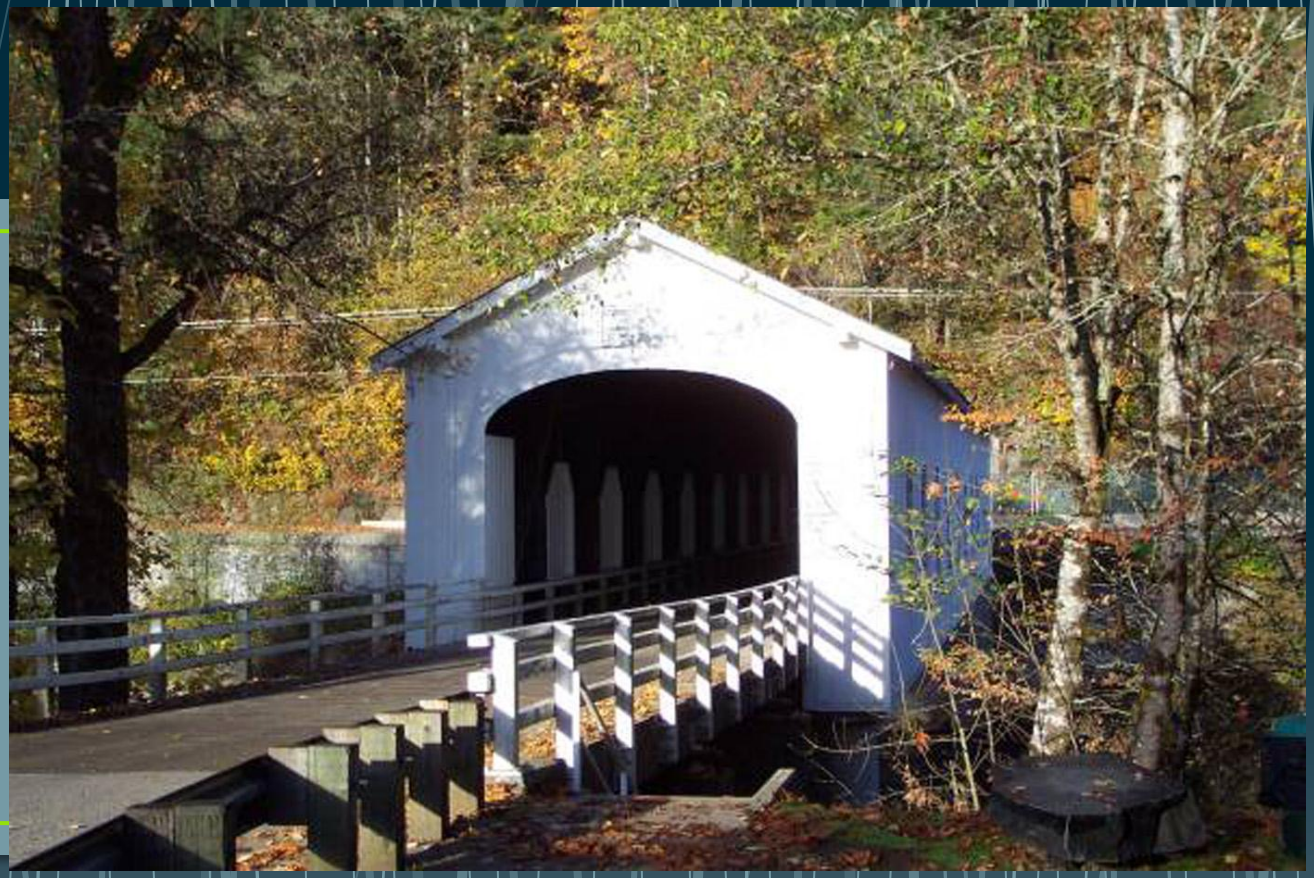
GOODPASTURE COVERED BRIDGE REHABILITATION

165-foot-long heavy timber Howe truss main span

Bridge Location:
Vida, Oregon

Bridge Owner:
Lane County



International Conference on Timber Bridges, 2013

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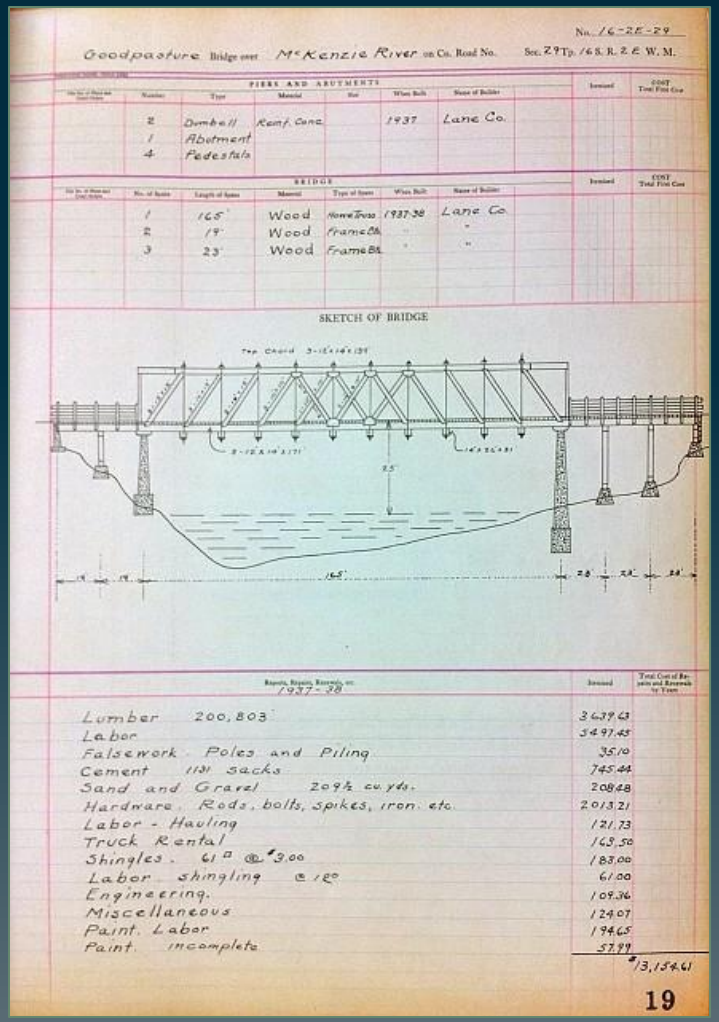
Tony LaMorticella, PE, SE, Sr. Project Engineer, TLaMorticella@obec.com

OBEC Consulting Engineers

BUILT IN 1938 BY LANE COUNTY

Under the supervision of veteran bridge builder Arthur C. Striker

TO CARRY GOODPASTURE ROAD ACROSS THE MCKENZIE RIVER FOR $13,155



No. 16-2E-29

Goodpasture Bridge over McKenzie River on Co. Road No. Sec. 29 Tp. 16 S. R. 2 E W. M.

