Market Street Bridge

"A picture is worth a thousand Words"

The success of the Market Street Bridge,

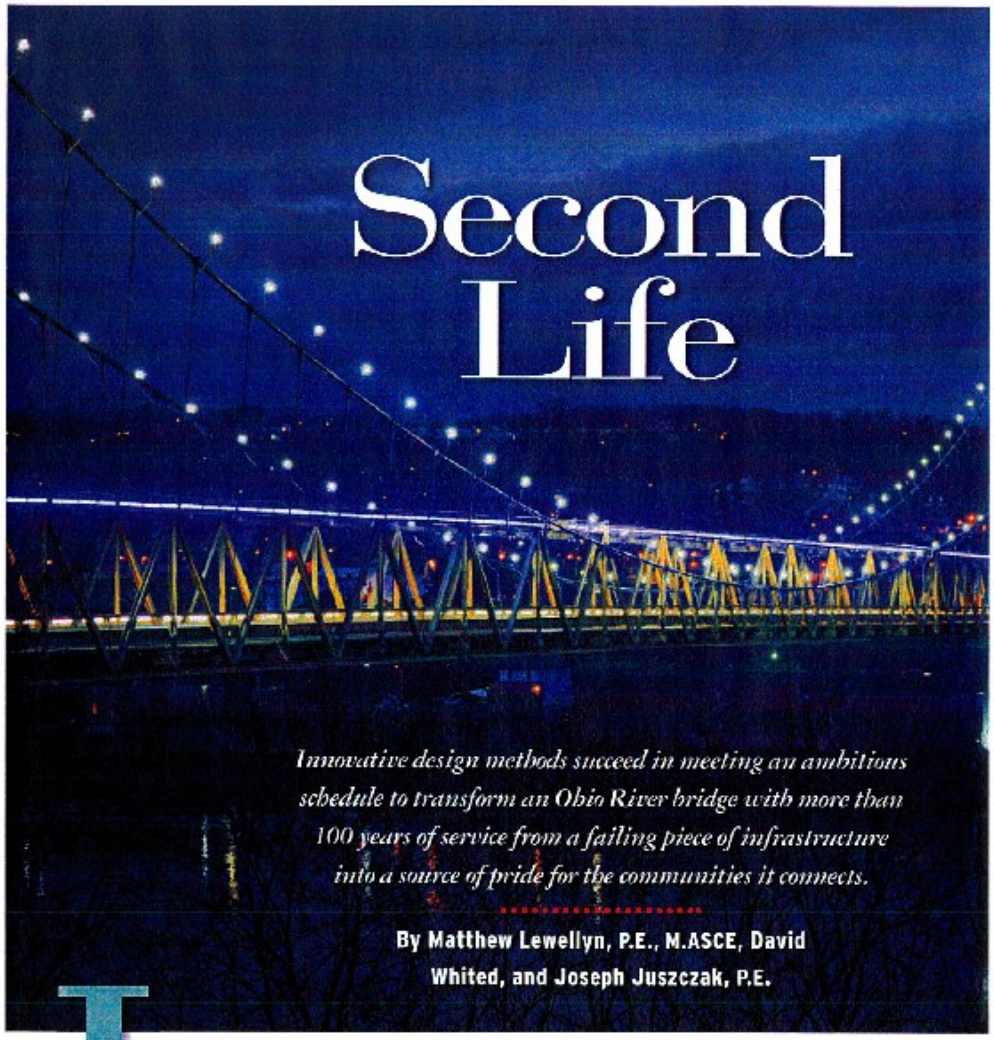
The top 10 list

How do you know??

#10

The project was presented at the 2012 International Bridge Conference.

#9



Second Life

Innovative design methods succeed in meeting an ambitious schedule to transform an Ohio River bridge with more than 100 years of service from a failing piece of infrastructure into a source of pride for the communities it connects.

By Matthew Lewellyn, P.E., M.ASCE, David Whited, and Joseph Juszczak, P.E.

THE MARKET STREET BRIDGE, which crosses the Ohio River to link West Virginia and Ohio, had been in need of rehabilitation for some time. But that need became more pressing in 2009, when one of the two other bridges that spanned the river to link Brooke County, West Virginia, with Jefferson County, Ohio, was closed. After swift action by local and state leaders, a team of engineers from Burgess & Niple, Inc. (B&N), an engineering firm based in Columbus, Ohio, used such innovative techniques as superimposing repair notes on plan photographs to meet an accelerated design schedule and transform the failing bridge, which is more than 100 years old, into an icon of the communities it connects.

A banker in Steubenville, Ohio, by the name of Dohrman J. Sinclair constructed the Market Street Bridge in 1905 to serve as a gateway for Steubenville residents who were interested in obtaining jobs at the tin mill that was being developed across the river. The 1,794 ft long cable suspension bridge, stiffened by a Warren through truss, carried workers

#8

Thank you letter from City Of Steubenville, OH

David M. Lalich
Councilman

119 Aberdeen Road
Steubenville, Ohio 43952
Phone: 740.266.6070

123 South Third Street
Steubenville, Ohio 43952
Phone: 740.283.6000 ext. 2100
Email: council@cityofsteubenville.us

SEC-info
CC: CH
HO
D-6

January 31, 2012

Secretary of Transportation
Paul A. Mattox, Jr.
1900 Kanawha Blvd. East
Building 5
Charleston, WV 25305

2.22.12

Dear Secretary Mattox:

On behalf of the City Council, City Administration, and citizens of the City of Steubenville we would like to take this opportunity to thank you for the rehabilitation of the Market Street Bridge that spans the beautiful Ohio River between the States of Ohio and West Virginia.

The span lends itself to economic opportunities on both sides of the river and we are greatly appreciative of all your hard work and investment.

Sincerely,

David M. Lalich
Sixth Ward Councilman
Chairman, Economic
Development Committee
Steubenville City Government

DML/plo

RECEIVED
FEB 16 2012
WV Dept. of Transportation
Office of Secretary

#7

Thank you letters from Ohio residents

From: Michelle [mailto:mikkig0104@att.net]
Sent: Tuesday, December 27, 2011 5:57 PM
To: DOT Secretary
Subject: Market Street Bridge

Mr. Mattox:

I am a resident of Steubenville, OH and I wanted you to know that I appreciate all that was done to make the Market Street Bridge look so beautiful. I do not live close enough to the bridge to view it as often as I would like; however, I work downtown and can see it from the building in which I work. I have found myself driving downtown Steubenville just to see the bridge lit at night. With so much negative news at the present time, the updated and decorated bridge is certainly a positive news item. I have heard nothing but positive comments about it.

Thanks again for all that you and many others did to bring this about. It is appreciated by not only West Virginia residents but also Ohio residents.

