Illinois Association of Floodplain & Stormwater Management
Annual Conference
March 14, 2023

Stratton-Bolger Lock & Dam Improvements

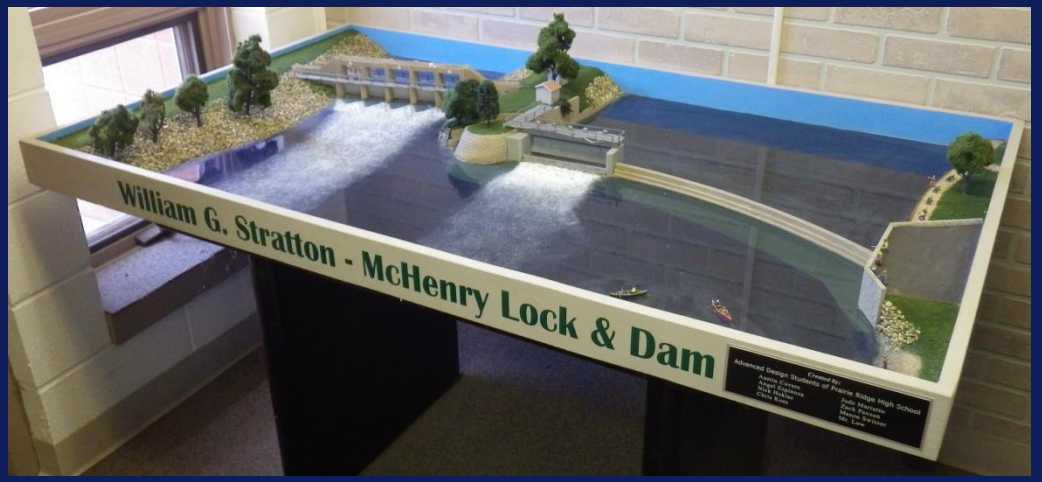
McHenry, IL

Jeff Tatarek, P.E., S.E.
Project Manager
Hanson Professional Services Inc.

Ted Montrey, P.E., S.E.
Chief of Design & Construction
Illinois Department of Natural Resources

Stratton Lock & Dam Improvements

- Existing Facilities
- Phase 1 – Pre-Design Study
- Phase 2 – Design
- Phase 3 – Construction



Stratton Lock & Dam Improvements

- **Existing Facilities**
- Phase 1 – Pre-Design Study
- Phase 2 – Design
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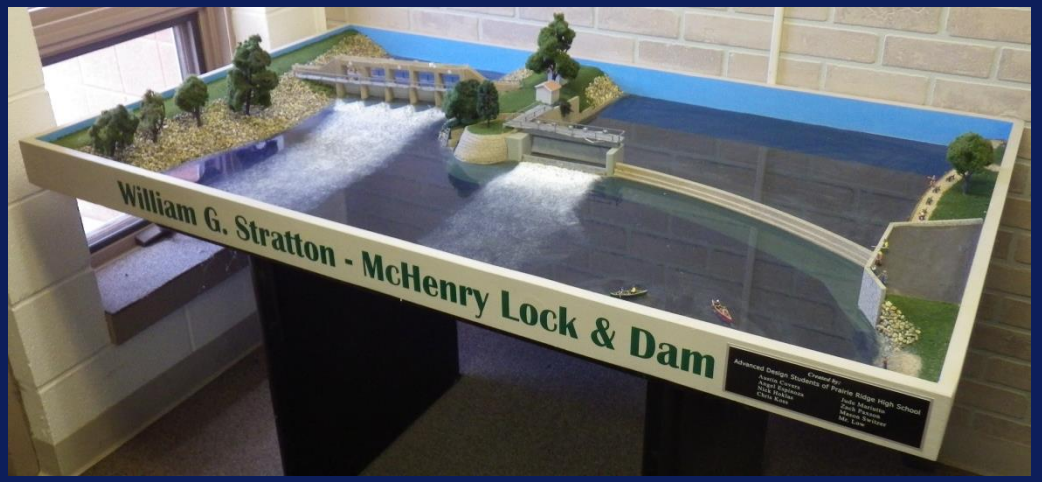

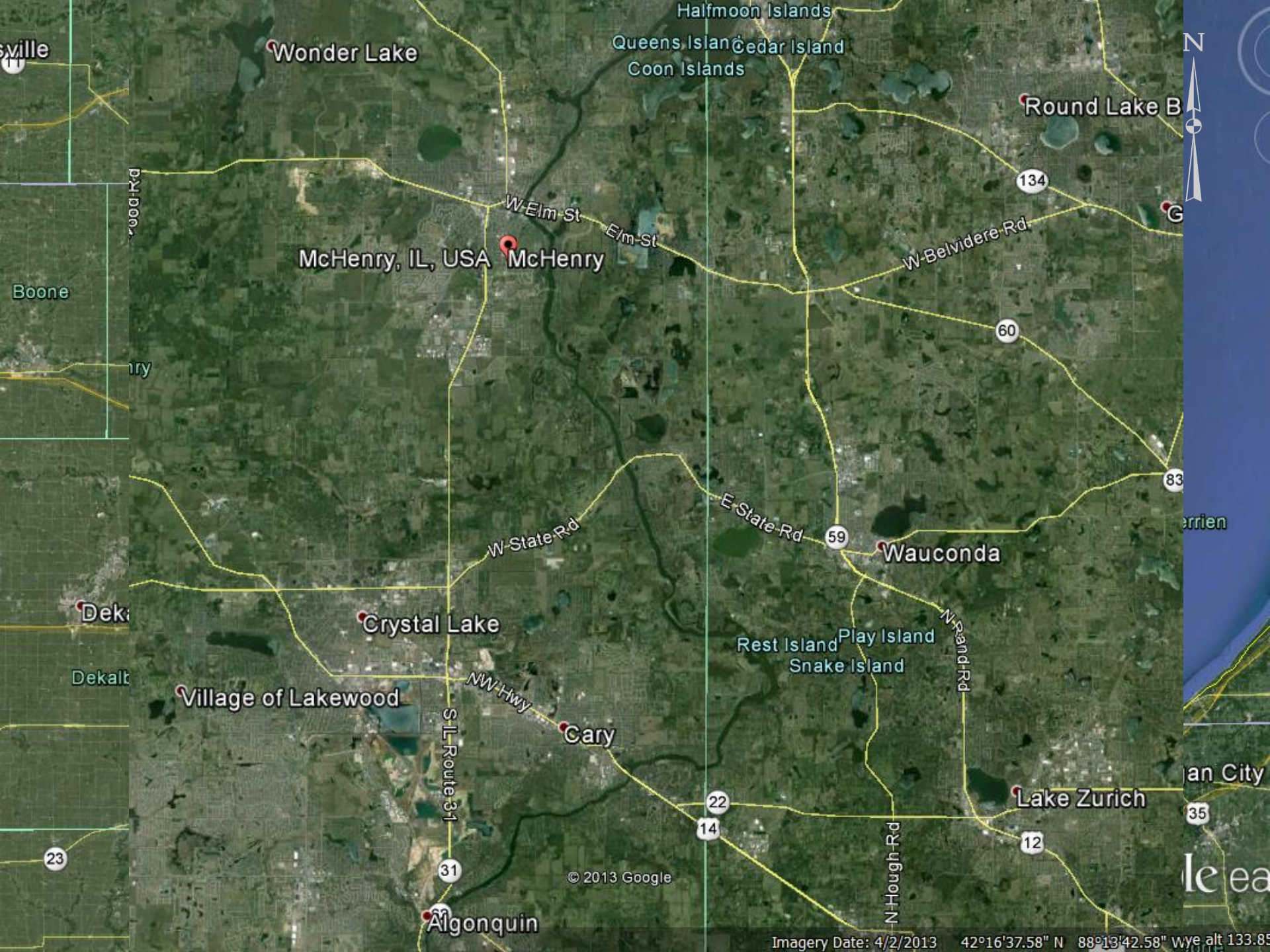
Halfmoon Islands
Queens Island
Cedar Island
Coon Islands
Wonder Lake
Round Lake B
134
W-Elm-St
Elm-St
McHenry, IL, USA
McHenry
W-Belvidere-Rd
Boone
60
W-State-Rd
E-State-Rd
59
Wauconda
Crystal Lake
Rest Island
Play Island
Snake Island
N-Rand-Rd
Village of Lakewood
NW-Hwy
Cary
S-IL-Route-31
Lake Zurich
22
14
12
31
N-Hough-Rd
© 2013 Google
Algonquin
Imagery Date: 4/2/2013
42°16'37.58" N
88°13'42.58"


W Vista Terrace
W Terrace Dr
W Biscayne Rd
Hunter Path
Sunrise View St
S Hilltop Blvd
S Bonnie Brae Dr
S Broadway St
S Capri Terrace
Foxview Highland Dr
State Park Rd
Lock Ln
Laguna Dr
Totem Trl
Sauk Dr
S Osage Dr
Pontiac Ave
McHenry Dam Road
Blackhawk Ave
© 2013 Google


North Berm
Existing Gate Structure
Existing Lock
Hinged Crest Gate/ Fixed Crest Weir
FOX RIVER
N
W Vista Terrace
W Terrace Dr
W Biscayne Rd
Hunter Path
Sunrise View St
S Hilltop Blvd
S Bonnie Brae Dr
S Broadway St
S Capri Terrace
Foxview Highland Dr
Lock Ln
State Park Rd
Laguna Dr
Totem Trl
Sauk Dr
S Osage Dr
McHenry D
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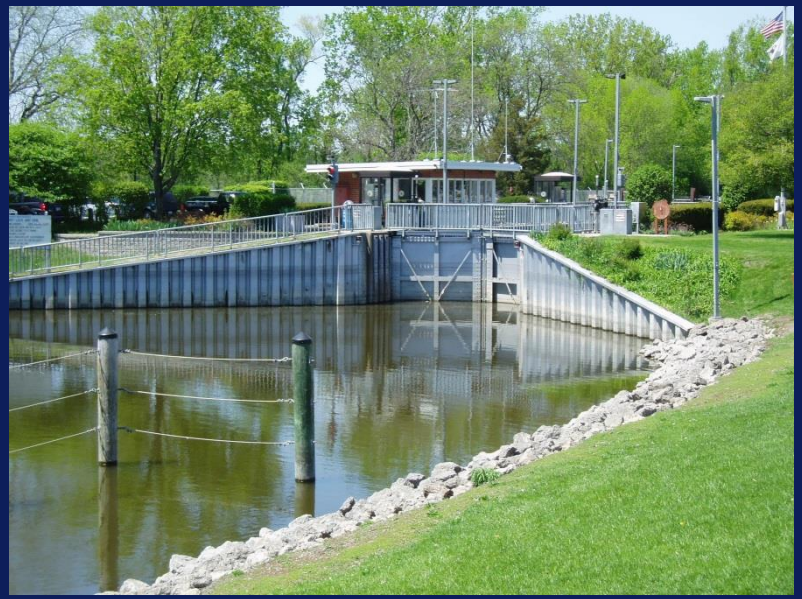
Navigation Lock

- Constructed 1958 – 1960
- Approx. usable chamber 18 feet by 60 feet
- 5.5-foot lift (normal pool)
- Operates during boating season (May 1 – October 31)
- Peak periods – lockage wait times as high as 4 hours

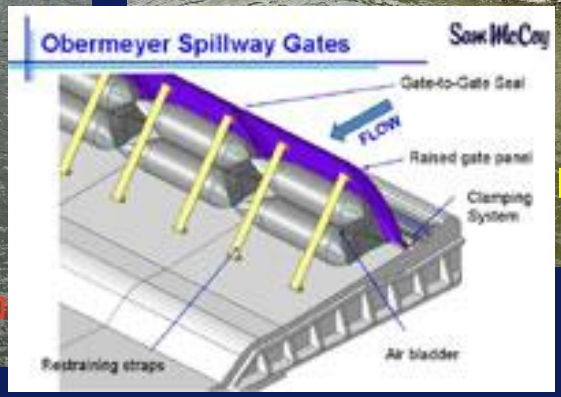


Existing Gate Structure

- Constructed 1938 – 1939
- 5–14-foot-wide sluice gates
- 4,500 – 5,500 CFS (normal pool)

Ancillary Features (not in contract)

- Fixed Crest Weir (constructed 1938 – 1939)
- Hinged Crest “Obermeyer” Gate (constructed 1999)



Existing Features

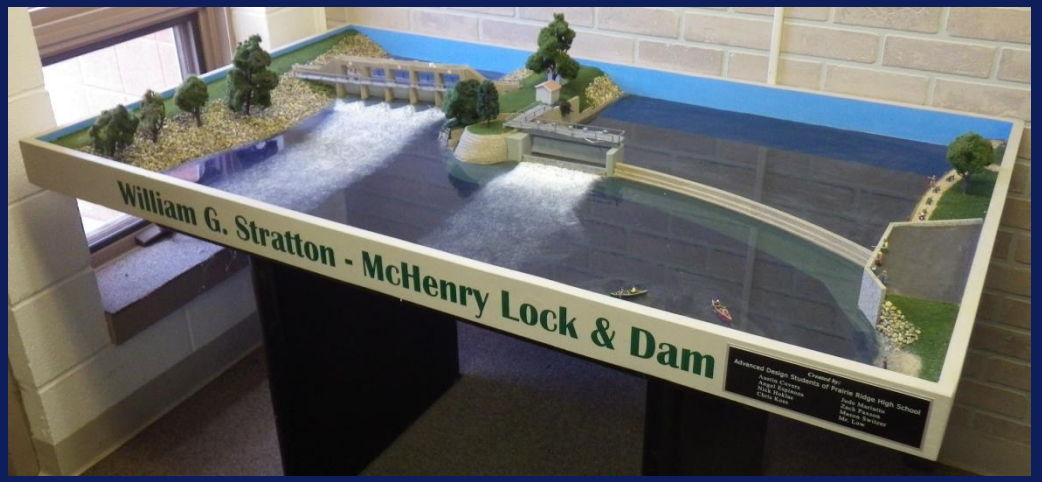
- Algonquin Dam
  - Fox River – 11 river miles downstream
  - Fixed crest weir with one Obermeyer hinged crest gate
  - Upgrade controls (remote monitoring and operations)

Phase 1 & 2 Professional Services

- IDOT – Professional Transportation Bulletin
  - November 2010 (Phase 1 & 2)
  - Engineering Services for Plans, Special Provisions and Cost Estimate
- QBS – Selection Process
- 4 Firms Submitted Proposals
- The Hanson Team was selected, including:
  - Hanson Professional Services Inc.
  - Bergmann & Associates Inc.
  - HDR Engineering

Stratton Lock & Dam Improvements

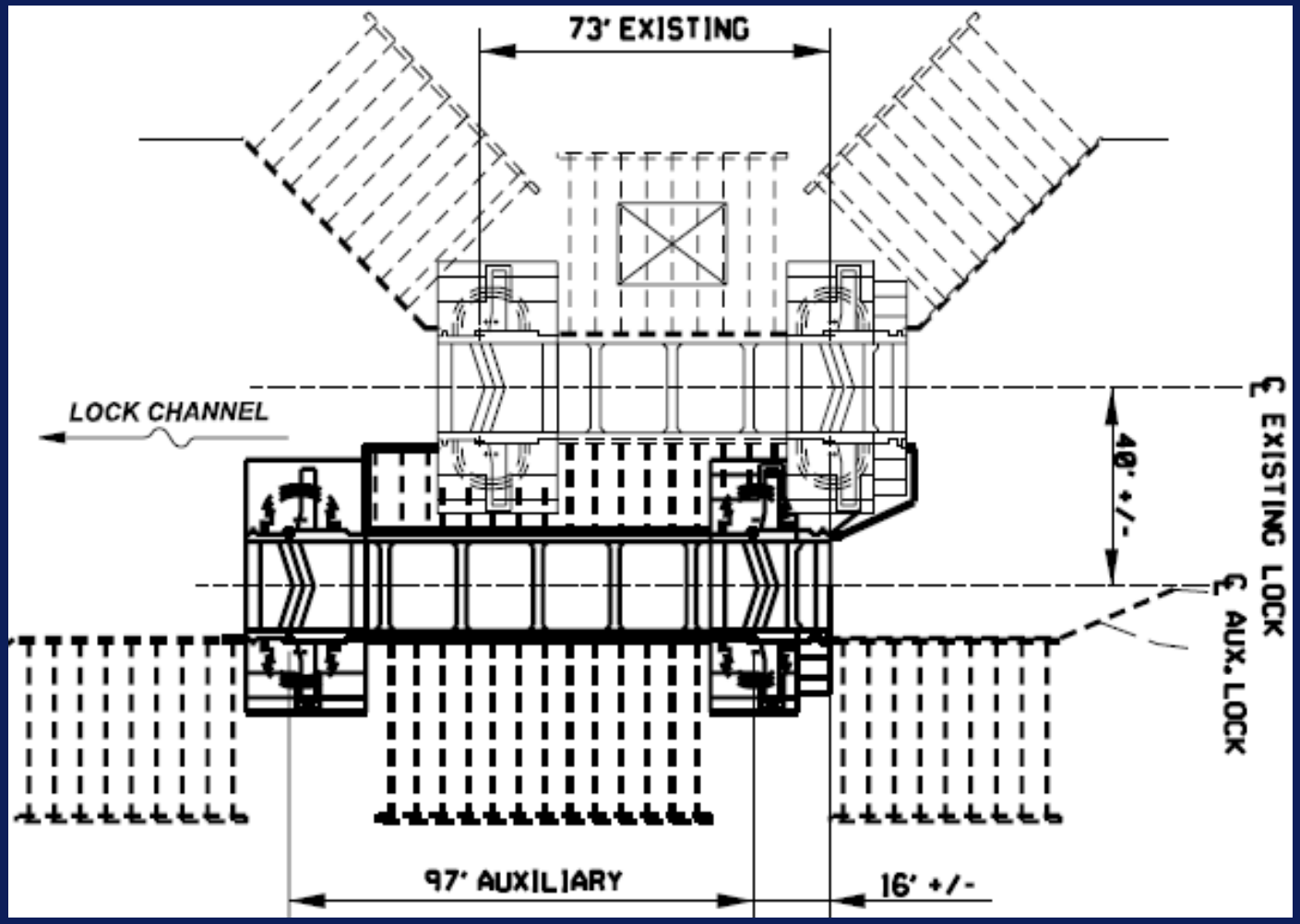
- Existing Facilities
- **Phase 1 – Pre-Design Study**
- Phase 2 – Design
- Phase 3 – Construction



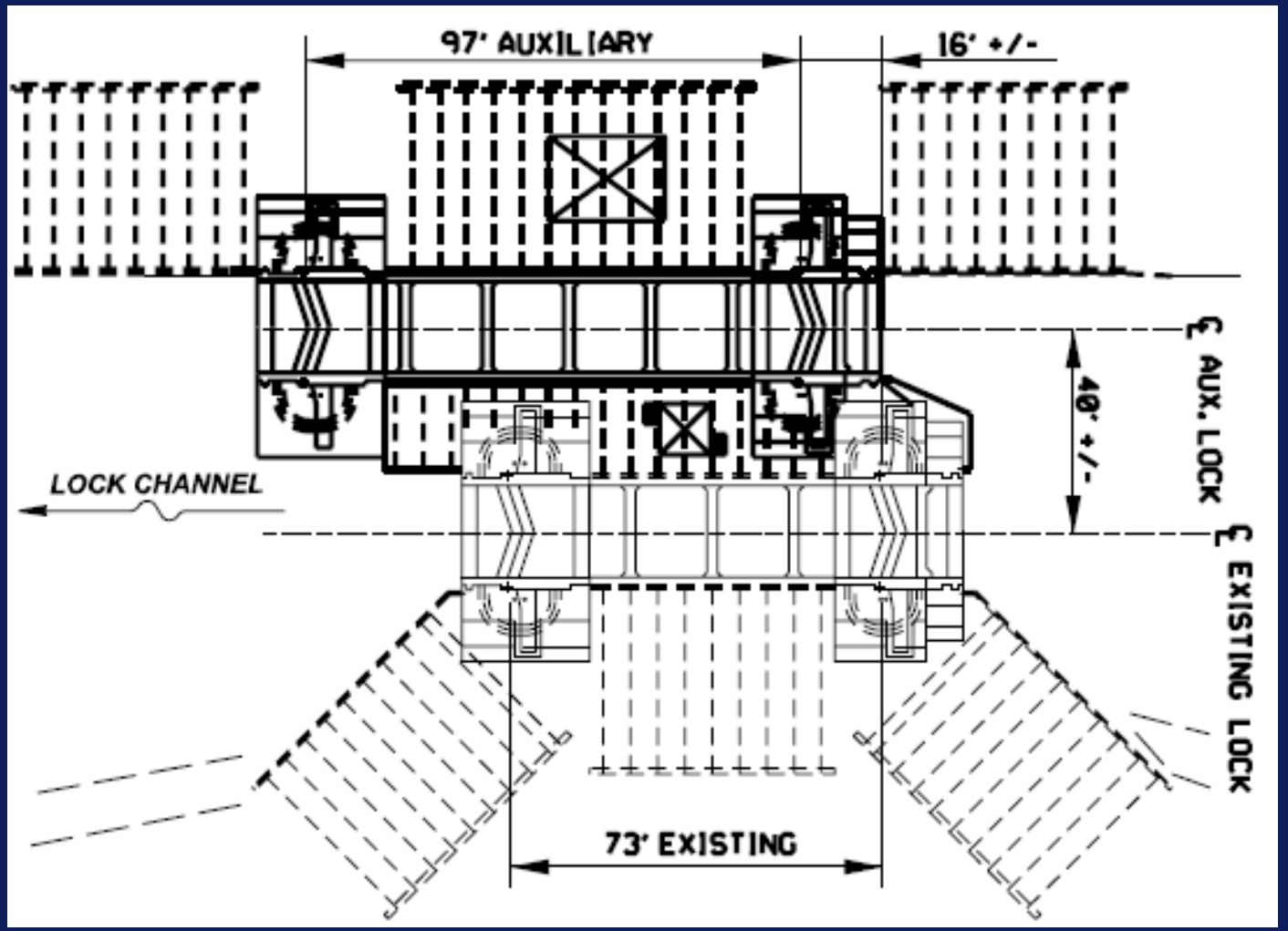
Phase 1 Pre-Design Study

- Alternatives - Weighted decision matrix of design criteria
  - Design, Constructability, Cost, O&M, Performance
- Lock Improvement Criteria
  - Increase capacity
  - Improved filling & emptying performance; minimize turbulence
  - Address structure deterioration
  - Update controls
  - Renovate Lock Control House structure & MEP systems
- Gate Improvement Criteria
  - Improvement & remote operation of water level control
  - Improve debris & ice management
  - Address structure deterioration & obsolete mechanical systems
  - Continuous discharge of 94 c.f.s. for downstream water supply

