CYCLONE(Buffalo Creek) Bridge
July 15, 2025

What we are faced with

Older encasements

Piling Encasements Deteriorating

Dough boy Bridge Commercial Repairs

Current Concrete Pier Repair

Concrete Pier Repair

Why not resolve the problem.

Keep road salts from under abutments

D22 Buffalo Creek Constructed 1928 rehabilitated 1956

Why replace a perfectly good Bridge

More Substructure issues

Abutment Fractured and shifting

Complaints about visibility


220th
Buffalo
Creek Blvd

Open Rail improves visibility


220
Buffalo
Creek Blvd

Is it fracture critical????

Construction Camera

Removal

Conditions in a normal year

Predrilled Holes and Bentonite

Galvanized & Coated Cardinal Red H-Piling

Coffer Dams for encased piling not this year

Trying to stay high and dry

One of the Wettest years on record

Record Rains

Wait for the water to drop

Its October Glad it is not snow

Completing Piers

Setting the beams

Setting the Beams

Placing Mid Span

The Beams are Completed.

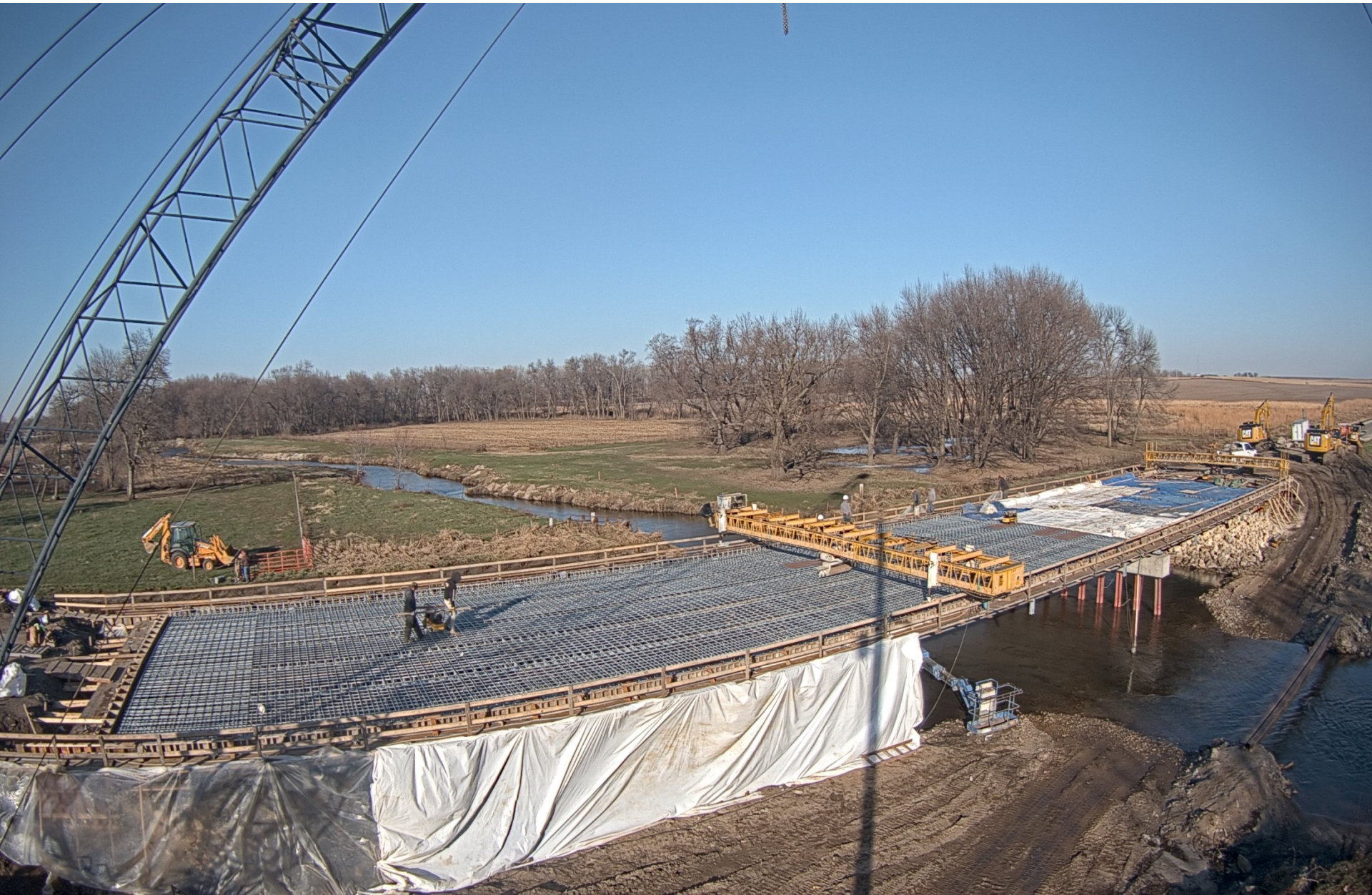
Decking is simpler with no encasements on the pier

