

LOCK & DAM 53 REHAB 2012

August 22nd to November 1st

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PROJECT ENGINEERS
LOUISVILLE DISTRICT



US Army Corps of Engineers
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Lock & Dam 53 History and Facts

- 600' chamber constructed in the late 1920's
- 1200' "Temporary" chamber constructed in the 1970's
- The latest repairs to the miter gate machinery in either chamber was in the early 1980's
- The dam is constructed of wickets and 2 bear traps. The bear traps were rocked shut in the 1980's due to deteriorated poiree anchors
- The lock operates an average of 10 percent of the time a year
- Olmsted Lock & Dam will replace Lock & Dam 52 & 53, the last low lift locks on the Ohio River



Outline

- 1200' chamber miter gate machinery repair
- 1200' culvert valve replacement
- 600' chamber miter gate machinery repair
- 600' butterfly valve repair
- L&D 52 upper 600' miter gate leaf repair
- L&D 53 lower 600' gate replacement



Repaired the 1200' Chamber Miter Gate Machinery.
Miter Gates were operated with a workboat to
prevent lock closure.



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Typical Issues at all 1200' Miter Gate Machinery Assemblies



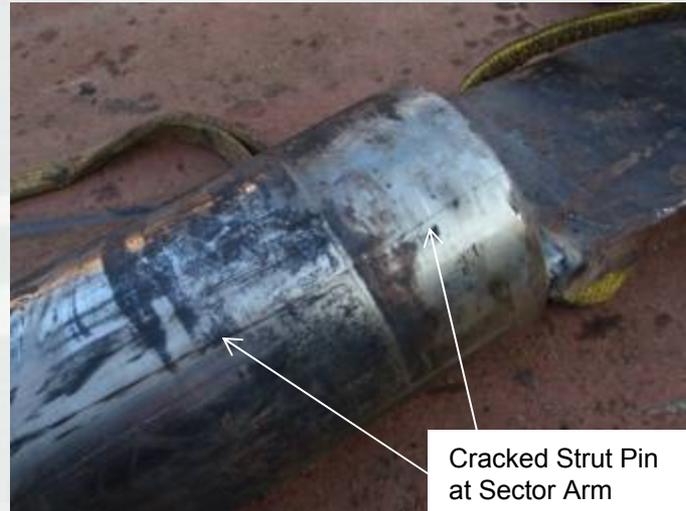
Had to Line Bore Sector Arms



Had to Lance Horizontal Strut Pins at the Gate.



Worn Pins & Bushings at All Connections



Cracked Strut Pin at Sector Arm



All four of the Sector Arm Cross Pins in the 1200 machinery assemblies were not greased on the bottom pin.

