USA Rice Outlook Conference

Transportation Update: A Conversation on Shifting Logistical Challenges

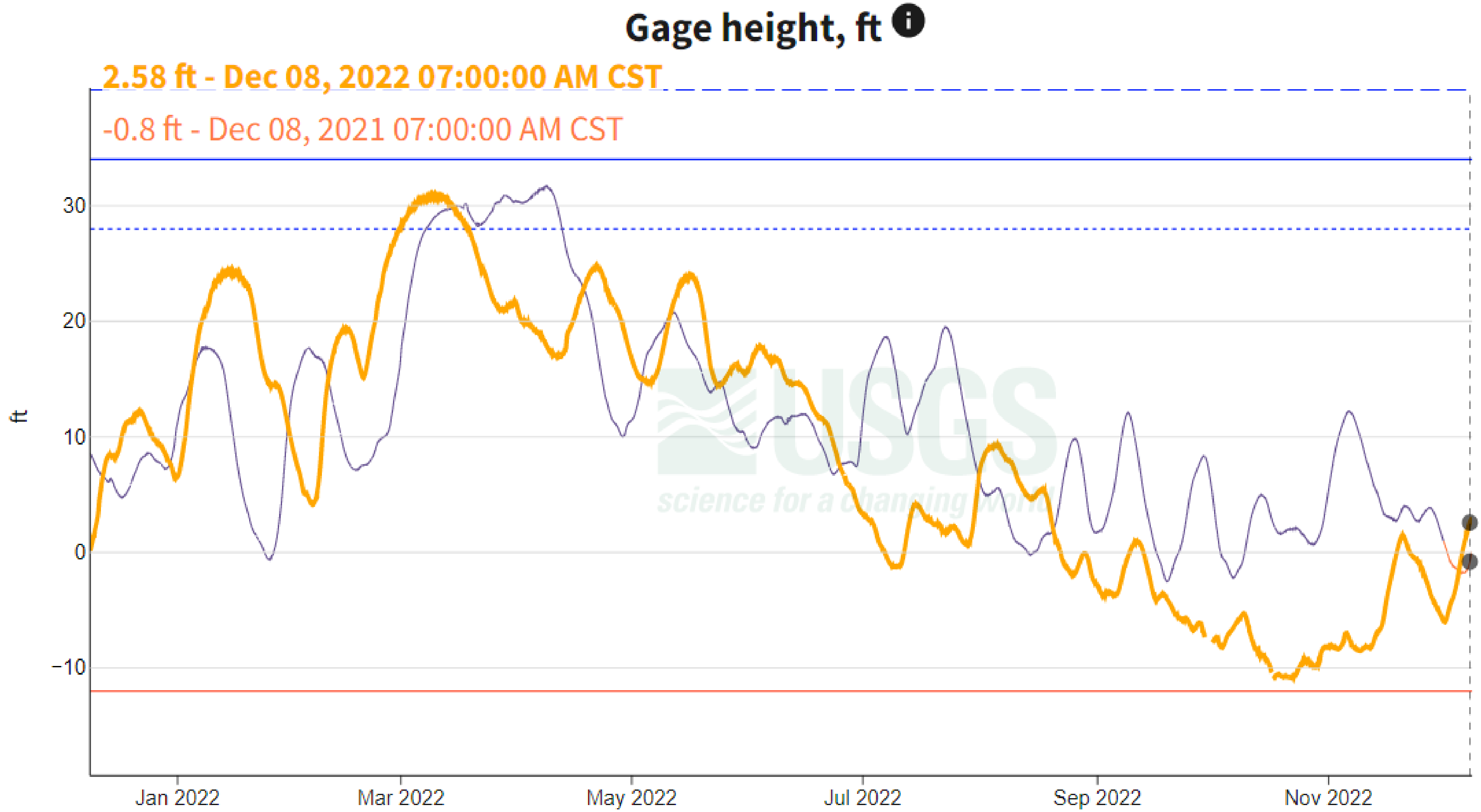
December 9, 2022

SOY TRANSPORTATION COALITION

The Soy Transportation Coalition – Farmer funded & farmer led

Established in 2007. Comprised of 13 state soybean organizations, the United Soybean Board, & American Soybean Association.