Decking

Tying steel in the snow

Waiting for warmer weather

Cold weather pouring



Placing the Concrete


AMERICAN CONCRETE PUMPING
Americon

Rolling up the Blankets

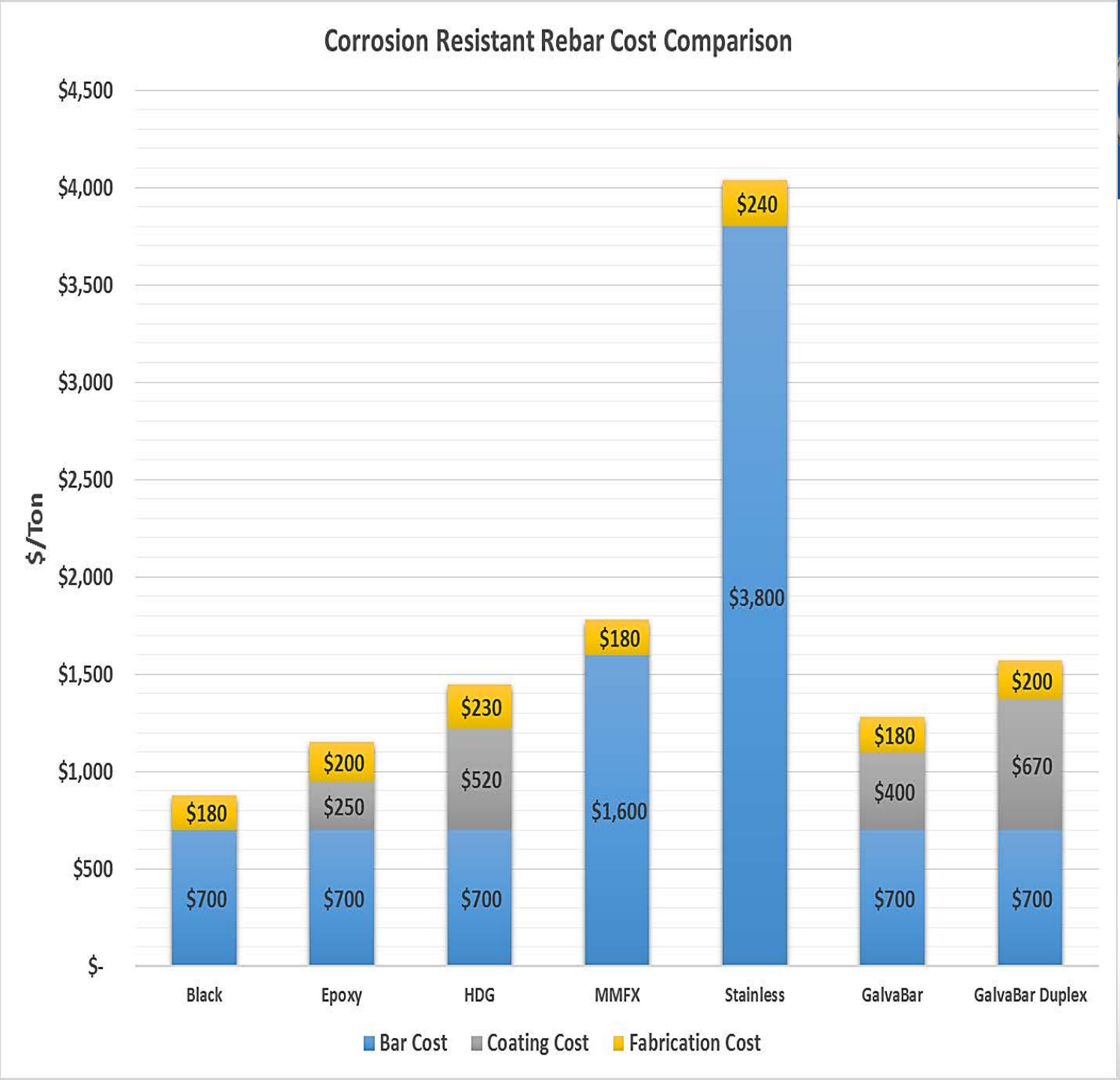
Addressing rails and approaches

Why Galvanized Rebar

- Life cycle analysis of epoxy coated, galvanized and solid stainless steel reinforcement in high chloride exposure bridge decks in the US has shown that galvanized steel has the lowest life cycle cost and lowest total present cost. Galvanized steel performs better than epoxy coated and the difference between epoxy and galvanized increases as the chloride exposure increases. The service life of galvanized decks is 100 years in comparison to epoxy coated deck life of 55 years and solid stainless steel of 100+ years.

Stephen R Yeomans

University of New South Wales, Canberra ACT Australia



AZZ GALVABAR™

Steel

Concrete

Case Study Bridges: Side-by-Side Comparison

Audrain County, MO Bridge 411

Built 2012

Steel 4 Girders

47.5 ft Span, 24 ft Roadway Width

2 ft Structural Depth

No Skew

Audrain County, MO Bridge 336

Built 2012

Precast 6 Hollowcore Slab Girders

50.5 ft Span, 24 ft Roadway Width

2 ft Structural Depth

