

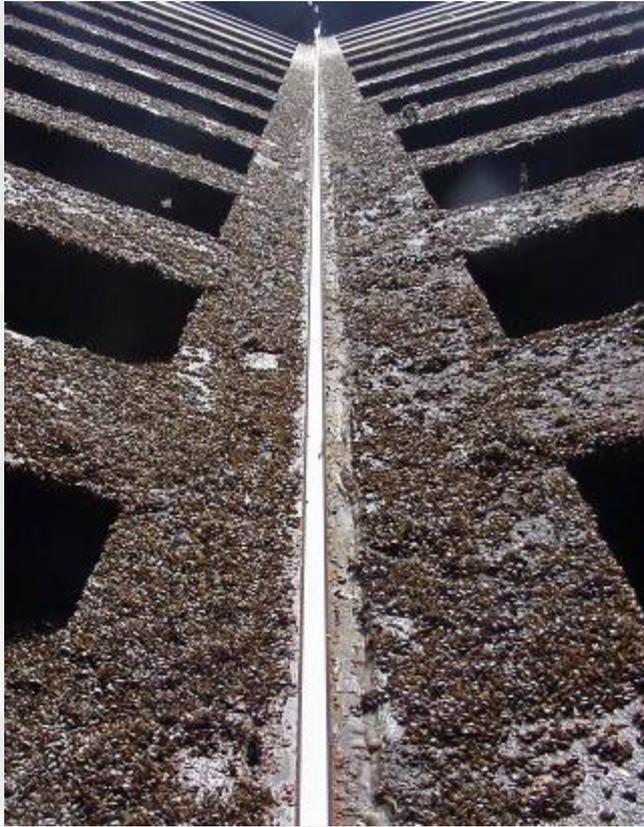
# Meldahl & Greenup Miter Gate and Top anchorage replacement



Presented by: Steve Hann



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- Meldahl Locks and Dam-Gate placed into service 1962

Severe corrosion and structural issues found in 2001



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# Meldahl Miter Gate Replacement

- Reported to CAM 15 August
  - ▶ Entire Aux. chamber dewatered and upper and lower gates inspected
  - ▶ Upper gates determined to be in worse condition
  - ▶ Bulkheads pulled and moved to upper end. Isolated upper gates with EM gates and bulkheads and dewatered again



# Meldahl Miter Gate Replacement

- Lifting Lugs installed on Upper gates
- Upper gates removed and placed on Shreve 9 Sept 2011.
- Transported to scrap facility and offloaded