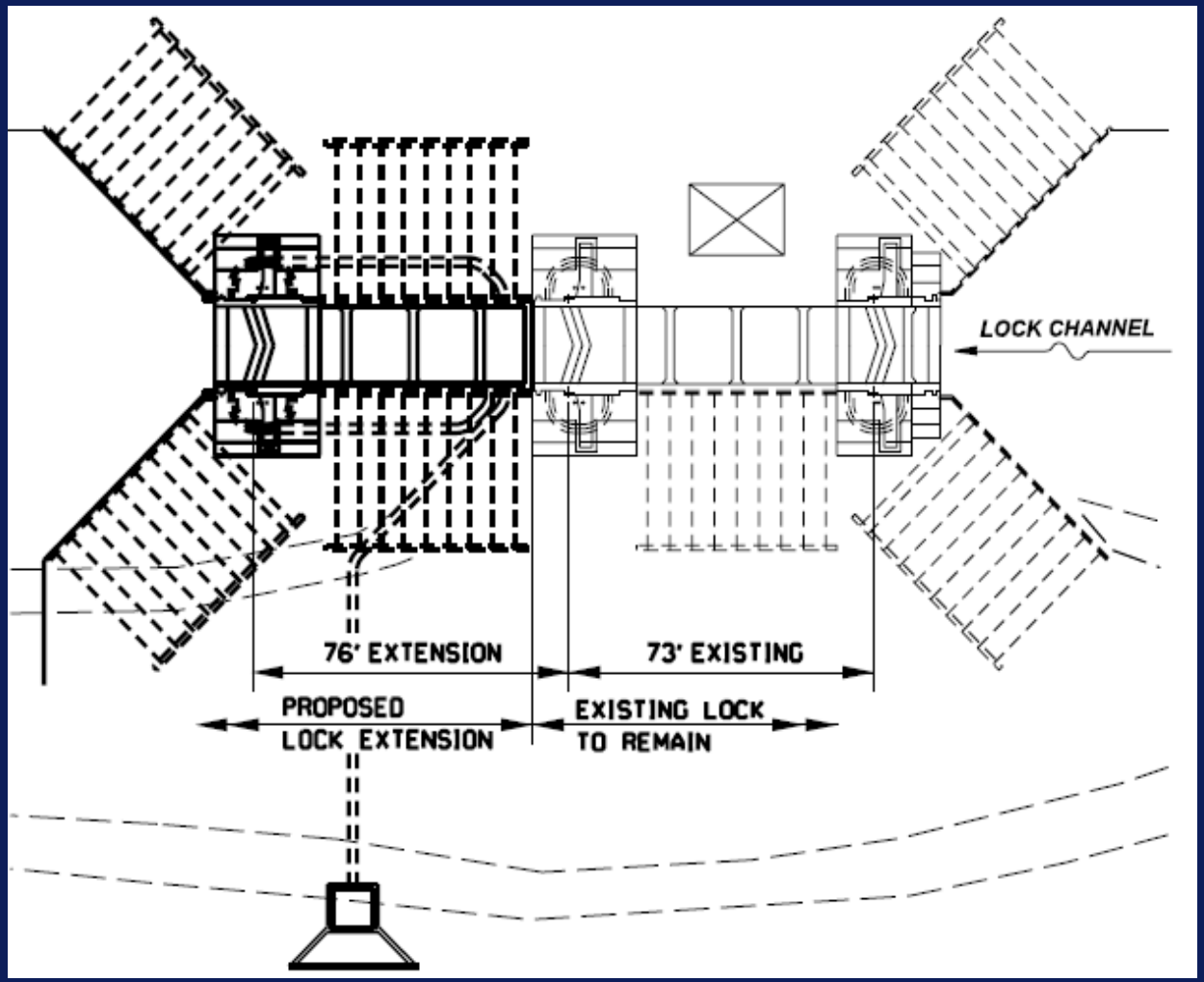
Lock Alternatives - New Riverward Lock Adjacent to Existing Lock



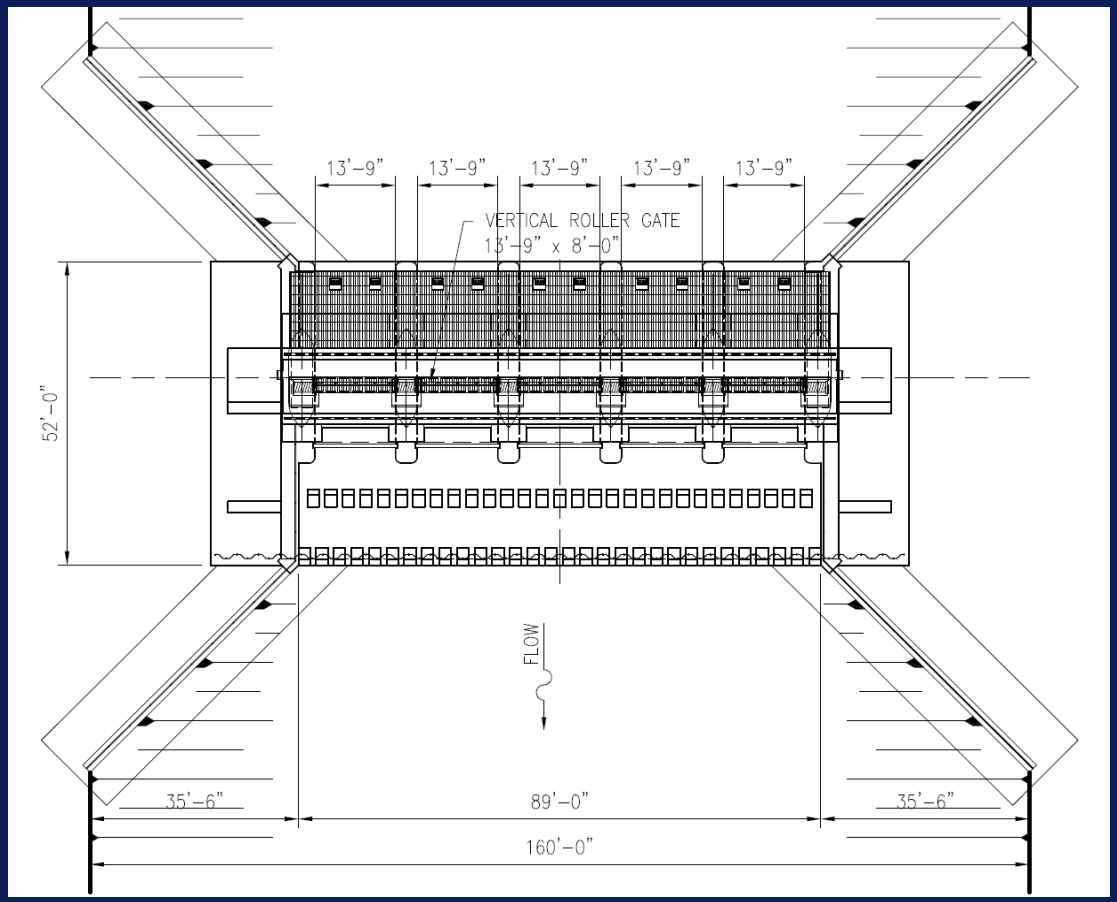
Lock Alternatives - New Landward Lock Adjacent to Existing Lock



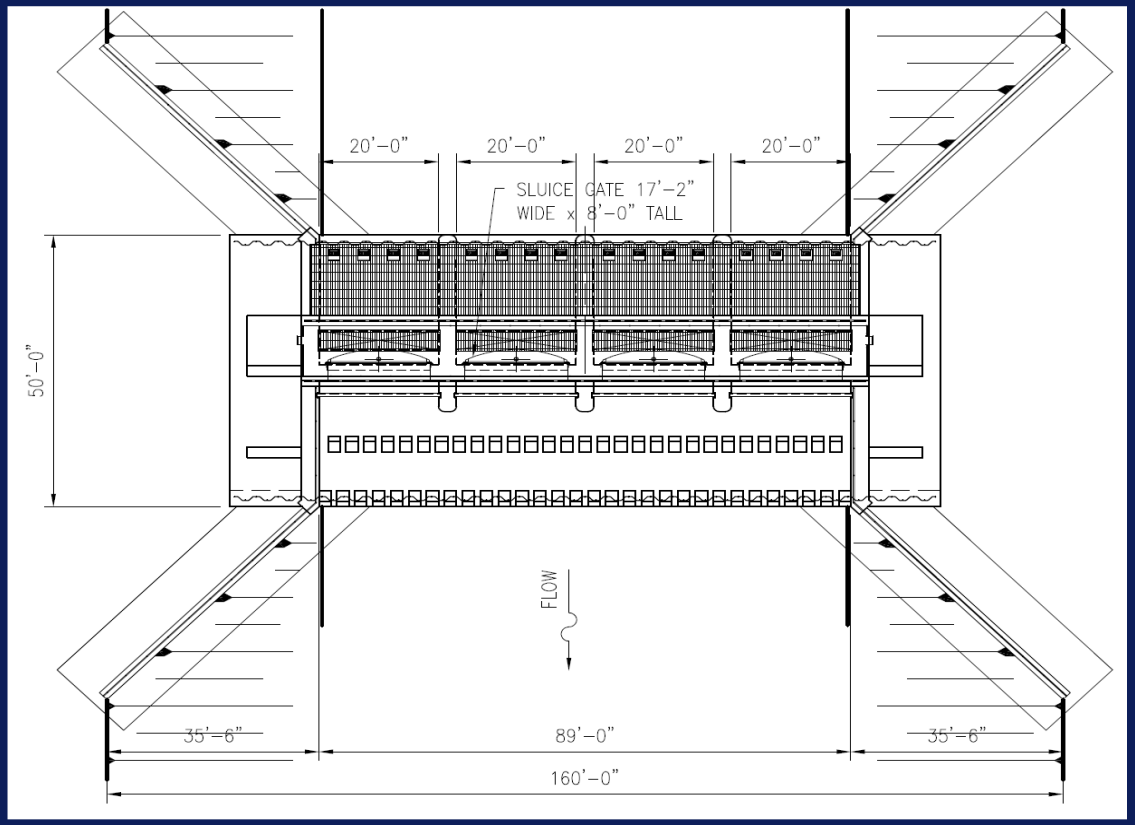
Lock Alternatives - Extension of Existing Lock



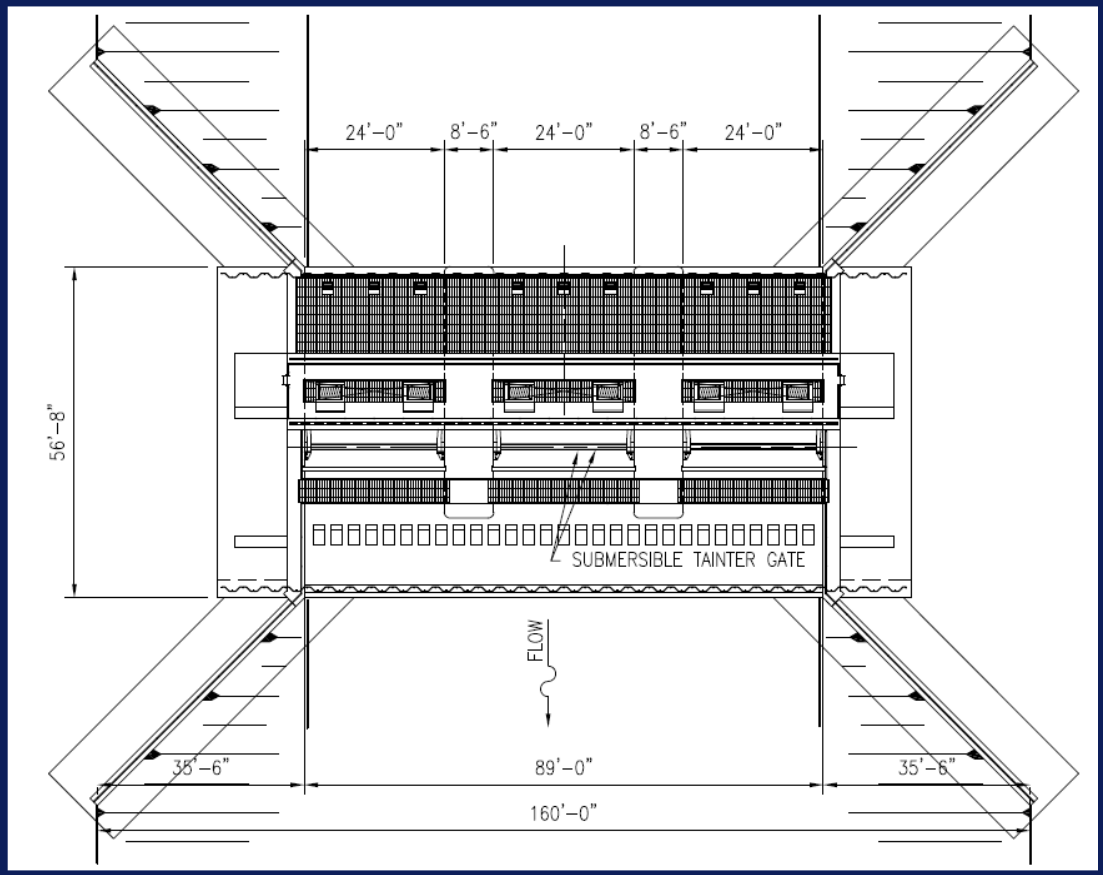
Gate Alternatives - Rehabilitate Existing Structure / Replace Five Vertical Roller Gates



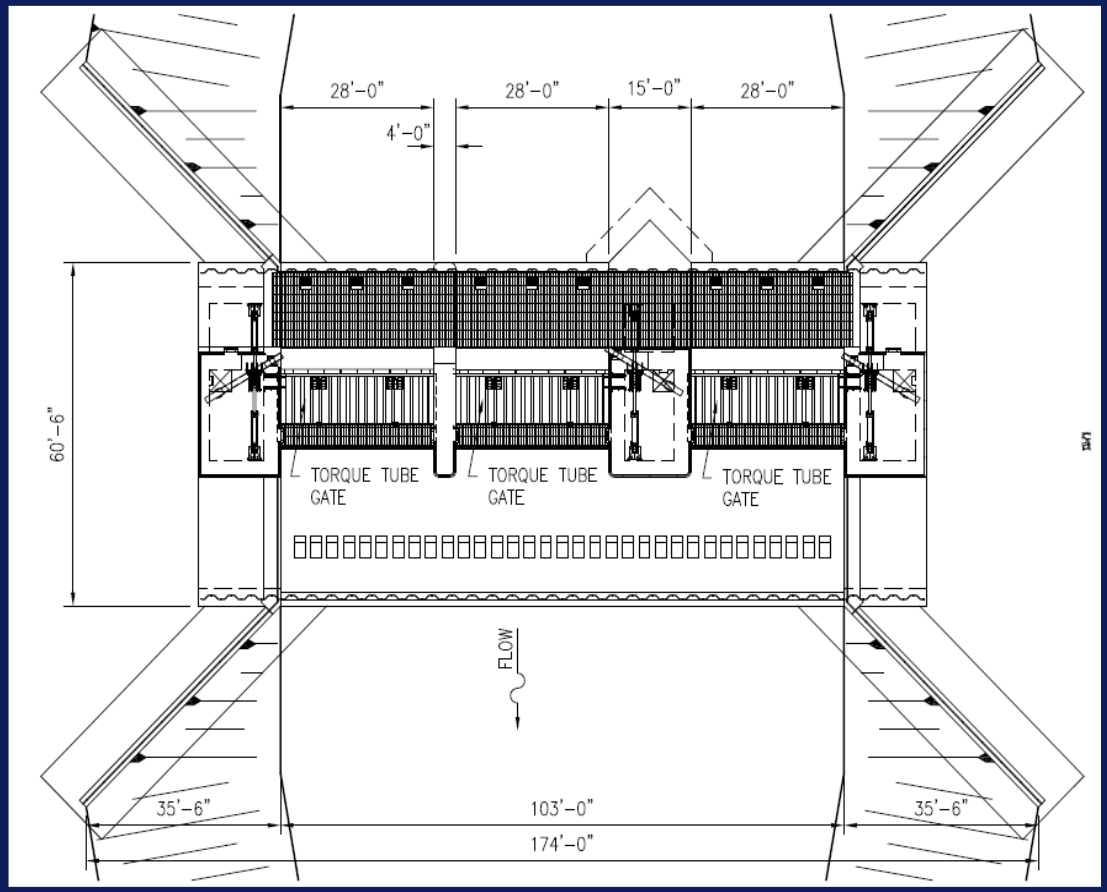
Gate Alternatives - Construct New Gate Structure with Four Vertical Roller Gates



Gate Alternatives - Construct New Gate Structure with Three Submersible Tainter Gates

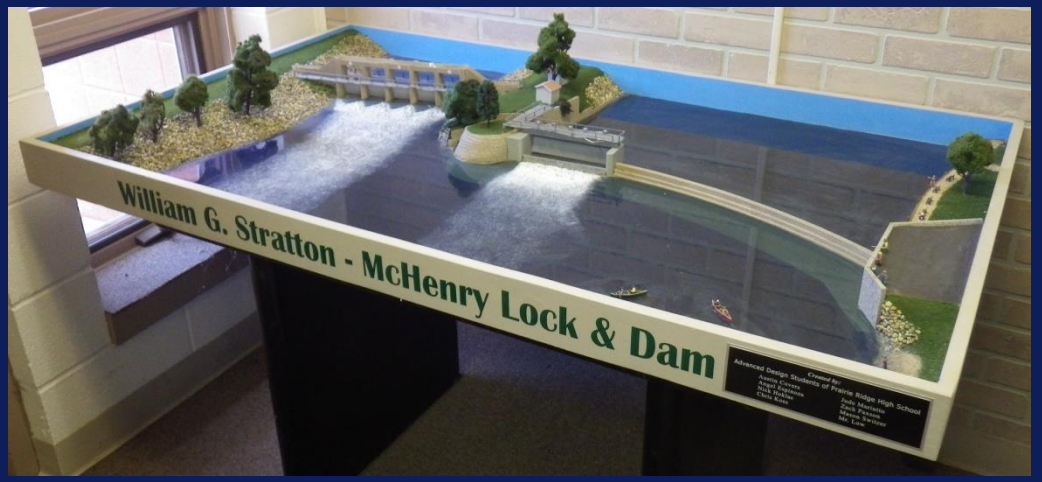


Gate Alternatives - Construct New Gate Structure with Three Hinged Crest Gates



Stratton Lock & Dam Improvements

- Existing Facilities
- Phase 1 – Pre-Design Study
- **Phase 2 – Design**
- Phase 3 – Construction



Phase 2 Design Scope of Work

- Downstream lock extension w/ new water intake structure
- Existing lock wall & miter gate rehabilitation
- Lock House renovation
- New gate structure (upstream) with three 28-foot-wide hinged crest gates, torque tube type
- Demolish existing gate structure
- North berm improvements
- Algonquin Dam controls for remote monitoring and operations

Special Construction Criteria

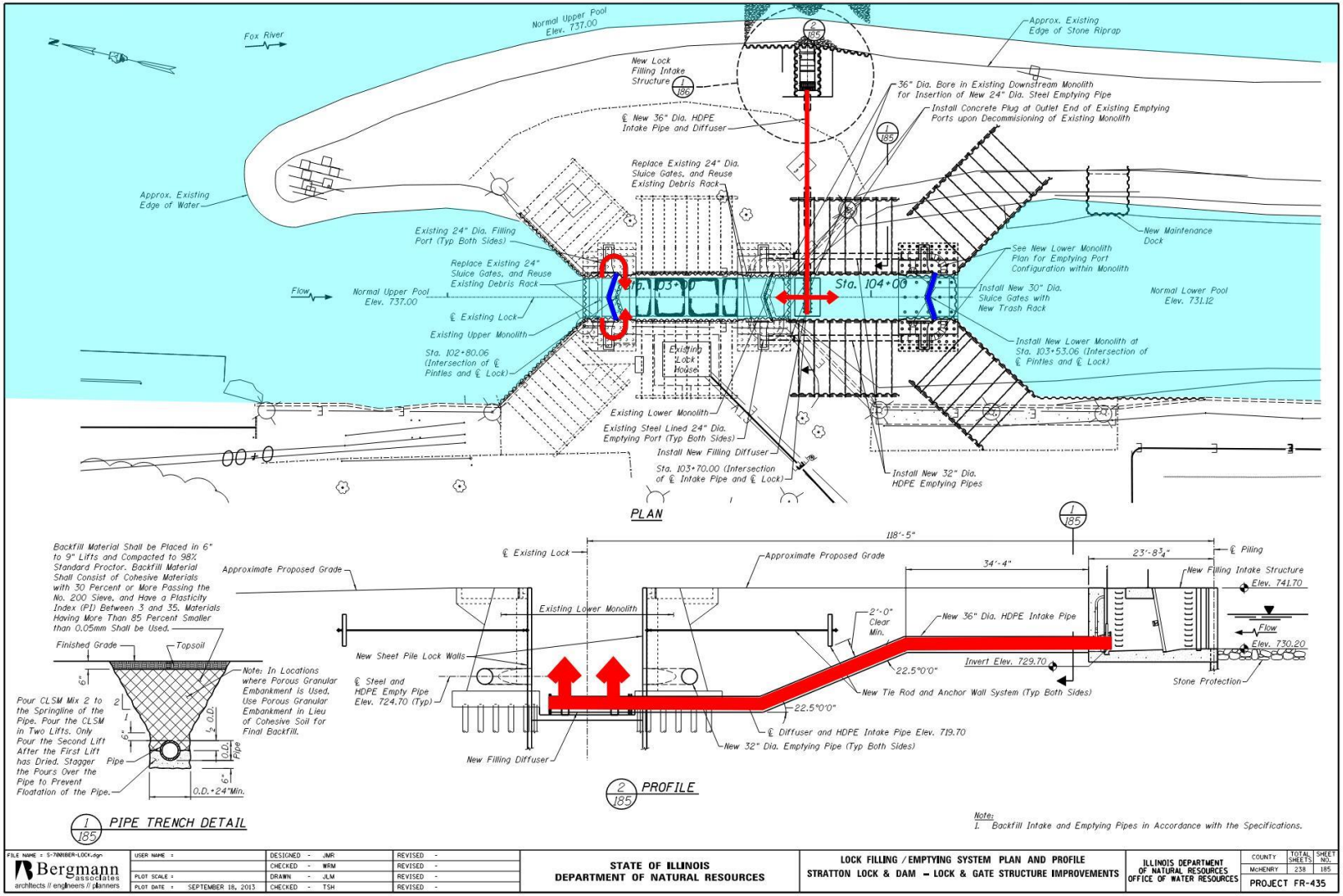
- Lock Rehabilitation & Expansion
  - Minimize lockage interruptions
  - Construction - Nov. 1 to Apr. 31 (non-navigation season)

- New Gate Structure
  - Maintain water level control; flood mitigation
  - Maintain recreational pool
  - Phased upstream construction; minimize channel obstruction
  - Difficult access (islands)
  - Designated fishing areas

