



Alaska Department of
Transportation & Public Facilities

Susitna River Substructure Repairs in Remote Alaska

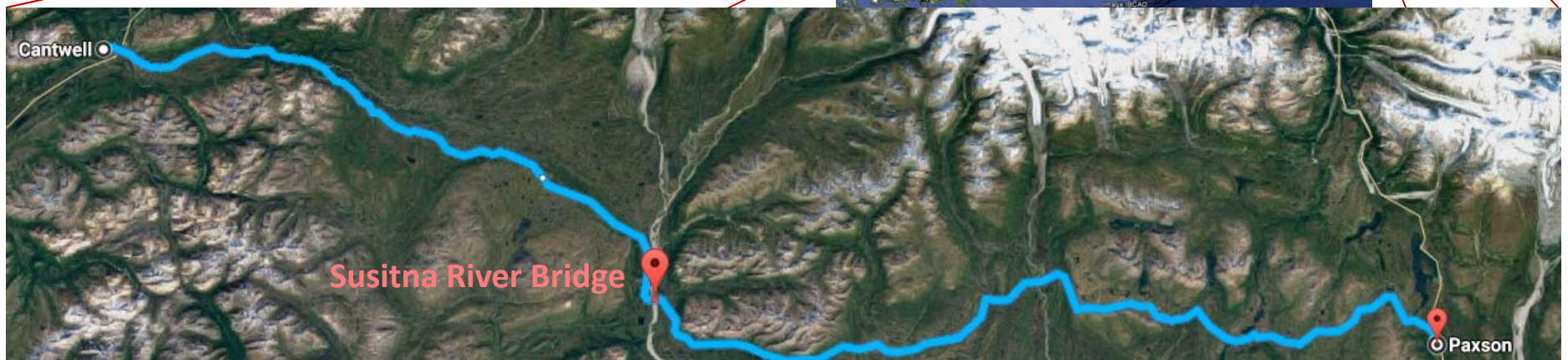
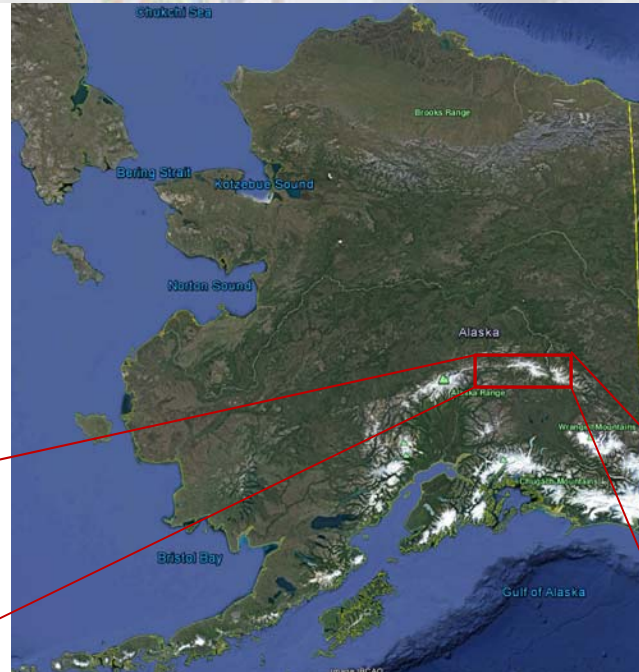
Jared Levings, P.E., S.E.
9/6/2017

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9/5/2017

Location & Description

- Denali Hwy (Gravel, Seasonal)
- 56 miles East of Cantwell and Denali National Park
- 17 span, 1039 ft long bridge
- 462 mile, 9 hour detour
- Tourist Route
- ADT 73

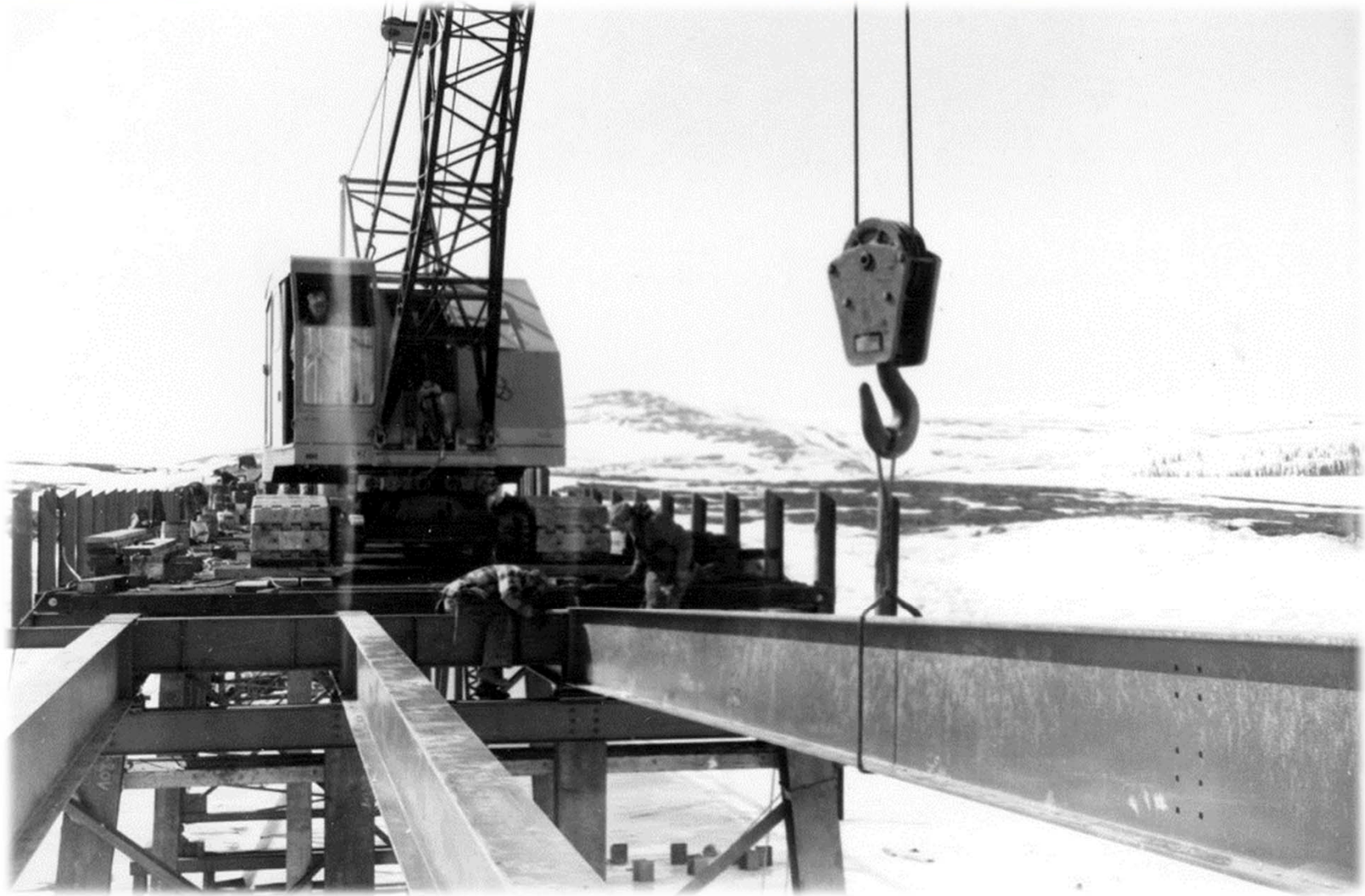


Original Construction - 1955-56



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Original Construction - 1955-56