# Meldahl Miter Gate Replacement

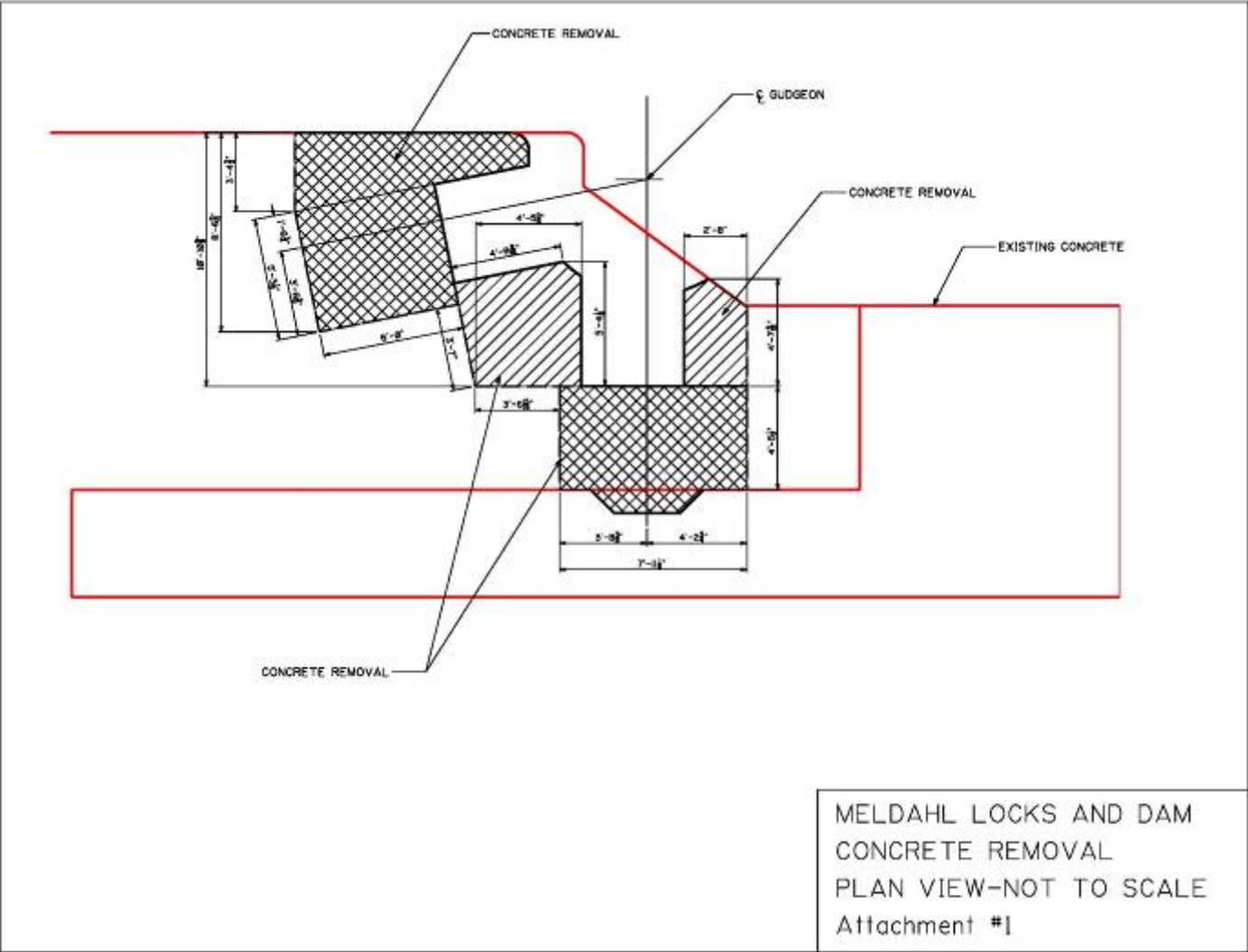
- Concrete cutting contractor on-site 12 September 2011.
- Began removal of top anchorage concrete
- Removal completed 30 Sept 2011



Note: All work completed till finish of top anchorage concrete removal  
Can be completed without total chamber shutdown. Work could be completed with intermittent shutdowns and allow lockage's to reduce wait times.