PIERS AND ABUTMENTS

	Type	Material	Built	Builder	Invoiced	Cost Total First Cost
2	Dumbell	Reinf. Conc.	1937	Lane Co.		
1	Abutment					
4	Pedestals					

BRIDGE

	No. of Spans	Length of Spans	Material	Type of Truss	When Built	Name of Builder	Invoiced	Cost Total First Cost
1		165'	Wood	Howe Truss	1937-38	Lane Co.		
2		19'	Wood	Frame Bk.		"		
3		23'	Wood	Frame Bk.		"		

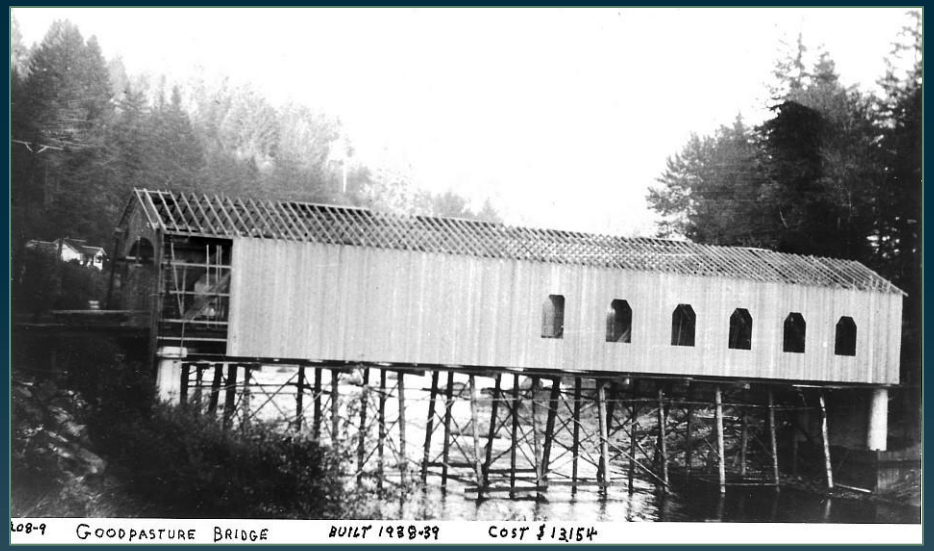
SKETCH OF BRIDGE

Repairs, Repairs Renewals etc. 1937-38

		Invoiced	Total Cost of Repairs and Renewals by Years
Lumber	200,803	3639.63	
Labor		5497.45	
Falsework Poles and Piling		35.10	
Cement	1131 sacks	745.44	
Sand and Gravel	209½ cu. yds.	208.48	
Hardware Rods, bolts, spikes, iron etc.		2013.21	
Labor - Hauling		121.73	
Truck Rental		163.50	
Shingles 61 M @ $3.00		183.00	
Labor shingling @ 18¢		61.00	
Engineering		109.36	
Miscellaneous		124.07	
Paint Labor		194.65	
Paint incomplete		57.99	
		$13,154.61	