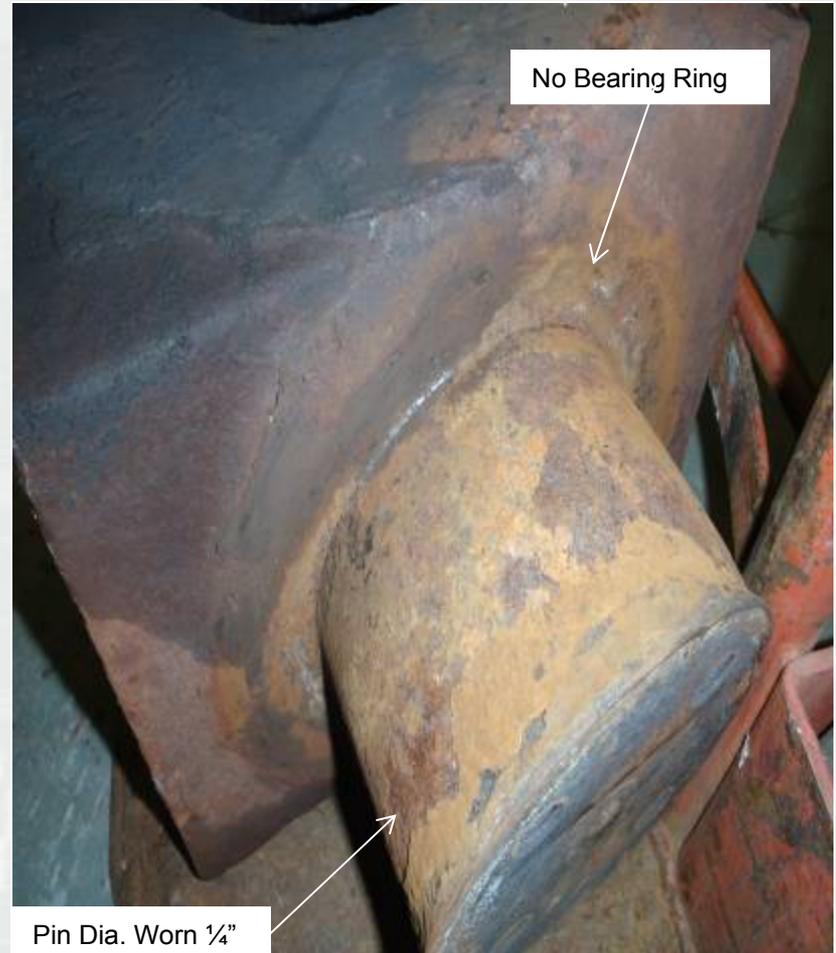


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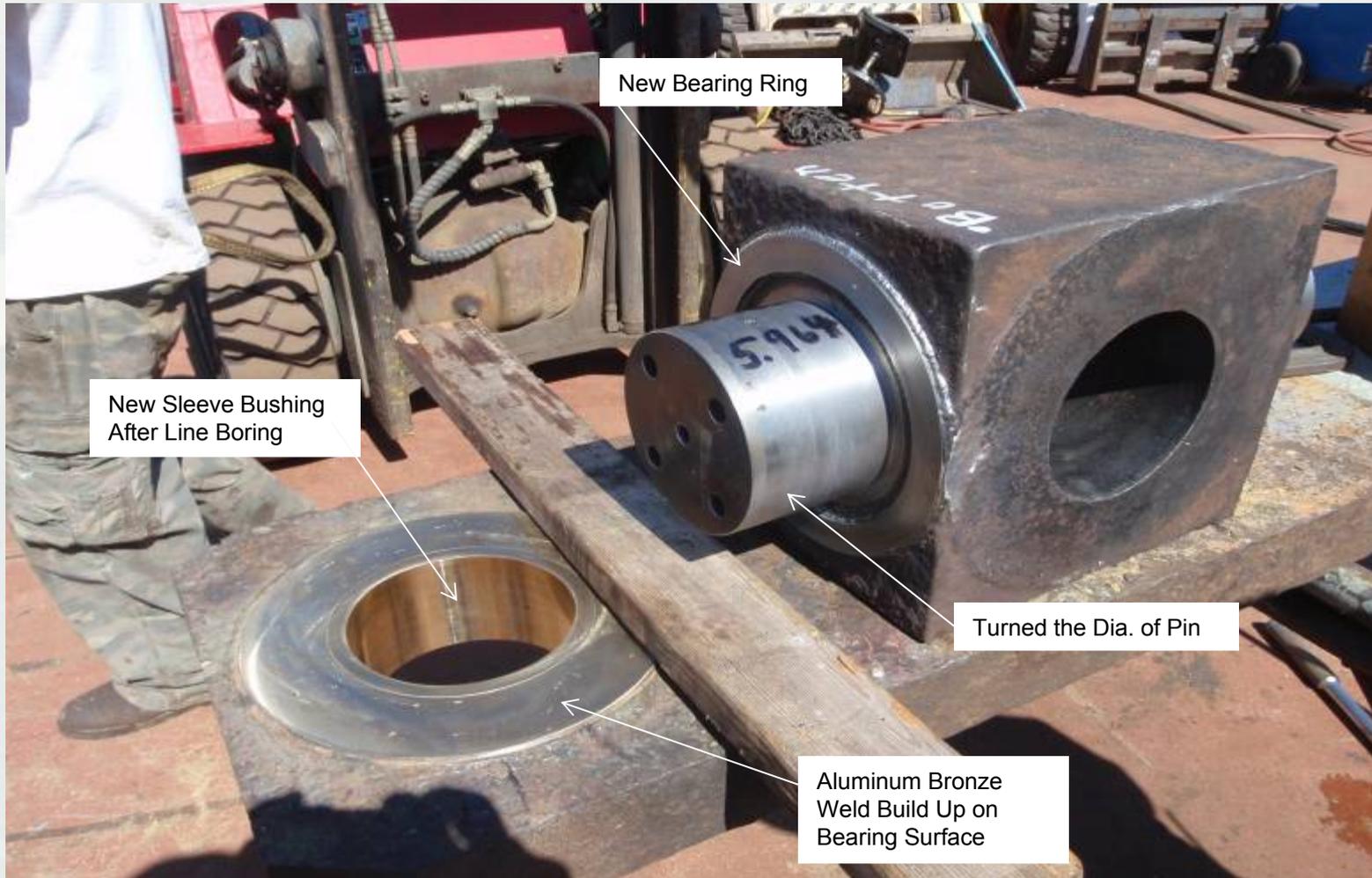
Grease