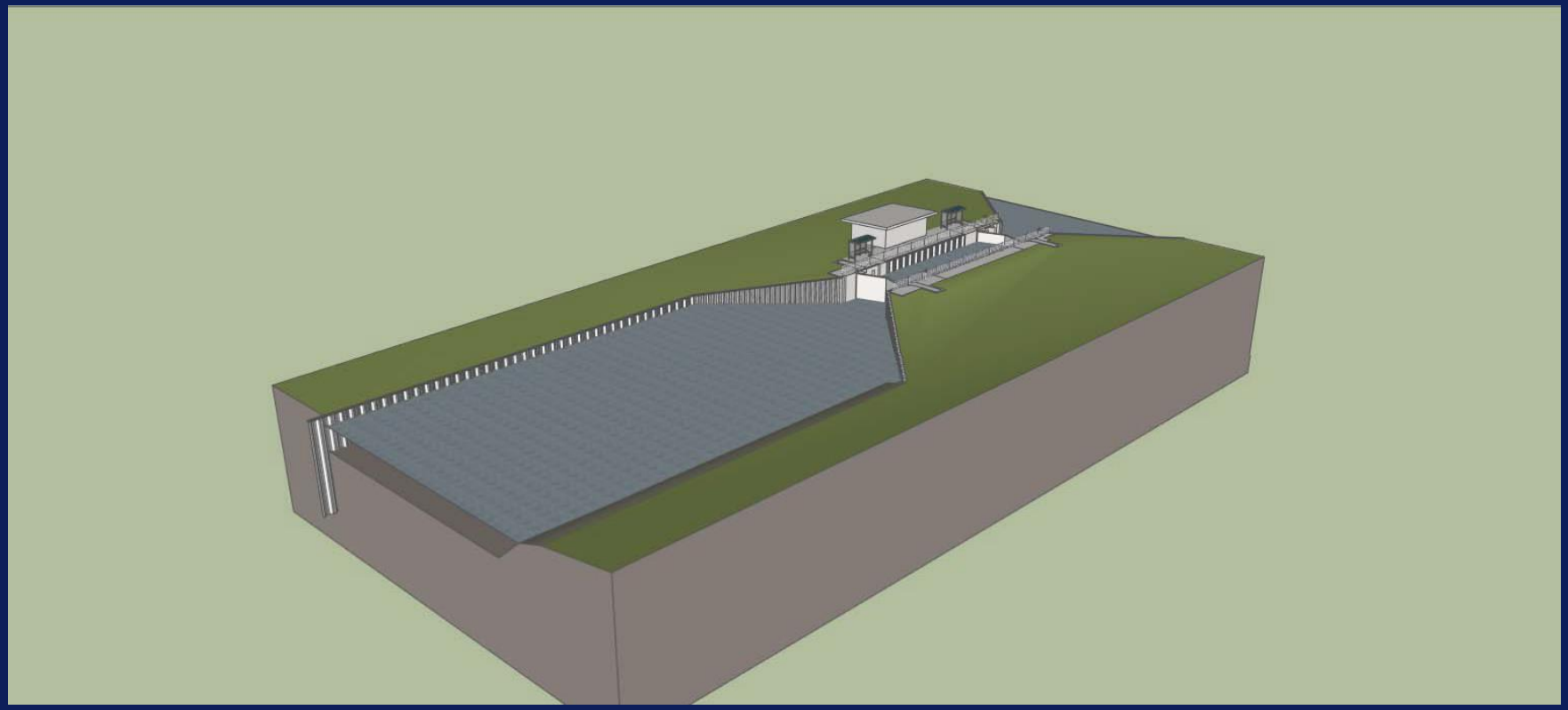
Lock Rehabilitation & Expansion

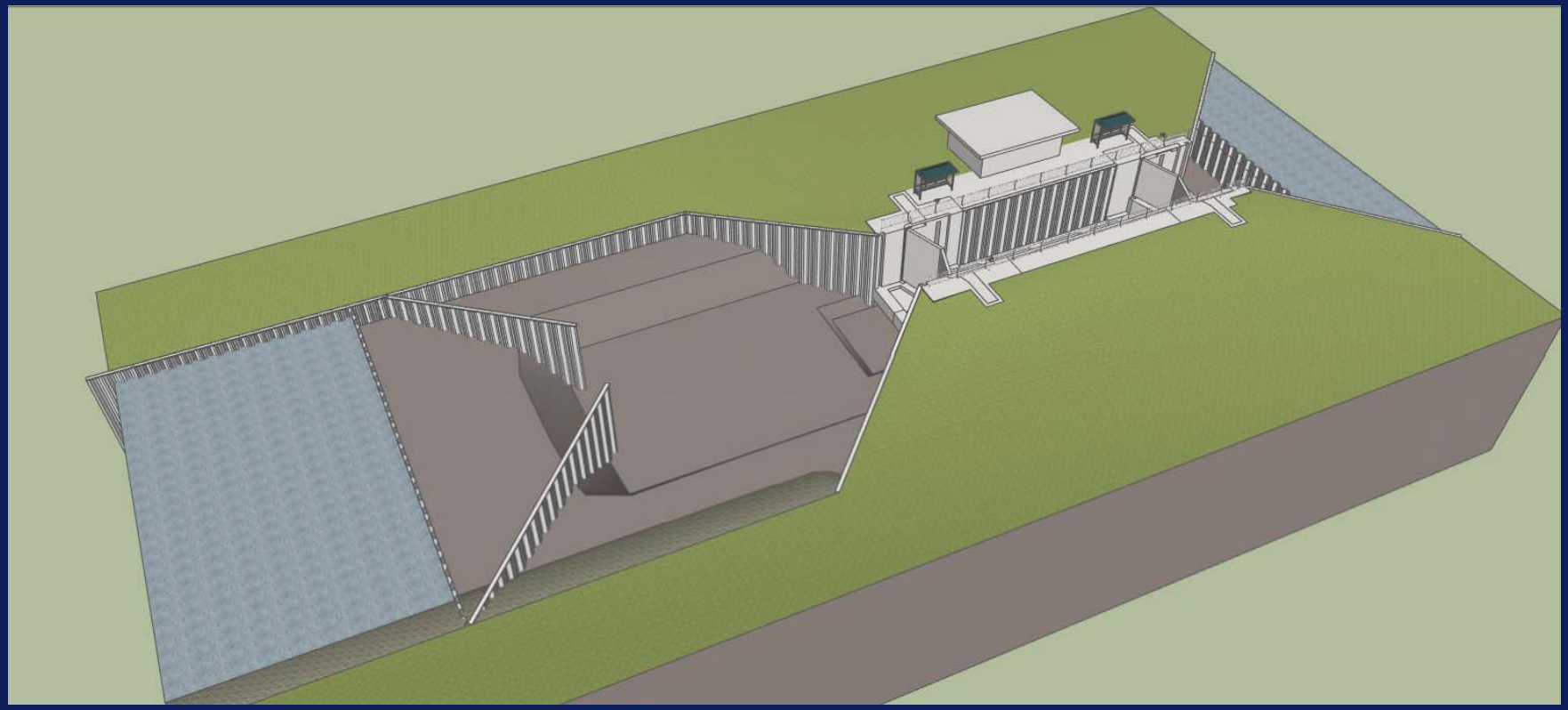
- Existing Lock Chamber

Lock Rehabilitation & Expansion

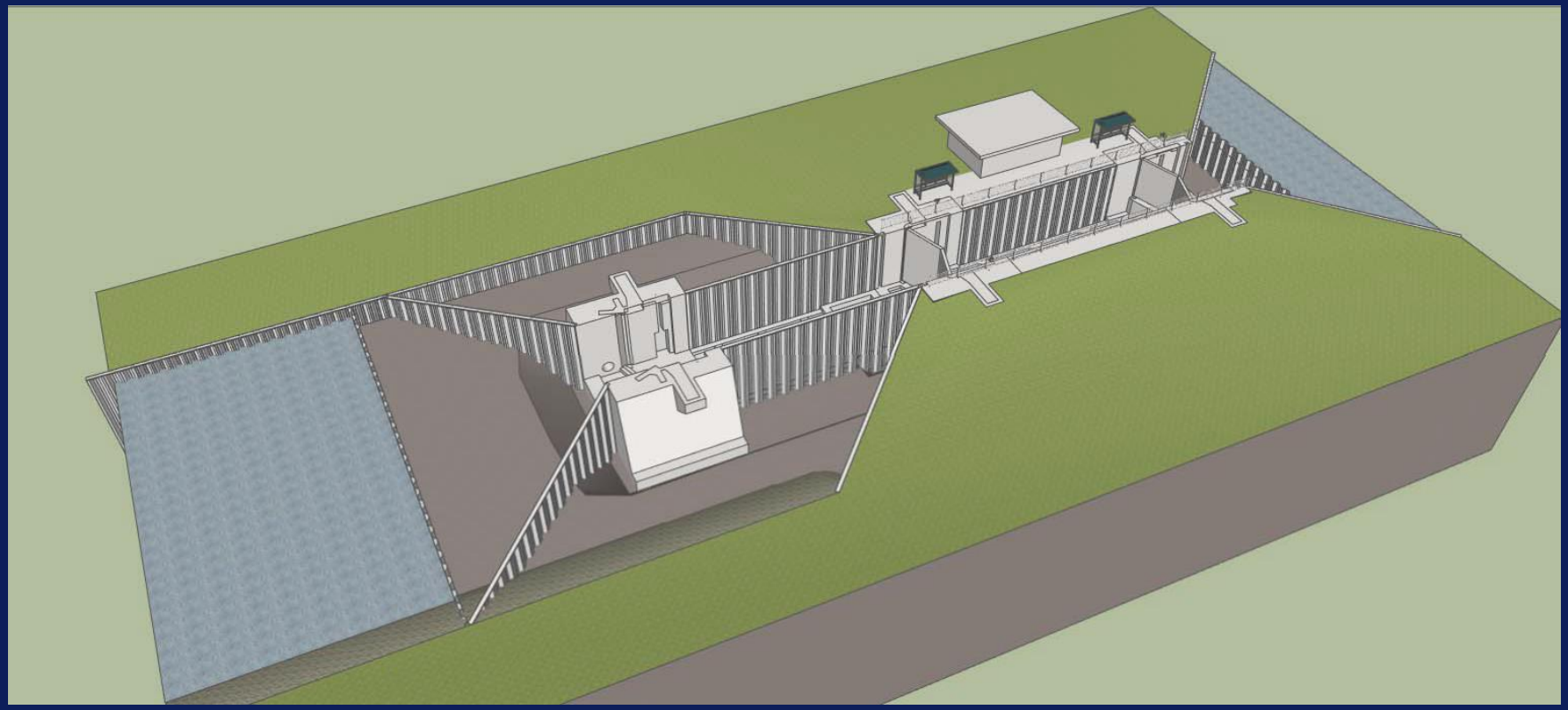


Lock Rehabilitation & Expansion

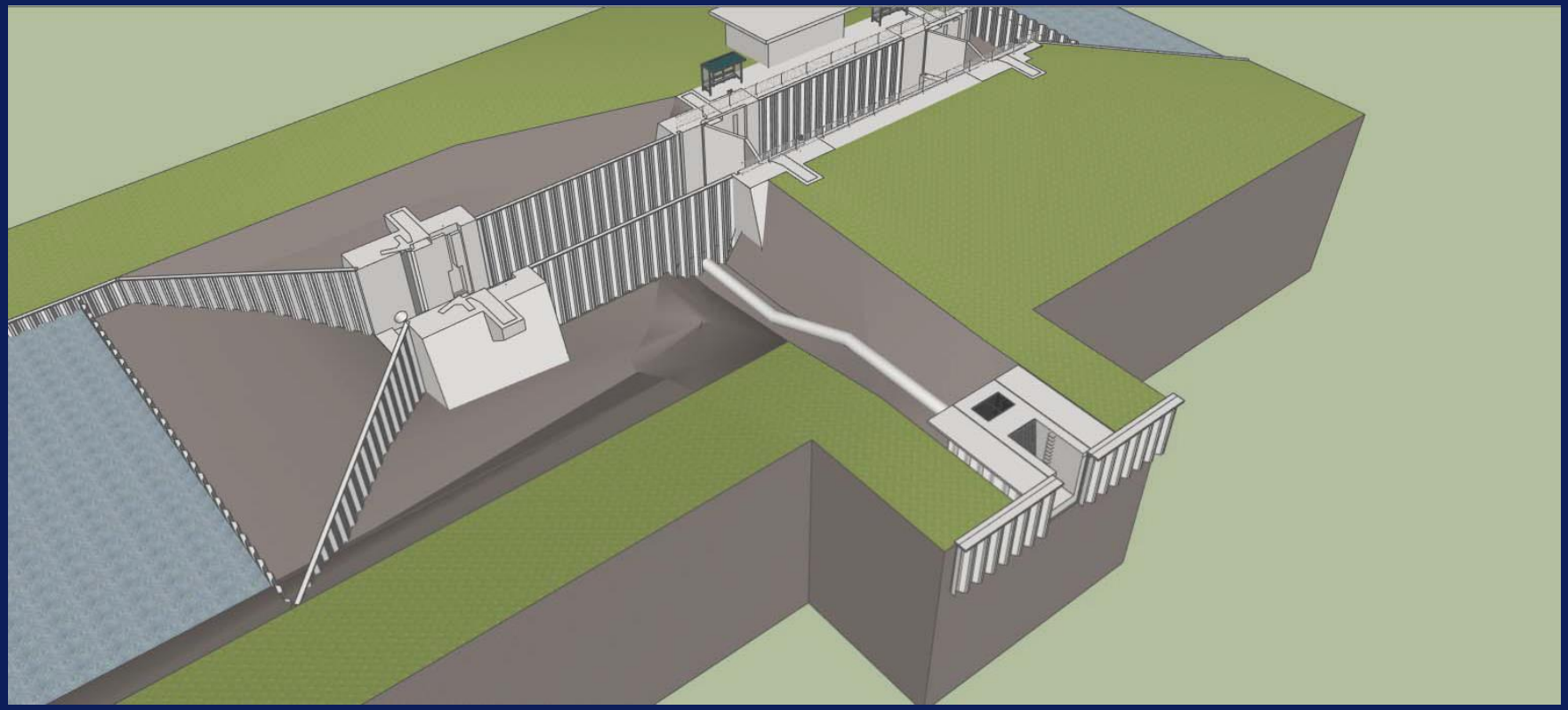




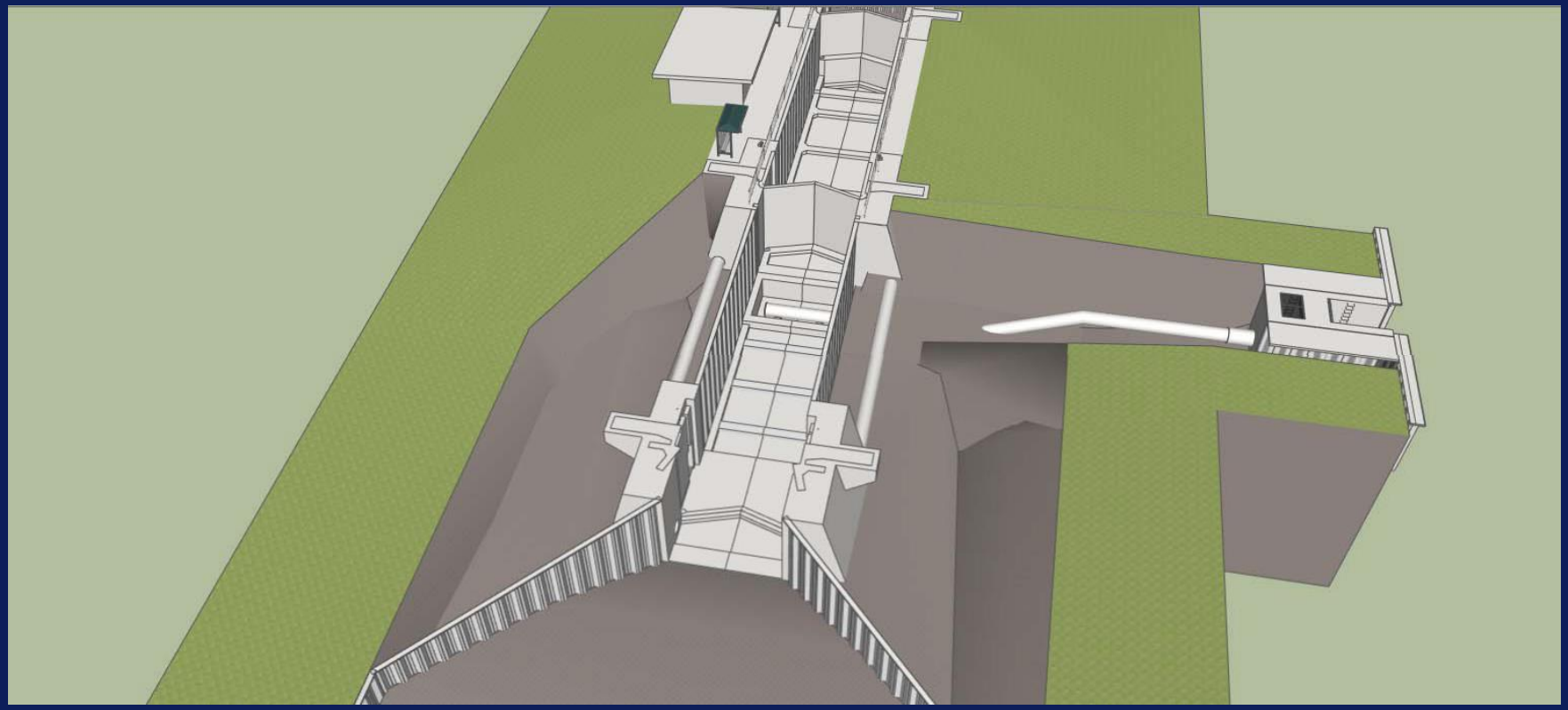
Place Cofferdam
Excavate and Drive Wing Wall Sheeting



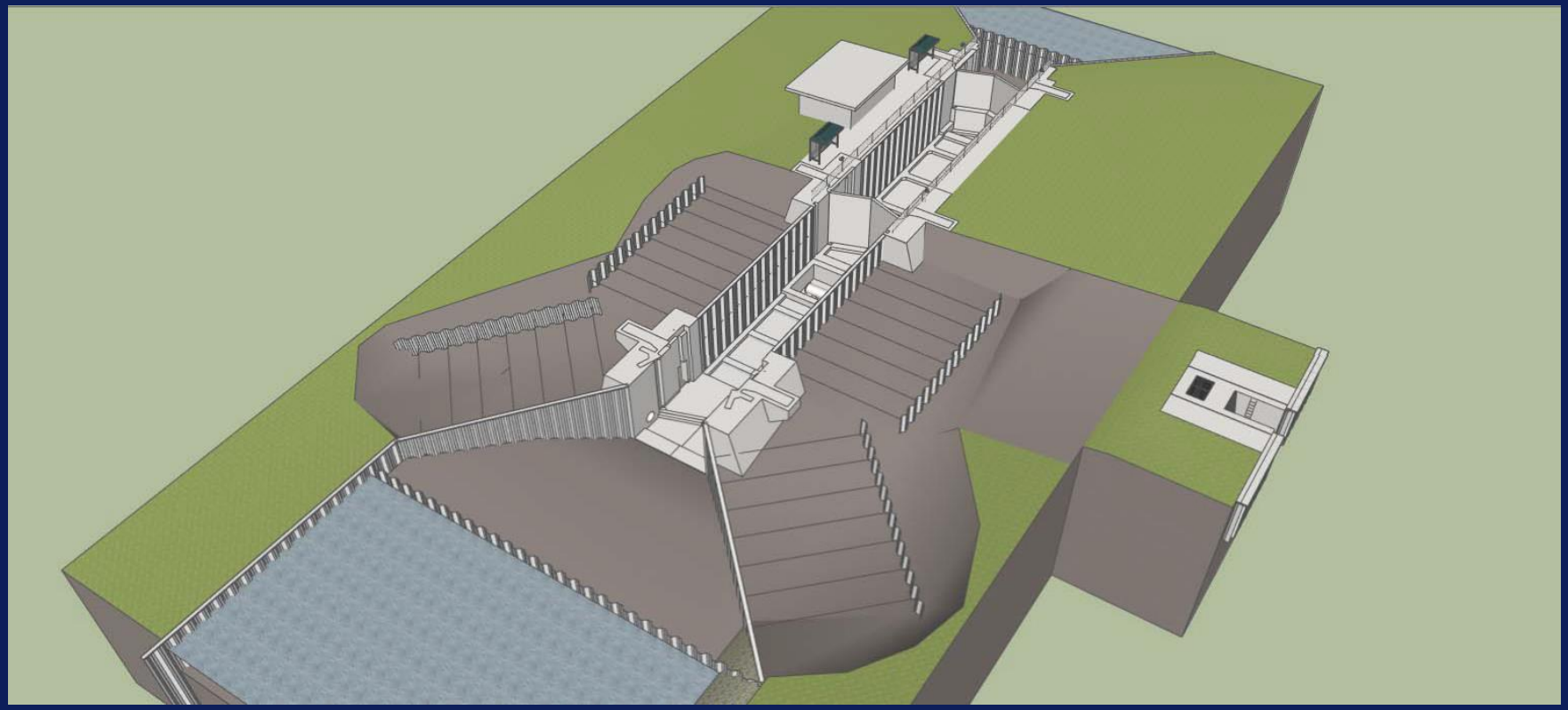
Place Lock Chamber Sheeting
Construct New Concrete Monolith



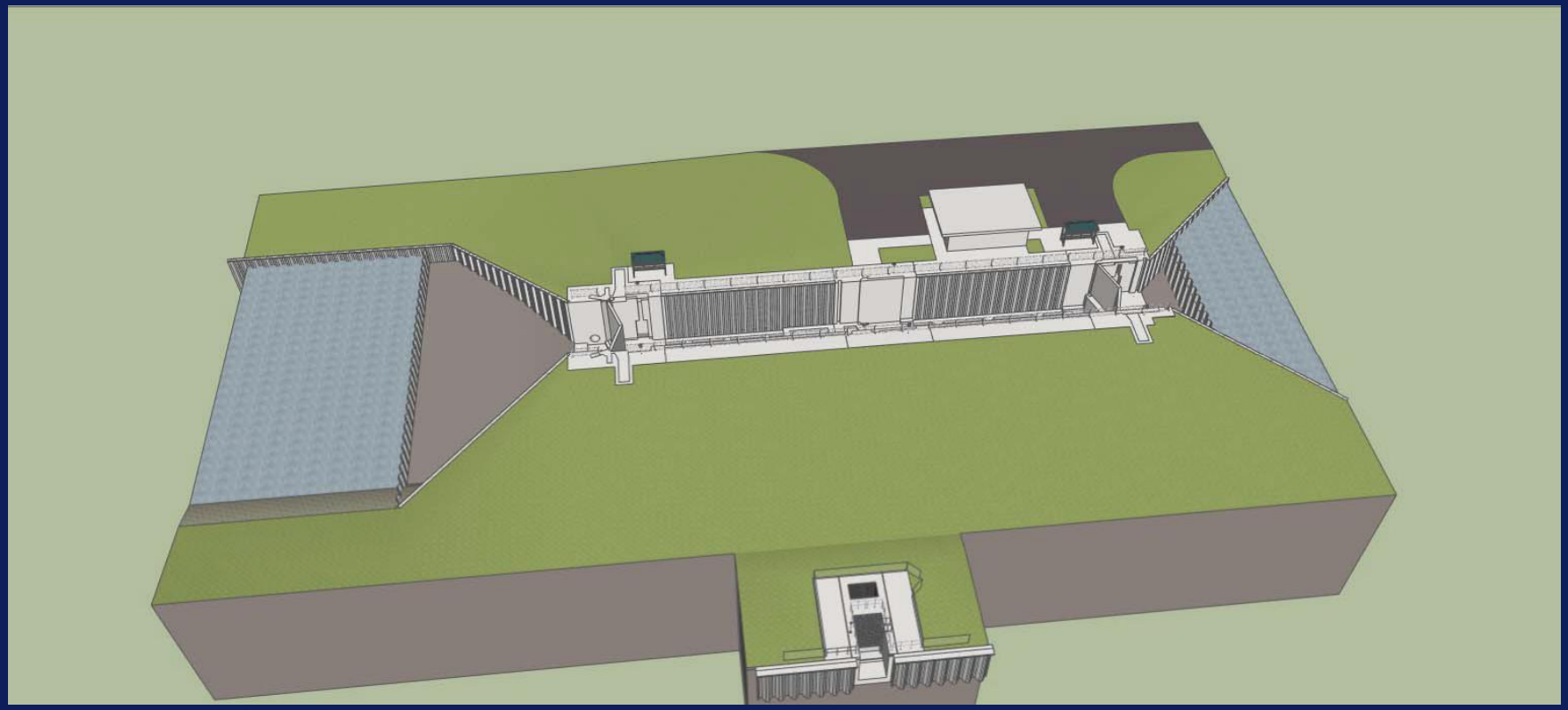
Excavate for and place new fill pipe
Build new intake structure



