Boone High Bridge

Agenda:

• History of the Kate Shelley Bridge
• Reason for repairs and replacement
• New Boone High Bridge
• Project Construction and Issues
• Questions
Kate Shelley Bridge - location

Kate Shelley Bridge

Map showing cities and regions connected by roads, including:
- Seattle
- Portland
- Eastport
- Duluth
- Twin Cities
- Omaha
- Omaha
- KC
- St. Louis
- Memphis
- Dallas
- New Orleans
- Houston
- Laredo
- Brownsville
- Nogales
- El Paso
- Eagle Pass
- Calexico
- Oakland
- SLC
- Denver
Kate Shelley Bridge - location

Location of new line and bridge location.

Boone

Moingona
Kate Shelley Bridge - facts

Bridge Information:
C&NW line Chicago to Omaha. Located 155 miles east of Omaha.

Spans the Des Moines River Valley.

Construction Started early 1899.

Bridge opened May 19th, 1901.

Length: 2685'
Height: 190'

22 steel formed towers resting on stone pier foundations. Spans ranging from 45' to 75'.

300' pin connected deck truss
Kate Shelley Bridge

Who is Kate Shelley?

Bridge originally named the Boone Viaduct.

July 1881 thunderstorm flooded Des Moines river bottom washing out a bridge over a small ravine east of the river near Moingona.

A freight train derailed into the flooded waters killing the fireman whose body was never found. The engineer survived.

Kate Shelley, then 15 yrs of age, knew of the derailment / washout and that a passenger train should soon be near. During the storm and heavy rains, with a lantern in hand, crossed the old Des Moines River bridge flagging the approaching passenger train to a stop.

In 1926 the bridge was dedicated to the memory of Kate Shelley.
Kate Shelley Bridge - construction
Kate Shelley Bridge – construction

Des Moines River Viaduct
Kate Shelley Bridge
Kate Shelley Bridge - construction
Kate Shelley Bridge - testing
Kate Shelley Bridge – opened May 19th, 1901
Kate Shelley Bridge - then

At this time, it is said that the Boone Viaduct was the longest railroad bridge, both for single or double track, in the world.
Kate Shelley Bridge - now
190 ft. high
Kate Shelley Bridge – Reasons for Replacement

• Prior to 2002, 1 train @ 35 mph.
• After 2002, 2 trains @ 25 mph.
• Creates a bottleneck and traffic congestion.
• Bridge is 104 years of age.
• Structural wear and degradation.
Kate Shelley Bridge – Reasons for Replacement

Crack in floor beam connection

Section loss due to rusting
Kate Shelley Bridge – Reasons for Replacement

Section loss and cracking at connection

Broken stiffener at a cross frame
Kate Shelley Bridge – Reasons for Replacement
Kate Shelley Bridge – Repairs and strengthening

Repairs made in 2002

- Lateral bracing rods
- Lateral struts and bottom diagonals
Kate Shelley Bridge – Repairs and strengthening

Repairs made in 2002
Kate Shelley Bridge – Repairs and strengthening

- Top chord strengthening
- Cross frame lateral bracing
- Bottom diagonals
Kate Shelley Bridge – Repairs and strengthening
Kate Shelley Bridge – Repairs and strengthening

Before

After
Kate Shelley Bridge – Repairs and strengthening
Kate Shelley Bridge
New Boone High Bridge

- Design speed 70 MPH.
- Double Track on 20 ft centers.
- Original length 2550 ft long.
- Revised length 2813 ft long

- Original Project Cost: $43 million
- Designed 2005 - 2006
- Started Construction late 2006
- Original completion Nov 2008
- Revised completion Aug. 20, 2009
New Boone High Bridge

- 26 concrete column bents (5 towers)
- Spans (6@30’ PCB, 20@110’ DPG and 6@70’ DPG x2)
- 0.0416% grade
- Nearly 560,000 yd^3 earthwork
- Nearly 26,000 yd^3 concrete used
- Nearly 2.9 million lbs steel rebar
- Nearly 1.2 million lbs structural steel and embeds
- Total weight estimated near 13.6 million lbs
Original Design

Key:
1. Original ground line
2. Designed slope
3. Current slope
4. Approx. shale layer
5. Estimated failure plane
Proposed Design

Key:
1. Proposed slope
2. New 70' span
3. New east approach (3 x 30' spans)
Boone High Bridge – Revised Design

- New 70’ steel span
- 102’ new west end approach
- 90’ new east end approach
- Original Slopes
- New slopes

West

East
Boone High Bridge

Thank You