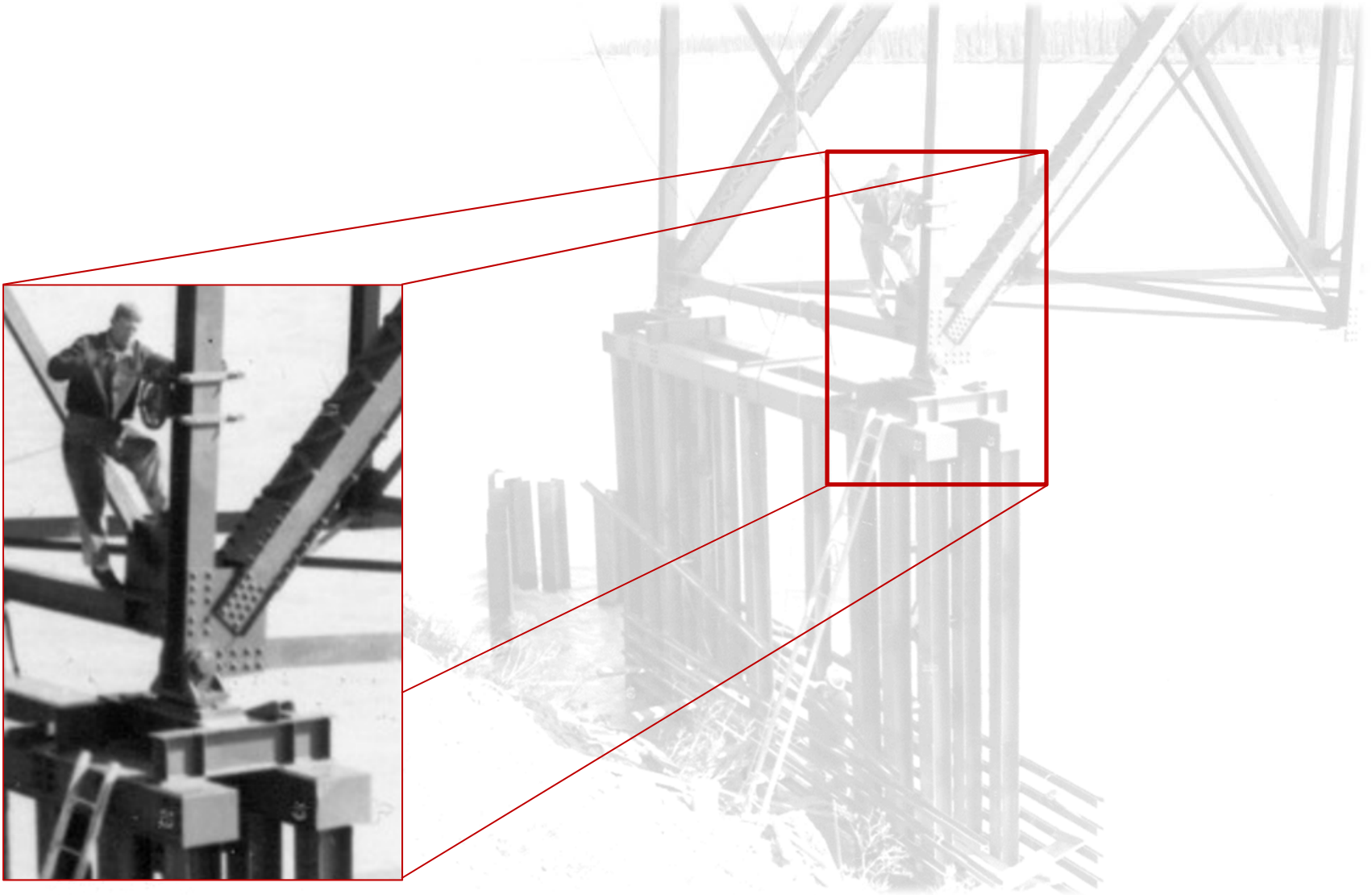


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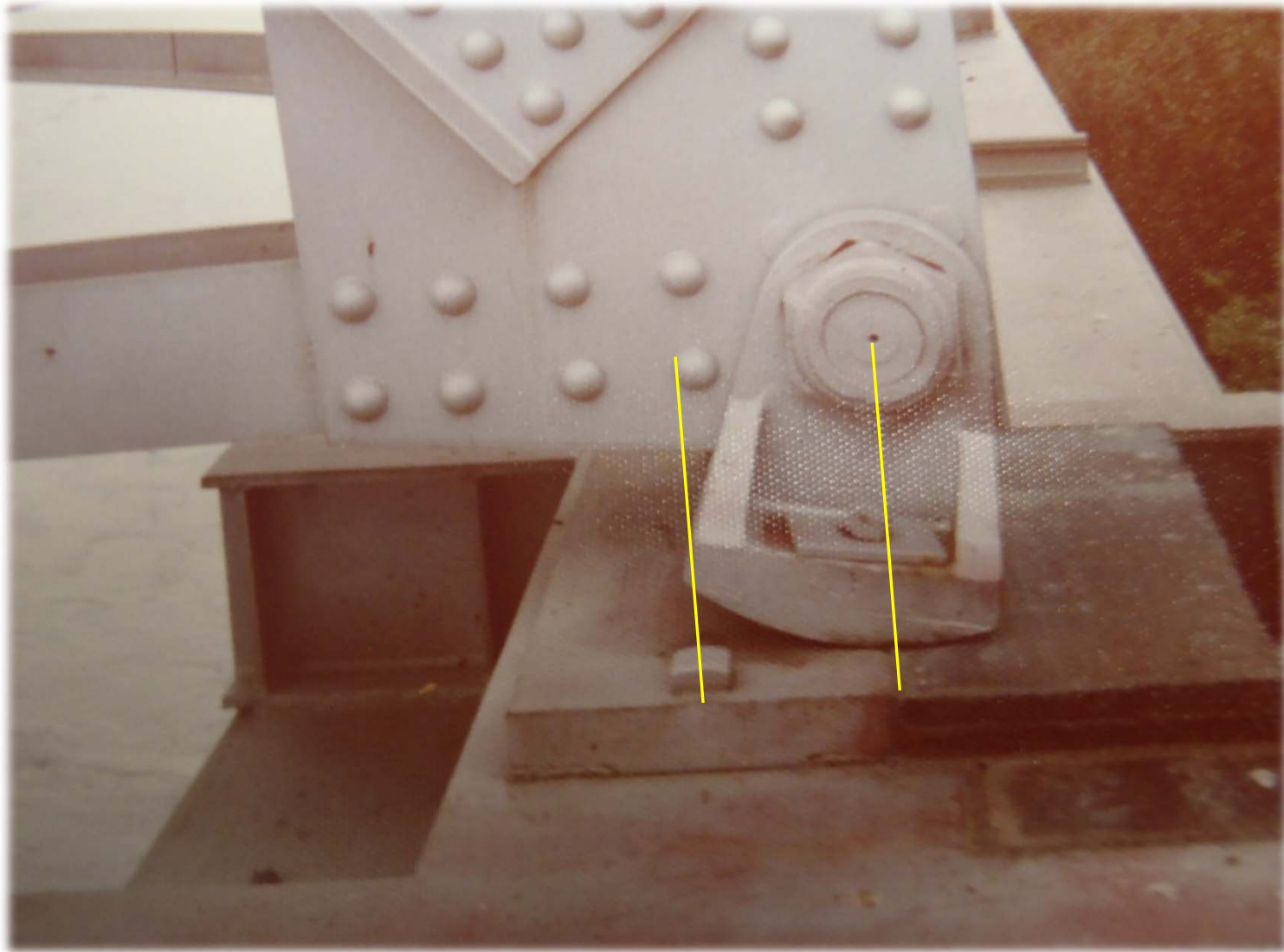
Original Construction - 1955-56



