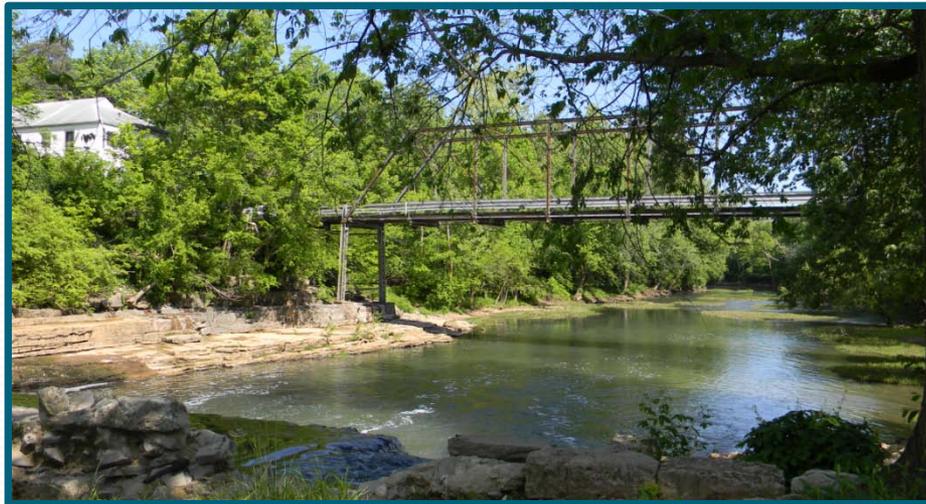


# ACEC Partnering Conference 2012



1899

## Truss Bridges of Kentucky

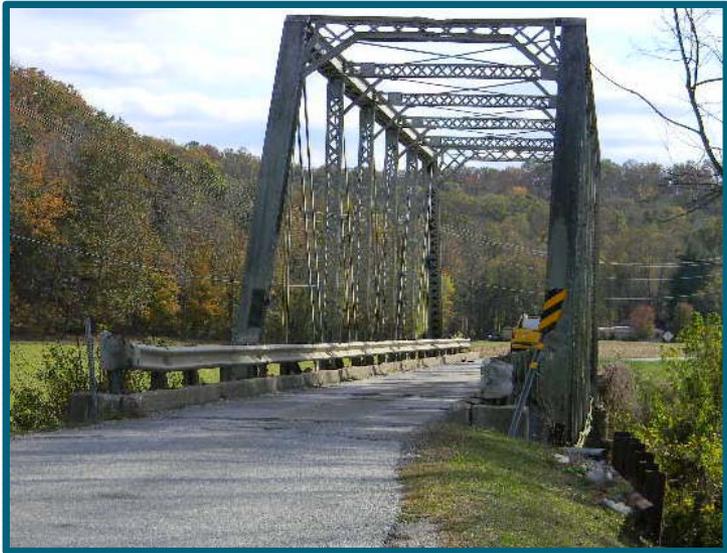


1893



Amanda Abner  
Rebecca Turner

# Truss Bridges of Kentucky



# Truss Bridges of Kentucky



Vincennes Bridge Company



Champion Bridge Company



Empire  
Bridge  
Company

# Truss Bridges of Kentucky



Henry Lawrence Bridge  
1934

Kennedy Bridge,  
1964



# Truss Bridges of Kentucky

Some types are very rare

- Whipple-Murphy- 3
- Parker Pony- 1
- Bedstead- 2
- Baltimore Through- 3
- Baltimore Deck- 1
- Bowstring- 2
- Pennsylvania Petit- 3
- Pratt Deck- 2



Circa 1890s Whipple Truss, Breathitt County

# Truss Bridges of Kentucky



Garrett Bridge  
Floyd County

# Methodology

The most important historic truss bridges in each District were identified based on:

- Truss Type/Rarity
- Best Examples of Type
- Association with Historic Bridge Companies
- Historic Setting/Historic District
- Integrity of Historic Elements  
(e.g., stone abutments, decorative features)
- Association with Other Historic Events  
(e.g., railroad, WPA)