# Meldahl Miter Gate Replacement





# Removal of Concrete

Concrete removed from embedded anchorage area to expose upper section



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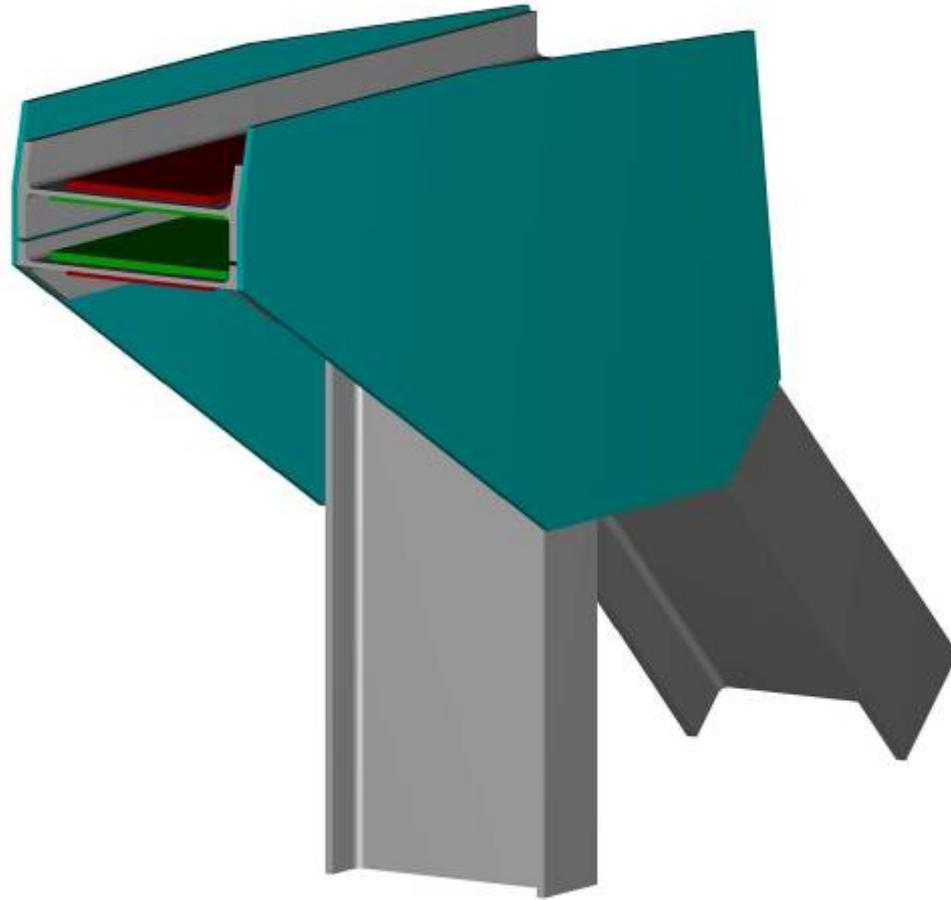


# Top Anchorage

Top Anchorage prepared for addition of new weldment – Top will be milled down to final elevation



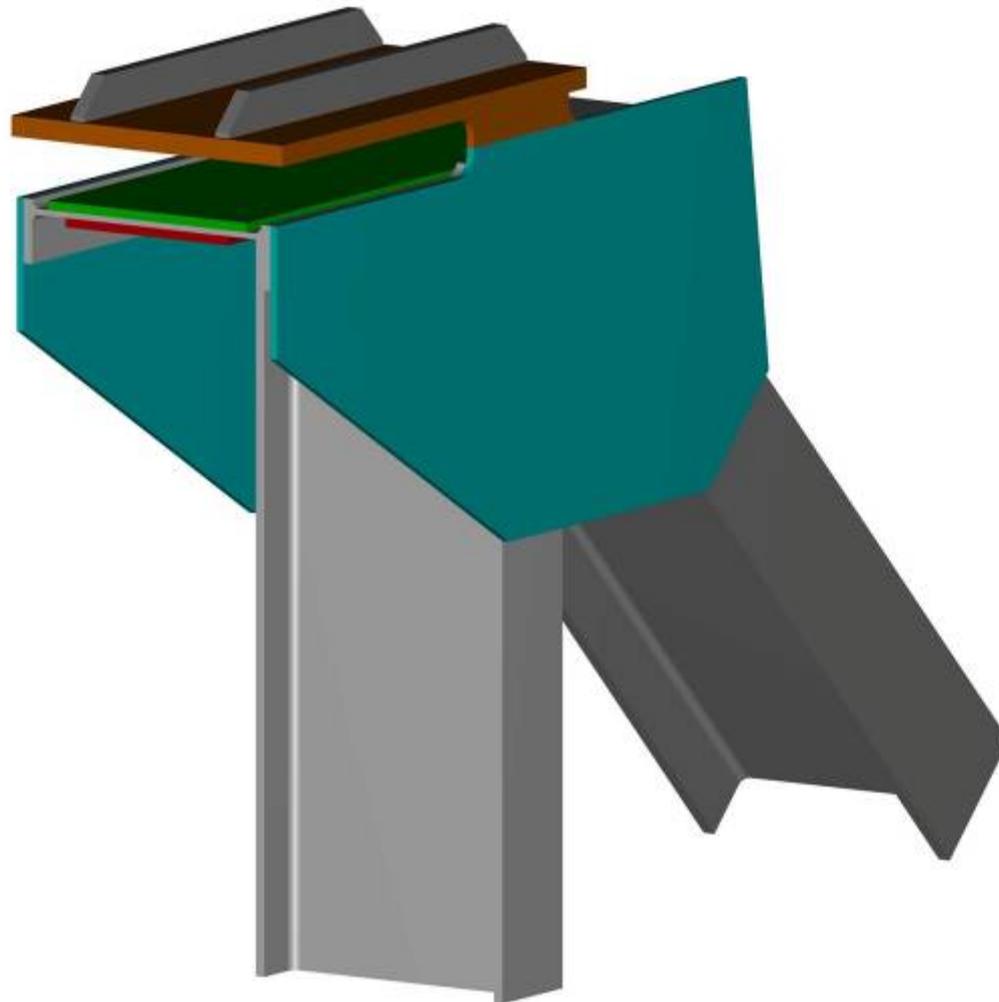
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## Old Top Anchorage Design



