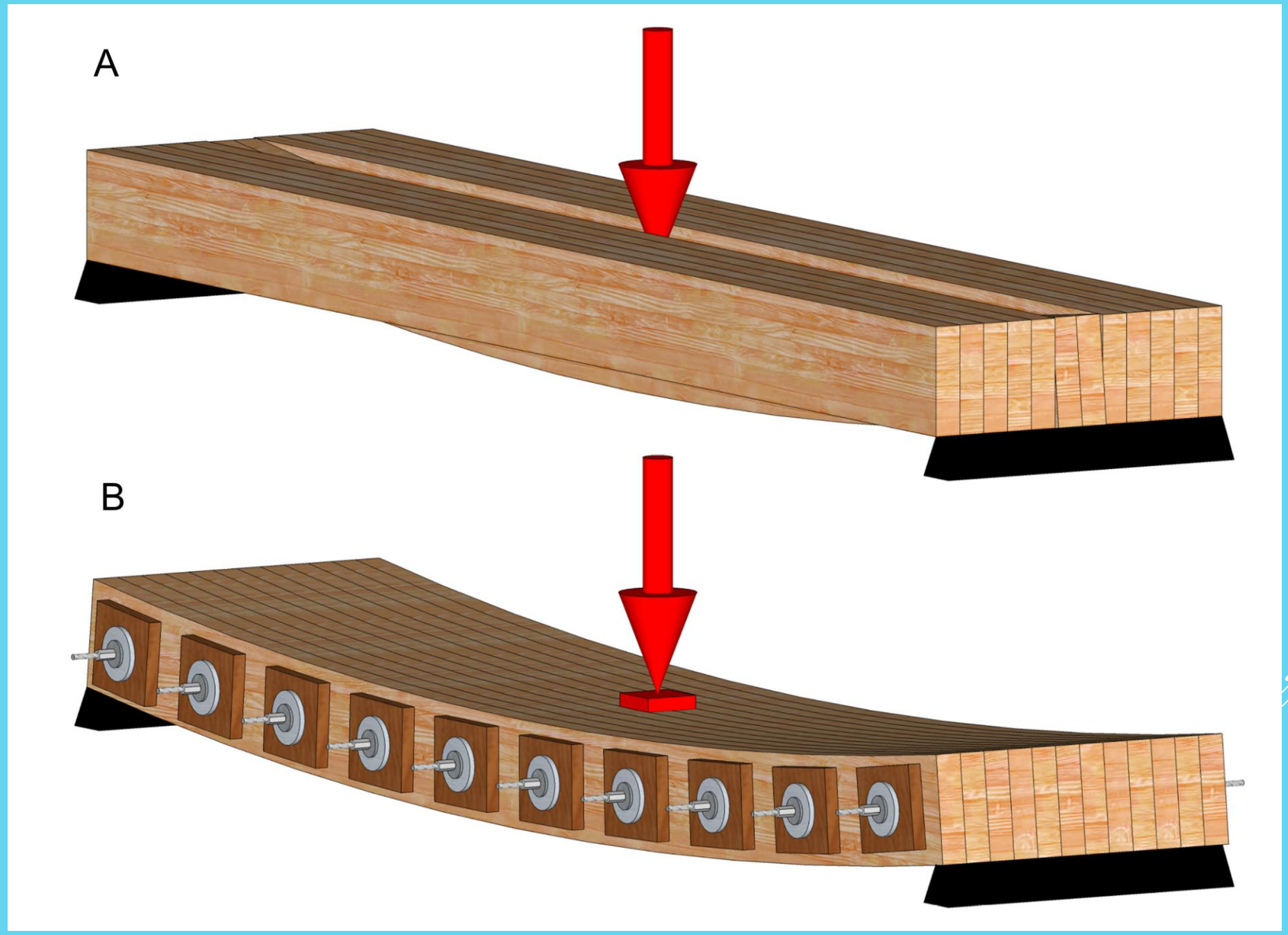
Stress Laminated Timbers

SLT decks are made from a number of timber or glulam beams positioned side by side and stressed together using high-strength steel bars.

