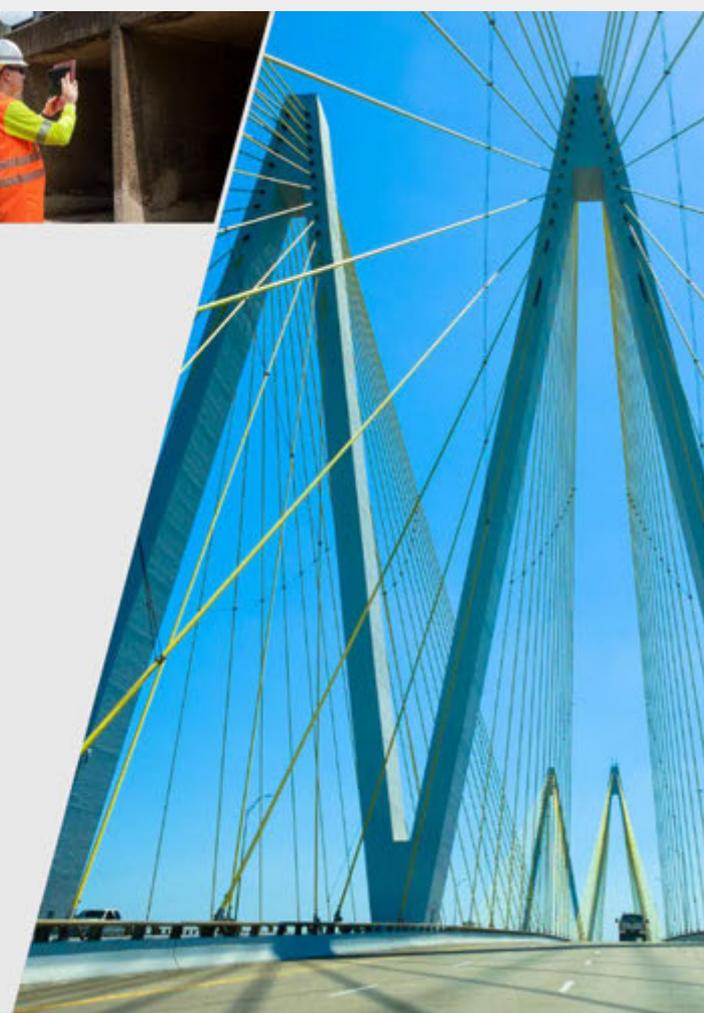




# Field Assessments and Repair Details

Chris Gomez, PE

TxDOT Bridge Division – Construction and Maintenance Branch





- “Visual” Inspection
  - We use many senses, not just sight
  - Auditory
    - Hammer sounding
    - Traffic on joints
  - Tactile
    - Changes in surface texture
    - Loose fasteners, loose concrete





- Observation
  - The active acquisition of information
  - Employs the senses
  - Can also involve perception of and recording of data from scientific instruments
    - Examples: Cylinder breaks, density readings, TIP testing, etc





- Observation = Information Intake
- Our task: Take in enough information about the bridge to determine:
  - Type of distress
  - Limits of distress
  - Cause of distress
- Goal: Take appropriate corrective action based on field observations





- A Field Assessment should answer the following questions:
  - Is the existing structure structurally adequate for widening and/or rehabilitation?
    - Load rating
    - Condition ratings
  - Is it economically advantageous to rehabilitate/widen the bridge? Or is it more fiscally responsible to replace the structure?



# Purpose of Field Assessment



- A Field Assessment should contain:
  - Summary of the condition of bridge components
  - Recommendation for suitability for widening/rehabilitation
  - Scope of rehabilitation, if applicable
  - Cost estimate for rehabilitation, if applicable
    - Compare rehab cost to replacement cost



# Purpose of Field Assessment



- A Field Assessment should contain:
  - Summary of the condition of bridge components
  - Recommendation for suitability for widening/rehabilitation
  - **Scope of rehabilitation, if applicable**
  - **Cost estimate for rehabilitation, if applicable**
    - **Compare rehab cost to replacement cost**





- NBI Folder review – AssetWise
  - Review recent inspection reports and photos
  - Note recommended follow-up actions
  - Understand when bridge was built, widened, previous rehab/repair, etc
    - Also understand future plans for bridge or corridor
    - Future plans will shape recommendations
  - Ask yourself:
    - What are the likely problem areas on this structure?
    - What might be causing those problems?