ACEC Partnering Conference 2012

**Interviews with  
District Bridge Engineers**

Ted Grossardt

Len O'Connell

Kentucky

Transportation Center

# Objective of Interviews

- Identify major repairs/work needed to maintain bridge for 20 years
- Generate *rough estimate* of cost to preserve
- Obtain estimate of amount of effort to preserve the bridge on a scale of 1 (very little or no effort) to 10 (most difficult)
- Opinion regarding preservation or replacement
- Identification of functional issues related to the preservation effort (e.g., problems with approach, traffic issues)

# Attributes of Bridges in Tables

Attribute	Explanation
Bridge Identification Number	A bridge with a B is state maintained; One with a C is county Maintained
Sufficiency Rating	From the NBI, ranging from 0.0 (closed) to 100 (condition new)
Year Built	Year said to be built; but may be year rehabilitated and not always accurate

# Attributes of Bridges in Tables

Attribute	Explanation
Work Effort to Preserve	Ranges from very little or no effort (1) to most difficult (10)
Replace or Preserve	Engineer's opinion on bridge's preservation Potential
Historic Qualities	Lists some of the qualities that render the bridge of historic interest
Preserve but bridge presents significant functional issues (summary table only)	The bridge engineer said it could be preserved but mentioned significant obstacles that might stand in the way of preservation, such as traffic flow issues or cost greater than replacement
Cost to Preserve	This is a very rough estimate of the cost of preservation

# District 3 Summary

ID	S.R.	Year Built	Work Effort	Replace or Preserve	Cost to Preserve	Historic Qualities
071C23	25.0	1925	3.5	Preserve	\$600,000 with painting, \$80,000 without	Stone abutments, pin connections
085C05	25.0	1911	2.5	Preserve	\$100,000	Camelback, Pin Connections
114C07	16.5	1911	5.5	Preserve	\$500,000 to \$800,000	Pratt Half-hip Pony, Pin Connections, Stone abutments
085C07	24.7	1921	9	Replace		Vincennes Bridge Co.

# Results by Sufficiency Rating Category

Sufficiency Rating Category	Number of Bridges	Opinion Preserve	Opinion Replace	Preserve w/ Functional Issues
0.0-9.99	6	2	2	2
10-19.99	14	3	5	6
20-29.99	16	9	3	4
30-39.99	7	2	2	3
40-49.99	16	16	0	0
50-59.99	7	6	0	1
60-69.99	2	2	0	0
70-79.99	4	3	1	0
80-89.99	0	0	0	0
90-100	0	0	0	0
Totals	72 (100%)	43 (59.7%)	13 (18.1%)	16 (22.2%)

# Observations from the Districts

- Many of the truss bridges can be maintained/preserved
- Maintenance needs (esp. painting) are underfunded, aggravating deterioration rates
- A spot painting program and/or the use of marine grease may be needed
- More frequent joint repair/replacement to lengthen life of bridge

# Barriers to Preservation

- Functional Issues – Width, Approaches, Existing and Future Traffic Mix, Heavy Agricultural or Industrial use – some bridges simply don't meet the functional needs of the routes they serve.
- County Maintained Bridges – County has little incentive to maintain. State will fix or replace if it gets too bad.
- Understanding Federal Funding.

# Federal Bridge Preservation Program

- Federal Funding **can** be used to rehabilitate these bridges – even if they show up on the Highway Plan as “replace”.
- A bridge is eligible for rehabilitation if it has a sufficiency rating below 80. It ***is not required*** to reach a post-rehabilitation SR of 80 to qualify for federal funding.
- The bridge must not have been federally funded for construction or restoration within the last ten years.

# Federal Bridge Preservation Program

- The bridge must be rehabilitated “to maintain or upgrade its structural capacity to the present and anticipated future capacity needed for route traffic.”
- The State Agency makes this determination.
- Kentucky: County Roads = 18 Tons  
State Routes = 22 Tons  
AAA Highway = 31 Tons
- If these targets cannot be met, the bridge *may* still remain in the system with a posted weight limit.