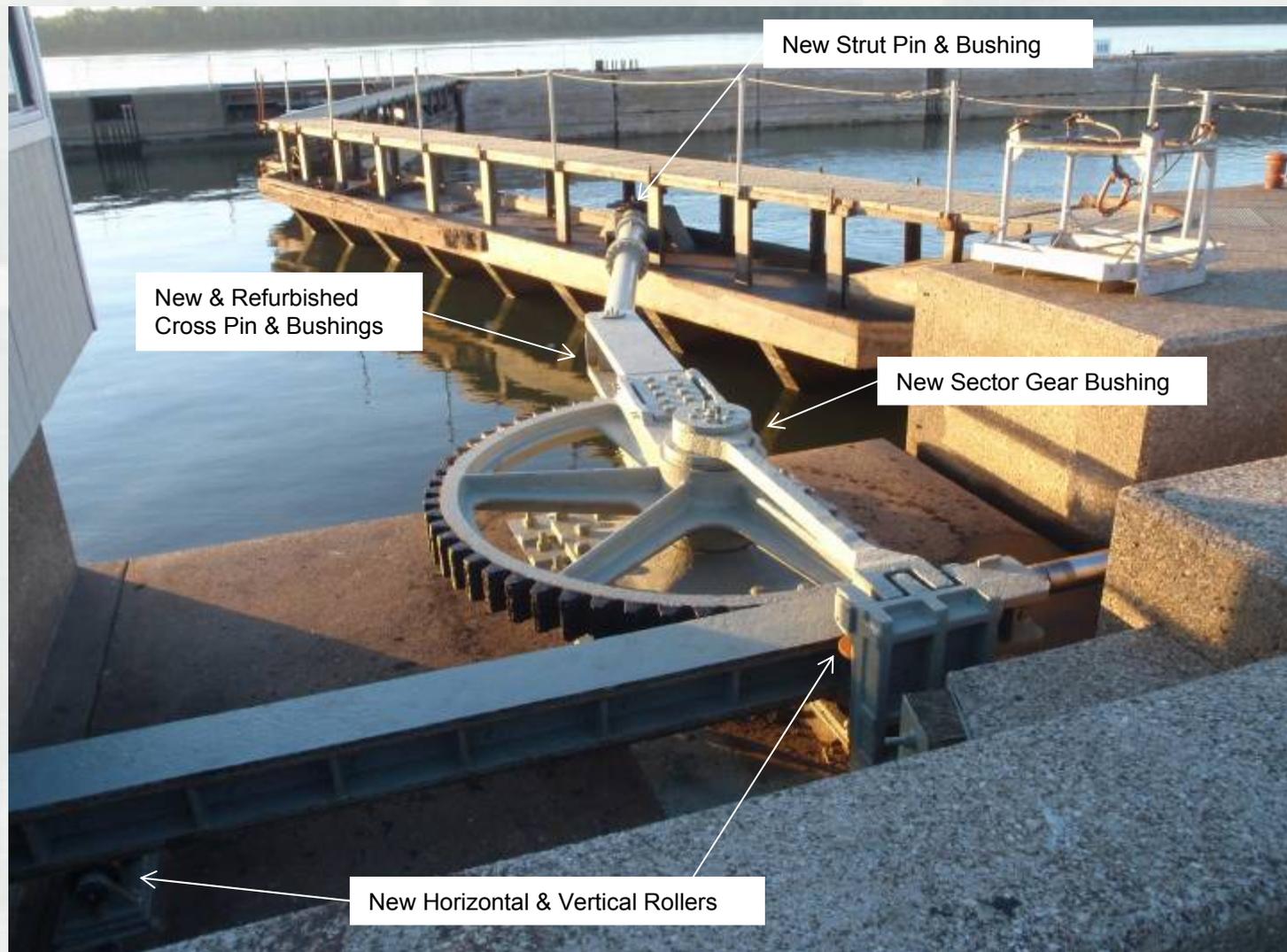
No Grease



Bottom Sector Arm and Cross Pin after machining



Completed 1200' Machinery Assembly



Replaced Filling and Emptying Valves in the 1200' Chamber



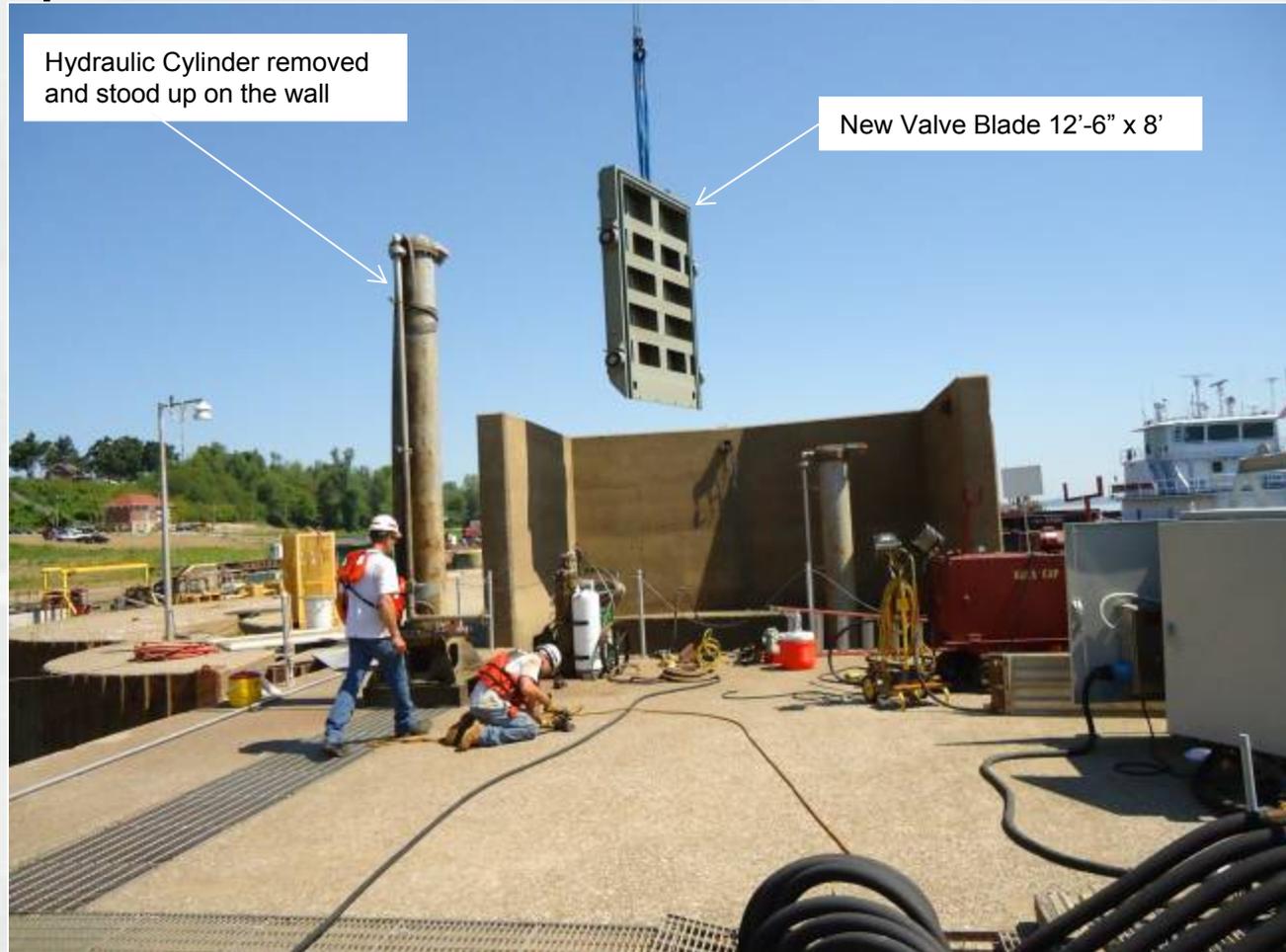
Filling Valves Hydraulic Cylinders



Existing 1200' valve blades were saved and will be refurbished for L&D 52.



LRS pre-fabricated 4 new 1200 valve blades to minimize the delay on traffic. They were able to replace one valve blade in a 10 hour shift.