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## New Top Anchorage Design



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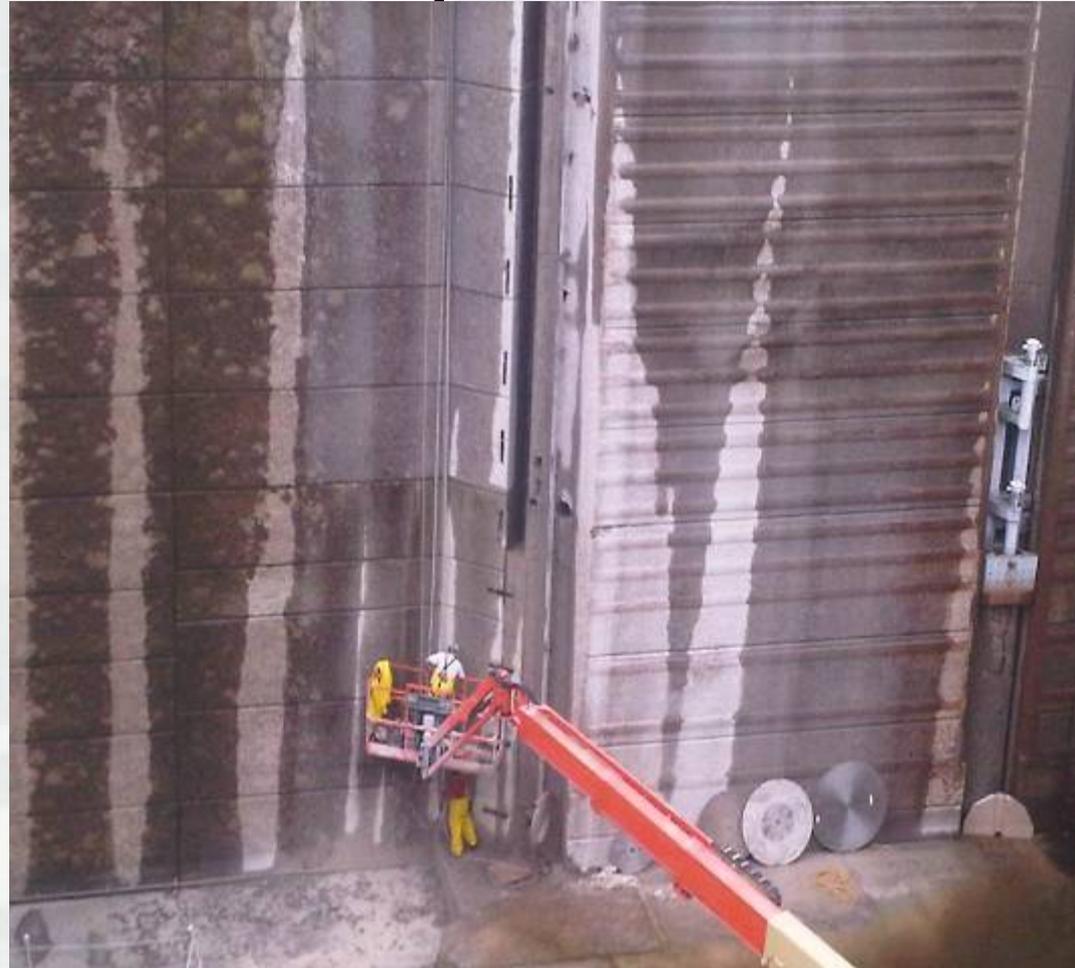
## New Top Anchorage Design



