2005 Tri-Service Infrastructure Systems Conference & Exhibition

St. Louis, MO
"Re-Energizing Engineering Excellence"

2-4 August 2005

Agenda

Panel*:* The Future of Engineering and Construction

- LTG Carl A. Strock, Commander, USACE
- Dr. James Wright, Chief Engineer, NAVFAC

Panel*:* USACE Engineering and Construction

- Dr. Michael J. O'Connor, Director, R&D

Panel*:* Navy General Session

- Mr. Steve Geusic, Engineering Criteria & Programs NAVFAC Atlantic

Introduction to Multi-Disciplinary Tracks, by Mr. Gregory W. Hughes
Engineering Circular: Engineering Reliability Guidance for Existing USACE Civil Works Infrastructure, by Mr. David M. Schaaf, PE, LRD Regional Technical Specialist, Navigation Engineering Louisville District
MILCON S&A Account Study, by Mr. J. Joseph Tyler, PE, Chief, Programs Integration Division, Directorate of Military Programs HQUSACE
Financial Justification on Bentley Enterprise License Agreement (ELA)

Track 1

- The Chicago Shoreline Storm Damage Reduction Project, by Andrew Benziger
- Protecting the NJ Coast Using Large Stone Seawalls, by Cameron Chasten
- Cascade: An Integrated Coastal Regional Model for Decision Support and Engineering Design, by Nicholas C. Kraus and Kenneth J. Connell
- Modeling Sediment Transport Along the Upper Texas Coast, by David B. King Jr., Jeffery P. Waters and William R. Curtis
- Sediment Compatibility for Beach Nourishment in North Carolina, by Gregory L. Williams
- Evaluating Beachfill Project Performance in the USACE Philadelphia District, by Monica Chasten and Harry Friebel
- US Army Corps of Engineers' National Coastal Mapping Program, by Jennifer Wozencraft
- Flood Damage Reduction Project Using Structural and Non-Structural Measures, by Stacey Underwood
- Shore Protection Project Performance Improvement Initiative (S3P2I), by Susan Durden
- Hurricane Isabel Post-Storm Assessment, by Jane Jablonski
- US Army Corps of Engineers Response to the Hurricanes of 2004, by Rick McMillen and Daniel R. Haubner
- Increased Bed Erosion Due to Increased Bed Erosion Due to Ice, by Decker B. Hains, John I. Remus, and Leonard J. Zabilansky
- Mississippi Valley Division, by James D. Gutshall
- Impacts to Ice Regime Resulting from Removal of Milltown Dam, Clark Fork River, Montana, by Andrew M. Tuthill and Kathleen D. White, and Lynn A. Daniels
- Carroll Island Micromodel Study: River Miles 273.0-263.0, by Jasen Brown
- Monitoring the Effects of Sedimentation from Mount St. Helens, by Alan Donner, Patrick O'Brien and David Biedenharn
  Watershed Approach to Stream Stability and Benefits Related to the Reduction of Nutrients, by John B. Smith
- A Lake Tap for Water Temperature Control Tower Construction at Cougar Dam, Oregon, by Stephen Schlenker, Nathan Higa and Brad Bird
- San Francisco Bay Mercury TMDL – Implications for Constructed Wetlands, by Herbert Fredrickson, Elly Best and Dave Soballe
- Abandoned Mine Lands: Eastern and Western Perspectives, by Kate White and Kim Mulhern
  Translating the Hydrologic Tower of Babel, byDan Crawford
- Demonstrating Innovative River Restoration Technologies: Truckee River, Nevada, by Chris Dunn
- System-Wide Water Resource Management – Tools of the Trade

Track 2

- Ecological and Engineering Considerations for Dam Decommissioning, Retrofits, and Reoperations, by Jock Conyngham
- Hydraulic Design of tidegates and other Water Control structures for Ecosystem Restoration projects on the Columbia River estuary, by Patrick S. O'Brien
- Surface Bypass & Removable Spillway Weirs, by Lynn Reese
- Impacts of using a spillway for juvenile fish passage on typical design criteria, by Bob Buchholz
- Howard Hanson Dam: Hydraulic Design of Juvenile Fish Passage Facility in Reservoir with Wide Pool Fluctuation, by Dennis Mekkers and Daniel M. Katz
- Current Research in Fate Current Research in Fate & Transport of Chemical and Biological Contaminants in Water Distribution Systems, by Vincent F. Hock
- Regional Modeling Requirements, by Maged Hussein
- Tools for Wetlands Permit Evaluation: Modeling Groundwater and Surface Water Interaction, by Cary Talbot
- Ecosystem Restoration for Fish and Wildlife Habitat on the UMRS, by Jon Hendrickson
- Missouri River Shallow Water Habitat Creation, by Dan Pridal
- Aquatic Habitat Restoration in the Lower Missouri River, by Chance Bitner
- Transition to an Oracle Based Data System (Corps Water Management System, CWMS), by Joel Asunskis
- RiverGages.com: The Mississippi Valley Division Water Control Website, by Rich Engstrom
- HEC-ResSim 3.0: Enhancements and New Capabilities, by Fauwaz Hanbali
- Hurricane Season 2004 – Not to Be Forgotten, by Jacob Davis
- Re-Evaluation of a Flood Control Project, by Ferris W. Chamberlin
- Helmand Valley Water Management Plan, by Jason Needham
- A New Approach to Water Management Decision Making, by James D. Barton
- Developing Reservoir Operational Plans to Manage Erosion and Sedimentation during Construction – Willamette Temperature
- Control, Cougar Reservoir 2002-2005, by Patrick S. O'Brien
- Improved Water Supply Forecasts for the Kootenay Basin, by Randal T. Wortman
- ResSIM Model Development for Columbia River System, by Arun Mylvahanan
- Prescriptive Reservoir Modeling and the ROPE, by Jason Needham
- Missouri River Basin Water Management, by Larry Murphy

Track 3

- Corps Involvement in FEMA's Map Modernization Program, by Kate White, John Hunter and Mark Flick
- Innovative Approximate Study Method for FEMA Map Moderniation Program , by John Hunter
- Flood Fighting Structures Demonstration and Evaluation Program (FFSD), by Fred Pinkard
- Integrating Climate Dynamics Into Water Resources Planning and Management, by Kate White
- Hydrologic and Hydraulic Contributions to Risk and Uncertainty Propagation Studies, by Robert Moyer
- Uncertainty Analysis: Parameter Estimation, by Jackie P. Hallberg
- Geomorphology Study of the Middle Mississippi River, by Eddie Brauer
- Bank Erosion and Morphology of the Kaskaskia River, by Michael T. Rodgers
- Degradation of the Kansas City Reach of the Missouri River, by Alan Tool
- Sediment Impact Assessment Model (SIAM), by David S. Biedenharn and Meg Jonas
- Mississippi River Sedimentation Study, by Basil Arthur
- Sediment Model of Rivers, by Charlie Berger
- East Grand Forks, MN and Grand Forks, ND Local Flood Damage Reduction Project, by Michael Lesher
- Hydrologic and Hydraulic Analyses, by Thomas R. Brown
- Hydrologic and Hydraulic Modeling of the Mccook and Thornton Tunnel and Reservoir Plans, by David Kiel
- Ala Wai Canal Project, by Lynnette F. Schaper
- Missouri River Geospatial Decision Support Framework, by Bryan Baker and Martha Bullock
- Systemic Analysis of the Mississippi & Illinois Rivers Upper Mississippi River Comprehensive Plan, by Dennis L. Stephens

Section 227: National Shoreline Erosion Control Demonstration and Development Program Annual Workshop

- Workshop Objectives
- Section 227: Oil Piers, Ventura County, CA, by Heather Schlosser
- An Evaluation of Performance Measures for Prefabricated Submerged Concrete Breakwaters: Section 227 Cape May Point, New Jersey Demonstration Project, by Donald K Stauble, J.B. Smith and Randall A. Wise
- Bluff Stabilization along Lake Michigan, using Active and Passive Dewatering Techniques, by Rennie Kaunda, Eileen Glynn, Ron Chase, Alan Kehew, Amanda Brotz and Jim Selegean
- Storm Damage at Cape Lookout
- Branchbox Breakwater Design at Pickleweed Trail, Martinez, CA
- Section 227: Miami, FL
- Section 227: Sheldon Marsh Nature Preserve
- Section 227: Seabrook, New Hampshire
- Jefferson County, TX – Low Volume Beach Fill
- Sacred Falls, Oahsacred Falls, Oahu Section 227 Demonstration Project

Track 4

- Fern Ridge LakFern Ridge Lake Hydrologic Aspects of Operation during Failure, by Bruce J Duffe
- A Dam Safety Study Involving Cascading Dam Failures, by Gordon Lance
- Spillway Adequacy Analysis of Rough River Lake Louisville District, by Richard Pruitt
- Water Management in Iraq: Capability and Marsh Restoration, by Fauwaz Hanbali
- Iraq Ministry of Water Resources Capacity Building, by Michael J. Bishop, John W. Hunter, Jeffrey D. Jorgeson, Matthew M. McPherson, Edwin A. Theriot, Jerry W. Webb, Kathleen D. White, and Steven C. Wilhelms

- HEC Support of the CMEP Program, by Mark Jensen
- Geospatial Integration of Hydrology & Hydraulics Tools for Multi-Purpose, Multi-Agency Decision Support, by Timothy Pangburn, Joel Schlagel, Martha Bullock, Michael Smith, and Bryan Baker
- GIS & Surveying to Support FEMA Map Modernization and Example Bridge Report, by Mark Flick
- High Resolution Bathymetry and Fly-Through Visualization, by Paul Clouse
- Using GIS and HEC-RAS for Flood Emergency Plans, by Stephen Stello
- High Resolution Visualizations of Multibeam Data of the Lower Mississippi River, by Tom Tobin and Heath Jones
- System Wide Water Resources Program Unifying Technologies Geospatial Applications, by Andrew J. Bruzewicz
- Raystown Plate Locations
- Hydrologic Engineering Center: HEC–HMS Version 3.0 New Features, by Jeff Harris
- SEEP2D & GMS: Simple Tools for Solving a Variety of Seepage Problems, by Clarissa Hansen, Fred Tracy, Eileen Glynn, Cary Talbot and Earl Edris
- Sediment and Water Quality in HEC-RAS, by Mark Jensen
- Advances to the GSSHA Model, by Aaron Byrd and Cary Talbot
- Watershed Analysis Tool: HEC-WAT Program, by Chris Dunn
- Little Calumet River UnsteadLittle Calumet River Unsteady Flow Model Conversion UNET to HEC-RAS, by Rick D. Ackerson
  Kansas River Basin Model, by Edward Parker
- Design Guidance for Breakup Ice Control Structures, by Andrew M. Tuthill
- Computational Hydraulic Model of the Lower Monumental Dam Forebay, by Richard Stockstill, Charlie Berger, John Hite, Alex Carrillo, and Jane Vaughan
- Use of Regularization as a Method for Watershed Model Calibration, by Brian Skahill
- Demonstration Program Urban Flooding and Channel Restoration in Arid and Semi-Arid Regions (UFDP), by Joan Pope, Jack Davis, Ed Sing, John Warwick, Meg Jonas

Track 5

- Walla Walla District Northwestern Division, by Robert Berger
- Best Practices for Conduits through Embankment Dams, by Chuck R. Cooper
- Design, Construction Design, Construction and Seepage at Prado Dam, by Douglas E. Chitwood
- 2-D Liquefaction Evaluation with Q4Mesh, by David C. Serafini
- Unlined Spillway Erosion Risk Assessment, by Johannes Wibowo, Don Yule, Evelyn Villanueva and Darrel Temple
- Seismic Remediation of the Clemson Upper and Lower Diversion Dams; Evaluation, Conceptual Design and Design, by Lee Wooten and Ben Foreman
- Seismic Remediation of the Clemson Upper and Lower Diversion Dams; Deep Soil Mix Construction, by Lee Wooten and Ben Foreman
- Historical Changes in the State of the Art of Seismic Engineering and Effects of those changes on the Seismic Response Studies of Large Embankment Dams, by Sam Stacy
- Iwakuni Runway Relocation Project, by Vincent R. Donnally
- Internal Erosion & Piping at Fern Ridge Dam, by Jeremy Britton
- Rough River Dam Safety Assurance Project, by Timothy M. O'Leary
- Seepage Collection & Control Systems: The Devil is in the Details , by John W. France
- Dewey Dam Seismic Assessment, by Greg Yankey
- Seismic Stability Evaluation for Ute Dam, New Mexico, by John W. France
- An Overview of Criteria Used by Various Organizations for Assessment and Seismic Remediation of Earth Dams, by Jeffrey S. Dingrando
- A Review of Corps of Engineers Levee Seepage Practices and Proposed Future Changes, by George Sills
- Ground-Penetrating Radar Applications for the Assessment of Pavements, by Lulu Edwards and Don R. Alexander
- Peru Road Upgrade Project, by Michael P. Wielputz
- Slope Stability Evaluation of the Baldhill Dam Right Abutment, by Neil T. Schwanz
- Design and Construction of Anchored Bulkheads with Synthetic Sheet Piles Seabrook, New Hampshire, by Siamac Vaghar and Francis Fung
- Characterization of Soft Claya Case Study at Craney Island, by Aaron L. Zdinak
- Dispersive ClayDispersive Clays – Experience andHistory of the NRCS (Formerly SCS), by Danny McCook
- Post-Tensioning Institute, by Michael McCray
- Demonstration Program Urban Flooding and Channel Restoration in Arid and Semi-Arid Regions (UFDP), by Joan Pope, Jack Davis, Ed Sing, John Warwick, Meg Jonas

Track 6

- State of the Art in Grouting: Dams on Solution Susceptible or Fractured Rock Foundations, by Arthur H. Walz
- Specialty Drilling, Testing, and Grouting Techniques for Remediation of Embankment Dams, by Douglas M. Heenan
- Composite Cut-Offs for Dams, by Dr. Donald A. Bruce and Trent L. Dreese
- State of the Art in Grout Mixes, by James A. Davies
- State of the Art in Computer Monitoring and Analysis of Grouting, by Trent L. Dreese and David B. Wilson
- Quantitatively Engineered Grout Curtains, by David B. Wilson and Trent L. Dreese
- Grout Curtains at Arkabutla Dam: Outlet Monolith Joints and Cracks using Chemical Grout, Arkabutla Lake, MS, by Dale A. Goss
- Chicago Underflow Plan – CUP: McCook Reservoir Test Grout Program, by Joseph A. Kissane
- Clearwater Dam: Sinkhole Repair Foundation Investigation and Grouting Project, by Mark Harris
- Update on the Investigation of the Effects of Boring Sample Size (3" vs 5") on Measured Cohesion in Soft Clays, by Richard Pinner and Chad M. Rachel
- Soil-Bentonite Cutoff Wall Through Free-Product at Indiana Harbor CDF, by Joe Schulenberg and John Breslin
- Soil-Bentonite Cutoff Wall Through Dense Alluvium with Boulders into Bedrock, McCook Reservoir, by William A. Rochford
- Small Project, Big Stability Problem the Block Church Road Experience, by Jonathan E. Kolber
- Determination of Foundation Rock Properties Beneath Folsom Dam, by Michael K. Sharp, José L. Llopis and Enrique E. Matheu
  Waterbury Dam Mitigation, by Bethany Bearmore
- Armor Stone Durability in the Great Lakes Environment, by Joseph A. Kissane
- Mill Creek - An Urban Flood Control Challenge, by Monica B. Greenwell
- Next Stop, The Twilight Zone, by Troy S. O'Neal
- Limitations in the Back Analysis of Shear Strength from Failures, by Rick Deschamps and Greg Yankey
- Reconstruction of Deteriorated Concrete Lock Walls After Blasting and Other Demolition Removal Techniques, by Stephen G. O'Connor

- Flood Fighting Structures Demonstration and Evaluation Program (FFSD), by George Sills
- Innovative Design Concepts Incorporated into a Landfill Closure and Reuse Design Portsmouth Naval Shipyard, Kittery, Maine, by Dave Ray and Kevin Pavlik
- Laboratory Testing of Flood Fighting Structures, by Johannes L. Wibowo, Donald L. Ward and Perry A. Taylor
- Bluff Stabilization Along Lake Michigan, Using Active and Passive Dewatering Techniques, Allegan Co. Michigan, by Rennie Kaunda, Eileen Glynn, Ron Chase, Alan Kehew and Jim Selegean

Track 7

- Case History: Multiple Axial Statnamic Tests on a Drilled Shaft Embedded in Shale, by Paul J. Axtell, J. Erik Loehr, Daniel L. Jones
- The Sliding Failure of Austin Dam Pennsylvania - Revisited, by Brian H. Greene
- M3 –Modeling, Monitoring and Managing: A Comprehensive Approach to Controlling Ground Movements for Protection of Existing Structures and Facilities, by Francis D. Leathers and Michael P. Walker
- Time-Dependent Reliability Modeling for Use in Major Rehabilitation of Embankment Dams and Foundation, by Robert C. Patev
- Lateral Pile Load Test Results Within a Soft Cohesive Foundation, by Richard J. Varuso
- Engineering Geology Challenge Engineering Geology Challenges During Design and Construction of the Marmet Lock Project, by Ron Adams and Mike Nield
- Mill Creek Deep Tunnel Geologic Conditions and Potential Impacts on Design/Construction, by Kenneth E. Henn III
- McAlpine Lock Replacement Instrumentation: Design, Construction, Monitoring, and Interpretation, by Troy S. O'Neal
- Geosynthetics and Construction of the Second Powerhouse Corner Collector Surface Flow Bypass Project, Bonneville Lock and Dam Project, Oregon and Washington, by Art Fong
- McAlpine Lock Replacement Project Foundation Characteristics and Excavation, by Kenneth E. Henn III
- Structural and Geotechnical Issues Impacting The Dalles Spillwall Construction and Bay 1 Erosion Repair, by Jeffrey M. Ament
  Rock Anchor Design and Construction: The Dalles Dam Spillwalls, by Kristie M. Hartfeil
- The Future of the Discrete Element Method in Infrastructure Analysis, by Raju Kala, Johannes L. Wibowo and John F. Peters
- Sensitive Infrastructure Sites - Sonic Drilling Offers Quality Control and Non-Destructive Advantages to Geotechnical Construction Drilling, by John P. Davis

Track 8

- Evaluation of The Use of LithiuEvaluation of The Use of Lithium Compounds in Controlling ASR in Concrete Pavement, by Mike Kelly
- Roller Compacted Concrete for McAlpine Lock Replacement, by David E. Kiefer
- Soil-Cement for Stream Bank Stabilization, by Wayne Adaska
- Using Cement to Reclaim Asphalt Pavements, by David R. Luhr
- Valley Park 100-Yr Flood Protection Project: Use of 'Engineered Fill' in the Item IV-B Levee Core, by Patrick J. Conroy
- Bluestone Dam: AAR –A Case Study, by Greg Yankey
- USDA Forest Service: Unpaved Road Stabilization with Chlorides, by Michael R. Mitchell
- Use of Ultra-Fine Amorphous Colloidal Silica to Produce a High-Density, High-Strength Grout, by Brian H. Green
- Modular Gabion Systems, by George Ragazzo
- Addressing Cold Regions Issues in Pavement Engineering, by Edel R. Cortez and Lynette Barna
- Geology of New York Harbor: Geological and Geophysical Methods of Characterizing the Stratigraphy for Dredging Contracts, by Ben Baker, Kristen Van Horn and Marty Goff
- Rubblization of Airfield Concrete Pavements, by Eileen M. Vélez-Vega
- US Army Airfield Pavement Assessment Program, by Haley Parsons, Lulu Edwards, Eileen Velez-Vega and Chad Gartrell
- Critical State for Probabilistic Analysis of Levee Underseepage, by Douglas Crum,
- Curing Practices for Modern Concrete Production, by Toy Poole
- AAR at Carters Dam: Different Approaches, by James Sanders
- Concrete Damage at Carters Dam, by Toy Poole
  Damaging Interactions Among Concrete Materials, by Toy Poole
- Economic Effects on Construction of Uncertainty in Test Methods, by Toy Poole
- Trends in Concrete Materials Specifications, by Toy Poole
- Spall and Intermediate-Sized Repairs for PCC Pavements, by Reed Freeman and Travis Mann
- Acceptance Criteria Acceptance Criteria for Unbonded Aggregate Road Surfacing Materials, by Reed Freeman, Toy Poole, Joe Tom and Dale Goss
- Effective Partnering to Overcome an Interruption In the Supply of Portland Cement During Construction at Marmet Lock and Dam, by Billy D. Neeley, Toy S. Poole and Anthony A. Bombich

Track 10

- Marmet Lock &Dam: Automated Instrumentation Assessment, Summer/Fall 2004, by Jeff Rakes and Ron Adams
  Success Dam Seismic Remediation

Track 9

- Fern Ridge Dam, Oregon: Seepage and Piping Concerns (Internal Erosion)