20° Skew

Steel

Concrete

Case Study Bridges: Side-by-Side Comparison

Total Bridge Costs

Material	= $41,764
Labor	= $24,125
Equipment	= $21,521
GuardRail	= $ 7,895
Rock	= $ 8,302
Engineering	= $ 8,246

TOTAL= $111,853

Total Bridge Costs

Material	= $67,450
Labor = $26,110	
Equipment	= $24,966
GuardRail	= $ 6,603
Rock	= $ 7,571
Engineering	= $21,335

TOTAL= $154,035

ECONOMIC ANALYSIS

- Letting Date: May 15, 201810:00 A.M Contract ID: IO-Colo-100 Call Order No.: 002
- County: BUCHANAN Project Engineer: BUCHANAN COUNTY ENGINEER
- Cost Center: 801 000 object Code; 890 DBE Commitment:$422.841 .00
- Contract Work Type: BRIDGE NEW - STEEL GIRDER
- This agreement made and entered by and between the Contracting Authority
- BOARD OF SUPERVISORS OF BUCHANAN COUNTY
- and Contractor
- TAYLOR CONSTRUCTION. INC
- Vendor ID: TA060 City: NEWVIENNA State: IA

Contractor, for and in considerations of **$ 1.409.469.84**

If black H-pile was used for the piers then they'd have to be incased in concrete so 240 LF at $75/LF that was added to the "conventional" bridge cost estimate. Replacing the steel beam barrier rail at ($250/LF) with concrete open railing, TL-4 ($65/LF) further reduced the cost.