Michelle Groninger

#6

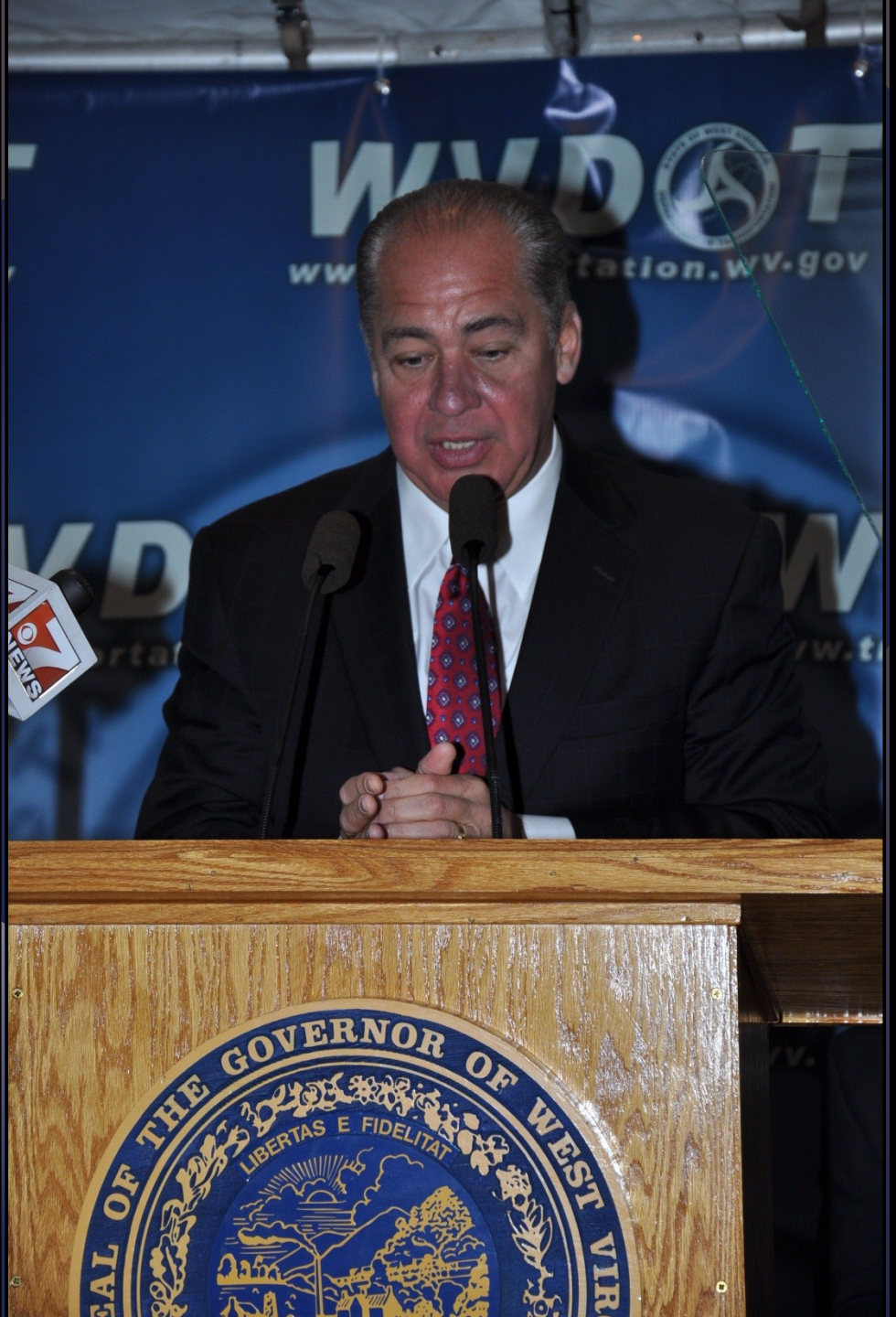
Ribbon cutting ceremony

#5

Secretary Mattox speaks at ceremony

#4

Governor Tomblin speaks at ceremony



#3 A lot of politicians

#2

Project engineer gets picture with the Governor

And

The

Number 1

Reason is

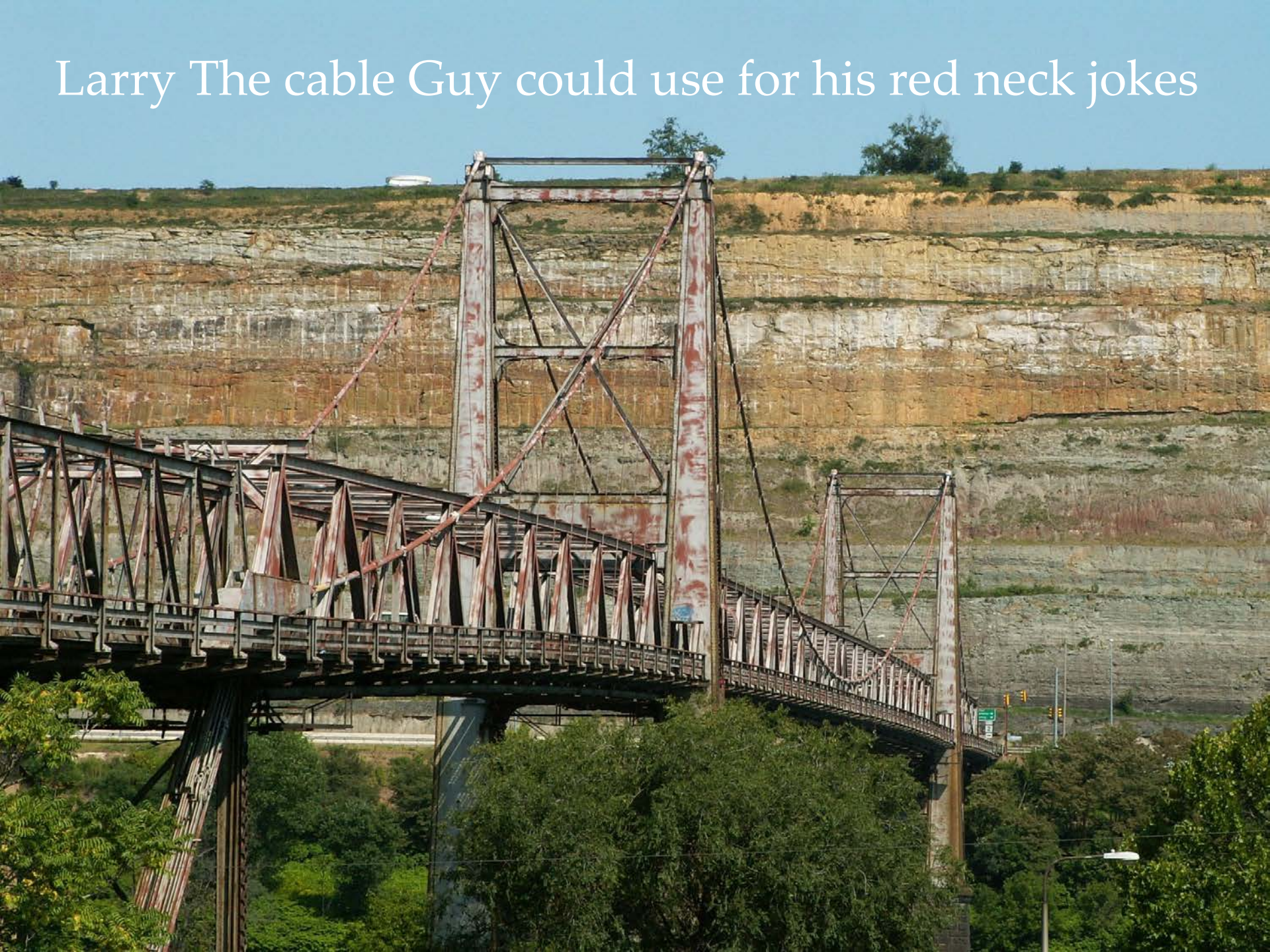
The Project is still a buzz nearly two years after the completion date of the contract

Why

Still looked good


Floor beam support not that bad

Larry The cable Guy could use for his red neck jokes




Just a few holes

Bent 5 bearing


Pack rust popping just a few rivets

The State of Ohio closed the Fort Steubenville Bridge in 2009, which is less than two miles north of the Market Street bridge and reported that it would be demolished.

Around the same time the WVDOT was planning a new bridge about 10 miles south of the Market Street Bridge. Burgess and Niple's bridge inspection revealed the bridge was in need of major repairs.

The first thought was to:

However

Local leaders banned together and then Governor Joe Manchin pledged the bridge would be repaired.

Thanks to The American Recovery Act Money was available for the repairs.

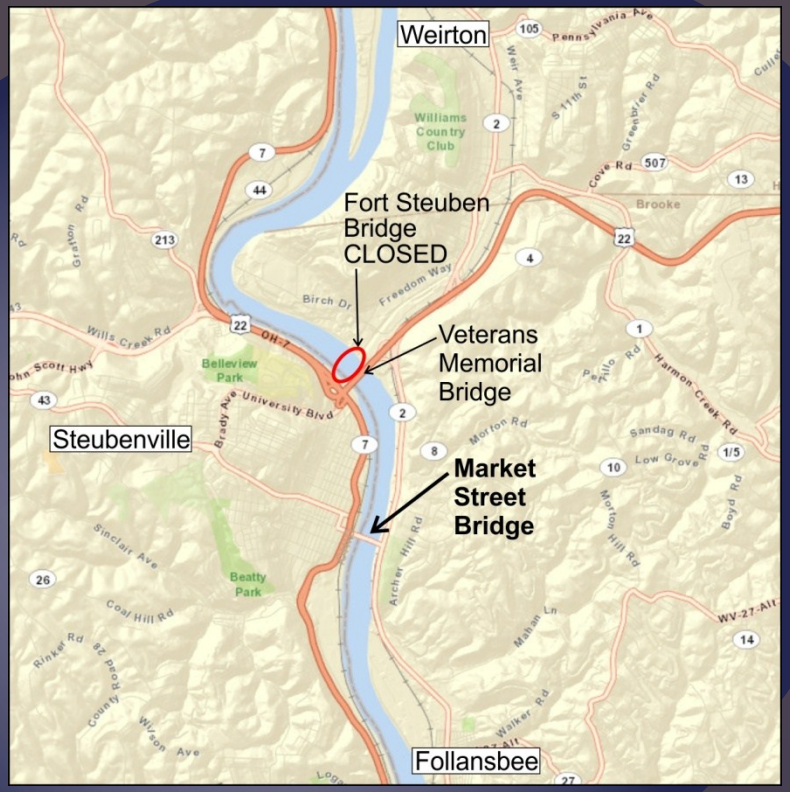
In order to meet the deadline for funding Burgess and Niple expedited the plans for the rehabilitation.

A Good Candidate for Rehab?

OR

Deciding Factors

- 2 of 3 Bridges Remain
  - Increased Congestion
- Traffic Served < 5 tons
- Cost versus Benefit
  - Rehab = $10 million
  - New Bridge = $100+ million
- Future Cost vs. Service Life



The Design Phase

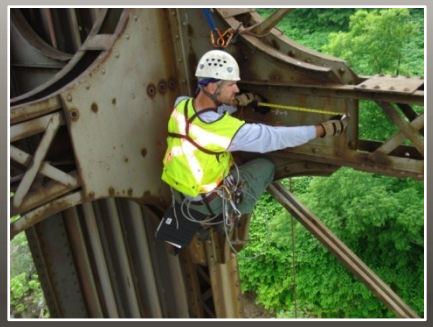
- June 1, 2009 - Field Work Begins
  2 weeks
- June 14, 2009 – Start Design Work
  10 weeks
- August 31, 2009 – Submit Bid Set

- Streamlined Reviews by WVDOT

- Project FTP Site

Field Inspection

Cable Climbing



Tower Bracing Inspection

Strand Inspection

Cable Inspection

Tower Rappelling

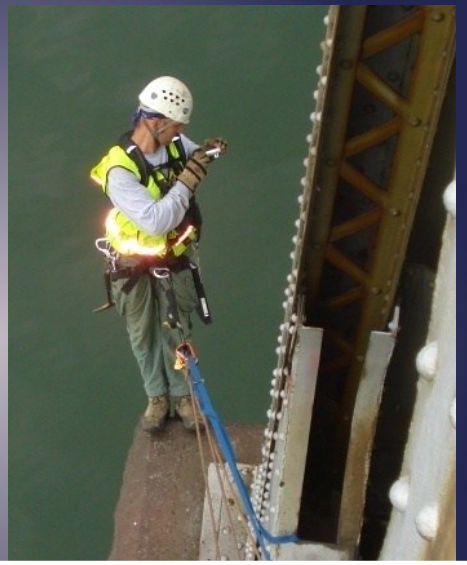
STATE OF WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