Low Water Conditions on Mississippi River (Memphis)



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Rail Service Challenges/Potential Strike Averted

- A rail strike will halt economic activity, but the threat of a strike can halt economic activity
- Of all the indicators defining whether a supply chain is effective, predictability and reliability are supreme. More important than the cost or speed of transportation. If a shipper does not have the confidence that the supply chain will arrive, depart, and deliver as expected, that supply chain is by definition dysfunctional.
- Strike averted, but not out of the woods…

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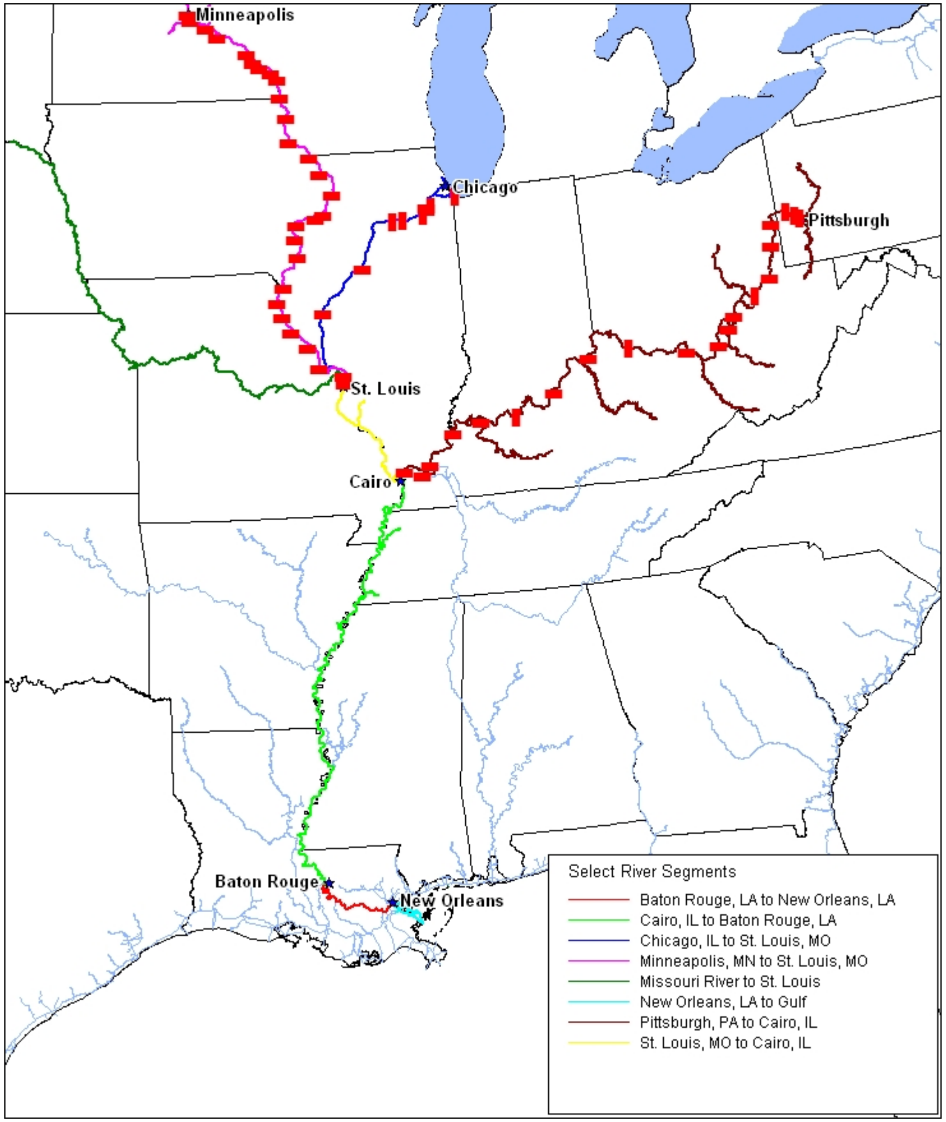
America's Rivers: An Efficient Maritime Highway