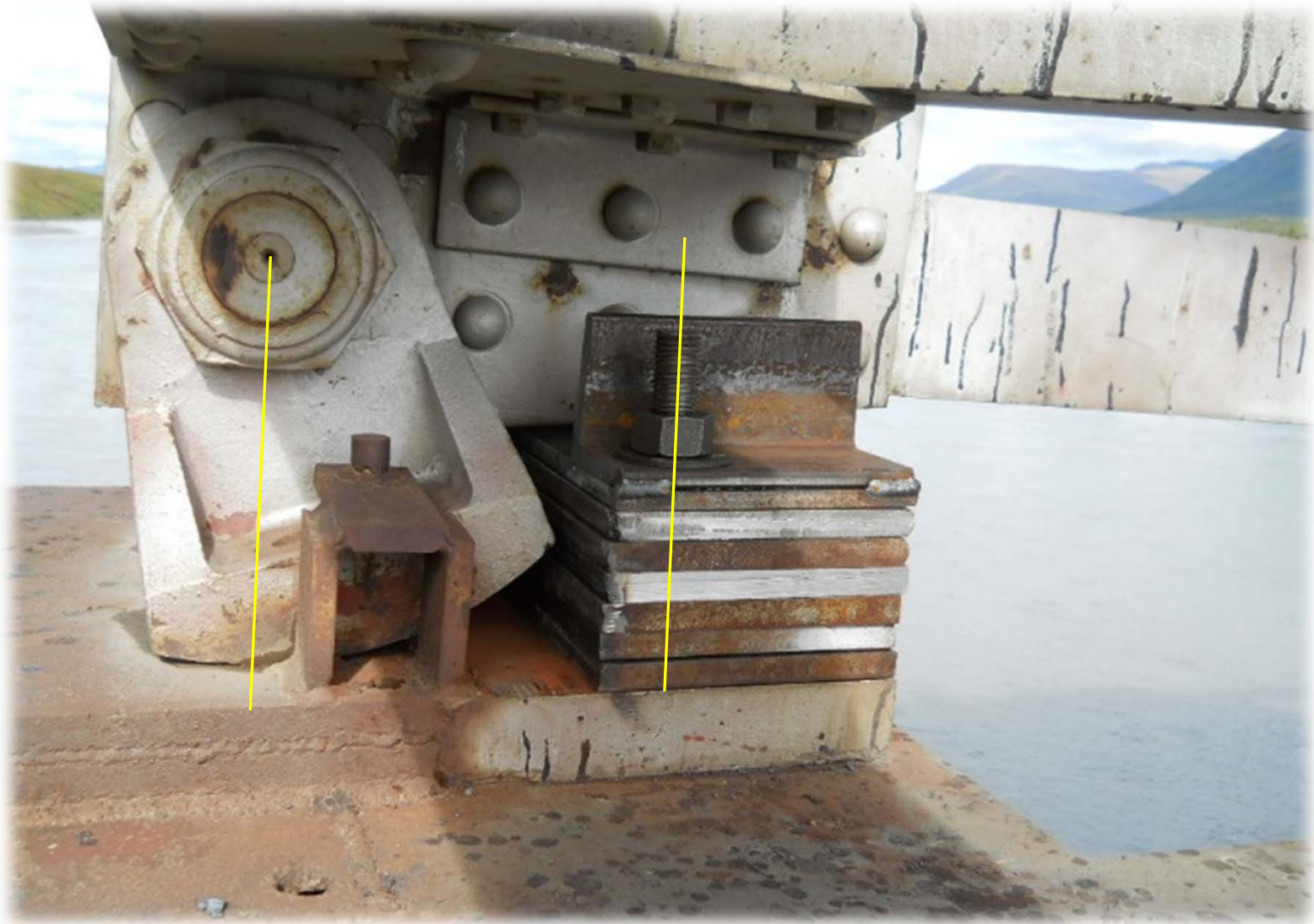
Original Bearing Location



Bearing Movement - 1974



Catcher Installation - 2012



Routine Inspection - 7/2013

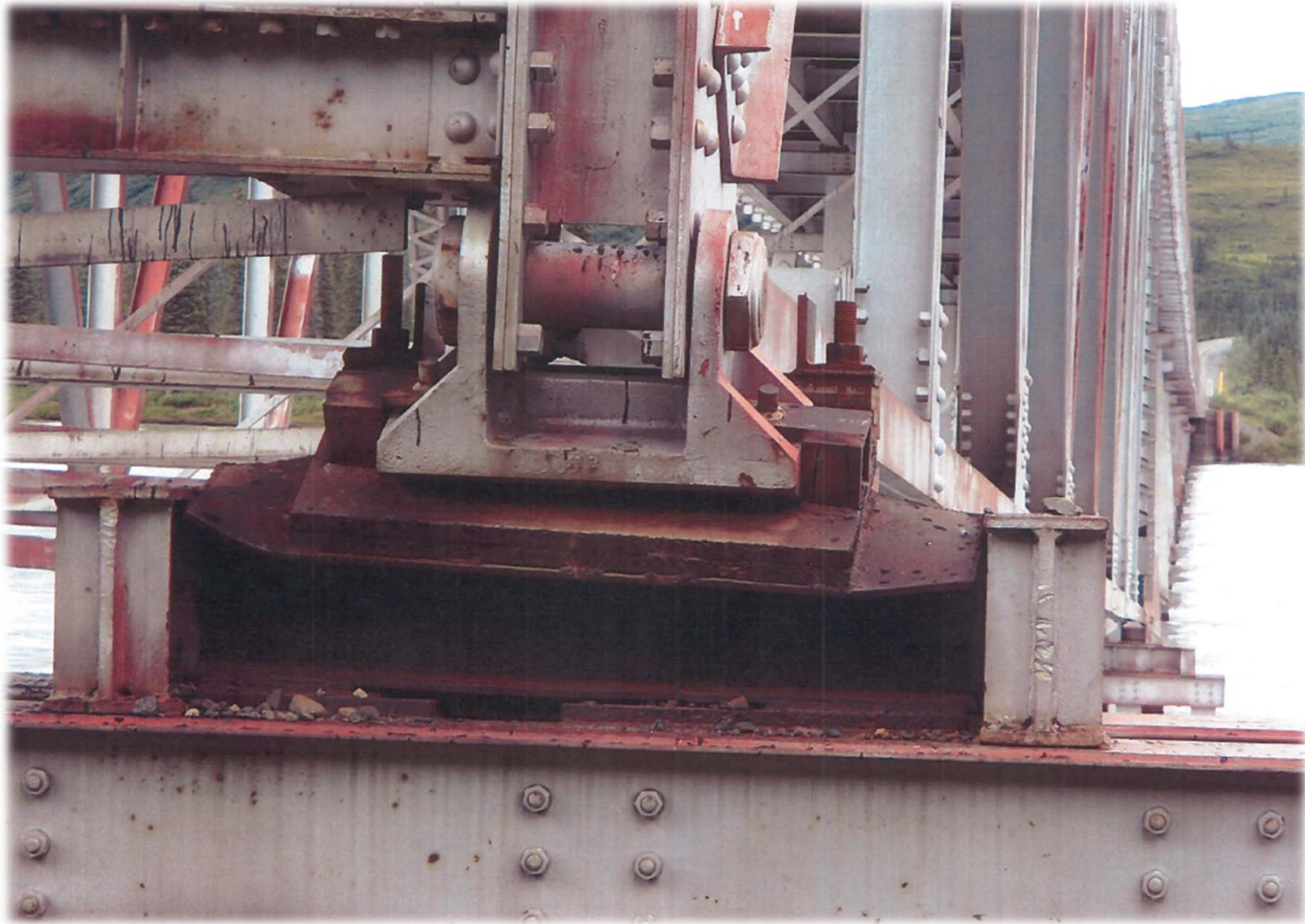


Upstream



Downstream

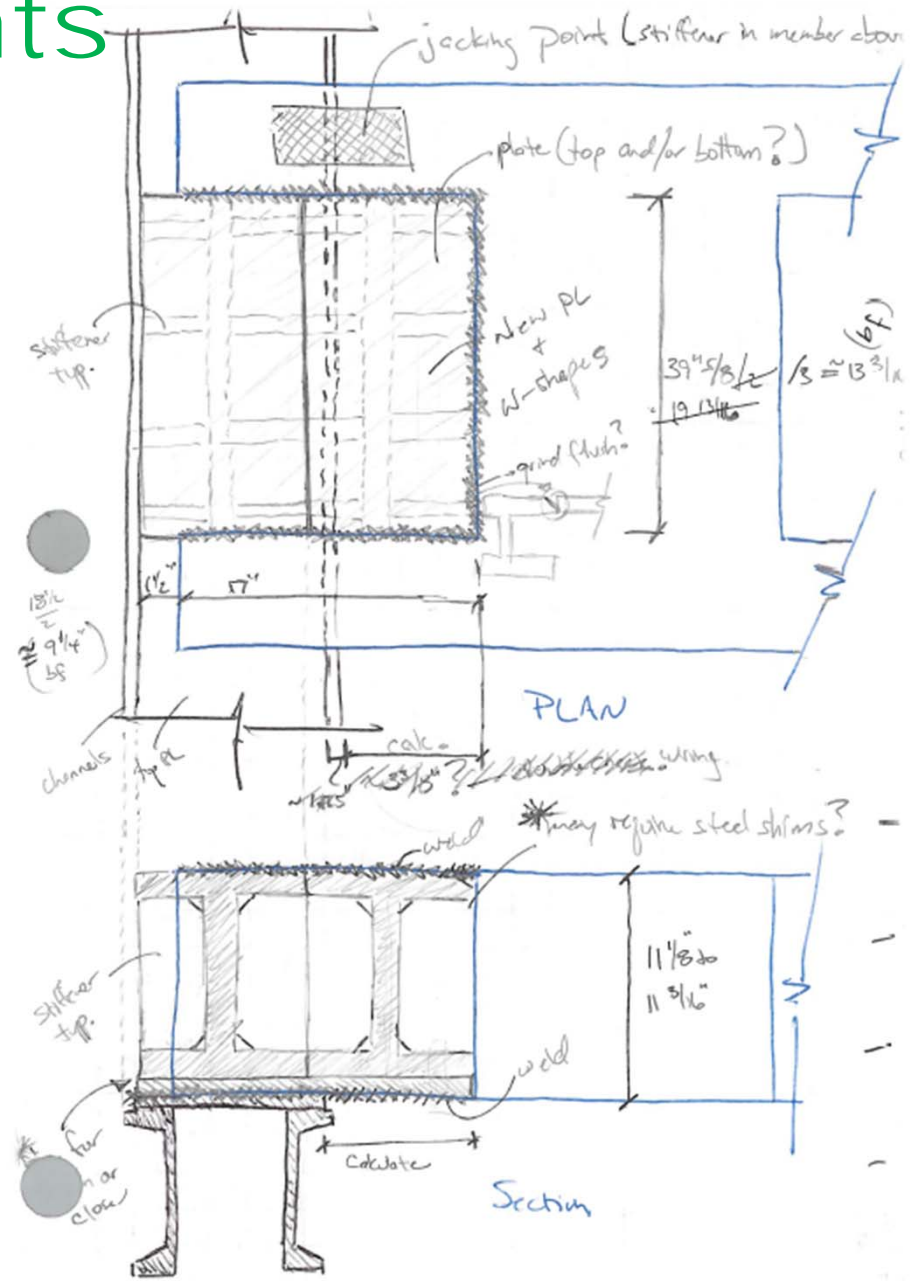
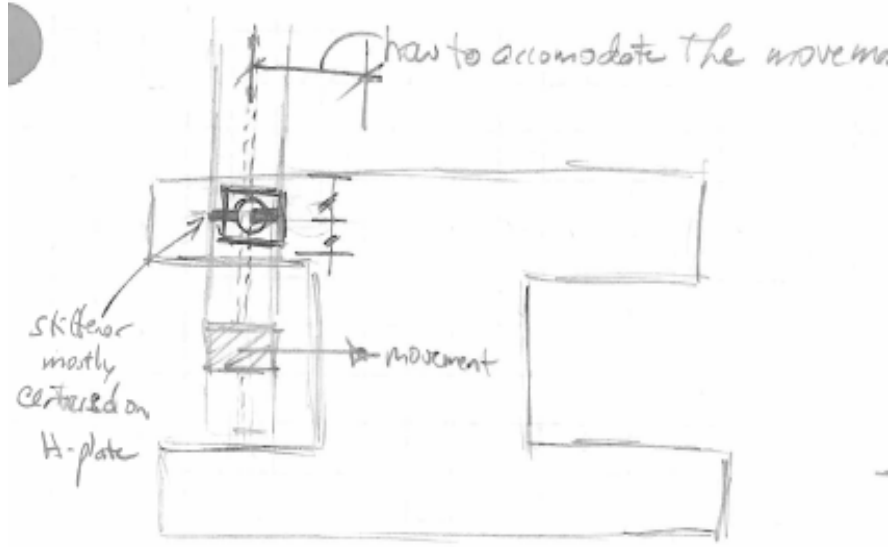
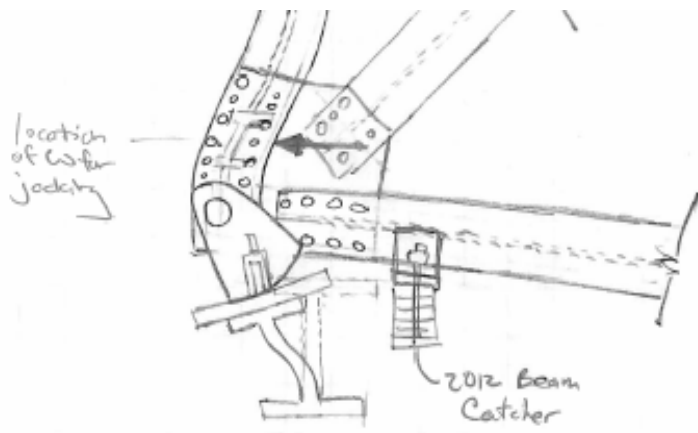
Support Damage - 7/2013



