Jacobs

Challenging today.
Reinventing tomorrow.

Sherman Minton Corridor Project

Achieving 30+ years through Innovation

Sherman Minton Bridge Complex

Background

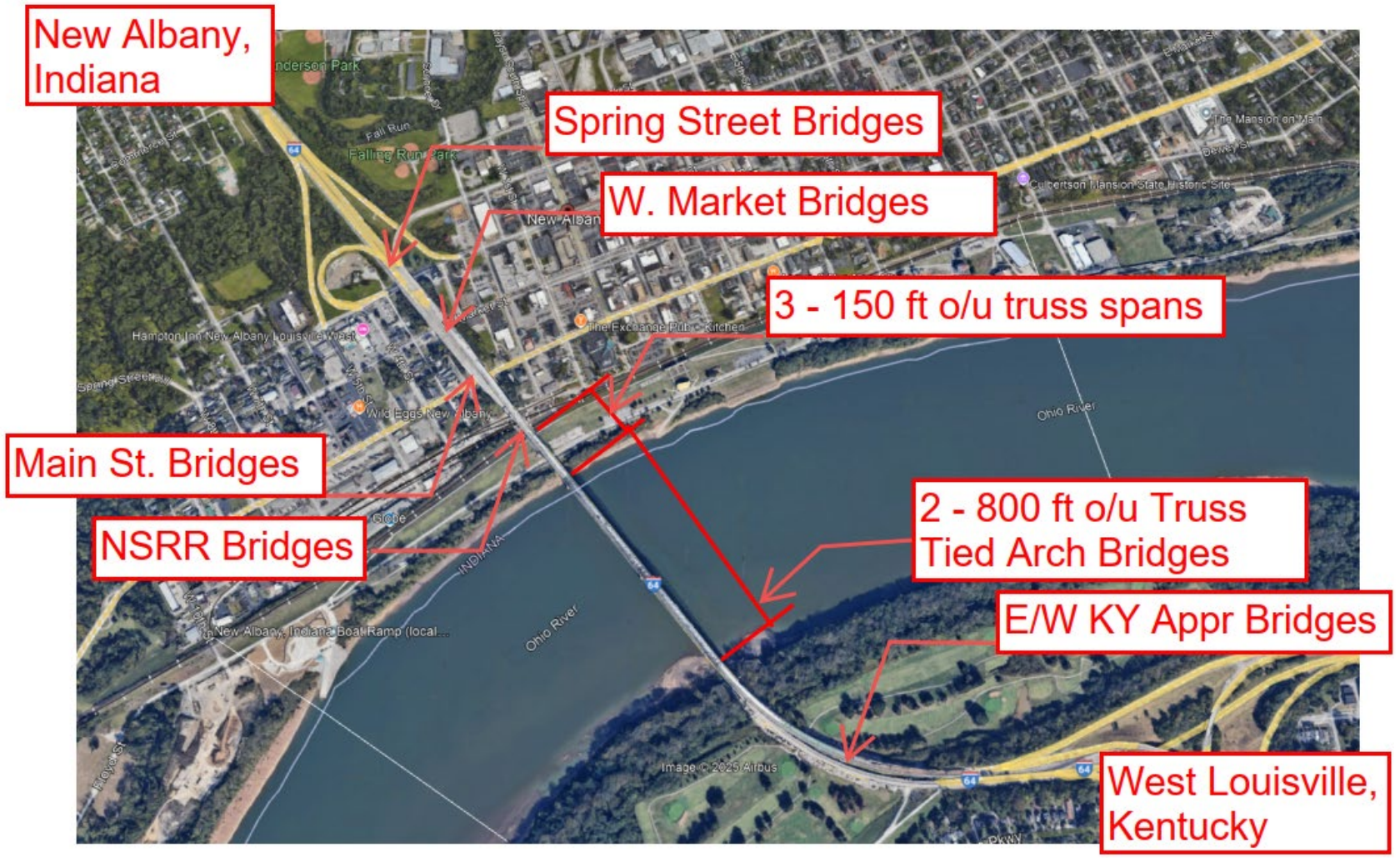
- New Albany – Louisville Bridge
- 2011 - 2012 Retrofit
- Corridor Project Development

