

WJE

Steel Repairs



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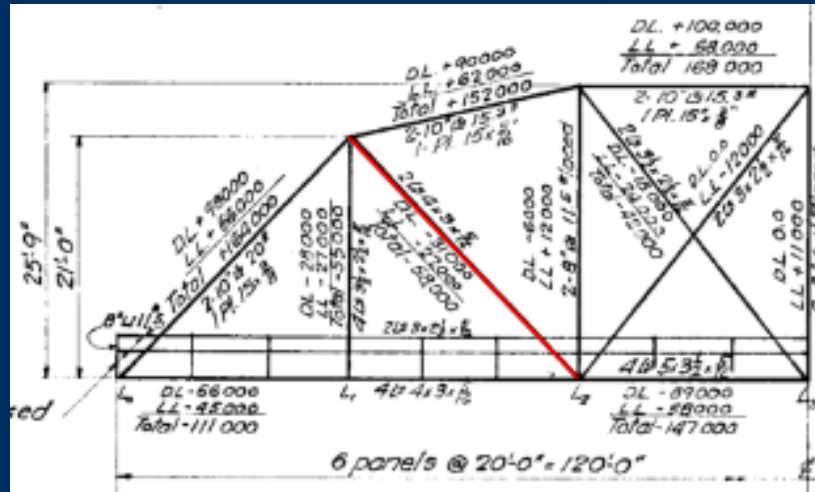
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Steel Repairs

- Emergency repairs to correct superstructure impact damage
- Two recent case studies
- Muscott Bridge
 - Highway 130 over Little Nestucca River
 - Tillamook County
- Bridge 08616
 - Highway 34 to 99W ramp
 - Corvallis

Muscott Bridge

- 120-foot riveted steel through truss
- Snowplow impact to North Truss
- Severe damage to Member U1-L2





- Built-up tension member
- 2L4x3x5/16 with tie plates
- Full fracture of one angle
- Partial fracture of second angle
- Severe distortion of member



- Bridge closed by ODOT
- Long detour
- Rapid return to service required
- Member replacement





- Repair Process:
 - Site visit to field verify damage and dimensions
 - Develop analysis model of truss
 - Confirm member dead load axial force
 - Model construction live loads
 - Design and fabricate replacement member
 - Design and fabricate temporary shoring system
 - Implement repair

- Temporary shoring system
- 1" nominal diameter 150 ksi all-thread bar
- Minimum tensile strength of 128 kips
- Upper and lower brackets
- 30 ton center-hole hydraulic ram



- Upper bracket
- Bears on end post
- Jacking stool for mechanical lock-off
- Large diameter, accurate pressure gauge



- Lower bracket
- Bears on truss bottom chord at L2
- Bolted connection using existing rivet holes
- Access using temporary work platform



- Jack incrementally to dead load force
- Verify truss panel dimensions
- Remove damaged member
- Install replacement member