Mississippi Gulf (Baton Rouge to Gulf of Mexico): #1 export region for soybeans & corn

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Dredging Lower Mississippi River: Impact on Midwest Agriculture

- Project officially kicked off on July 31st, 2020; Deepening work commenced on September 11, 2020

  "The soybean industry made for a great case study and reason to deepen the Mississippi River. Once this project is completed, the deepening of the Mississippi River will improve the global imports and exports of goods, and in turn, improve jobs, business and the quality of life for thousands of Louisianans and others who depend on the Mississippi River. I am grateful for our partnership and the commitment of time and money from the farming leaders of the United Soybean Board, the Soy Transportation Coalition, and countless others who have made this project possible." (Governor John Bel Edwards, D-LA)

- Soybean farmers contributed $2 million toward the project

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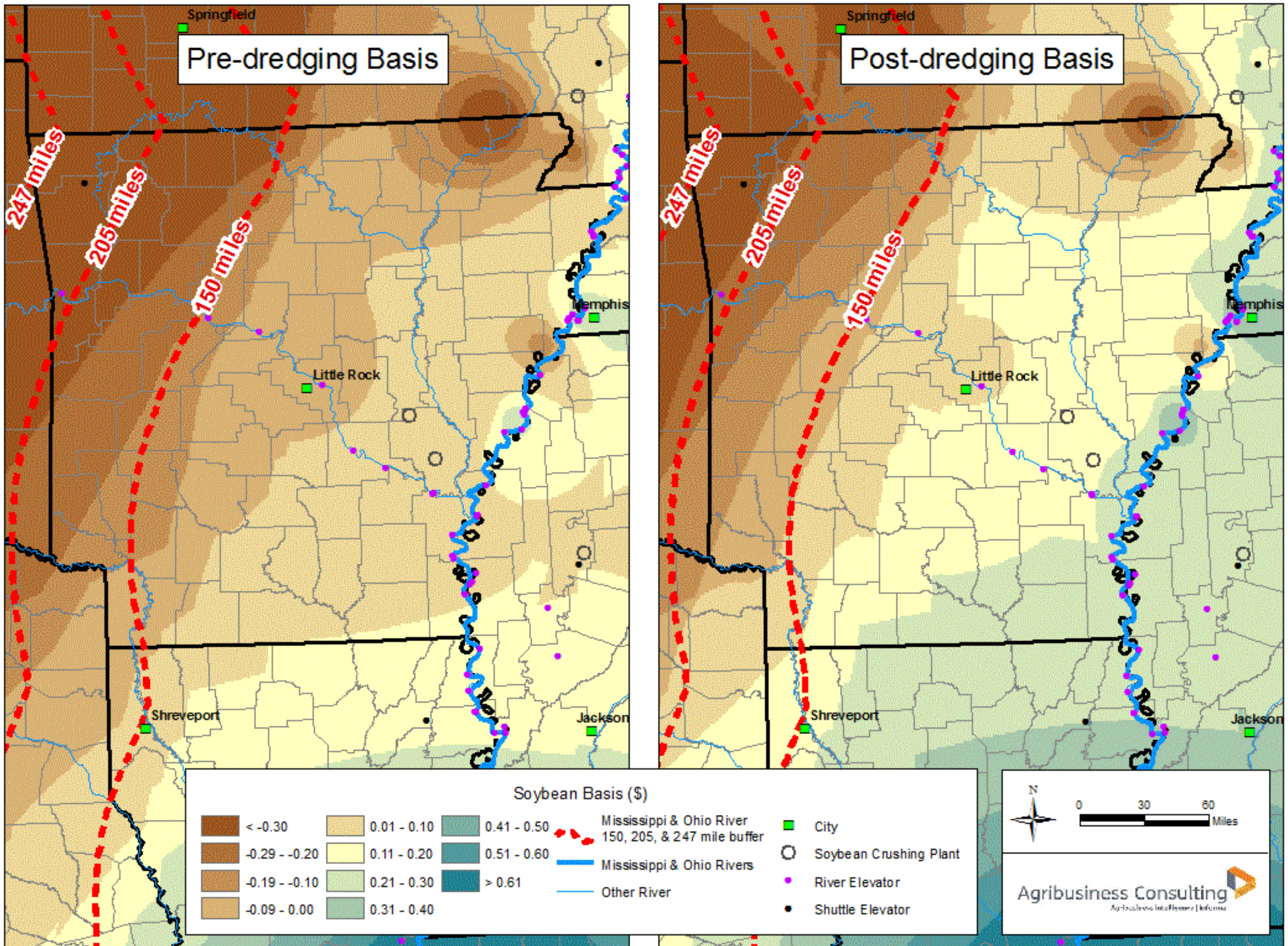
Dredging Lower Mississippi River: Impact on Midwest Agriculture



