

Lock & Dam 52

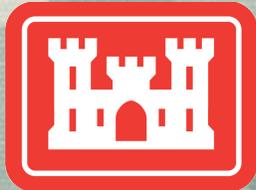
Embedded Anchorage Replacement

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Maintenance Section

Louisville District



US Army Corps of Engineers
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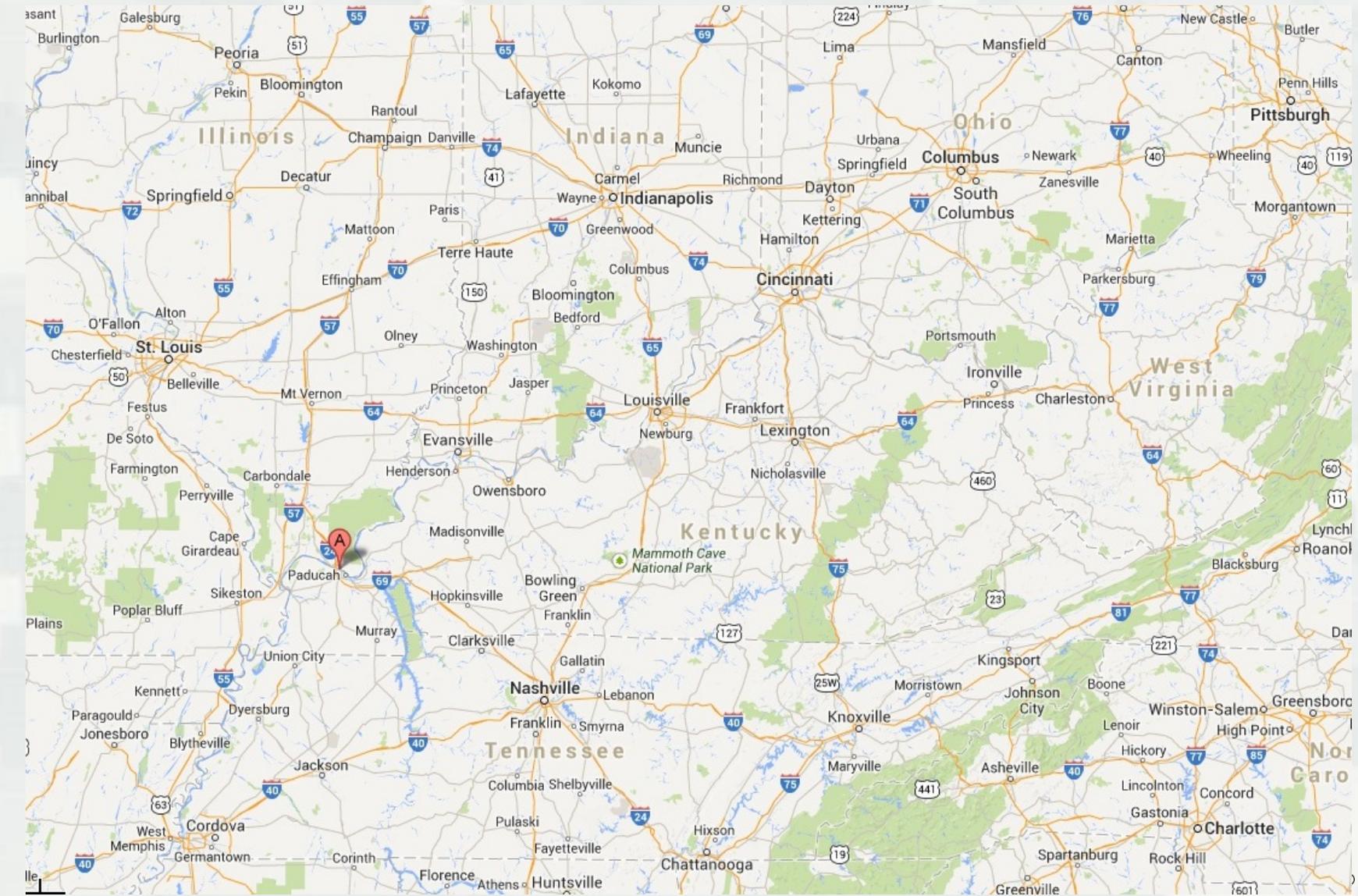
Presentation Outline

- History of Lock 52
- Background Info & Purpose of the repair
- Repair Process
- Technical Aspects
- Future plans
- Questions/Comments