Track 11

- Canton Dam Spillway Stability: Is a Test Anchor Program Necessary?, by Randy Mead
- Dynamic Testing and Numerical Correlation Studies for Folsom Dam, by Ziyad Duron, Enrique E. Matheu, Vincent P. Chiarito, Michael K. Sharp and Rick L. Poeppelman

Status of Portfolio Risk Assessment, by Eric Halpin
- Mississinewa Dam Foundation Rehabilitation, by Jeff Schaefer
- Wolf Creek Dam Seepage Major Rehabilitation Evaluation, by Michael F. Zoccola
- Bluestone Dam DSA Anchor Challenges, by Michael McCray
- Clearwater Dam Major Rehab Project, by Bobby Van Cleave
- Design, Construction and Seepage at Prado Dam, by Douglas E. Chitwood
- Seven Oaks Dam: Outlet Tunnel Invert Damage, by Robert Kwan
- An Overview of An Overview of the Dam Safety ProgramManagement Tools (DSPMT), by Tommy Schmidt

Track 12

- Greenup L&D Miter Gate Repair and Instrumentation, by Joseph Padula, Bruce Barker and Doug Kish
- Marmet Locks and Dam Lock Replacement Project, by Jeffrey S. Maynard,
- Status of HSS Inspections in The Portland District, by Travis Adams
- Kansas City District: Perry Lake Project Gate Repair, by Marvin Parks
- Mel Price – Auxiliary Lock Downstream Miter Gate Repair, by Thomas J. Quigley, Brian K. Kleber and Thomas R. Ruf
- J.T. Myers Lock Improvements Project Infrastructure Conference, by David Schaaf and Greg Werncke
- J.T. Myers Dam Major Rehab, by David Schaaf, Greg Werncke and Randy James
- Greenup L&D, by Rodney Cremeans
- McAlpine Lock Replacement Project, by Kathy Feger
- Roller Compacted Concrete Placement at McAlpine Lock, by Larry Dalton
- Kentucky Lock Addition Downstream Middle Wall Monolith Design, by Scott A. Wheeler
- London Locks and Dam Major Rehabilitation Project, by David P. Sullivan
- Replacing Existing Lock 4: Innovative Designs for Charleroi Lock, by Lisa R. Pierce, Dave A. Stensby and Steve R. Stoltz
- Olmsted L&D, Dam In-the-wet Construction, by Byron McClellan, Dale Berner and Kenneth Burg
- Olmsted Floating Approach Walls, by Terry Sullivan
- John Day Navigation Lock Monolith Repair, by Matthew D. Hanson
- Inner Harbor Navigation Canal (IHNC) Lock Replacement, by Mark Gonski
- Comite River Diversion Project, by Christopher Dunn
- Waterline Support Failure: A Case Study, by Angela DeSoto Duncan
- Public Appeal of Major Civil Projects: The Good, the Bad and the Ugly, by Kevin Holden and Kirk Sunderman
- Chickamauga Lock and Dam Lock Addition Cofferdam Height Optimization Study, by Leon A. Schieber
- Des Moines Riverwalk, by Thomas D. Heinold

Track 13

- Folsom Dam Evaluation of Stilling Basin Performance for Uplift Loading for Historic Flows and Modification of Folsom Dam
- Stilling Basin for Hydrodynamic Loading, by Rick L. Poeppelman, Yunjing (Vicky) Zhang, and Peter J. Hradilek
- Seismic Stress Analysis of Folsom Dam, by Enrique E. Matheu
- Barge Impact Analysis for Rigid Lock Walls ETL 1110-2-563, by John D. Clarkson and Robert C. Patev
- Belleville Locks & Dam Barge Accident on 6 Jan 05, by John Clarkson
- Portugues Dam Project Update, by Alberto Gonzalez, Jim Mangold and Dave Dollar
- Portugues Dam: RCC Materials Investigation, by Jim Hinds
- Nonlinear Incremental Thermal Stress Strain Analysis Portugues Dam, by David Dollar, Ahmed Nisar, Paul Jacob and Charles Logie
- Seismic Isolation of Mission-Critical Infrastructure to Resist Earthquake Ground Shaking or Explosion Effects, by Harold O. Sprague, Andrew Whitaker and Michael Constantino
- Obermeyer Gated Spillway S381, by Michael Rannie
- Design of High Pressure Vertical Steel Gates Chicago Land Underflow Plan McCook Reservoir, by Henry W. Stewart, Hassan Tondravi, Lue Tekola,
- Development of Design Criteria for the Rio Puerto Nuevo Contract 2D/2E Channel Walls, by Janna Tanner, David Shiver, and Daniel Russell
- Indianapolis NortIndianapolis North Phase 3A Warfleigh Section
- Design of Concrete Lined Tunnels in Rock CUP McCook Reservoir Distribution Tunnels Contract, by David Force

Track 14

- GSA Progressive Collapse Design Guidelines Applied to Concrete Moment-Resisting Frame Buildings, by David N. Bilow and Mahmoud E. Kamara,
- UFC 4-023-02 Retrofit of Existing Buildings to Resist Explosive Effects, by Jim Caulder
- Summit Bridge Fatigue Study, by Jim Chu
- Quality Assurance for Seismic Resisting Systems, by John Connor
- Seismic Requirements for Arch, Mech, and Elec. Components, by John Connor
- SBEDS - (Single degree of freedom Blast Effects Design Spreadsheets), by Dale Nebuda,
- Design of Buildings to Resist Progressive Collapse UFC 4-023-03, by Bernie Deneke,
- Fatigue and Fracture Assessment, by Jesse Stuart
- Unified Facilities Criteria: Seismic Design for Buildings, by Jack Hayes
- Evaluation and Repair Of Blast Damaged Reinforced Concrete Beams, by MAJ John L. Hudson
- Building an In-house Bridge Inspection Program
- United Facilities CriteriUnited Facilities Criteria Masonry Design for Buildings, by Tom Wright
- USACE Homeland Security Portal, by Michael Pace
- Databse Tools for Civil Works Projects

- Standard Procedure for Fatigue Evaluation of Bridges, by Phil Sauser
- Consolidation of Structural Criteria for Military Construction, by Steven Sweeney
- Cathodic Protectionfor the South Power Plant Reinforcing Steel, Diego Garcia, BIOT, by Thomas Tehada and Miki Funahashi

Track 15

- Engineering Analysis of Airfield Lighting System Lightning Protection, by Dr. Vladimir A. Rakov and Dr. Martin A. Uman
- Dr. Martin A. Uman
- Charleston AFB Airfield Lighting Vault
- UNIFIED FACILITIES CRITERIA (UFC) UFC 3-530-01 Design: Interior, Exterior Lighting and Controls, by Nancy Clanton and Richard Cofer
- Electronic Keycard Access Locks, by Fred A Crum
- Unified Facilities Criteria (UFC) 3-560-02, Electrical Safety, by John Peltz and Eddie Davis
- Electronic Security SystemElectronic Security Systems Process Overview
- Lightning Protection Standards
- Electrical Military Workshop
- Information Technology Systems Criteria, by Fred Skroban and John Peltz
- Electrical Military Workshop
- Electrical Infrastructure in Iraq- Restore Iraqi Electricity, by Joseph Swiniarski

Track 16

- BACnet® Technology Update, by Dave Schwenk
- The Infrastructur Conference 2005, by Steven M. Carter Sr. and Mitch Duke
- Design Consideration for the Prvention of Mold, by K. Quinn Hart
- COMMISSIONING, by Jim Snyder
- New Building Commissioning , by Gary Bauer
- Ventilation and IAQ TheNew ASHRAE Std 62.1, by Davor Novosel
- Basic Design Considerations for Geothermal Heat Pump Systems, by Gary Phetteplace
- Packaged Central Plants
- Effective Use Of Evaporative Cooling For Industrial And Institutional/Office Facilities, by Leon E. Shapiro
- Seismic Protection For Mechanical Equipment
- Non Hazardous Chemical Treatments for Heating and Cooling Systems, by Vincent F. Hock and Susan A. Drozdz
- Trane Government Systems & Services
- LONWORKS Technology Update, by Dave Schwenk
- Implementation of Lon-Based Specifications by Will White and Chris Newman

Track 17

- Utility System Security and Fort Future, by Vicki Van Blaricum, Tom Bozada, Tim Perkins, and Vince Hock
- Festus/Crystal City Levee and Pump Station
- Chicago Underflow Plan McCook Reservoir (CUP) Construction of Distribution Tunnel and Pumps Installation
- Technological Advances in Lock Control Systems, by Andy Schimpf and Mike Maher
- Corps of Engineers in Iraq Rebuilding Electrical Infrastructure, by Hugh Lowe
- Red River of the North at East Grand Forks, MN & Grand Forks, ND: Flood Control Project – Armada of Pump Stations Protect Both Cities, by Timothy Paulus
- Lessons Learned for Axial/Mixed Flow Propeller Pumps, by Mark A. Robertson
- Creek Automated Gate Considerations, by Mark A. Robertson
- HydroAMP: Hydropower Asset Management, by Lori Rux
- Acoustic Leak Detection for Water Distribution Systems, by Sean Morefield, Vincent F. Hock and John Carlyle
- Remote Operation System, Kaskaskia Dam Design, Certification, & Accreditation, by Shane M. Nieukirk
- Lock Gate Replacement System, by Shaun A. Sipe and Will Smith

Track 20

- “Re-Energizing Medical Facility Excellence”, by COL Rick Bond
- Rebuilding and Renovating The Pentagon , by Brian T. Dziekonski,
- Resident Management System
- Design-Build and Army Military Construction, by Mark Grammer
- Defense Acquisition Workforce Improvements Act - Update, by Mark Grammer
- Construction Management @ Risk: Incentive Price Revision – Successive Targets, by Christine Hendzlik
- Construction Reserve Matrix, by Christine Hendzlik
- Award contingent on several factors..., by Christine Hendzlik
- 52.216-17 Incentive Price Revision--Successive Targets (Oct 1997) - Alt I (Apr 1984), by Christine Hendzlik
- Preconstruction Services, by Christine Hendzlik
- Proposal Evaluation Factors, by Christine Hendzlik
- MILCON Transformation in Support of Army Transformation, by Claude Matsui
- Construction Practices in Russia, by Lance T. Lawton

- Partnering as a Best Practice, by Ray Dupont
- USACE Tsunami Reconstruction for USAID, by Andy Constantaras

Track 21

- Dredging Worldwide, by Don Carmen
- SpecsIntact Editor, by Steven Freitas
- SpecsIntact Explorer, by Steven Freitas
- American River Watershed Project, by Steven Freitas
- Unified Facilities Guide Specifications (UFGS) Conversion To MasterFormat 2004, by Carl Kersten
- Unified Facilities Guide Specifications (UFGS) Status and Direction , by Jim Quinn

Workshops

- Design of Buildings to Resist Progressive Collapse UFC 4-023-03, by Bernie Deneke
- Security Engineering and at Unified Facility Criteria (UFC), by Bernie Deneke, Richard Cofer, John Lynch and Rudy Perkey
- Packaged Central Plants, by Trey Austin

NATIONAL DEFENSE INDUSTRIAL ASSOCIATION

NDIA

STRENGTH THROUGH INDUSTRY & TECHNOLOGY

2005 Tri-Service Infrastructure Systems Conference & Exhibition

"Re-Energizing Engineering Excellence"

ON-SITE AGENDA

The America's Center
St. Louis Convention Center
St. Louis, MO
August 2-4, 2005
Event # 5150

ISC
Tri-Service Infrastructure Systems Conference & Exposition 2005

2005 Tri-Service Infrastructure Systems Conference & Exhibition

AGENDA

Monday, August 1, 2005

8:00 AM-9:00 PM	Exhibit Move-In
12 Noon-5:00 PM	Registration

Tuesday, August 2, 2005

7:00 AM-8:00 AM	Registration and Continental Breakfast
8:00 AM-8:15 AM Ferrara Theatre	Welcome and Introduction
8:15 AM-9:00 AM Ferrara Theatre	The Future of Engineering and Construction Panel Moderator: *Mr. Don Basham, Chief, Engineering & Construction, USACE* Panelists: *LTG Carl A. Strock, Commander, USACE* *Dr. James Wright, Chief Engineer NAVFAC*
9:00 AM-9:45 AM Ferrara Theater	Keynote Address The Lord of the Things: The Future of Infrastructure Technologies *Mr. Paul Doherty, AIA, Managing Director,* *General Land Corporation*
9:45 AM-10:15 AM	Break
10:15 AM-11:15 AM Ferrara Theatre	USACE Engineering and Construction Panel Moderator: *Mr. Don Basham, Chief, Engineering & Construction, USACE* Panelists: *MG Donald T. Riley, Director, Civil Works, USACE* *BG Bo M. Temple, Director, Military Programs, USACE* *Dr. Michael J. O'Connor, Director, R&D*
10:15 AM-11:15 AM Room 225	Navy General Session
11:00 AM - 7:00 PM	Exhibits Open
11:15 AM-1:00 PM	Lunch in Exhibit Hall (on your own)
11:15 AM-1:00 PM Washington G	Women's Career Lunch Session (Bring your lunch from Exhibit Hall) Moderator: *Ms. Demi Syriopoulou, HQ USACE* Opening Remarks: *LTG Carl A. Strock, Commander, USACE* Presentations & Discussion: *Dwight Beranek, Kristine Allaman, Donald Basham, HQ USACE*
1:00 PM-1:55 PM Ferrara Theatre	Introduction to Multi-Disciplinary Tracks

Tuesday, August 2, 2005

2:00 PM-2:50 PM — 1st Round of Multi-Disciplinary Concurrent Sessions (Continued)

Track 1: Acquisition Strategies for Civil Works
Room 230
Walt Norko

Track 2: Risk and Reliability Engineering
Room 231
Anjana Chudgar
David Schaaf

Track 3: Portfolio Risk Assessment
Room 232
Eric Halpin

Track 4: Hydrology, Hydraulics and Coastal Engineering
Room 240 Support for USACE
Jerry Webb
Darryl Davis

Track 5: Civil Works R&D Forum
Room 241
Joan Pope

Track 6: Civil Works Security Engineering
Room 242
Joe Hartman
Bryan Cisar

Track 7: Building Information Model Applications
Room 226
Brian Huston
Daniel Hawk

Track 8: Design Build for Military Projects
Room 220
Mark Grammer

Track 9: Army Transformation/Global Posture Initiative/
Room 221 Force Modernization
Al Young
Claude Matsui

Track 10: Force Protection - Army Access Control Points
Room 222
John Trout

Track 11: Cost Engineering Forum on Government Estimates
Room 227 vs. Actual Costs
Ray Lynn *Jack Shelton* *Kim Callan*
Miguel Jumilla *Ami Ghosh* *Joe Bonaparte*

Track 12: Engineering & Construction Information Technology
Room 228
MK Miles

Track 13: Sustainable Design
Room 223
Harry Goradia

Track 14: ACASS/CCASS/CPARS
Room 224
Ed Marceau
Marilyn Nedell

Track 15: Whole Building Design Guide
Room 229
Earle Kennett

Tuesday, August 2, 2005

2:50 PM-3:30 PM	Break in Exhibit Hall
3:30 PM-4:20 PM	2nd Round of Multi-Disciplinary Sessions
4:30 PM-5:20 PM	3rd Round of Multi-Disciplinary Sessions
5:30 PM-7:00 PM	Ice Breaker Reception in Exhibit Hall

Wednesday, August 3, 2005

7:00 AM-8:00 AM	Registration and Continental Breakfast
8:00 AM-9:30 AM	Concurrent Sessions (Please Refer to Concurrent Session Schedule on the Following Pages)
9:00 AM	Exhibit Hall Opens
9:30 AM-10:30 AM	Break in Exhibit Hall
10:30 AM-12:00 Noon	Concurrent Sessions (Please Refer to Concurrent Session Schedule on the Following Pages)
12:00 Noon-1:30 PM	Lunch in Exhibit Hall
1:30 PM-3:00 PM	Concurrent Sessions (Please Refer to Concurrent Session Schedule on the Following Pages)
3:00 PM-4:00 PM	Break in Exhibit Hall
4:00 PM-5:30 PM	Concurrent Sessions
5:00 PM	Exhibit Hall Closes

Thursday, August 4, 2005

7:00 AM-8:00 AM	Registration and Continental Breakfast
8:00 AM-9:30 AM	Concurrent Sessions (Please Refer to Concurrent Session Schedule on Following Pages)
9:30 AM-10:30 AM	Break in Exhibit Hall (Last Chance to view Exhibits)
10:30 AM-12:00 Noon	Concurrent Sessions (Please Refer to Concurrent Session Schedule on Following Pages)
12:00 Noon-1:30 PM	Lunch (On your own)
12:00 Noon-6:00 PM	Exhibits Move-Out
1:30 PM-3:00 PM	Concurrent Sessions (Please Refer to Concurrent Session Schedule on Following Pages)
3:00 PM-3:30 PM	Break
3:30 PM-5:00 PM	Concurrent Sessions (Please Refer to Concurrent Session Schedule on following pages)

Wednesday, August 3, 2005 Concurrent Sessions

HH&C Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 220	**TRACK 1 Coastal Structures** Session 1A	Protecting the NJ Coast using large stone seawalls — *Cameron Chasten*	Chicago shoreline storm damage reduction project — *Andrew Bezinger*	Risk and reliability in coastal structure design — *Jeffrey Melby*	**TRACK 1 Coastal Regional Manangement** Session 1B	Cascade: An integrated regional model for decision support — *Nicholas Kraus*	Upper Texas coast sediment transport modeling & sediment budgets — *David King*	Sediment compatibility for beach nourishment in North Carolina — *Gregory Williams*
Room 221	**TRACK 2 Ecological Engineering & Design** Session 2A	Ecological and engineering considerations for dam decommissioning, retrofits and operations — *Jock Conyngham*	Hydraulic design of tidegates and other water control structures for ecosystem restoration on the Columbia Estuary — *Patrick O'Brien*	Innovative Integration of engineering and biological tools aids hydraulic structure design for restoring T&E fish — *Andrew Goodwin*	**TRACK 2 Ecological Engineering & Design** Session 2B	Innovative hydraulic structure design at Lower Granite Dam: design that saves water and salmon — *Lynn Reese*	Impacts of using a spillway for juvenile fish passage on typical design criteria — *Robert Buchholz*	Hydraulic design of juvenile fish passage facility for reservoir with wide range of pool elevation - Hanson Dam — *Dennis Mekkers*
Room 222	**TRACK 3 Modeling** Session 3A	Corps involvement in the FEMA map modernization program — *Kete White*	Innovative approximate study method for FEMA map modernization program — *John Hunter*	Flood fight structures demonstration evaluation program — *Fred Pinkard*	**TRACK 3 Modeling** Session 3B	Integrating climate dynamics into water resources planning and management — *Kate White*	Risk and uncertainty in flood damage reduction studies — *Rob Moyer*	Uncertainty analysis and stochastic simulation — *Jacke Hallberg*
Room 223	**TRACK 4 H&H Aspects of Dam Safety** Session4A	Hydrologic aspects of operating in failure mode: Fern Lake — *Bruce Duffe*	Dam safety study with cascading failures — *Gordon Lance*	Rough river spillway capacity — *Richard Pruitt*	**TRACK 4 International/ Military H&H** Session 4B	Capability restoration and historic marsh restoration — *Fauwaz Hanbali*	USACE capacity building effort for Iraq MoWR — *Steven Wilhelms*	USACE support of CMEP in 2004 — *Mark Jensen*

Break in Exhibit Hall

12 Noon — **Lunch in Exhibit Hall**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	4:00 PM	4:30 PM	5:00 PM
Room 220	**TRACK 1 Coastal Sediments** Session 1C	Evaluating beachfill project performance in the NAP — *Monica Chasten*	USACE's regional coastal mapping program — *Jennifer Wozencraft*	US Naval Academy flood damage reduction project using structural and non-structural measures — *Stacey Underwood*	**TRACK 1 Shore Protection Projects** Session 1D	Hurricane Isabel effects on communities — *Jane Jablonski*	Repair of the shore protection projects adversly affected by the hurricanes of 2004 — *Rick McMillen*	Shore protection project performance assessmet — *Sharon Haggett*
Room 221	**TRACK 2 Modeling Ecological Restoration/Systems Assessment** Session 2C	Regional modeling requirements for ecosystem restoration — *Maged Hussein*	Tools for wetlands permit evaluation: Modeling groundwater and surface water distribution systems — *Cary Talbot*	Current research in fate and transport of chemical and biological contaminants in water distribution systems — *Mark Ginsberg*	**TRACK 2 Ecosystem Habitat Restoration** Session 2D	Aquatic habitat restoration in the lower Missouri River — *Chance Bittner*	Missouri River restoration: shallow water habitat creation — *Daniel Pridal*	Ecosystem restoration for fish and wildlife habitat on the upper Mississippi River — *Jon Hendrickson*
Room 222	**TRACK 3 River Morphology** Session 3C	Geomorphology study of the Mississippi river — *Edward Braurer*	Bank erosion and morphology of the Kaskaskia river — *Michael Rodgers*	Sediment movement at Kansas City from water years 1920 to 2004 — *Alan Tool*	**TRACK 3 Modeling River Sedimentation** Session 3D	Sediment impact assessment model (SIAM) — *David Biedenharn*	Sediment modeling of MS River, Cairo to Gulf — *Basil Arthur*	Sediment modeling of rivers — *Charlie Berger*
Room 223	**TRACK 4 GIS and Surveying** Session 4C	GIS tools available now to support HHC — *Timothy Pangburn*	High resolution bathymetry and fly-through visualization — *Paul Clouse*	GIS & surverying to support national FEMA — *Mark Flick*	**TRACK 4 GIS and Surveying** Session 4D	Update flood emergency plans with GIS and HEC-RAS — *Stephen Stello*	High resolution visualizations of multibeam data: lower Mississippi River — *Thomas Tobin*	GIS in SWWRP — *Andrew Bruzewicz*