# Preparing for the Field Assessment



## ■ Safety and Access

- Determine any special access needs
  - Snooper? Boat? Traffic control?
  - Man lift?
- Look at the structure on GoogleMaps/GoogleEarth.
  - Plan your arrival and departure
  - Find a safe place to park

Good access road!

But... looks like it floods. See if you can find out site conditions in advance.



# Preparing for the Field Assessment



- Tools and Equipment
  - Measuring tape and/or folding ruler
  - Hammer
  - Flashlight
  - Crack width gauge card
  - Scraping tool (putty knife or similar)
  - Binoculars
  - Ladder





- Overall/Big Picture
  - Alignment
  - Settlement
  - Widenings or other structure modifications

★ Look down length of rail at eye level





- Deck
  - Surface condition
    - Spalling, cracking
  - Overlay condition and thickness
  - Soffits
    - Cracking, staining
    - Efflorescence
  - Overhangs





- Rails

- Rail Type?
  - "non-standard" on the inspection report doesn't mean "unacceptable"
- Retrofit?
- Measure height

- Joints

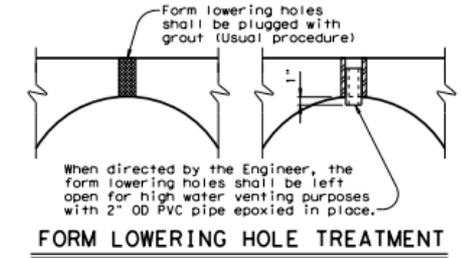
- Joint type?
- Seal intact?
- Spalling or other damage?



# Points of Inspection – Pan Girders



- Longitudinal cracking at tops of arches
  - Usually not a concern, but will lower condition ratings
- Spalling/cracking at midspan
  - Due to water from form-lowering holes
  - Plug or use PVC pipe to extend holes below arch soffit

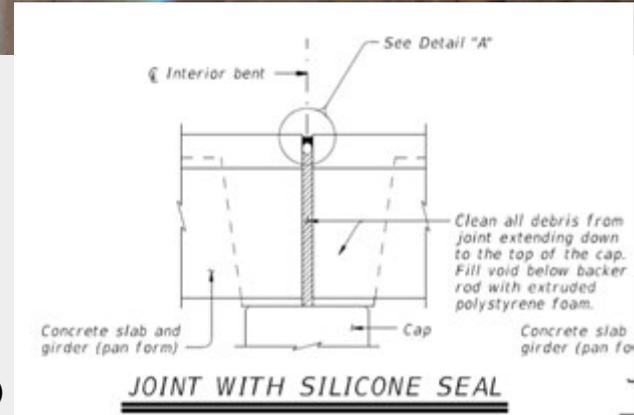


(From CG-MD Standard)





- Substructure spalling
  - As joints fill with debris pan girder expansion/contraction becomes limited
  - Concrete-on-concrete bearing at cap corners produce spalling
  - Prevention is key!
    - Clean joints FULL DEPTH
    - May extend repairs to provide additional bearing area



From WD-CSBJ(PG)



- Substructure issues similar to Pan Girders
- Lead sheets
  - Common FUA item
  - Consider other alternatives to replacement of sheets
  - Lifting may cause more damage than taking no action





- Usually very limited issues
  - Overheight impacts
  - Spalled/delaminated beam ends
- Elastomeric bearings
  - Old bearings prone to slip
  - Test: Natural rubber will hold a flame
  - SS 4002
  - Replace all pads at bents or abutments where slip is occurring



Temporary fix – Timber Bearings!