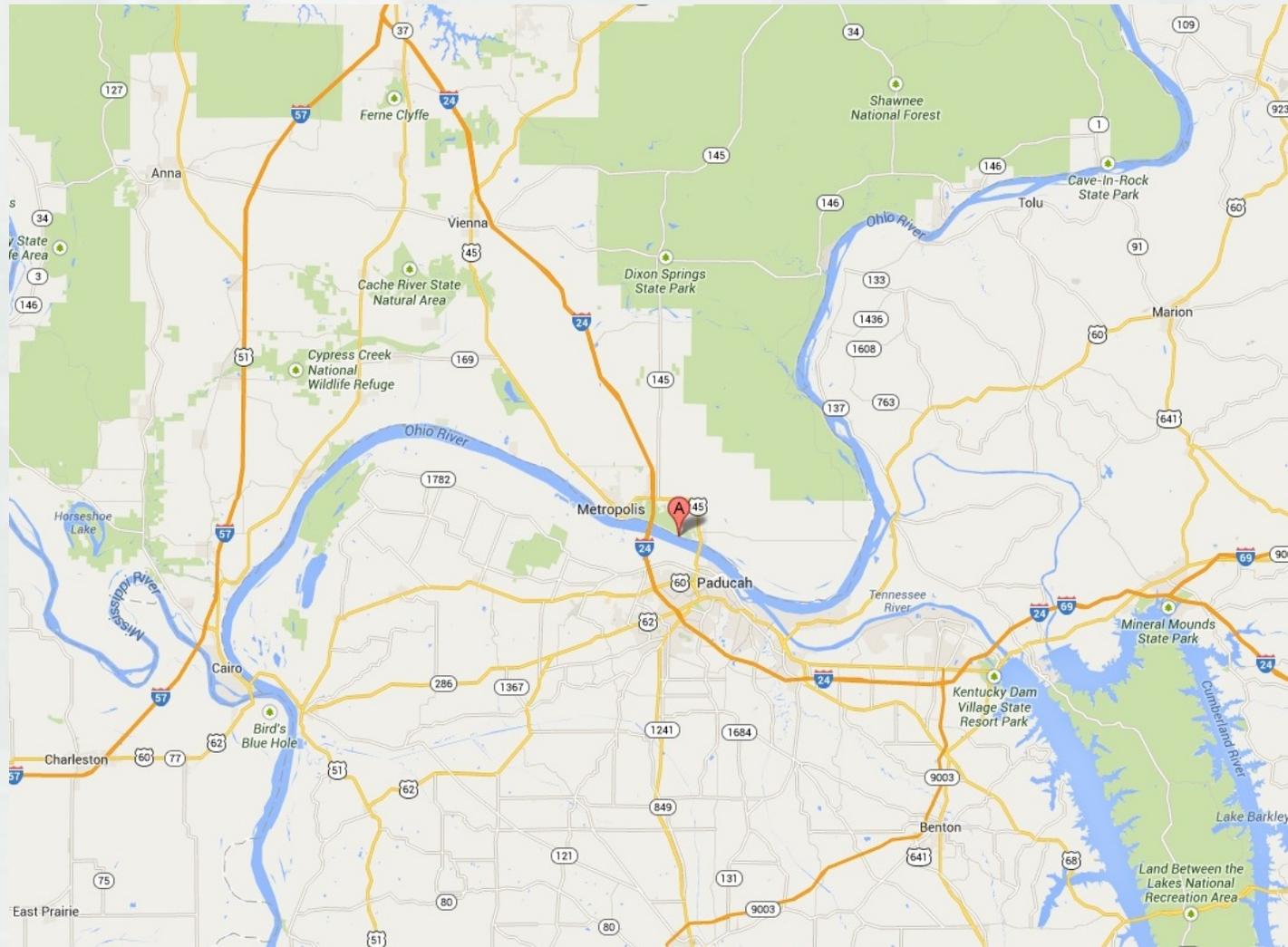


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Location of Lock 52



Location of Lock 52



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Lock & Dam 52 History

- 600' chamber constructed in the late 1920's
- 1200' "Temporary" chamber constructed in the 1970's
- Intermittent operation ranges from June-November depending on water levels and dam conditions.
- Olmsted Lock & Dam will replace Lock & Dam 52 & 53, the last low lift locks on the Ohio River