19

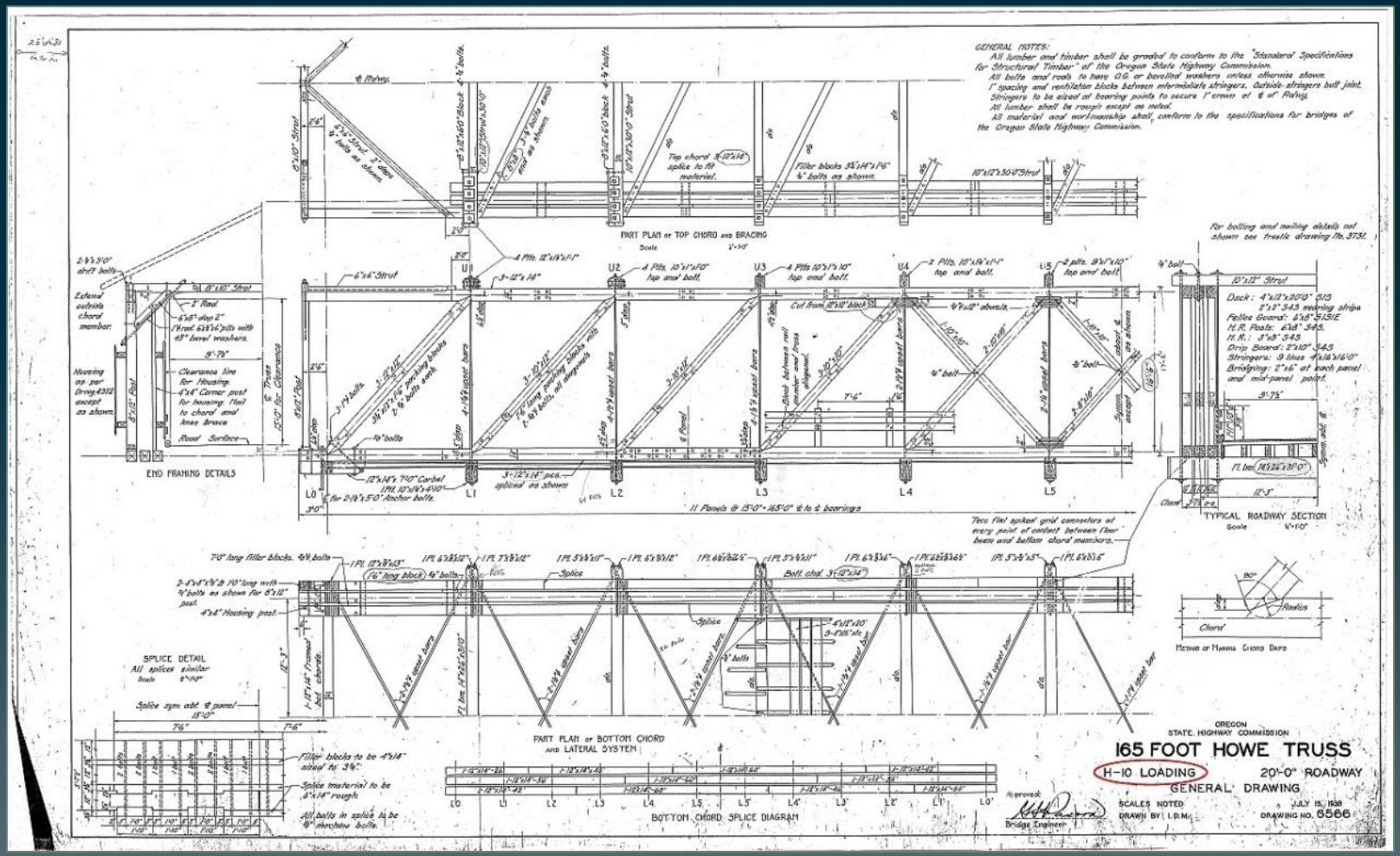
Goodpasture Covered Bridge



Under construction 1938

Original construction invoice

STATE STANDARD DRAWING FOR H10 LOADING

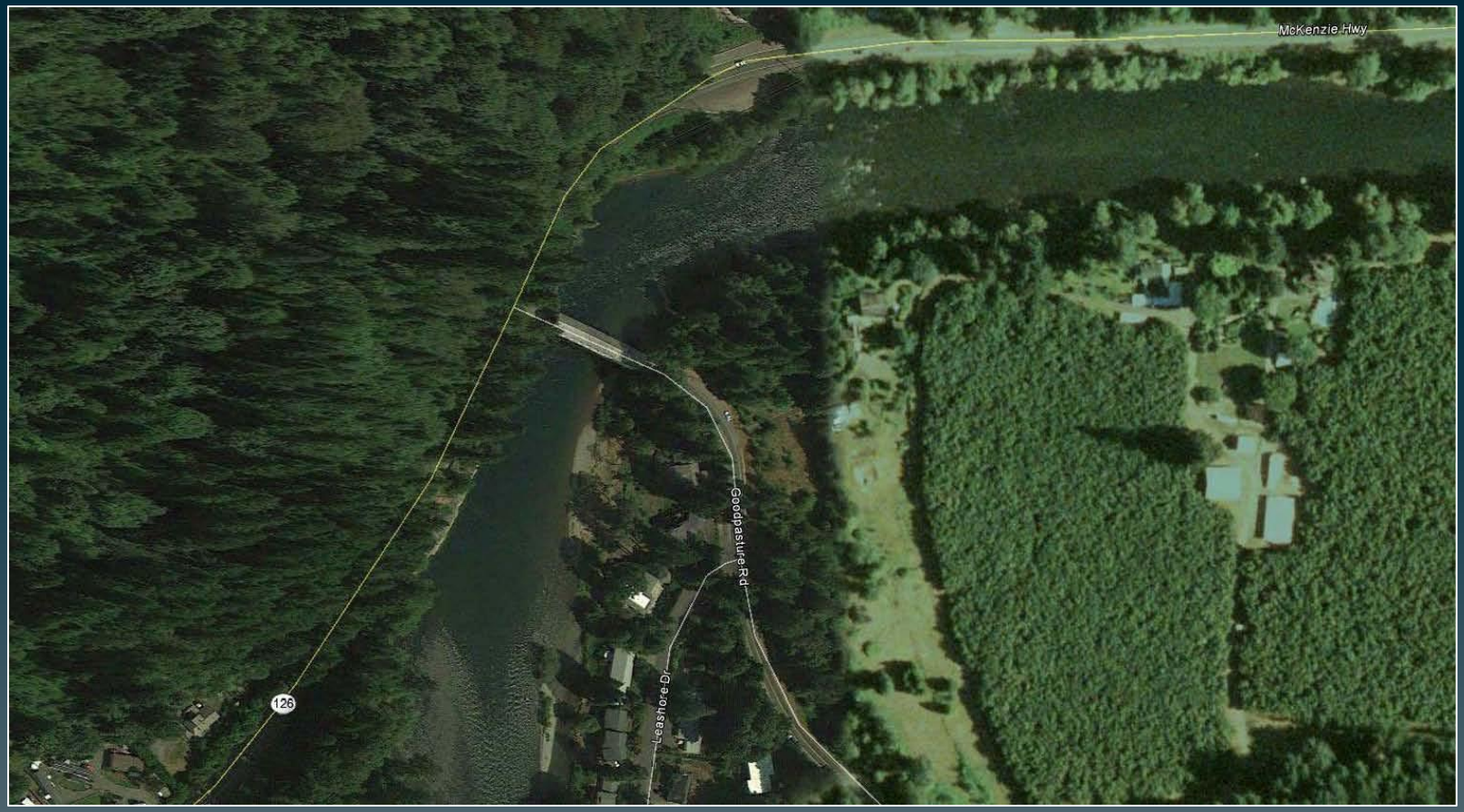


THE MIGHTY MCKENZIE RIVER

from Google Earth

Fast pristine water, good fishing, home to many listed species of aquatic life

BRIDGE IS LIFELINE TO COMMUNITY SOUTH OF RIVER



Aerial view – Google Earth

BLIND CURVE AND NO SHOULDER OR TURN LANE FOR WESTBOUND TRAFFIC

Looking east up highway

BRIDGE CIRCA 1950

With H10 truck of the day

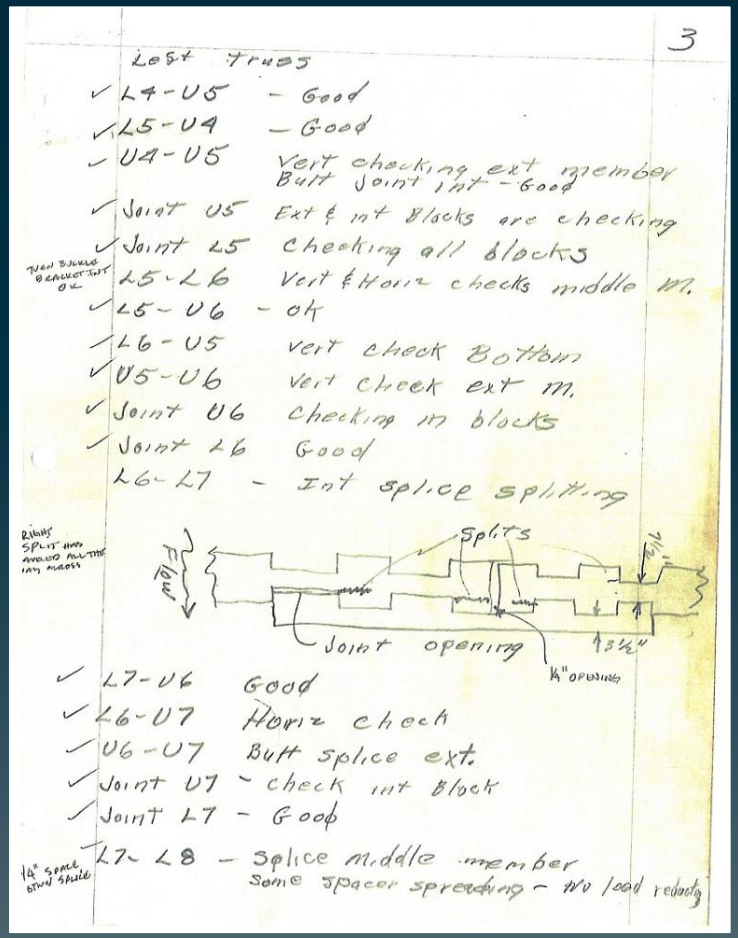
Typical modern Oregon log trucks

Substantially heavier than design load

One-log loads,
once common, now rare

Hazard to covered bridges even when empty

1972 STRUCTURAL DISTRESS



3

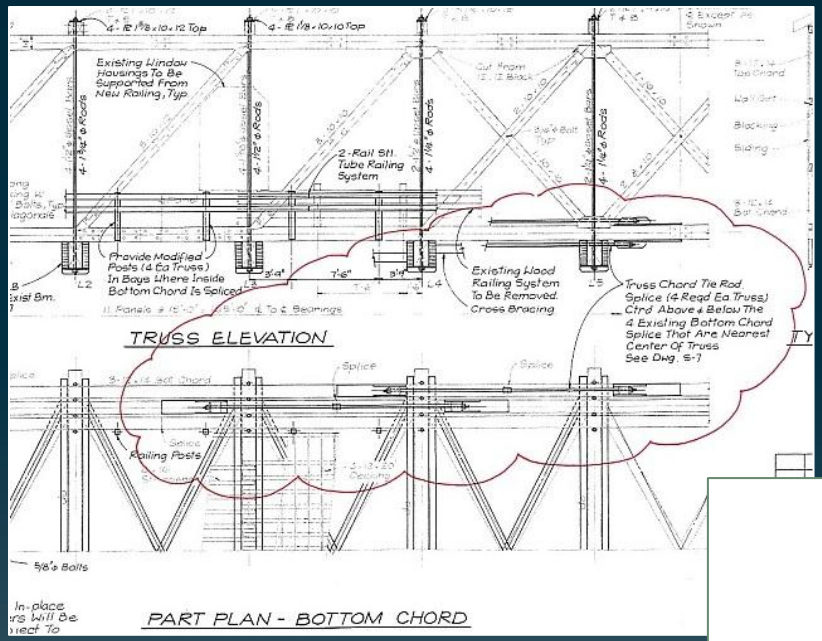
East Truss