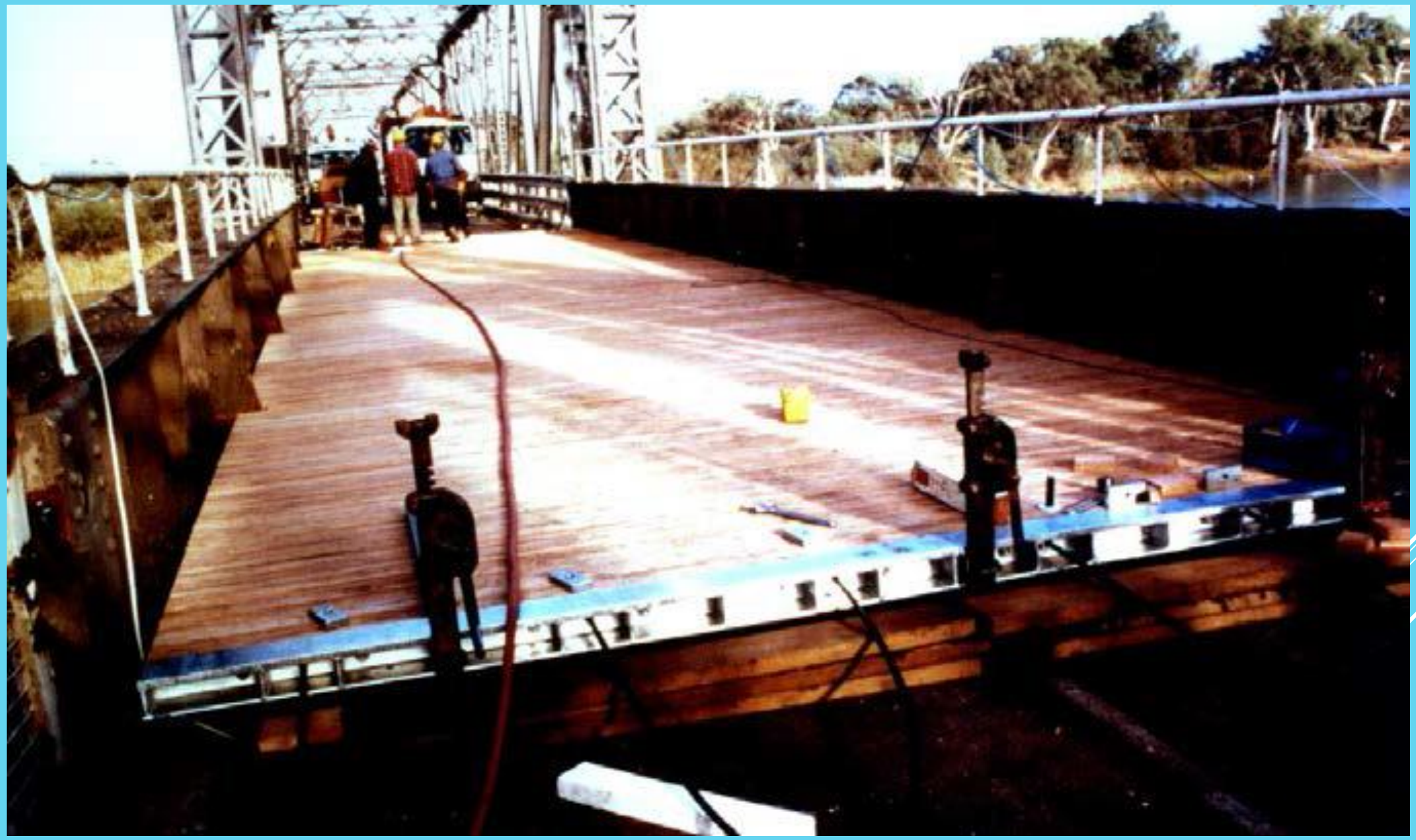
Stress Laminated Timbers

SLT decks are made from a number of timber or glulam beams positioned side by side and stressed together using high-strength steel bars.

A concentrated load can therefore be **distributed from the loaded beams onto adjacent beams** due to the resisting friction caused by the stressing.