# ACEC Partnering Conference 2012

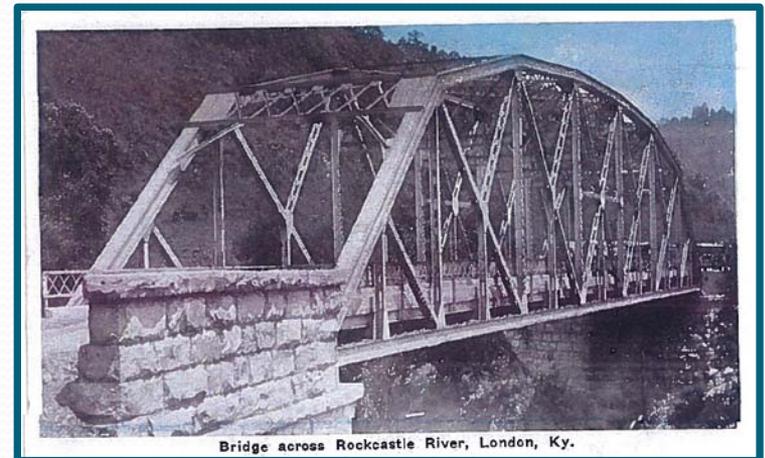
## Historic Rockcastle River Bridge

Tom Matthews & Phil Logsdon



# Rockcastle River Bridge

- KY 490 Rockcastle and Laurel Counties
- Rural – Low Volume Road (200 ADT)
- Pennsylvania Petit Steel Truss
  - Constructed in 1921
  - 205' long, 18-20' wide
  - Sufficiency Rating = 38.7



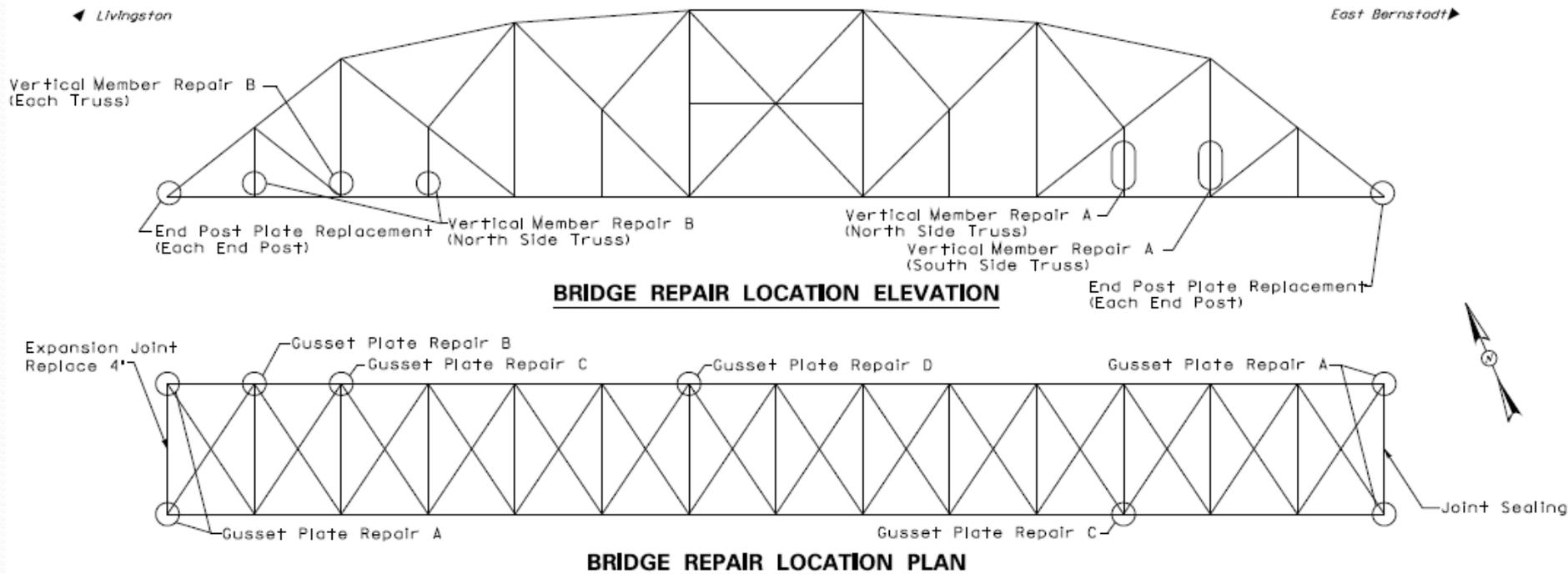
# Other Project Issues

- Only three Pennsylvania Petit Steel Truss bridges remain in Kentucky
- Outstanding Resource Water
- Endangered Mussels
- Sheltowee Trace National Recreation Trail
- 22-Mile detour
- 2006 Estimated replacement costs >\$1.8M