Arkansas soybean farmers will receive $19 million more for the value of their soybeans post dredging the lower MS River. U.S. soybean farmers - $461 million more

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Option A or B? Given 1.) Truck driver shortages, 2.) Need to decrease costs (especially fuel); 3.) Need to decrease emissions; 4.) Need to increase motorist safety; 5.) Need to transport more volume; 6.) Rail service challenges, which is preferable?

Grain Elevator A

- 6 million bushels handled (4 million bushels of corn + 2 million bushels of soybeans)
- Utilizing 5 axle, 80,000 lbs. semis, Grain Elevator A would annually require 4,149 trips for corn (964 bushels per load) and 2,222 trips for soybeans (900 bushels per load). Total annual trips = 6,371. If the delivery location for the grain elevator is 40 miles or 80 miles roundtrip, 509,680 miles would be driven annually.

Grain Elevator B

- 6 million bushels handled (4 million bushels of corn + 2 million bushels of soybeans)
- Utilizing 6 axle, 91,000 lbs. semis, Grain Elevator B would annually require 3,604 trips for corn (1,110 bushels per load) and 1,929 trips for soybeans (1,037 bushels per load). Total annual trips = 5,533. If the delivery location for the grain elevator is 40 miles or 80 miles roundtrip, 442,640 miles would be driven annually.

Therefore, Grain Elevator A handling the same number of bushels would annually have to incur 838 additional trips – driving 67,040 additional miles. 67,040 miles ÷ 5 mpg = 13,408 additional gallons. 13,408 additional gallons X $4.97 (average diesel) = $66,638 additional fuel cost.

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Rural Bridges – The Problem…

- Challenge facing rural America: The area of the country in which our bridge problem is most severe also happens to be the area of the country in which resources are most limited.
- A typical rural county can often have 100-300 bridges. Replacing a single bridge via traditional methods can often cost $250,000 - $500,000. Many rural counties will only have $500,000 - $1.5 million available annually to repair and replace their bridges.
- Example: A single weight restricted bridge results in a 5 mile detour for local semi and truck traffic; 25 trucks are impacted each day
  - 125 miles of detour are incurred each day (25 trucks X 5 miles)
  - 45,625 miles of detour are incurred each year (125 miles X 365 days)
  - If it costs $2 per mile to operate the semi, <u>the annual cost of the detour for the single weight restricted bridge is approximately $100,000</u>. These are costs that will be inserted into food delivery and other industries.