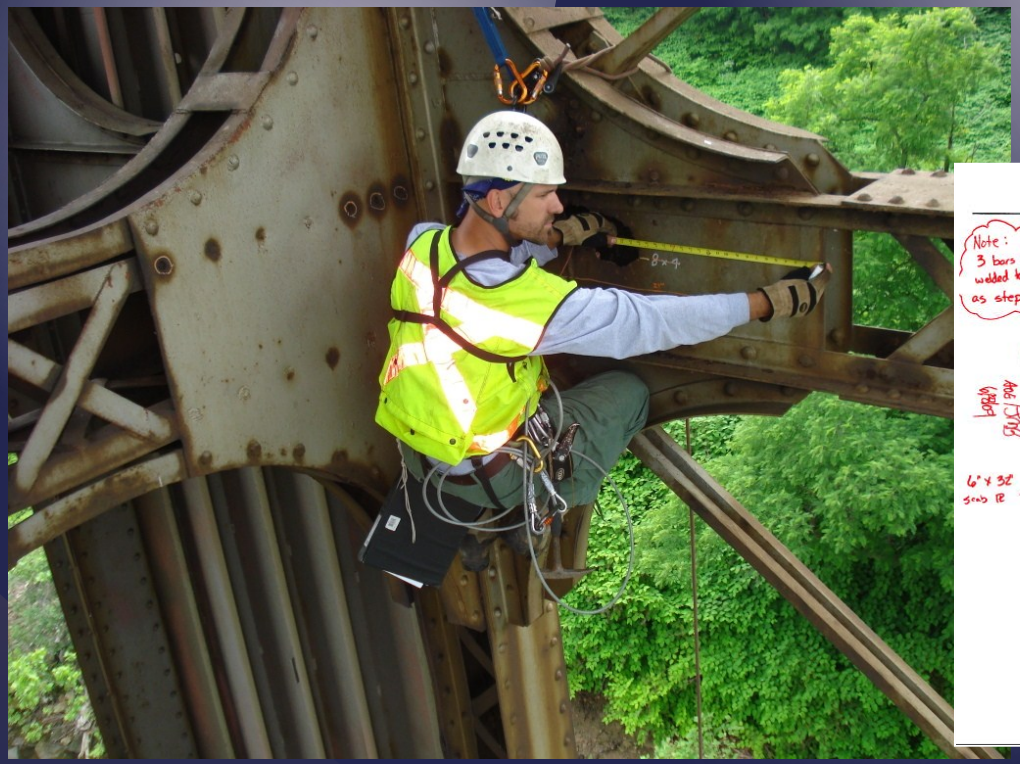
BURGESS & NIPLE

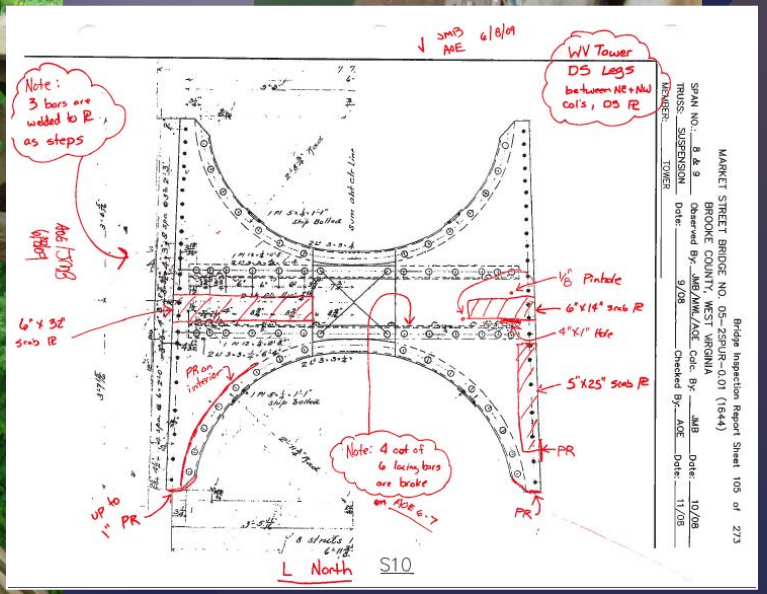
Inspection Photos converted to Rehabilitation Plans

Field Inspection

- Measure & Mark on Bridge
- Photographs – Square & Overall

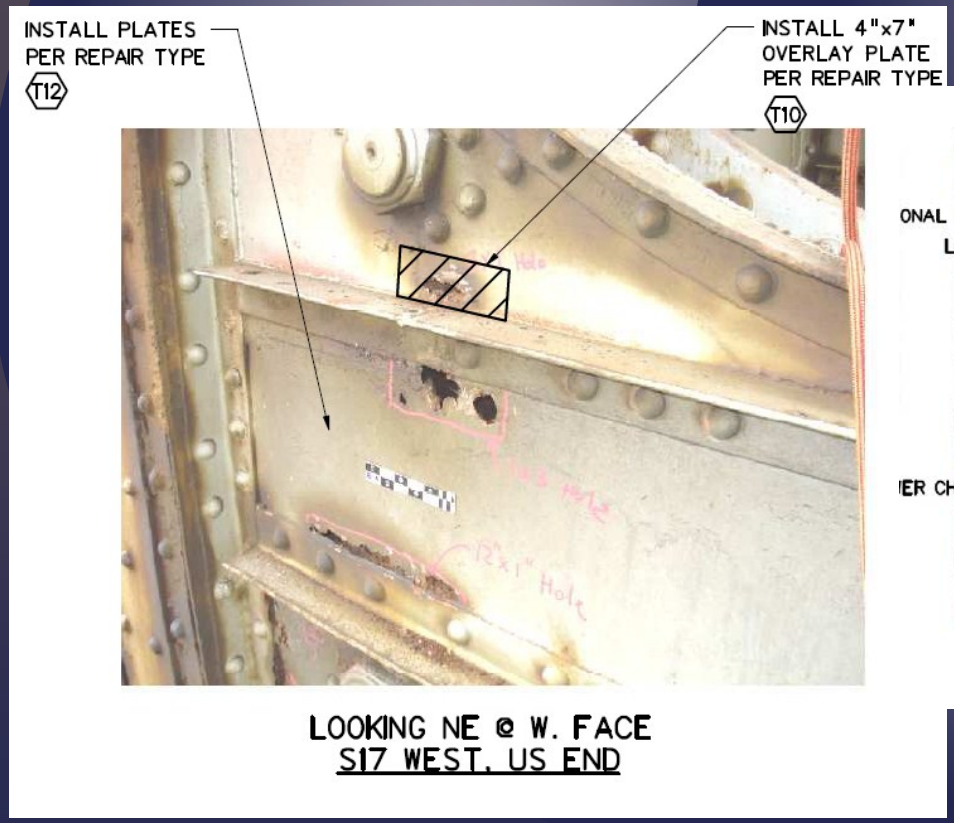


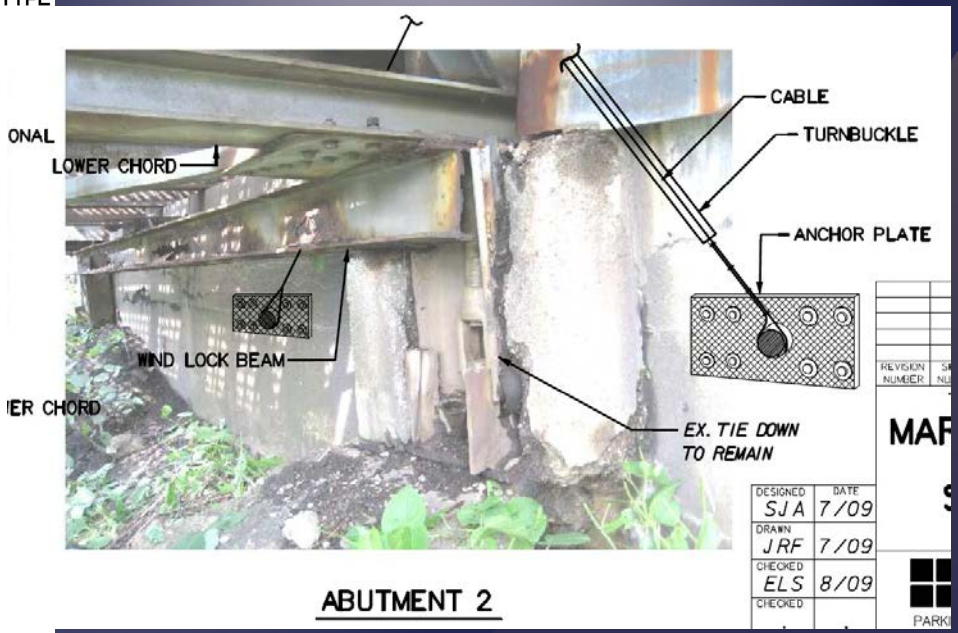




Using Photographs in Rehab Plans

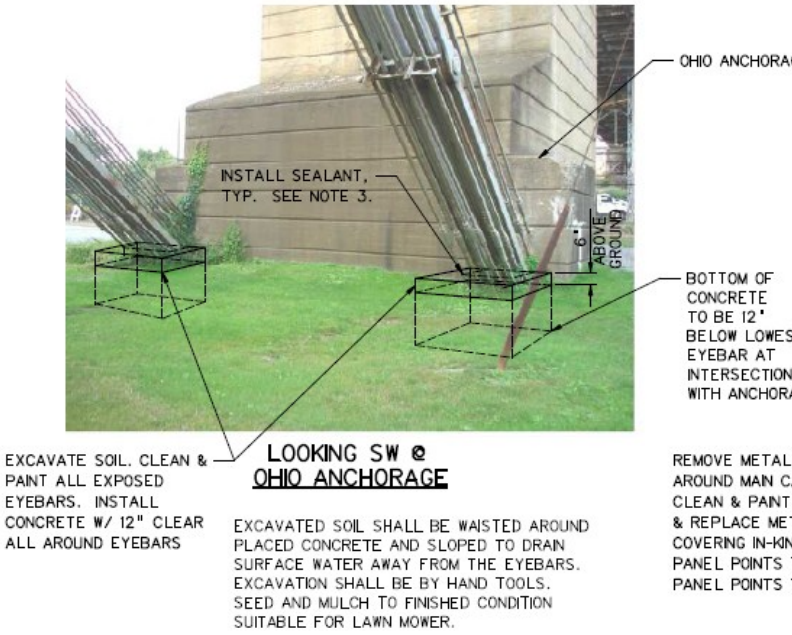
- Insert as Raster Reference in Microstation
- Add Notation and Details Pertaining to Repairs





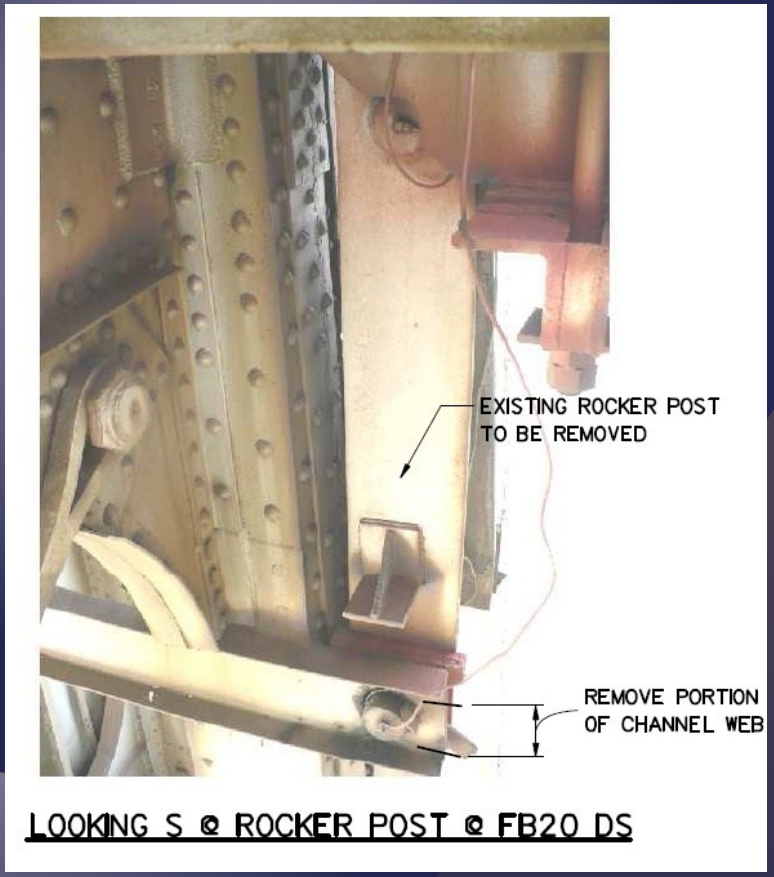
Design Benefits

- Inspection findings are well documented
- Saves detailing of items that don't need hard dimensions
- Allows engineer to focus more time on typical details, procedures, and specs
- Each location can be shown