# Issues Associated With Bridge

- 3-Ton Weight Limit
- Overall Condition - Paint
- Vertical Member Repairs
- Gusset Plate Repairs
- End Post Plate Replacement



# Alternative Costs

## Replacement

Estimate = \$1.8M

(ROW + Utilities +  
Construction)

## Paint and Repair

Engineer's Estimate = \$913K

Four Bids = \$465K - \$696K

Low Bid = \$465K

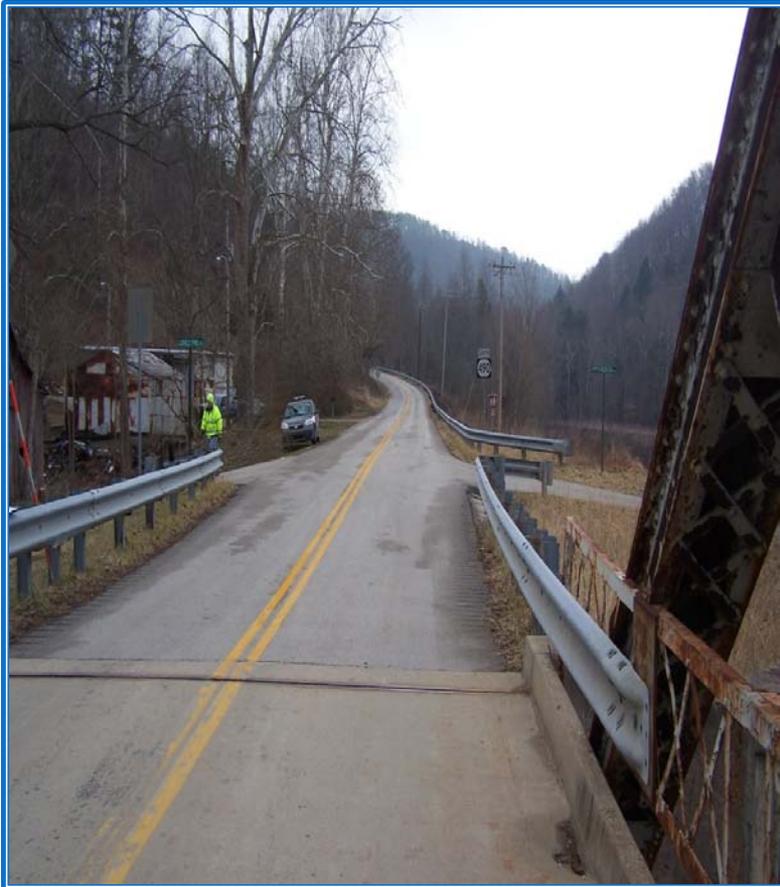


# Rockcastle River Bridge

- Plans Developed In-House
- Let - September 28, 2011
- \$465K - Spartan Contractors
- Closed - October 17-21
- Completed - December 5, 2011