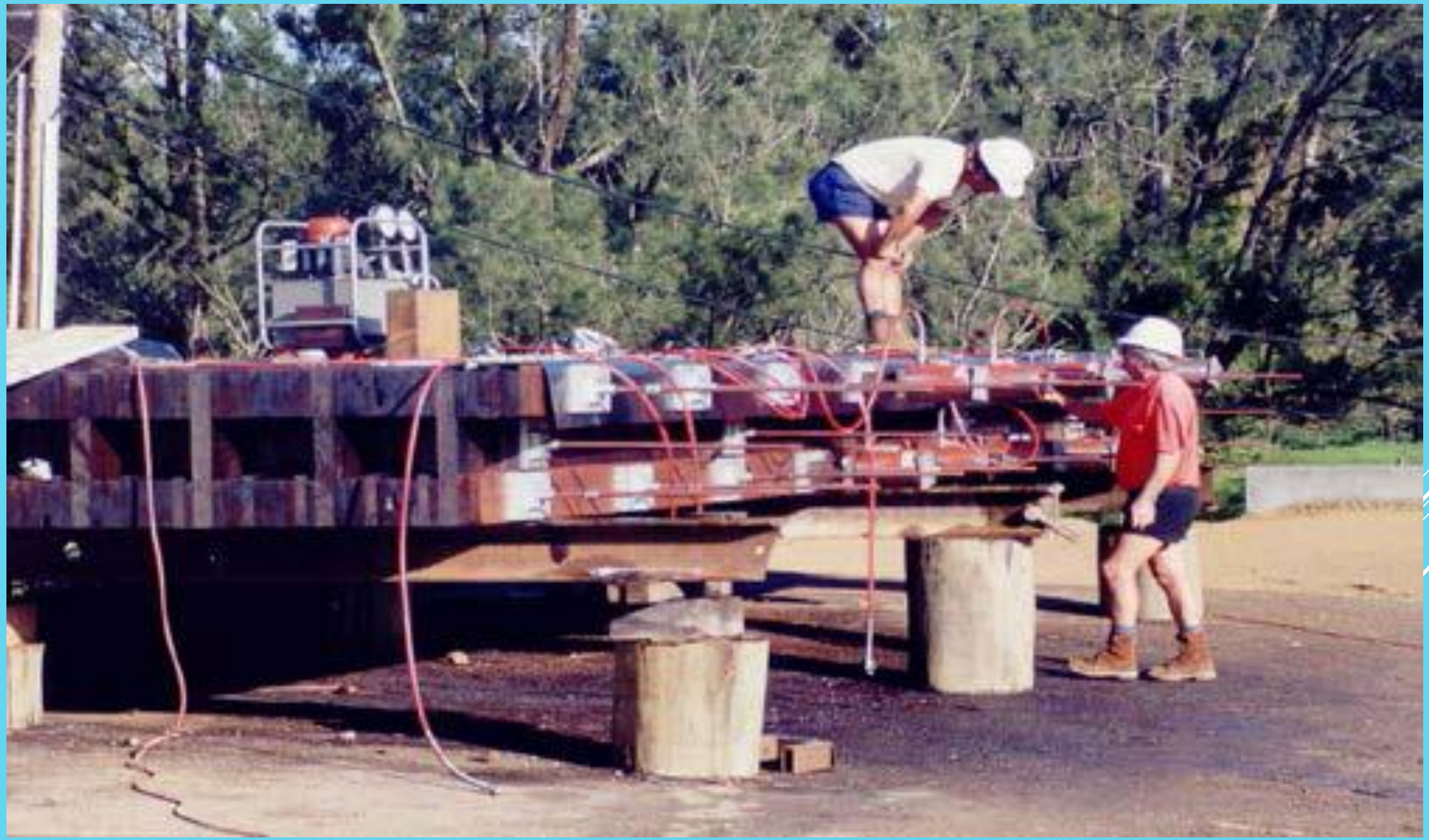

A
B

Transverse Stress Laminated Panels on Longitudinal Beams

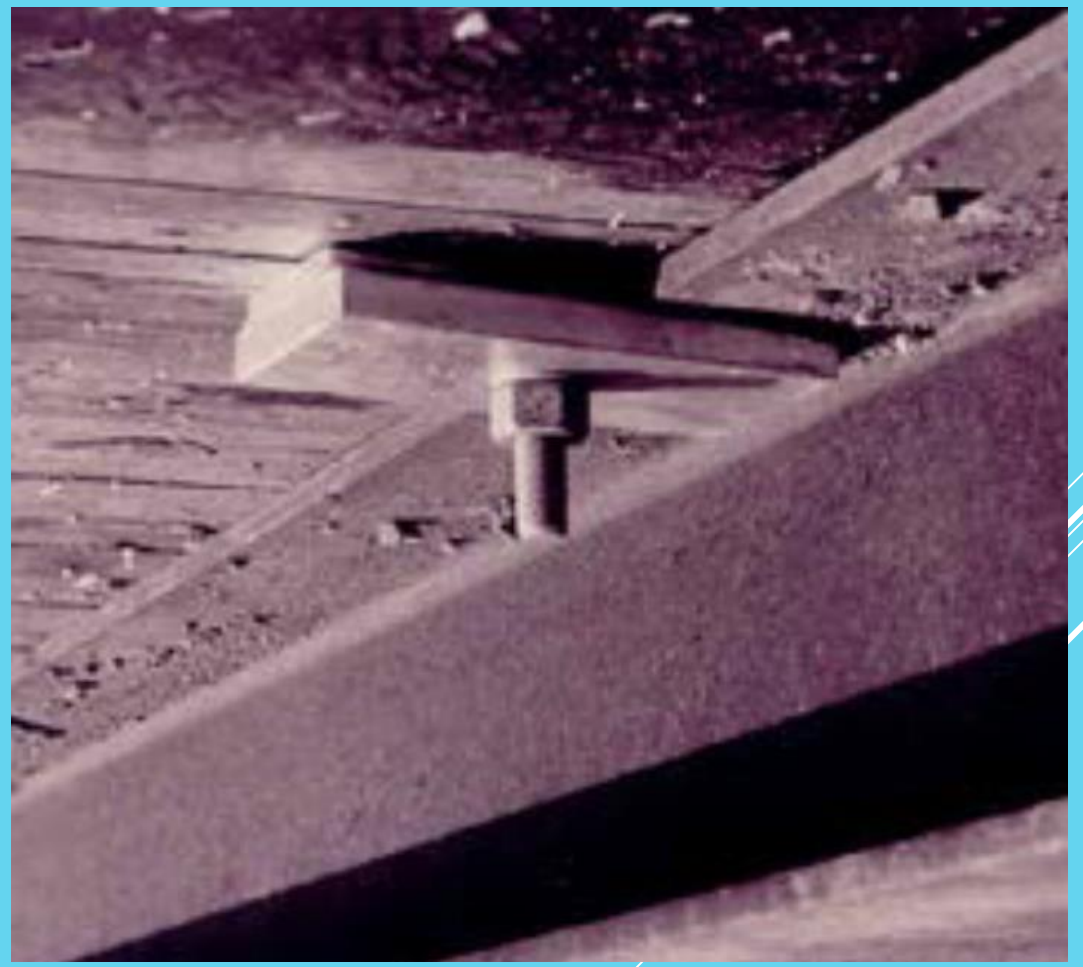


Stress Laminated Longitudinal Timber Deck

Built Up Sections



Connections



Plywood?

Bridge Ply (Australian)

Structural grade. cross-laminated plywood

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Structural grade. cross-laminated plywood

Treated to protect against termites, fungus and environmental degradation.

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Structural grade. cross-laminated plywood

Treated to protect against termites, fungus and environmental degradation.

Bridge Ply panels are available in widths of 1200mm (47.24”), with a standard thickness of 170mm (6.7”) and in lengths to order. Panels can be produced in lengths over 10 meters (32.8’).

Cross-Laminated Timber (CLT) ?

Deck Ends

Deck Edges

Waterproof Membranes

Waterproof Membranes

Spray:

Waterproof Membranes

Spray: Seals well - Works on uneven surfaces

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Doesn’t bond well with AC wearing surfaces