Emptying Valves



Repair 600' Chamber Miter Gate Machinery



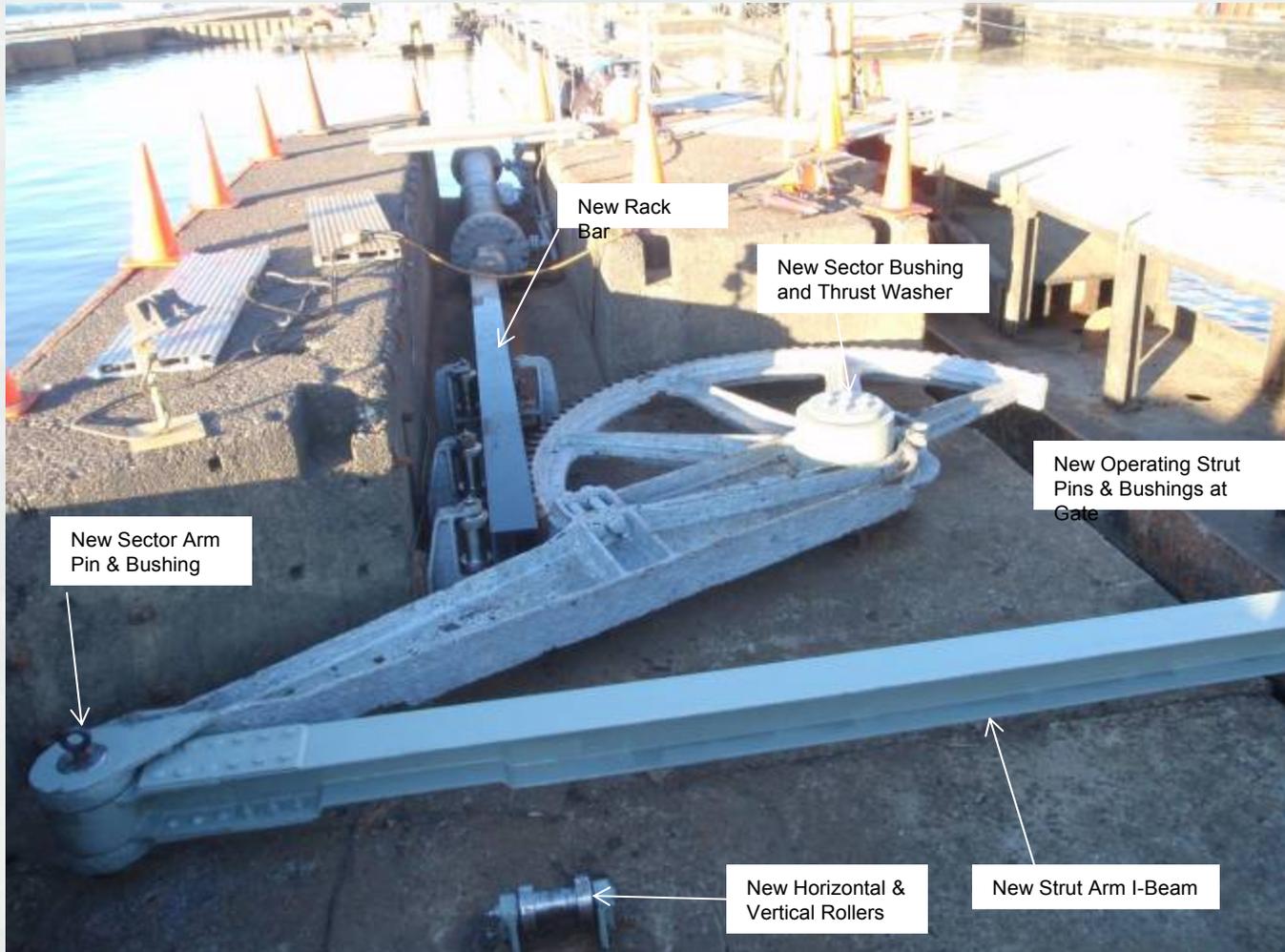
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Typical Issues with the 600' Miter Gate Machinery Assemblies

- All pin and bushing connections were worn.
- Strut arm beams had severe section loss and were held together with miscellaneous pieces of metal.
- Rack bar teeth worn causing lots of backlash.
- Sector Bushings, Rollers, and rack bar beam worn causing sector gear and rack bar to rub.