Break in Exhibit Hall

Wednesday, August 3, 2005 Concurrent Sessions

Geotechnical Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 226	**TRACK 5**	Levee lowering for the Lewis & Clark bi-centennial celebration	Conduits through embankment dams - best practices for design, construction, problem id and evaluation, inspection, maintenance, renovation & repair		2-D liquefaction evaluation with q4MESH	Unlined spillway erosion risk assessment	Seismic remediation of the Clemson upper and lower diversion dams: evaluation, conceptal design and design (P1)
	Session 5A	***Robert Berger***	***Dave Pezza***	***Douglas Chitwood***	**Session 5B** ***David Serafini***	***Johannes Wibowo***	***Ben Foreman***
Room 227	**TRACK 6**	USACE dams on solution susceptible or highly fractured rock foundations	Special drilling and grouting techniques for remedial work in embankment dams	Composite grouting & cutoff wall solutions	State of the art in grout mixes	State of the art in computer monitoring, control, and analysis of grouting	Quantitatively engineered grout courtains
	Session 6A	***Art Walz***	***Doug Heenan***	***Donald Bruce***	**Session 6B** ***James Davies***	***Trent Dreese***	***David Wilson***
Room 228	**TRACK 7**	Case history: multiple axial statnamic test on a drilled shaft embedded in shale	Austin Dam, Pennsylvania: the sliding failure of a concrete gravity dam revisited	M^3 (Modeling, Monitoring and Manufacturing) - a comprehensive approach to controlling ground movements for protecting existing structures and facilities	Controlled modulus columns: A ground improvement technique	Time-dependent reliability models for use in major rehabilitation of embankment dams and foundations	Engineering geology design challenges at the Soo Lock replacement project
	Session 7A	***Paul Axtell***	***Brian Greene***	***Michael Walker***	**Session 7B** ***Martin Taube***	***Robert Patev***	***Mike Nield***
Room 229	**TRACK 8**	Evaluation of the use of lithium nitrate in controlling alkali-silica reactivity in an existing concrete pavement	Use of self-consolidating concrete in the installation of bulhead slots - Lessons learned in the use of this innovative concrete material	Roller compacted concrete for McAlpine lock walls	Soil-cement for stream bank stabilization	Using cement to reclaim asphalt pavements	Valley park 100-year flood protection project: use of "engineered fill" in item 4b levee core
	Session 8A	***Mike Kelly***	***Darrell Morey***	***David Kiefer***	**Session 8B** ***Wayne Adaska***	***David Luhr***	***Patrick Conroy***

Break in Exhibit Hall

12 Noon — **Lunch in Exhibit Hall**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	4:00 PM	4:30 PM	5:00 PM
Room 226	**TRACK 5**	Seismic remediation of the Clemson upper and lower diversion dams: deep soil mix construction	Historical changes in the state-of-the-art of seismic engineering & effects of those changes on the seismic response studies of large embankement dams	New Iwakuni runway	Internal erosion and piping at Fern Ridge dam: Problems and solutions	Rough river dam safety assurance project	Seepage collection and control systems: The devil is in the details
	Session 5C	***Ben Foreman***	***Samuel Stacy***	***Vincent Donnally***	**Session 5D** ***Jeremy Britton, Ph.D.***	***Timothy O'Leary***	***John France***
Room 227	**TRACK 6**	Grout courtains at Arkabutla Dam outlet monolith joints using chemical grout to seal joints, Arkabutla, MS	Results from a large-scale grout test program, Chicago underflow plan (CUP) McCook Reservoir	Clearwater Dam - foundation drilling and grouting for repair of sinkholes	Update on the investigation of the effects of boring sample size (3' vs 5") on measured cohesion in soft clays	Soil-bentonite cutoff wall through free-product at Indiana Harbor CDF	Soil-bentonite cutoff wall through dense alluvium with boulders into bedrock, McCook Reservoir
	Session 6C	***Dale Goss***	***Joseph Kissane***	***Mark Harris***	**Session 6D** ***Richard Pinner***	***Joseph Schulenberg***	***William Rochford***
Room 228	**TRACK 7**	Engineering geology during design and construction of the Marmet lock project	Mill Creek deep tunnel - Geological affects on proposed structures and construction techniques	Earth pressure loads behind the new McAlpine Lock replacement project	Geosynthetics and construction of the Bonneville lock and dam second powerhouse corner collector surface flow bypass project	McAlpine lock replacement - foundation characteristics and excavation	
	Session 7C	***Michael Nield***	***Tres Henn***	***Troy O'Neal***	**Session 7D** ***Art Fong***	***Kenneth Henn***	
Room 229	**TRACK 8**	What to do if your dam is expanding: a case study	Unpaved road stabilization with chlorides	Use of ultra-fine amorphous colloidal silica to produce a high-density, high-strength rock-matching grout for instrumentation grouting	Innovative techniques in the Gabion system	Addressing cold regions issues in pavement engineering	Geology of New York Harbor - geological and geophysical methods of characterizing the stratigraphy for dredging contracts
	Session 8C	***Greg Yankey***	***Michael Mitchell***	***Brian Green***	**Session 8D** ***George Ragazzo***	***Lynette Barna***	***Ben Baker***

Break in Exhibit Hall

Wednesday, August 3, 2005 Concurrent Sessions

Structural Engineering Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 240	**TRACK 12 Civil Works Structural**	Recent changes to Corps guidance on steel hydraulic structures	Crack repairs and instrumentation of Greenup L&D miter gate	Recent hydraulic steel structures findings in the Portland district	**TRACK 12 Civil Works Structural**	Perry Lake gate repair	Mel Price auxiliary lock gate repair	Mel Price auxiliary lock gate repair (Continued)
	Session 12A	*Joe Padula*	*Doug Kish*	*Travis Adams*	**Session 12B**	*Marvin Parks*	*Andrew Schimpf*	*Andrew Schimpf*
Room 241	**TRACK 13 Civil Works Structural**	Folsom Dam evaluation of stilling basin performance for uplift loading for historic flows	Rehabilitation of Folsom Dam stilling basin	Seismic stability evaluation of Folson Dam	**TRACK 13 Civil Works Structural**	Seismic stress analysis of Folsom Dam	Barge impact guidance for rigid lock walls, ETL 110-2-563 and probalistic barge impact analysis	Belleville barge accident
	Session 13A	*Rick Poeppelman*	*Rick Poeppelman*	*Enrique Matheu*	**Session 13B**	*Enrique Matheu*	*John Clarkson*	*John Clarkson*
Room 242	**TRACK 14 Bridges/ Buildings**	The USACE bridge management system	Standard procedures for fatigue evaluation of bridges	Fatigue and fracture assessment of Jesse Stuart Highway Bridge	**TRACK 14 Bridges/ Buildings**	Building an in-house bridge inspection program	Fatigue analysis of Summit bridge	Consolidation of Structural criteria for military construction
	Session 14A	*Phil Sauser*	*Phil Sauser*	*John Jaeger*	**Session 14B**	*Jennifer Laning*	*Jim Chu*	*Steve Sweeney*

Break in Exhibit Hall

12 Noon — **Lunch in Exhibit Hall**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	4:00 PM	4:30 PM	5:00 PM
Room 240	**TRACK 12 Civil Works Structural**	Overview of John T. Myers locks improvements project	John T. Myers rehabilitation study	Ohio River Greenup Lock extension	**TRACK 12 Civil Works Structural**	McAlpine lock replacement project, project summary and status of construction	Results of Roller Compacted concrete placement at the McAlpine lock replacement project	Tennessee Valley authority Kentucky lock addition downstream middle wall monoliths
	Session 12C	*Greg Werncke*	*Greg Werncke*	*Rodney Cremeans*	**Session 12D**	*Kathleen Feger*	*Larry Dalton*	*Scott Wheeler*
Room 241	**TRACK 13 Civil Works Structural**	Portugues Dam, Ponce, Puerto Rico project update	Portugues Dam, Ponce, Puerto Rico, RCC design and testing program	Portugues Dam, Ponce, Puerto Rico, Thermal analysis of hydration and subsequent cooling of RCC	**TRACK 13 Civil Works Structural**	Miter gate anchorage design	Obermeyer gated spillway project - S381	McCook Reservoir design of high pressure steel gates
	Session 13C	*Jim Mangold*	*Jim Hinds*	*Ahmed Nisar*	**Session 13D**	*Andy Harkness*	*Michael Rannie*	*Luelseged Tekola*
Room 242	**TRACK 14 Brigdes/ Buildings**	Unified facilities criteria seismic design for buildings	Seismic requirements for architectural, mechanical and electrical components	Quality assurance for seismic resisting systems	**TRACK 14 Bridges/ Buildings**	Unified facilities criteria masonry structural design for buildings	Cathodic protection of building reinforcing steel (in Diego Garcia)	USACE Homeland security web portal
	Session 14C	*Jack Hayes*	*John Connor*	*John Connor*	**Session 14D**	*Tom Wright*	*Thomas Tehada*	*Mike Pace*

Break in Exhibit Hall

Wednesday, August 3, 2005 Concurrent Sessions

Dam Safety Track & Construction Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 224	**TRACK 10 Dam Safety**	Tuttle Creek warning and alert systems	Lessons from the dam failure warning system exercise - Tuttle Creek	Tuttle Creek ground modification treatability program	**TRACK 10 Dam Safety**	Dam safety analysis of Cannelton Dam	John Martin Dam, CO - Dam safety structural upgrades	Vesuvius Lake Dam rehabilitation
	Session 10A	***Bill Empson***	***Bill Empson***	***Bill Empson***	**Session 10B**	***Terry Sullivan***	***George Diewald***	***Susan Peterson***
Room 225	**TRACK 11 Dam Safety**	Canton lake spillway stabilization project: IS a test anchor program NECESSARY?	Dynamic testing and numerical correlation studies for Folsom dam	Status of portfolio risk assessment	**TRACK 11 Dam Safety**	Mississinewa Dam remediation	Wolf creek seepage history	Blue dam major rehabilitation
	Session 11A	***Randy Mead***	***Ziyad Duron***	***Eric Halpin***	**Session 11B**	***Jeff Schaefer***	***Michael Zoccola***	***Michael McCray***
Room 230	**TRACK 19 Construction**	RMS Update	RMS Update (Continued)	Updated CQM for Contractors Course	**TRACK 19 Construction**	Lessons learned on major construction projects	Update on safety issues - Safety manual 385-1-1	Update on safety issues - safety manual 385-1-1 (continued)
	Session 19A	***Haskell Barker***	***Haskell Barker***	***Walt Norko***	**Session 19B**	***Jim Cox***	***Charles Ray Waits***	***Charles Ray Waits***
Room 231	**TRACK 20 Construction**	Construction methods in Russia	Construction methods in Russia (Continued)	Renovating the Pentagon using Design/Build delivery	**TRACK 20 Construction**	Completion of the Olmsted approach walls	Completion of the Olmsted approach walls (Continued)	Construction management at risk
	Session 20A	***Lance Lawton***	***Lance Lawton***	***Brian Dziekonski***	**Session 20B**	***Dale Miller***	***Dale Miller***	***Christopher Prinslow***

Break in Exhibit Hall

12 Noon **Lunch in Exhibit Hall**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	4:00 PM	4:30 PM	5:00 PM
Room 224	**TRACK 10 Dam Safety**	Project specific risk analysis - Success Dam	Dam safety lessons learned, Winter storm 2005, Muskingum & Scioto Basins	Dam security and Dams Government Coordinating Council	**TRACK 10 Dam Safety**	Prompton Dam hydrologic deficiency and spillway modification	"Well, that's water over the dam" - Rough River spillway adequacy design	Roller-compacted concrete for dam spillways and overtopping protection
	Session 10C	***Ronn Ross***	***Charles Barry***	***Roy Braden***	**Session 10D**	***Troy Cosgrove***	***Richard Pruitt***	***Fares Abdo***
Room 225	**TRACK 11 Dam Safety**	Clearwater Dam major rehabilitation	Success dam seismic dam safety modification	Problems on the Santa Ana River - Prado Dam	**TRACK 11 Dam Safety**	Problems on the Santa Ana River - Seven Oaks Dam	Dam safety program management tools	
	Session 11C	***Bobby Van Cleave***	***Norbert Suter***	***Douglas Chitwood***	**Session 11D**	***Robert Kwan***	***Tommy Schmidt***	
Room 230	**TRACK 19 Construction**	3D Modeling and impact on constructability	3D Modeling and impact on constructability (Continued)	Construction in Iraq & Afganistan	**TRACK 19 Construction**	Air Force streamlining Design/Build	Air Force streamlining Design/Build (Continued)	Sustainable design requirements & construction implementation
	Session 19C	***Gary Cough***	***Gary Cough***	***Walt Norko***	**Session 19D**	***Joel Hoffman***	***Joel Hoffman***	***Harry Goradia***
Room 231	**TRACK 20 Construction**	Tsunami reconstruction	Tsunami reconstruction (Continued)	Military construction transformation in support of Army transformation	**TRACK 20 Construction**	MEDCOM Construction Issues	MEDCOM Construction Issues (Continued)	*TBA*
	Session 20C	***Andy Constantaras***	***Andy Constantaras***	***Sally Parsons***	**Session 20D**	***Rick Bond***	***Rick Bond***	

Break in Exhibit Hall

Wednesday, August 3, 2005 Concurrent Sessions

Electrical & Mechanical Engineering Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room A	**TRACK 15 Military Electrical**	Tri-Service Electrical Criteria Overview -	Tri-Service Electrical Criteria Overview - (Continued)	Tri-Service Electrical Criteria Overview -(Continued)	**TRACK 15 Military Electrical**	Interior/Exterior and security lighting criteria	Information technology systems criteria	Information technology systems criteria (Continued)
	Session 15A	***Tri-Service Panel***	***Tri-Service Panel***	***Tri-Service Panel***	**Session 15B**	***Tri-Service Panel***	***Tri-Service Panel***	***Tri-Service Panel***
Room B	**TRACK 16 Military Mechanical**	Building Commissioning	HVAC Commissioning	Ventilation and indoor air quality	**TRACK 16 Military Mechanical**	Ventilation and indoor air quality (Continued)	Refrigerant implications for HVAC specifications, selection, and o&m - now and future	Refrigerant implications for HVAC specifications, selection, and o&m - now and future (Continued)
	Session 16A	***Dale Herron***	***Dale Herron***	***Davor Novosel***	**Session 16B**	***Davor Novosel***	***Mike Thompson***	***Mike Thompson***
Room D	**TRACK 17 Military Mechanical / Electrical**	Sustainable design update			**TRACK 17 Military Mechanical / Electrical**	Utility systems security and fort future	Acoustic leak detection for utilities distribution systems	Acoustic leak detection for utilities distribution systems (Continued)
	Session 17A	***Harry Goradia***			**Session 17B**	***Vicki L. Van Blaricum***	***Sean Morefield***	***Sean Morefield***
Room E	**TRACK 18 Civil Mechanical**	Emsworth Dam vertical lift gate hoist replacement	Hydraulic drive for Braddock Dam	John Day navigation lock upstream lift gate wire rope failure	**TRACK 18 Civil Mechanical**	Overhead bulkhead at Olmstead Lock	Replacement of gate # 5 intermediate gear and pinion at RC Byrd Lock and Dam	Mechanical design issues during construction of McAlpine Lock
	Session 18A	***John Nites***	***Janine Krempa***	***Ronald Wridge***	**Session 18B**	***Rick Schultz***	***Brenden McKinley***	***Richard Nichols***

Break in Exhibit Hall

12 Noon — **Lunch in Exhibit Hall**

	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM
Room A	**TRACK 15 Military Electrical**	Mass notification system	Mass notification system (Continued)	Electronic card access locks	**TRACK 15 Military Electrical**	Lightning protection standards	Lightning and surge protection	Lightning and surge protection (Continued)
	Session 15C	***Tri-Service Panel***	***Tri-Service Panel***	***Fred Crum***	**Session 15D**	***Richard Bouchard***	***Tri-Service Panel***	***Tri-Service Panel***
Room B	**TRACK 16 Military Mechanical**	Basic design considerations for geothermal heat pump systems	Basic design considerations for geothermal heat pump systems (Continued)	Pentagon renovation	**TRACK 16 Military Electrical**	Effective use of evaporative cooling for industrial and institutional/office facilities	Efective use of evaporative cooling for industrial and institutional/office facilities (Continued)	Non-hazardous chemical treatments for heating and cooling systems
	Session 16C	***Gary Phetteplace***	***Gary Phetteplace***	***Mitch Duke***	**Session 16D**	***Leon Shapiro***	***Leon Shapiro***	***Vincent Hock***
Room D	**TRACK 17 Civil Mechanical / Electrical**	Hydropower asset management partnership (hydroAMP)	New gas fueled/diesel fueled turbine powered electrical generating station in Iraq	The construction of distribution tunnels and pump installation for the metropolitan Chicago sewer systems	**TRACK 17 Civil Mechanical / Electrical**	The Festus/Crystal City levee and pump station project	Remote operations for Kaskaskia Dam	Technological advances in lock control systems
	Session 17C	***Lori Rux***	***Lester Lowe***	***Ernesto Go***	**Session 17D**	***Stephen Farkas***	***Shane Nieukirk***	***Andy Schimpf***
Room E	**TRACK 18 Civil Mechanical**	New coating products for civil works structures	New guide specification for procurement of turbine oils	Synchronous condensing with large Kaplan turbine - A case study	**TRACK 18 Civil Mechanical**	Acquifer storage and recovery (ASR) system	Wastewater infrastructure improvements in Appalachia	Storm water pumps
	Session 18C	***Al Beitelman***	***John Micetic***	***Brian Moentenich***	**Session 18D**	***Gerald Deloach***	***James Sadler***	***Thomas Jamieson***

Break in Exhibit Hall

Thursday, August 4, 2005 Concurrent Sessions

HH&C Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 220	**TRACK 1 Sedimentation & New Concepts** Session 1E	Ice jams, contaminated sediment and structures Clark Fork River, MT — *Andrew Tuthill*	Increased bed erosion due to ice — *John Hains*	Monitoring the Mississippi River using GPS coordinated video — *James Gutshall*	**TRACK 1 Sedimentation, Case Examples** Session 1F	Watershed approach to stream stability the reduction of nutrients — *John B. Smith*	Monitoring the effects of sedimentation from Mount St. Helen — *Alan Donner*	Navigation and environmental interests in alleviating repetitive dredging — *Jason Brown*
Room 221	**TRACK 2 Water Management** Session 2E	Enhancements and new capabilities of HEC-ResSim 3.0 — *Fauwaz Hanbali*	Transition to Oracle based data system — *Joel Asunskis*	Accessing real time Mississippi Valley water level data — *Rich Engstrom*	**TRACK 2 Water Management** Session 2F	Hurricane Season 2004 — *Susan Sylvester*	Reevaluation of a project's flood control benefits — *Ferris Chamberlin*	Helmand Valley water management plan — *Jason Needham*
Room 222	**TRACK 3 Case Studies** Session 2E	Red River of the north flood protection project — *Michael Lesher*	Southeast Arkansas flood control & water supply feasibility study — *Thomas Brown*	McCook and Thorton tunnel and reservoir modeling — *David Kiel*	**TRACK 3 Case Studies** Session 3F	Ala Wai Canal Project, Honolulu, Oahu, Hawaii — *Lynnette Schapers*	Missouri River geospatial decision support framework — *Brian Baker*	Systemic analysis of the Mississippi & Illinois Rivers — *Dennis Stephens*
Room 223	**TRACK 4 Modeling** Session 4E	Hydrologic models supported by ERDC — *Robert Wallace*	HEC-HMS Version 3.0 new features — *Jeff Harris*	SEEP2D & GMS: Simple tools for solving a variety of seepage problems — *Clarissa Hansen*	**TRACK 4 Modeling** Session 4F	Water quality and sediment transport in HEC-RAS — *Mark Jensen*	Advances to the GSSHA program — *Aaron Byrd*	Software integration for watershed studies HEC-WAT — *Chris Dunn*