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Waterproof Membranes

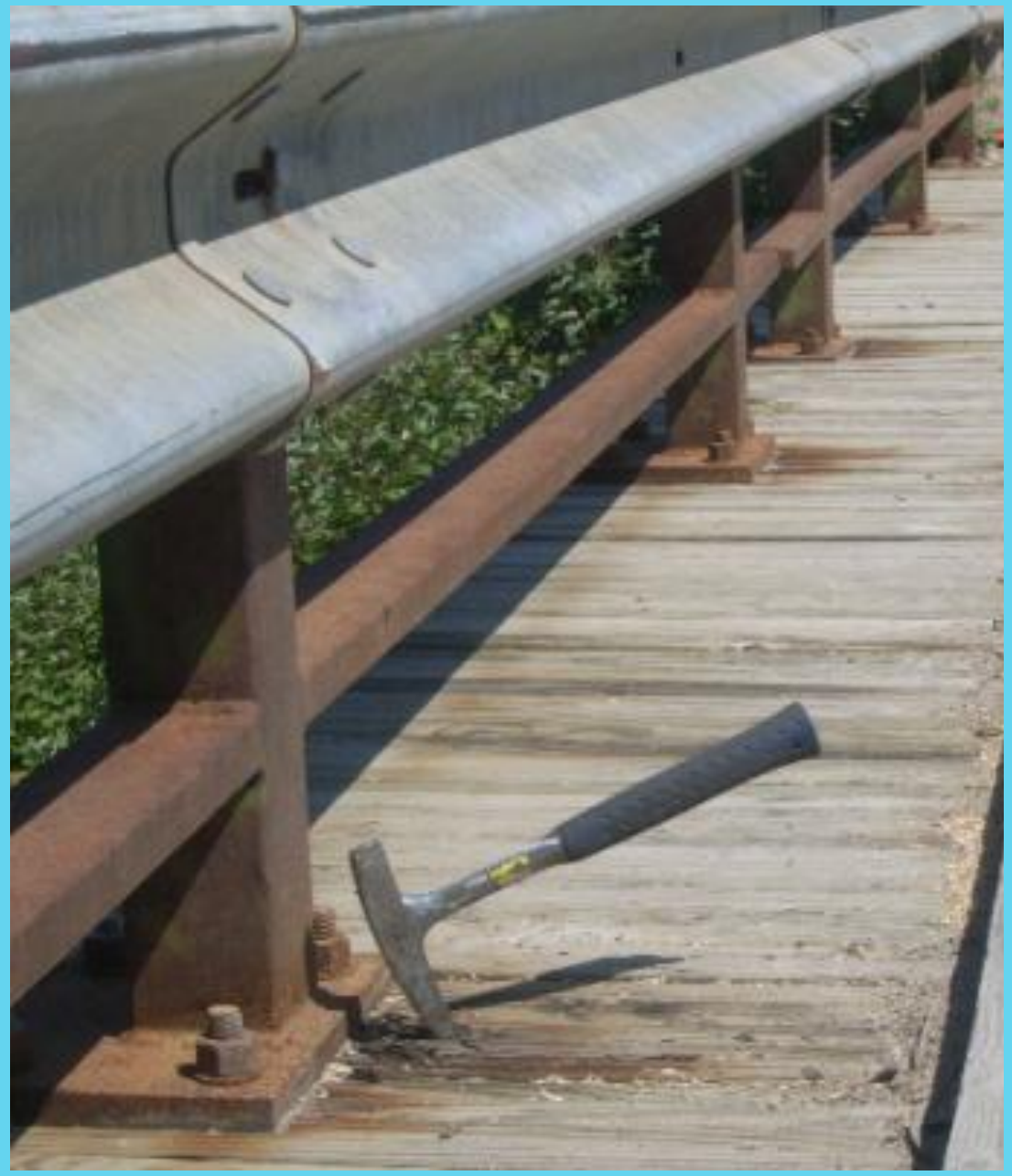
Spray: Seals well - Works on uneven surfaces
Doesn’t bond well with AC wearing surfaces
Expensive - Most agencies don’t have the equipment