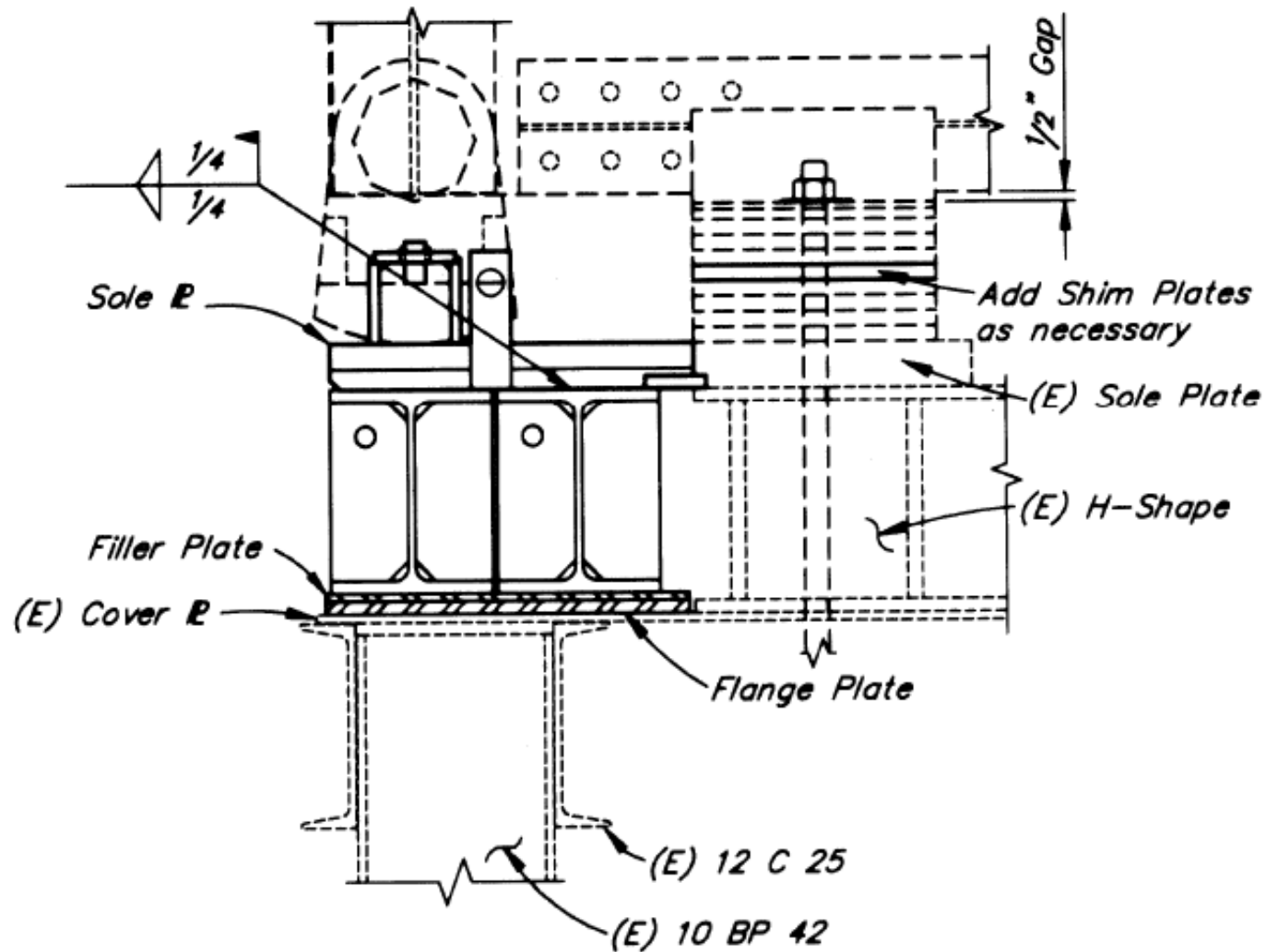


10/2013 – Emergency Repair (3 months later, hunting season) (Northern Region M&O)