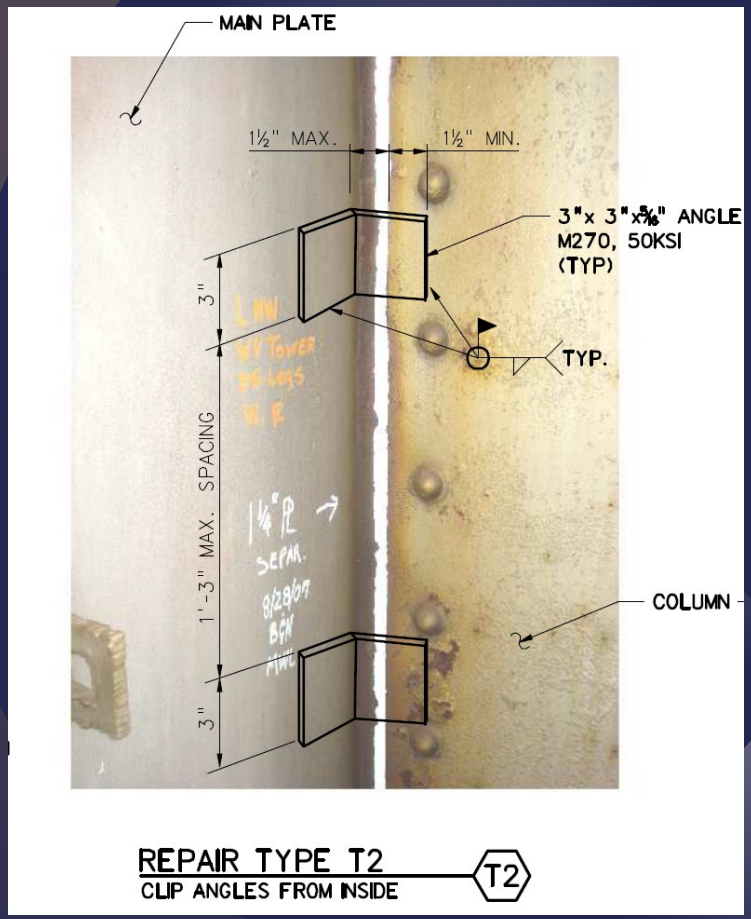


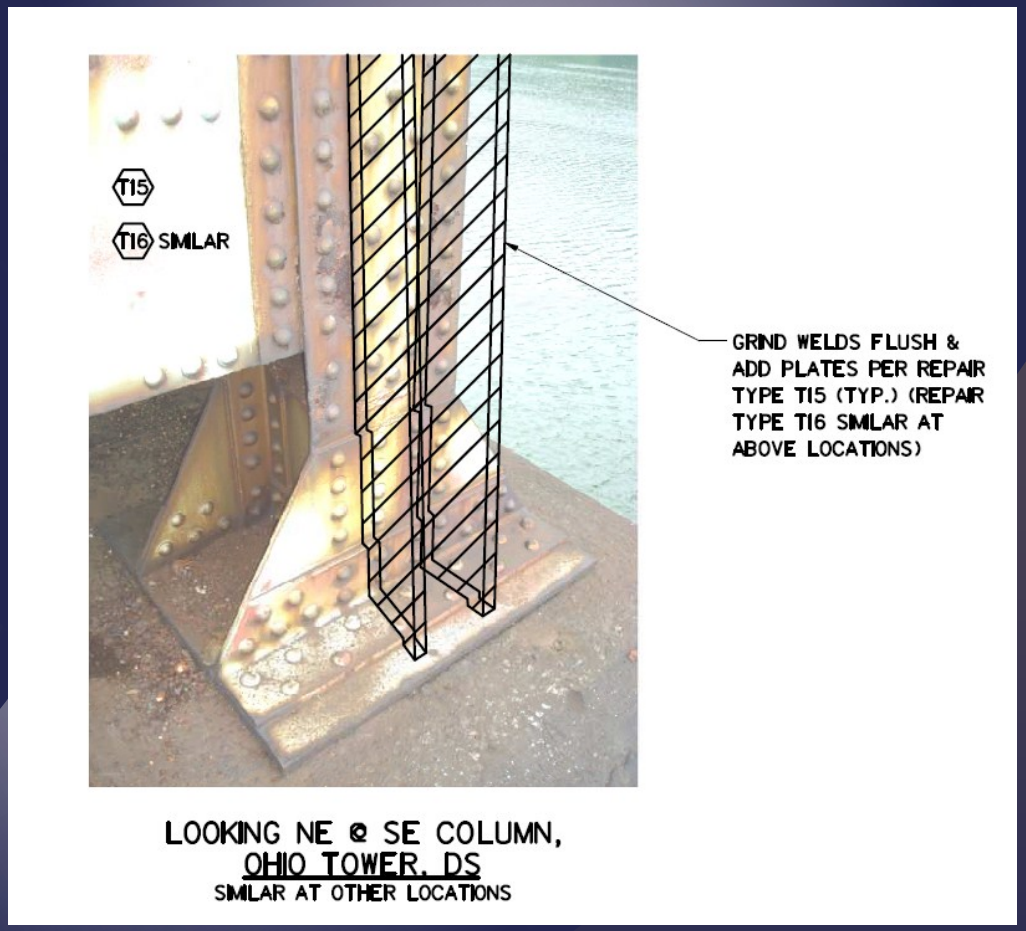
Construction Benefits

- Contractor can see the existing conditions
- Clearly Communicates the Intent of the Repair
- Post-Repair Photo to Document As-Built Condition