- ✓ L4-U5 – Good
- ✓ L5-U4 – Good
- ✓ U4-U5 Vert checking ext member Butt Joint int – Good
- ✓ Joint U5 Ext & int blocks are checking
- ✓ Joint L5 Checking all blocks
- ✓ L5-L6 Vert & Horiz checks middle M.
- ✓ L5-U6 – OK
- ✓ L6-U5 Vert check Bottom
- ✓ U5-U6 Vert check ext M.
- ✓ Joint U6 Checking in blocks
- ✓ Joint L6 Good
- L6-L7 – Int splice splitting

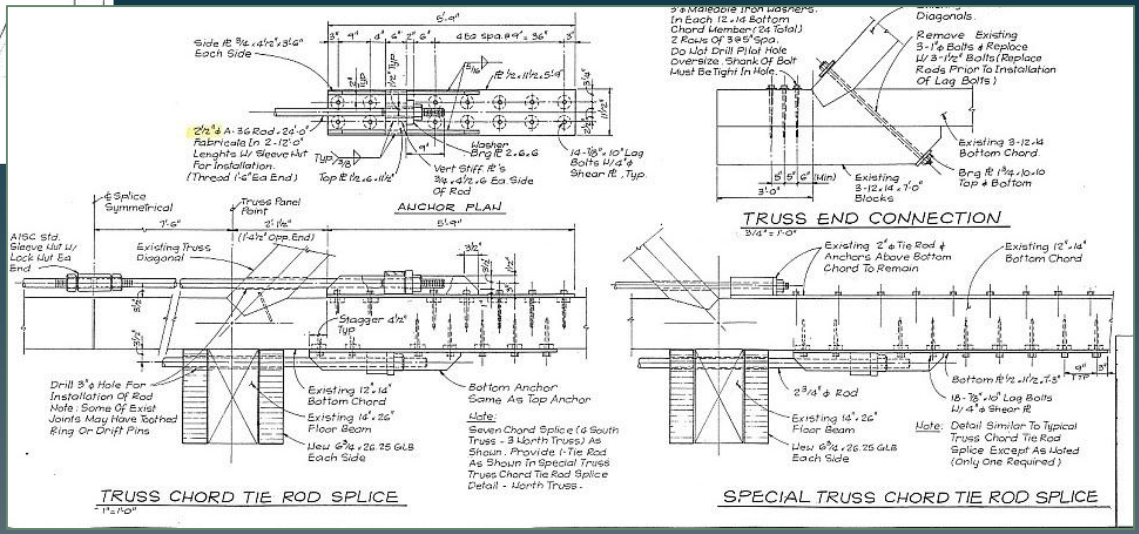
- ✓ L7-U6 Good
- ✓ L6-U7 Horiz check
- ✓ U6-U7 Butt splice ext.
- ✓ Joint U7 – check int block
- ✓ Joint L7 – Good
- ✓ L7-L8 – Splice middle member Some spacer spreading – no load reduction

Inspector's notes documenting broken bottom chord splices

1986 CHORD SPLICE REINFORCEMENT DESIGN



Welded steel plate anchors fastened to bottom chord segments with lag screws and 2½" diameter tie rods passing through timber truss diagonal members.