Break in Exhibit Hall

12 Noon — **Lunch**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM
Room 220	**TRACK 1 Water Quality Management** Session 1G	San Francisco Bay Mercury TMDL-Implications for constructed wetlands — *Herb Fredrickson*	Abandoned mine land: Eastern and Western perspectives — *Kate White*	A lake tap for temperature control tower construction at Cougar Dam — *Steve Schlenker*	**TRACK 1 Watershed Management** Session 1H	Demonstrating innovative river restoration technologies: Truckee River, NV — *Chris Dunn*	Comprehensive watershed restoration in the Buffalo district — *Anthony Friona*	Translating the hydrologic tower of Babel — *Dan Crawford*
Room 221	**TRACK 2 Water Management** Session 2G	Developing reservoir operation plans to manage erosion — *Patrick O'Brien*	New approaches to water management decision making — *James Barton*	Improved water supply forecasts for Kooteny basin using principal components regression — *Randal Wortman*	**TRACK 2 Water Management** Session 2H	Prescriptive reservoir modeling and ROPE study — *Jason Needham*	Missouri River mainstem operations — *Larry Murphy*	Res-Sim model for the Columbia River — *Arun Mylvahanan*
Room 222	**TRACK 3 Section 227** Session 3G	Section 227 Workshop/ Program Review — *William Curtis*	Section 227 Workshop/ Program Review (Continued) — *William Curtis*	Section 227 Workshop/ Program Review (Continued) — *William Curtis*	**TRACK 3 Section 227** Session 3H	Section 227 Workshop/ Program Review — *William Curtis*	Section 227 Workshop/ Program Review (Continued) — *William Curtis*	Section 227 Workshop/ Program Review (Continued) — *William Curtis*
Room 223	**TRACK 4 Modeling** Session 4G	Little Calumet River unsteady flow model conversion — *Rick Ackerson*	Kansas City River basin model — *Edward Parker*	Design guidance for breakup ice control — *Andrew Tuthill*	**TRACK 4 Modeling** Session 4H	Forebay flow simulations using Navier-Stokes code — *Charlie Berger*	Use of regularizatino as a method for watershed model calibration — *Brian Skahill*	Demonstration program in the arid southwest — *Margaret Jonas*

Break

Thursday, August 4, 2005 Concurrent Sessions

Geotechnical Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 226	**TRACK 5**	Dynamic deformation analyses Dewey Dam Huntintong District Corps of Engineers	Seismic stability evaluation for Ute Dam, NM	An overview of criteria used by various organizations for assessments and seismic remediation of earth dams	**TRACK 5**	USACE seepage berm design criteria and district practices	Ground penetrating radar applications for the assessment of airfield pavements	Challenges of the Fernando Belaunde Terry road upgrade Campanillia to Pizana - Peru road project
	Session 5E	***Greg Yankey***	***John France***	***Sean Carter***	**Session 5F**	***George Sills***	***Lulu Edwards***	***Michael Wielputz***
Room 227	**TRACK 6**	Small geotechnical project, big stability problem - The Block Church Road experience	Geophysical investigation of foundation conditions beneath Folsom Dam	Bioengineering slope stabilization techniques coupled with traditional engineering applications - The result a stable slope	**TRACK 6**	Shoreline armor stone quality issues	Mill Creek - An urban flood control challenge	Next stop, The Twilight Zone
	Session 6E	***Jonathan Kolber***	***Jose Llopis***	***Bethany Bearmore***	**Session 6F**	***Joseph Kissane***	***Monica Greenwell***	***Troy O'Neal***
Room 228	**TRACK 7**	The geotechnical and structural issues impacting the Dalles spillway construction	The Dalles spillway engineering and design	The future of the discrete element method in infrastructure analysis	**TRACK 7**	Evaluating the portable falling weight deflectometer as a low-cost technique for posting seasonal load restrictions on low volume payments	Soil structure interaction effects in the seismic evaluation of success dam control tower	Olmsted locks and Dam project geotechnical/construction issues
	Session 7E	***Kristie Hartfeil***	***Kristie Hartfeil***	***Raju Kala***	**Session 7F**	***Maureen Kestler***	***Michael Sharp***	***Jeff Schaefer***
Room 229	**TRACK 8**	Rubblization of airfield concrete pavement	US Army airfield pavement assessment program	Critical state for probabilistic analysis of levee underseepage	**TRACK 8**	Curing practices for modern concrete construction	AAR at Carters Dam, a different approach	Concrete damage at Carters Dam, GA
	Session 8E	***Eileen Velez-Vega***	***Haley Parsons***	***Douglas Crum***	**Session 8F**	***Toy Poole***	***James Sanders***	***Toy Poole***

Break in Exhibit Hall

12 Noon — **Lunch**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM
Room 226	**TRACK 5**	Slope stability evaluation of the Baldhill Dam right abutment	Lateral pile load test results within a soft cohesive foundation	Design and construction of anchored bulheads for river diversion, Seabrook, NH	**TRACK 5**	Characterization of soft marine clays - A case study at Craney Island	50 years of NRSC experience with engineering problems caused by dispersive clays	Changes in the post-tensioning institutes new (4th Ed. 2004) "Recommendations for prestressed rock and soil anchors"
	Session 5G	***Neil Schwanz***	***Richard Varuso***	***Siamac Vaghar***	**Session 5H**	***Aaron Zdinak***	***Danny McCook***	***Michael McCray***
Room 227	**TRACK 6**	Perils in back analysis failures	Reconstruction of deteriorated lock walls concrete after blasting and other demolition removal techniques	Flood fighting structures demonstrations and evaluation program	**TRACK 6**	Innovative design concepts incorporated into a landfill closure and reuse design	Laboratory testing of flood fighting structures	Bluff stabilization along Lake Michigan using active and passive dewatering techniques
	Session 6G	***Greg Yankey***	***Steve O'Connor***	***George Sills***	**Session 6H**	***Dave Ray***	***Johannes Wibowo***	***Eileen Glynn***
Room 228	**TRACK 7**	Geotechnical instrumentation and foundation re-evaluation of John Day lock and Dam, Columbia River, Oregon-Washington	A study of the long term performance of seepage cutoff barriers in dams	Design, construction, and performance of seepage barriers for Guanella Dam, near Empire, CO	**TRACK 7**	Sensitive infrastructure sites and structures - Sonic drilling offers quality control and non-destructive advantages to geotechnical construction drilling	Subgrade failure criteria according to soil type and moisture condition	The automated stability monitoring of the Mississippi River levees using the range scan system
	Session 7G	***David Scofield***	***John Rice***	***John France***	**Session 7H**	***John Davis***	***Edel Cortez***	***Robert Jolissian***
Room 229	**TRACK 8**	Damaging interactions among concrete materials	Economic effects on construction of uncertainty in test methods	Major issues in materials specifications	**TRACK 8**	Spall and intermediate-sized repairs for PCC pavements	Acceptance criteria for unbonded aggregate road surfacing materials	Effective partnering to overcome an interruption in the supply of Portland cement during construction of Marmet lock and Dam
	Session 8G	***Toy Poole***	***Toy Poole***	***Toy Poole***	**Session 8H**	***Reed Freeman***	***Reed Freeman***	***Billy Neeley***

Break

Thursday, August 4, 2005 Concurrent Sessions

Geotechnical, Specifications, Electrical & Mechanical Engineering & Construction Tracks

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 225	**TRACK 9 Geotechnical**	Seepage Committee Meeting	Seepage Committee Meeting (Continued)	Seepage Committee Meeting (Continued)			
	Session 9E	***GROUP DISCUSSION***	***GROUP DISCUSSION***	***GROUP DISCUSSION***			
Room 232	**TRACK 21 Specifications**	SpecsIntact-Demonstration of the SI explorer, publishing to PDF and Word	SpecsIntact - Demonstration of the SI editor, UMRL and reference wizard	UFGS status and direction			
	Session 21E	***Patricia Robinson***	***Patricia Robinson***	***Jim Quinn***			
Room A	**TRACK 15 Military Electrical**	Electronic Security	Electronic Security (Continued)	AIRFIELD lightning protection & grounding and lighting			
	Session 15E	***Tri-Service Panel***	***Tri-Service Panel***	***Tri-Service Panel***			
Room B	**TRACK 16 Military Mechanical**	Lon works technology update	BACnet Technology Update	Implementation of Lon-based specifications			
	Session 16E	***David Schwenk***	***David Schwenk***	***Will White***			
Room D	**TRACK 17 Civil Mechanical**	Lessons learned on flood water pump stations	Armada of pump stations, Grand Forks and East Grand Forks	Various screen equipment selection guide			
	Session 17E	***Mark Robertson***	***Timothy Paulus***	***Sara Benier***			
Room 230	**TRACK 19 Construction**	NAVFAC Construction scheduling	NAVFAC Construction scheduling (Continued)	ACASS/CASS - CPARS			
	Session 19E	***Glenn Saito***	***Glenn Saito***	***Ed Marceau***			
Room 231	**TRACK 20 Construction**	Update on DAWIA and Facilities Engineering	Update on DAWIA and Facilities Engineering (Continued)	Partnering as a best practice			
	Session 20E	***Mark Grammer***	***Mark Grammer***	***Ray DuPont***			
				Break in Exhibit Hall			
Room 225					**TRACK 9 Geotechnical**	GMCoP Forum	GMCoP Forum (Continued)	GMCoP Forum (Continued)
					Session 9F	***GROUP DISCUSSION***	***GROUP DISCUSSION***	***GROUP DISCUSSION***
Room 232					**TRACK 21 Specifications**	UFGS transitin to Master-Format 2004	Project specifications for the upper tier Folsom outlet works modifications	UFGS dredging
					Session 21F	***Carl Kersten***	***Steve Freitas***	***Don Carmen***
Room A					**TRACK 15 Military Electrical**	Electrical safety and arc flash UFC	Electrical safety and arc flash UFC (Continued)	Electrical infrastructure in Iraq - Restore Iraqi electricity
					Session 15F	***Tri-Service Panel***	***Tri-Service Panel***	***Joseph Swiniarski***
Room B					**TRACK 16 Military Mechanical**	Prefabricated Chiller Plants	Seismic for ME systems	Design considerations for the prevention of mold
					Session 16F	***Trey Austin***	***Greg Stutts***	***Quinn Hart***
Room D					**TRACK 17 Civil Mechanical**	Lock gate replacement system	Lock gate replacement system (Continued)	Automated closure gate design for Duck creek flood control
					Session 17F	***Will Smith***	***Will Smith***	***Mark Robertson***
Room 230					**TRACK 19 Construction**	Self-consolidating concrete	Self-consolidating concrete (Continued)	
					Session 19F	***Beatrix Kerhoff***	***Beatrix Kerhoff***	
Room 231					**TRACK 20 Construction**	S&A Update	Construction Issues Open Forum (Q&A)	Construction Issues Open Forum (Q&A) (Continued)
					Session 20F	***Harry Jones***	***Don Basham***	***Don Basham***

12 Noon — **Lunch**

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM
Room 225	**TRACK 9 Geotechnical**	Seismic Manual	Seismic Manual (Continued)	Seismic Manual (Continued)			
	Session 9G	***GROUP DISCUSSION***	***GROUP DISCUSSION***	***GROUP DISCUSSION***			

Thursday, August 4, 2005 Concurrent Sessions

Dam Safety Track & Structural Engineering Track

	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:30 AM	11:00 AM	11:30 AM
Room 224	**TRACK 10** Dam Safety	Seepage and stability, final evaluation for reservoir pool raising project, Terminus Dam, Kaweah River, CA	Initial filling plan, Terminus dam spillway enlargement, Terminus Dam, Kaweah River, CA	Hydrologic aspects of operating in a "failure mode" - Fern Ridge Lake, OR			
	Session 10E	*Michael Ramsbotham*	*Michael Ramsbotham*	*Bruce Duffe*			
Room 240	**TRACK 12** Civil Works Structural	London lock and dam, West Virginia major rehabilitation project	Replacing existing lock 4-Innovative designs for Charleroi lock	Use of non-linear incremental structural analysis in the design of the Charleroi lock			
	Session 12E	*David Sullivan*	*Steveb Stoltz*	*Randy James*			
Room 241	**TRACK 13** Civil Works Structural	Chicago shoreline project	Structural assessment of Bluestone Dam	Duck Creek, OH local flood protection projection phase III Culvert damage			
	Session 13E	*Jan Plachta*	*Robert Reed*	*Jeremy Nichols*			
Room 242	**TRACK 14** Bridges/ Buildings	Urban search & rescue program overview	Evaluation and repair of blast damaged reinforced concrete beams	Single degree of freedom blast effects spreadsheets			
	Session 14E	*Tom Niedernhofer*	*John Hudson*	*Dale Nebuda*			
				Break in Exhibit Hall			
Room 224	**TRACK 10** Dam Safety				A dam safety study involving cascading dam failures		The relationship of seismic velocity to the erodibility index
	Session 10F				*Gordon Lance*		*Joseph Topi*
Room 240	**TRACK 12** Civil Works Structural				Olmsted dam in-the-wet construction methods	Completion of the Olmstead approach walls	John Day lock monolith repair
	Session 12F				*Lynn Raque*	*Terry Sullivan*	*Mathew Hanson*
Room 241	**TRACK 13** Civil Works Structural				Development of design criteria for the Rio Puerto Nuevo contract 2D/2E channel wall	Design of concrete lined tunnels in rock	Indianapolis north phase IIIA project
	Session 13F				*Jana Tanner*	*David Force*	*Gene Hoard*
Room 242	**TRACK 14** Bridges/ Buildings				UFC 4-023-02 Structural design to resist explosive effects for existing buildings	Progressive collapse UFC requirements	U.S. general services admnistrative progressive collapse design guidelines applied to concrete moment-resisting frame buildings
	Session 14F				*Jim Caulder*	*Brian Crowder*	*David Billow*

12 Noon — **Lunch**

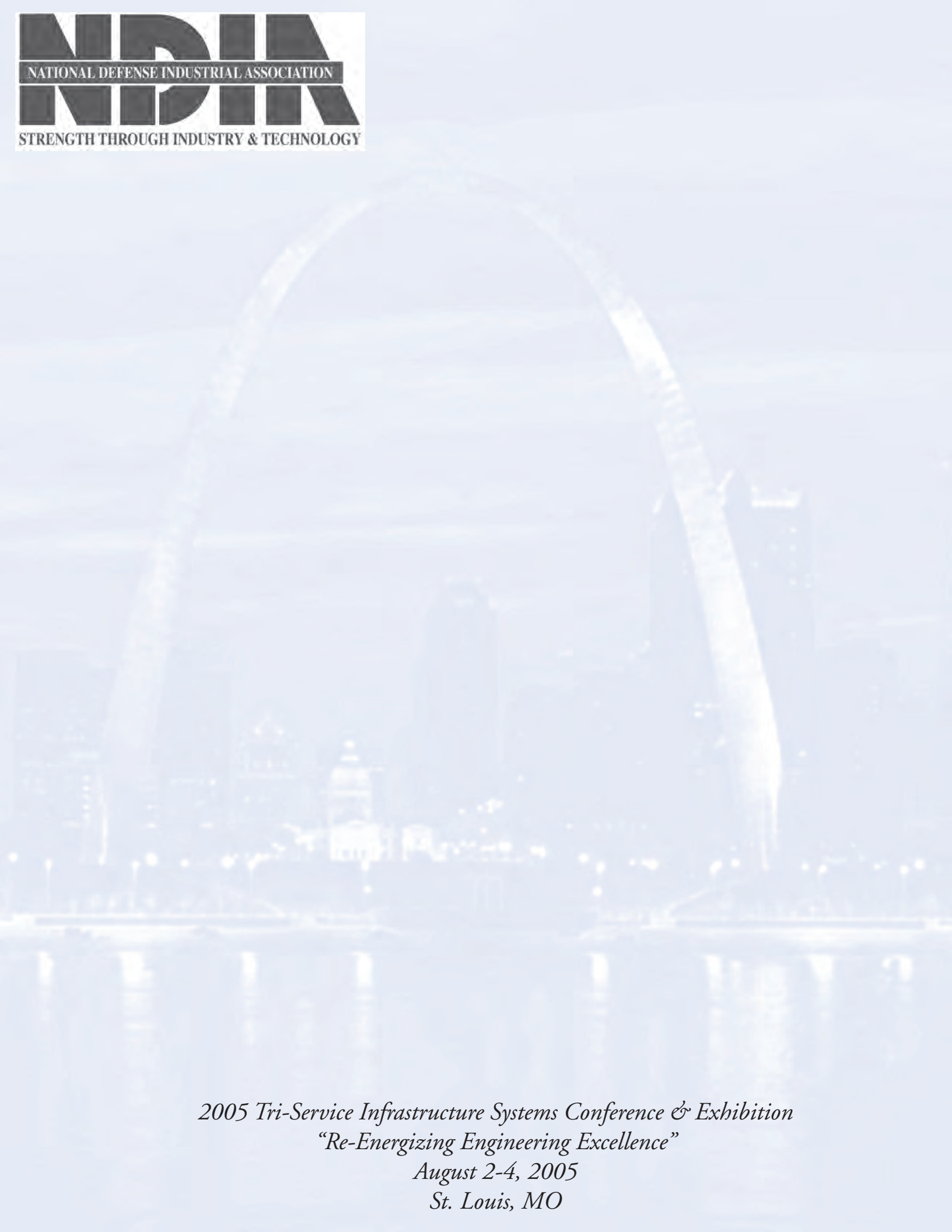
	1:30 PM	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM
Room 224	**TRACK 10** Dam Safety	Dam safety instrumentation data management utilizing WinIDP to aid data collection and evaluation	Automated instrumentation assessments at Marmet lock & Dam	Potential failure mode analysis of Eau Galle Dam			
	Session 10G	*Travis Tutka*	*Ronald Rakes*	*David Rydeen*			
Room 240	**TRACK 12** Civil Works Structural	Inner Harbor navigation canal and lock structure	Design features and challenges of the Comite River diversion project	Waterline support failure on the Harvey canal: A case study			
	Session 12G	*Mark Gonski*	*Christopher Dunn*	*Angela DeSoto Duncan*			
				Break			
Room 224	**TRACK 10** Dam Safety				Dam safety officers panel - The Good	Dam safety officers panel - The Bad	Dam safety officers panel - The Ugly
	Session 10H				*Bruce Murray*	*Bruce Murray*	*Bruce Murray*
Room 240	**TRACK 12** Civil Works Structural				Public appeal of major civil projects- The good, the bad and the ugly	Des Moines Riverwalk	Chickamauga lock and Dam height optimization study using Monte Carlo simulation
	Session 12H				*Kevin Holden*	*Thomas Heinold*	*Leon Schieber*

Thursday, August 4, 2005 Concurrent Workshops

	1:30 PM	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM
Room 241	**Workshop 1** DoD Security Engineering	Security planning & minimum standards	Security planning & minimum standards (Continued)	Security planning & minimum standards (Continued)	Security design manuals	Security design manuals (Continued)	Security design manuals (Continued)
	Session 1A	*Curt Betts*	*Curt Betts*	*Curt Betts*	**Session 1B**	*Bernie Deneke*	*Bernie Deneke*	*Bernie Deneke*
Room 231	**Workshop 2** Electrical Workshop	National Electrical Code 2005 Changes	National Electrical Code 2005 Changes (Continued)	National Electrical Code 2005 Changes (Continued)	National Electrical Code 2005 Changes (Continued)	National Electrical Code 2005 Changes (Continued)	National Electrical Code 2005 Changes (Continued)
	Session 2A	*Mark McNamara*	*Mark McNamara*	*Mark McNamara*	**Session 2B**	*Mark McNamara*	*Mark McNamara*	*Mark McNamara*
Room 242	**Workshop 3** Mechanical Engineering	Design and application of packaged central cooling plants	Design and application of packaged central cooling plants (Continued)	Design and application of packaged central cooling plants (Continued)	Improving dehumidification in HVAC systems	Improving dehumidification in HVAC systems (Continued)	Improving dehumidification in HVAC systems (Continued)
	Session 3A	*The Trane Company*	*The Trane Company*	*The Trane Company*	**Session 3B**	*The Trane Company*	*The Trane Company*	*The Trane Company*
Room 230	**Workshop 4** Construction	Construction Community of Practice Forum	Construction Community of Practice Forum (Continued)	Construction Community of Practice Forum (Continued)			
	Session 4A	*Walt Norko*	*Walt Norko*	*Walt Norko*			
Room 232	**Workshop 5** Specifications	Open Meeting of Corps Specifications Steering Committee	Open Meeting of Corps Specifications Steering Committee (Continued)	Open Meeting of Corps Specifications Steering Committee (Continued)	Open Meeting of Corps Specifications Steering Committee (Continued)	Open Meeting of Corps Specifications Steering Committee (Continued)	Open Meeting of Corps Specifications Steering Committee (Continued)
	Session 5A	*Robert Iseli, et al.*	*Robert Iseli, et al.*	*Robert Iseli, et al.*	**Session 5B**	*Robert Iseli, et al.*	*Robert Iseli, et al.*	*Robert Iseli, et al.*

Break

NOTES



2005 Tri-Service Infrastructure Systems Conference & Exhibition
"Re-Energizing Engineering Excellence"
August 2-4, 2005
St. Louis, MO

US Army Corps
of Engineers
Portland District

Status of HSS Inspections in The Portland District

2005 Infrastructures Conference

By Travis Adams, P.E.