Scope/Innovations

- As-Built Verification/Load Rating
- Bridge Deck Replacement
- Structural Steel Retrofits
- Substructure Repairs
- Arch Cable Replacements

Sherman Minton Bridge Complex

- Begin Spring Street
- Downtown New Albany
- I-64 over the Ohio River
- Shawnee Golf Course
- Approximately 1 mi.
- End at Levee
- 8 IN Bridges
- 2 KY Bridges
- 1 River Bridge

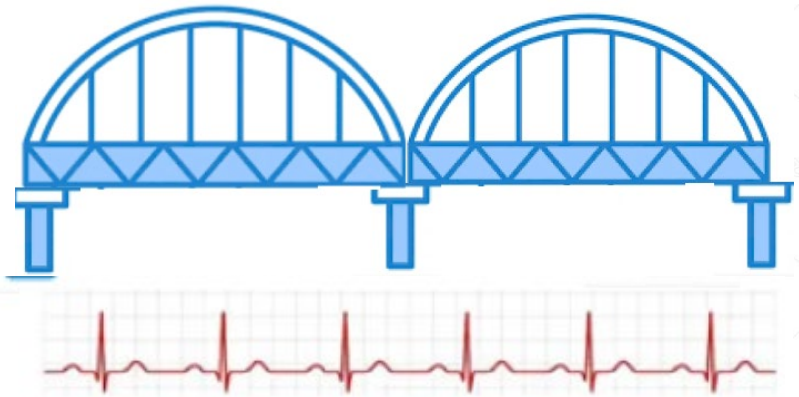


Sherman Minton Bridge Complex

- Designed by Hazlet andErdal
- Opened in 1962
- Carries 6 lanes of traffic
- 70,000 vpd

Sherman Minton Corridor Project

- Project Goals



30 Year Service Life Extension

Reduce Impact to Community and Travelling Public

Budget, Timeline and Impacts

Sherman Minton Bridge Rehabilitation Components

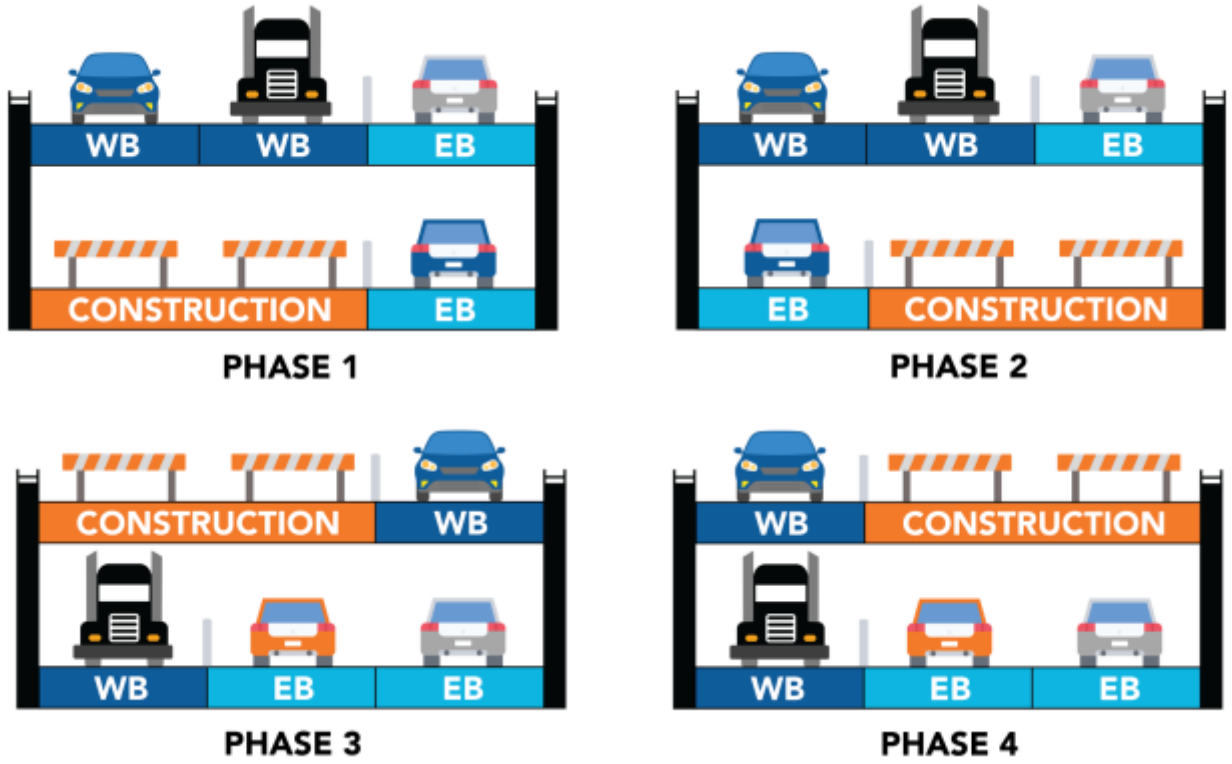
- Replacement of Bridge Decks
- Hanger Replacements
- Structural Steel Repairs
- Bridge Deck Overlays
- Traffic Lighting
- Drainage Repairs
- Bridge Painting
- Substructure Patching
- Inspection Access