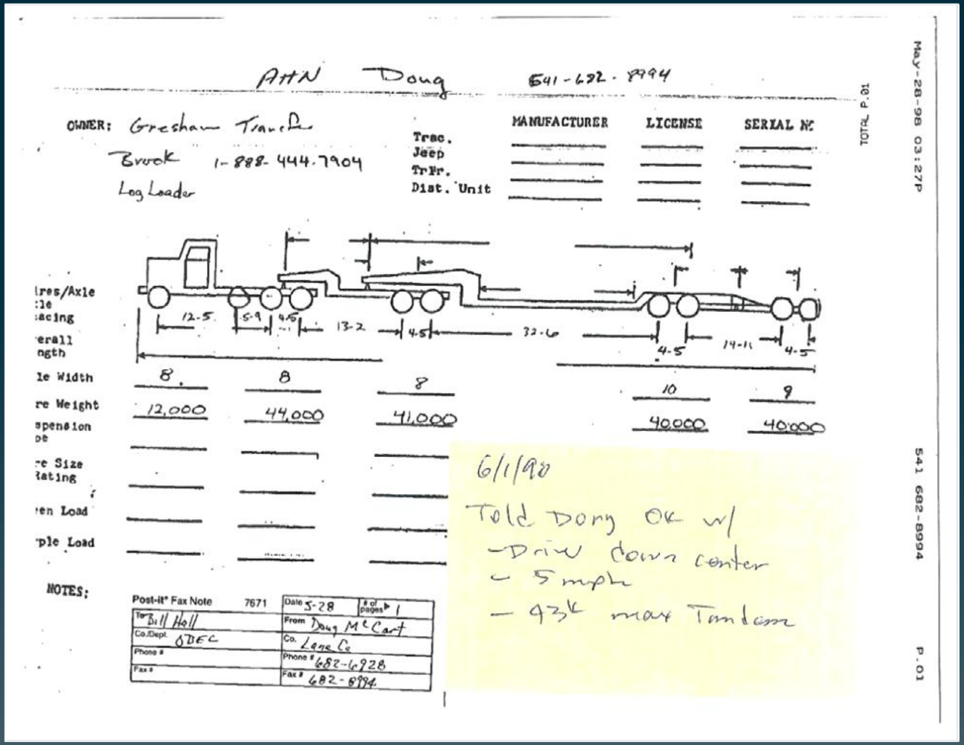
REPAIR ADDED >7 TONS OF DEAD LOAD BUT WAS ONLY MARGINALLY EFFECTIVE

Broken splices leaving gaps to ½"

Some rods were never engaged

Gaps not closed by tie rods

OVERLOADS



Approved overload request from 1998 GVW is 177,000 lbs.

LIGHTER ROOF IN 2010

Very heavy cement/wood fiber composite roofing was leaking

Replaced with much lighter and historically more appropriate cedar shingles

4-INCH SAG AT MID-SPAN EVEN WITH LIGHTER ROOF

2012 photo

TYPICAL RIVER LEVEL

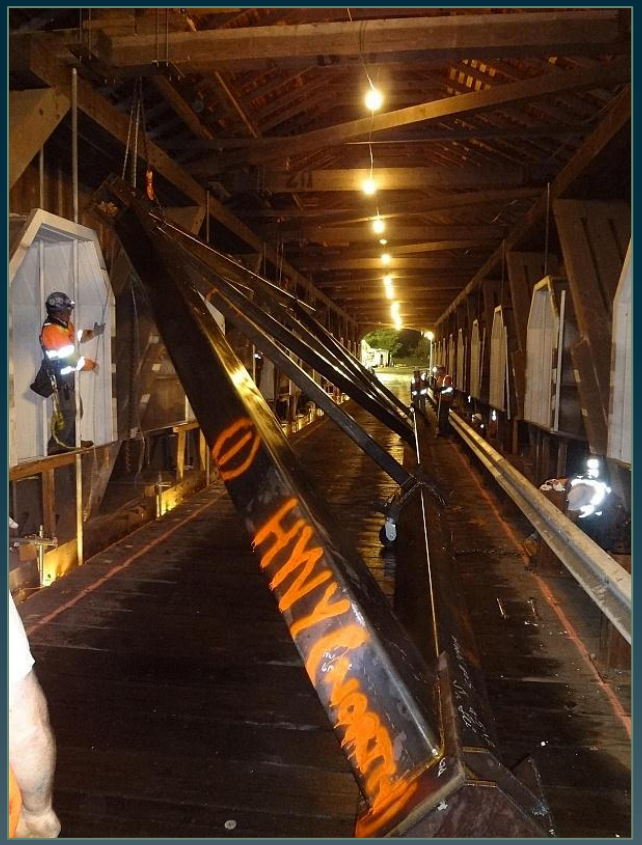
Bridge soffit approximately 30 feet above hard rock stream bed, fast and deep water. In-water work period is only 6 weeks, July 15 to September 1.

HIGH WATER

Water level can rise several feet in a few days

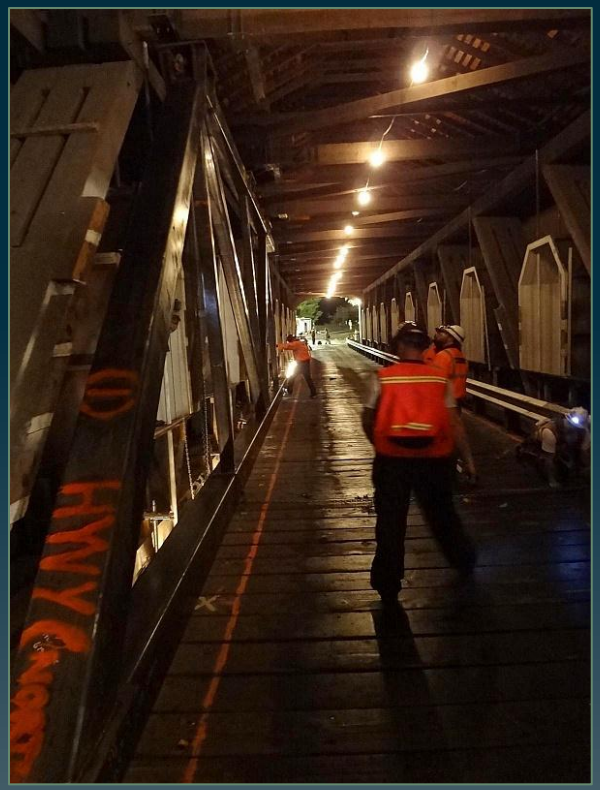
CORRECTING THE GEOMETRY FROM ABOVE STEP 1