- Paint Condition
  - Consider zone painting
  - Not intended to address paint failure
  - Intended to address *areas of concern* related to paint failure
  - Typically beam ends at expansion joints, exterior bottom flanges





- Section Loss
  - Consider location
    - Webs at beam ends
    - Flanges at mid-span
  - Repairs
    - Maintain load path
    - Minimize “stress risers”
    - Smooth transitions
    - Grind edges of holes
    - Paint repair area





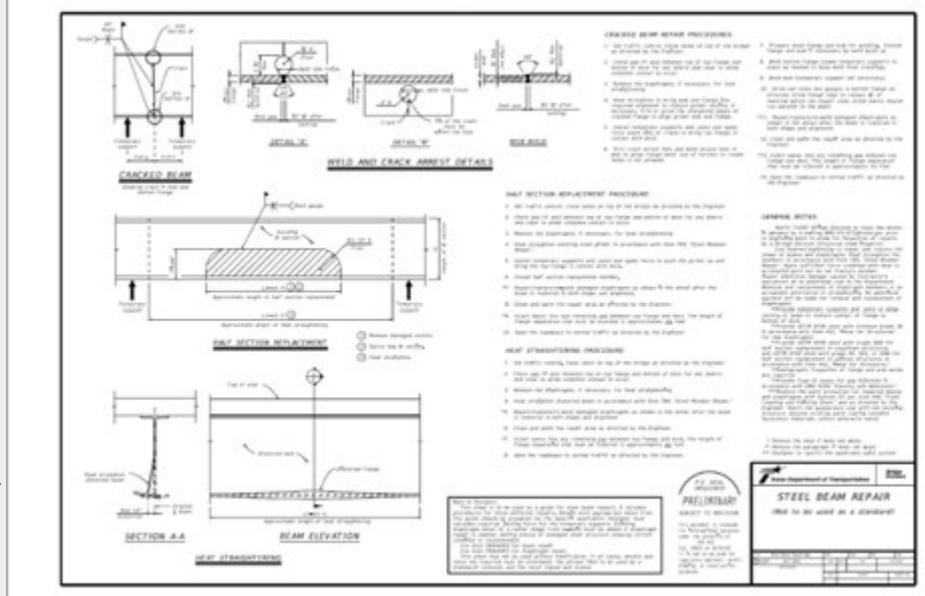
- Overheight Impacts
  - Very common
  - Steel → Older → Lower clearance
  - Repairs
    - Heat straightening (Item 784)
    - Grind out defects
    - Crack arrest hole drilling
    - Half section replacement
    - Full section replacement



# Points of Inspection – Steel Beams



- Overheight Impacts
  - Very common
  - Steel → Older → Lower clearance
  - Repairs
    - Heat straightening (Item 784)
    - Grind out defects
    - Crack arrest hole drilling
    - Half section replacement
    - Full section replacement



WD-SBR-22

# Points of Inspection - Substructure



- Column cracking/spalling
- Stress cracks in cap



## Points of Inspection - Substructure



- Substructure spalling
  - Overestimate quantity!





- Real world feel of bridge condition
- Inspection report use
  - Preliminary Investigation
  - Component Ratings
  - Historical Changes
    - Rate of deterioration



- Why don't we fully rely on inspection reports?

Inspection Report Photo





- Why don't we fully rely on inspection reports?

Inspection Report Photo



Field Visit Photo



# Importance of Field Assessments



- Why don't we fully rely on inspection reports?