Sherman Minton Bridge Challenges

- Maintenance of Traffic
- Procurement Schedule
- Design Schedule
  - As-Built Verification Process
  - Preliminary Load Rating
  - Structural Design & Plan Dev.

Sherman Minton Bridge Rehabilitation Maintenance of Traffic

- Maintenance of Traffic
  - Maintain two lanes in each direction.
  - Up to 360 nightly closures
  - One, 9-day closure, per calendar year
  - Up to 3 weekend period closures per calendar year
  - One lane for a 15 consecutive day closure for As-Built Verification Inspection

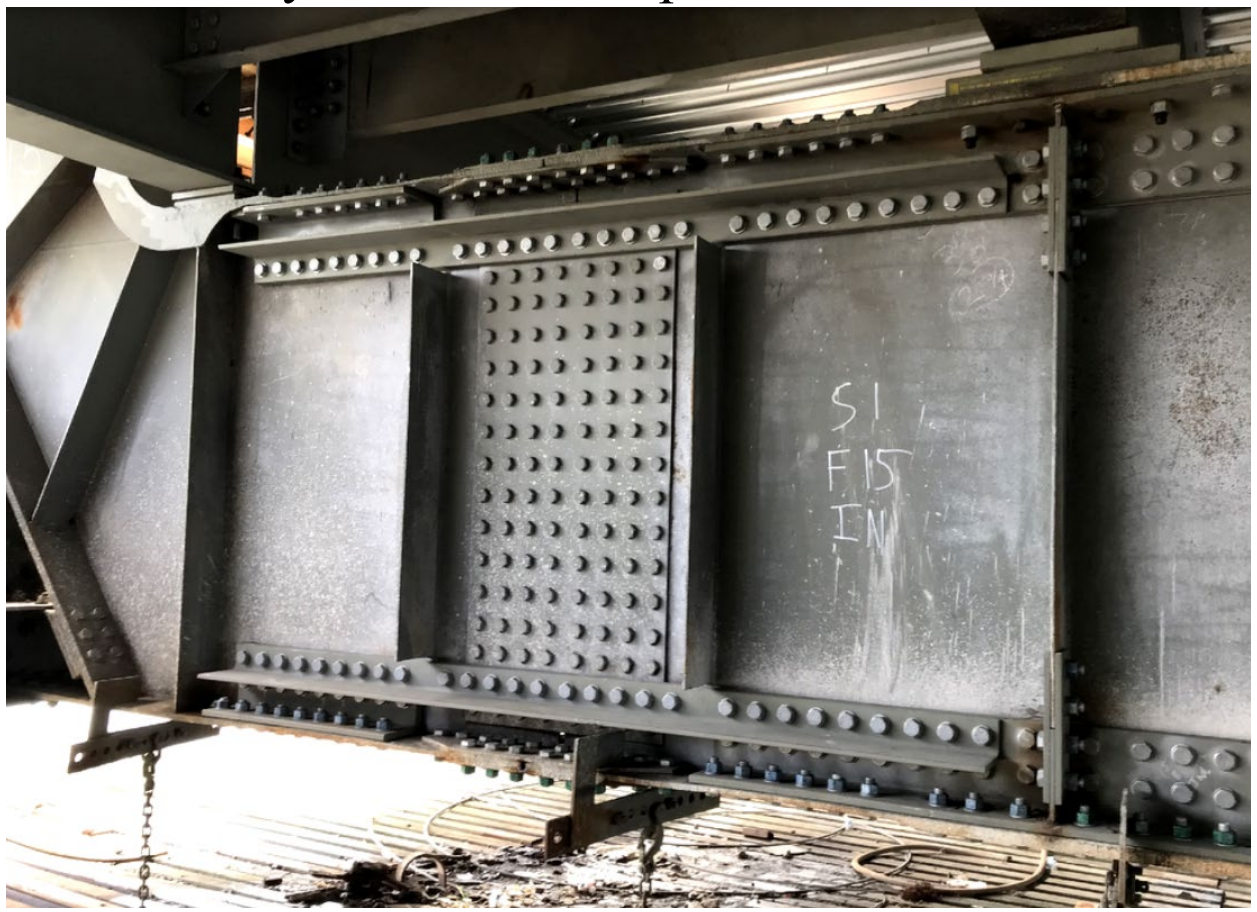


Sherman Minton Bridge Structural Steel

- Corrosion of Structural Steel
  - Manifest at all expansion joints and exterior members
  - Suite of Standard Details Developed to address corrosion and design requirements.
  - Requirements based on Load Rating
  - Allowances available for unknown corrosion locations.

Sherman Minton Bridge Structural Steel

- Exterior Stringers: Replaced
- Primary Members: Plating repairs
- Secondary Members: Replace in Kind