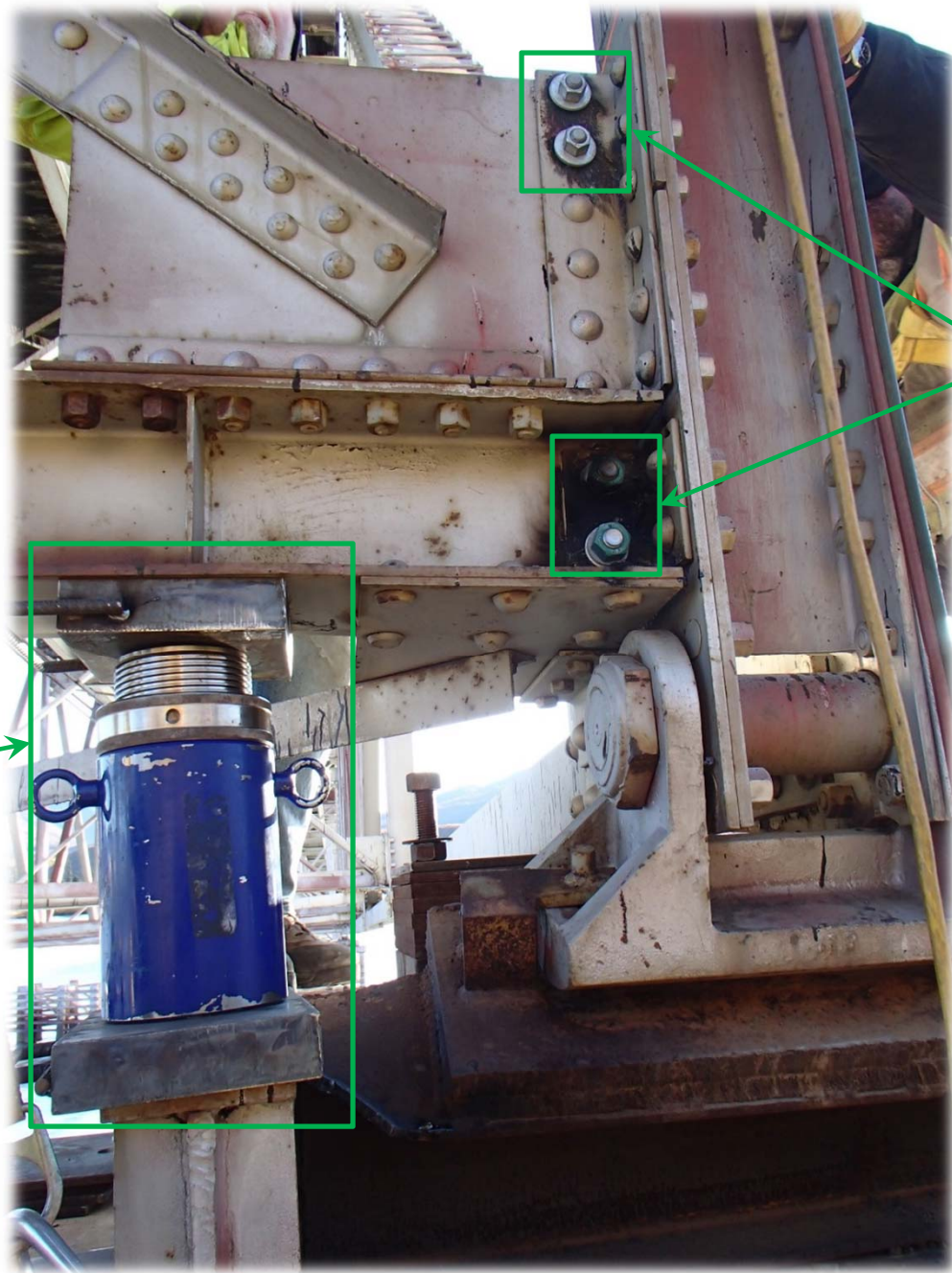
Field Measurements & Concept



Final Plans - Section View



Downstream

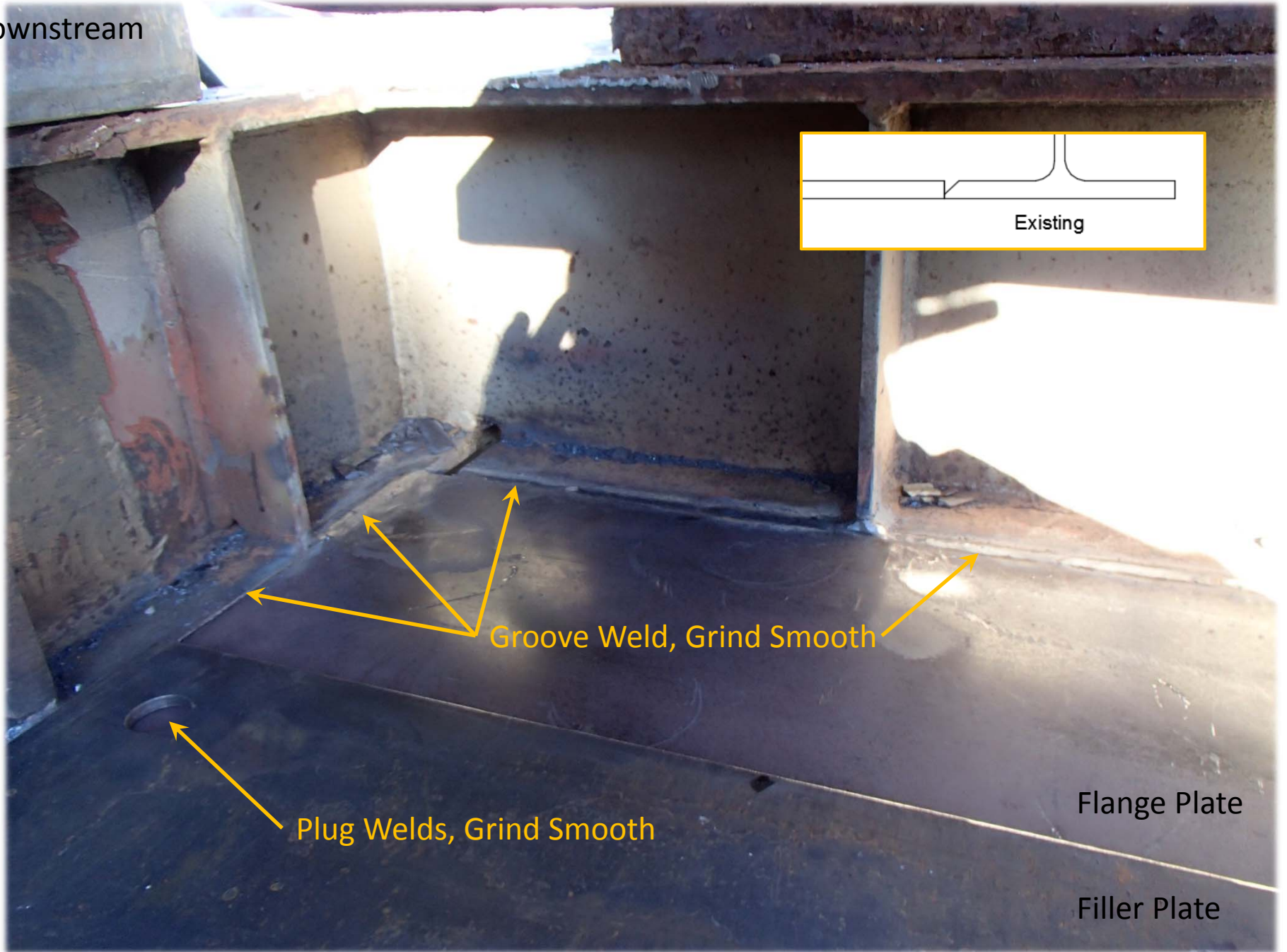


New A325 Bolts

Lock-Off Jack &
Distribution
Plates

Strut-and-Tie and
Conventional
Analysis

Downstream

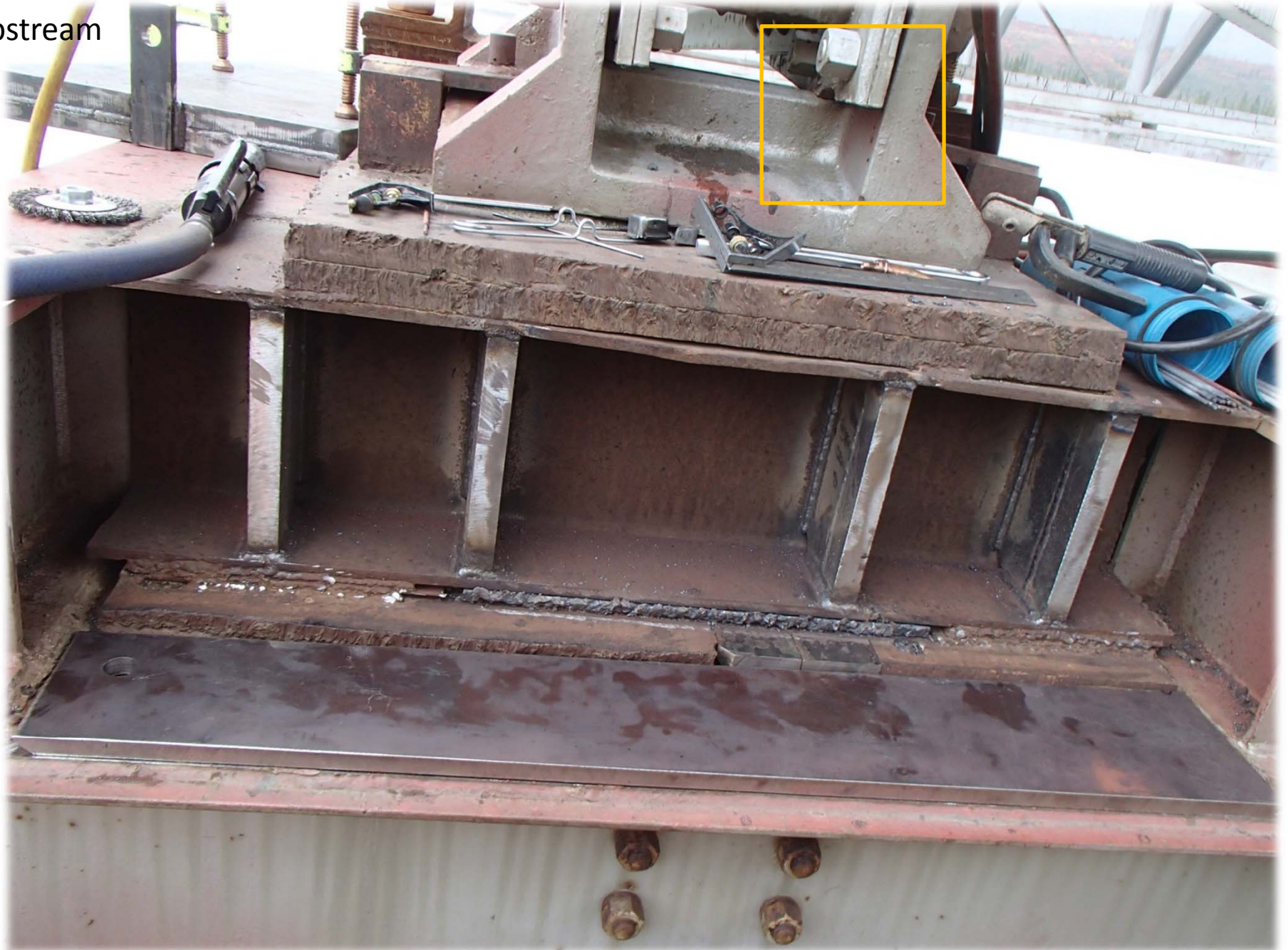


Downstream



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Upstream



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Downstream



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Downstream



3-Day Repair

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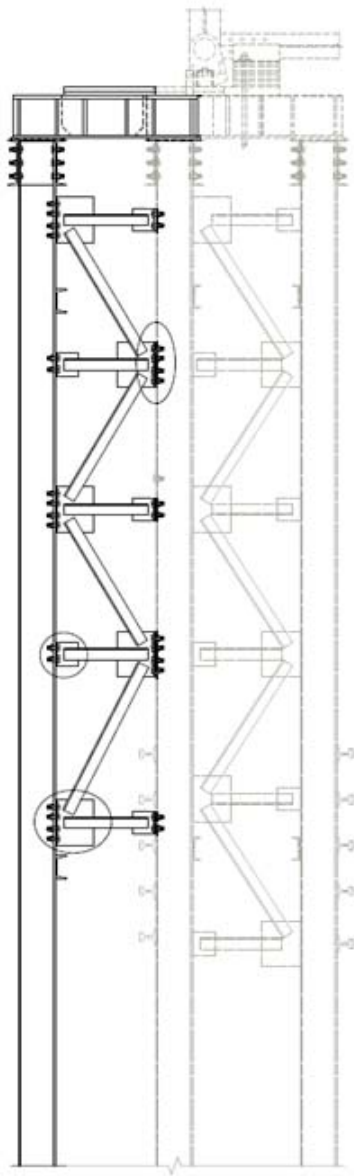
Downstream

9/14/2014
(one year after repair)



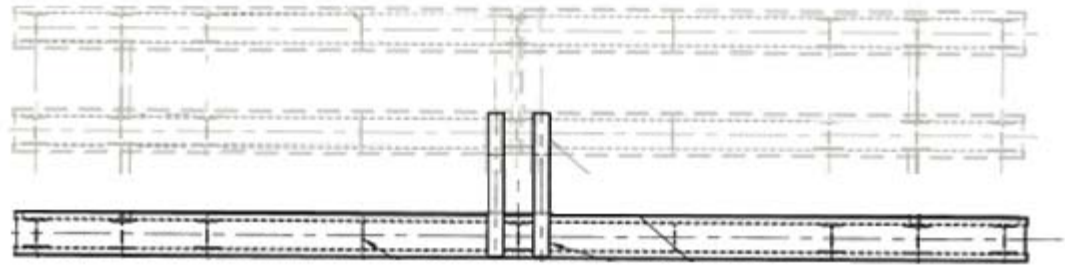


2015 – Temporary Repair (Contractor)

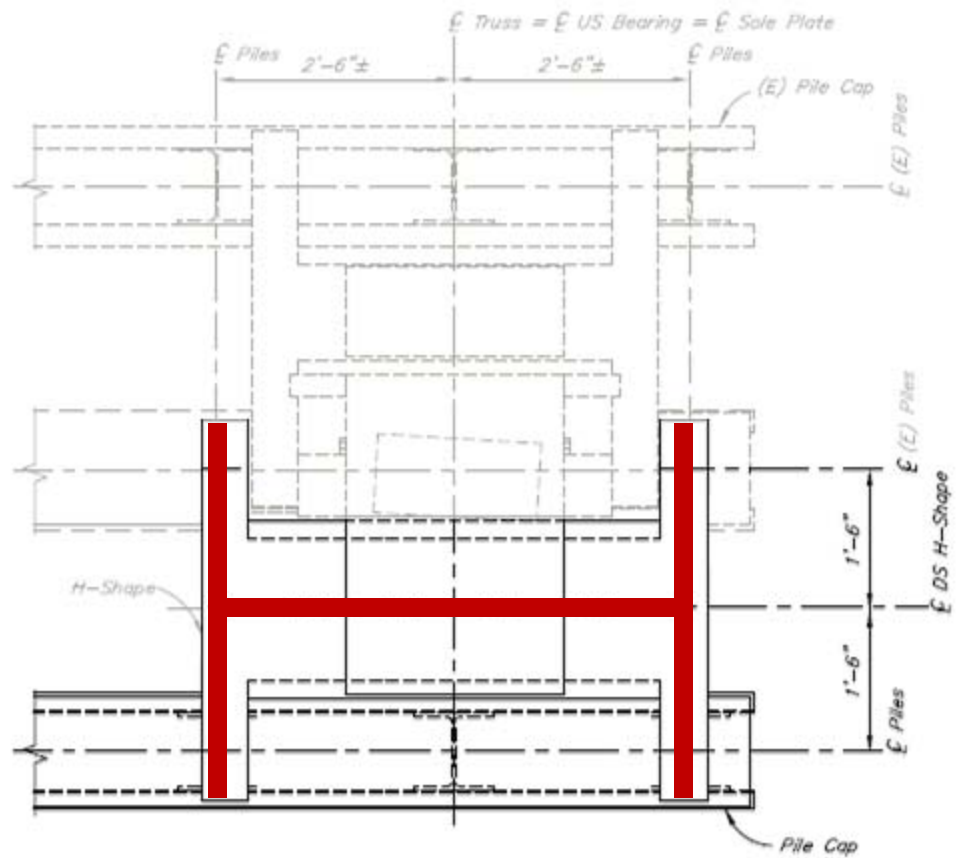


Piles – Elevation View

Same Tip Elev.