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The Top 20 Innovations for Rural Bridge Replacement and Repair

- Goal: Highlight a relatable number of innovative concepts that 1.) Will provide initial or lifecycle cost savings, 2.) Have been validated by a credible engineering entity or organization, and 3.) Are accessible in a large section of rural America.
- STC assembled a group of 13 bridge engineers and experts (county engineers, state DOTs, LTAP programs, universities, engineering firms) from the 13 states that comprise the organization. Three engineers served as principal analysts for the project with the remaining ten engineers or experts serving as advisory committee members.
- STC and farmers can play a role in 1.) Increasing awareness, 2.) Increasing understanding, and 3.) Increasing motivation

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The Top 20 Innovations for Rural Bridge Replacement and Repair

Bridge Replacement Innovations

- Railroad Flat Car Bridges
- Geosynthetic Reinforced Soil – Integrated Bridge System (GRS-IBS)
- Vibratory H-Piling Drivers
- Buried Soil Structures
- All Steel Piers
- Galvanized H-Piling
- Press Brake Tub Girders
- Galvanized Steel Beams
- Prestressed Precast Double Tees
- Precast Inverted Tee Slab Span Bridges

Bridge Repair Innovations

- Piling Encasements
- Concrete Pier Piling Repairs
- Driving Piling through Decks
- Epoxy Deck Injections
- Deck Overlays with Type O Concrete and Plasticizers
- Deck Patching
- Thin Polymer Concrete Overlays
- Penetrating Concrete Sealers
- Spot Cleaning Painting Steel Beams
- Concrete Overlay on Adjacent Box Beams

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Railroad Flat Car Bridges

Railroad flatcars can be an attractive option for bridge superstructures – particularly for lower volume roads. Railroad flatcar bridges are quick and easy to install; can be placed on existing abutments; are available in a variety of lengths; require minimal maintenance; and are very economical. The availability of retired railroad flat cars can fluctuate and should be considered. Railroad flatcars utilized for bridges should be designed to accommodate 80 or more tons per car. Railroad flatcar bridges do not require more frequent inspection.

Cost Savings: 50% – 60%

COST PER BRIDGE:
$120,000
vs. $275,000 – $350,000 (prevailing method)

APPLICABLE:
Low volume roads throughout rural America

STRUCTURAL INTEGRITY:
Can support loads far in excess of legal loads

CONSTRUCTION TIME:
15% – 25% faster

TIME TO CONSTRUCT:
6 weeks
vs. 7 – 8 weeks (prevailing method)

Research source(s): Iowa State University Bridge Engineering Center;
https://bec.iastate.edu/research/completed/field-testing-of-railroad-flatcar-bridges-tr-498/