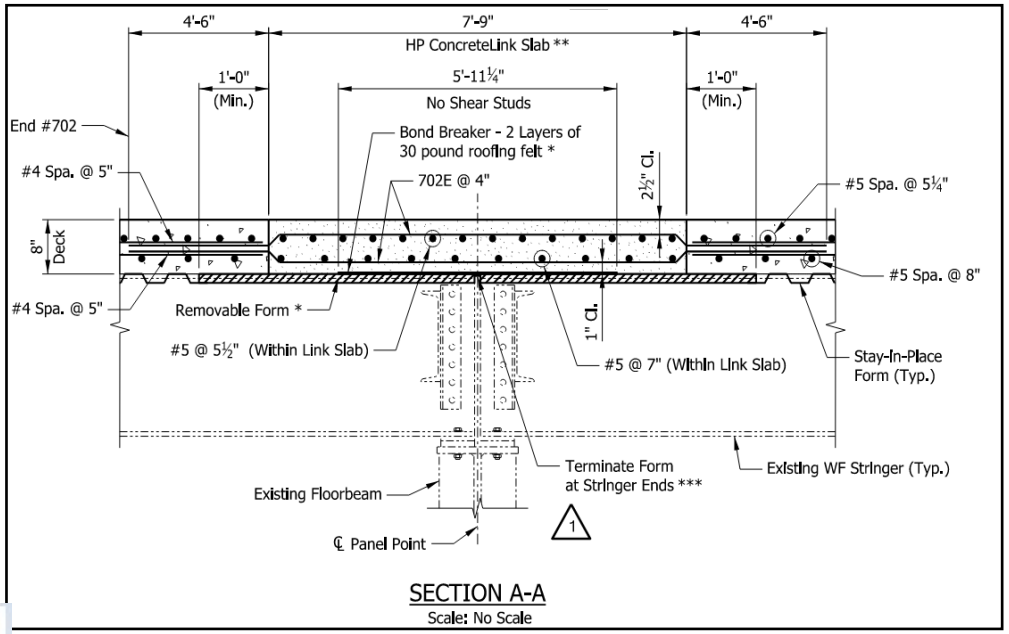


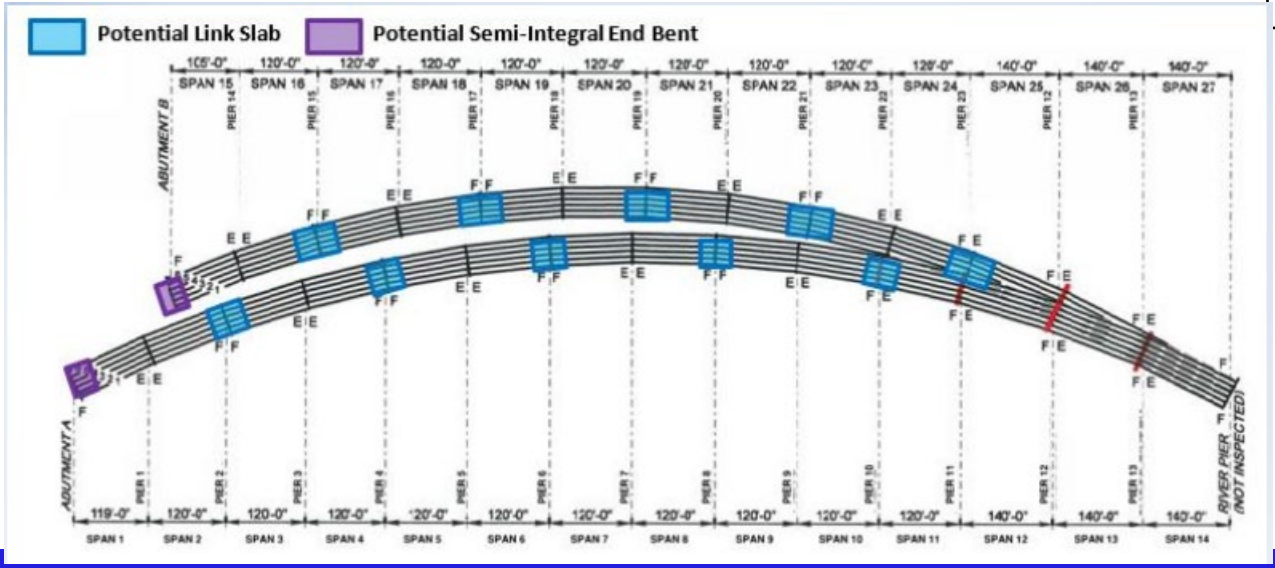
Sherman Minton Bridge Deck Replacement

- Replaced existing 7” deck with new 8” deck, f’c = 4,000 psi
- Metal SIP forms used.
- Used E5 Internal Cured Concrete
  - Nano-Silica (Liquid Fly-Ash)
  - Eliminates need for wet-cure

Sherman Minton Bridge Rehabilitation Link Slabs

- Link Slabs
  - Eliminate 31 expansion joints.
  - 16 for KY Approach Structures
  - 12 for Main Spans