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# Meldahl Miter Gate Replacement

- Began removal embedded wall quoin concrete 4 Oct 2011
- Removal to be completed 4 Nov 2011
- Crew furloughed Dec 11-Mar 12





## New Top Anchorage Design



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## New Top Anchorage Design



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# Meldahl Miter Gate Replacement- Round II

- ▶ Began work 5 Mar 2012
- ▶ Completed on 8 June 2012
- ▶ Total Job Timeframe: 28 Weeks
  - Approx. 3.5 weeks of lost time due to weather related issues



# Lessons Learned & Delays

- Concrete cutting around top anchorage should be completed before shutdown of chamber.
- Pre-Fabricate new top anchorage design and all components.
- 2 week delay in start of job due to overrun at GRO.
- 3.5 weeks lost time dewatering entire chamber for inspection
- Concrete cutting contractor-2.25 week overage
- 3 weeks total lost time due to flooding events 

# Greenup Miter Gate Replacement

- Small crew onsite 11 June 2012 to begin removal of old miter gates.
- 1<sup>st</sup> phase of concrete removal completed 19-27 June
- Full crew on-site 28 June



# Greenup Miter Gate Replacement

- Chamber dewatered
  - ▶ 2<sup>nd</sup> phase of concrete cutting (embedded wall quoin) completed 11-31 Jul
    - 4 days over allowable contract time
    - Time savings of 2.25 weeks after incorporating lessons learned



# Greenup Miter Gate Replacement

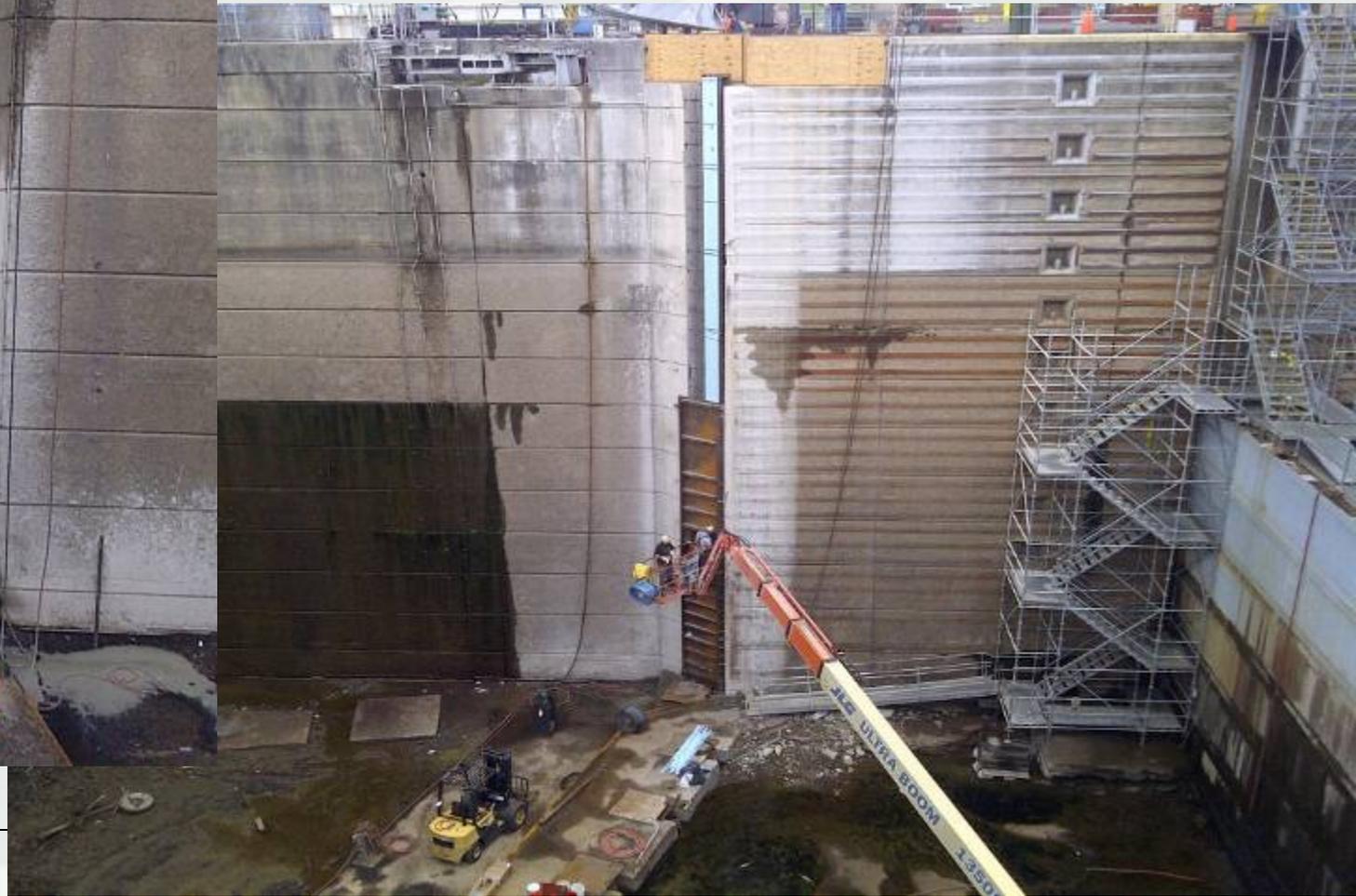
- Corps personnel installed new embedded wall quoin structure
- Installed formwork
- Placed SCC concrete
  - ▶ Completed in 3.5 weeks (time savings of 3 weeks after incorporating lessons learned)