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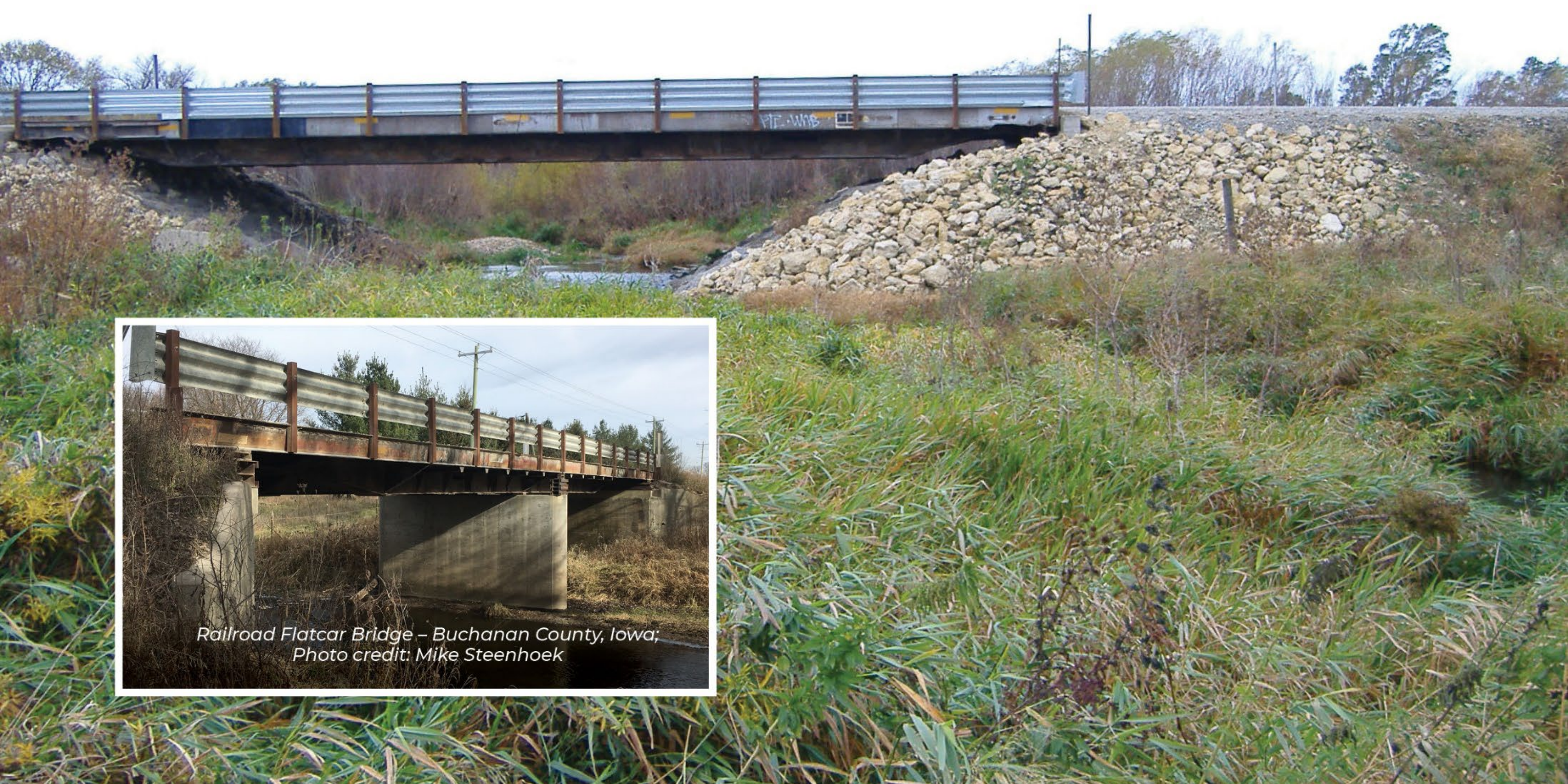
Railroad Flatcar Bridges

Railroad Flatcar Bridge – Buchanan County, Iowa;
Photo credit: Brian Keierleber



Railroad Flatcar Bridge – Buchanan County, Iowa;
Photo credit: Mike Steenhoek

Buried Soil Structures

Buried soil structures are arch, three-sided, or box-shaped structures with unsupported spans greater than 20 ft. that rely on soils for support. Buried soil structures are economical to construct and quick to install, result in significantly reduced maintenance, and offer enhanced durability. Buried soil structures can result in increased load capacity compared to conventional bridges due to load sharing with the soil embedment. While periodic inspection may be necessary, buried soil structures do not include bridge decks or approaches, which can be expensive to clean, maintain, or replace. On the underside of the bridge, routine maintenance involves removing debris or vegetation – similar to other bridges.

Cost Savings: 50% – 60%

COST PER BRIDGE:
$75,000 – $95,000
vs. $150,000 – $200,000 (prevailing method)

APPLICABLE:
Throughout rural America

STRUCTURAL INTEGRITY:
Equal to prevailing method

CONSTRUCTION TIME:
20% – 25% faster

TIME TO CONSTRUCT:
6 – 8 weeks
vvs. 8 – 10 weeks (prevailing method)

Research source(s): Transportation Research Board; http://onlinepubs.trb.org/onlinepubs/webinars/160623.pdf; National Council of Structural Engineers Associations; https://www.structuremag.org/?p=12752

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Buried Soil Structures

Buried soil structure – Appanoose County, Iowa; Photo credit: CONTECH Engineered Solutions, LLC

Buried soil structure – Houston County, Minnesota; Photo credit: CONTECH Engineered Solutions, LLC

Thank You

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