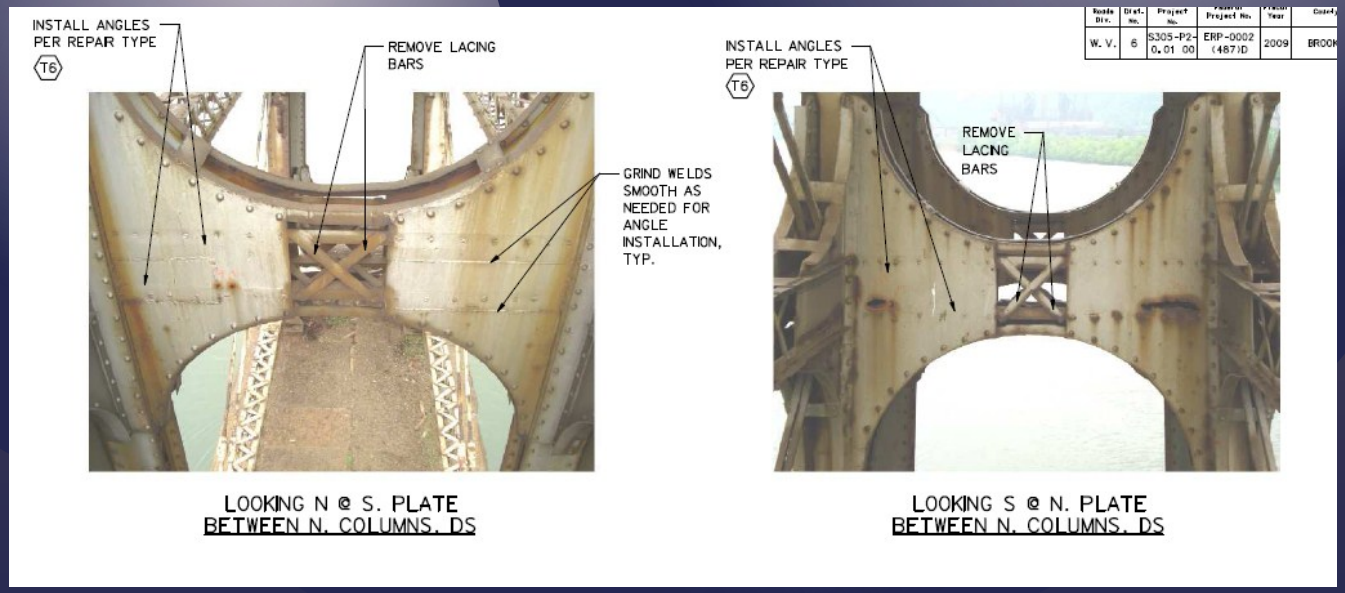
Allows 3-D Perspective



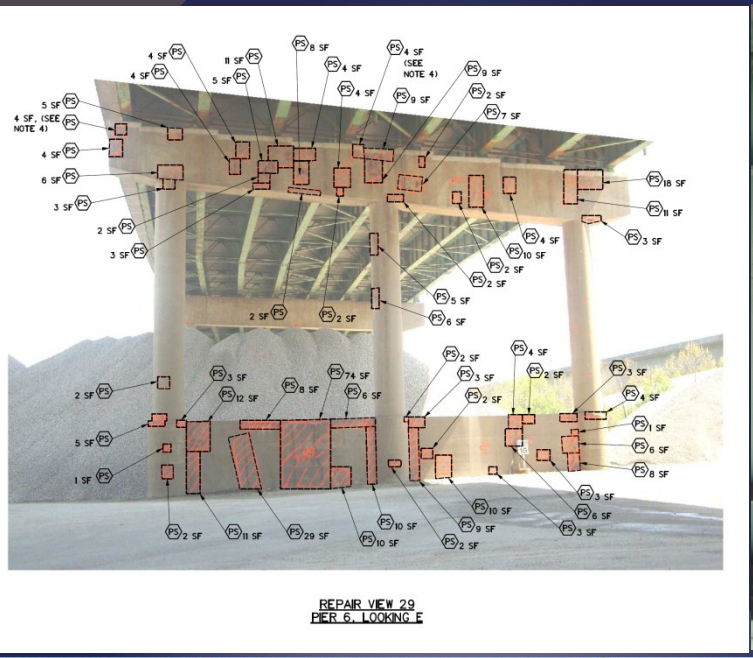


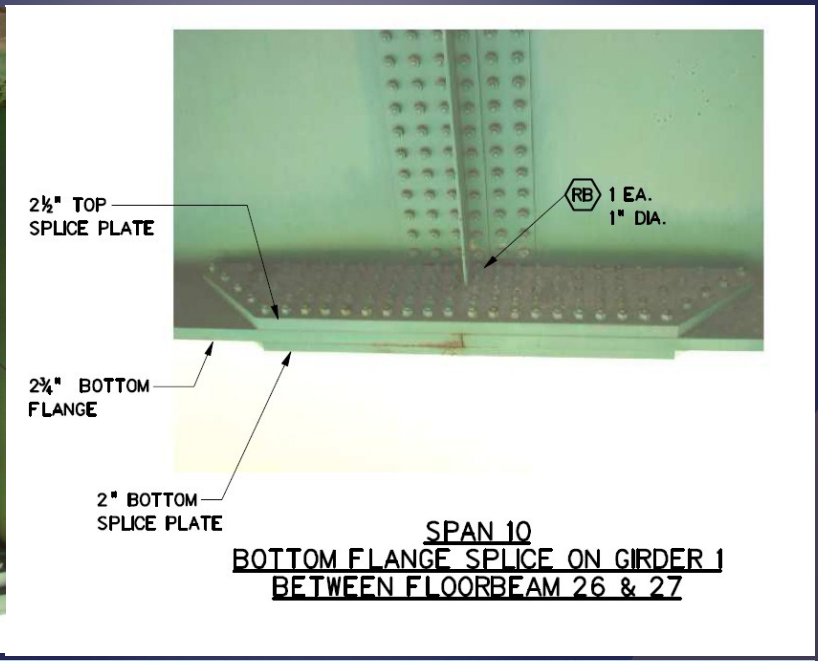
Challenges

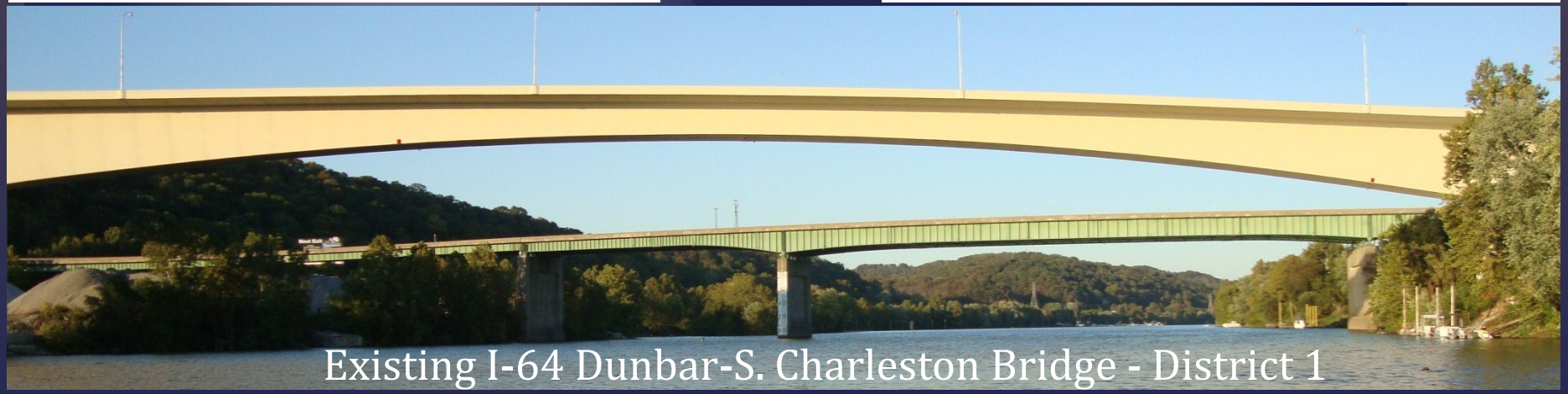
- Adjustment of CAD Standards
- Full-Size Color Plots
- Reproducible Mylars
- Ability to Visualize in 3-D



A picture is worth a thousand…



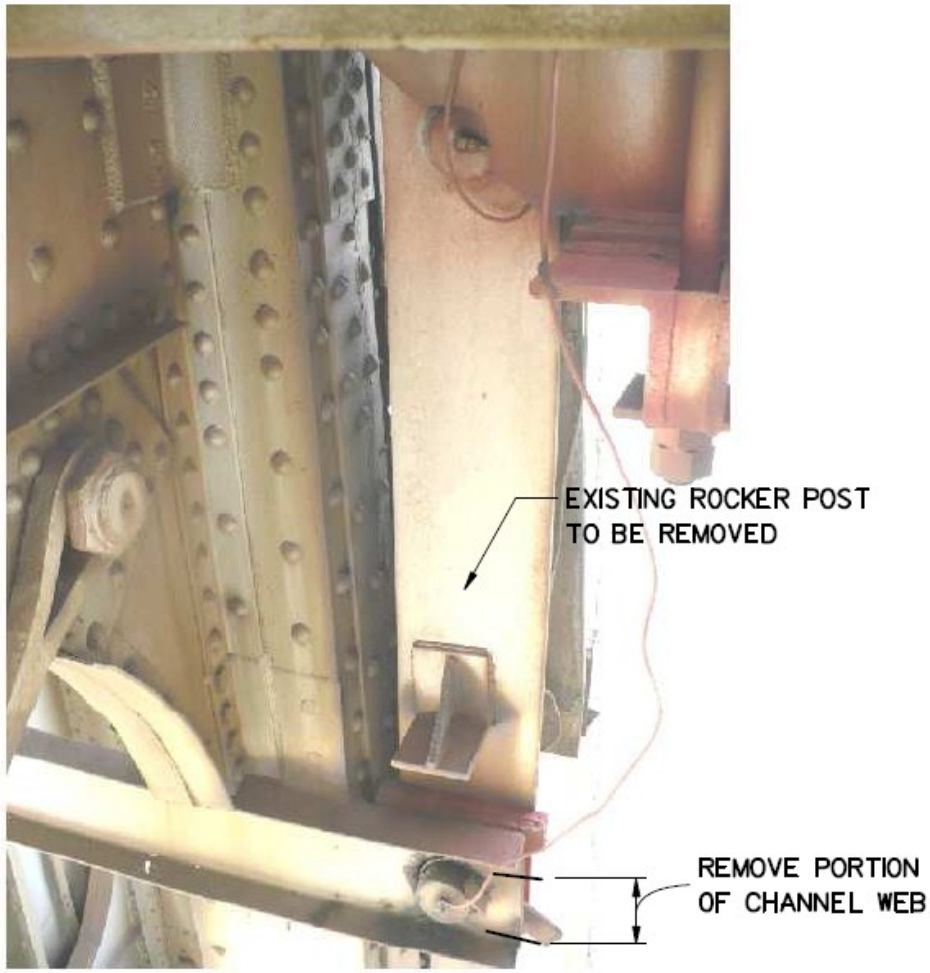




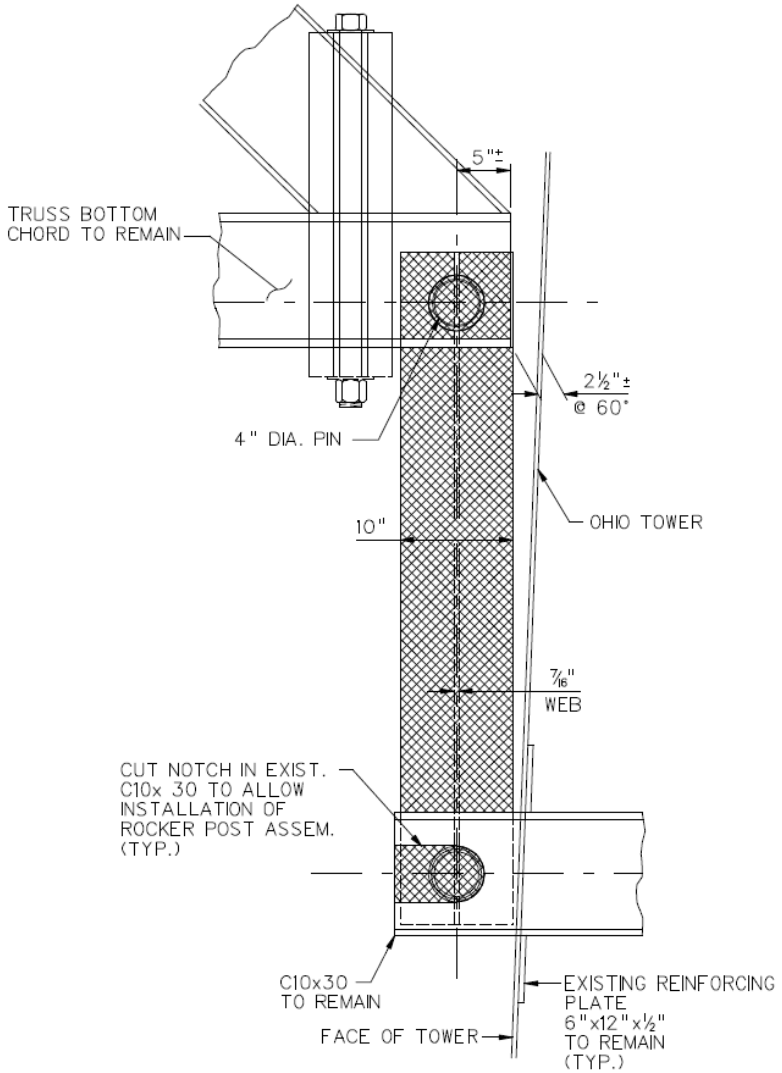
Existing I-64 Dunbar-S. Charleston Bridge - District 1

Interesting Repairs

Rocker Post Removal

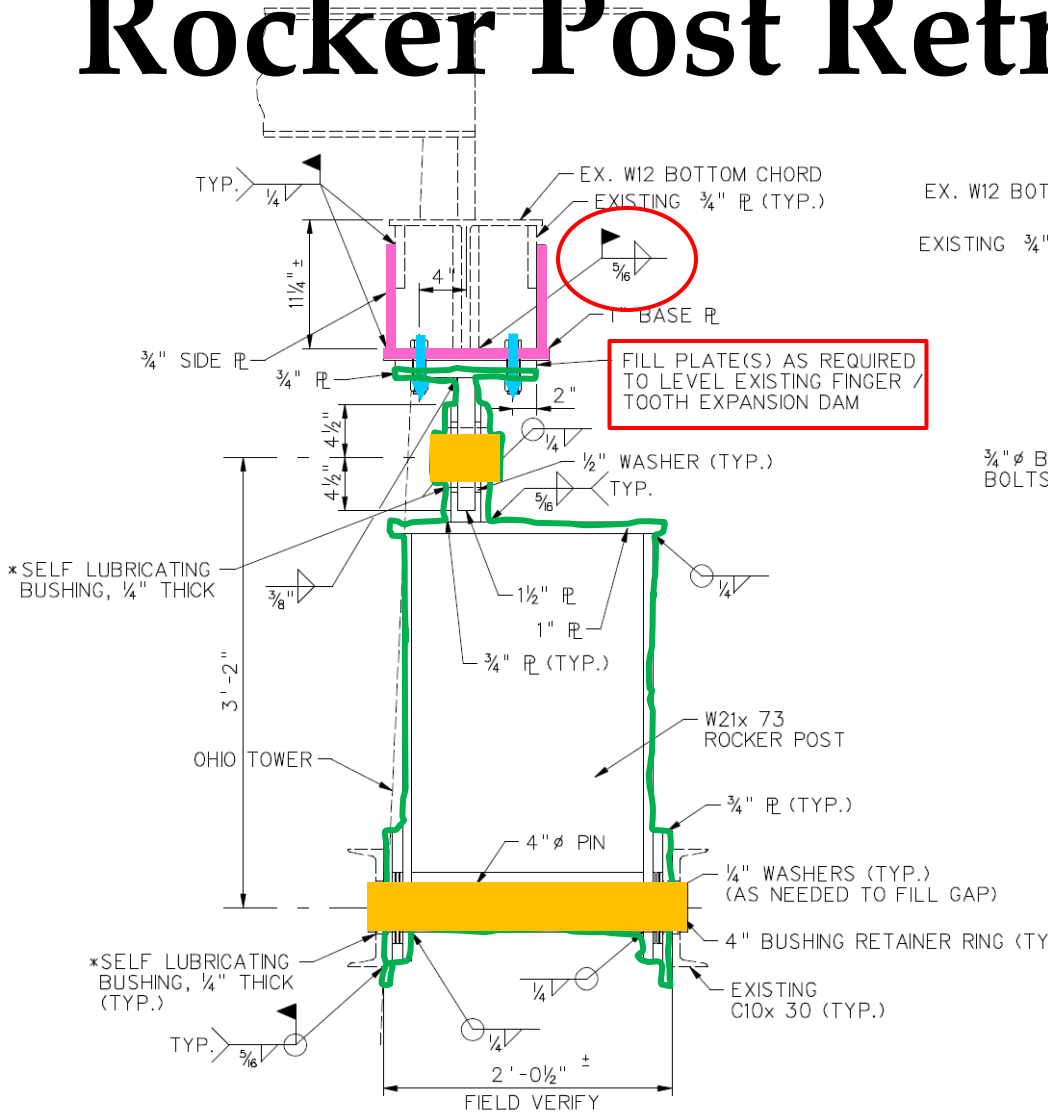


LOOKING S @ ROCKER POST @ FB20 DS



VIEW LOOKING NORTH
SCALE: 1½" - 1'-0"