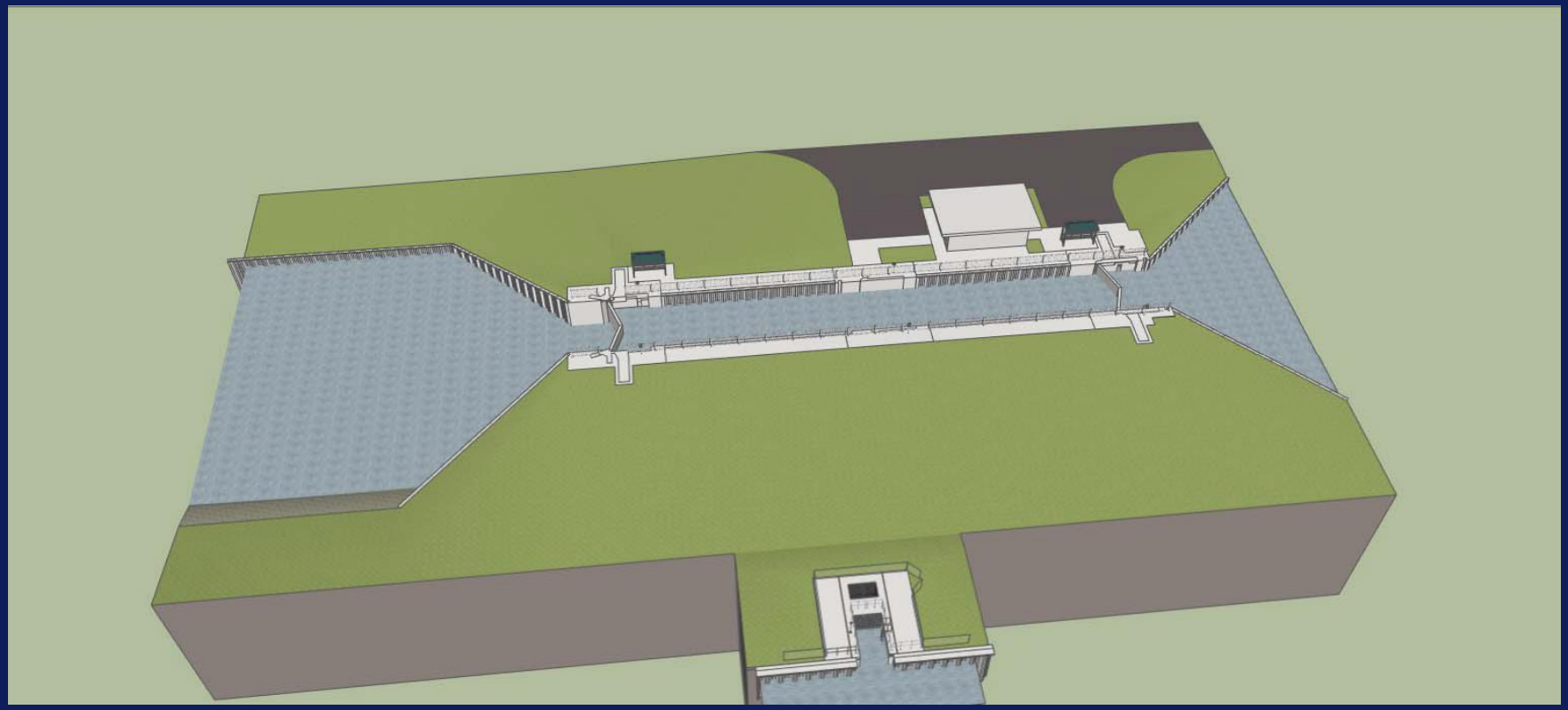
Construct Emptying Pipes



Backfill Emptying Pipes and Construct Tiebacks



Rehabilitate & Relocate Downstream Gates,
Backfill Tiebacks, Sitework

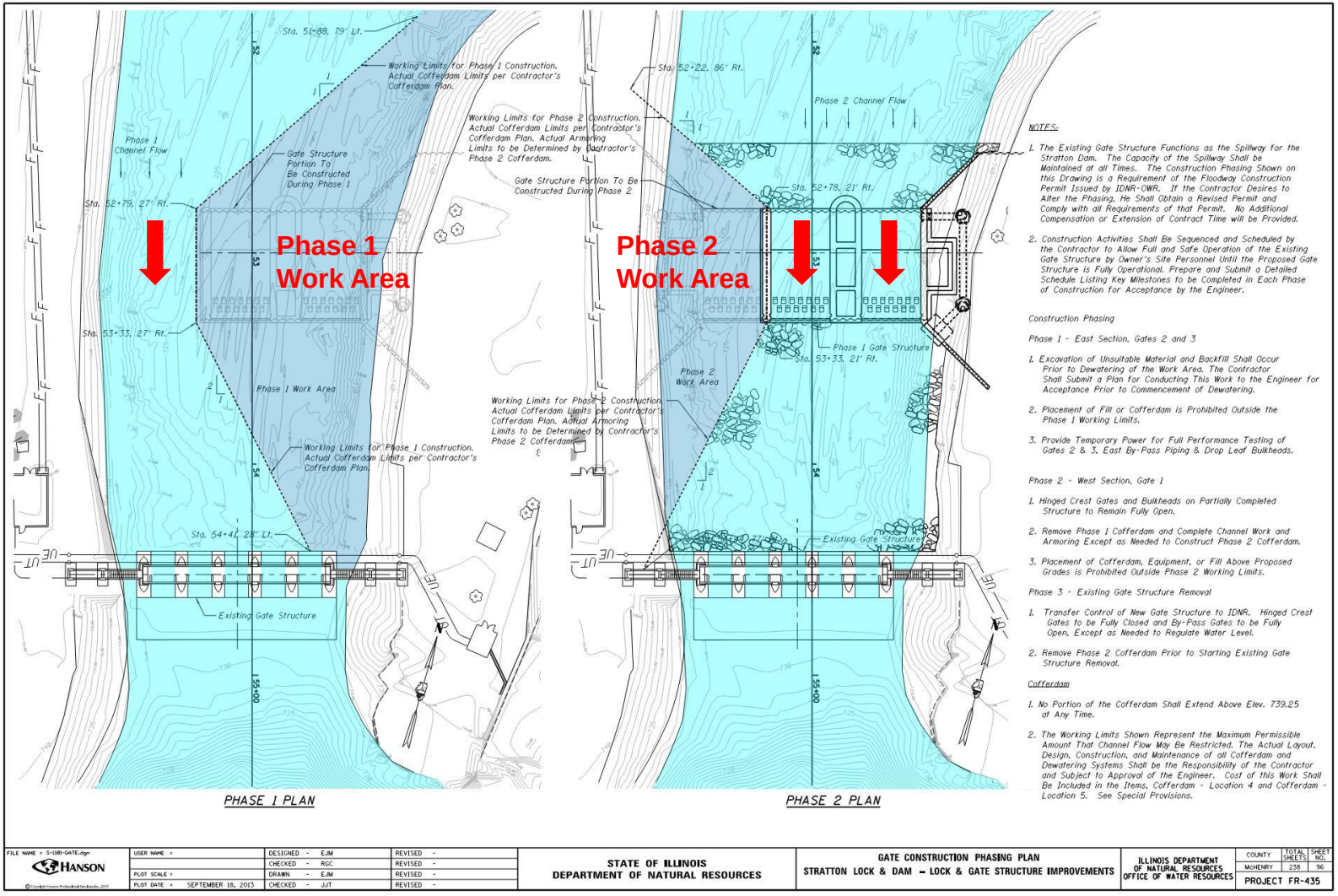


Remove Cofferdam
Open for Business – May 2015

Gate Structure Replacement

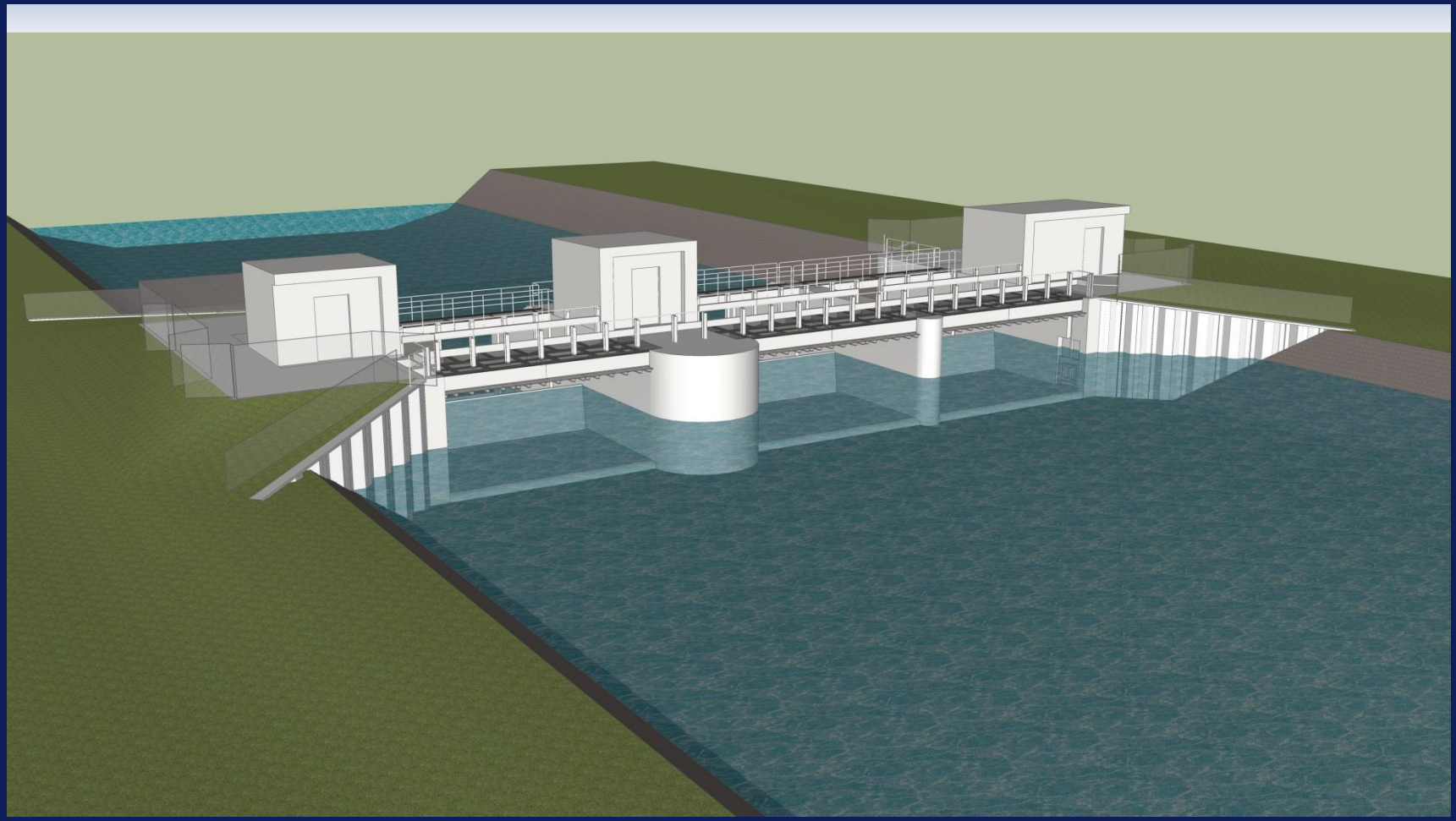
Existing Structure with 5 Vertical Roller Gates