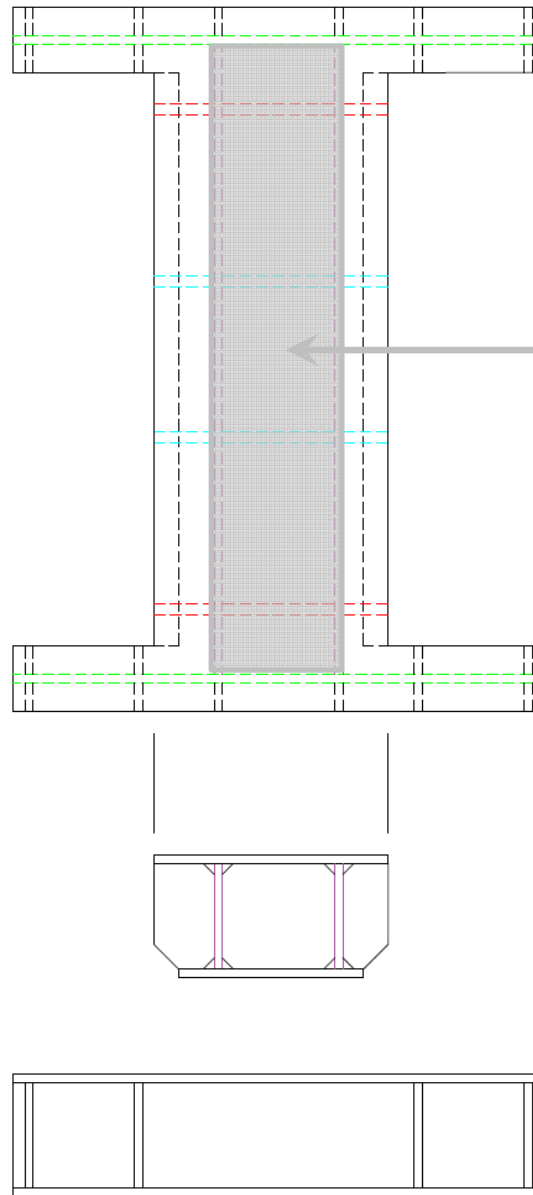
Pier Extension – Plan View



“H-Shape” – Plan View

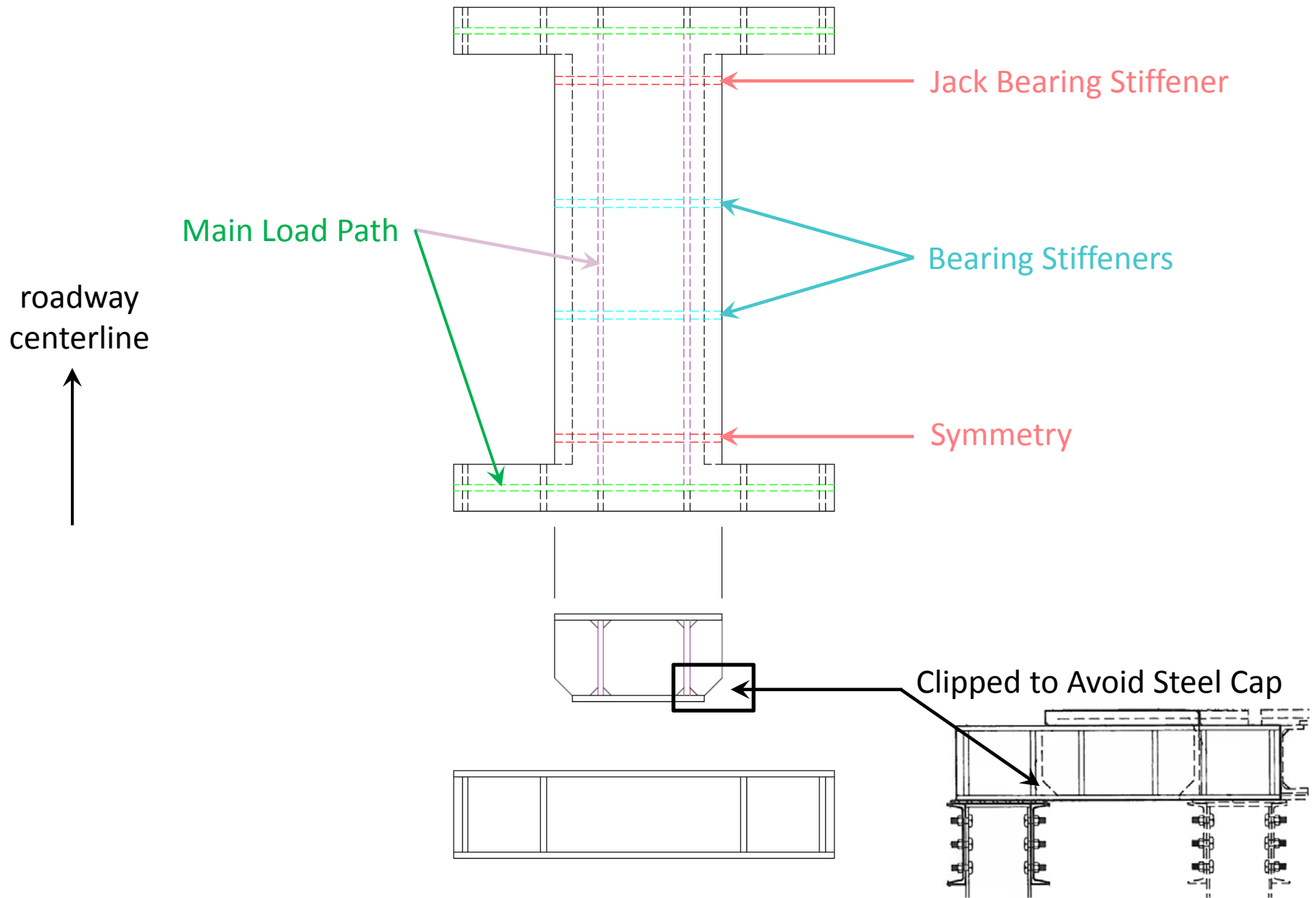
Downstream

roadway
centerline



Closed Boxes (x5)

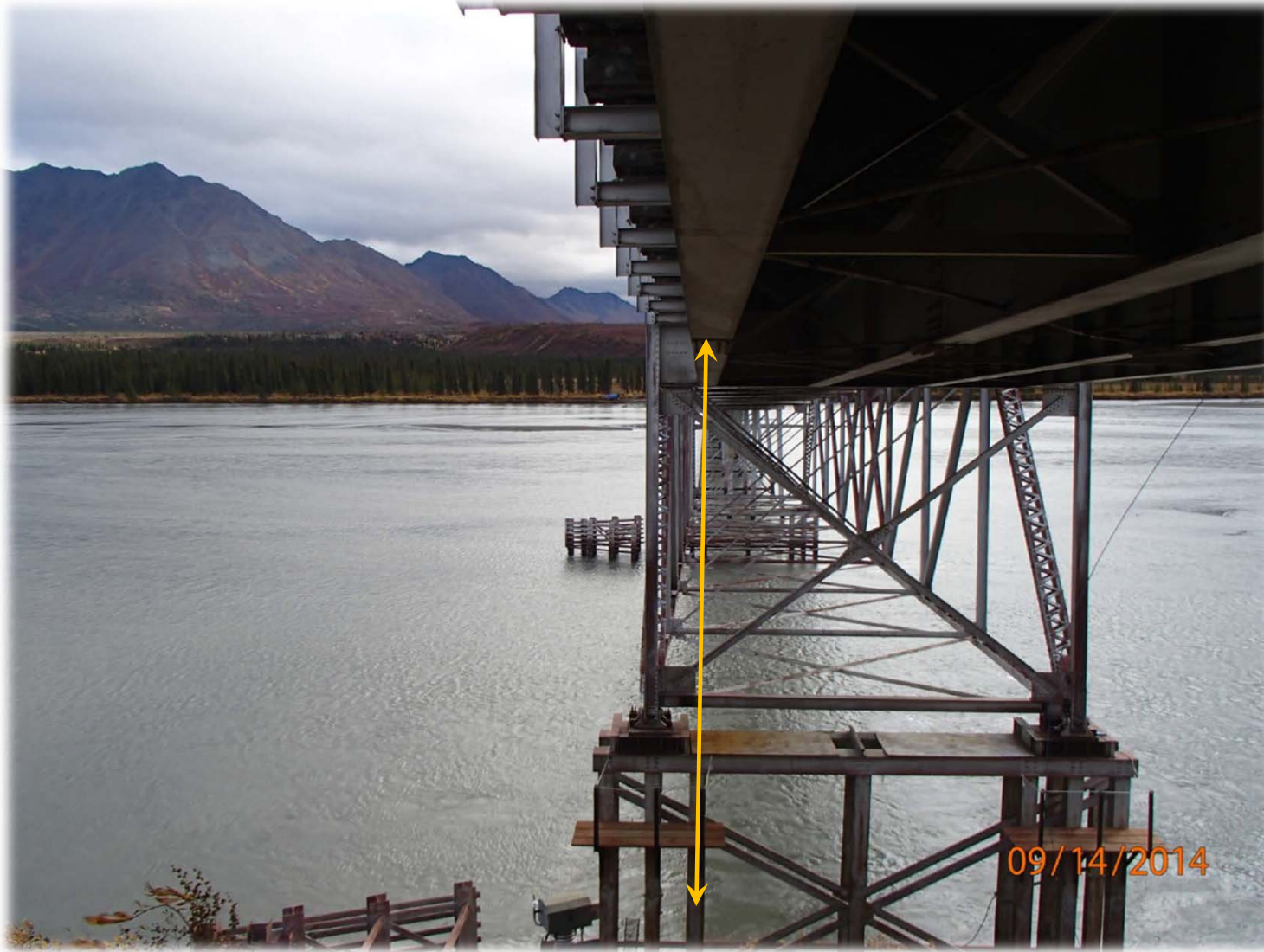
Downstream





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Challenges - Pile Alignment





Challenges – Roadway



09/14/2014

Challenges – Posted Road



Challenges - Geometry



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Challenges – Truss Distortion