County:	Bridge Type	Actual Deck Length (ft.)	Actual Deck Width (ft.)	No. Spans	Skew	Actual Deck Sqft	Bridge Structure Cost	Bridge Structure $/sqft.	Item Description	Quantity	Units	Unit Price	Ext Amount	
POTTAWATTAMIE	PPCB-IB	166.8	27.2	3	0°	4537	$492,066	$125.17	CONCRETE ENCASEMENT OF STEEL H PILES, HP 12 X 53 (P10A TYPE 3)	400	LF	$ 72.00	28,800.00	
POTTAWATTAMIE	PPCB-IB	166.8	27.2	3	0°	4537	$396,794	$100.93	CONCRETE ENCASEMENT OF STEEL H PILES, HP 10 X 57 (P10A TYPE 3)	280	LF	$ 95.00	26,600.00	
BUTLER	PPCB-IC	204.3	33.17	3	0°	6777	$513,615	$85.05	CONCRETE ENCASEMENT OF STEEL H PILES, HP 10 X 57 (P10L TYPE 3)	204.3	LF	$ 205.00	41,881.50	$ 76.60
GRUNDY	PPCB-IC	204.3	33.167	3	15°	6776	$556,342	$92.12	CONCRETE ENCASEMENT OF STEEL H PILES, HP 10 X 57 (P10L TYPE 3)	240	LF	$ 67.75	16,260.00	
POWESHIEK	PPCB-IB	191.8	33.167	3	15°	6361	$546,849	$94.66	CONCRETE ENCASEMENT OF STEEL H PILES, HP 14 X 73 (P10L TYPE 3)	301	LF	$ 71.65	21,566.65	
ADAIR	PPCB-IC	229.3	43.17	3	0°	9899	$819,194	$90.50	CONCRETE BARRIER RAILING	506.7	LF	$ 48.00	24,321.60	49.16
BREMER	PPCB-IC	166.8	47.17	3	0°	7868	$632,699	$87.79	CONCRETE BARRIER RAILING	361.7	LF	$ 50.32	18,200.74	
BUTLER	PPCB-IC	204.3	33.17	3	0°	6777	$513,615	$85.05	CONCRETE OPEN RAILING, TL-4	456.7	LF	$ 69.00	31,512.30	
WARREN	PPCB-IC	217.3	33.17	3	30°	7208	$760,615	$118.59	CONCRETE OPEN RAILING, TL-4	481.7	LF	$ 65.00	31,310.50	
EMMET	PPCB-IC	229.3	33.17	3	0°	7606	$741,716	$109.25	CONCRETE OPEN RAILING, TL-4	506.7	LF	$ 72.00	36,482.40	
DAVIS	PPCB-IC	204.3	27.17	3	15°	5551	$637,473	$131.95	CONCRETE OPEN RAILING, TL-4	456.7	LF	$ 65.00	29,685.50	
PLYMOUTH	PPCB-IC	204.3	33.17	3	0°	6777	$624,119	$103.35	CONCRETE OPEN RAILING, TL-4	456.7	LF	$ 70.00	31,969.00	65.68
POTTAWATTAMIE	PPCB-IB	166.8	27.2	3	0°	4537	$492,066	$125.17	CONCRETE OPEN RAILING, TL-4	361.7	LF	$ 60.10	21,738.17	
POTTAWATTAMIE	PPCB-IB	166.8	27.2	3	0°	4537	$396,794	$100.93	CONCRETE OPEN RAILING, TL-4	361.7	LF	$ 70.00	25,319.00	
GRUNDY	PPCB-IC	204.3	33.167	3	15°	6776	$556,342	$92.12	CONCRETE OPEN RAILING, TL-4	456.7	LF	$ 60.00	27,402.00	
POWESHIEK	PPCB-IB	191.8	33.167	3	15°	6361	$546,849	$94.66	CONCRETE OPEN RAILING, TL-4	411.9	LF	$ 60.00	24,714.00	
BUCHANAN	**CRSB**	**203**	**43.17**	**3**	**0°**	**8764**	**$1,109,037**	**$138.63**	**('LINEAR FEET' ITEM) STEEL BEAM BARRIER RAILING**	**434**	**LF**	**$ 250.00**	**108,500.00**	