  - 5 for IN Approach Structures
  - Design Based on: FHWA and Purdue.
  - Concrete Similar to Deck Concrete but included fibers.



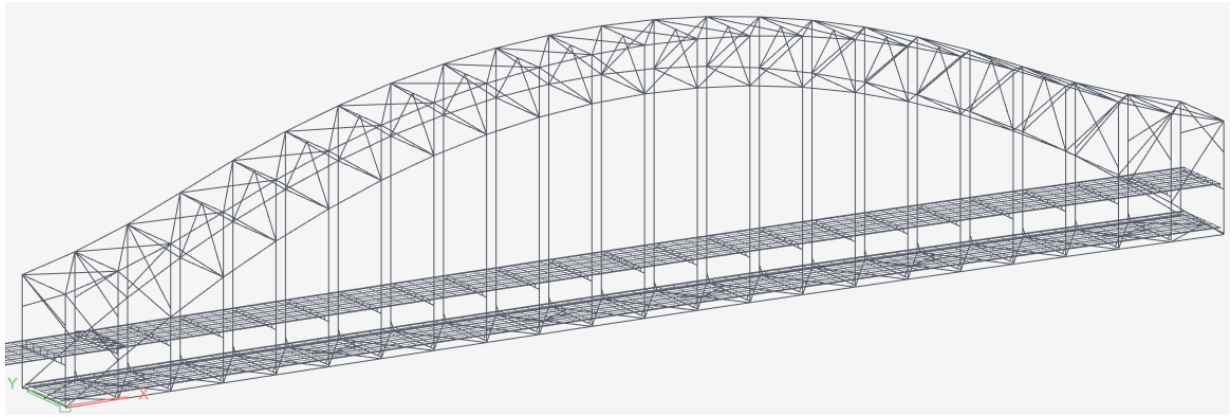


Sherman Minton Bridge KY Approach Substructure

- Substructure Rehabilitation
  - Remove all concrete cover on pier caps.
  - Repair delamination on columns.
  - Cathodic Protection thru galvanic anodes.
  - Allowances available for unknown concrete repair not recorded.