Status of HSS Inspections in NWP

Fiscal Year	No. HSS Inspected
2002	73
2003	97
2004	257
2005 (So Far)	331
Total	**785**

Breakdown of HSS Inspections by Project

Project	Total Number of HSS	Total Number of HSS Inspected
Bonneville	540	359
John Day	127	86
The Dalles	471	221
The Willamette Valley (13 Projects Total)	171	77
Willow Creek	2	0
The Rogue Basin (2 Projects)	42	42
Total for 19 Projects	**1353**	**785**

Total of 58% of HSS Completed To Date.

HSS by the Numbers

- Currently have 785 HSS completed, 58% of total
- 25% of HSS inspected this year – over 300 structures. A majority of HSS is being done “At the last possible minute”
- Currently have more than 80 HSS removed from service
- More than $1,000,000 in repair contracts in the works. Major maintenance being delayed because of HSS

HSS Findings/Issues in FY05

- Tagging out of Fracture Critical Structures
  - This FY several structures have been removed from service due to flaws in Fracture Critical Welds or Tension Splices
  - Examples:
    - Bonneville Second Powerhouse Taillogs – 12 Taillogs with extensive Class A flaws in vertical skin plate splices in tension
    - The Dalles Spillway Stoplogs – 20 Stoplogs with extensive Class A flaws in Tension Splices in the Truss Chords
    - Dexter Spillway Stoplog Lifting Beam – Latticework Lifting Beam damaged and repaired numerous times

HSS Findings/Issues in FY05 Cont…







Bonneville Main Unit Taillogs: fabricated in the 1980's– UT flaws in fracture critical CJP tension splices in skin plate – 12 stoplogs removed from service.

HSS Findings/Issues in FY05 Cont…



The Dalles Spillway Stoplogs – fabricated in the 1960's. Fracture critical truss structure with 24 CJP tension splices. 323 failed connections out of 481 tested. 67% failure rate



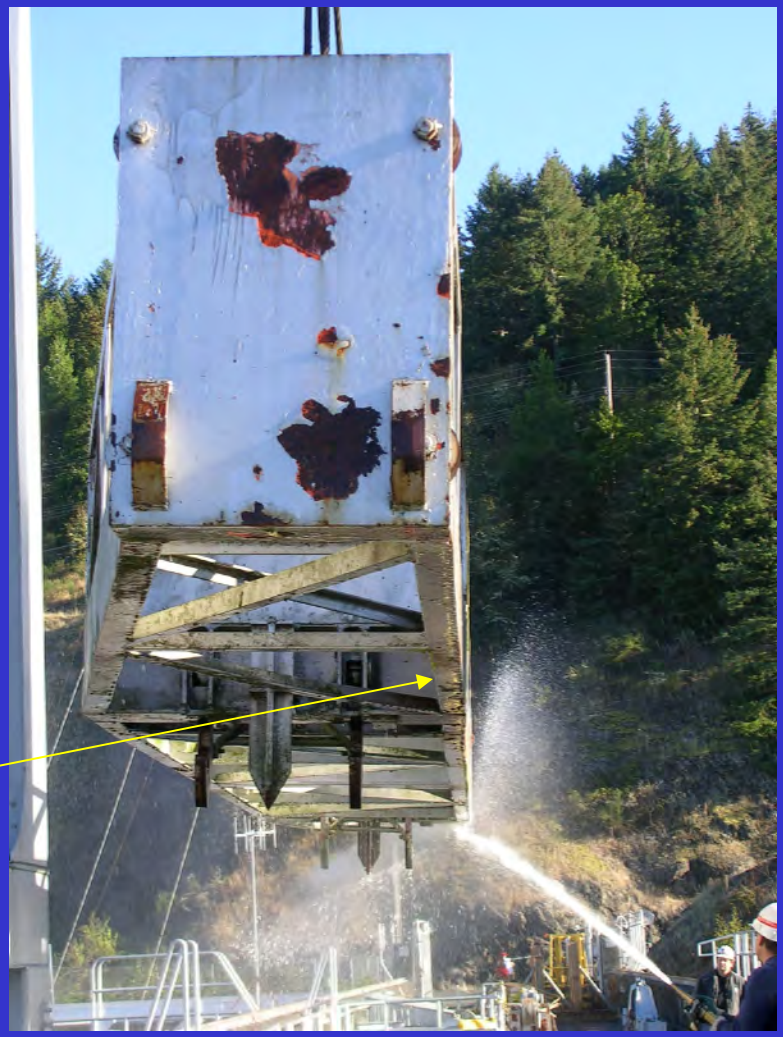




HSS Findings/Issues in FY05 Cont…



Brazed Splice



Dexter Spillway Stoplog Lifting Beam - missing hooks, failed UT, brazed splices, etc.

Ultrasonic Testing Lessons Learned

- Ultrasonic Testing of CJP welds provides a method of finding weld flaws including slag, voids, and lack of penetration in the joint
- AWS D1.1 requires welds tested with UT to be clean, free of weld splatter, paint, etc.
- AWS D1.1 requires visual exam prior to UT – for assurance of fit-up etc. Connections not passing visual should not be UT'd
- As a result – our inspections do not truly meet AWS requirements (paint, joint configuration, access, etc.)

Ultrasonic Testing Lessons Learned

- Rule Number 1 – **ALWAYS** Bring a UT Technician.
  - The UT Tech/CWI is not only a great source of information, but he/she may be just the person to help explain and justify why the $13 Million rewind contract is NOT going to start tomorrow
  - You never know what you are going to find
    - Splices, torch cut holes and patches
    - A 60 foot tall bulkhead that was dropped on an intake deck and then welded back together

Ultrasonic Testing Lessons Learned Cont…



The Dalles Intake Bulkhead – Spliced back together after being dropped in the 1980's.

Splice Through One Side of Bulkhead



Girder Cut Out Directly Below Splice



Ultrasonic Testing Lessons Learned Cont…

The Dalles Intake Bulkhead – Repaired.

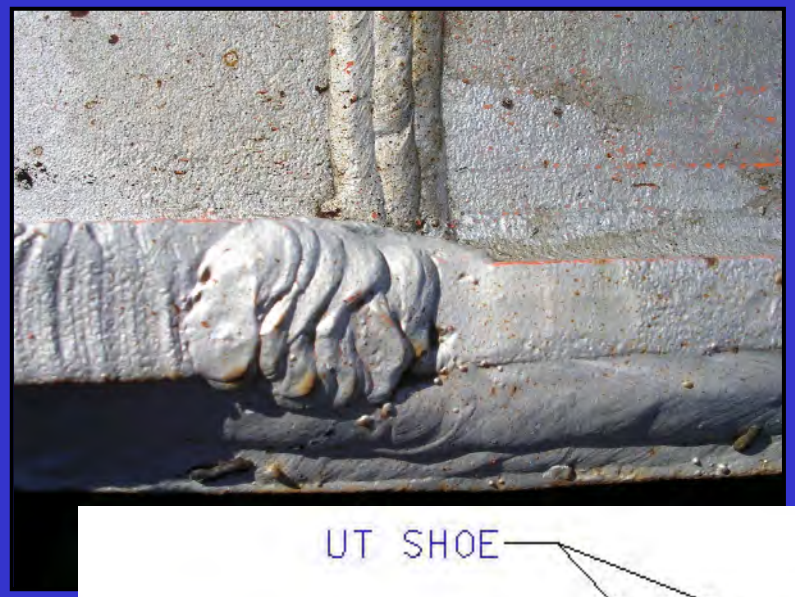




Ultrasonic Testing Lessons Learned Cont…

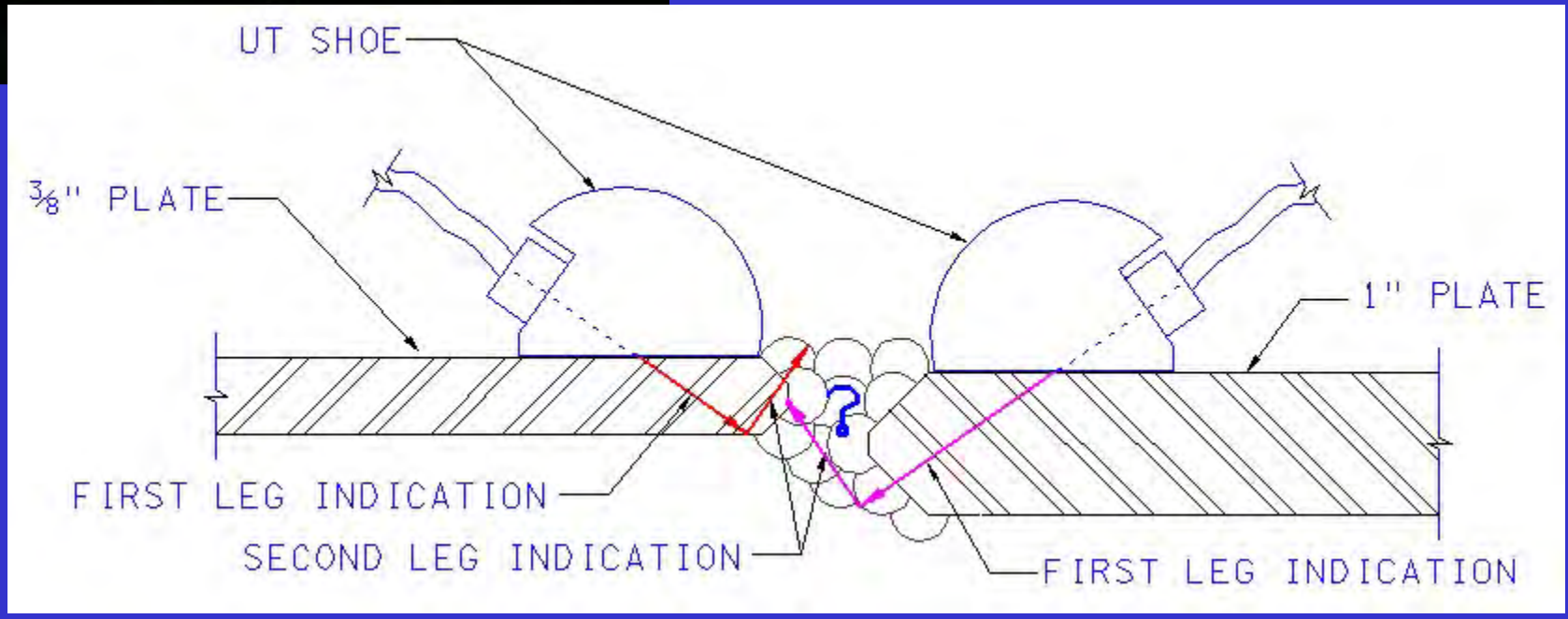
- Rule Number 2 – **Understand the Limits of UT**
  - Testing through paint, joint configuration, weld profile, etc
  - Understand first leg/second leg indications
  - Need to know what the weld looks like in order to UT it

Ultrasonic Testing Lessons Learned Cont…



The Dalles Spillway Stoplogs – Fracture critical connections that can not be fully UT'd due to joint configuration.

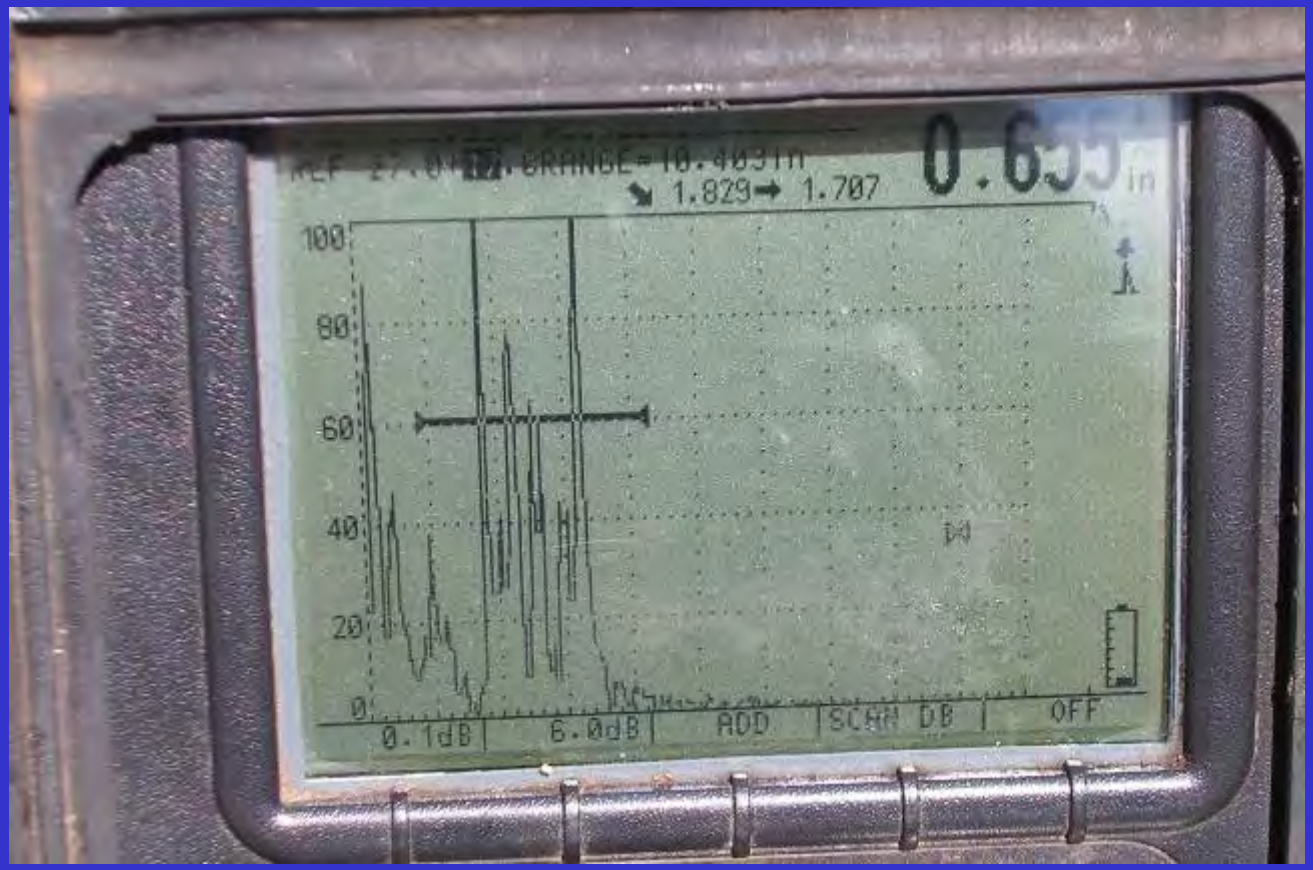
First leg indications can not be found without grinding the welds flush.



Ultrasonic Testing Lessons Learned Cont…

The Dalles Spillway Stoplogs – UT Screen Shot.

First leg indications cannot be found without grinding the welds flush.



CJP double bevel groove weld In tension – subjected to a 4 dB penalty – rejection at +2 dB or less – so each of these signals at +6 dB is rejectable.

Ultrasonic Testing Lessons Learned Cont…

- Rule Number 3 – **Write a Procedure**
  - A lesson we are still learning
  - AWS D1.1 requires
    - Clean, paint free welds with minimum reinforcement
    - Proper fit-up and joint configuration
    - Visual acceptance prior to UT
  - Need to know what the weld looks like to find the location of the flaw
  - Write an acceptance/rejection criteria for your inspector for in-service equipment

Ultrasonic Testing Lessons Learned Cont…

- Rule Number 3 – **Continued…**
  - Recognizing that the joint being inspected does not meet AWS D1.1 for inspection purposes (joint configuration, offset, etc.) – Now you need to fix it
  - AWS D1.1 requires
    - Visual acceptance prior to UT
  - If the weld did not meet visual requirements in the field due to fit up and offset, you will have the same problem in the shop when you perform the repairs.

Ultrasonic Testing Lessons Learned Cont…

- Rule Number 3 – **Continued…**
  - So write your own acceptance procedure for in the field and in the shop
  - Ensure your specifications ask for:
    - A complete record of the weld, recording what failed UT prior to repairs. AWS does not require this
    - Require a third party inspection or use a contracting services contract to do the spot checking yourself.

Inspection Tips

- Ways to make the inspection work for you:
  - Do the calculations before you go – know what weld you are looking for instead of what weld is on the drawing
  - Assume a vertical splice in large gates and check the tension load/weld required
  - By doing both of these calculations, safety decisions can be made BEFORE you go behind the gate to do additional inspections
  - Most importantly – Bring Donuts

Inspection Tips Continued…

- What to look for:
  - ALWAYS Inspect the lifting beam first!
  - Project Modification - Nothing a torch can't fix
  - Partial penetration welds where complete joint penetration welds are supposed to be
  - Welds that are difficult today (CJP from one side in a closed shape) did not happen in 1953 – so do not assume the weld is CJP
  - If the weld is hard to see, it isn't welded
  - Bulkheads that work either direction

Inspection Tips Continued…





Project Modification





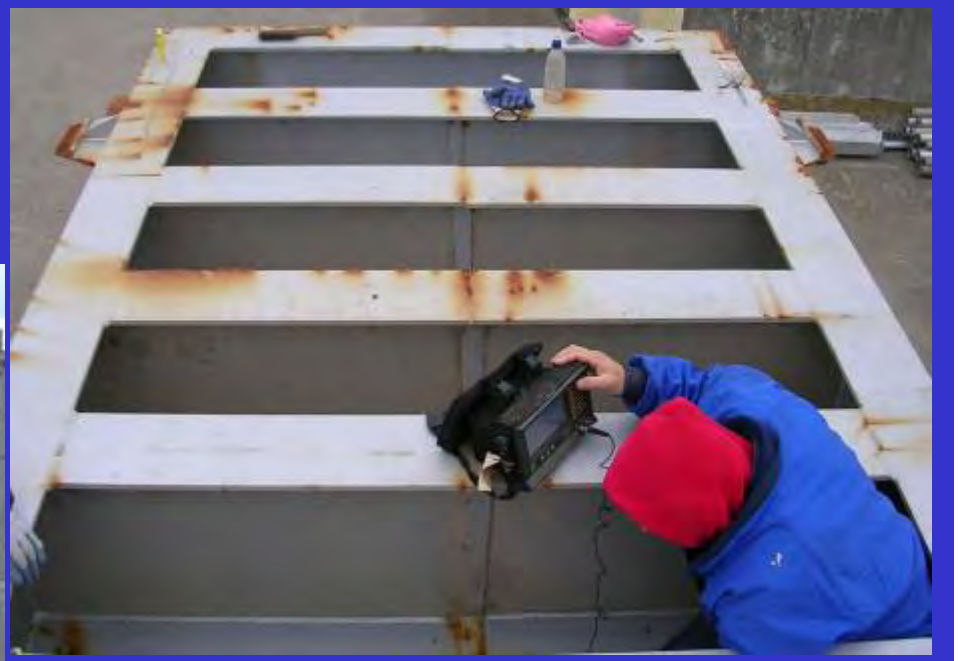
Inspection Tips Continued…





Air lines for cleaning the sill

Project Modification Continued…



The fastest way to get a narrower gate

Where are we going from here?