Inspection Report Photo

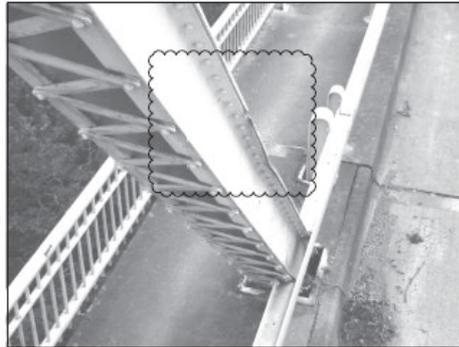


Field Visit Photo



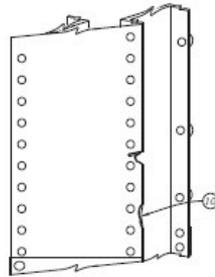


- Isometric Details
  - Value added?
  - Time spend



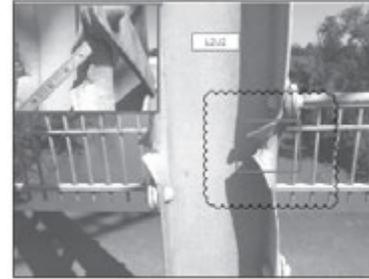
DIAGONAL MEMBER AT  
SPAN 8 NEAR TRUSS #2 (L2U2)

(Approximate length of heat straightening = 5 ft.)



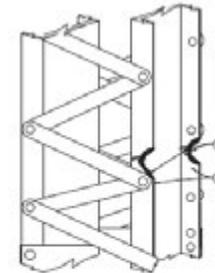
DAMAGED DIAGONAL MEMBER

(Step 1)



VERTICAL MEMBER AT  
SPAN 8 NEAR TRUSS #2 (L2U2)

(Approximate length = 2 ft. of repair)



VERTICAL MEMBER

(Step 2)



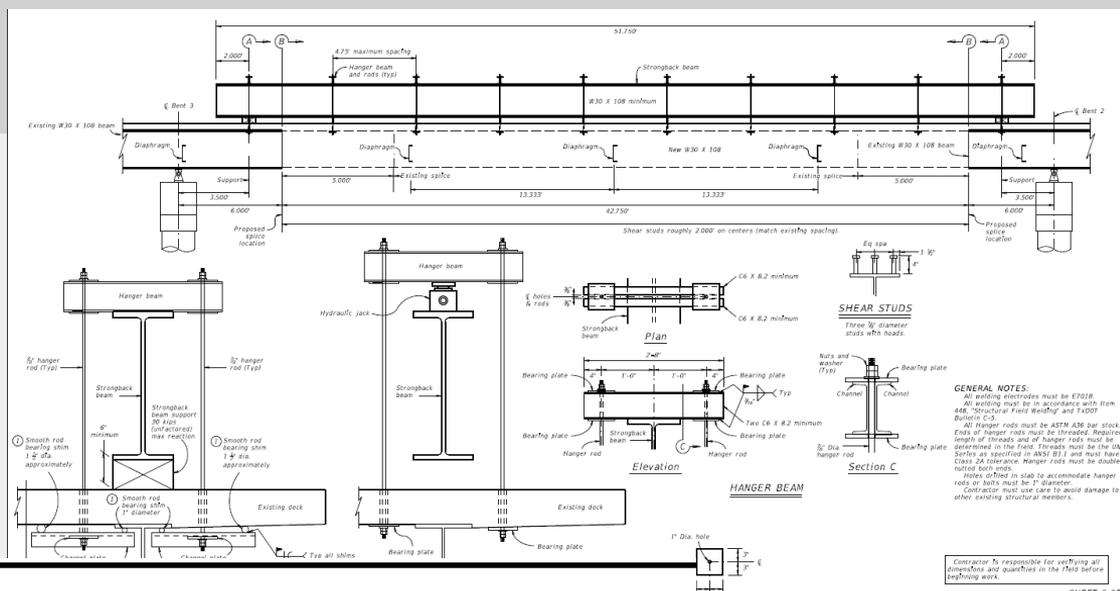
- Type of Repair
  - Structural
  - Cosmetic
  - Preventative



# Repair Details – Payments



# Repair Details – Payments



## General Notes:

All work required to replace and straighten girders will be paid for at the Lump Sum price under Item 784. This includes but is not limited to temporary shoring, jacking, welding, materials, and labor.