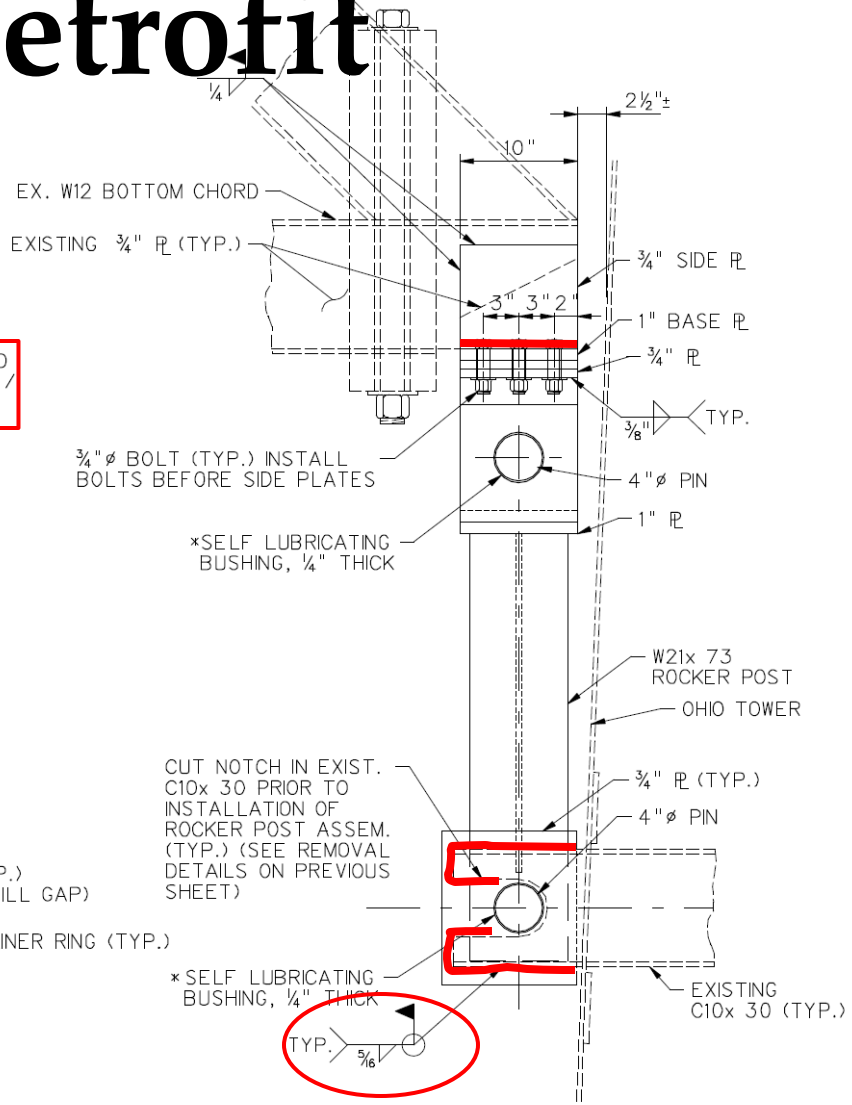
Rocker Post Retrofit



ROCKER POST ELEVATION

R1

LOOKING EAST
SCALE: 1½" = 1'-0"

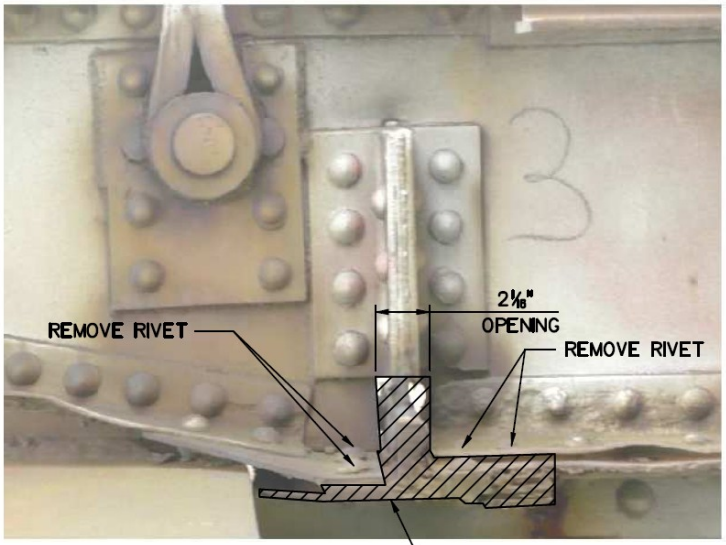


ROCKER POST SIDE VIEW

R1

LOOKING NORTH
SCALE: 1½" = 1'-0"

Removal for Suspender Retrofits



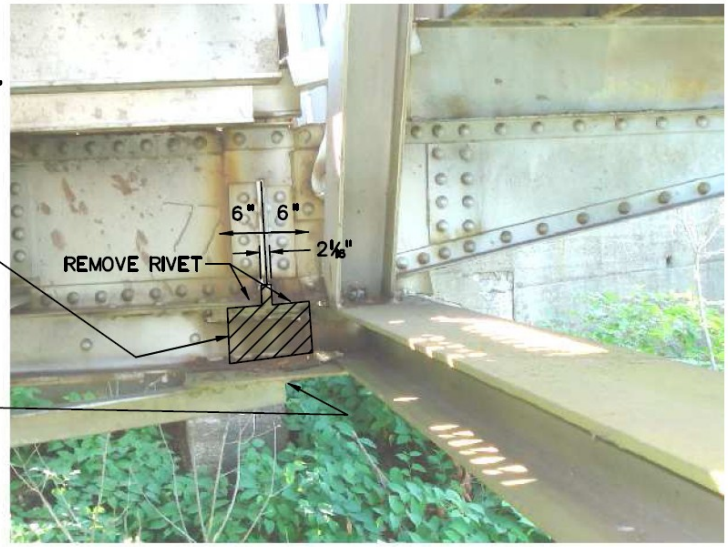
REMOVE STUBS OF TRUSS ANGLES, PORTION OF TRUSS WEB, PORTIONS OF FLOORBEAM STIFFENING PLATE AND ANY OTHER EXTRANEOUS STEEL, GRIND RESULTING OPENING SMOOTH TO ACCOMODATE 2"x3¾"x 9" CONNECTION BAR, TYPICAL AT FLOORBEAMS 2, 3, 76, 77 & 78

CONNECTION BAR REMOVALS H2 H3 H6 H7 H8

FLOORBEAM 3 REMOVAL DETAIL SHOWN, FLOORBEAMS 2, 76, 77 & 78 SIMILAR

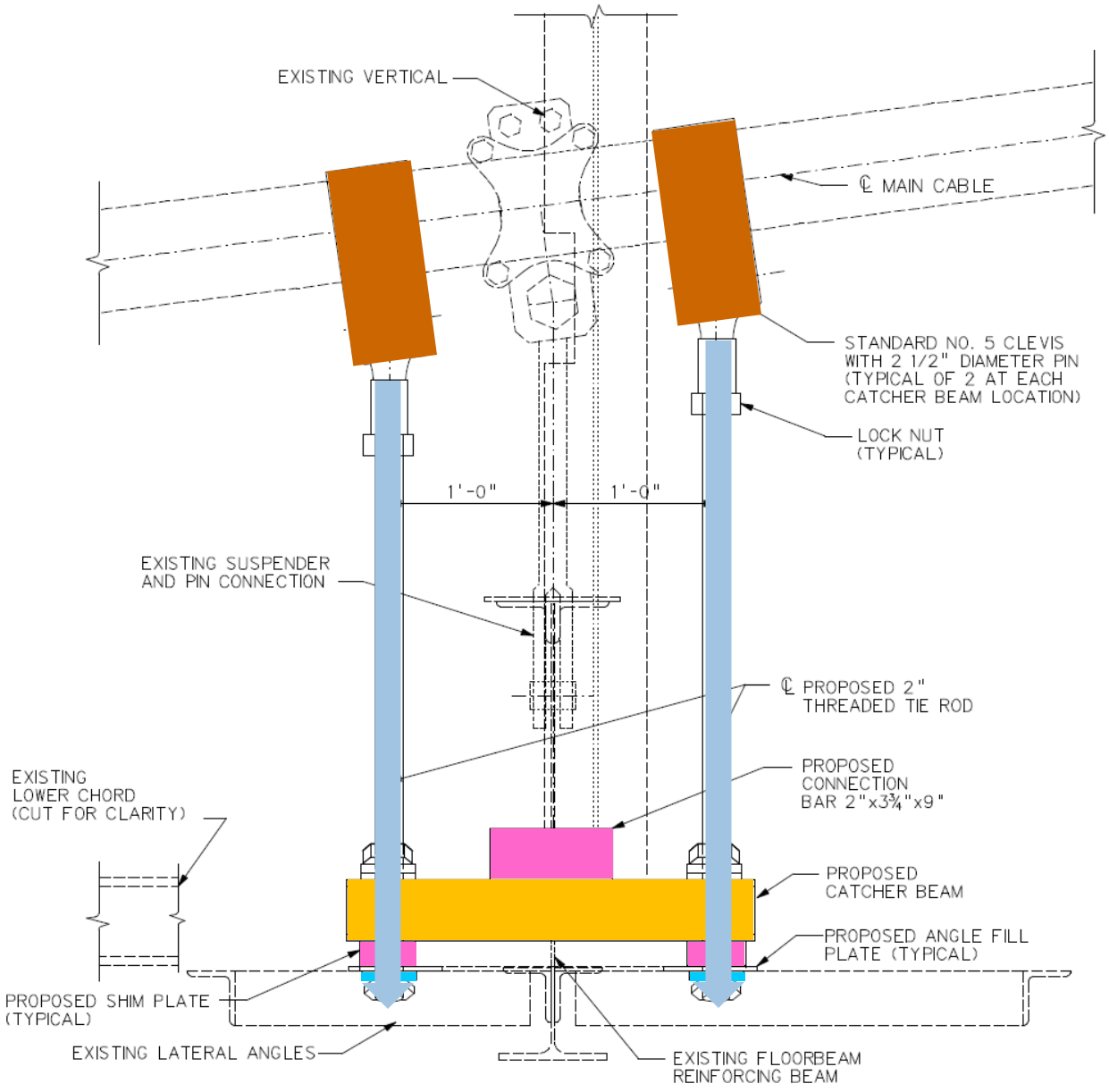
REMOVE VERTICAL LEG OF FLOORBEAM REINFORCING ANGLES, TRUSS ANGLES, PLATE, RIVETS THROUGH STIFFENING CHORD FLANGE, PACK RUST & EXTRANEOUS STEEL TO PROVIDE OPENING FOR 2"x3¾"x9" CONNECTION BAR AND SEAT FOR CATCHER BEAM