- HSS Inspection Planning
  - Attempting to avoid last minute inspections
  - Developing better working relationships with not just project management and engineering staff, but also the staff that relies on these structures for life safety
  - Getting project welders qualified
  - Thinking ahead as much as possible to ensure contract work stays on schedule
  - Ensuring that all new HSS meet HSS criteria

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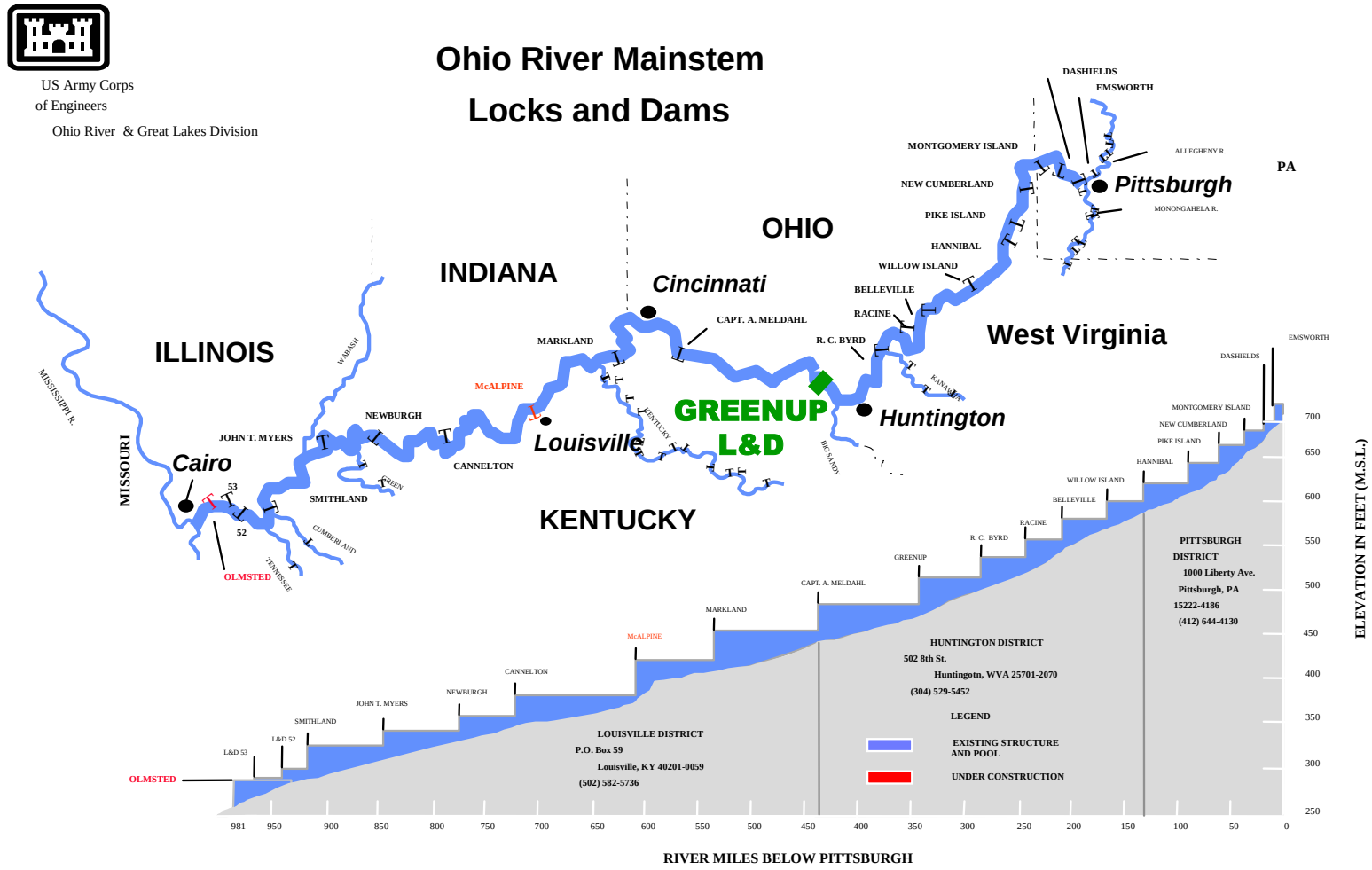
Greenup L&D

Rodney Cremeans, PE, PS
Project Manager/Structural Engineer

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Greenup L&D Statistics

- **Traffic**
  - 8th Busiest Lock in United States
  - 1995 – 2004 Average Annual Tonnage = 71.1 Million Tons
  - Projection – By 2050 tonnage = 71.9M to 118M
- **Closures**
  - 1991 - $5.7M Transportation Delay Costs
  - 1998 - $3.6M Transportation Delay Costs
  - 1999 - $3.6M Transportation Delay Costs
  - 2003 - $13.2M Transportation Delay Costs, $28.6M+ End User Costs, $1.5M O&M Costs, 546 tows affected

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Greenup L&D
Miter Gates









US Army Corps of Engineers

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Greenup L&D Miter Gates

- **Present situation**
  - Miter gates for main lock chamber are significantly deteriorated
  - Unscheduled outage in FY 03 revealed large cracks on the downstream miter gate – main chamber
    - Downstream middle wall leaf has extensive cracking around the pintle casting
    - Upstream river wall leaf had two cracks in the thrust diaphragm (steel member above pintle casting)
  - Strain gauges have been installed to assist in monitoring the miter gates
  - The gates have severely deteriorated and additional dewatering, inspection, and repair is anticipated

US Army Corps of Engineers

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Greenup L&D
Project Description

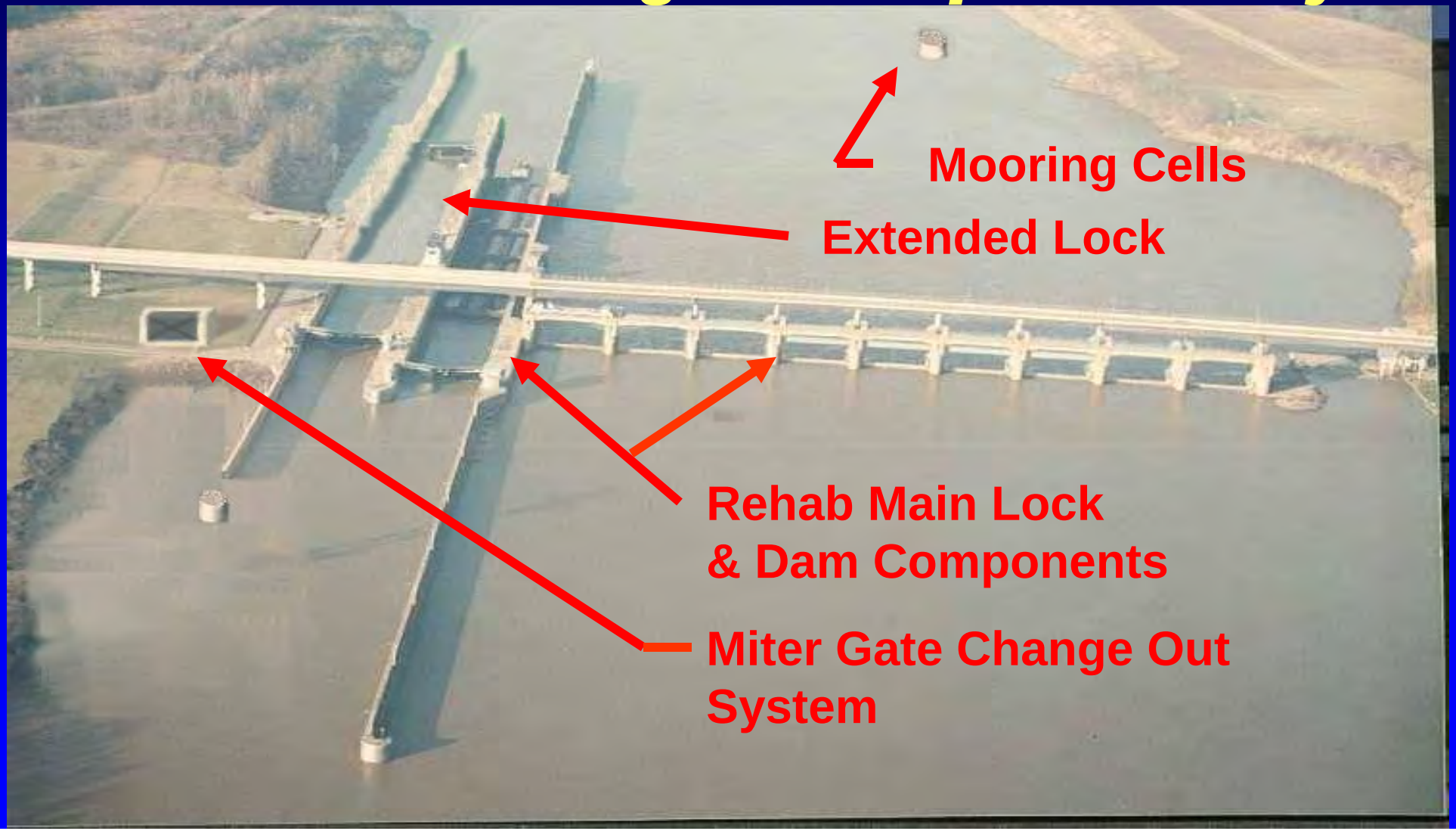
- **Project Authorized WRDA 2000**
- **Project Elements**
  - **Downstream Mooring Cells**
  - **Miter Gate Change-out System**
  - **R.C. Byrd Dry Dock**
  - **Extend Auxiliary Lock Downstream to 1200’**
  - **Environmental Mitigation**
  - **Rehabilitation of Main Lock & Dam Components**
- **Total Project Cost $230.2 M**
  - **Excludes Rehab**

US Army Corps of Engineers

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Greenup L&D

Rendering of Completed Project



US Army Corps of Engineers

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Greenup PED Project Status

- **Funding through FY05: $7.8 M**
- **Pre-Construction Engineering and Design (PED) Activities**
  - **Mooring Cells P&S (100%)**
  - **Lock Extension DDR (10%)**
    - **Hydraulic Modeling (90%)**
    - **Drilling (100%)**
  - **Miter Gate Design (90%)**
  - **Conducted Preliminary Mitigation Modeling in FY 03**

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Mitigation Model Study



Filling & Emptying System Modeling



Navigation Approach Modeling

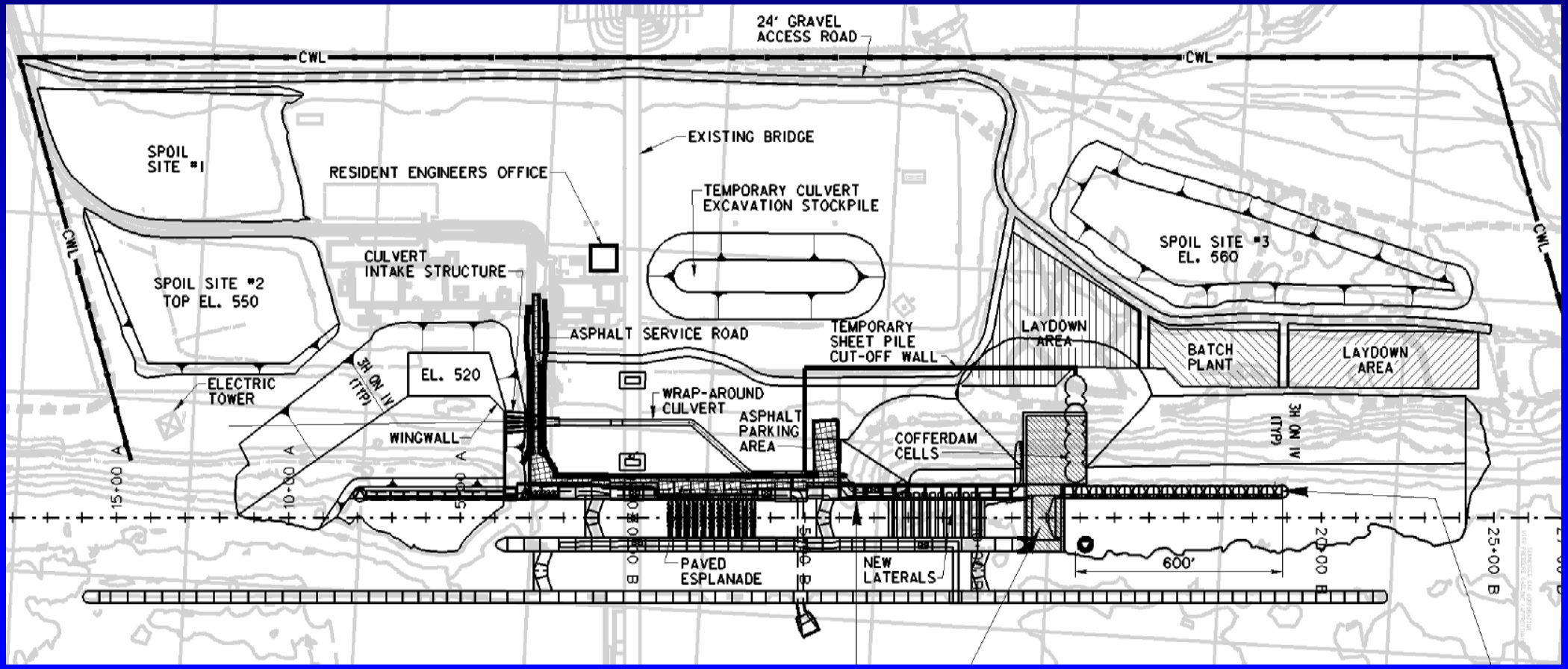
Tin Can Mooring Cell



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of Engineers

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Greenup L&D



US Army Corps
of Engineers

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Greenup L&D
Mooring Cells





US Army Corps of Engineers

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Greenup L&D Mooring Cells

Concurrent Navigation →



Lock and Dam No. 24

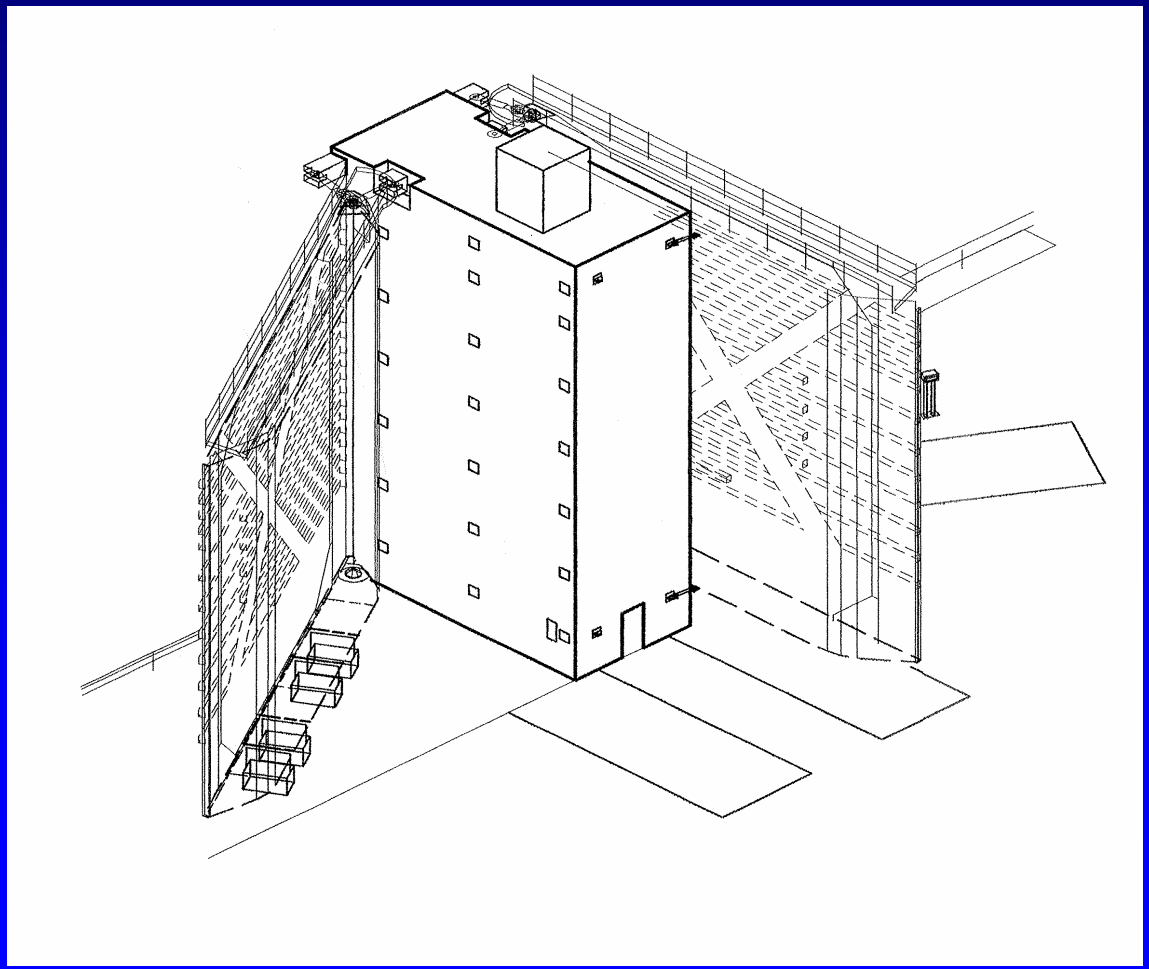
1400 cy tremie, then pumped
Maximum 100 cy/hour
Approx. 20 hours to place concrete
24 hour navigation closure permitted to place concrete, but not used
Helper boat for 7 days for concrete strength gain period

US Army Corps of Engineers

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Greenup L&D
Miter Gate Quick Change-out System

1. Assembly pier (18' x 32' x 66')
2. Features: Removable Pintle Base, Miter Gate Blocks, Jack Support Slabs



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Greenup L&D
Fixed Downstream Guide Wall





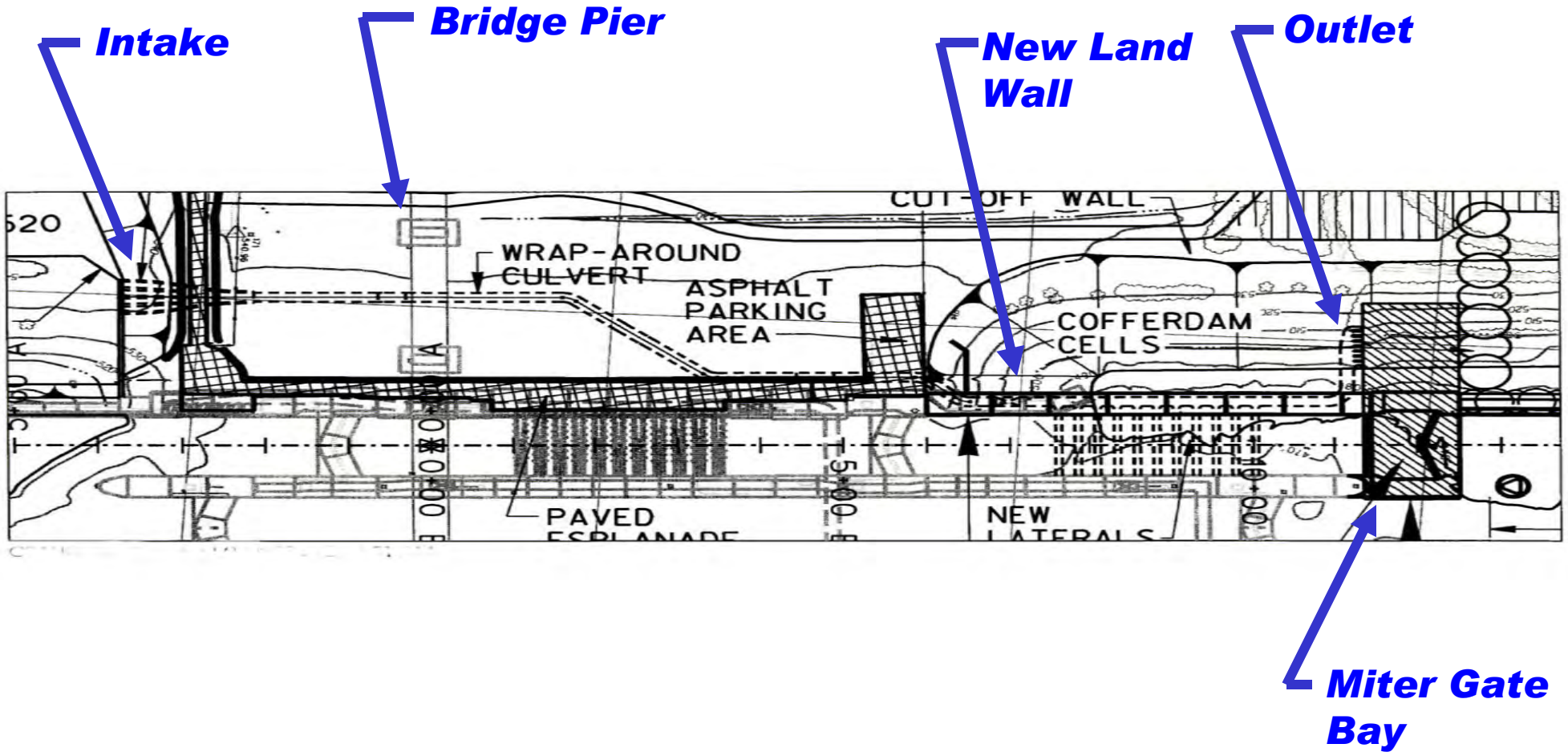




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Greenup L&D
Supplemental F&E System