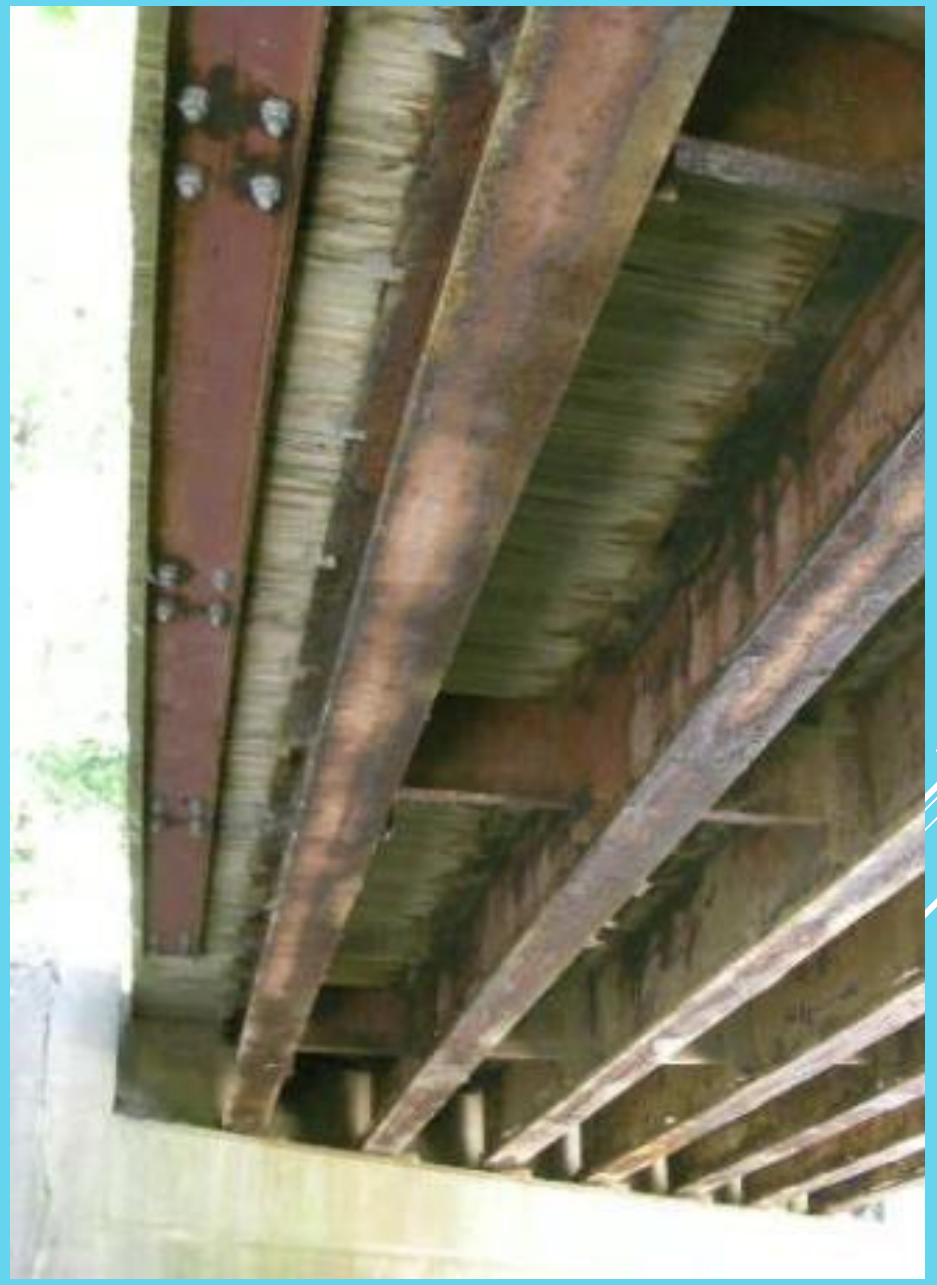
Roll: Relatively inexpensive - Can be used vertically
Doesn’t work Well on uneven surfaces
Often has leakage issues


6. 19. 2001


OVERSIZE LOAD
6. 20. 2001

Barriers






6. 19. 2001


PW1260
TAKEUCHI

Repair Projects

Labish Center Bridge, Marion County

Transverse Vertical Laid Planks,
Partial Replacement


MODERN
Wirtgen
09.05.2012 09:04


09.05.2012


09.05.2012 13:43


09.06.2012 11:53


09.06.2012 14:57


09.06.2012
PW1257
E257035

09.06.2012 14:59


E239510
09.07.2012 10:28


09.07.2012 12:02


E257035
PW1257
09.07.2012 11:10


09.07.2012 15:20

Wintel Road Bridge, Marion County

Longitudinal Stress Laminated Vertical Laid Planks, Partial Replacement


REDTAF


KNIFE
RIVER

Boones Ferry Road Bridge, Marion County

Longitudinal Vertical Laid Planks, Partial Replacement


STIHL


SENECAL CR

Bear Creek Bridge, Clackamas County

Transverse Horizontal Laid Planks on Longitudinal Stringers with 2x2 Overlay Complete Deck Replacement