REMOVE FASTENERS FROM LATERAL BRACING AS NECESSARY TO PROVIDE FLAT SURFACE FOR SHIM PLATE



DOWNSTREAM END FACING EAST H7

REMOVALS - FLOORBEAM 77

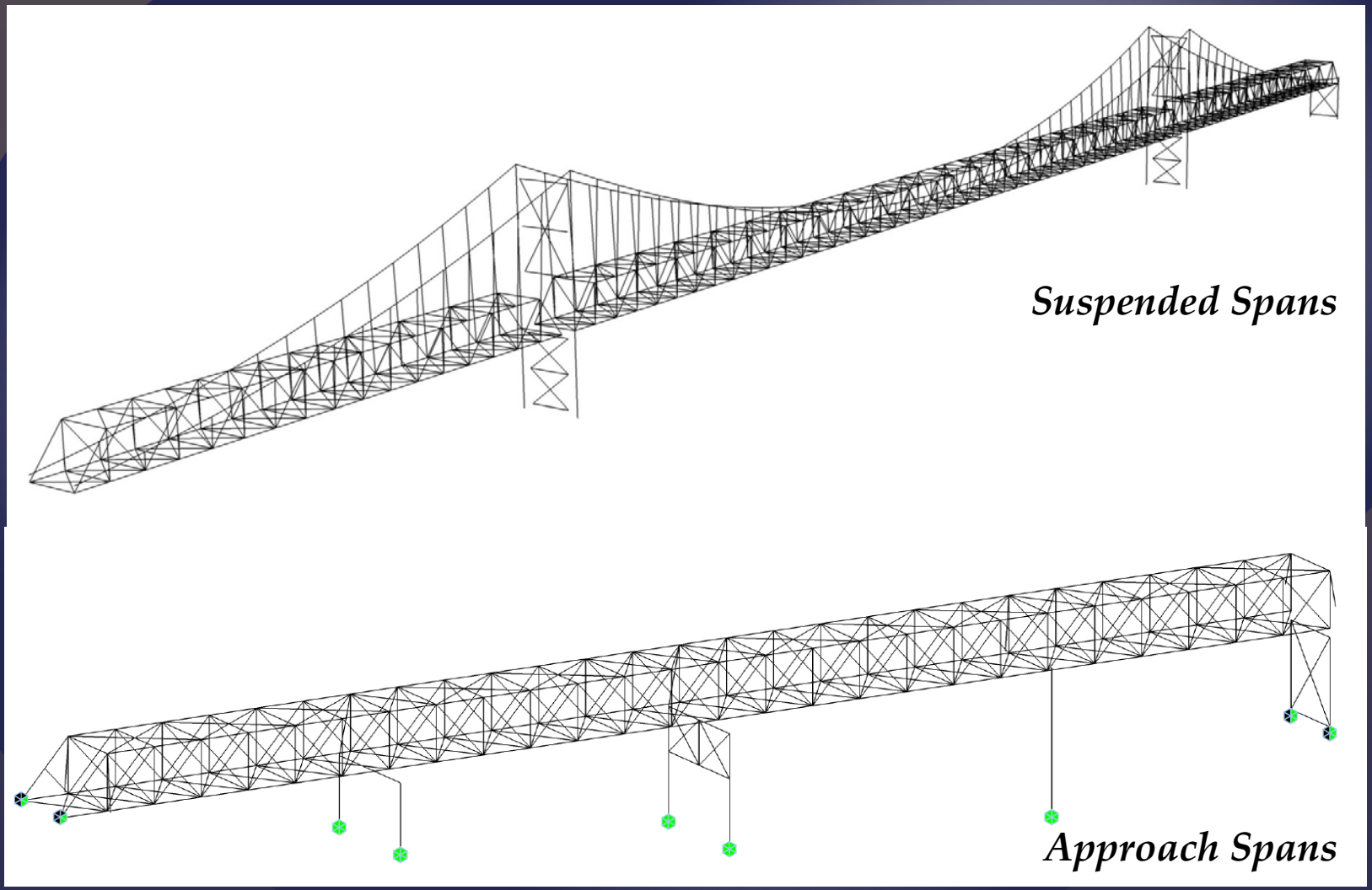


FB 78 - ELEVATION H8

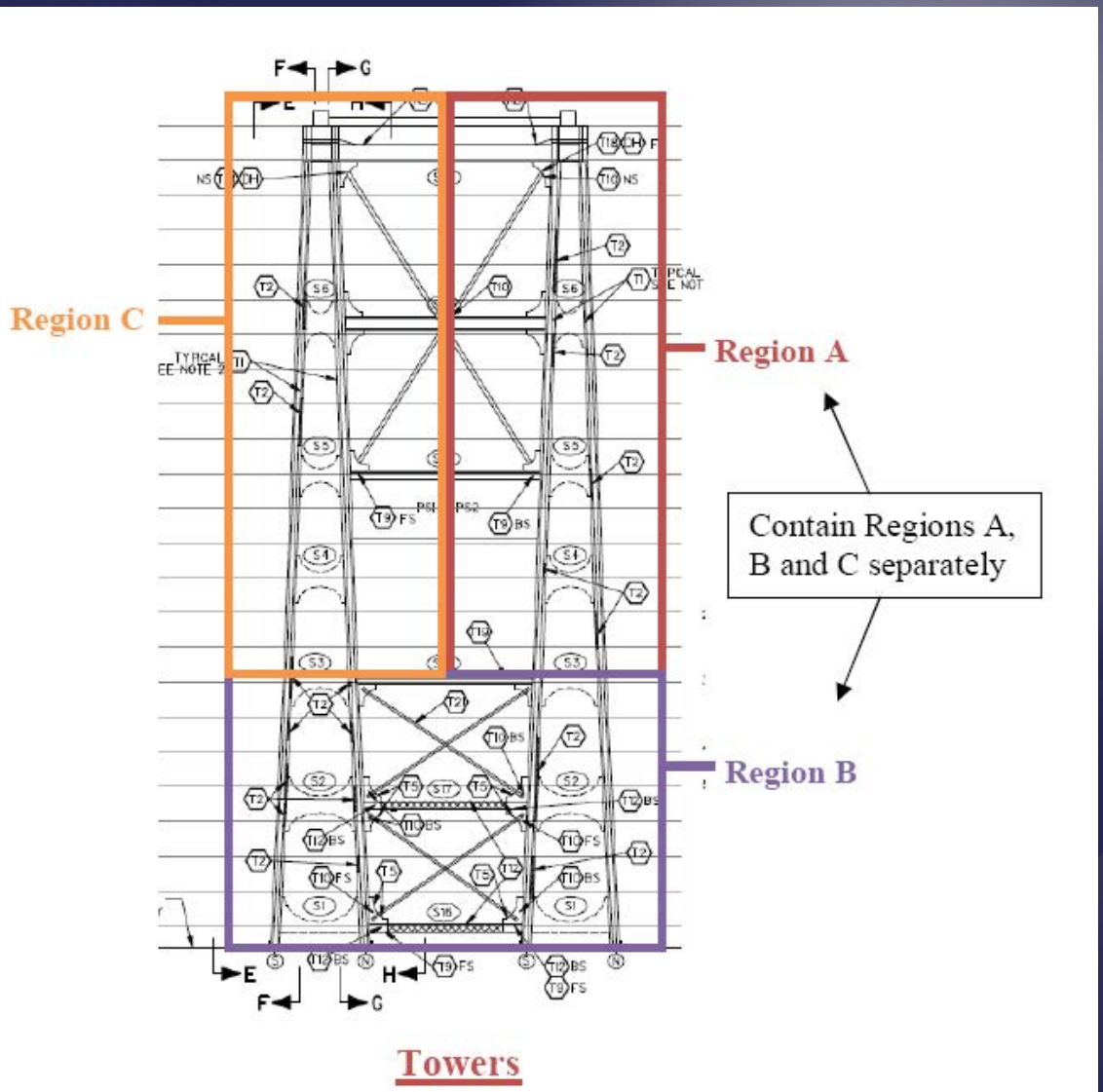
SCALE: 2" - 1'-0"

(EXISTING LOWER CHORD NOT SHOWN FOR CLARITY)