600' Chamber Miter Gate Machinery Completed



600' Chamber Butterfly Valves

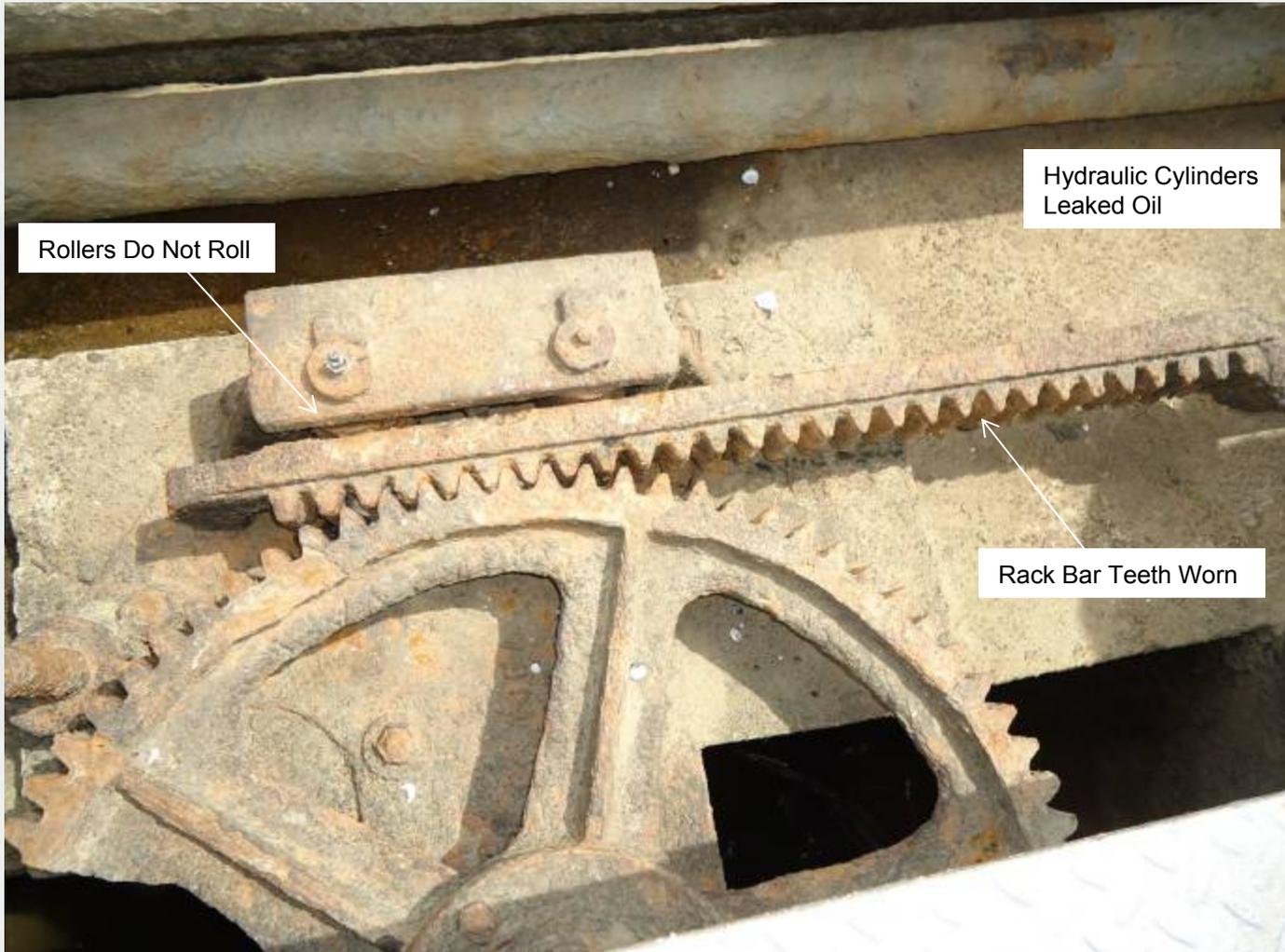


There are 17 filling and 17 emptying butterfly valves in the 600.