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Purpose

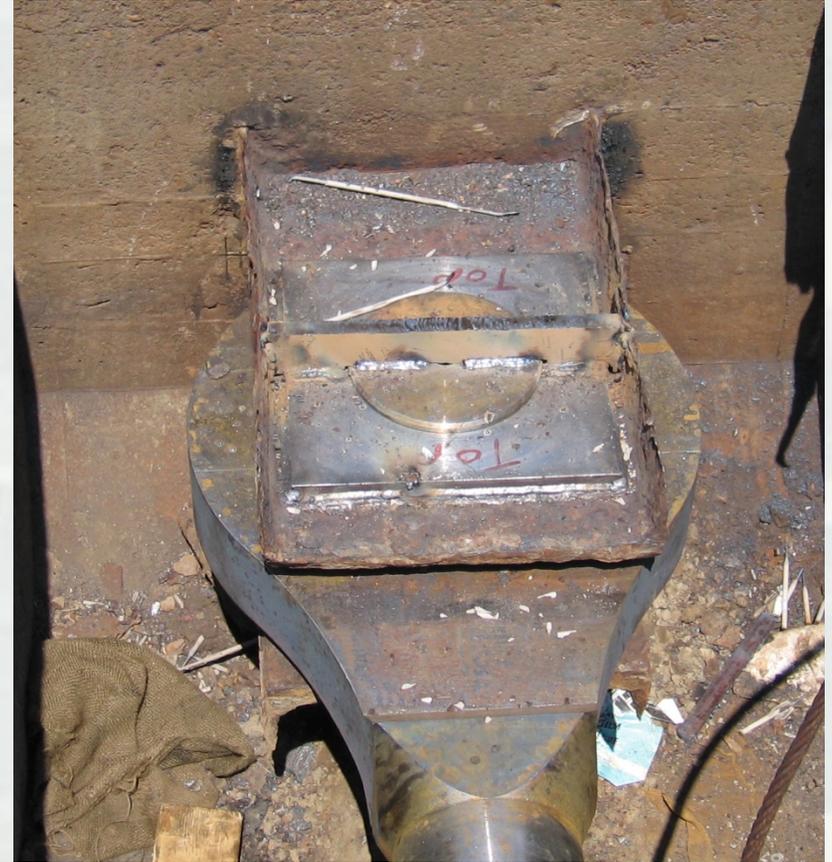
- Replace severely deteriorated embedded anchorage members.



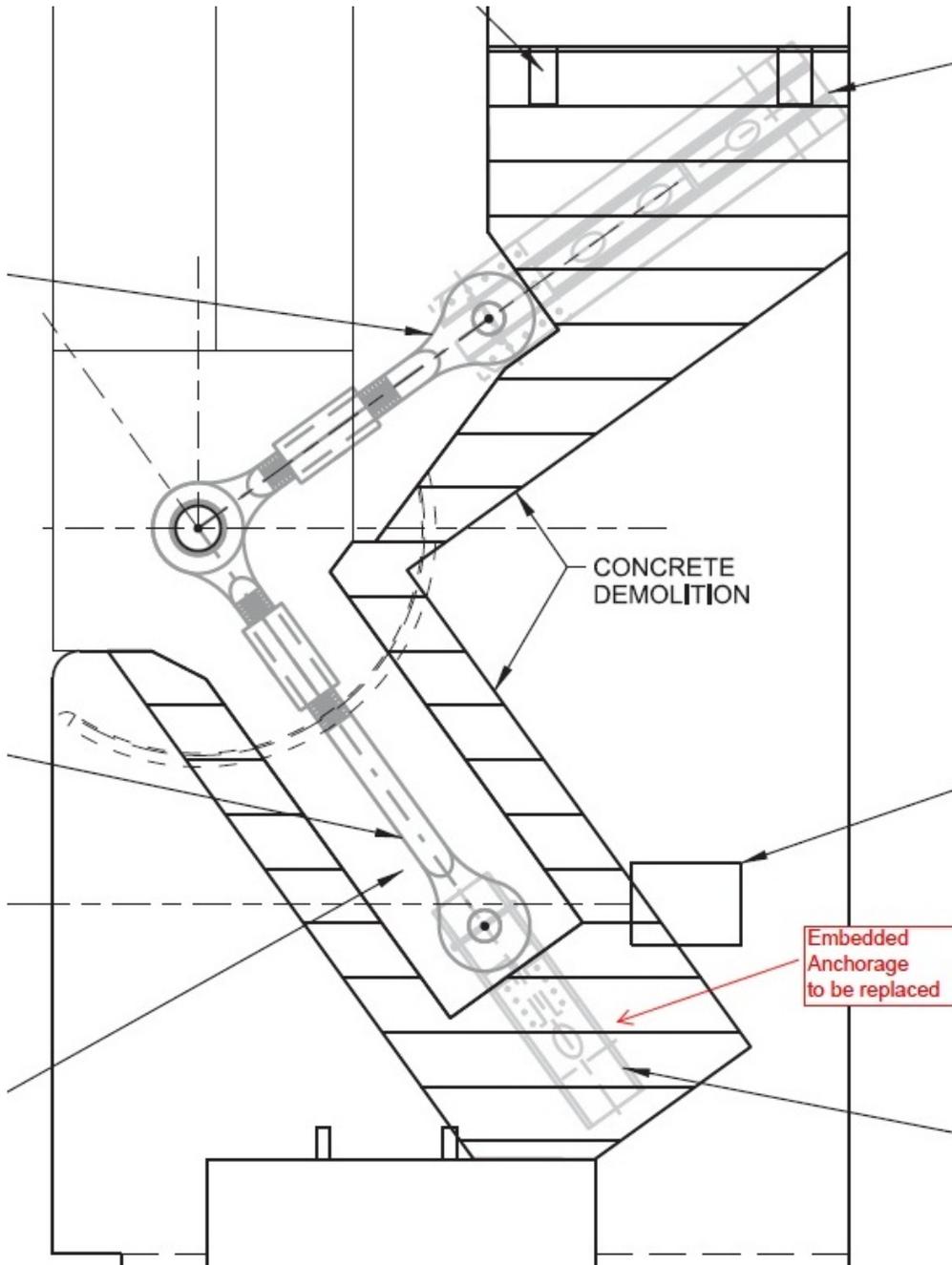
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Purpose cont.