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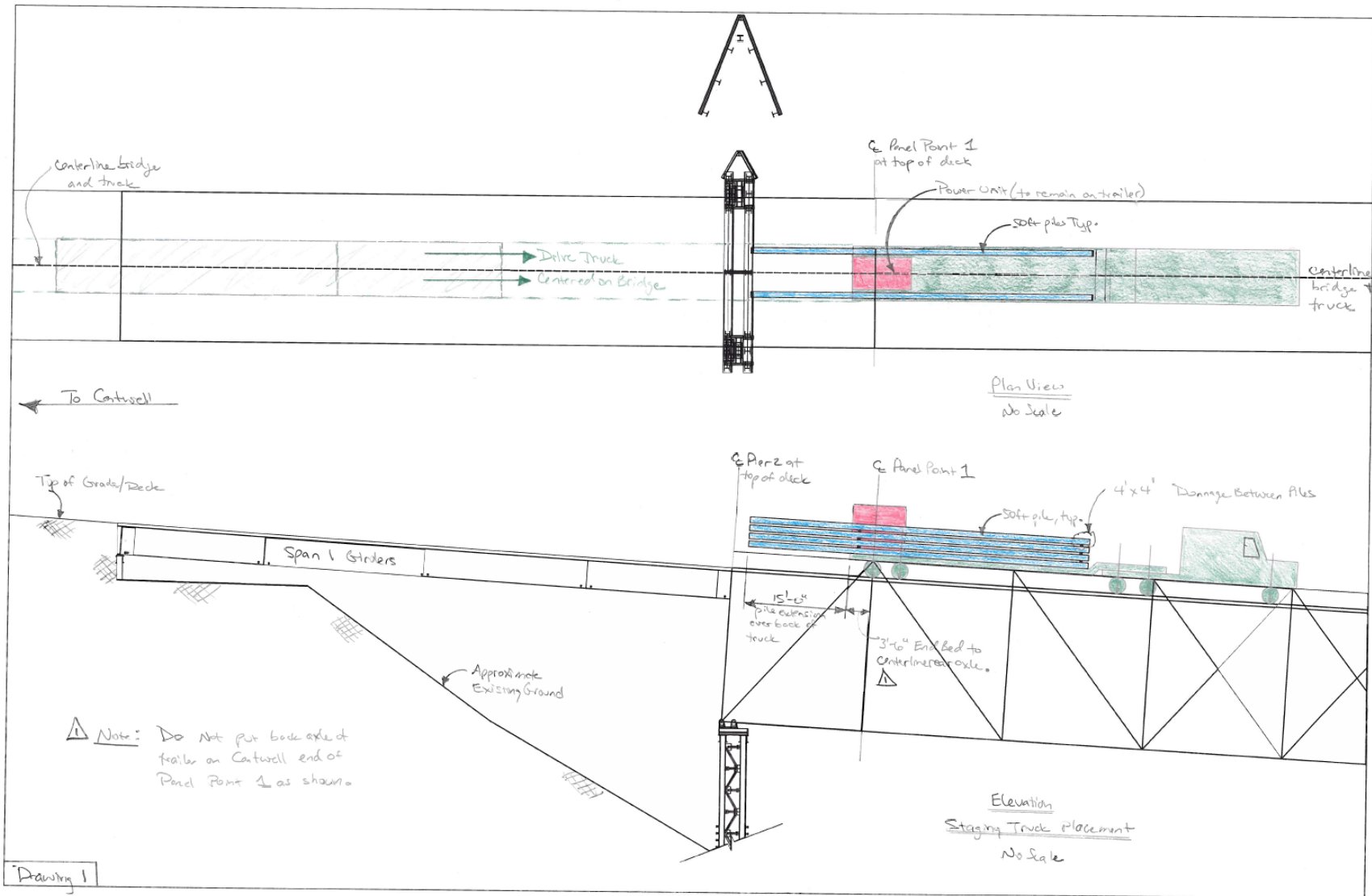


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Challenges – Staging Plan





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Basic Bid		ENGINEER'S ESTIMATE		LOW BIDDER		BIDDER 2			
Item No.	Description	Quantity	Pay Unit	Unit Price	Amount	Unit Price	Amount		
202(107)	Deck, Running Plank, Rail, and Platform Removal and Replacement	All Required	Lump Sum	L.S.	18,000.00	L.S.	80,000.00	L.S.	100,000.00
504(1)	Structural Steel	All Required	Lump Sum	L.S.	87,000.00	L.S.	100,000.00	L.S.	100,000.00
505(5)	Furnish Structural Steel Piles	322	Linear Foot	250.00	80,500.00	100.00	32,200.00	300.00	96,600.00
505(6)	Drive Structural Steel Piles	7	Each	20,000.00	140,000.00	15,000.00	105,000.00	40,000.00	280,000.00
512(101)	Abutment Lifting, Abutment 1 Lifting	All Required	Lump Sum	L.S.	25,000.00	L.S.	100,000.00	L.S.	125,000.00
512(102)	Pier Lifting, Pier 2 Lifting	All Required	Lump Sum	L.S.	30,000.00	L.S.	100,000.00	L.S.	175,000.00
640(1)	Mobilization and Demobilization	All Required	Lump Sum	L.S.	38,050.00	L.S.	50,000.00	L.S.	94,000.00
640(4)	Worker Meals and Lodging, or Per Diem	All Required	Lump Sum	L.S.	35,000.00	L.S.	40,000.00	L.S.	108,000.00
641(107)	Pollution Control	All Required	Lump Sum	L.S.	5,000.00	L.S.	20,000.00	L.S.	40,000.00
644(1)	Field Office	All Required	Lump Sum	L.S.	15,000.00	L.S.	20,000.00	L.S.	100,000.00
Total Basic Bid					473,550.00				1,218,600.00

\$647,200

+\$75,000

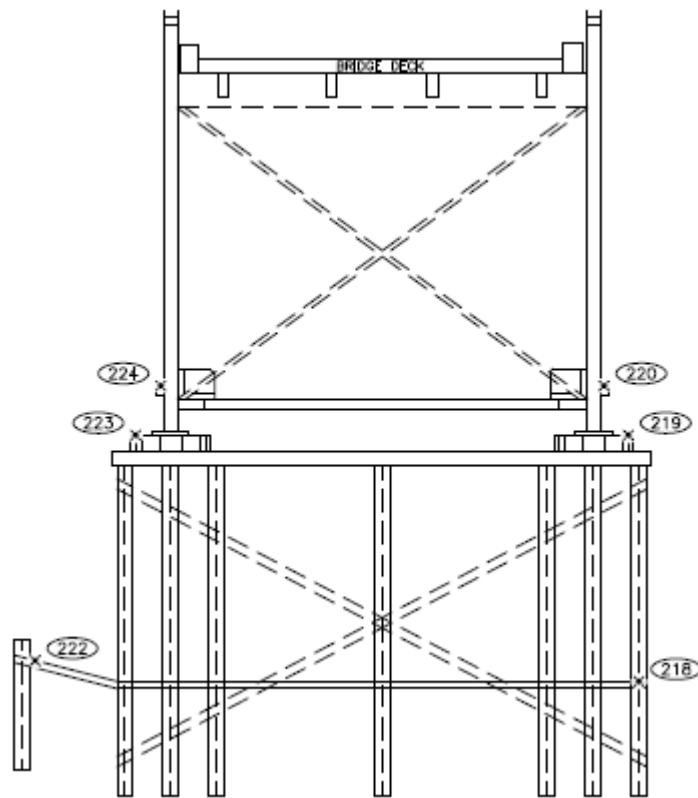
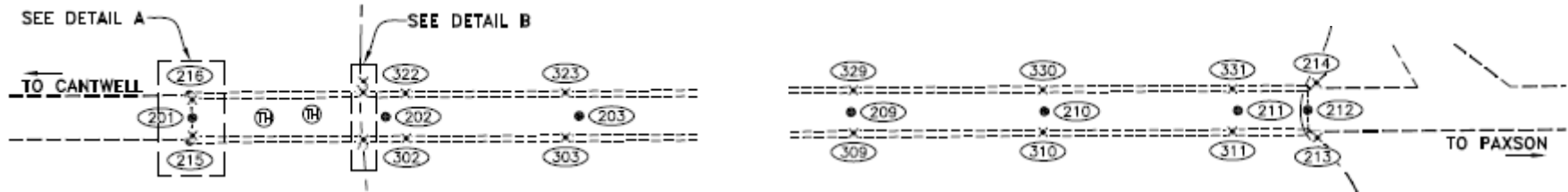
(Change Orders)