New Gate Structure

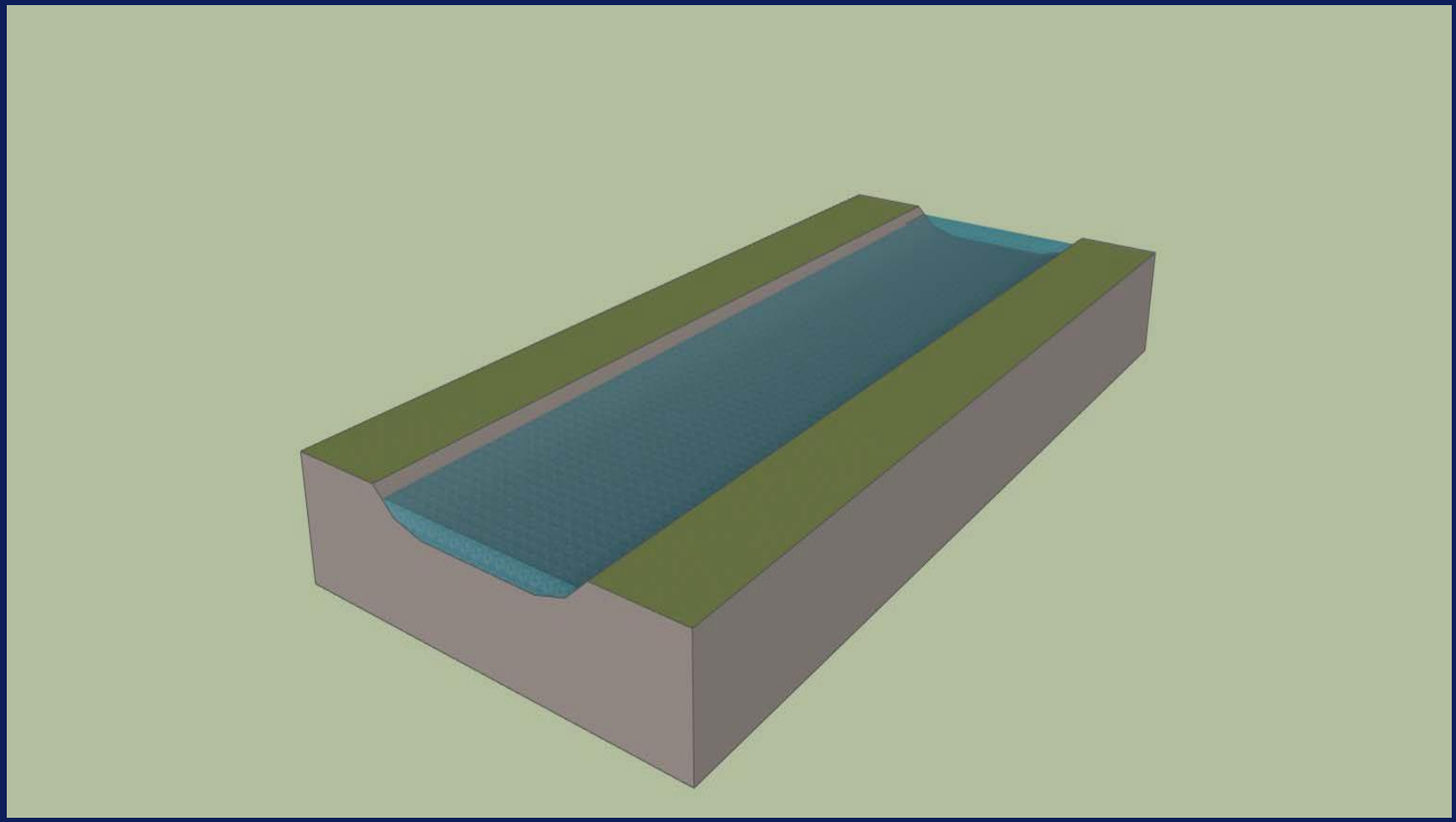


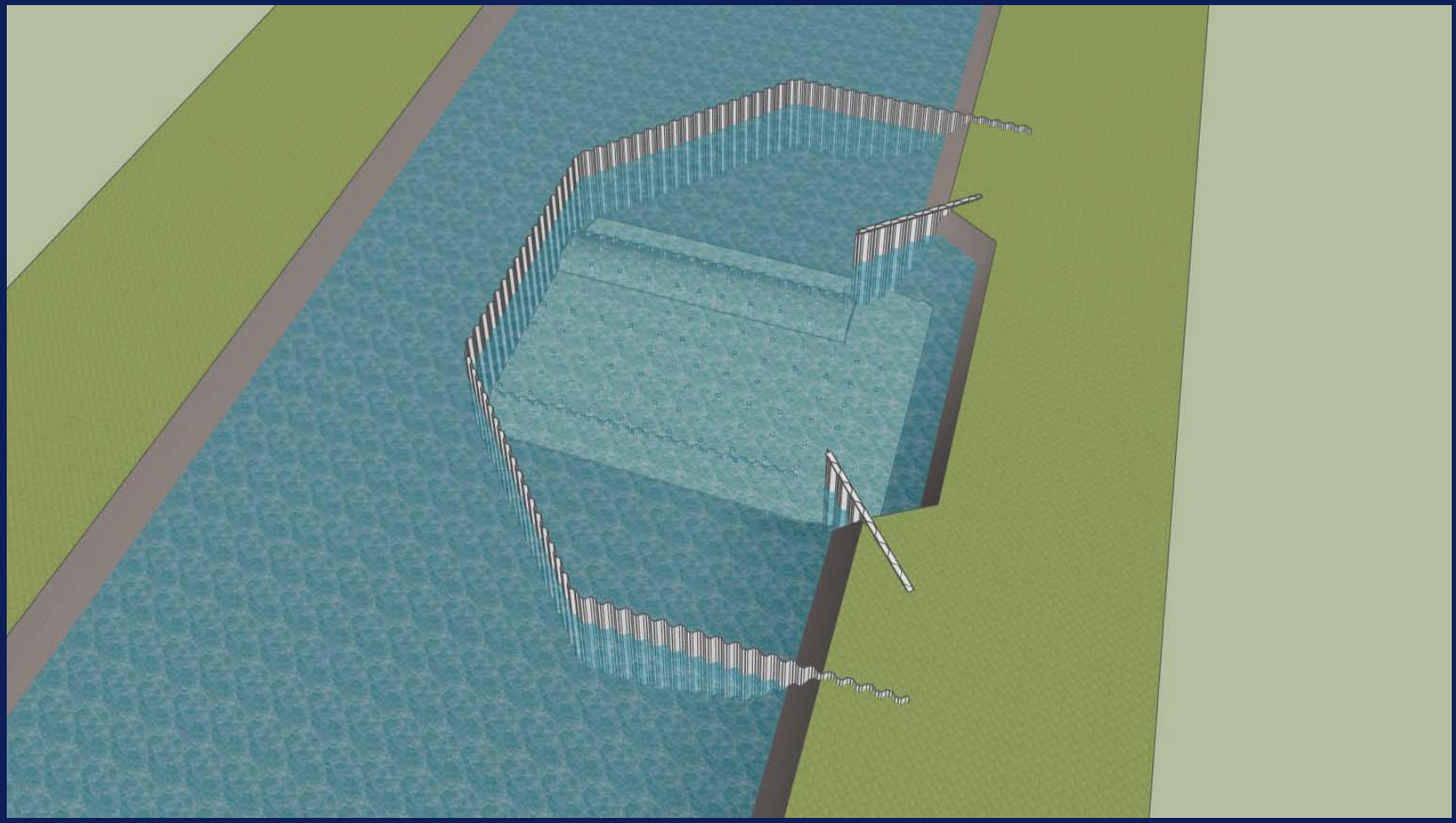
Phased Construction

New Gate Structure with Three Torque Tube Gates

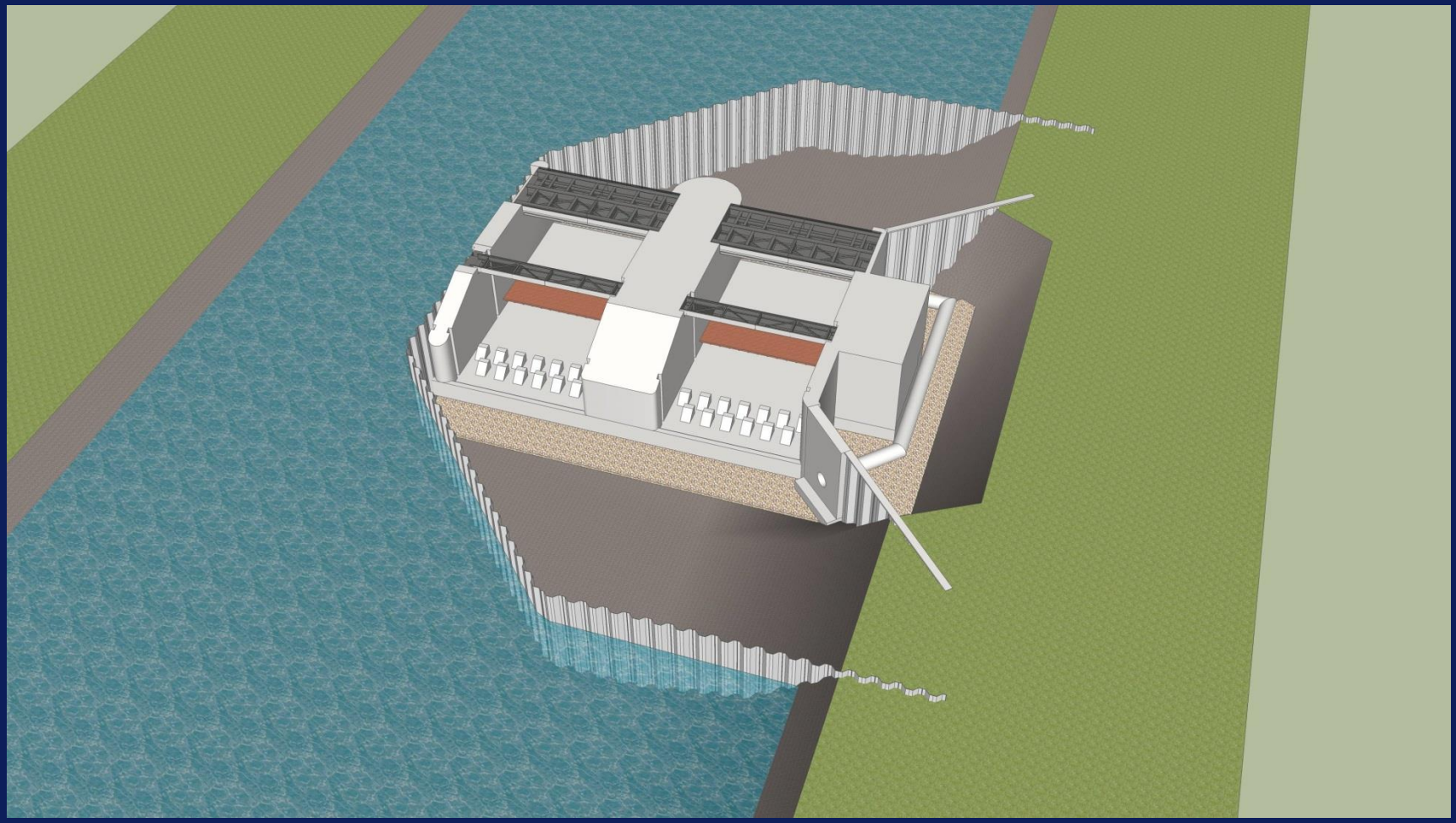


New Gate Structure

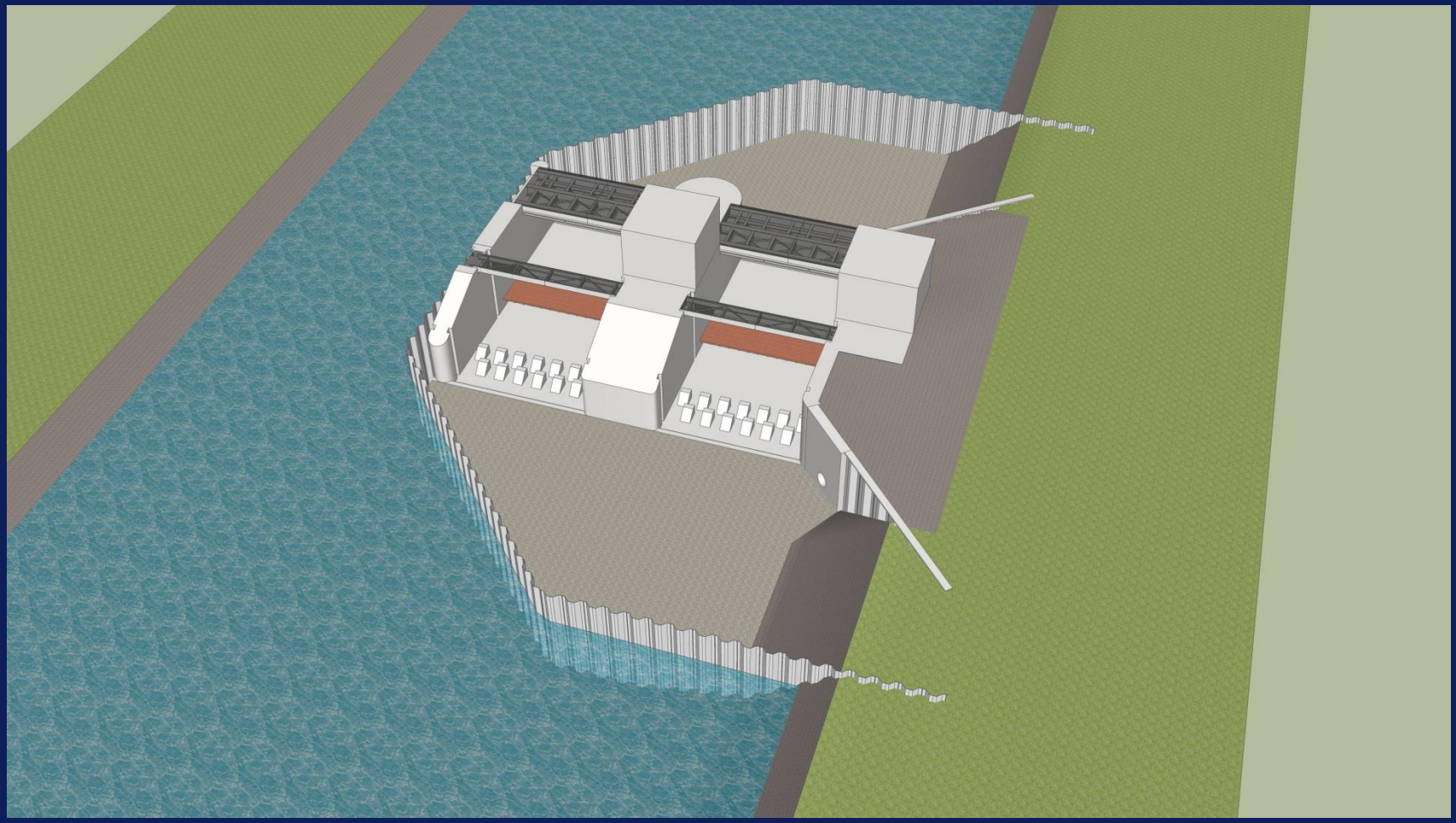




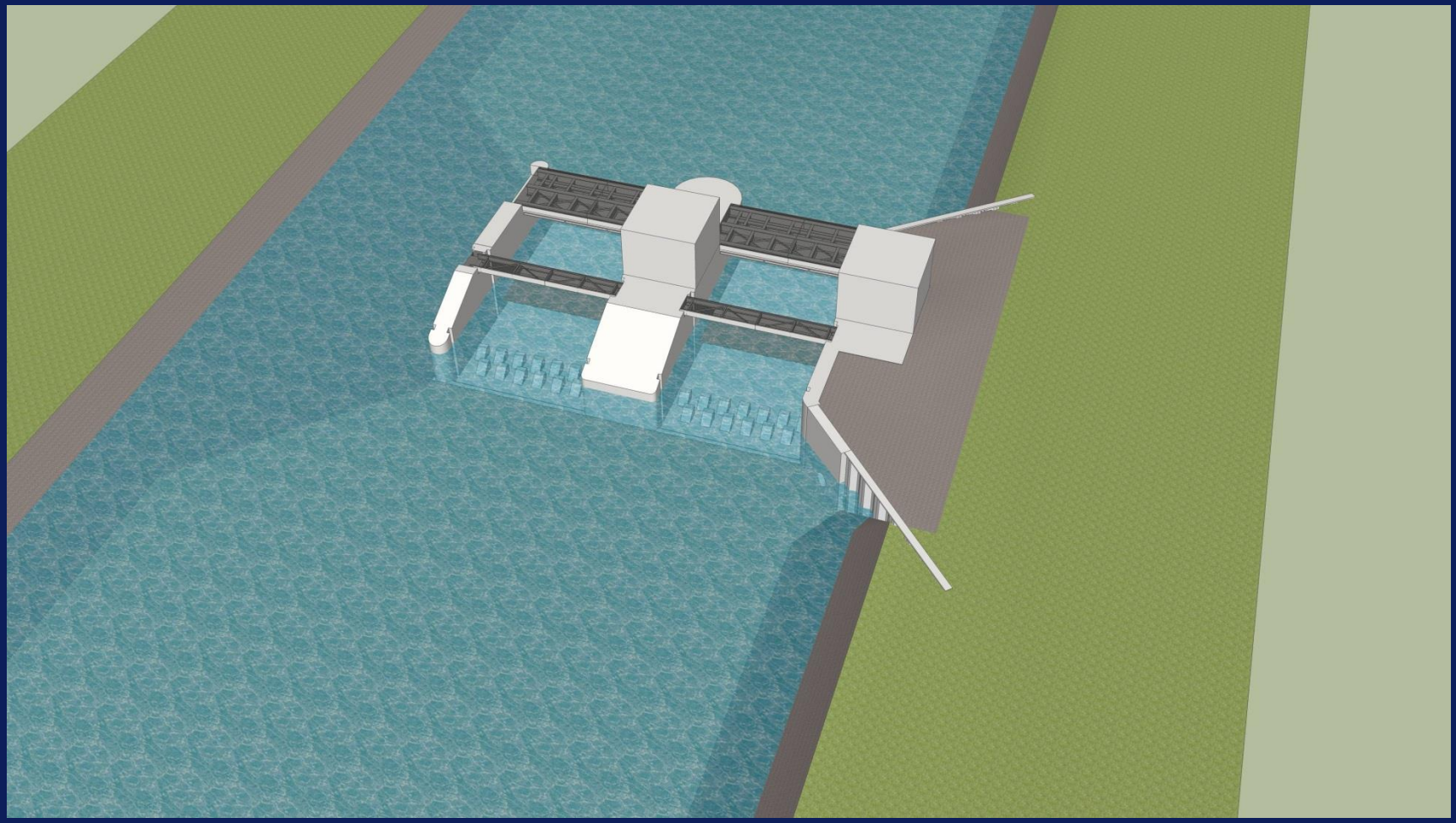
Construct Cofferdam, Drive Sheeting for Cutoff & Wing Walls, Excavate Unsuitable Material



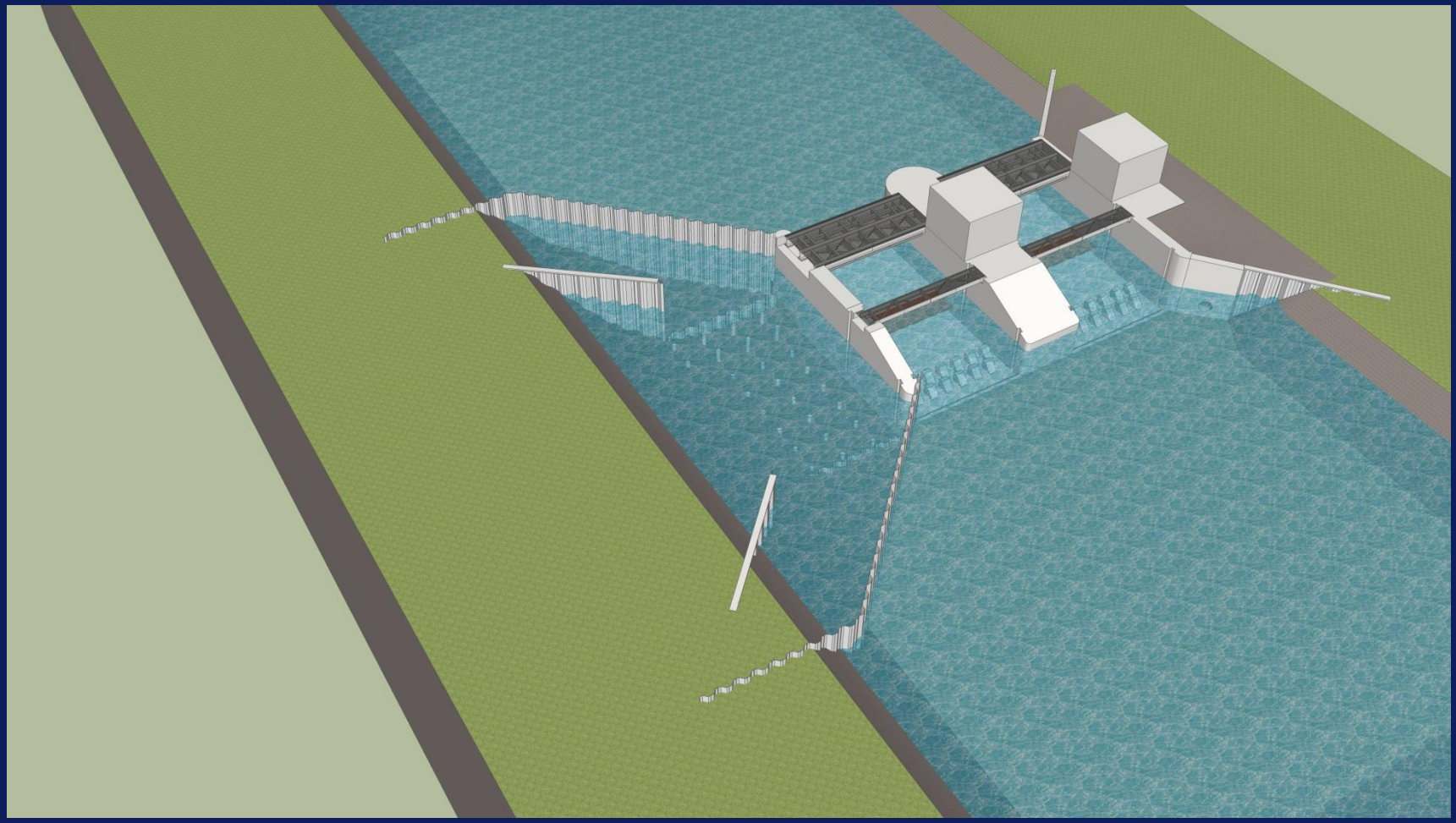
Place Slab, Build Lower Vaults 2 and 3, and Pier
Construct Access Bridge Sections, Install Outlet Pipe



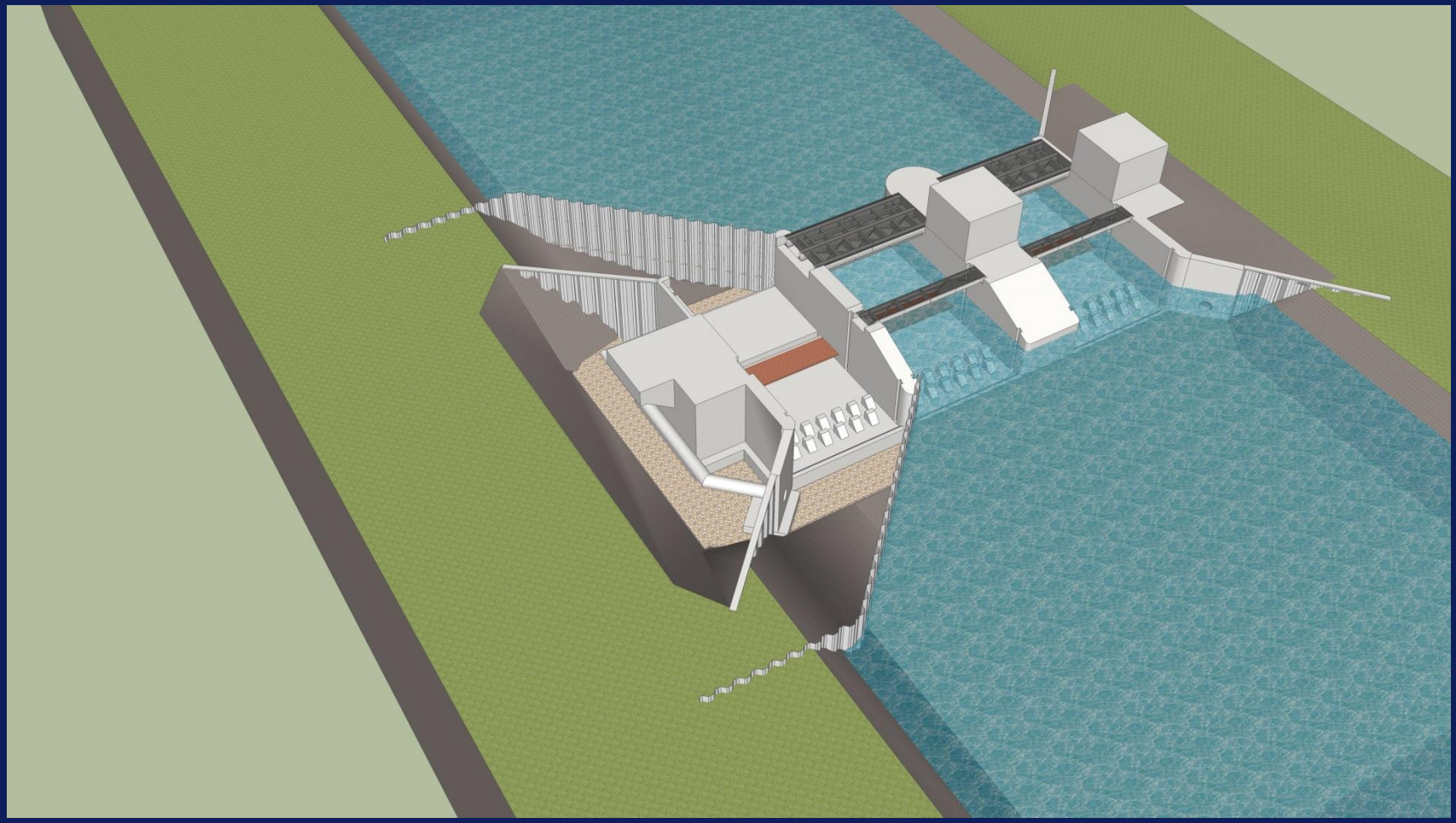
Build Upper Vaults, Backfill behind Wingwalls
Place Riprap Up and Downstream



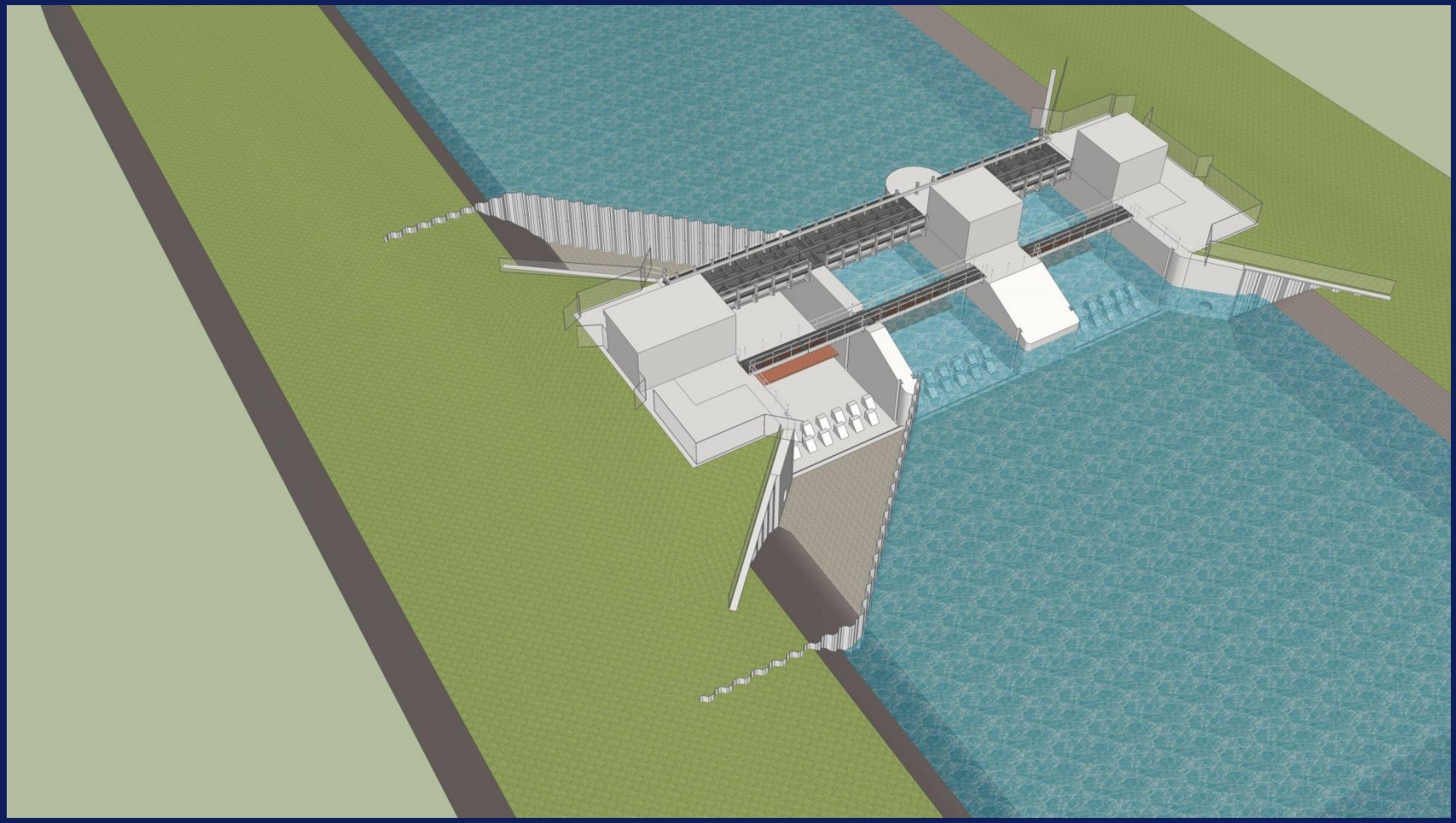
Complete Gate Mechanical-Electrical Work, Flood Cofferdam, Test Gate, Remove Phase 1 Cofferdam



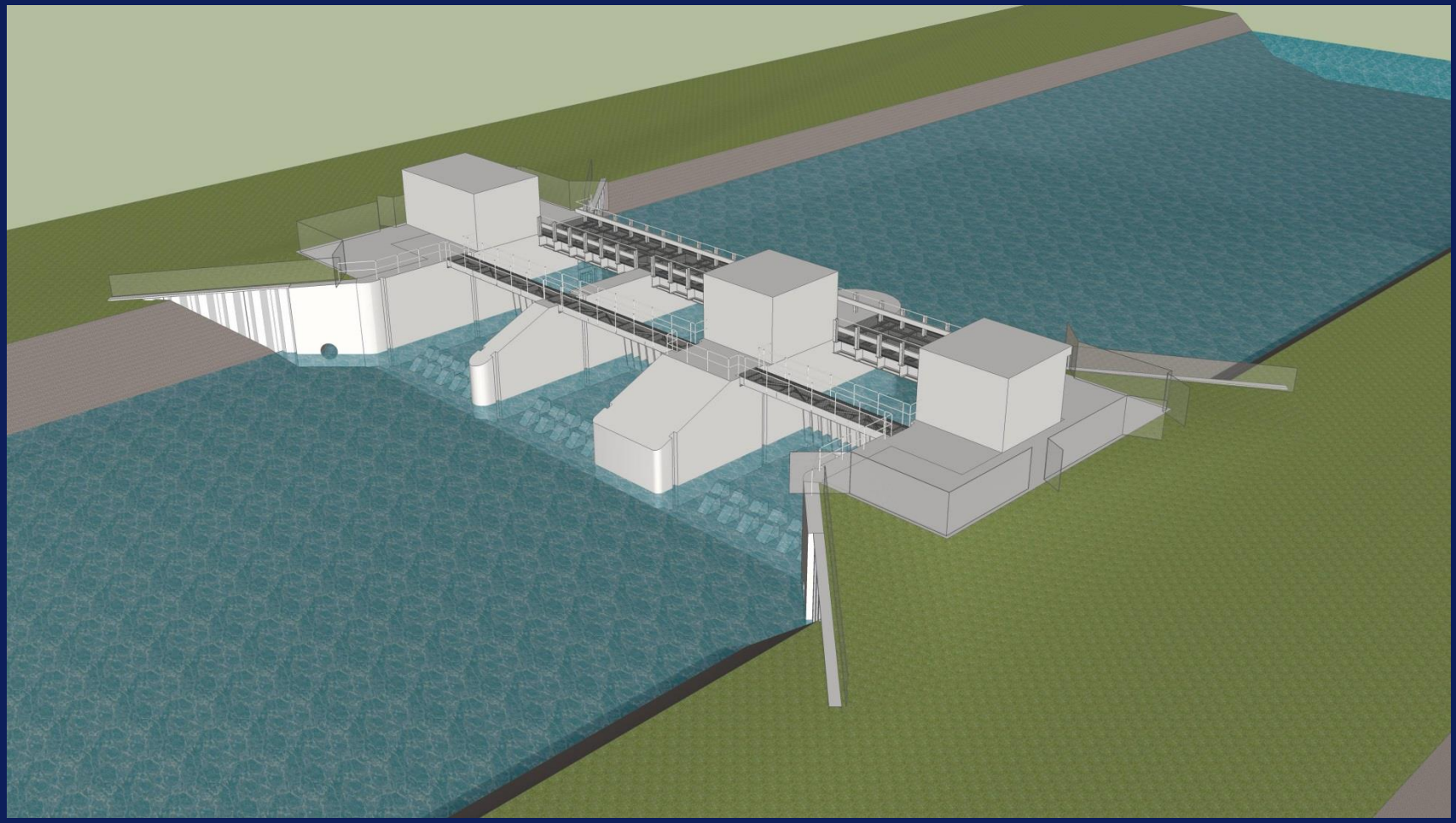
Drive Piles, Drive Sheeting for Cutoff and Wing Walls, Place Phase 2 Cofferdam