The unit cost of the galvanized r-bar ($1.25/lb.) and galvanized HP 10 X 57 ($85/LF) used by the Buchanan Co. CRSB bridge is significantly greater than the average for epoxy r-bar ($0.92) and black H-pile ($37.37) used by the other bridges in this study

Project:	Letting Date	County:	Bridge Type	Actual Deck Sqft	Bridge Structure Cost	Bridge Structure $/sqft.	Item Description	Quantity	Units	Unit Price	Ext Amount	
BROS-C012(103)--8J-12	11/21/2017	BUTLER	PPCB-IC	6777	$301,898	$49.99	REINFORCING STEEL, EPOXY COATED	76,230.00	LB	$ 0.85	64,795.50	
BROS-C012(103)--8J-12	11/21/2017	BUTLER	PPCB-IC	6777	$482,103	$79.83	REINFORCING STEEL, EPOXY COATED	76,230.00	LB	$ 0.85	64,795.50	
BRFN-025-3(29)--39-01	12/19/2017	ADAIR	PPCB-IC	9899	$794,872	$87.81	REINFORCING STEEL, EPOXY COATED	89,571.00	LB	$ 0.97	86,883.87	
BRS-C091(113)--60-91	12/19/2017	WARREN	PPCB-IC	7208	$729,305	$113.71	REINFORCING STEEL, EPOXY COATED	77,242.00	LB	$ 0.90	69,517.80	
BRF-003-6(58)--38-09	1/18/2018	BREMER	PPCB-IC	7868	$614,498	$85.26	REINFORCING STEEL, EPOXY COATED	73,135.00	LB	$ 1.00	73,135.00	
BRS-C032(49)--60-32	1/18/2018	EMMET	PPCB-IC	7606	$705,234	$103.88	REINFORCING STEEL, EPOXY COATED	83,654.00	LB	$ 1.01	84,490.54	
BRS-C075(143)--60-75	2/20/2018	PLYMOUTH	PPCB-IC	6777	$592,150	$98.05	REINFORCING STEEL, EPOXY COATED	72,420.00	LB	$ 0.87	63,005.40	
BROS-C078(192)--8J-78	2/20/2018	POTTAWATTAMIE	PPCB-IB	4537	$470,327	$119.64	REINFORCING STEEL, EPOXY COATED	51,852.00	LB	$ 1.00	51,852.00	Average
BROS-C078(193)--8J-78	2/20/2018	POTTAWATTAMIE	PPCB-IB	4537	$371,475	$94.49	REINFORCING STEEL, EPOXY COATED	51,852.00	LB	$ 0.90	46,666.80	Epoxy r-bar LB
BROS-C079(51)--8J-79	6/19/2018	POWESHIEK	PPCB-IB	6361	$522,135	$90.38	REINFORCING STEEL, EPOXY COATED	69,998.00	LB	$ 0.86	60,198.28	$ 0.92
BRS-C010(100)--60-10	**4/20/2018**	**BUCHANAN**	**CRSB**	**8764**	**$1,000,537**	**$125.07**	**REINFORCING STEEL, GALVANIZED**	**88,560.00**	**LB**	**$ 1.25**	**110,700.00**	
BROS-C012(103)--8J-12	11/21/2017	BUTLER	PPCB-IC	6777	$482,103	$79.83	PILES, STEEL, HP 10 X 57	2,380.00	LF	$ 30.00	71,400.00	
BRFN-025-3(29)--39-01	12/19/2017	ADAIR	PPCB-IC	9899	$794,872	$87.81	PILES, STEEL, HP 10 X 57	1,120.00	LF	$ 35.50	39,760.00	
BRS-C091(113)--60-91	12/19/2017	WARREN	PPCB-IC	7208	$729,305	$113.71	PILES, STEEL, HP 10 X 57	2,160.00	LF	$ 36.00	77,760.00	
BRF-003-6(58)--38-09	1/18/2018	BREMER	PPCB-IC	7868	$614,498	$85.26	PILES, STEEL, HP 10 X 57	1,580.00	LF	$ 39.00	61,620.00	
BRS-C032(49)--60-32	1/18/2018	EMMET	PPCB-IC	7606	$705,234	$103.88	PILES, STEEL, HP 10 X 57	3,300.00	LF	$ 42.00	138,600.00	
BROS-C026(97)--5F-26	2/20/2018	DAVIS	PPCB-IC	5551	$607,787	$125.80	PILES, STEEL, HP 10 X 57	3,090.00	LF	$ 44.00	135,960.00	
BRS-C075(143)--60-75	2/20/2018	PLYMOUTH	PPCB-IC	6777	$592,150	$98.05	PILES, STEEL, HP 10 X 57	3,280.00	LF	$ 42.00	137,760.00	
BROS-C078(193)--8J-78	2/20/2018	POTTAWATTAMIE	PPCB-IB	4537	$371,475	$94.49	PILES, STEEL, HP 10 X 57	2,040.00	LF	$ 35.75	72,930.00	
BRS-C010(100)--60-10	4/20/2018	BUCHANAN	CRSB	8764	$1,000,537	$125.07	PILES, STEEL, HP 10 X 57	1,280.00	LF	$ 36.00	46,080.00	Average
BROS-C038(108)--5F-38	6/19/2018	GRUNDY	PPCB-IC	6776	$528,940	$87.59	PILES, STEEL, HP 10 X 57	2,880.00	LF	$ 36.25	104,400.00	HP 10 X 57 LF
BROS-C079(51)--8J-79	6/19/2018	POWESHIEK	PPCB-IB	6361	$522,135	$90.38	PILES, STEEL, HP 10 X 57	1,080.00	LF	$ 34.55	37,314.00	$ 37.37
BRS-C010(100)--60-10	**4/20/2018**	**BUCHANAN**	**CRSB**	**8764**	**$1,000,537**	**$125.07**	**('LINEAR FEET' ITEM) PILE STEEL HP 10X57 GALVANIZED**	**1,800.00**	**LF**	**$ 85.00**	**153,000.00**	