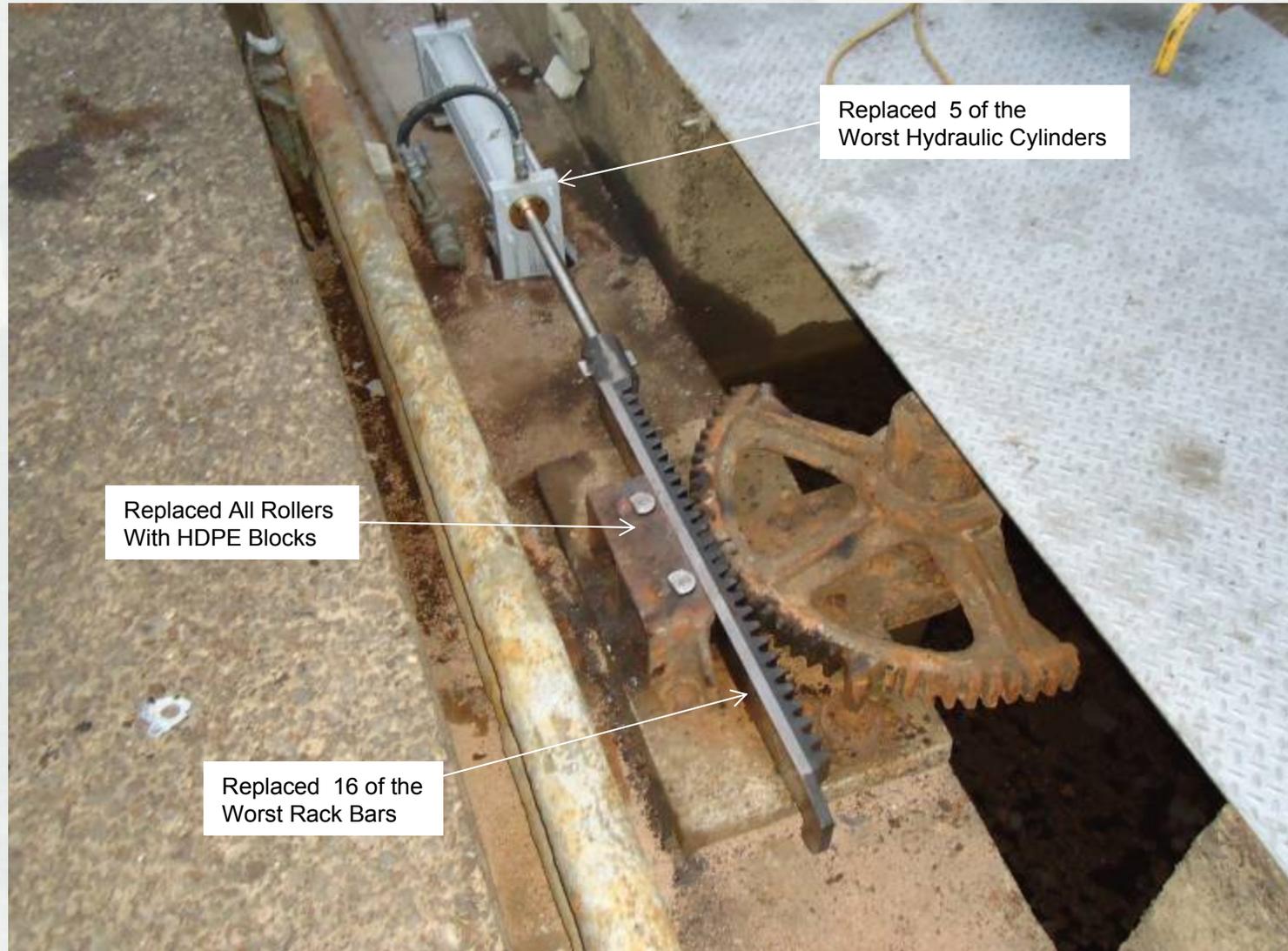


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Typical Issues



Butterfly Valve Repair



L&D 52 600' Upper Middle Gate Leaf Repair



Tow backed into the gate leaf and damage Vertical Girders 1 and
2



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The Gate Leaf was brought down to L&D 53 with the rest of the LRS Fleet to be repaired.



Girder 1 was completely replaced and girder 2 was spliced in the center. The bottom sill plate was also removed and repaired.



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The buckle plate skin sheet had to be pushed back into the original position



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The gate repair was completed. It was then transported back to L&D 52 and installed.



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L&D 53 Lower 600' Miter Gate Replacement



Assembly of replacement sectional gate leafs.