Dewater Phase 2 Cofferdam, Build Base Slab &
Lower Vault 1, Install Gate and Outlet Pipe



Build Upper Vault 1, Construct Access Bridges, Backfill Behind Wing Walls, Place U.S. & D.S. Riprap

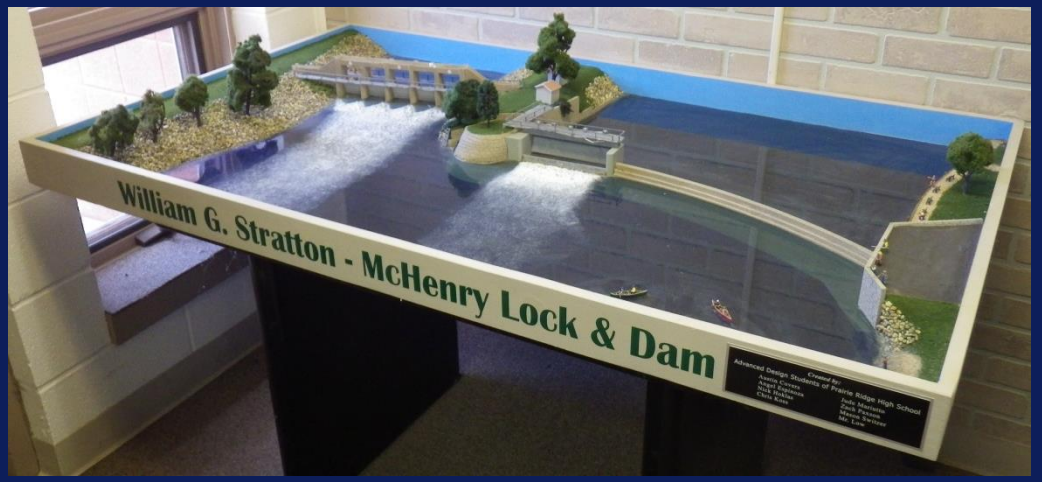


Substantially Complete
November 2021

Open for Business
April 2016

Stratton Lock & Dam Improvements

- Existing Facilities
- Phase 1 – Pre-Design Study
- Phase 2 – Design
- **Phase 3 – Construction**



Stratton Lock & Dam Improvements

- IDOT Letting February 28, 2014
- 5 Bidders
- Engineers Estimate = $16,949,256
- Average Bid = $21,511,607
- High Bid = $27,506,281
- Low Bid = $16,679,000
- Kiewit Infrastructure Company

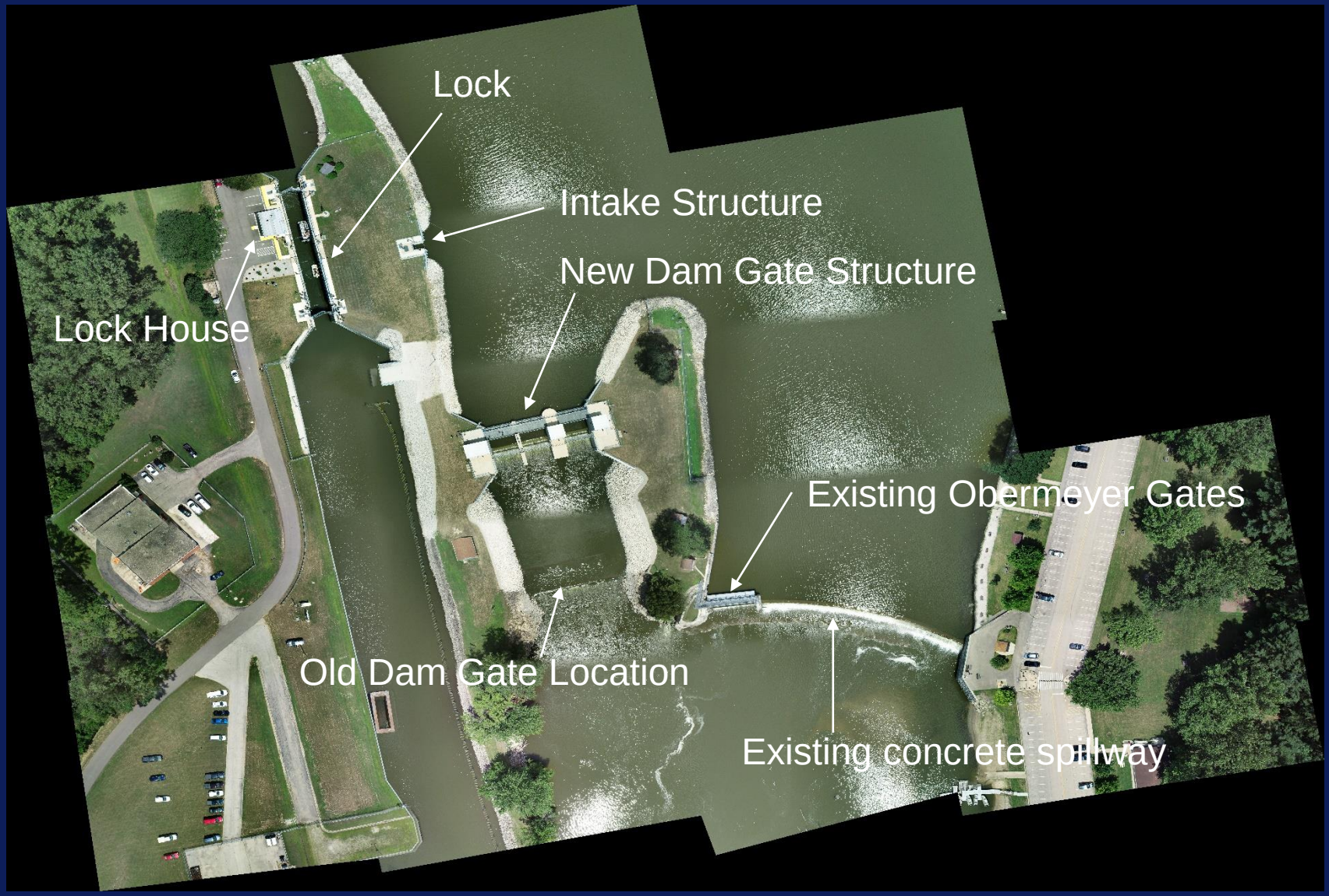
Lock Rehabilitation & Expansion

- Construction Schedule:
  - November 2014 through April 2015
  - Complete construction during ONE Non-Navigation Season
  - Major Items of Work Include:
    - Lock Extension Sheet Pile
    - Rehab/Repaint Existing Miter Gates
    - Clean/Repaint Existing Lock Walls
    - New Intake Structure
    - New Mechanical Machinery for Miter Gates

New Dam Gate Structure

- Construction Schedule:
  - January 2015 through March 2016
  - 2 Phases of Construction
    - Phase 1 - Gates 2 and 3
    - Phase 2 - Gate 1
  - Major Items of Work Included:
    - Three 28’ Torque Tube Gates
    - Concrete Vaults for gate machinery
    - Six Hydraulic Cylinders to operate gates

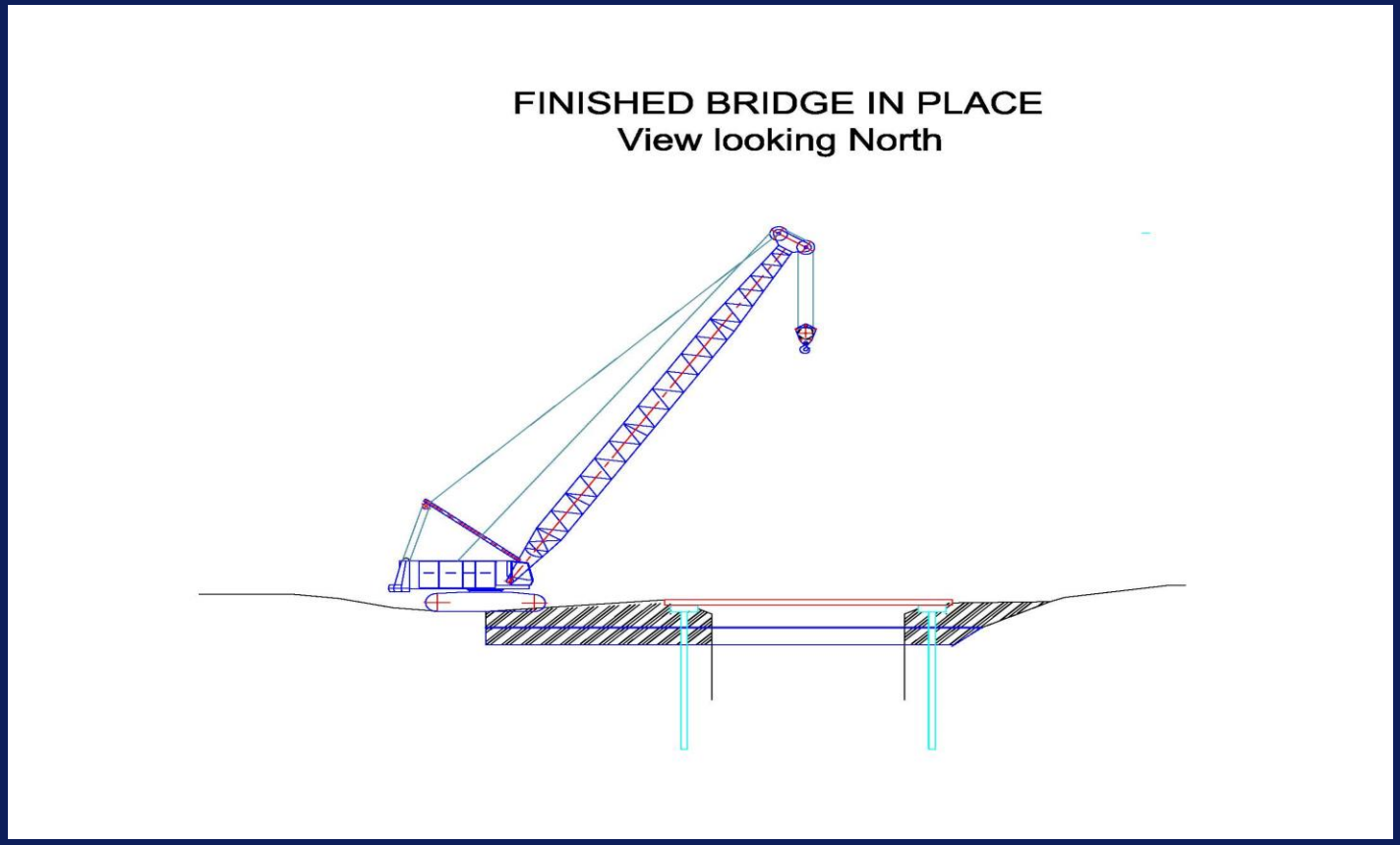
Final 2022 As Built Site Plan



Project Goal/End Game

- Upstream Looking Downstream/South with Drone

Construction (November 2014)



- Temporary Bridge in Lock Channel

Construction (November 2014)

- Temporary Bridge

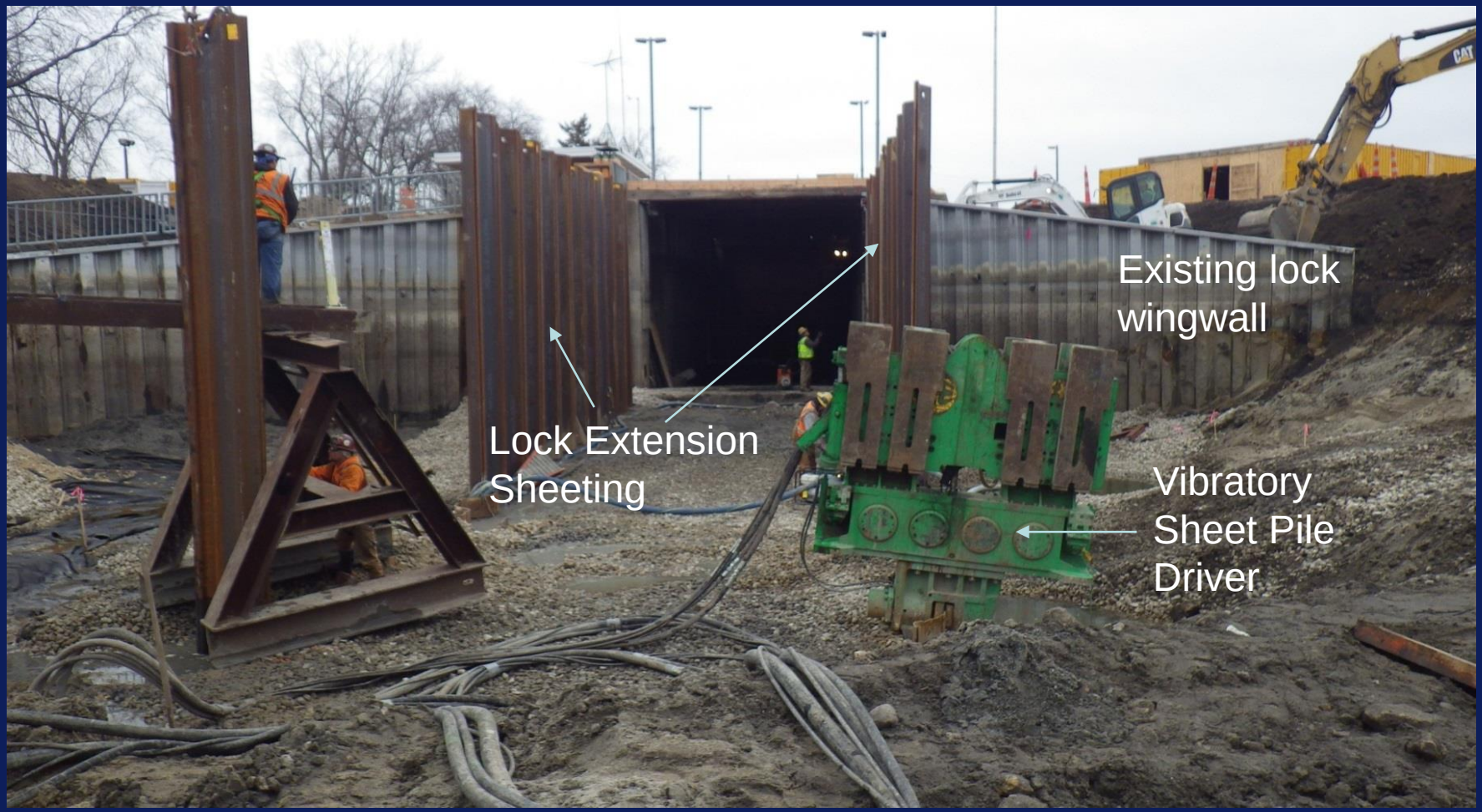
Construction (December 2014)

- Temporary Bridge/Cofferdam

Construction (December 2014)

- Driving wing wall sheet piling (looking downstream)

Construction (December 2014)



- Lock Expansion (Inside cofferdam Looking Upstream)

Construction (December 2014)

- Inside of Existing Lock (looking upstream)

Construction (December 2014)

- Uncontrollable seepage under existing sill, existing cutoff wall missing, employed grouting, cured over xmas

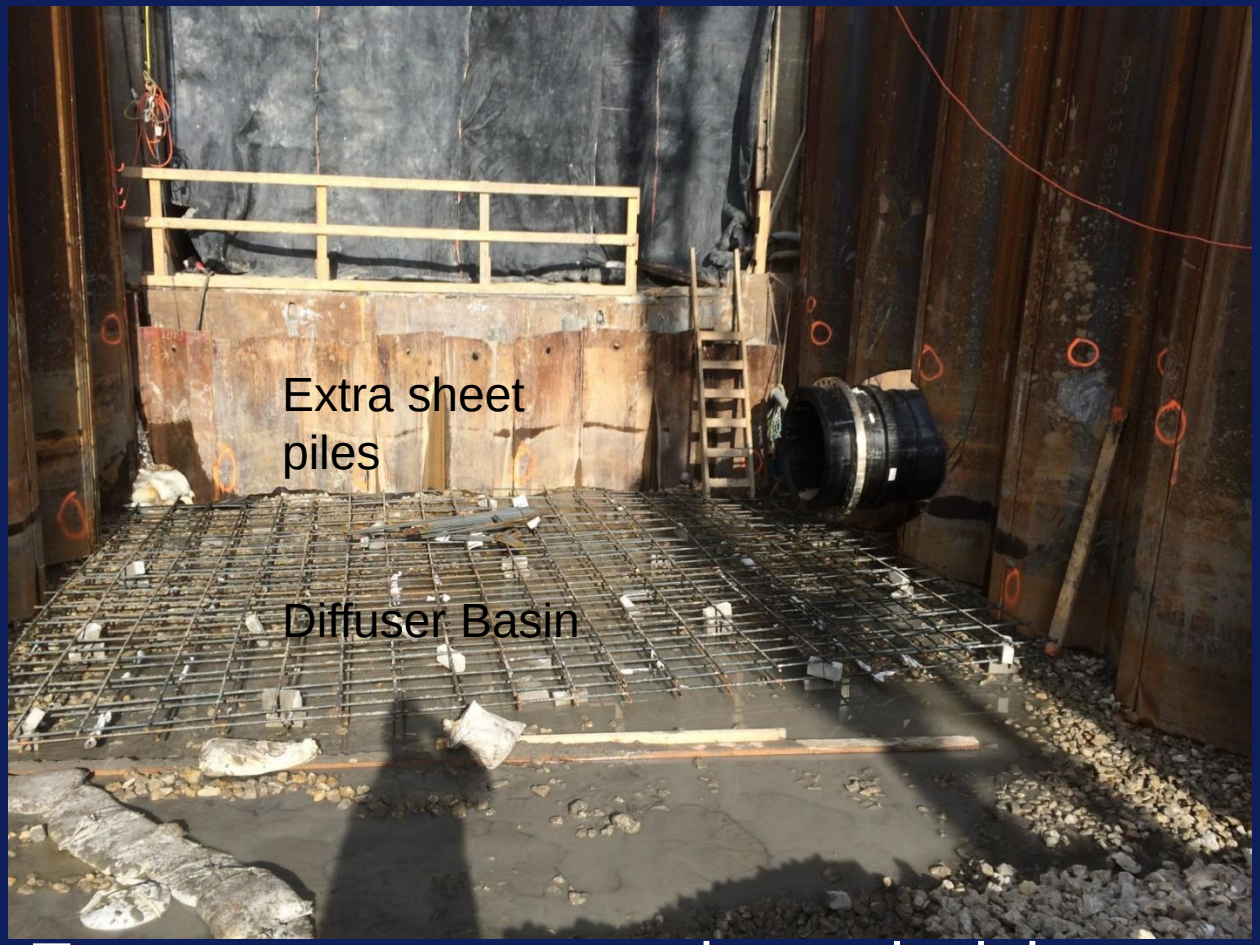
Construction (December 2014)

- Grouting appeared to solve problem, but sprung a leak while excavating deeper for diffuser basin

Construction (January 2015)

- Seepage suspected of causing large settlement within 10 feet of lock house

Construction (January 2015)



- To arrest seepage, and save lock house, sheet piles were driven just downstream of existing sill

Construction Phase (January 2015)

- Driving Metal Shell Piles for West Monolith footing

Construction (January 2015)

Construction (February 2015)

- West emptying pipe connected, Monolith footings complete, lock floor being poured

Construction (February 2015)

- Emptying pipe (looking west)

Construction (February 2015)

- Conveyor belt concrete delivery (looking west)

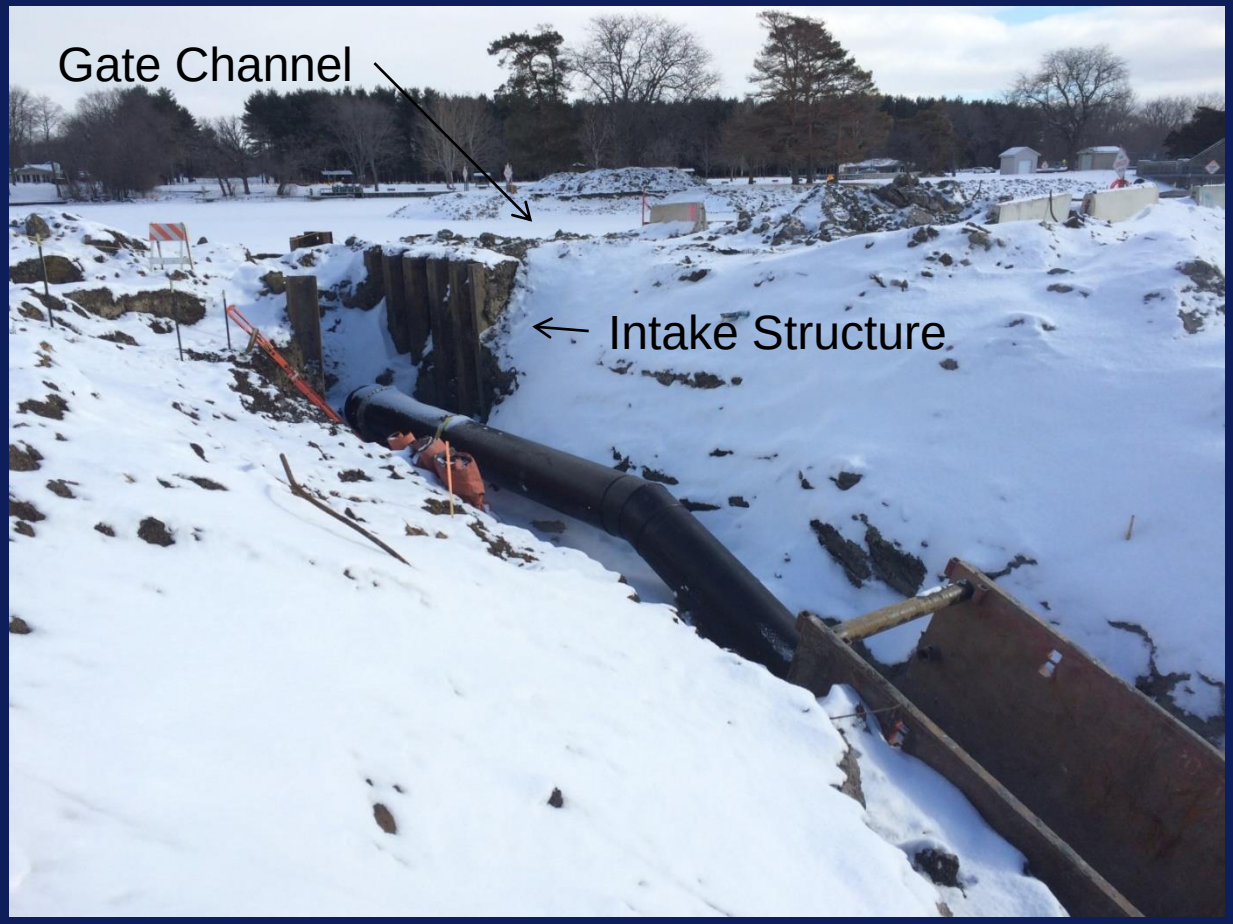
Construction (March 2015)

- Monolith Formwork being assembled

Construction Phase (March 2015)

- Monolith concrete cured, waterproofing being applied

Construction (January 2015)