Hanger Replacement – Requirements

- Existing Condition
  - Observed loss of galvanizing and broken wires in the hanger
  - Pack rust in the connections
- Objectives:
  - Mitigate traffic closures
  - Redundant operation
  - Geometry based replacement
    - Cable forces were analyzed, monitored and recorded
    - Live load present on lower deck

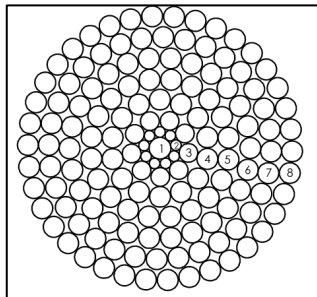


Jacking Force Table (Per Strand)*	
Dead Load =	170 Kips (85 Tons)
Live Load =	70 Kips (35 Tons)
Calculated Lifting Force =	240 Kips (120 Tons)
Maximum Lifting Force =	270 Kips (135 Tons)

4 adjacent lanes + const LL

Hanger Replacement - Fabrication

- Structural (Bridge) Strand (26’ – 102’)
  - A586 Grade 1
  - 2 9/16” dia (F.S. 3.0)
  - Prestretched
- Socket Type 8/6
  - Lower Type 6 - tapped for threaded insert

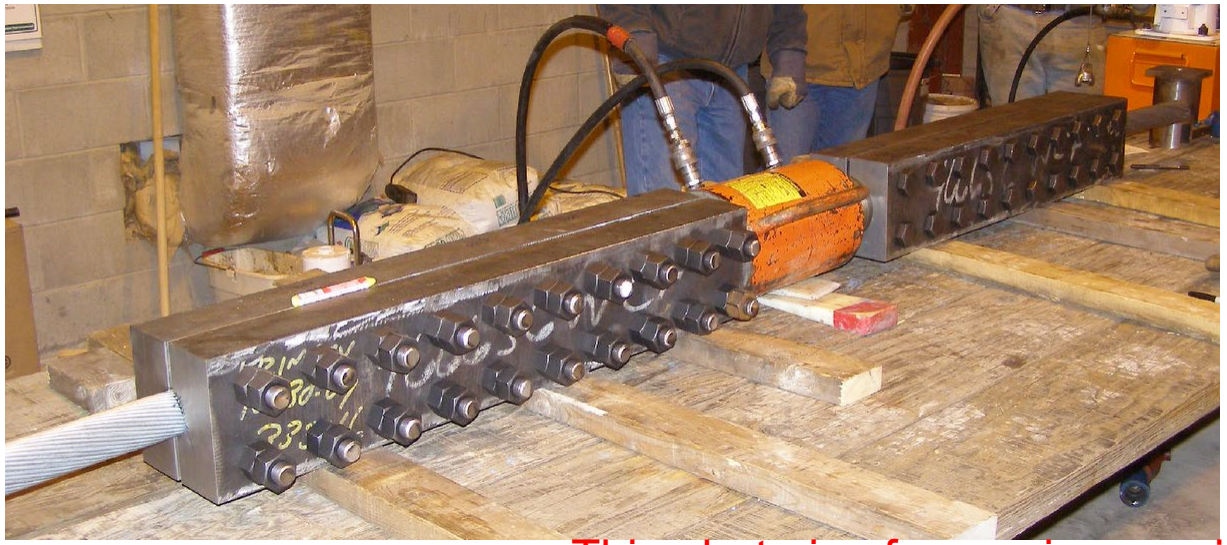


Layer #	Wire Diameter (Inch)	Quantity #	Wire Coating Class	Wire Tensile Strength PSI
1	0.196	1	A	250,000
2	0.096	9	A	250,000
3	0.168	9	A	250,000
4	0.188	14	A	250,000
5	0.188	20	A	250,000
6	0.188	26	A	250,000
7	0.188	32	A	250,000
8	0.188	38	C	200,000