**Existing Joints needed replacement 1~reseal,  
and 1~slide plate to 4" strip seal**



# Vertical member repairs - Section loss was the factor for the 3 ton weight posting.



# Lateral Gusset Plate repairs - Several with excessive deterioration



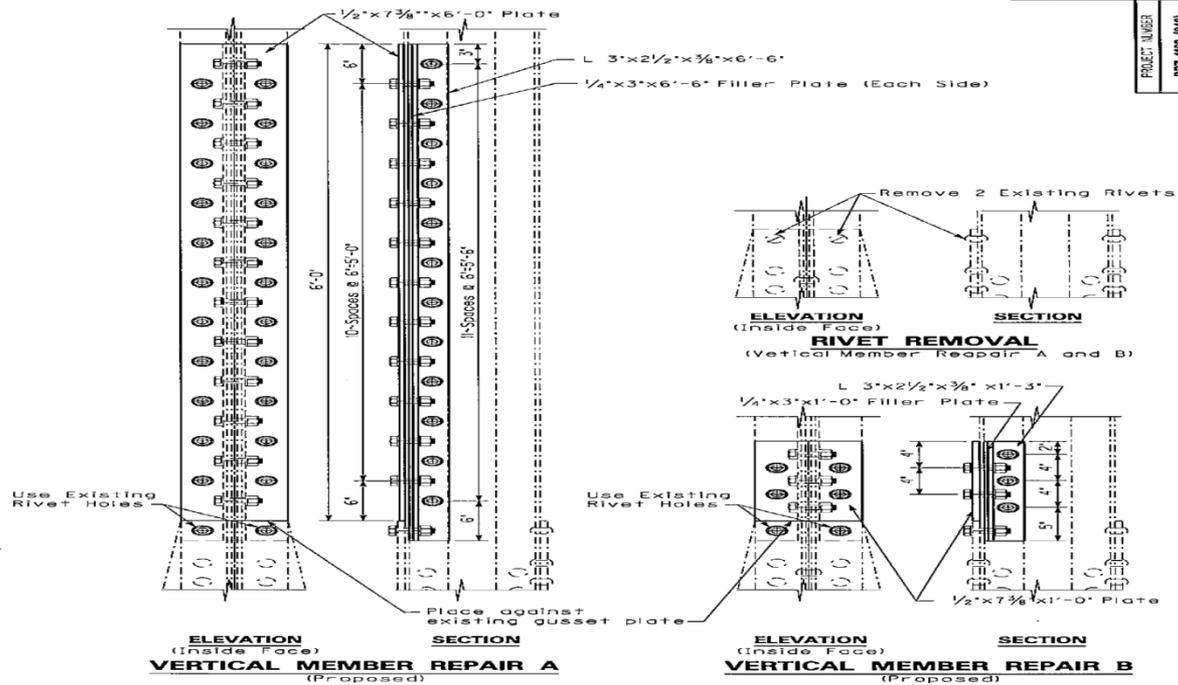
# End Post Plate repair - All 4 locations



# Plan ~ vertical member repair

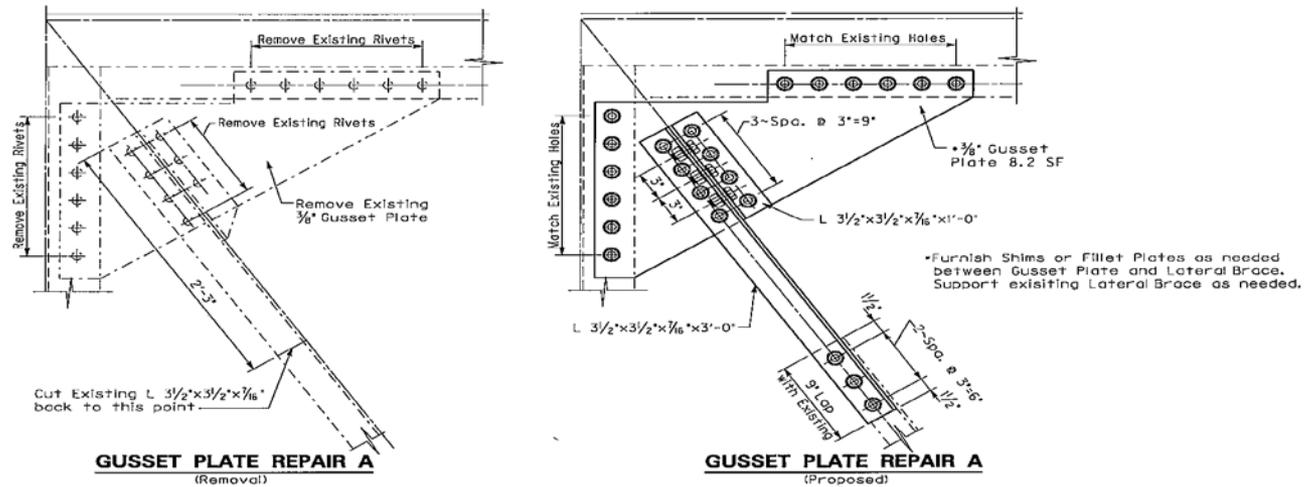
Notes: 1.) The Contractor is responsible for field verifying all dimensions.  
 2.) Cost of all labor, tools, equipment and materials to complete the repairs as detail on this sheet shall be included in the unit price bid for each noted repair.  
 3.) See Bridge Repairs Sheet S1 for High Strength Bolted Connection.

Commonwealth of Kentucky DEPARTMENT OF HIGHWAYS	
LAUREL	
Recreation Pier	
KT 48	STEEL REPAIRS
PROJECT NUMBER	BRZ 1103 (248)
Division of Maintenance	Bridge Preservation Branch



Note: The Contractor Shall remove and re-attach lattice railing as needed to complete Vertical Member Repair A and B.