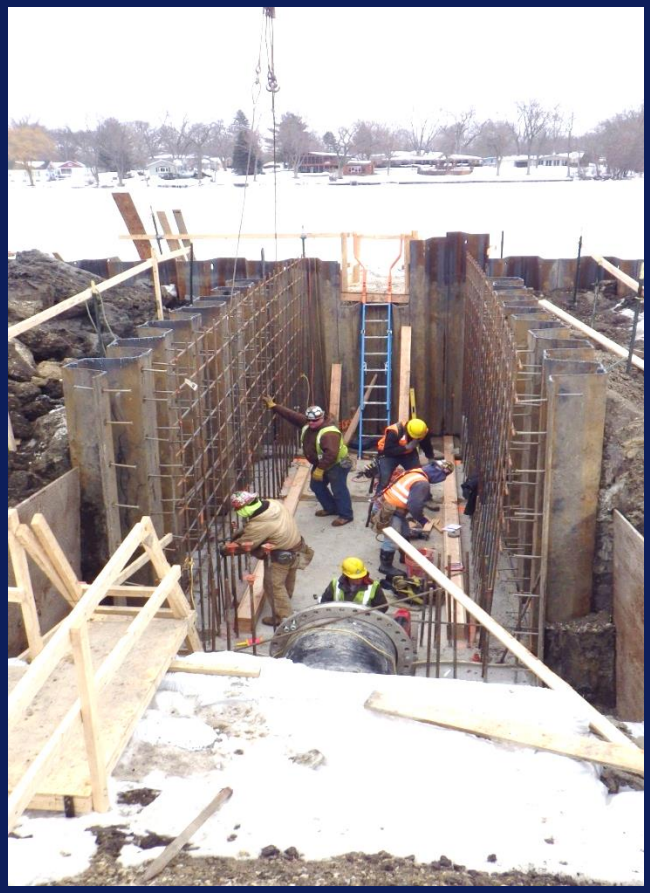


- Intake Structure pipe installation, looking east

Project Goal/End Game Refresher

- Upstream Looking Downstream/South with Drone

Construction (February 2015)



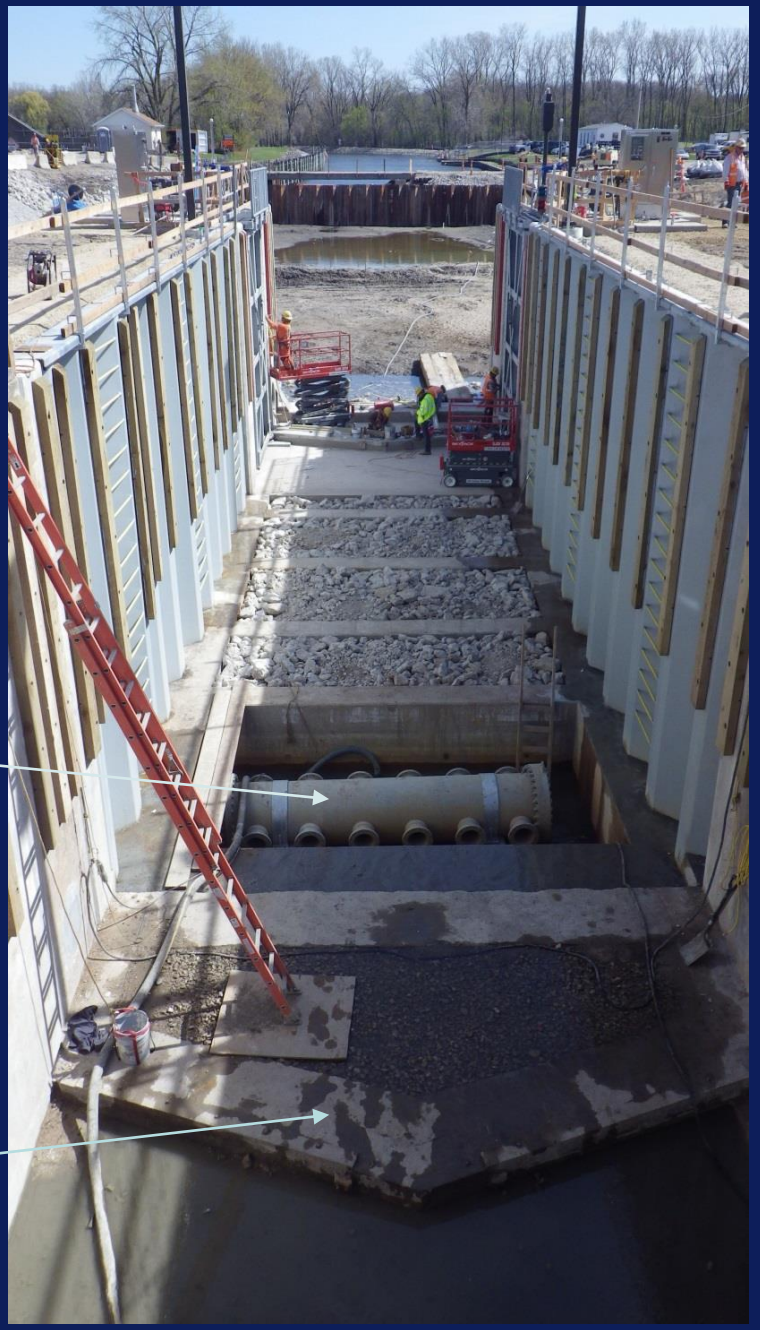
Intake Structure, looking east

Construction (April 2015)

- Lock Extension (Looking Upstream)

Construction (April 2015)

- Lock Extension
- New Intake Diffuser
- Original Downstream Monolith, Existing Gates Removed



Construction (April 2015)

Downstream Lock Miter Gates in Place

Construction (April 2015)

- Rebuilt Mechanical Gate Actuator

Construction (April 29, 2015)

- Filling the Lock to Test System and check for Leaks

Construction (December 2014)

- Lock House Renovations

Construction (December 2014)

- Lock House Renovations

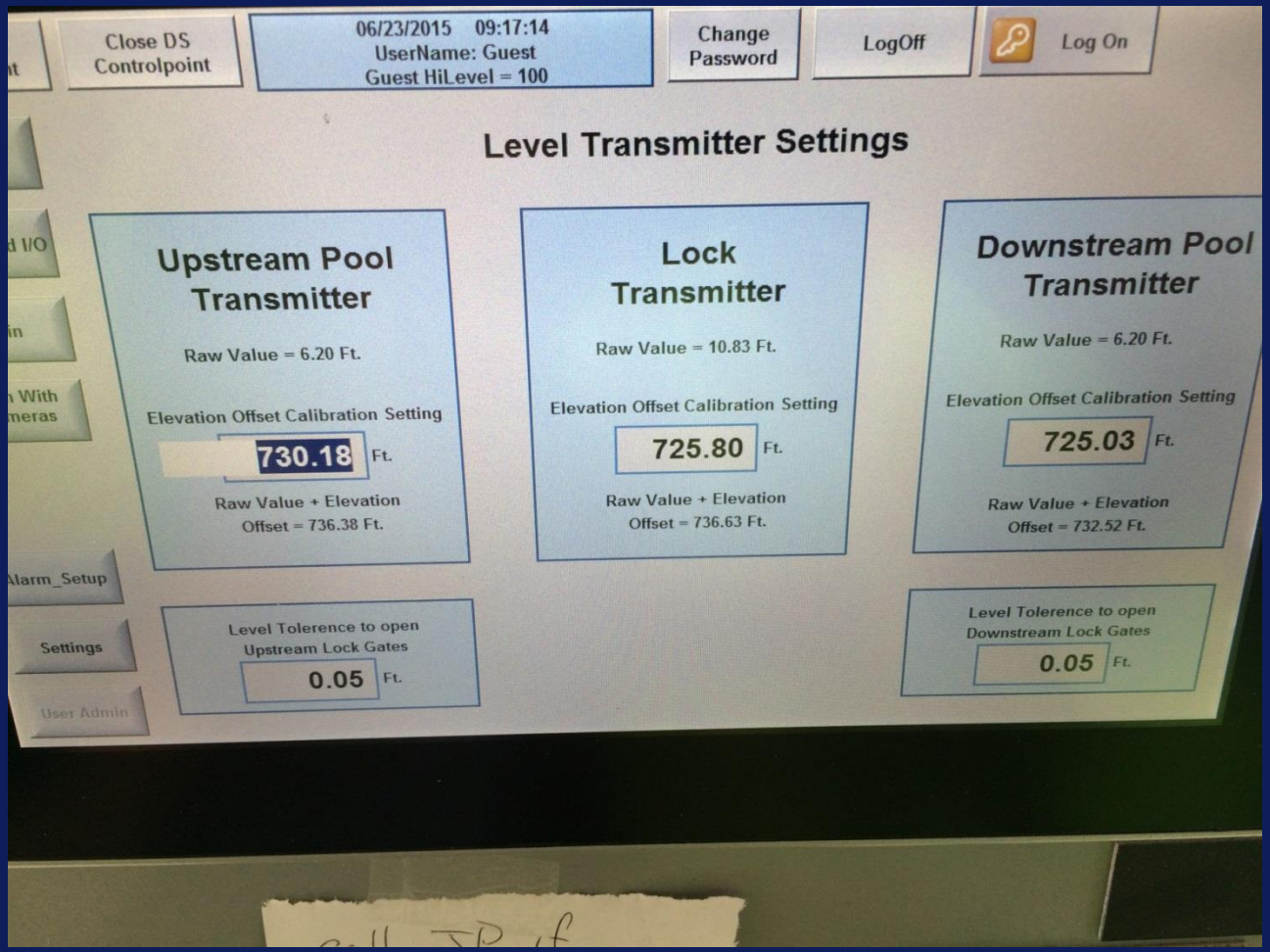
Construction (April 2015)

- Lock House Renovations

Construction (April 2015)

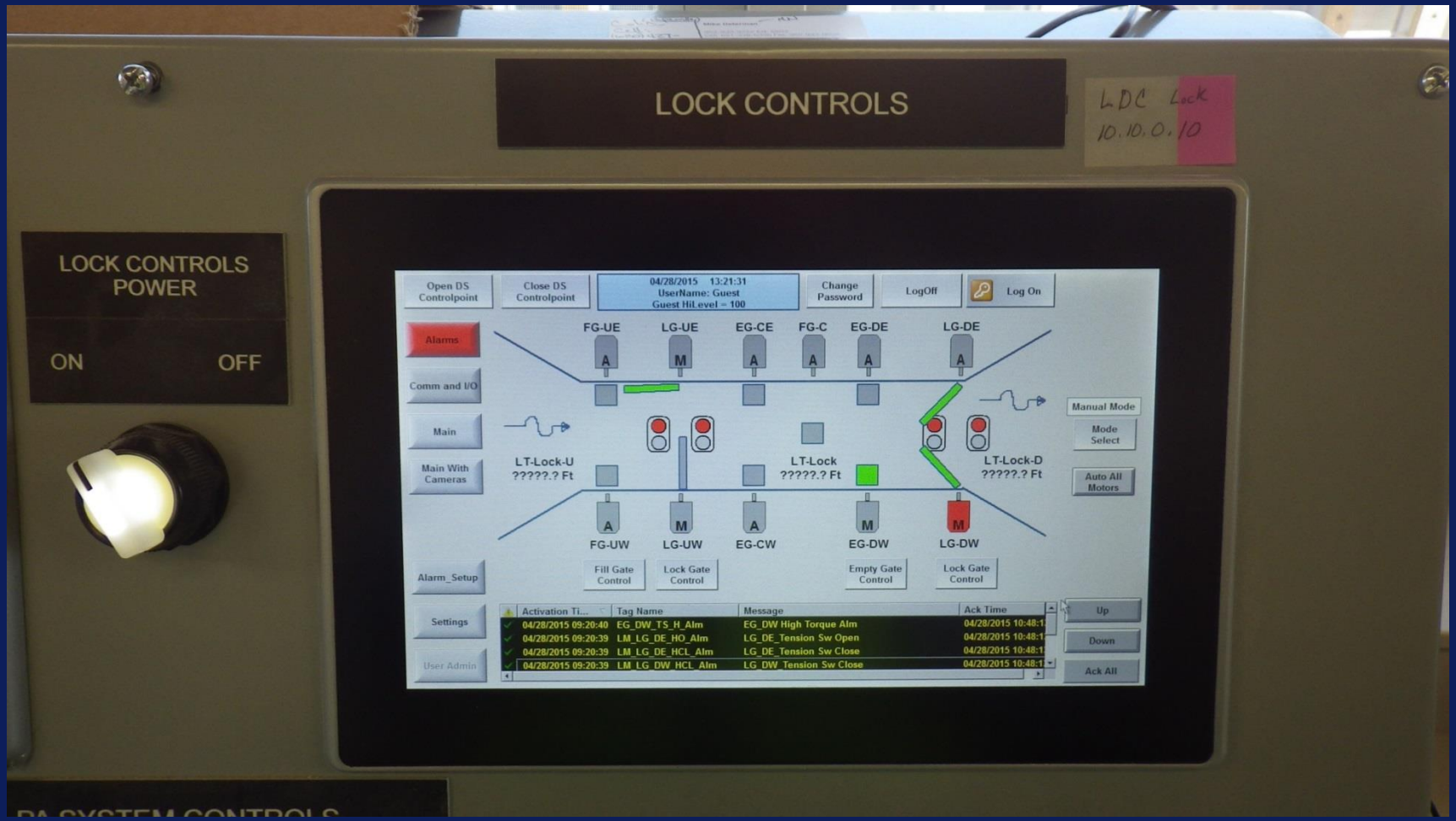
- Lock & Dam Controls

Construction (April 2015)



- Lock Control HMI Panel

Construction (April 2015)



- Lock Control HMI Panel

Construction (May 1st, 2015)

- Opening Day

Construction (May 1st, 2015)

- Problem, how to efficiently get to the island to build the Gate Structure now that the lock channel is open to boat traffic?

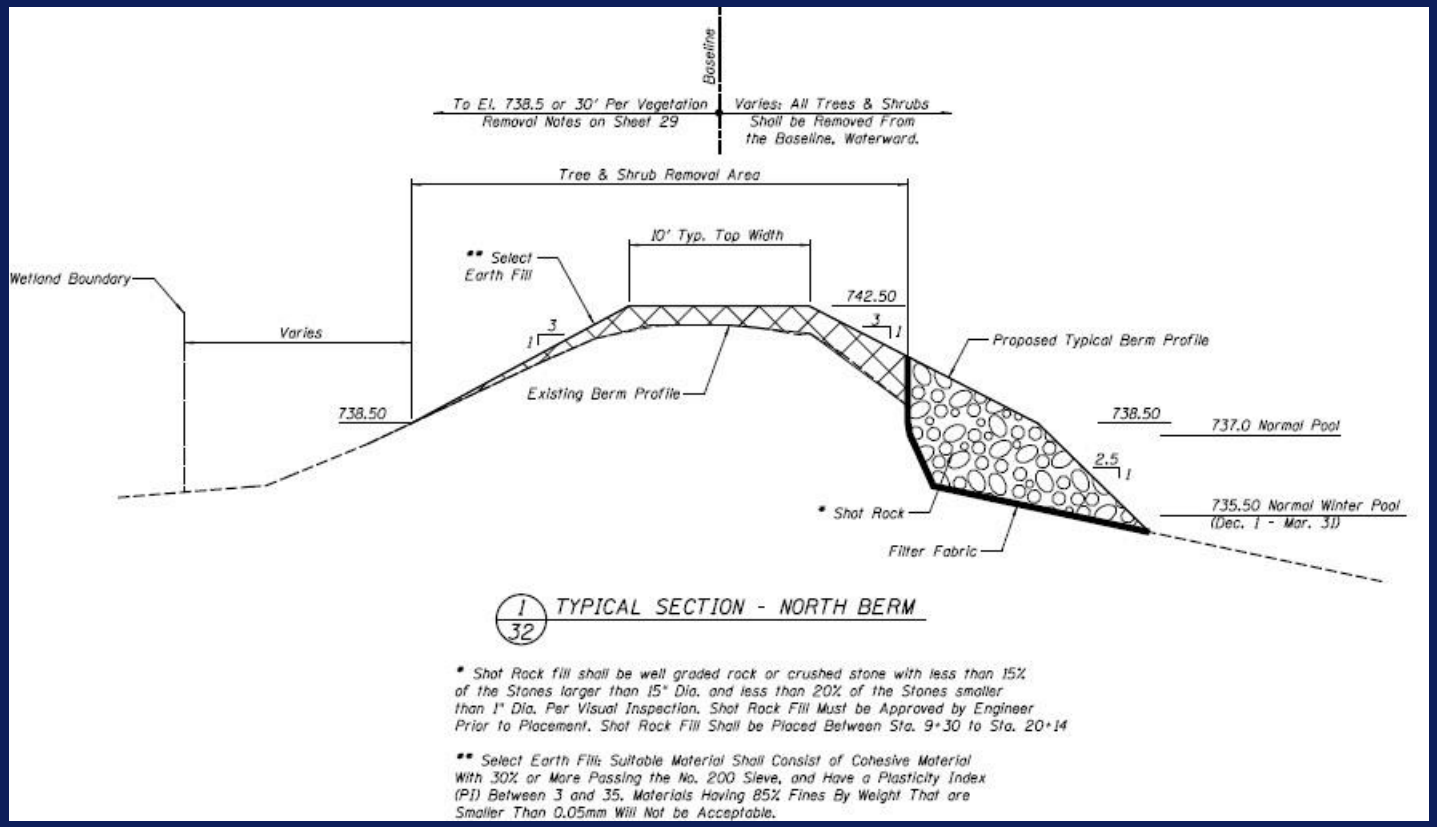
Construction (February 18, 2015)

- Clearing of North Berm/Levee

Pre - Design (January 2013)

- Hole in Berm/Levee 6’-8’ deep

Construction Plans Typical Section



- North Berm/Levee Repair Details

Construction (May 14, 2015)

- Upstream Berm/Levee Rehabilitation = 2,300’

Construction (February 18, 2015)

- Gate Channel Excavation

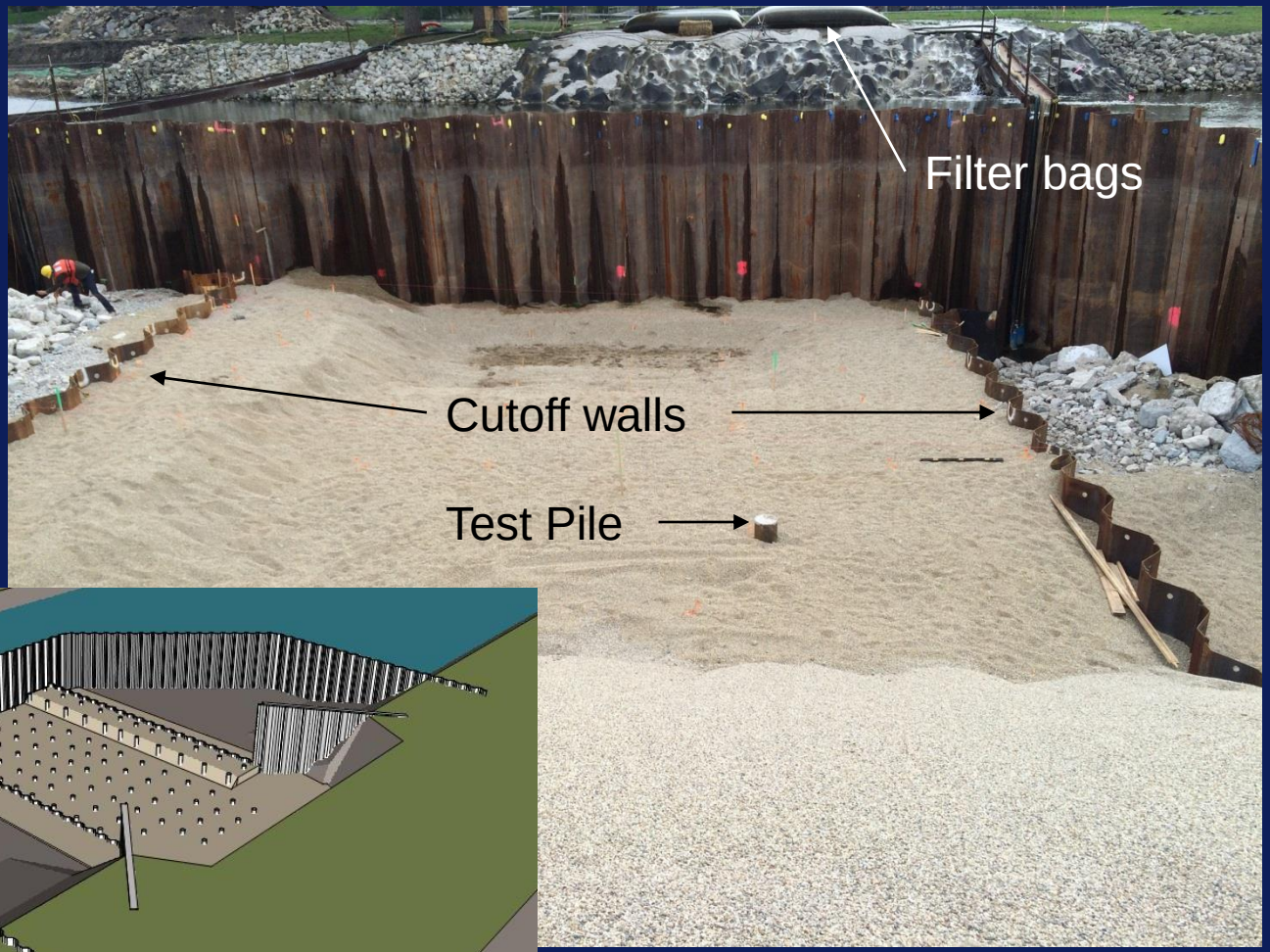
Project Goal/End Game Refresher

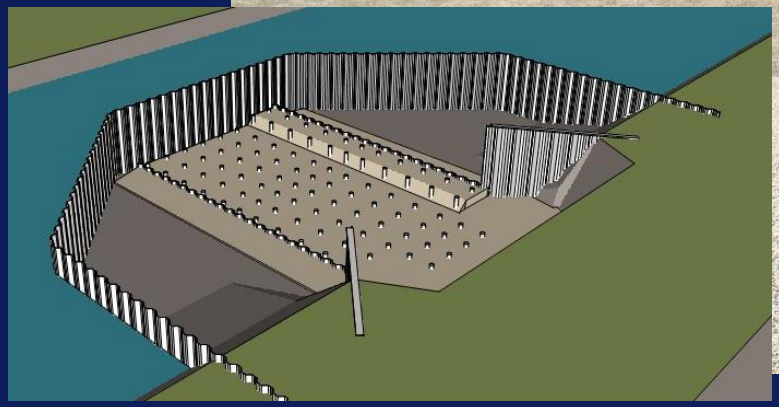
- Upstream Looking Downstream/South with Drone

Construction (March 2015)

- Channel excavation and phase 1 cofferdam complete

Construction (May 8, 2015)





- Gate Cofferdam Phase 1 (West Side of Channel)