Higher than average costs

Total Contract On a Paved Route

- $1, 409,469.84 / 201 ft x 40 = **$175.3 / SF**.

- Contractor, for and in considerations of $ 1.409.469.84

- Galva Bar + $20,000
- Metal Bolt on Rail System (NOT MGS or SL-1)
- + $90,000

Buffalo Creek Bridge Construction Costs

Below costs are for bridge only and do not include approach roadway, guardrail, revetment beyond footprint of bridge, existing bridge removal and mobilization.

Galvanized as constructed

Concrete	=	$ 243,000
Galv. Beams	=	$ 436,500
Galv. Rebar	=	$ 111,000
Galv. Pier Pile	=	$ 153,000
Abutment Pile	=	$ 46,100
Galv. Barriers	=	$ 109,000
Revetment	=	$ 25,000
Bearings	=	$ 3,500
Prebored Holes	=	$ 12,000
TOTAL	**=**	**$ 1,139,100**

$130/SF

If weathering steel beams, epoxy-coated rebar, concrete barrier and concrete encased pier piling were used;

Construction Cost Total = $ 929,000

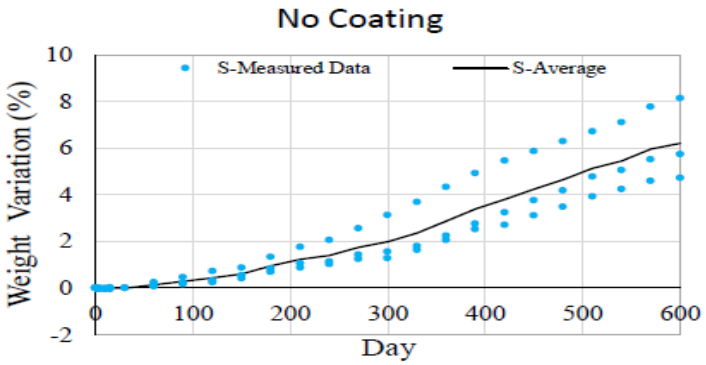
$106/SF