# Plan ~ lateral gusset plate repair



- Notes:
- 1.) The Contractor is responsible for field verifying all dimensions.
  - 2.) Cost of all labor, tools, equipment and materials to complete the repairs as detail on this sheet shall be included in the unit price bid for each noted repair.
  - 3.) See Bridge Repairs Sheet S1 for High Strength Bolted Connection.

Commonwealth of Kentucky	
DEPARTMENT OF HIGHWAYS	
LAUREL	
Crossing	
KY 490	Rockcastle River
STEEL REPAIRS	
Division of Maintenance	
Bridge Preservation Branch	

PROJECT NUMBER  
BRZ 1103 (249)

DATE  
REV

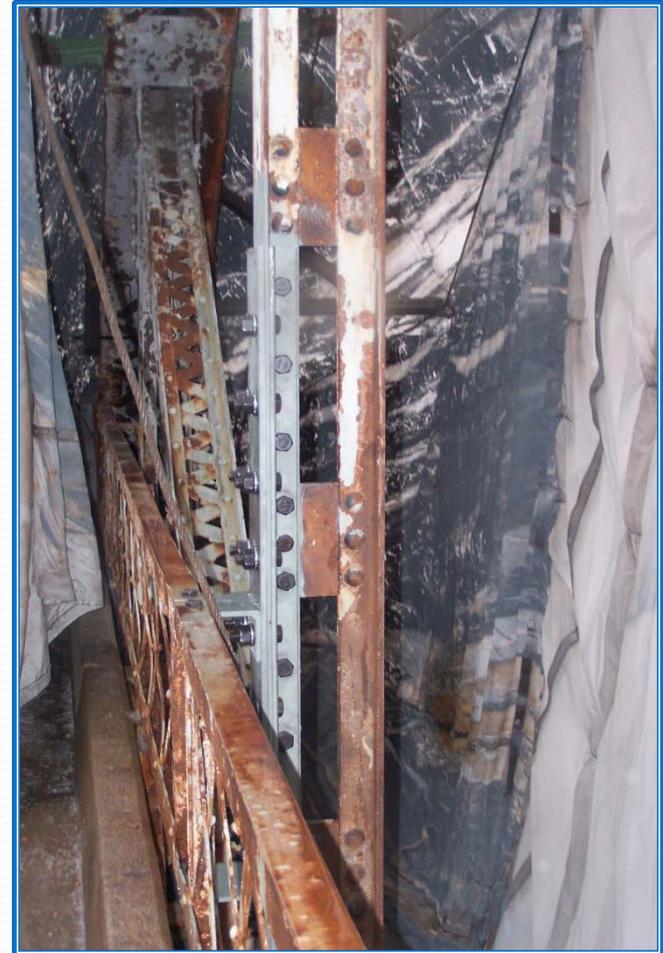
# Joint Reseal, Joint Replacement



# Construction Vertical Member Repair



# Construction Vertical Member Repair



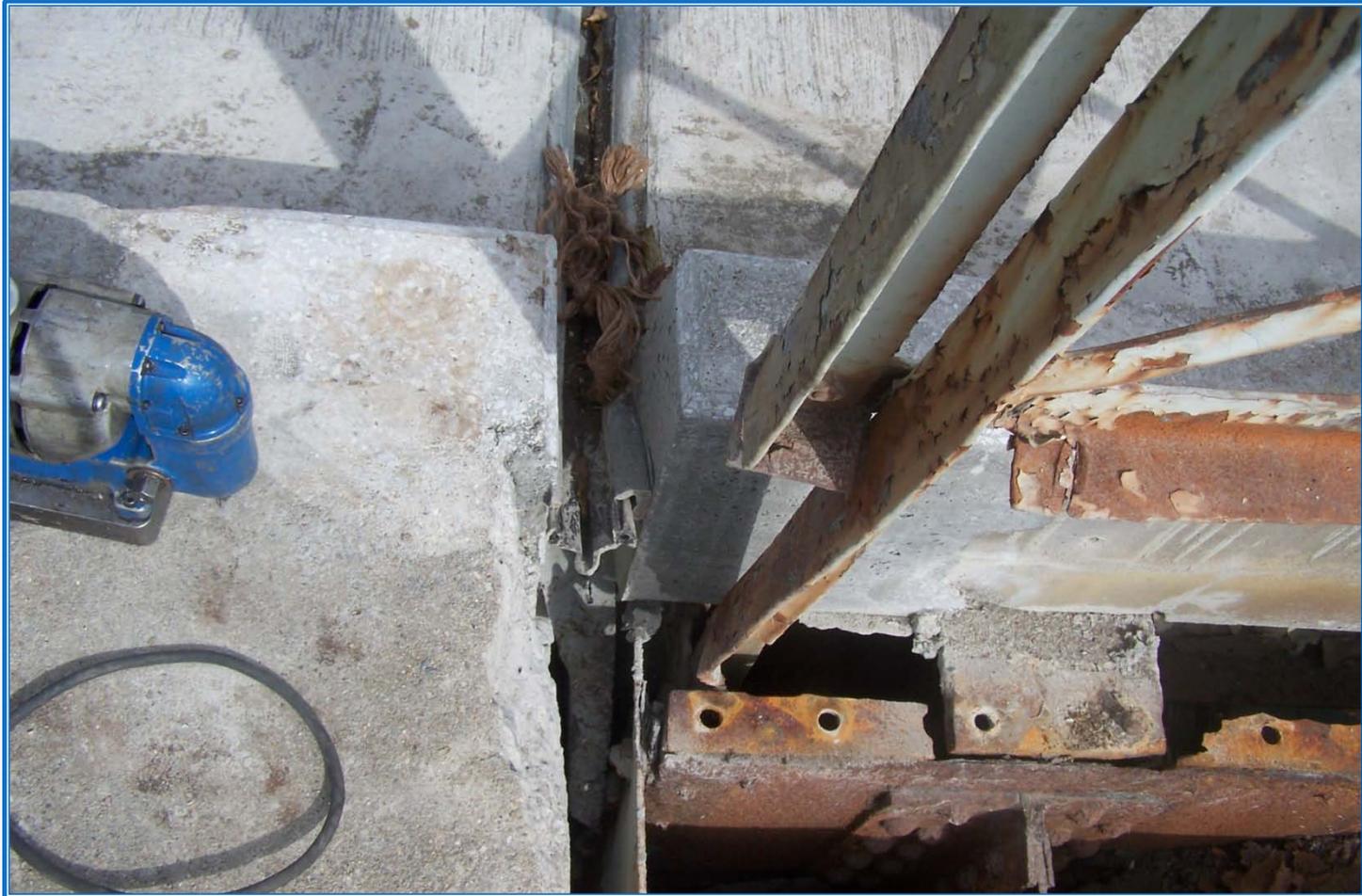
# Construction Lateral Gusset Plate Repair