WIRECO

Hanger Replacement - Testing

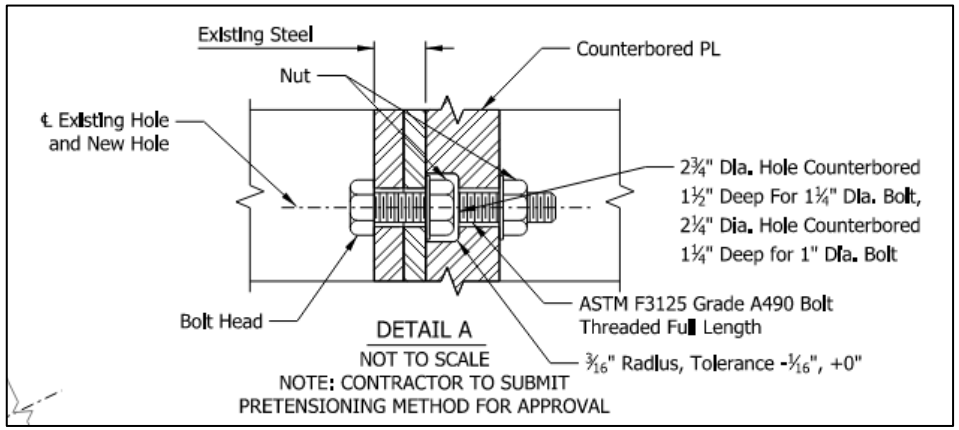
- Testing (MO, TX)
  - Modulus Test: 55% breaking strength
  - Breaking Test: Failure or max 2x required breaking strength
  - Friction clamp testing



This photo is of a previous project

Hanger Replacement – Hanger Assembly

- Exterior Bolted weldment
  - Cheeseplate approach
  - Replaced bolts one at a time as early works