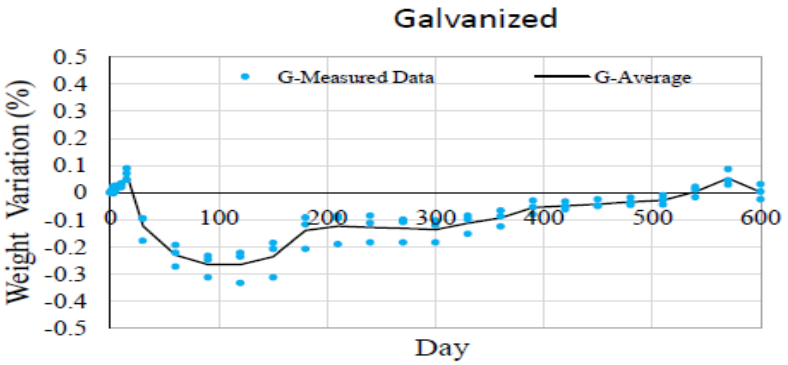
Evaluation of Galvanized and Painted-Galvanized Steel Piling

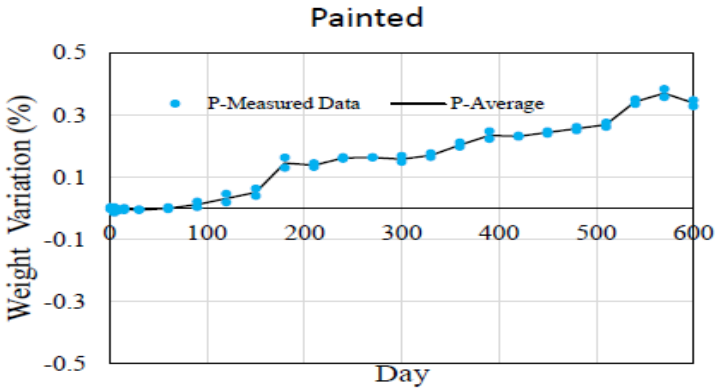
IHRB Meeting - September 30, 2022

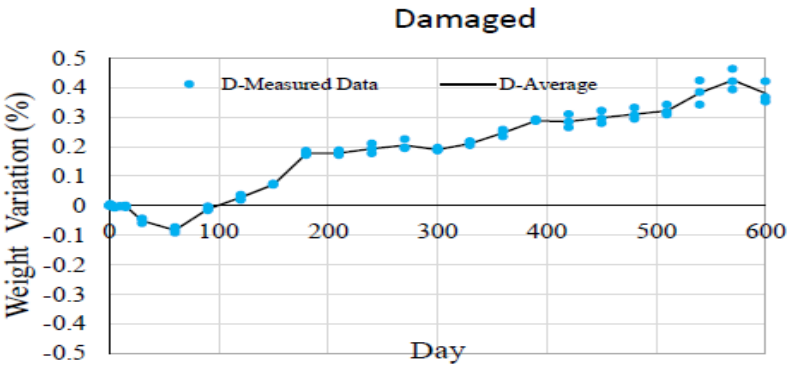
Justin Dahlberg
Iowa State University
Bridge Engineering Center

600 days in the corrosion chamber=100 years life









BRIDGE ENGINEERING CENTER

To be continued…

Observation of
Buffalo Creek Bridge piles

BRIDGE ENGINEERING CENTER

Cyclone Bridge Any Questions

Amish Sawmill Press Brake Tub Girder

Jesup South Bridge

Buffalo Creek Bridge

Where Do we Go from Here?

- Grade 65 steel

- 30% Increase in Strength
- 5% increase in costs.
- Cutshaw Bridge 415 ft. 2021
- Possibly bid both ways Steel or Conc.

NUCOR Gr 65 Steel Simple Long Lasting

- :
- https://youtu.be/JpSJ4hi7r-w?feature=shared
- https://www.youtube.com/watch?v=2wEmmHlTz6Y&list=PL-3KOeD6pAKQEwEEy3EzEgbptufPkYtQe&index=1

Any Questions?