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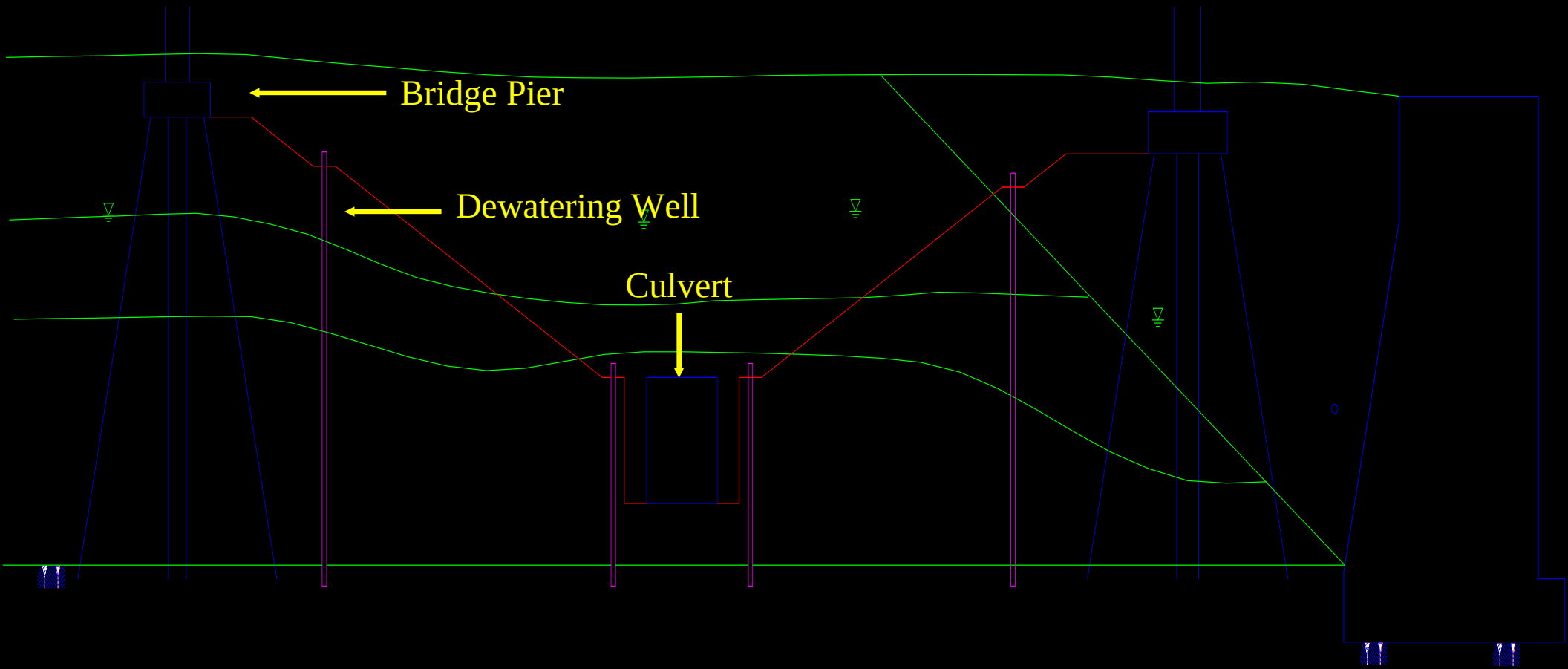
Greenup L&D
Supplemental F&E System



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Greenup L&D
Supplemental F&E System



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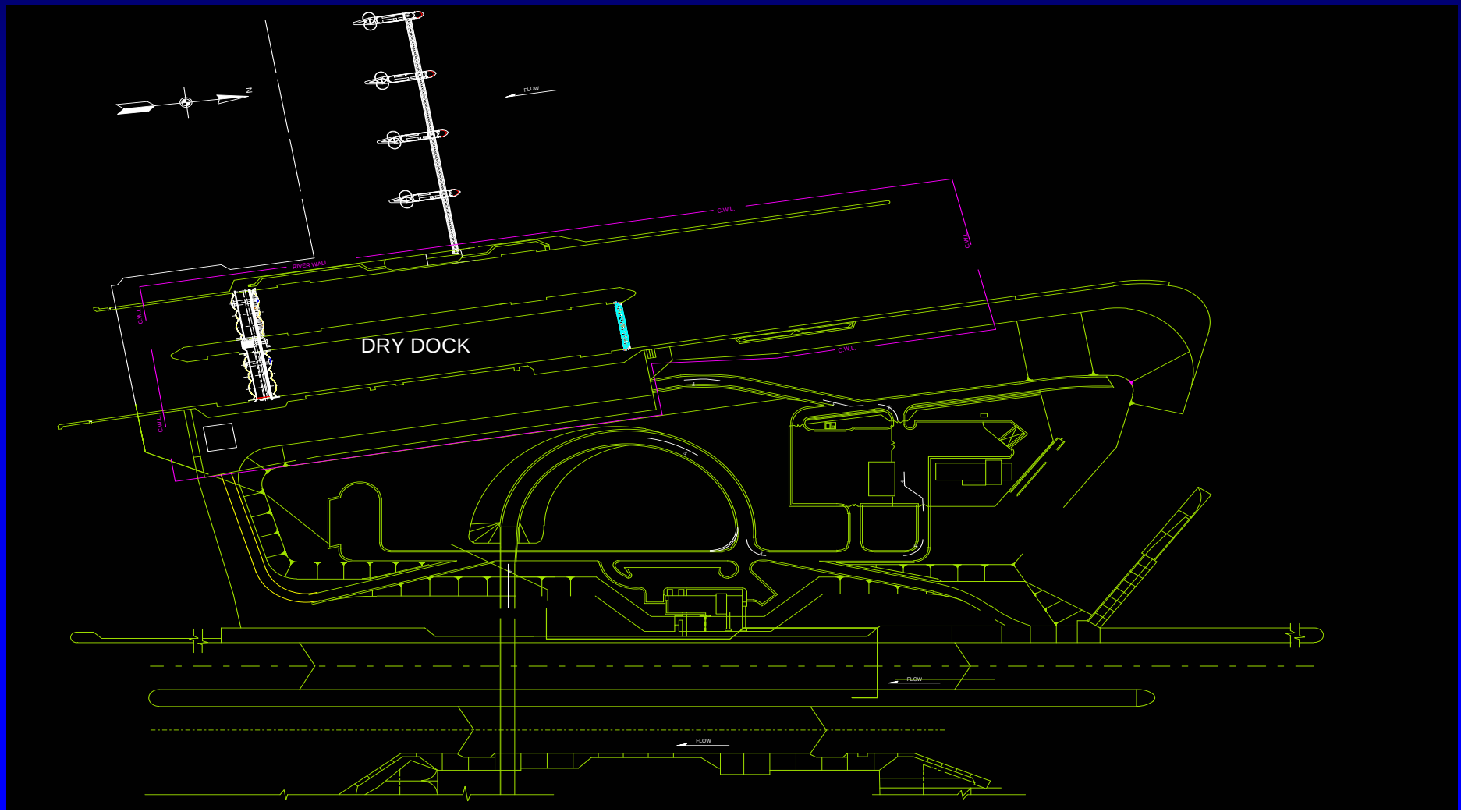
Greenup L&D
New Land Wall - Conventional



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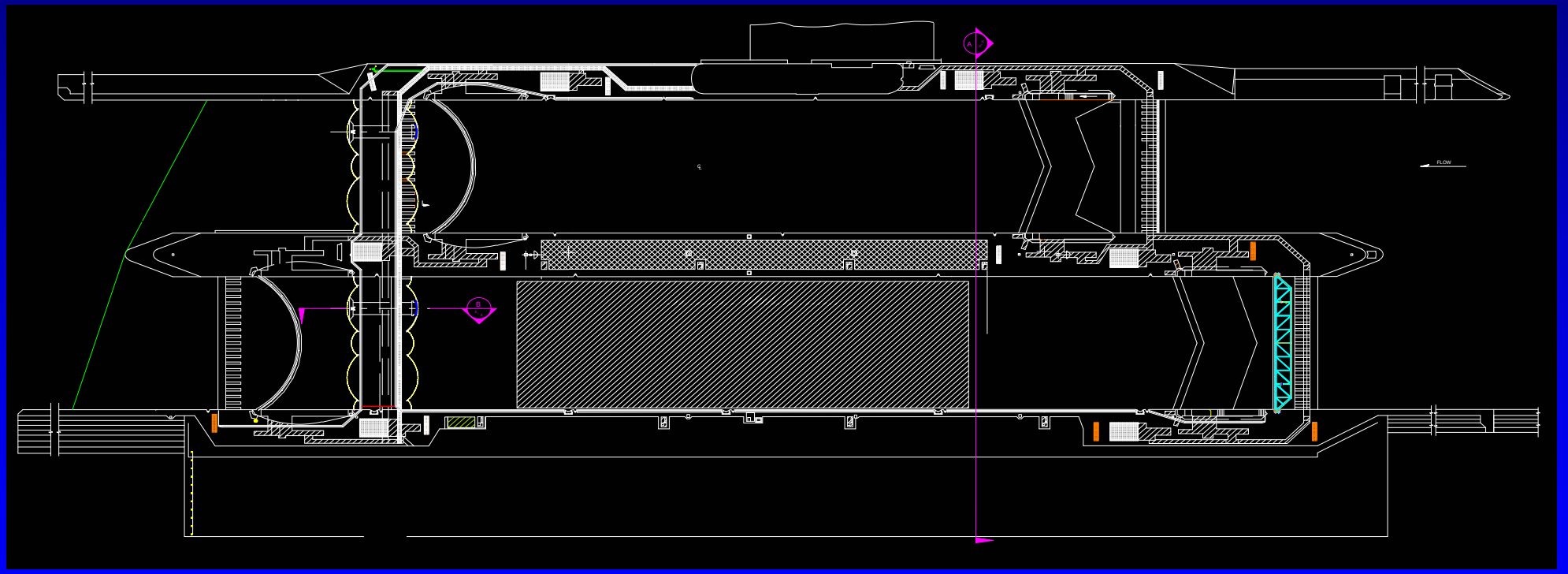
Greenup L&D
Dry Dock at R.C. Byrd L&D



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Greenup L&D
Dry Dock at R.C. Byrd L&D



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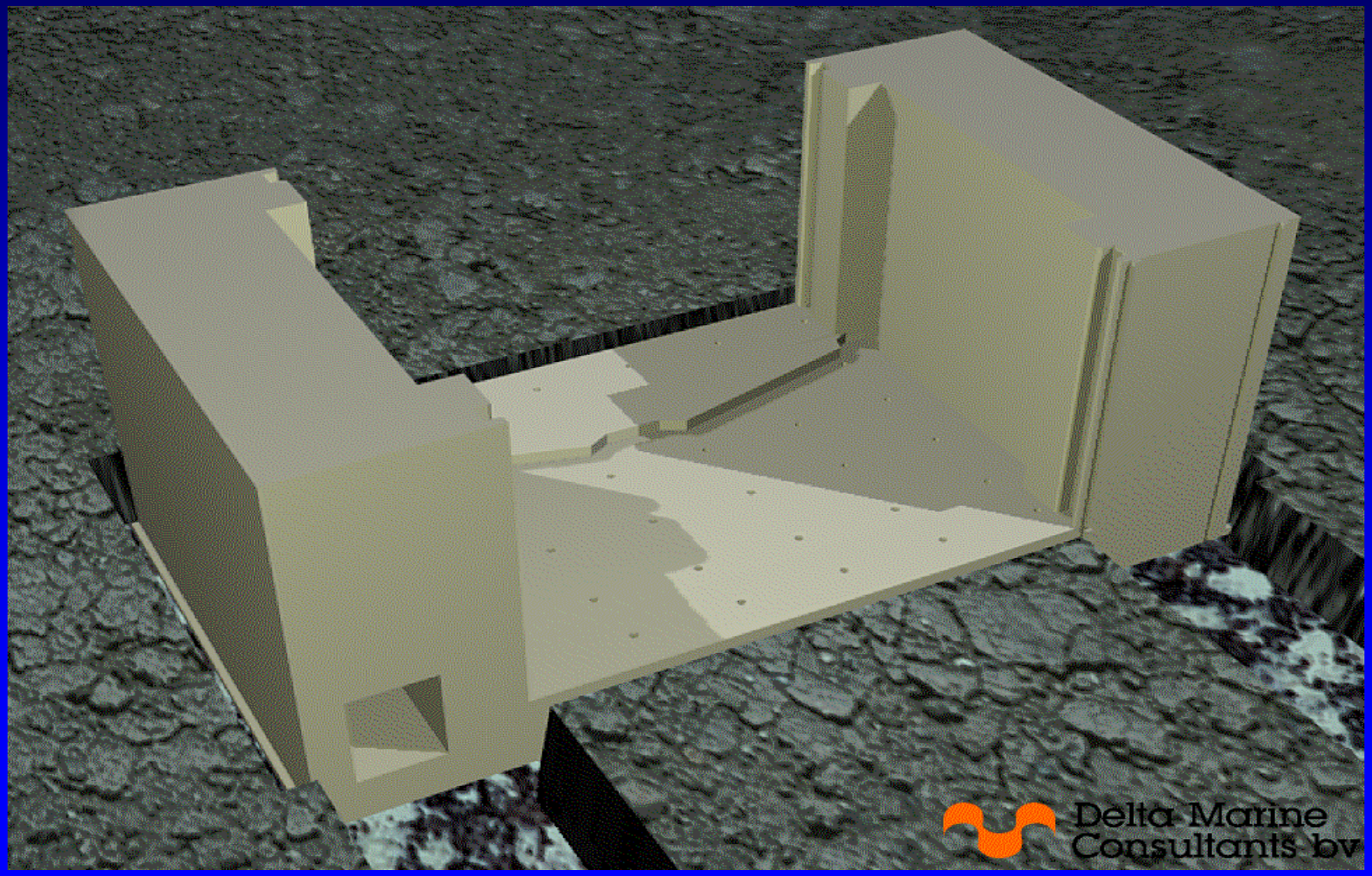
Greenup L&D
Miter Gate Bay

FLOAT-IN MITER GATE BAY "INNOVATIVE TECHNIQUE"

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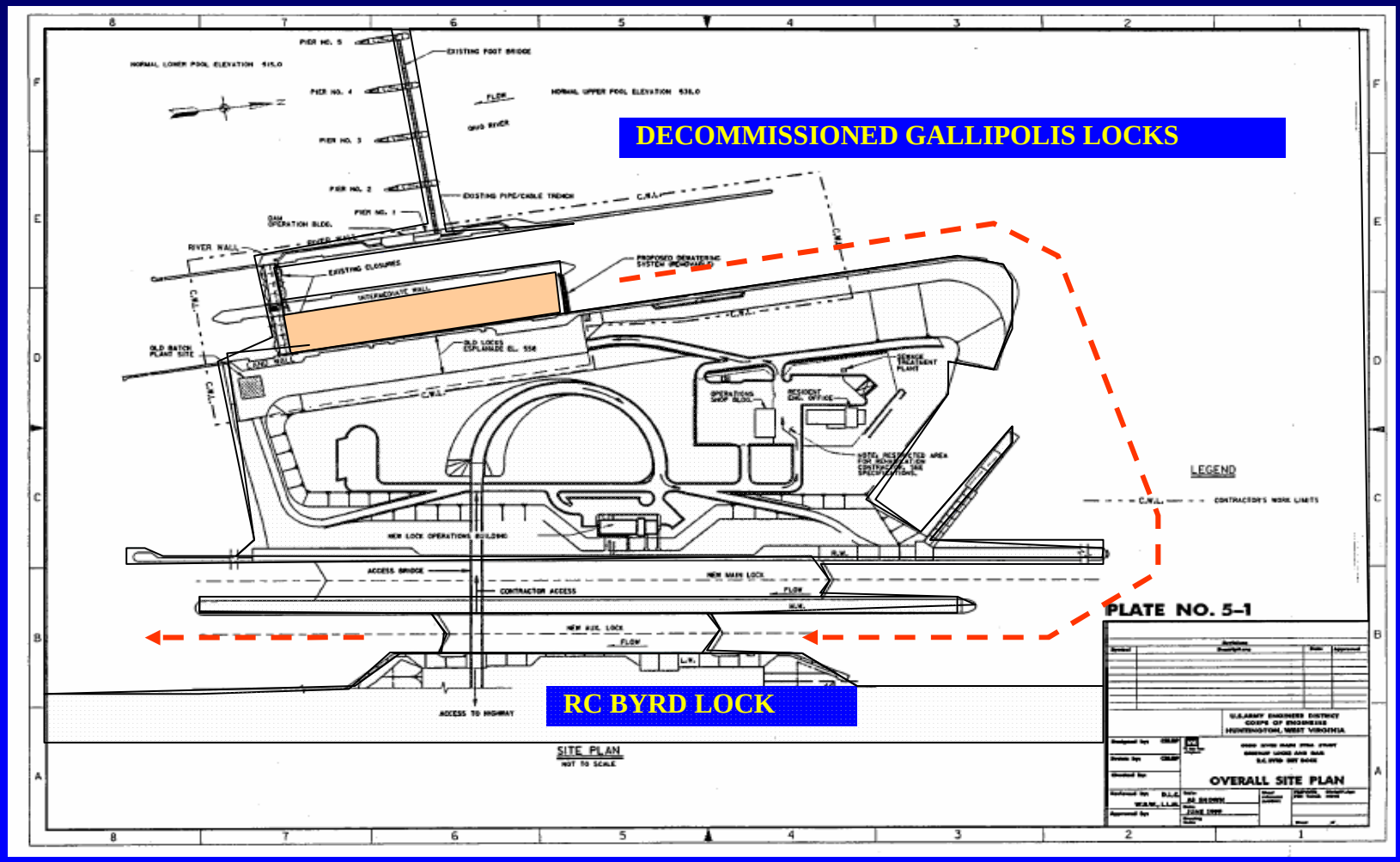
Greenup L&D
Miter Gate Bay



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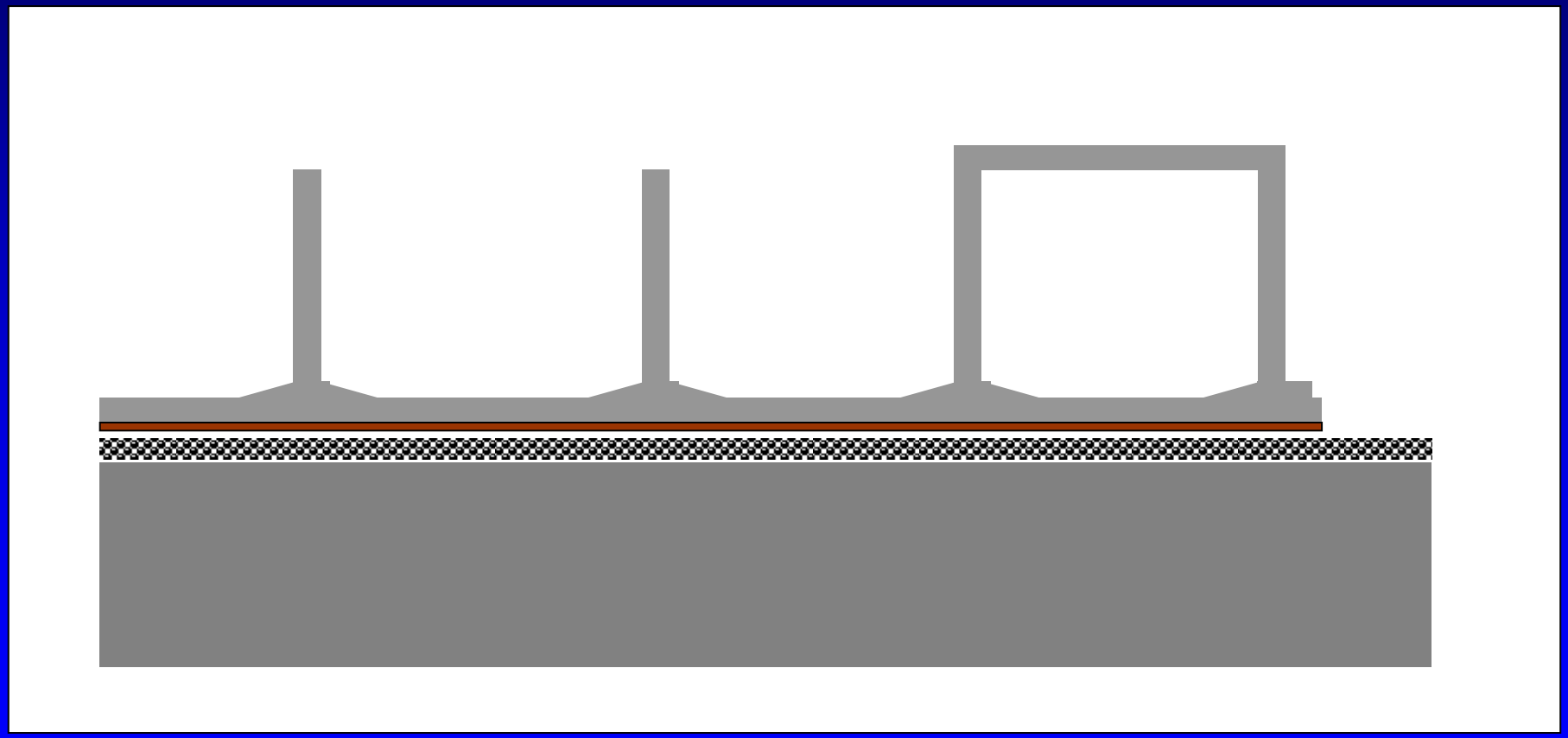
Greenup L&D
Miter Gate Bay