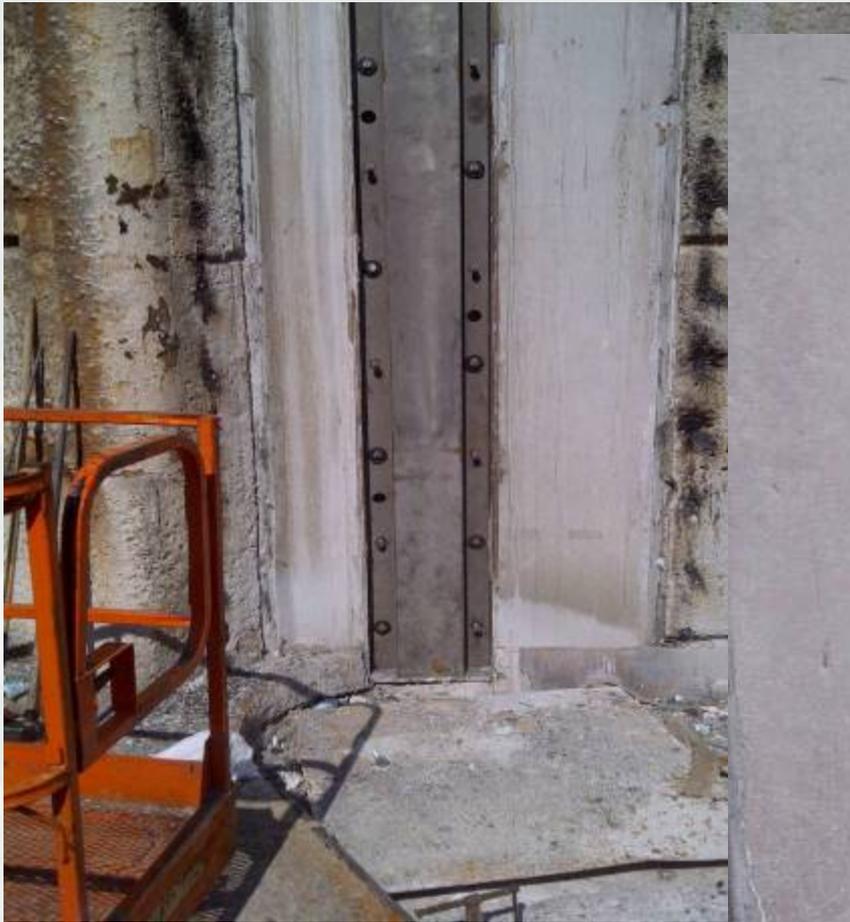
# Greenup Miter Gate Embedded Wall Quoin