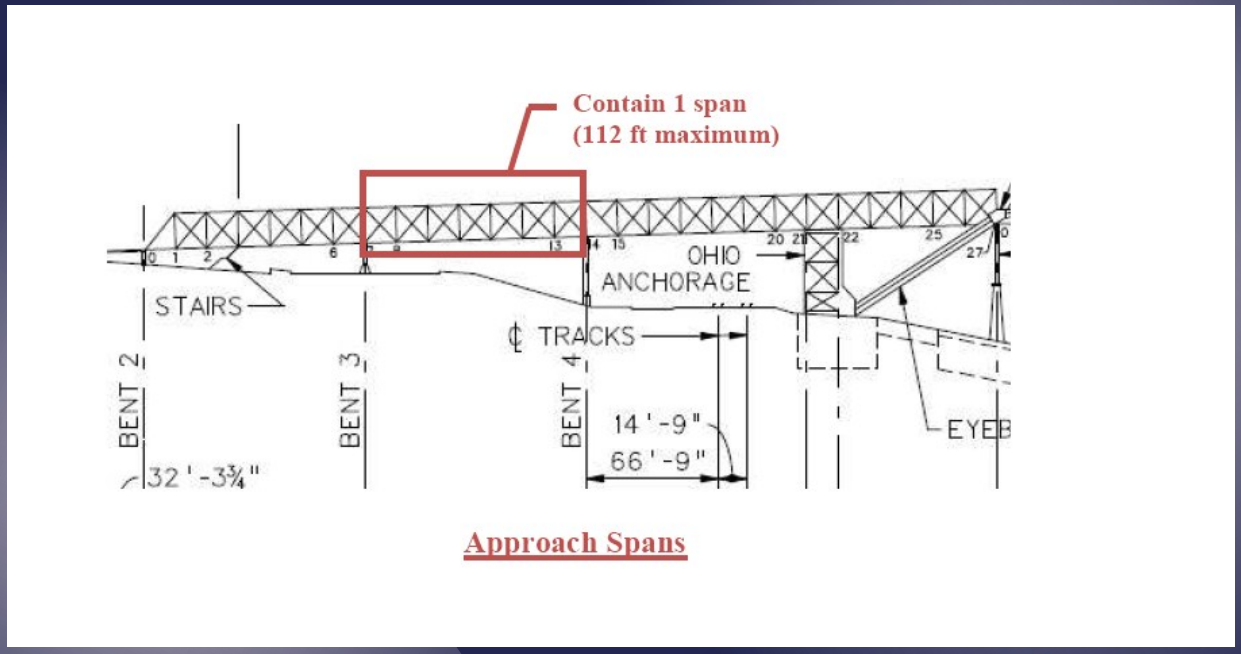
Structural Model



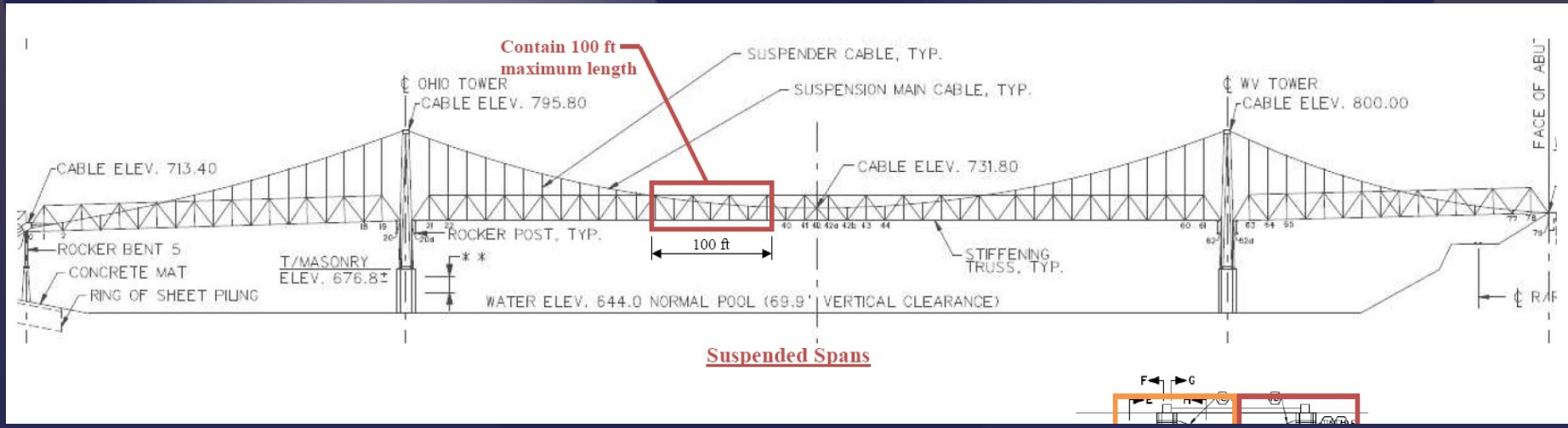
Tower Containment



Truss Containment



Approach Spans

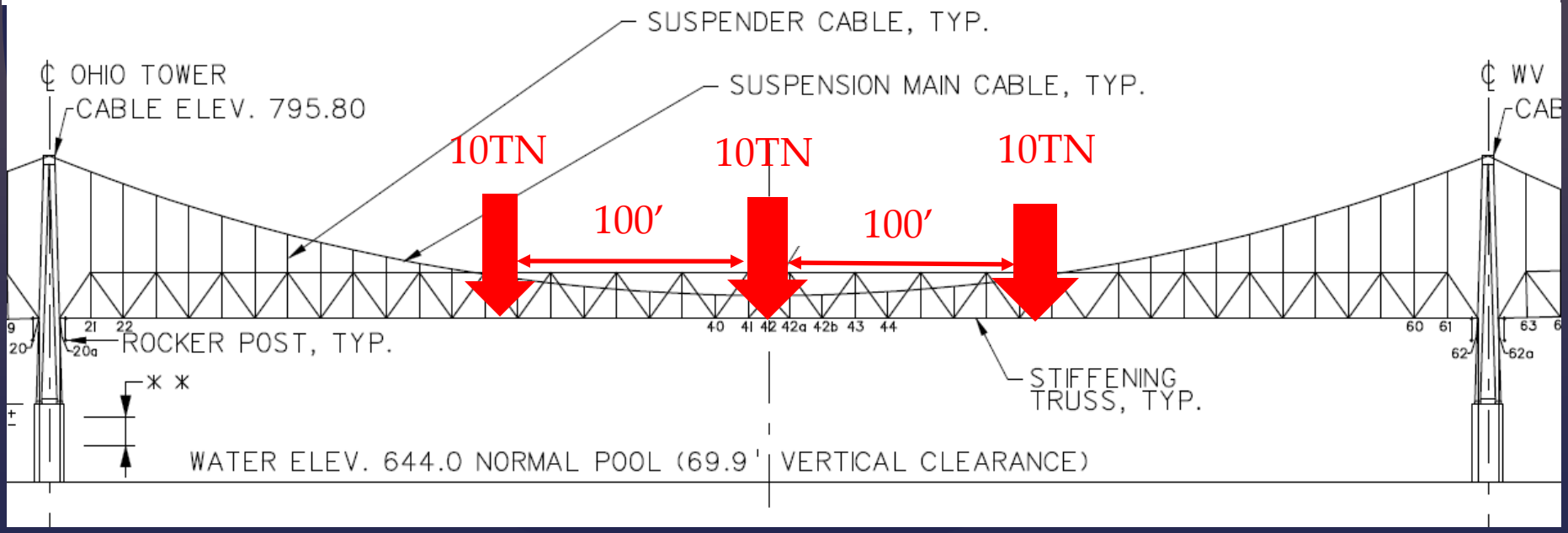


Suspended Spans

Construction Load Limitations

LIMIT OF CONSTRUCTION LOADS

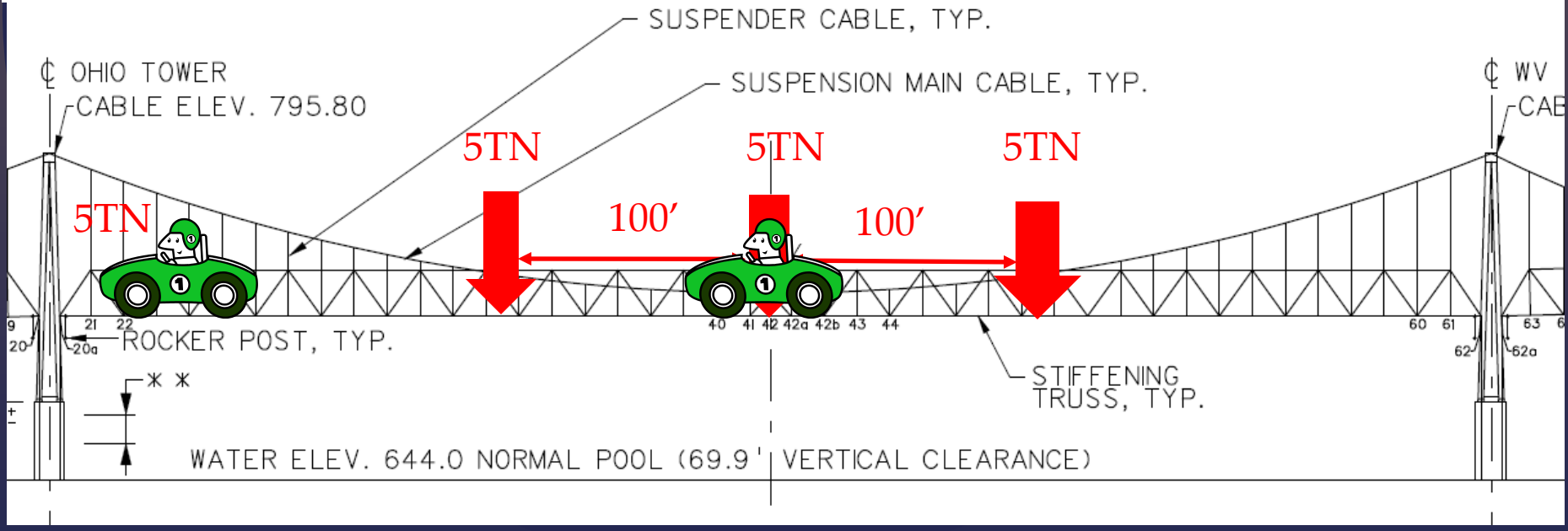
AT NO TIME SHALL THE TOTAL GROSS WEIGHT OF ANY ONE VEHICLE, OR THE TOTAL WEIGHT OF STORED MATERIAL, OR COMBINATIONS THEREOF EXCEED 10 TONS AT ANY ONE LOCATION ON THE BRIDGE. A TOTAL OF THREE SUCH AREAS ARE PERMITTED ON THE BRIDGE WITH A MINIMUM CLEAR SPACING OF 100 FEET BETWEEN AREAS. AT NO TIME SHALL THE TOTAL GROSS WEIGHT OF ALL VEHICLES PLUS THE WEIGHT OF ALL STORED MATERIAL EXCEED 30 TONS.



Construction Load Limitations

LIMIT OF CONSTRUCTION LOADS

AT NO TIME SHALL THE TOTAL GROSS WEIGHT OF ANY ONE VEHICLE, OR THE TOTAL WEIGHT OF STORED MATERIAL, OR COMBINATIONS THEREOF EXCEED 10 TONS AT ANY ONE LOCATION ON THE BRIDGE. A TOTAL OF THREE SUCH AREAS ARE PERMITTED ON THE BRIDGE WITH A MINIMUM CLEAR SPACING OF 100 FEET BETWEEN AREAS. AT NO TIME SHALL THE TOTAL GROSS WEIGHT OF ALL VEHICLES PLUS THE WEIGHT OF ALL STORED MATERIAL EXCEED 30 TONS.




reet Bridge
nlight, Steubenville, Ohio

Market Street Bridge Facts

Built in 1905 to transport mill workers to WV by streetcar

Structure length: 1794 feet
Suspended length: 1200 feet
Suspended length between the 2 main towers: 680 feet
Roadway width: 20.7 feet
5 approach spans

Owned by the Steubenville Bridge Company

Purchased by WV in 1941 for $ 1,300,000.00

Made $ 400,000.00 worth of improvements for vehicle use

Place toll on bridge until 1953 to help pay for the repairs

Numerous upgrade made to the bridge

Market Street Bridge

Contractor: Ahern & Associates / Kokosing

Designer: Burgess and Niple

Contract Bid: $ 13,741,000.00

Change orders: $ 1,112,369.78

Consultant inspection: G&O

Tower repairs: over 30,000 lbs of structural steel added to the 2 towers

All work performed from spider baskets


Tower plates repairs

Strut repairs to the towers


Spider


Strut repairs

Attach tower plates to structure legs by welding or clips.
685 clips
1000 lf of weld

Three choices of repair:
Weld on interior of tower leg
Place 3x3 clip on interior
Weld on exterior of tower leg

New weld on tower plates

clips


Testing welds

More testing


And even more testing