6. 12. 2001


6. 13. 2001


JOHN DEERE
6. 13. 2001

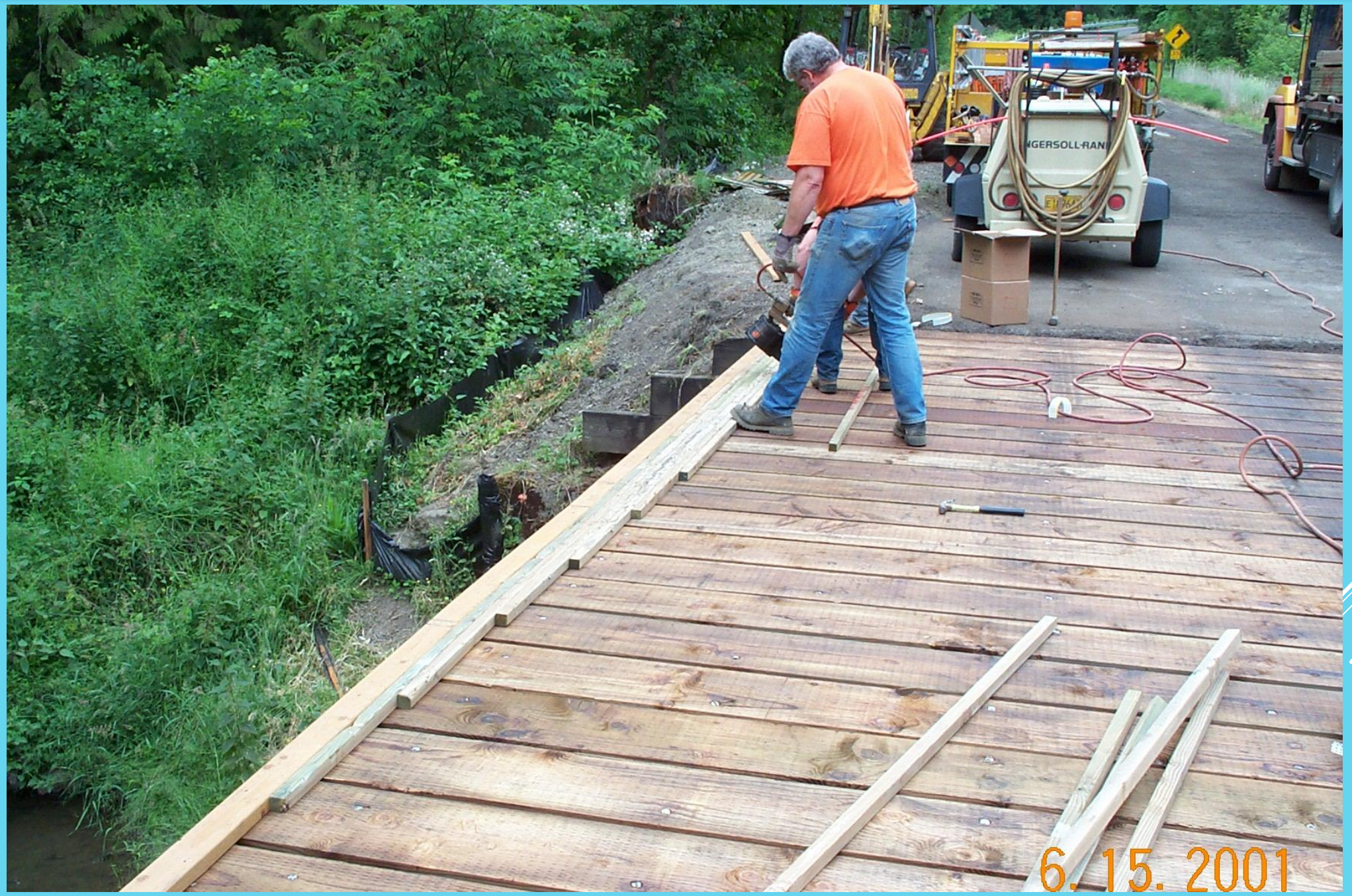

6. 14. 2001


6. 14. 2001


6. 14. 2001


6. 14. 2001


6. 14. 2001


6. 15. 2001


6.15.2001


6. 15. 2001

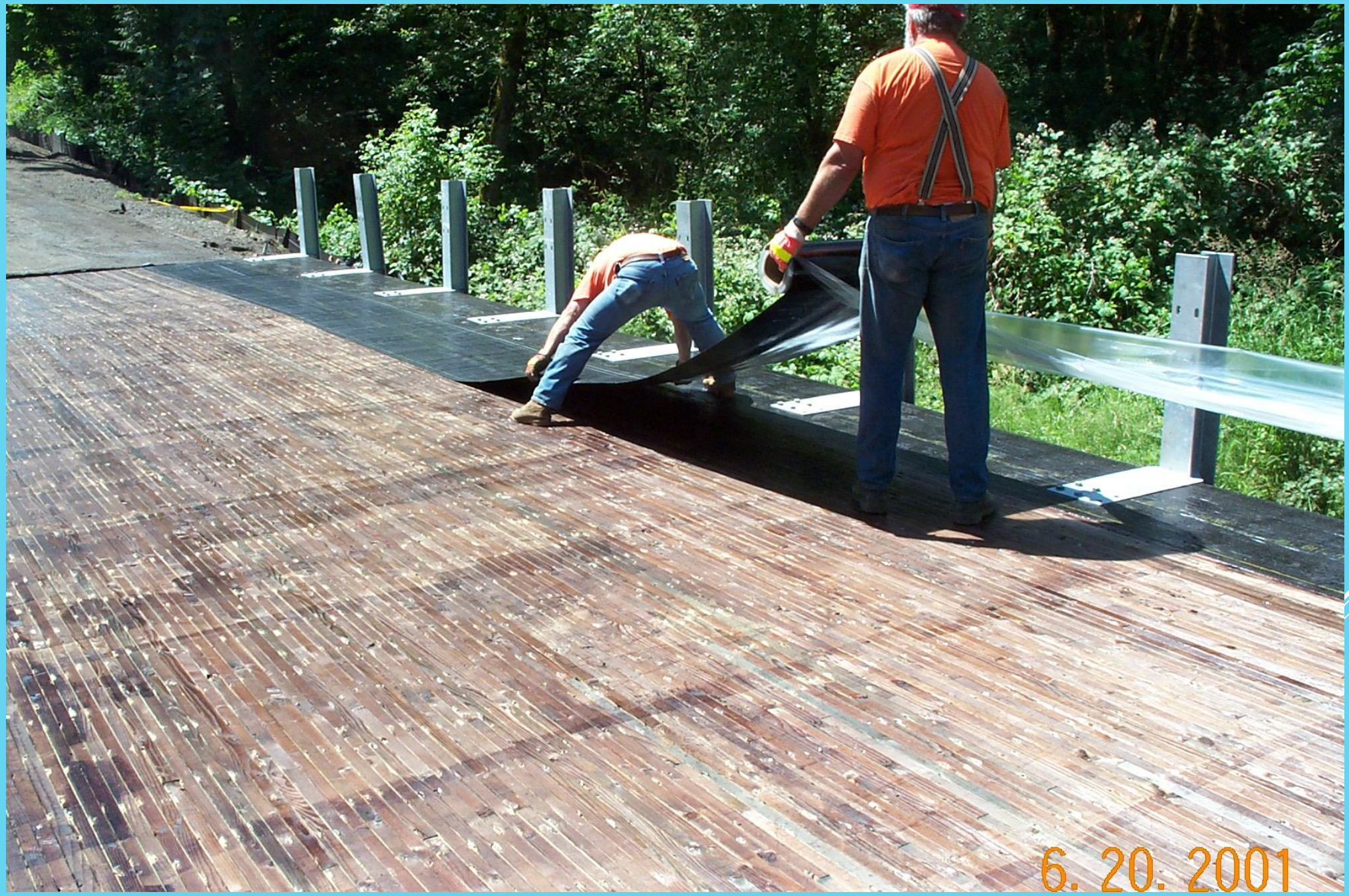

6. 19. 2001


6. 19. 2001


6. 20. 2001


6. 19. 2001


6. 20. 2001


6. 20. 2001


OVERSIZE LOAD
6. 20. 2001


6. 21. 2001


6. 21. 2001


6. 26. 2001


7. 16. 2001

Questions?

Comments?

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