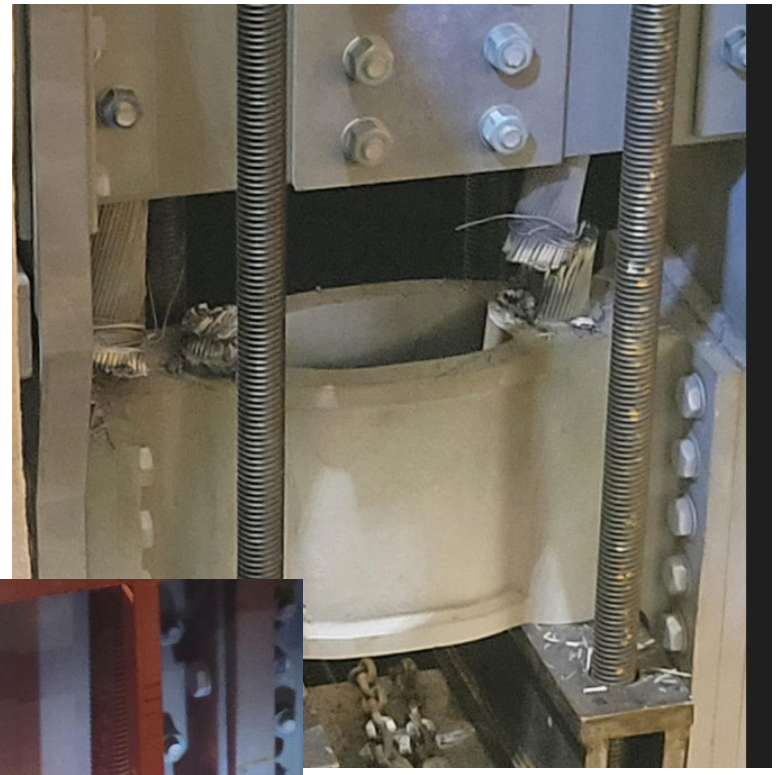


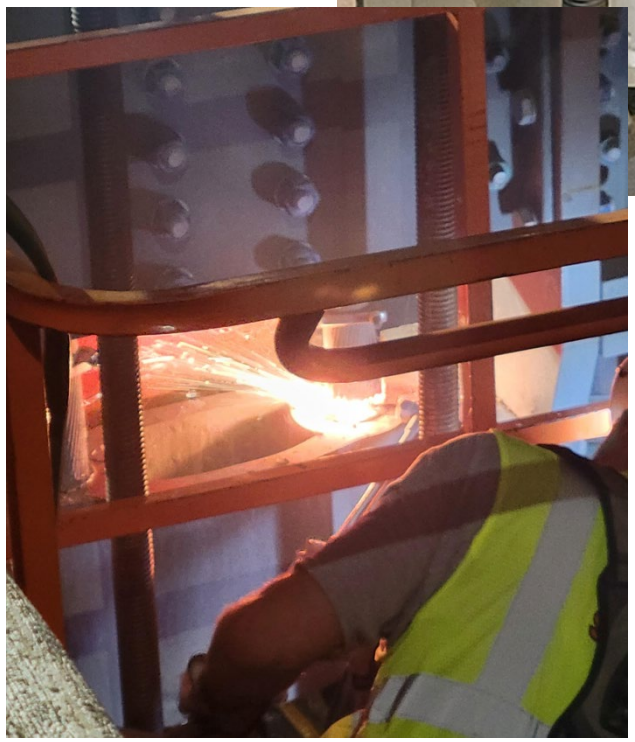
Hanger Replacement – Jacking Setup

- Equipment
  - 100 ton Thru hole jacks for 1.75” thread bars
  - Group A (4) –new hanger tensioning system
    - Shared manifold
  - Group B (4) –existing hanger detensioning system
    - Shared manifold
  - Maximum stroke: 4”

Hanger Replacement - Construction

- Jacking sequence– Detensioning Cables
  - Jack Group B
  - Hanger sounding
  - Unseating, or torch cut existing cable
  - Transfer load from Jack Group B (existing) to Jack Group A (new)





Hanger Replacement - Construction

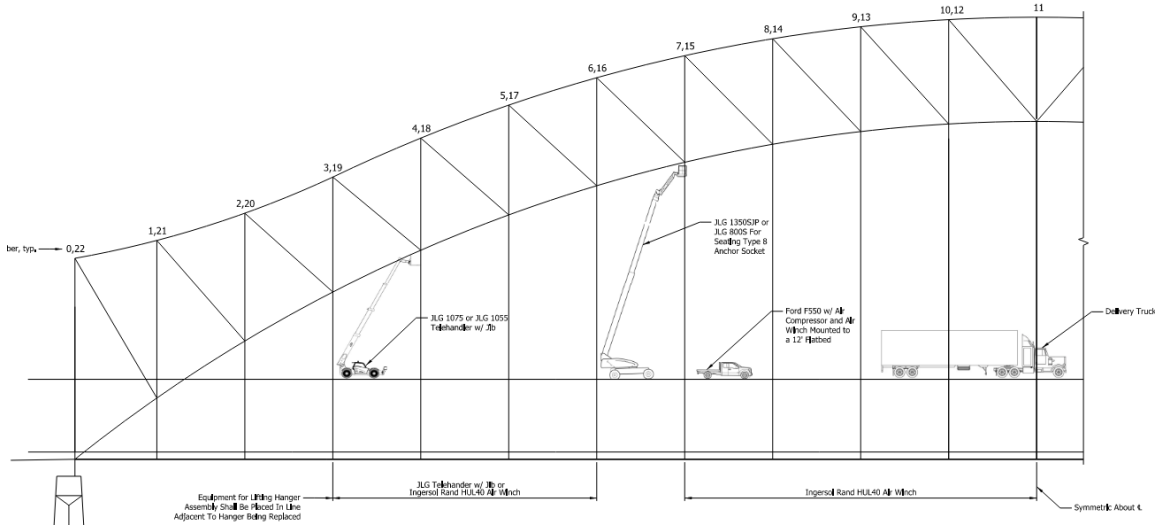
- Jacking sequence– Loading New Cables
  - Jack group (A)
  - Adjust bearing nut
  - Lower jack to seat the nut
  - Check final elevations
  - Repeat as needed

Hanger Replacement – Monitoring and Geometry Control

- Monitoring
  - Initial/ Final hanger lengths
    - Laser measurement
  - Max ¼” deck displacement

Hanger Replacement – Success

- 1 cable/night start
- 2-3 cables/night
  - Setup crew, jacking crew, demo crew
- 68 hanger pairings (136 hangers)
- Went down one side, came back another

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Important

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Reinventing tomorrow.