# Construction Lateral Gusset Plate Repair



# Construction: End Post Plate Repair.....Note new plate installed after painting



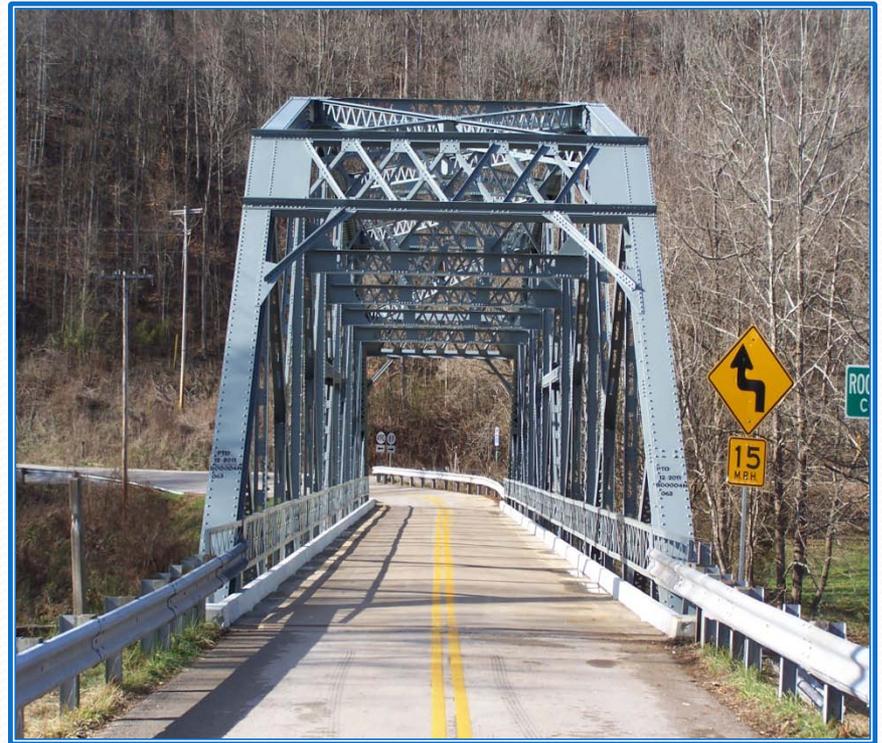
# Cleaning, Painting



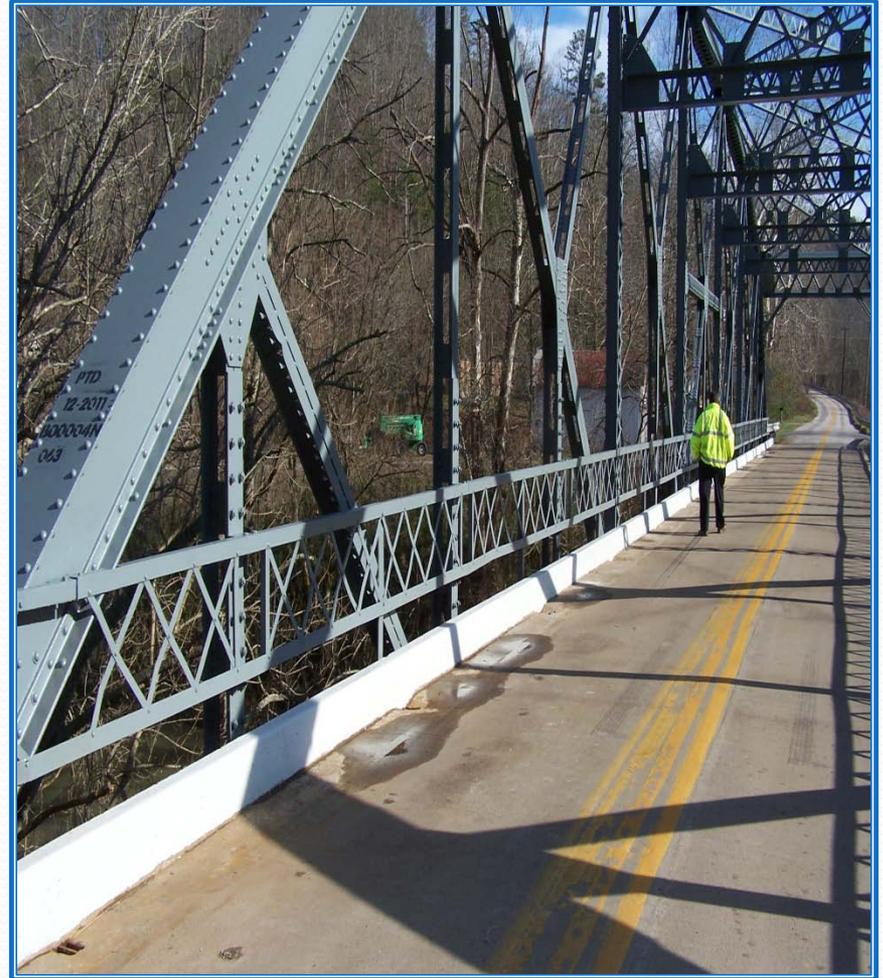
# Cleaning, Painting



# Containment Down finished product....Note masonry coating on deck curb.



# Finish ~ Vertical Member Repair



# Finish ~ Lateral Gusset Plate Repair



# Finish ~ End Post Repair





## Completed Bridge

- 20+ year repair
- 15-Ton weight limit
- 5-Day Closure
- 2-months with 1-lane
- 75% Savings

# Lessons Learned/Conclusions

- Very few historic truss bridges remain
- We need to get better at estimating rehabilitation costs
- Rehabilitation should be considered – even for bridges identified for “replacement” in the highway plan
- “Right Sizing” a project may save overall project costs, including environmental costs
- District Bridge Engineers are interested in preserving and maintaining historic truss bridges
- Consider investing more in preventive maintenance