- Additional plates had been welded on during past maintenance projects in attempts to delay a major failure.



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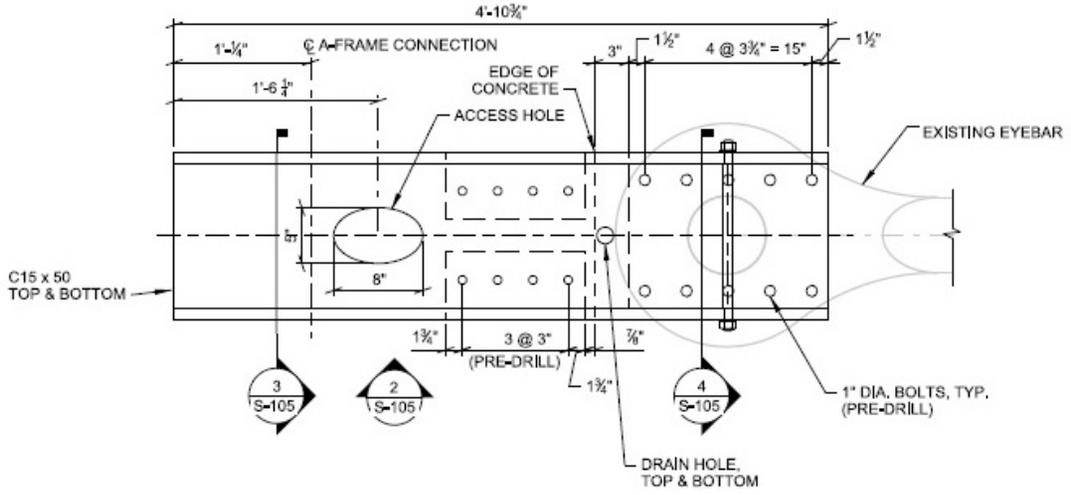
Background Information

- LRL-ED was tasked with design to replace all anchorage members.
- Work was to be done by LRN through regionalization.
- Deterioration was much more severe on A-arm anchorage.
- New design was to match original as close as possible.
- Original anchorages used riveted connections vs. new design using bolted.
- FRAGO 3 discourages welding of anchorage members



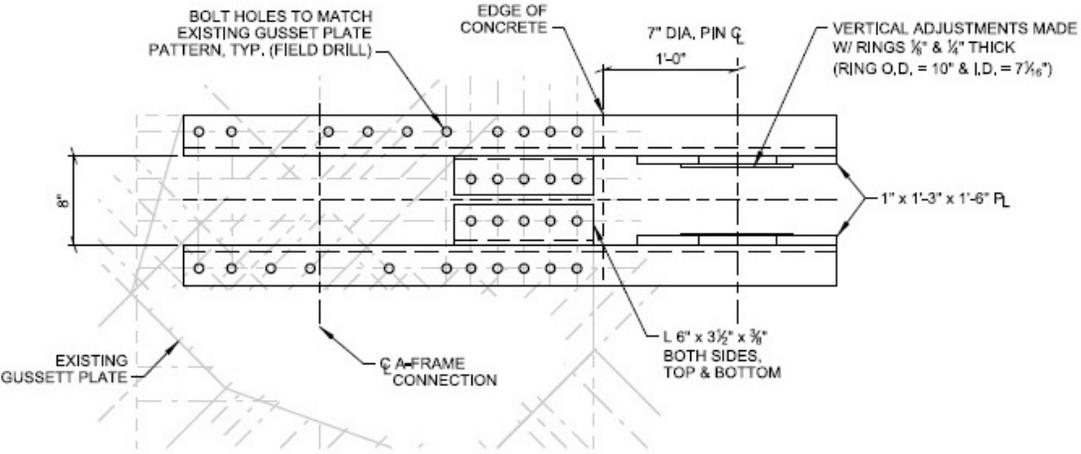
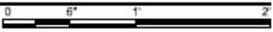
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Replacement Anchorage Bolted Design