Provide ASTM A-709 Grade 36 or Grade 50 for replacement steel.

Set traffic control on US 70 to maintain a safe work zone during repairs. The right lane of US 287 Northbound will remain closed during the duration of the girder repairs. Resume traffic after all repairs have been made and concrete strength has reached a minimum of 3000 psi.

Damaged areas shown on the layout are approximations and should be measured in the field for accuracy.

Assume the existing paint contains lead. Comply with all worker and public safety protection measures outlined in Item 446, "Field Cleaning and Painting Steel," and with 29 CFR 1926.62. Monitor permissible exposures limits (PEL) in accordance with OSHA requirements.

Use heat-straightening as necessary in accordance with Item 784, "Repair Steel Bridge Members" to restore shape of diaphragms and facilitate girder replacement.

Where possible re-use existing diaphragms that were separated and re weld to connect them to girders.

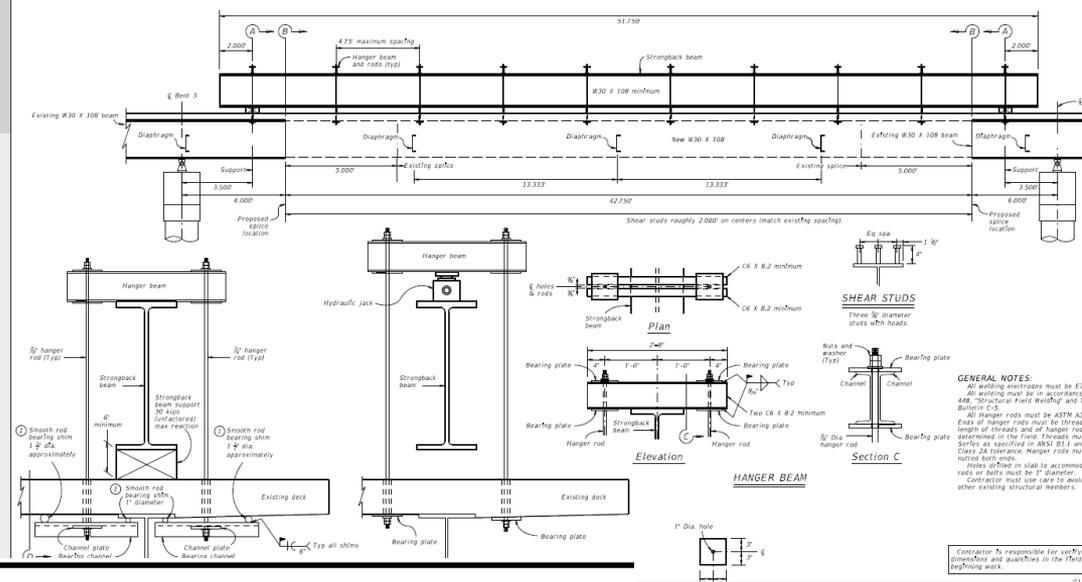
Use certified welders to perform heat-straightening and all welding involved in the repair in accordance with Item 448, "Structural Field Welding" and Item 784. The steel repair work will be inspected by a Bridge Division Structural Steel Inspector.

Spot paint all repaired steel areas utilizing System I-A (Overcoating, One Coat), in accordance with Item 446, "Field Cleaning and Painting Steel". Provide an overcoating system in accordance with DMS-8105.

Replace all removed deck concrete in accordance with Item 429, "Concrete Structure Repair" as a full depth concrete deck repair.

# Repair Details – Payments

- Think of the small items
- Which beam is being repaired?



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Contractor is responsible for verifying dimensions and quantities in the field during work.

# Repair Details – Payments





- Using the observations we made, does it make sense to rehabilitate the bridge...
  - Structurally?
  - Economically?
- Think long term
  - Focus on addressing causes, not just chasing FUA
- Details
  - What is needed?
  - What is covered in the Item Spec?



# QUESTIONS?



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