# Greenup Miter Gate Embedded Wall Quoin



# Greenup Miter Gate Embedded Wall Quoin



# Greenup Miter Gate Replacement

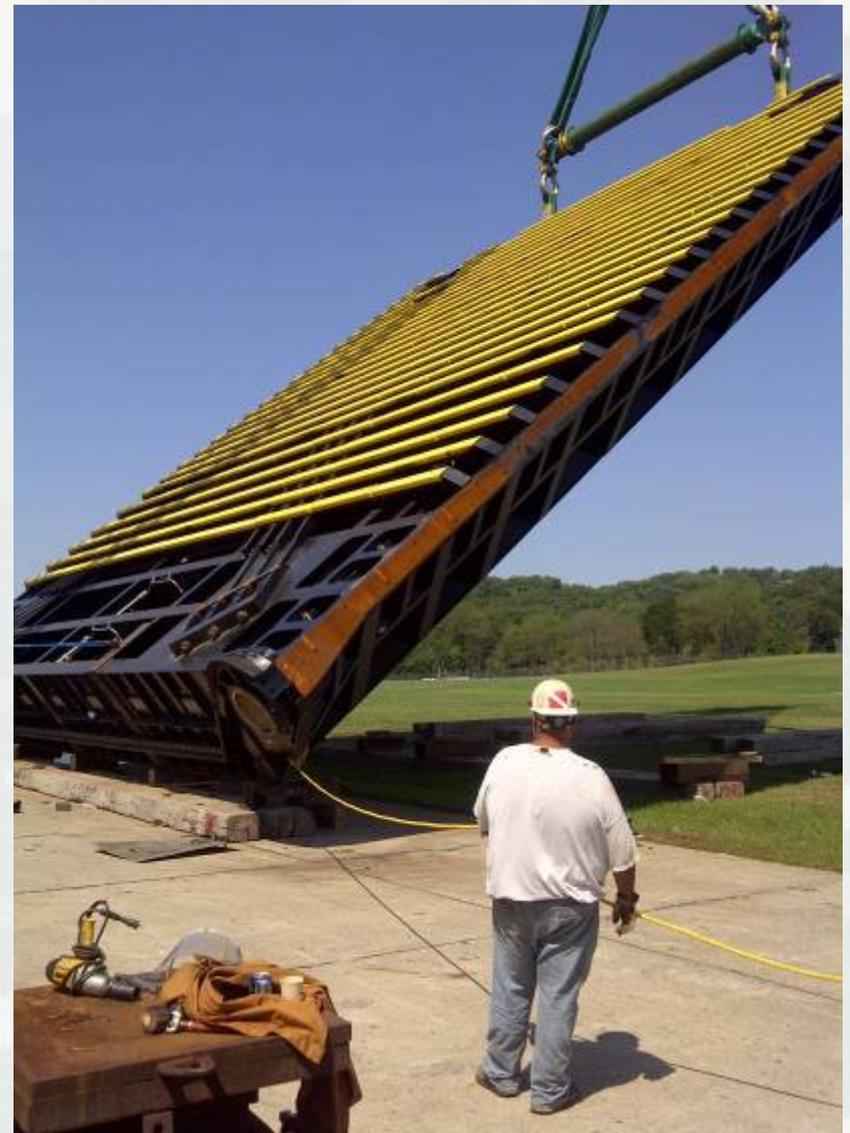
- Top anchorage cut, milled and new weldment installed to accept new top anchorage design
- Surveyed into position
  - ▶ All components installed within a tolerance of +/- 1/4"