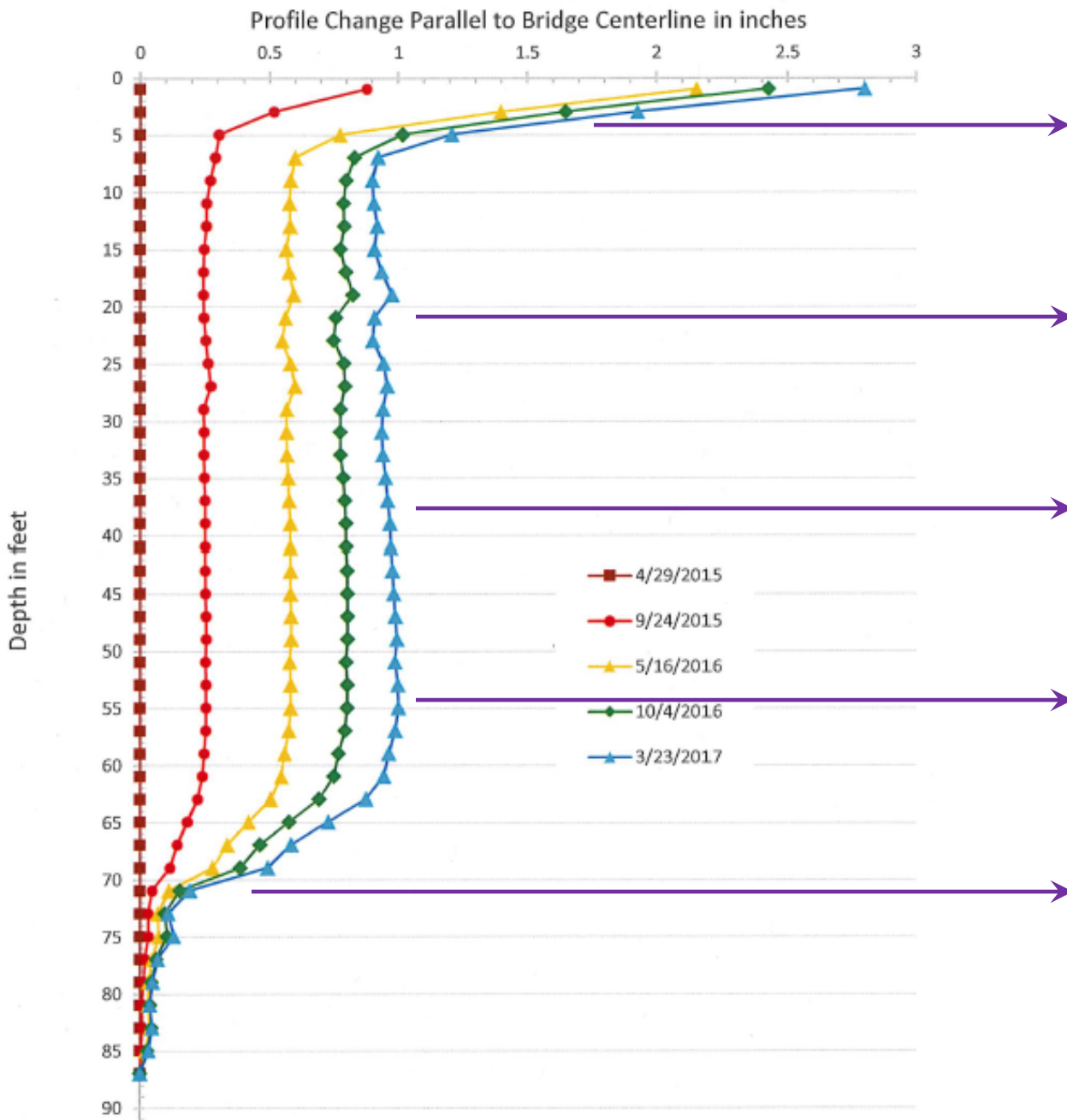


Field Data / Future Work



Survey Data





**Inclinometer:
Lateral Movement
and Rotation**

4/2015 – 3/2017

Prolonged Life - 2016

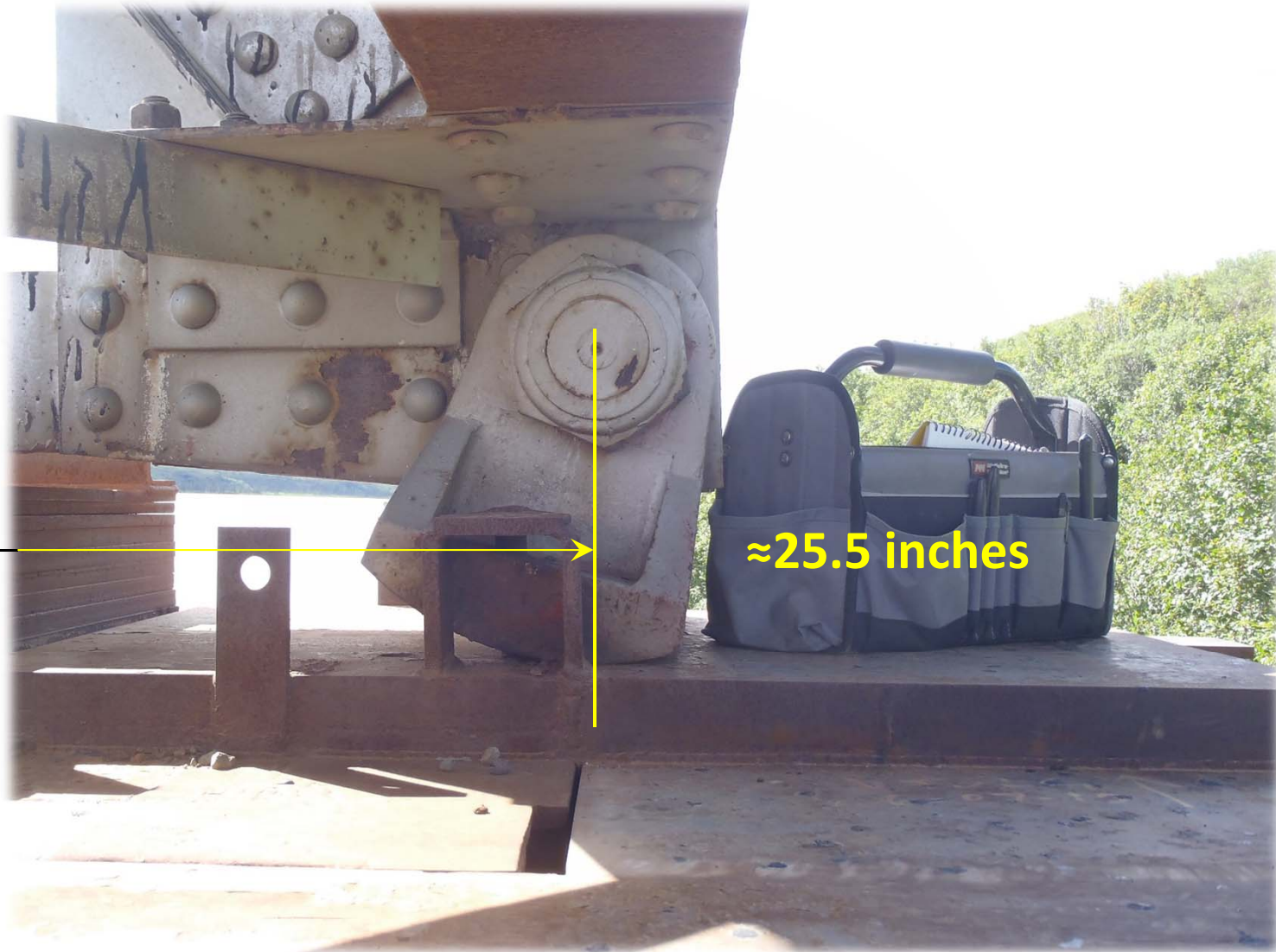


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Prolonged Life - 2016



CL 1956

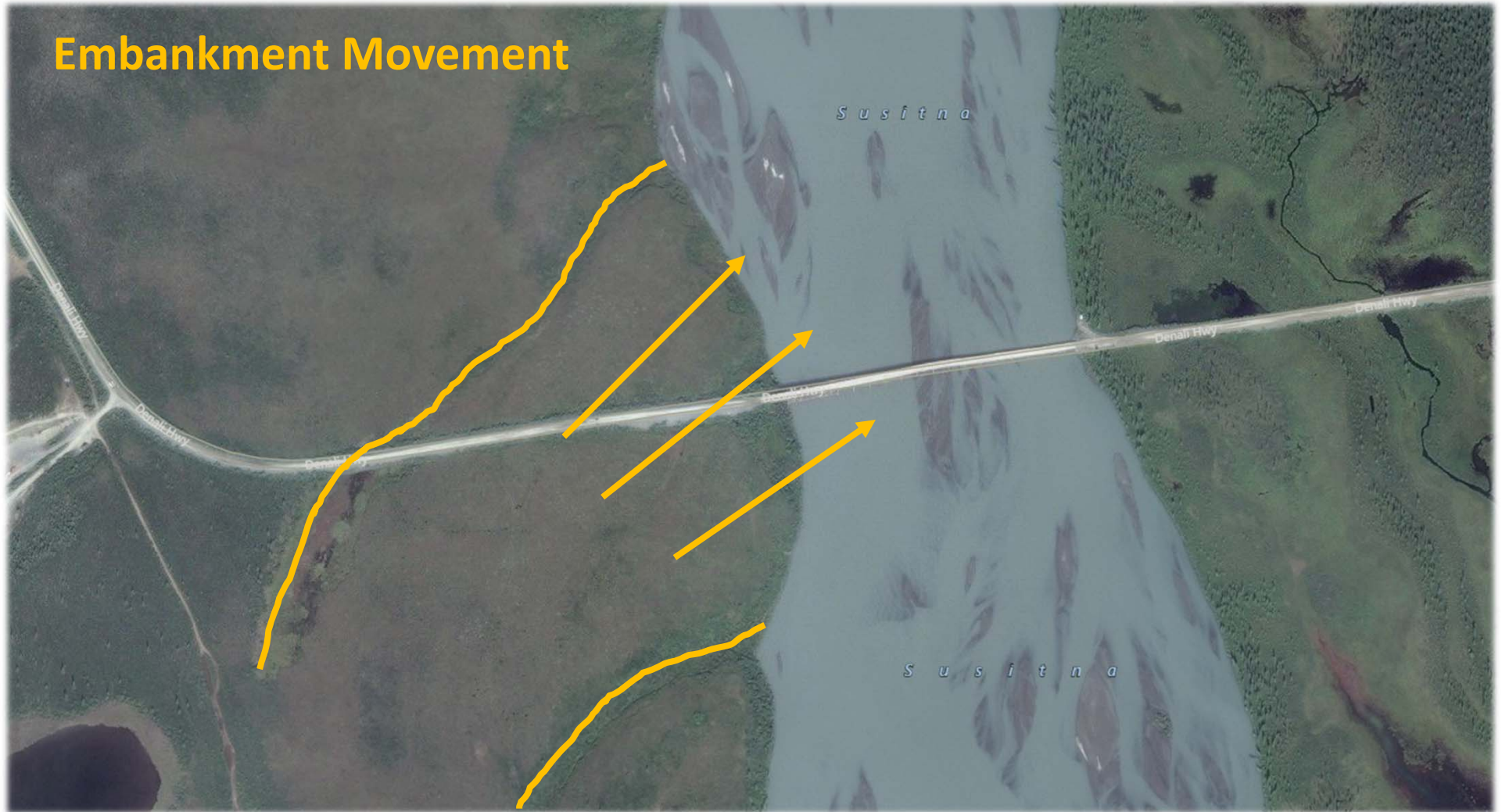


≈25.5 inches



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Embankment Movement





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Questions

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Contact Information

- Jared Levings, P.E., S.E.
 - Alaska DOT&PF
 - Bridge Engineer
 - jared.levings@alaska.gov
 - 907-465-6945



Brainstormed Repairs

- Do Nothing and Eventually Close Bridge
- Address Symptoms
 - Pier Seat Extensions
 - Bury Approach Span (MSE Walls?)
 - Replace Spans 1-3 (Approach, Truss, Next)
- New Bridge Alignment
- Other?