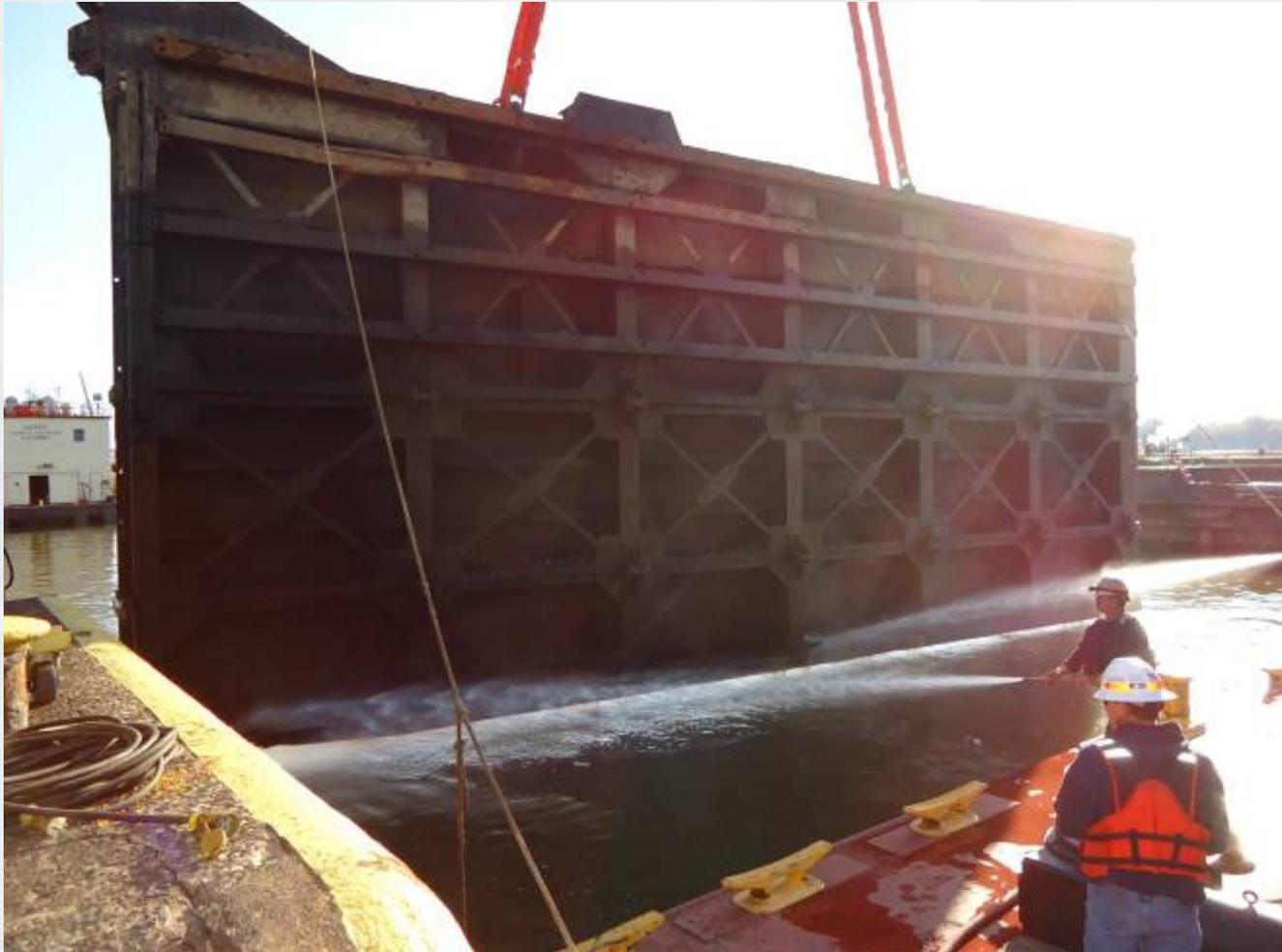


Gate sections were bolted together, then the diagonals and timber seals were installed.



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The Existing Gate Leafs were remove by the LD 683 Brown



Each gate leaf weighed approximately 95 tons.



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Condition of Existing Gate Leaf



Holes in all Vertical Girders transferring to Bottom Girder



All Cross Bracing Plates had cracks



Cracks in the Skin Sheet



Buckled Bottom Girder and bent bearing plate



Once the replacement gate leafs were assembled,
Nashville District picked and set them with the
Binkley.



Each replacement
gate leaf weighed
114 tons fully
assembled.

LD 683 Brown's
Capacity is 100 tons.

Crane Barge
Binkley's Capacity is
116 tons at the
required 40' radius.



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Steel Boxes were added to protect the Diagonal Studs



Other Miscellaneous Repairs



Pulled the upper guide wall concrete beam back in place and anchored it to the cells.



Added timber heads in required locations.



Repaired expansion joints and removed 500' of leaking 4" hydraulic piping.



Replaced Rub Timbers on 6 Gate Leafs.
Photo is before the Timbers were replaced.



Any Questions?



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