Temporary rail installed and deck cut



Installing the first temporary steel truss during night-time closure

FIRST TEMPORARY STEEL TRUSS IN PLACE

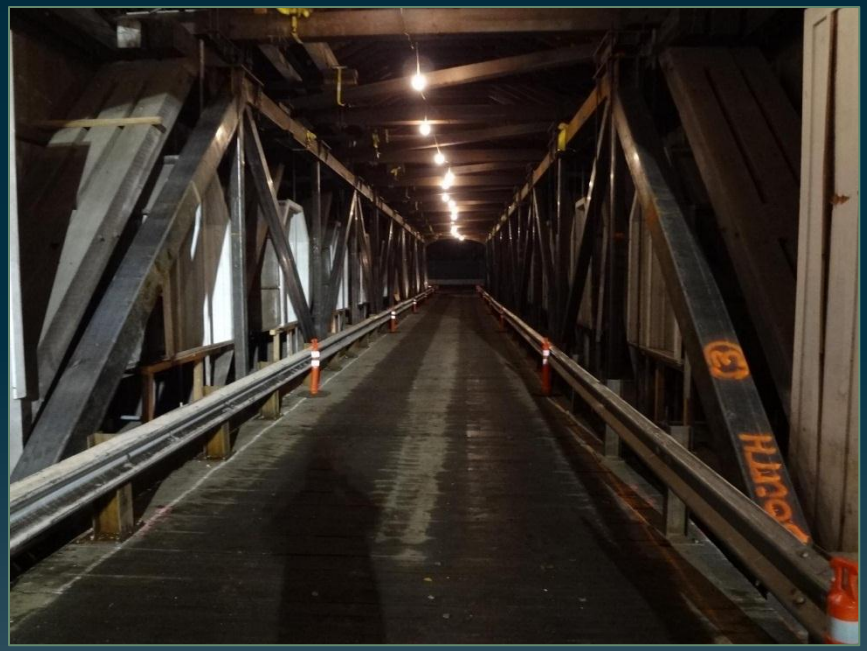


Standing vertical

Bearing on concrete pier

Temporary rail in place, ready for traffic

LIFTING ASSEMBLY IN PLACE



Ready to lift timber bridge

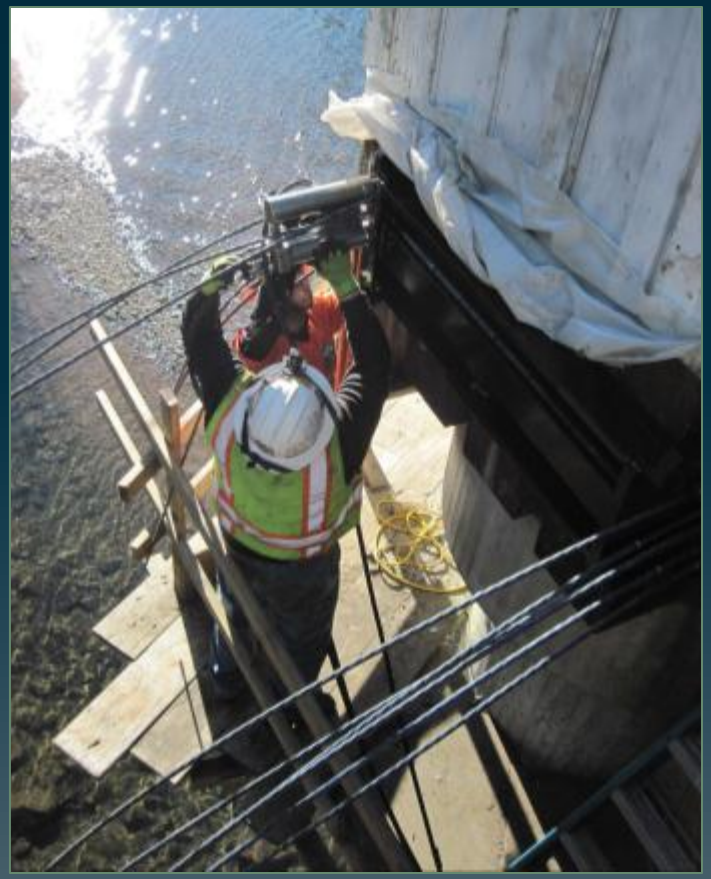
One of twenty 50-ton hydraulic jacks

AVAILABLE CLEARANCES FOR POST-TENSIONING