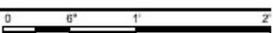
1 PLAN - 4'-10 3/4" ANCHOR BEAM

1 1/2" = 1'-0"



2 ELEVATION - 4'-10 3/4" ANCHOR BEAM

1 1/2" = 1'-0"



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Repair Process

- Replace anchorages on one end of lock chamber at a time (Lower then Upper)
- Remove both lower gates and lay on barge for maintenance
- Core drill/wire saw and remove concrete from embedded anchorage
- Remove existing anchorage members to be replaced
- Fit new anchorage assembly into place and transfer bolt holes to members
- Drill holes and paint new anchorage assembly
- Install new anchorage assembly and torque bolts to achieve slip critical connection
- Install rebar and forms for concrete pour
- Pour concrete and allow cure time
- Re-install miter gates
- Revise work plan for inefficiencies and move to upper end of chamber



Remove Lower Miter Gates (96 tons each)



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Core Drill & Wire Saw Concrete



- Core drilled across back of anchorage
- Two vertical wire saw cuts
- One horizontal wire saw cut to remove block of concrete from top of anchorage



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Existing Anchorage: Initial concrete Removal



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Removal of Existing Anchorage



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Removal of Existing Anchorage, cont.

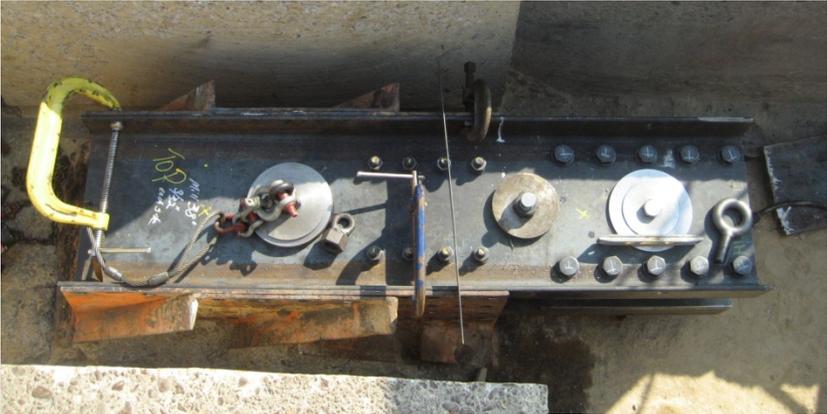


Assemble Part for Replacement Anchorage



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Anchorage Assembly Test Fit for Hole Transfer



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Drill Holes / Paint / Reinstall



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Anchor Rebar / Concrete Form and Pour



Before and After



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Revisions to Work Plan for Upper End

- Lower Anchorage Duration from Gate Removal to Installation: 23 Days (5 off days)
- Decision was made for LRS to pursue upper end based on lessons learned from lower end.
 - Knowledge base of crew.
 - Jump start on core drilling upper while concrete cured on lower
 - Anchorage Assemblies for upper were put together and had required machining completed
 - Gates were hung prior to pouring concrete, so cure time could happen on off weekend.
- Work on Upper end from Gate Removal to Installation: 8 Days



Technical Aspects

- Size of concrete Removal Area
- Alignment of New Anchorage with Old
 - Fabrication of spacers to get spacing of top and bottom channels correct
- Wrong hole alignment Dimension on Design Drawings-angle braces
- Mill edges of Replacement Anchorage Channel to correct width
- Slip critical connection
- Placing gate that didn't hang plumb back on pintle ball under water
- Realignment of Gates with damaged lower sill and upper shim issues



Future Work Plans

- Have completed design for all embedded anchorage
- B-arm embedded anchorage was in much better shape than A-arm
- B-arms are deeper in concrete
- Monitor condition of B-arms for future replacement



Questions / Discussions



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