# Greenup Miter Gate Replacement



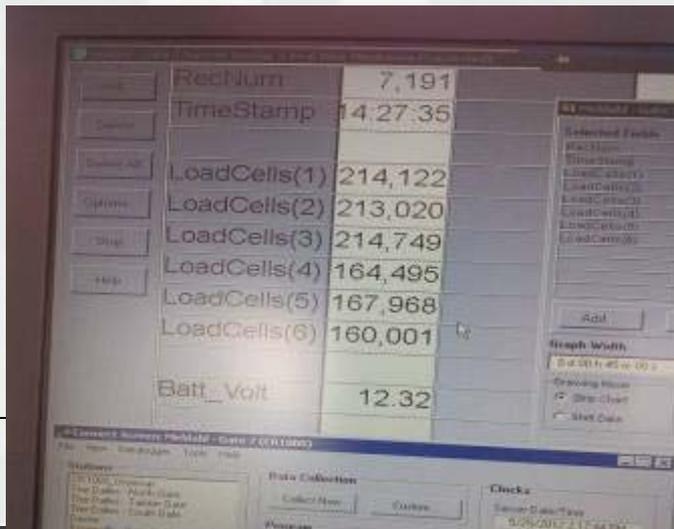
- Small crew sent to CAM to pick-up miter gates
  - ▶ Gates were delivered horizontally
    - Crew set-up cribbing to allow rotation of gates to vertical position



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# Greenup Miter Gate Replacement

- New Miter gates installed 5 Sept
- Diagonal stressing completed in 5 days (1.5 week time savings)



# Greenup Miter Gate Replacement



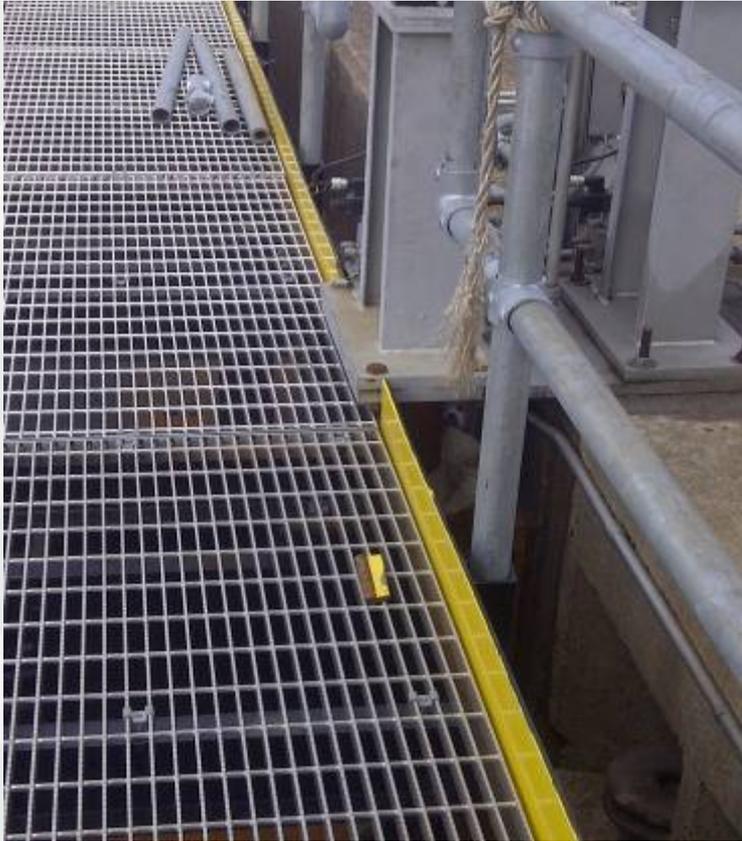
# Greenup Miter Gate Replacement

- Installed new miter and quoin blocks
- Repaired air lines
- Chamber open to traffic 5 Oct 2012
- Total timeframe: 17 Weeks-1 week over schedule



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# The OOPS factor:



Upper and lower latching devices were not in the correct location

CAM: Had to be moved approx 8"

GRO: Had to be moved 18"



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# The OOPS factor



Bottom seal has NO adjustment. GRO embedded sill was actually over 1" higher on the middle wall side. Rubber seal had to be cut to fit.



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QUESTIONS??????



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