Between bottom chord and siding

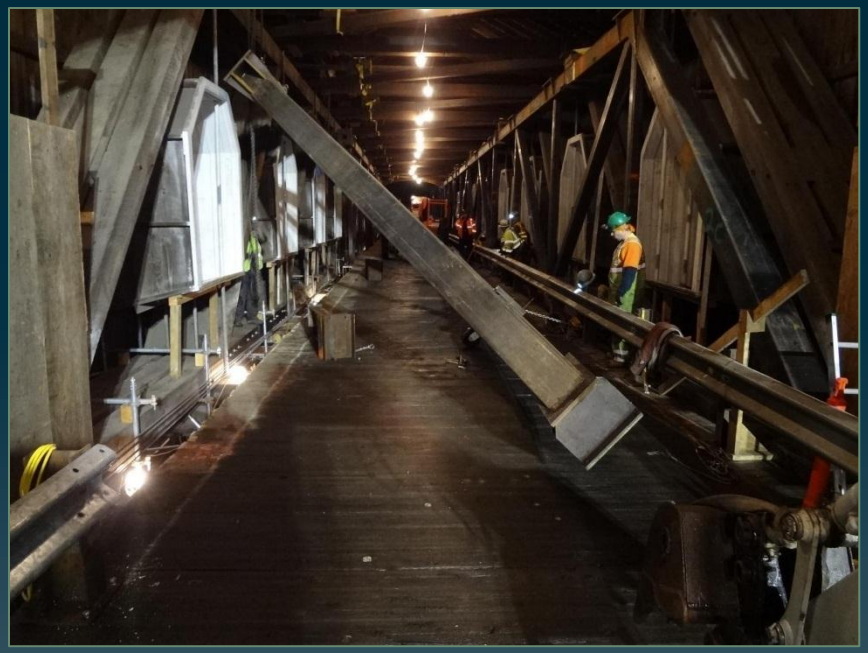
Between rail post and bottom chord

JACKING THE STRAND



Six ½" strands each side of each bottom chord, each pulled to 20,000 pounds

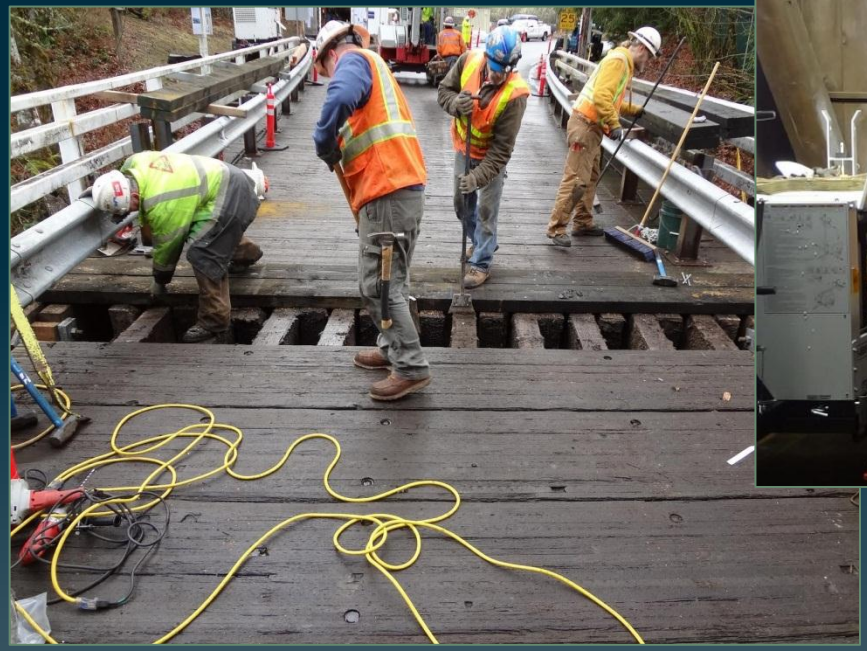
REMOVING TEMPORARY STRUCTURE



Removing temporary steel trusses

Reinstalling bridge rail

REPLACING THE DECK



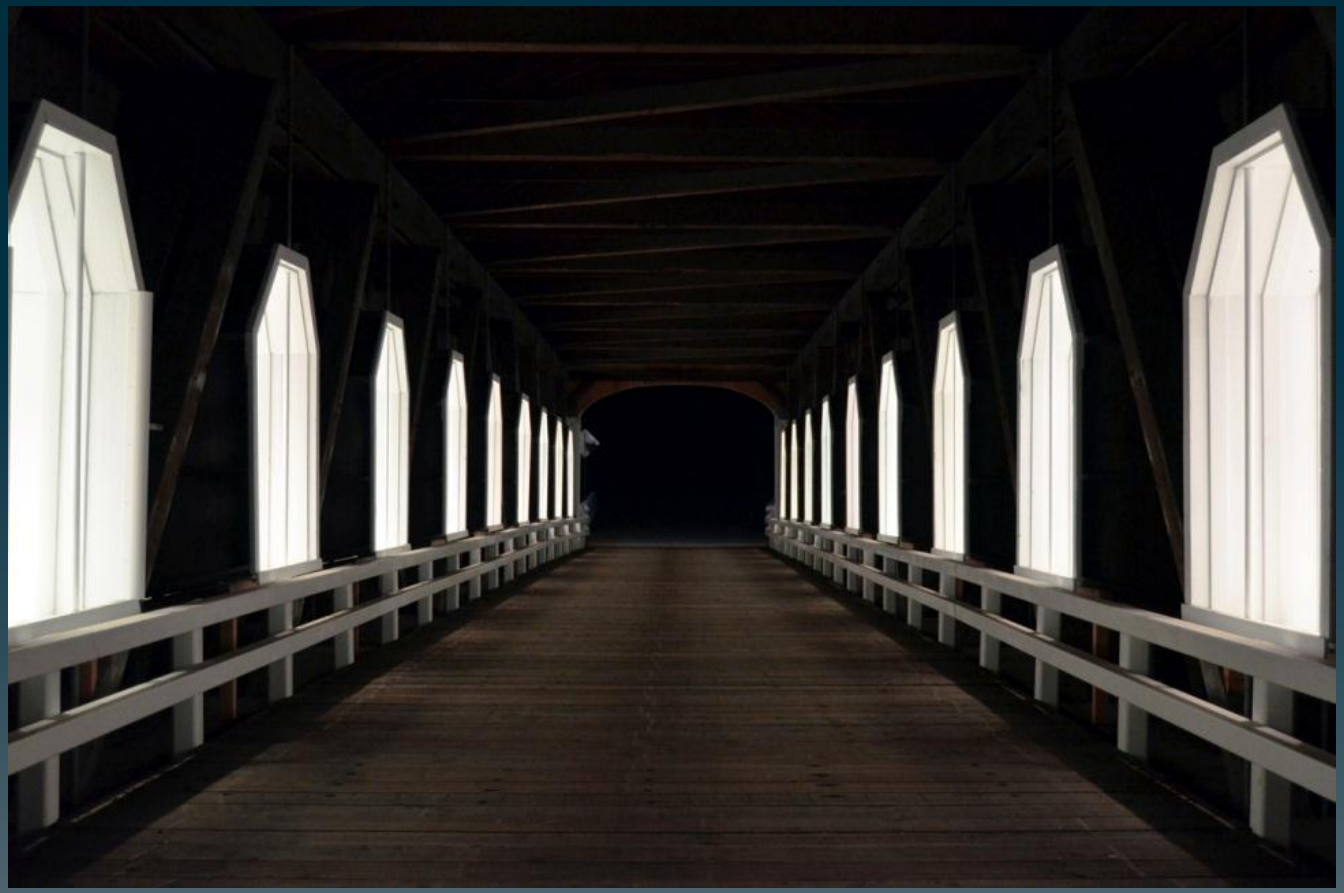
Spiking done during night closures

PROJECT COMPLETE

Looking northwest, March 11, 2013