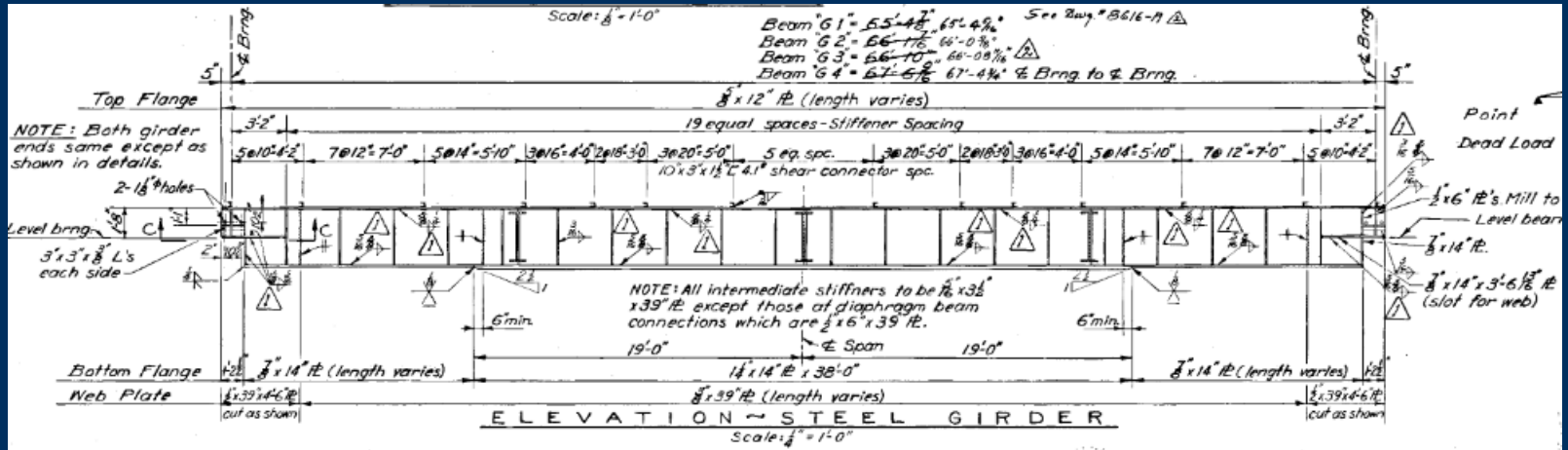


- Field cut member to length
- Match drilled end connections
- ASTM F3125 Grade F1852 (A325-TC) tension control bolts
- 3 coat system – shop primed, intermediate and top coats in field
- WJE self-performed as design-build
- Repair completed 11 days after receiving notice to proceed



Bridge 08616

- Welded steel plate girders carrying single lane ramp
- Four girders, 66-foot span, 40-inches deep
- Over-height load impact to north fascia girder (logging processor)





- Full flange fracture
- Partial web fracture
- Partial flange fracture
- Web rupture at diaphragm
- Existing repairs of prior impact damage





- Bridge initially closed by ODOT
- ODOT load rating
- Re-opened with temporary barrier to move traffic over south girders
- Emergency repair

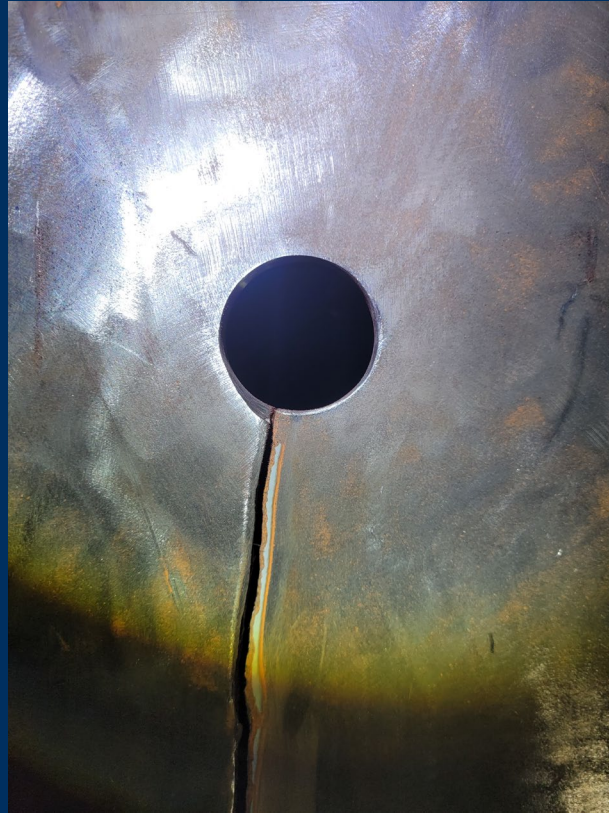




■ Repair Process:

- Site visit to field verify damage and dimensions
- Develop analysis model of girder
- Develop jacking procedure
- Design and fabricate repair components
- Traffic control requirements and plans
- Lead paint abatement (Long Painting)
- Gouge and crack tip removal (WJE)
- Heat straightening (Dan R. Dalton, Inc.)
- Girder jacking (WJE)
- Steel repair installation (WJE)
- Recoating (Long Painting)
- Concrete repairs at girder shear connectors (Pioneer Waterproofing)