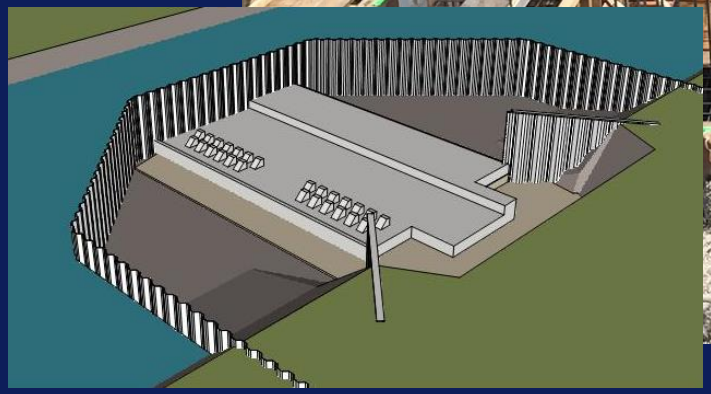
Construction (May 13, 2015)

- Gate Phase 1 Metal Shell Piles

Construction (June 9, 2015)

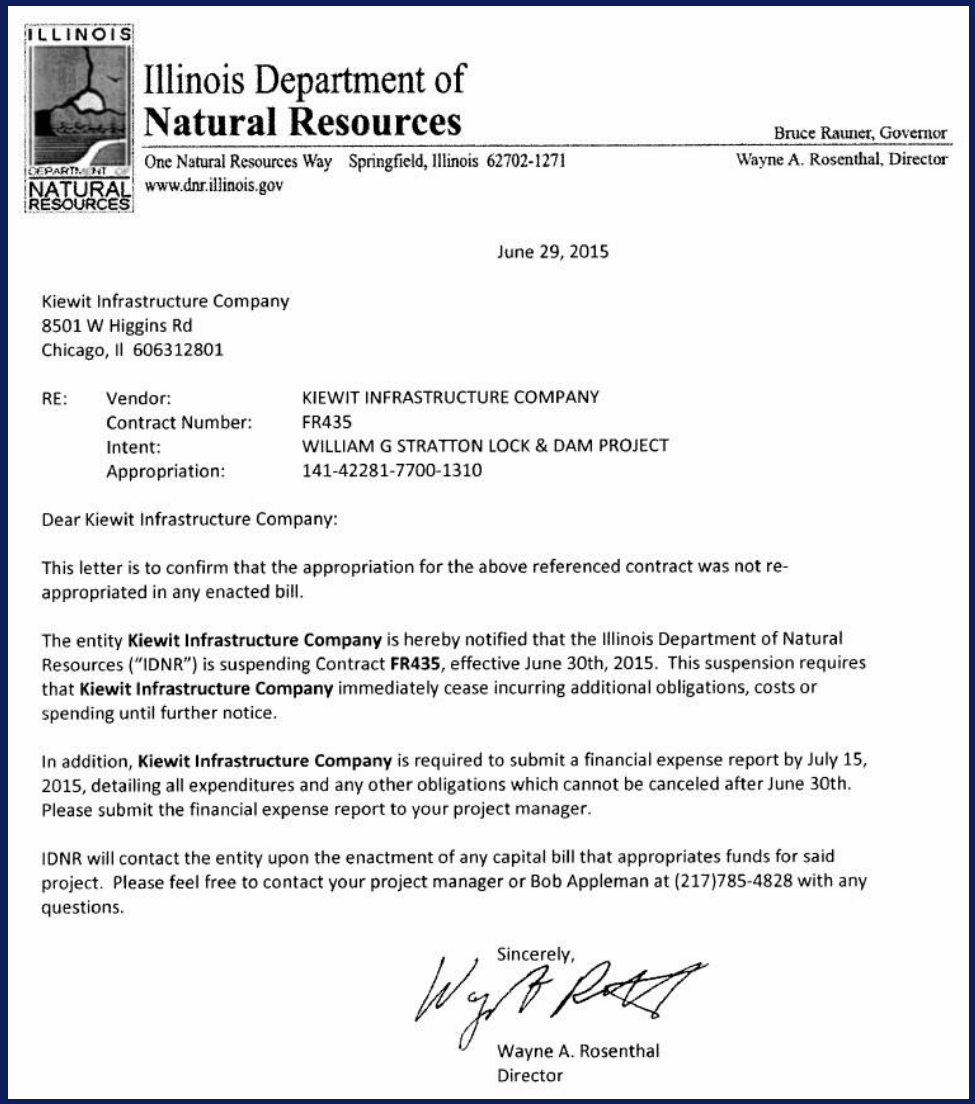
- Phase 1 Base Slab

Construction (June 29, 2015)



- Phase 1 Base Slab

Construction (June 29, 2015)



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

June 29, 2015

Kiewit Infrastructure Company
8501 W Higgins Rd
Chicago, Il 606312801

RE: Vendor: KIEWIT INFRASTRUCTURE COMPANY
Contract Number: FR435
Intent: WILLIAM G STRATTON LOCK & DAM PROJECT
Appropriation: 141-42281-7700-1310

Dear Kiewit Infrastructure Company:

This letter is to confirm that the appropriation for the above referenced contract was not re-appropriated in any enacted bill.

The entity **Kiewit Infrastructure Company** is hereby notified that the Illinois Department of Natural Resources ("IDNR") is suspending Contract **FR435**, effective June 30th, 2015. This suspension requires that **Kiewit Infrastructure Company** immediately cease incurring additional obligations, costs or spending until further notice.

In addition, **Kiewit Infrastructure Company** is required to submit a financial expense report by July 15, 2015, detailing all expenditures and any other obligations which cannot be canceled after June 30th. Please submit the financial expense report to your project manager.

IDNR will contact the entity upon the enactment of any capital bill that appropriates funds for said project. Please feel free to contact your project manager or Bob Appleman at (217)785-4828 with any questions.

Sincerely,

Wayne A. Rosenthal
Director

- June 29th official suspension letter

Construction (June 30, 2015)

- Phase 1 Base Slab Concrete Placement

Construction (June 30, 2015)

- Phase 1 Base Slab Concrete Placement

Construction was suspended June 30, 2015, due to State of Illinois budget stalemate.

- At that point 59% of Construction was Complete
- Total funds expended through 6/30/15 = $9,854,791.63
- Contractor demobilized from the site
- IDNR concerned how long suspension would last
- Would we need to re-bid the project?
- Would the cofferdam be stable in the river with ice and floods?
- Would Contractor be willing to return to the site?
- Would in place work be durable (exposed rebar, etc.)

Suspension (July 2015)

- Abandoned Project Site

Suspension (September 2018)

- Cofferdam flooded, weeds taking over

Suspension (September 2018)

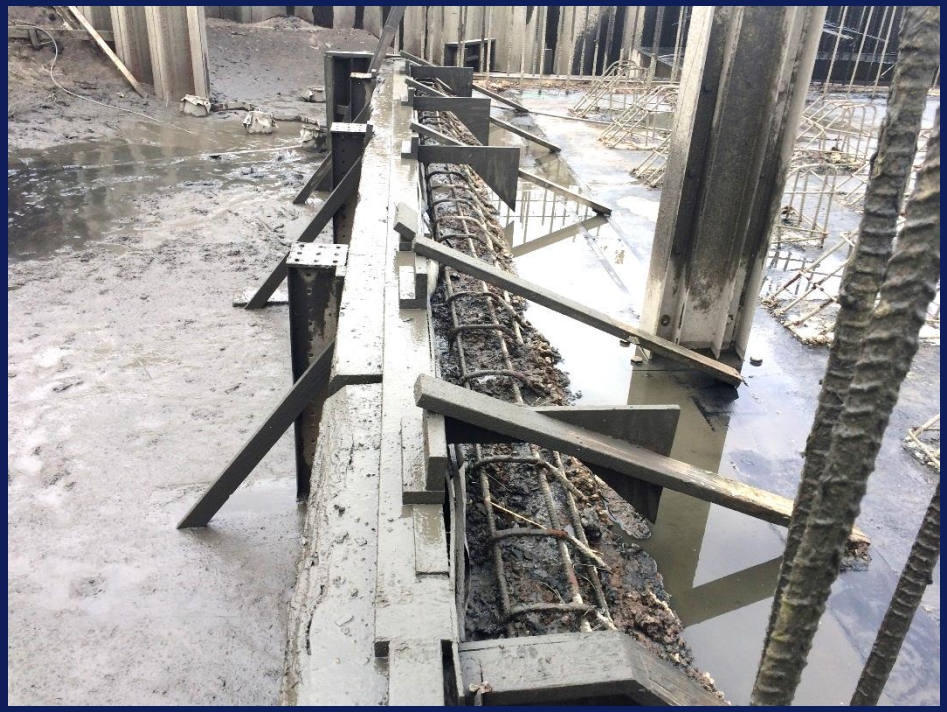
- Various material piles/weeds

Construction resumed October 2018 after the state budget stalemate was resolved and after lengthy negotiations with the contractor.

- Suspension lasted approximately 1,200 days
- Material escalation = $1,000,000
- Labor escalation = $550,000
- Demobilization & remobilization charges =$1,000,000
- Re-engagement of suppliers, fabricators and subcontractors (New Crest Gate Manufacturer $550,000)
- Bring site back to pre-suspension condition
- Cofferdam sheeting rental = $300,000
- Total additional cost due to suspension = $3,400,000

Remobilization (October 2018)

Remobilization (October 2018)



Remobilization (October 2018)

Remobilization (October 2018)

Remobilization (November 2018)

Intended Wall Face, but clearance no good (need 3” cl)

Wall had to be built to this line to meet clearance requirements.

Construction (February 2019)

Construction (May 6, 2019)

Construction (May 31, 2019)

Concrete forms stripped from vaults

Construction (June 26, 2019)

Trestle bridge being constructed downstream of cofferdam to allow access to eastern island

Construction (July 16, 2019)

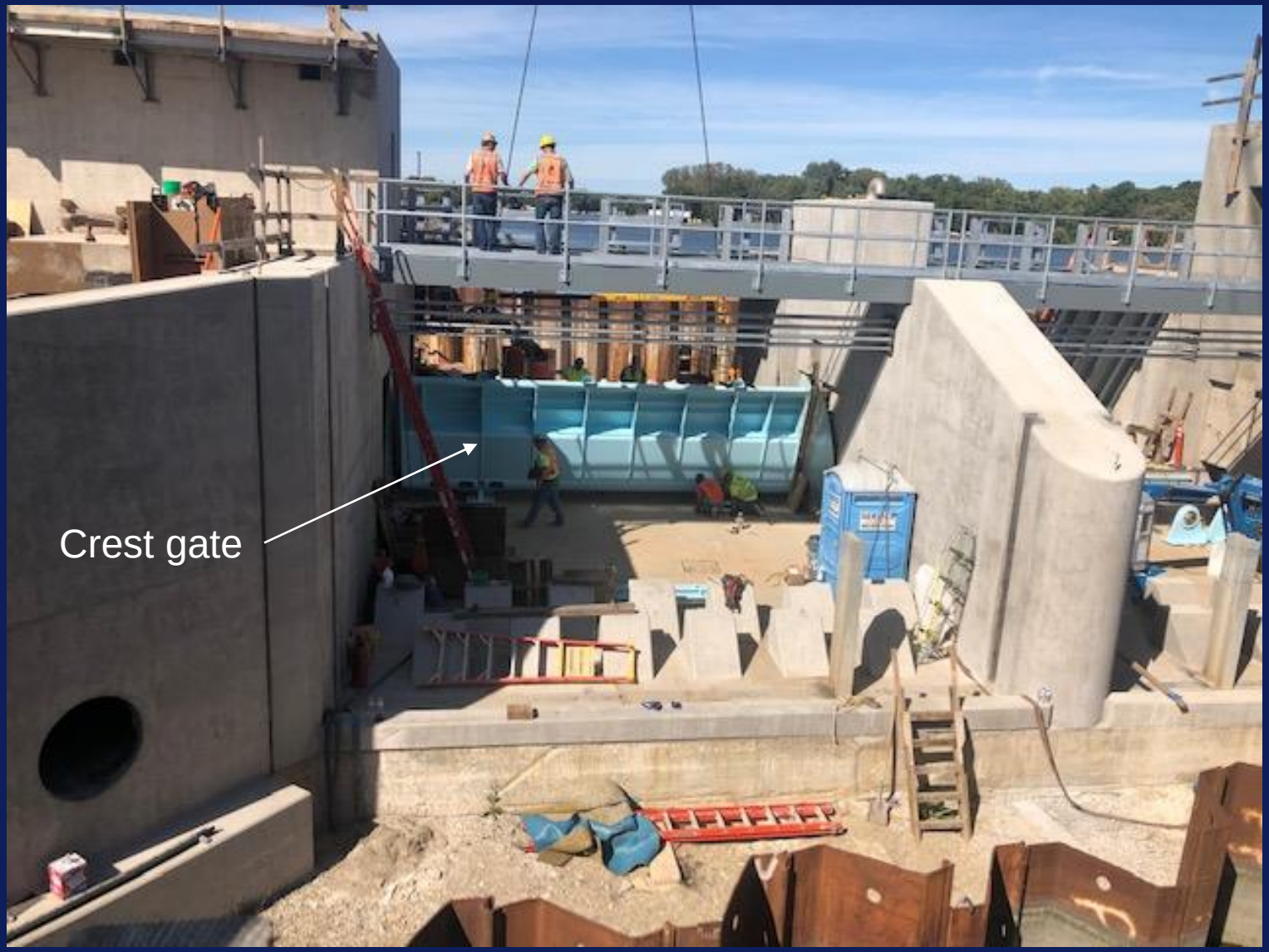
Trestle bridge completed

Construction (July 22, 2019)

Vault 2 upper floor beginning to emerge

Construction (August 9, 2019)

Construction (September 27, 2019)



Construction (October 25, 2019)

Hydraulic cylinders in place in vaults 1 & 2

Construction (October 21, 2019)

Construction (November 13, 2019)

Intentional flooding of cofferdam downstream of stop logs

Intentional flooding cofferdam upstream of bulkheads

Leakage Testing

Construction (December 17, 2019)

Bays 1 and 2 gates operational, Bay 3 Gate Construction beginning

Construction (June 30, 2020)

Bay 3 Gate Construction nearing completion

Construction (December 10, 2020)

Bay 3 Gate Construction nearly complete, was functional in November.

Construction (December 10, 2020)

Hydraulic Power Unit (HPU) inside of Vault 1

Construction (September 2020)

Pre-Demolition of Existing Dam Structure

Construction (November 13, 2020)

Demolition of Existing Dam Structure

Construction (April 9, 2021)

Dam Gate Structure Construction still not quite complete

Construction (May 22, 2021)

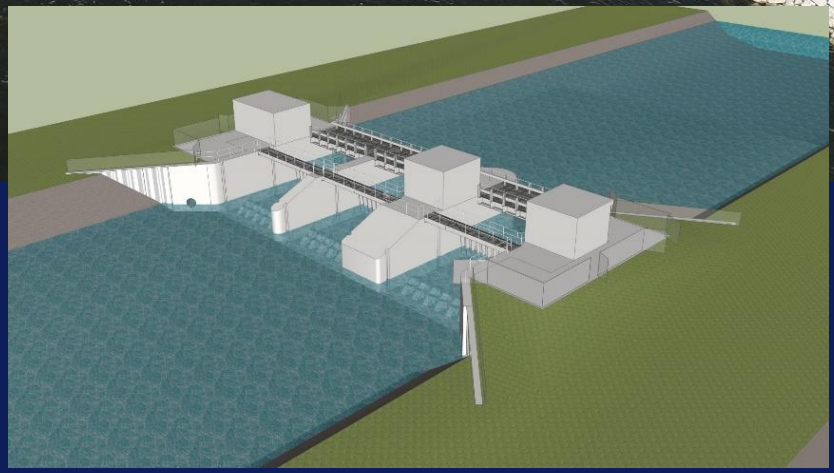
Newly paved entrance road

Project pretty much complete except for ongoing punch list items which would drag out through the end of 2021

Stratton Lock & Dam Improvements

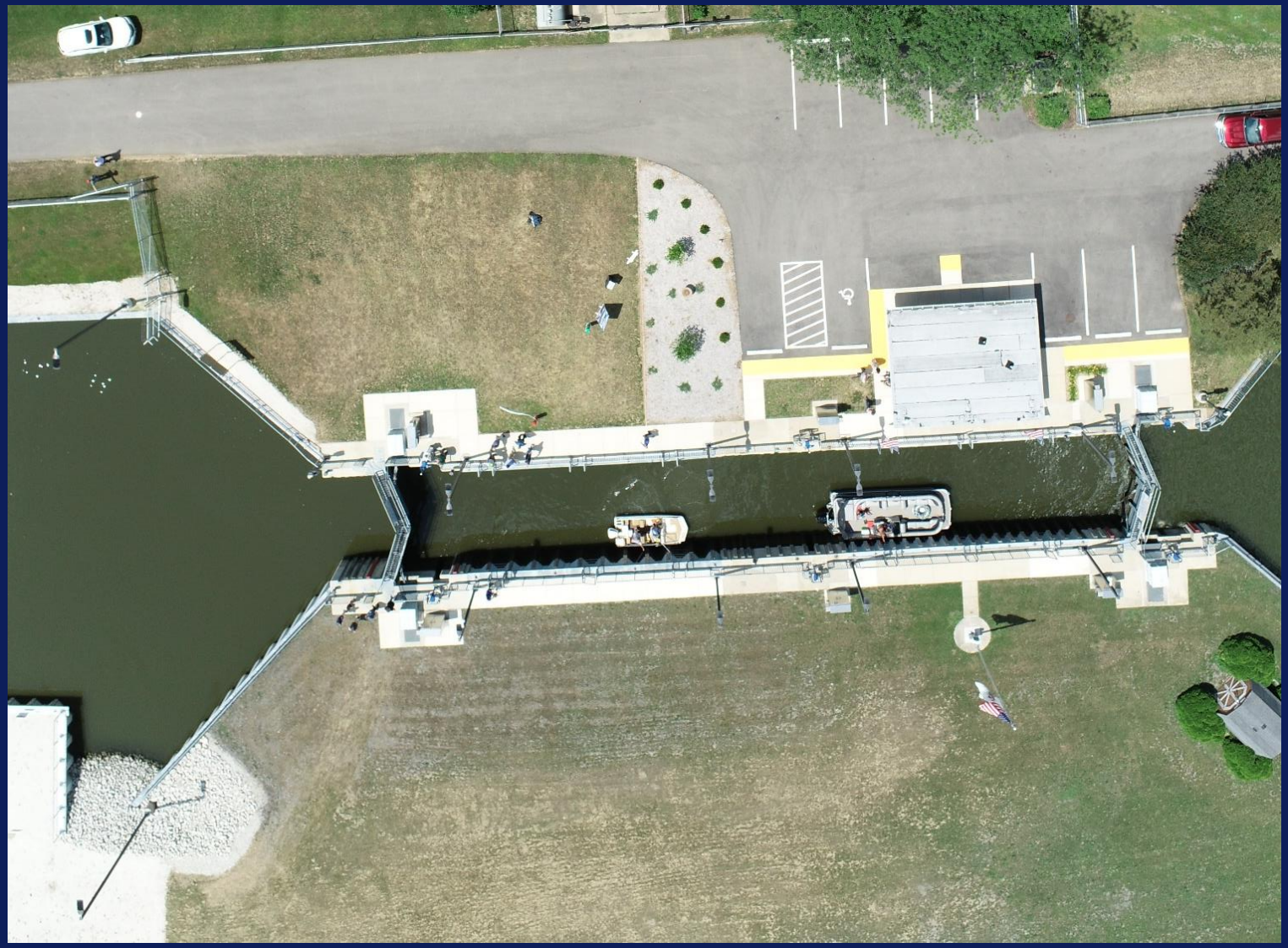
- Contract Execution Date = 5/23/14
- Construction Start Date = 8/11/14
- Contract Suspension = 1,231 days
- Construction End Date = 12/1/21
- Low Bid = $16,679,000
- Suspension Costs = $3,400,000
- Change Orders = $306,000
- Total Cost = $20,385,000

Completed Dam Structure



Completed Lock and Intake Structure

Birds eye view locking boats



Ribbon Cutting 2022

Stratton Lock & Dam Improvements

- Governor Pritzker quoted as saying "*With the completion of this improvement project, boaters on the Fox River will have safer, more efficient access through the Stratton Lock and Dam, so they can spend less time waiting and more time enjoying the water and summer sun with their families. A huge thank you to IDNR and the Fox Waterway Agency for their leadership"*.
- Joe Keller of the Fox Waterway Agency quoted as saying *"The users of this great waterway celebrate the final completion and enhanced benefits of this worthwhile project and are grateful for the team at IDNR for getting it done".*

Stratton-Bolger Lock & Dam
Questions?

Lock Alternatives – Decision Matrix

			Alternative 1 Lock Extension		Alternative 2A New Riverside Lock		Alternative 2B New Landside Lock	
Criteria		Weight	Score	Weighted	Score	Weighted	Score	Weighted
1	Construction Cost	5	5	25	3	15	3	15
2	Navigation During Construction	4	1	4	4	16	5	20
3	Navigation in Final Condition	4	5	20	3	12	3	12
4	Life Cycle & Future Maintenance	3	4	12	2	6	2	6
5	Operations During Construction	2	3	6	5	10	3	6
6	Operations in Final Condition	4	5	20	4	16	4	16
7	Peak Usage Performance	5	3	15	5	25	5	25
8	Off-Peak Performance	2	4	8	5	10	5	10
9	System Redundancy	4	3	12	5	20	5	20
10	Impact on Other Users	1	5	5	5	5	5	5
11	Operational Training	2	5	10	4	8	4	8
Total Score			**137**		**143**		**143**	
Total Score without Construction Cost (1)			**112**		**128**		**128**	
Total Score without Construction Cost (1) & Life Cycle Costs (4)			**100**		**122**		**122**	

Alt 2A / Alt 1 Ratio =	**1.04**	**Based on Total Score**
Alt 2A / Alt 1 Ratio =	**1.14**	**Based on Total Score without Construction Cost (1)**
Alt 2A / Alt 1 Ratio =	**1.22**	**Based on Total Score without Construction Cost (1) & Life Cycle Costs (4)**

Gate Alternatives – Decision Matrix

			Alternative 1		Alternative 2		Alternative 3		Alternative 4	
			Reuse Existing Structure with New Vertical Roller Gates and Controls		New Sluice Gates		New Tainter Gates		New Hinged, Torque Tube Crest Gates	
Criteria		Weight	Score	Weighted	Score	Weighted	Score	Weighted	Score	Weighted
1	Construction Cost	5	3	15	5	25	5	25	4	20
2	Fail Safe Capability	5	5	25	4	20	4	20	4	20
3	Ability to be Remotely Controlled and Operated	2	5	10	5	10	5	10	5	10
4	Ability to Operate Gates in Manual Mode	5	5	25	5	25	3	15	5	25
5	Routine Maintenance	4	3	12	5	20	4	16	5	20
6	Hydraulic Efficiency	5	5	25	5	25	5	25	5	25
7	Sediment /debris accumulation	3	4	12	4	12	5	15	4	12
8	Constructability	3	2	6	5	15	5	15	5	15
9	Reliability	5	4	20	5	25	4	20	5	25
10	Public Safety	4	3	12	3	12	4	16	5	20
11	Ice Considerations	5	3	15	3	15	4	20	5	25
12	Bulkheads for Maintenance	5	5	25	5	25	5	25	5	25
13	Permitability	1	5	5	4	4	4	4	4	4
14	Life Cycle Maintenance	3	4	12	5	15	4	12	4	12
	Total Score			**229**		**248**		**238**		**258**
	Total Score without Construction Cost			**204**		**223**		**213**		**238**