LIGHTING FOR SAFETY

INTERIOR NIGHT VIEW



Goodpasture Covered Bridge

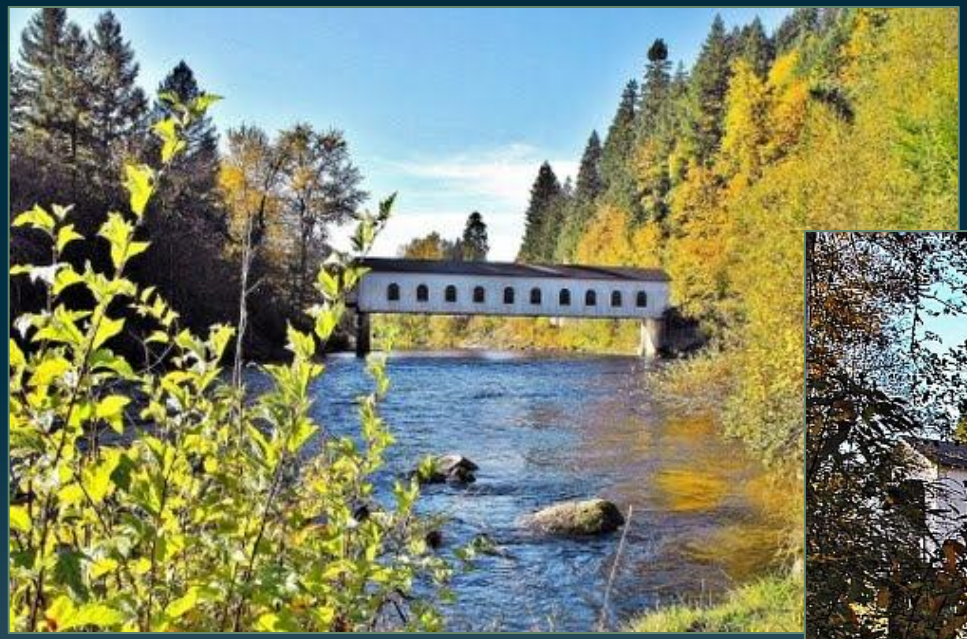
HOLIDAY LIGHTING

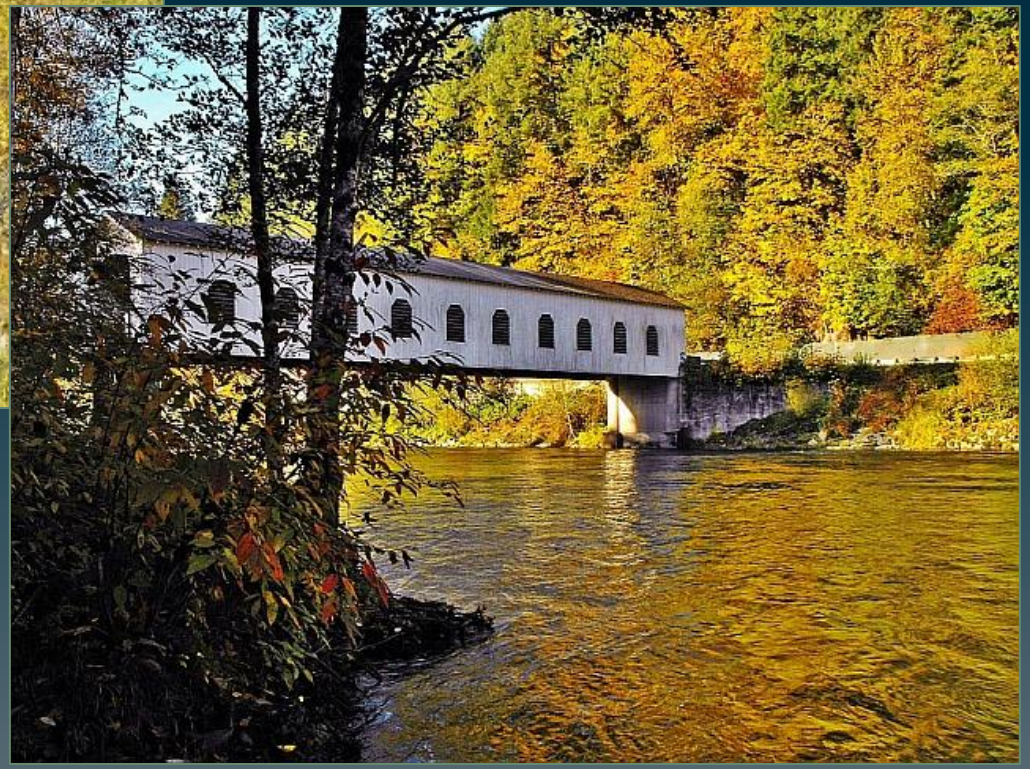
Prior to rehabilitation local residents strung lights with extension cords

Programmable LED lighting installed

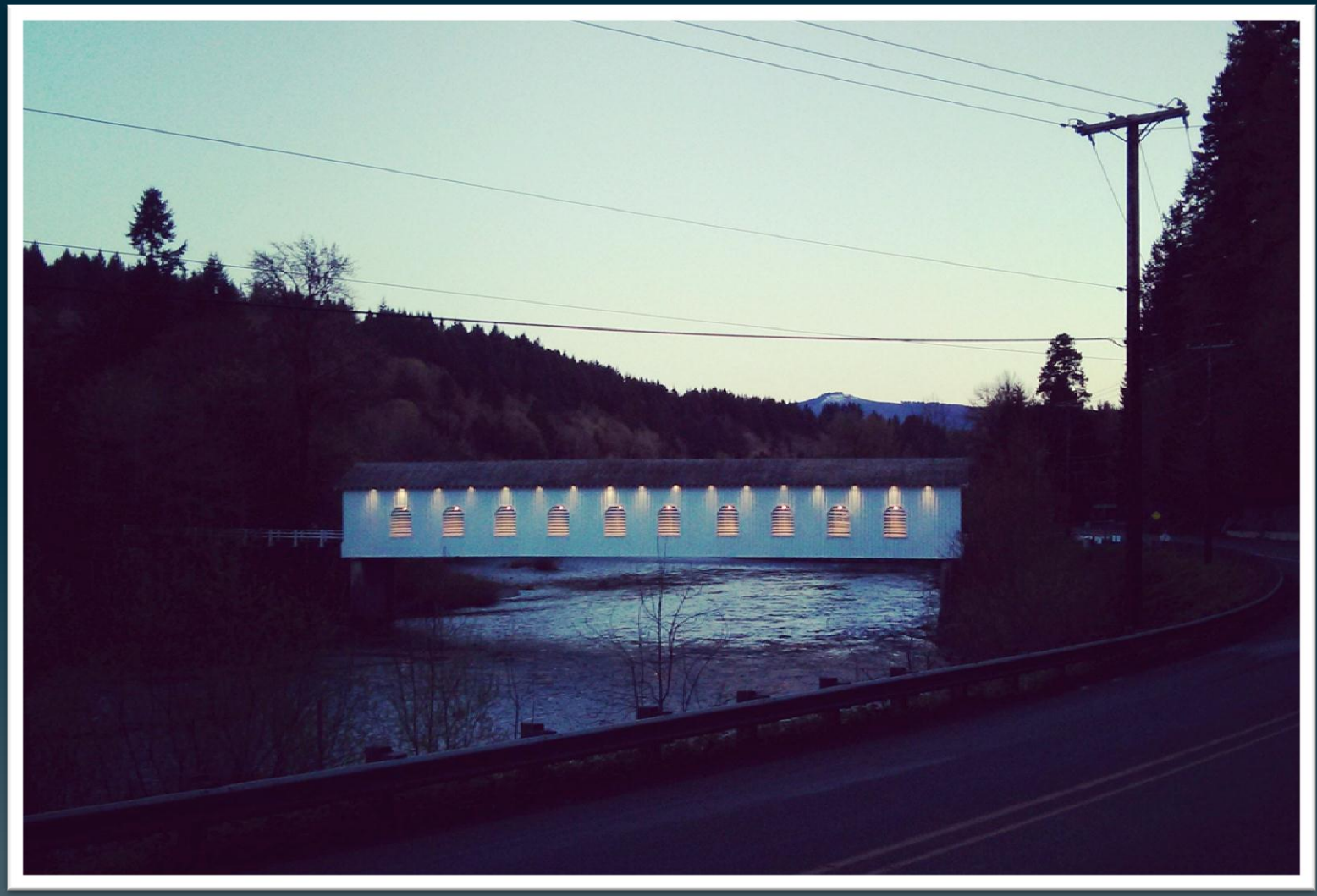
Circuitry concealed behind wrap-around siding

PICTURESQUE SETTING





Fall 2012
(prior to rehabilitation)



GOODPASTURE COVERED BRIDGE, 2013