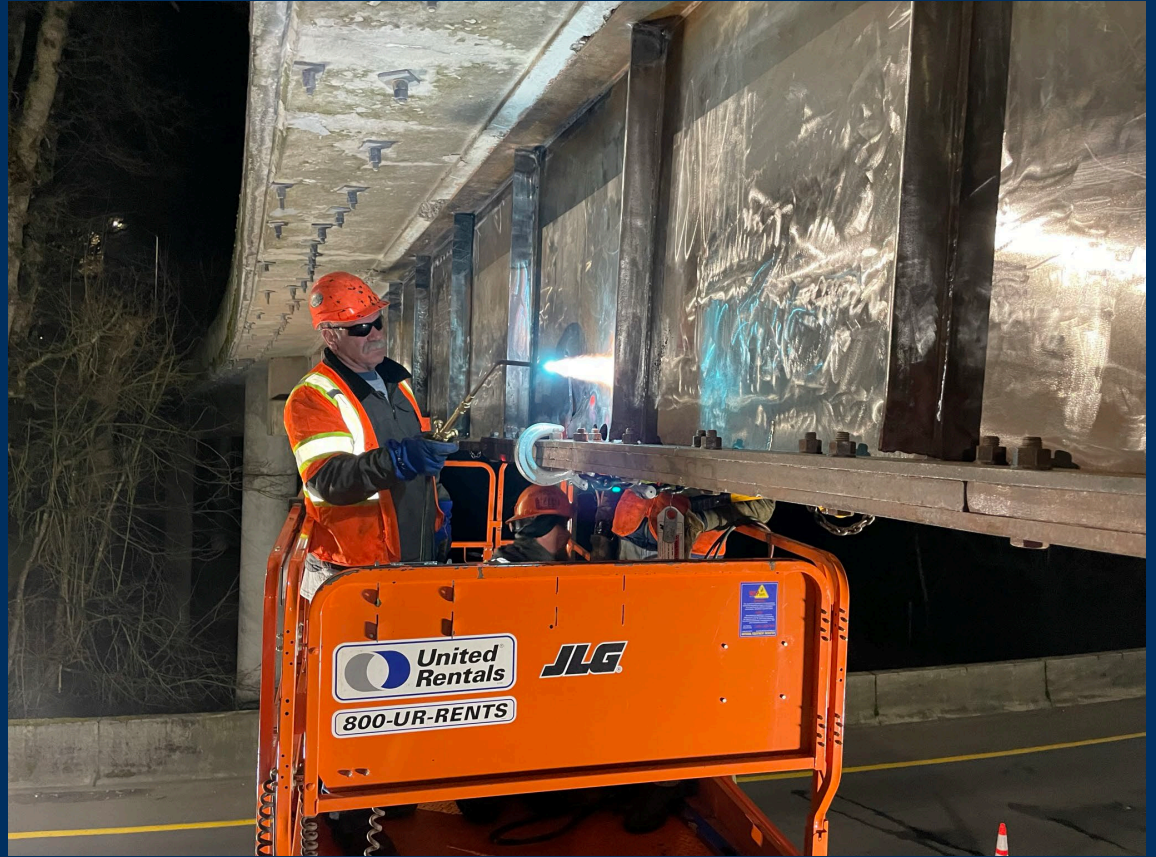
- Paint abatement
- Gouge and crack tip removal



- Second impact during paint removal
- No additional damage



- Heat Straightening



- Girder jacking procedure
- Evaluate supporting bridge for tower reactions
- Telescoping jacking towers
- Rapid deployment
- Jacking forces corresponding to girder dead loads



- Bolted repairs
- ASTM F3125 Grade F1852 (A325-TC) tension control bolts
- Grade 50 material with toughness requirements
- Flange plates full length between fractures – armor for next impact



- Bottom flange top and bottom cover plates



- Web repairs



- Recoating
- Three coat system



- Deck soffit repairs
- Restore concrete at girder shear connectors
- Trowel applied, formed, and epoxy injection



Questions?