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Greenup L&D
Miter Gate Bay

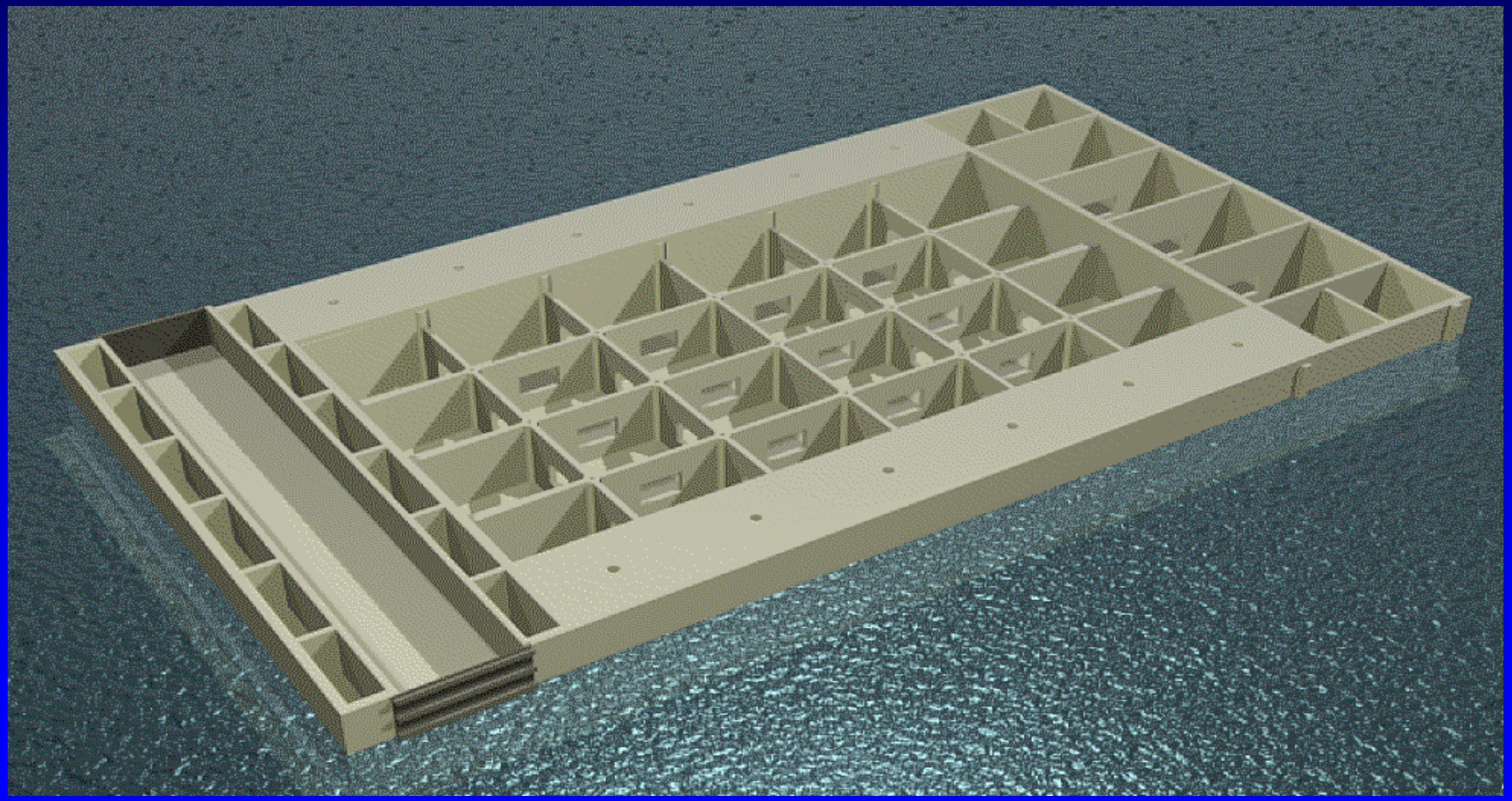


Casting of Miter Gate Bay

US Army Corps
of Engineers

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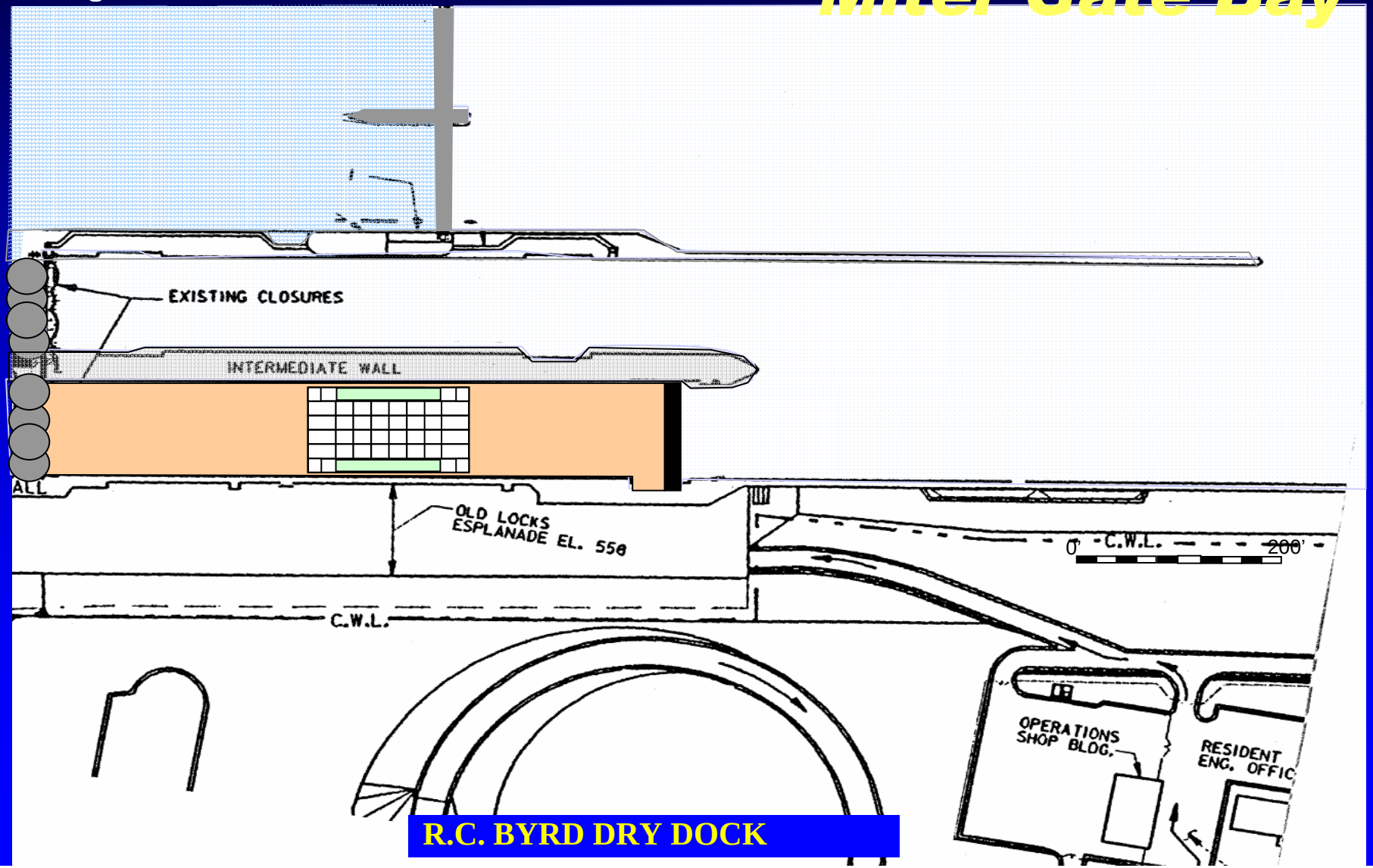
Greenup L&D
Miter Gate Bay



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Greenup L&D
Miter Gate Bay

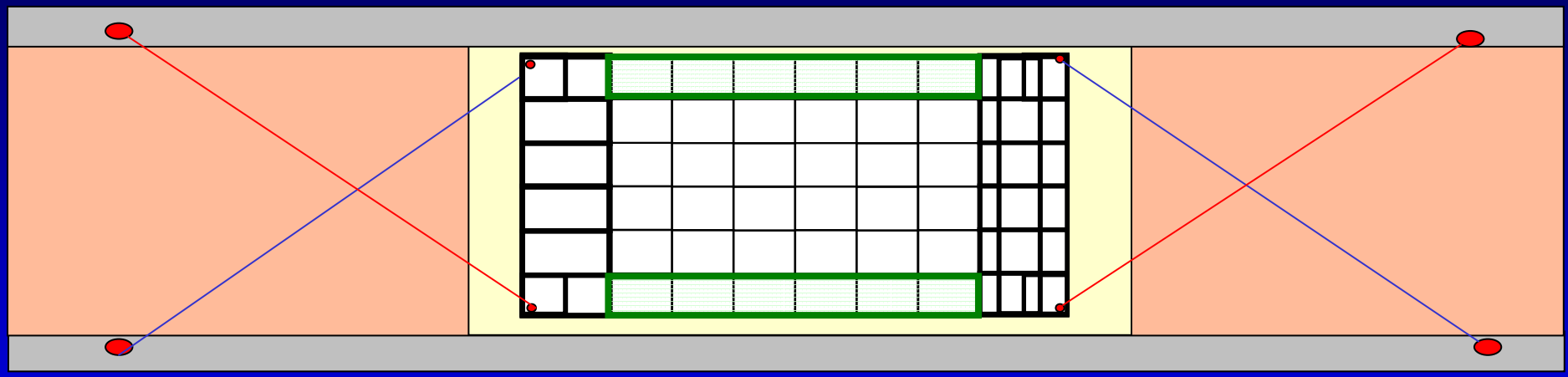


US Army Corps of Engineers

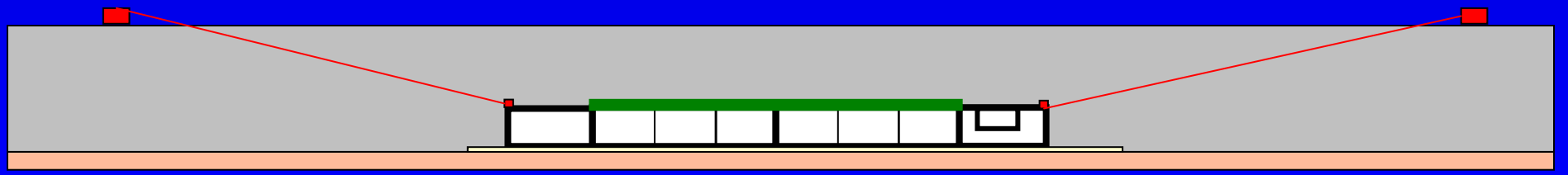
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Greenup L&D
Miter Gate Bay

0’ 100’



PLAN



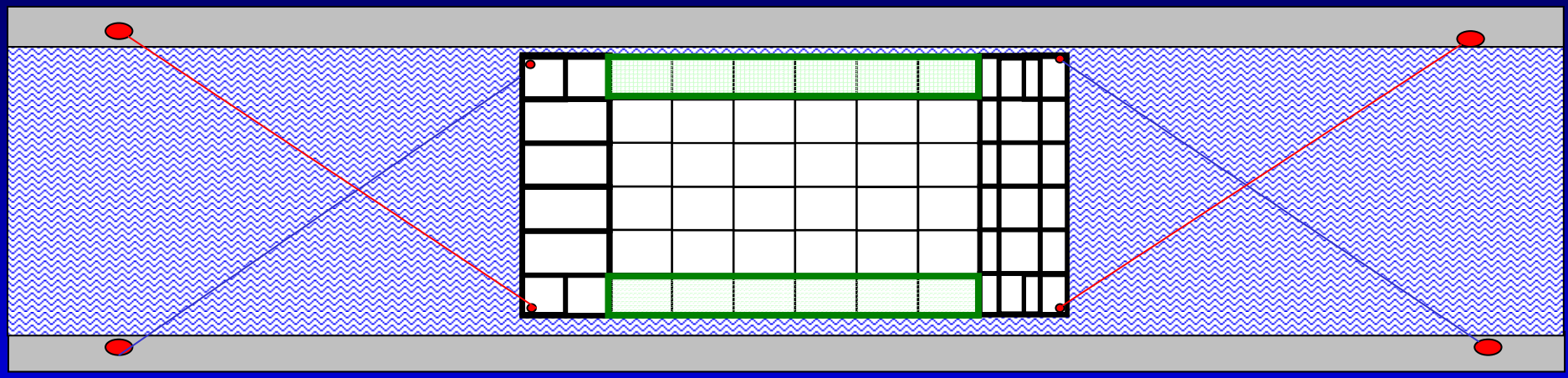
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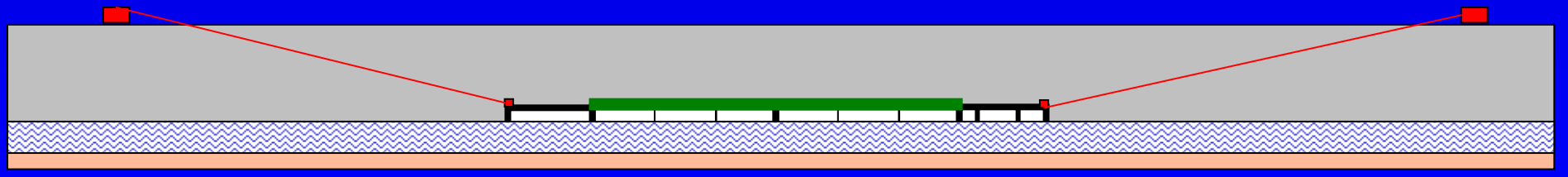
AT R.C. BYRD DRY DOCK

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay





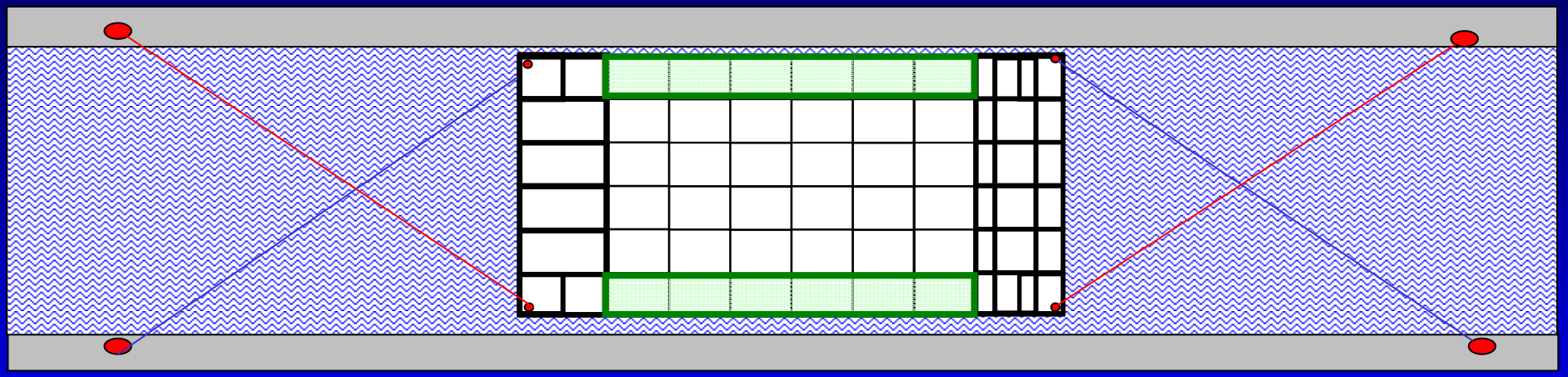
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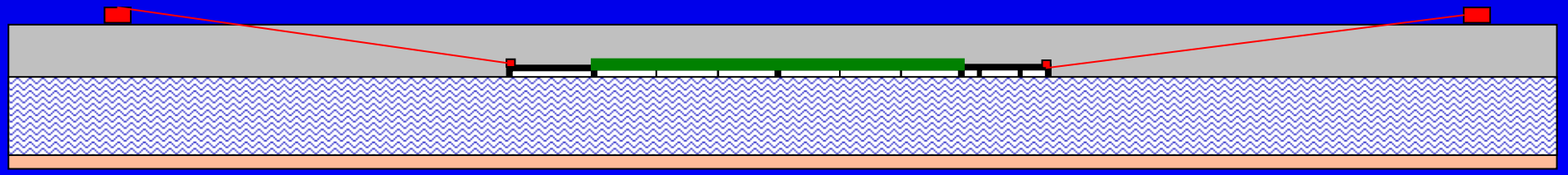
US Army Corps of Engineers

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Greenup L&D Miter Gate Bay

0’ 100’



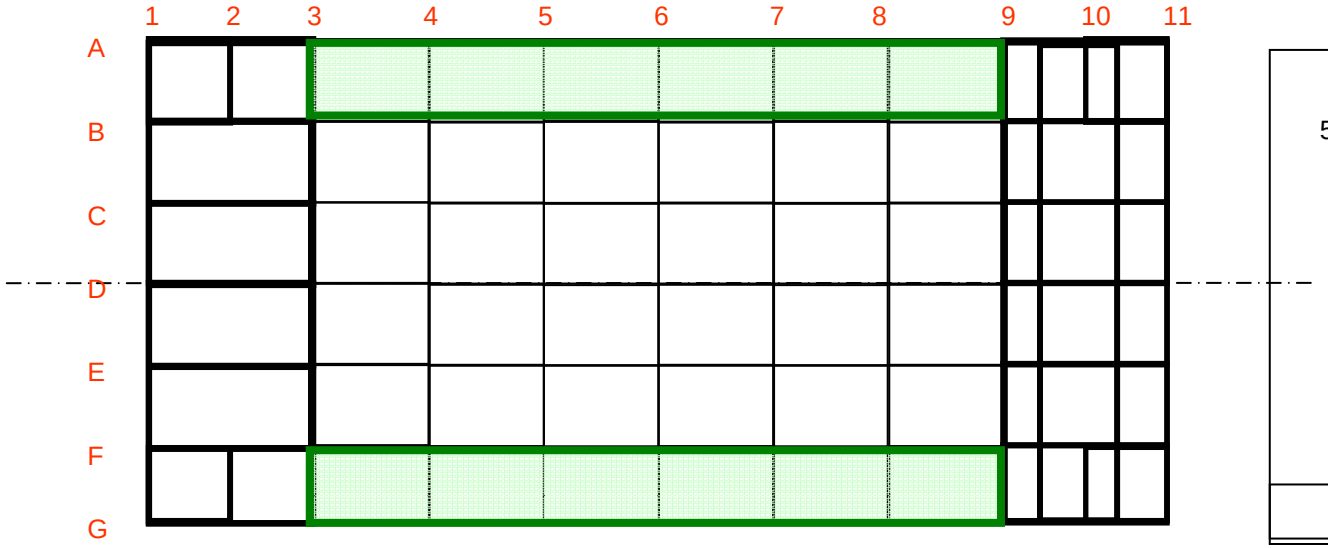


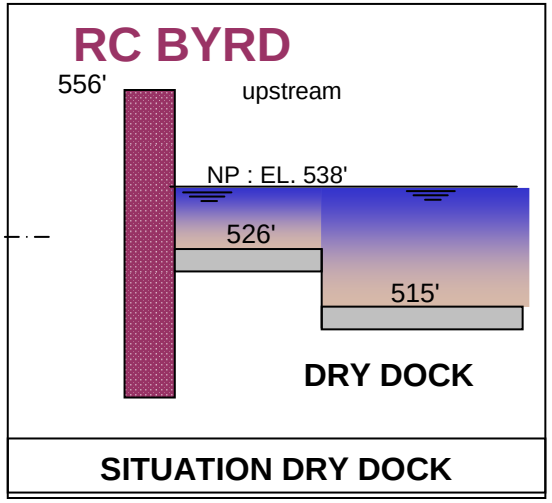
AT R.C. BYRD DRY DOCK

US Army Corps of Engineers

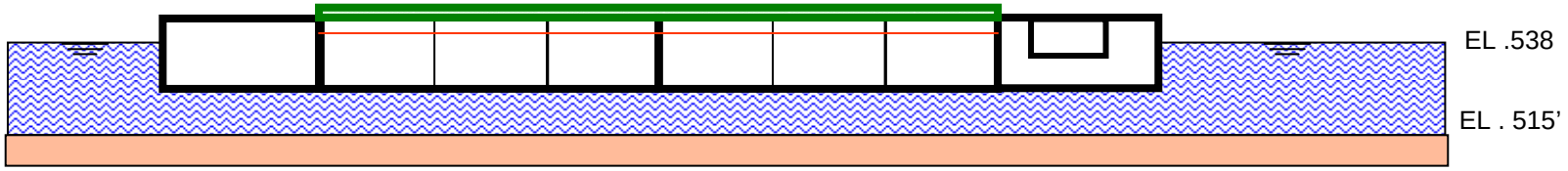
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Miter Gate Bay





SITUATION DRY DOCK



Remarks :

1. Case 1: Spec. weight concrete 157.9 pcf
   Spec. weight water 62.4 pcf
2. Case 2: Spec. weight concrete 150,7 pcf
   Spec. weight water 63.7 pcf

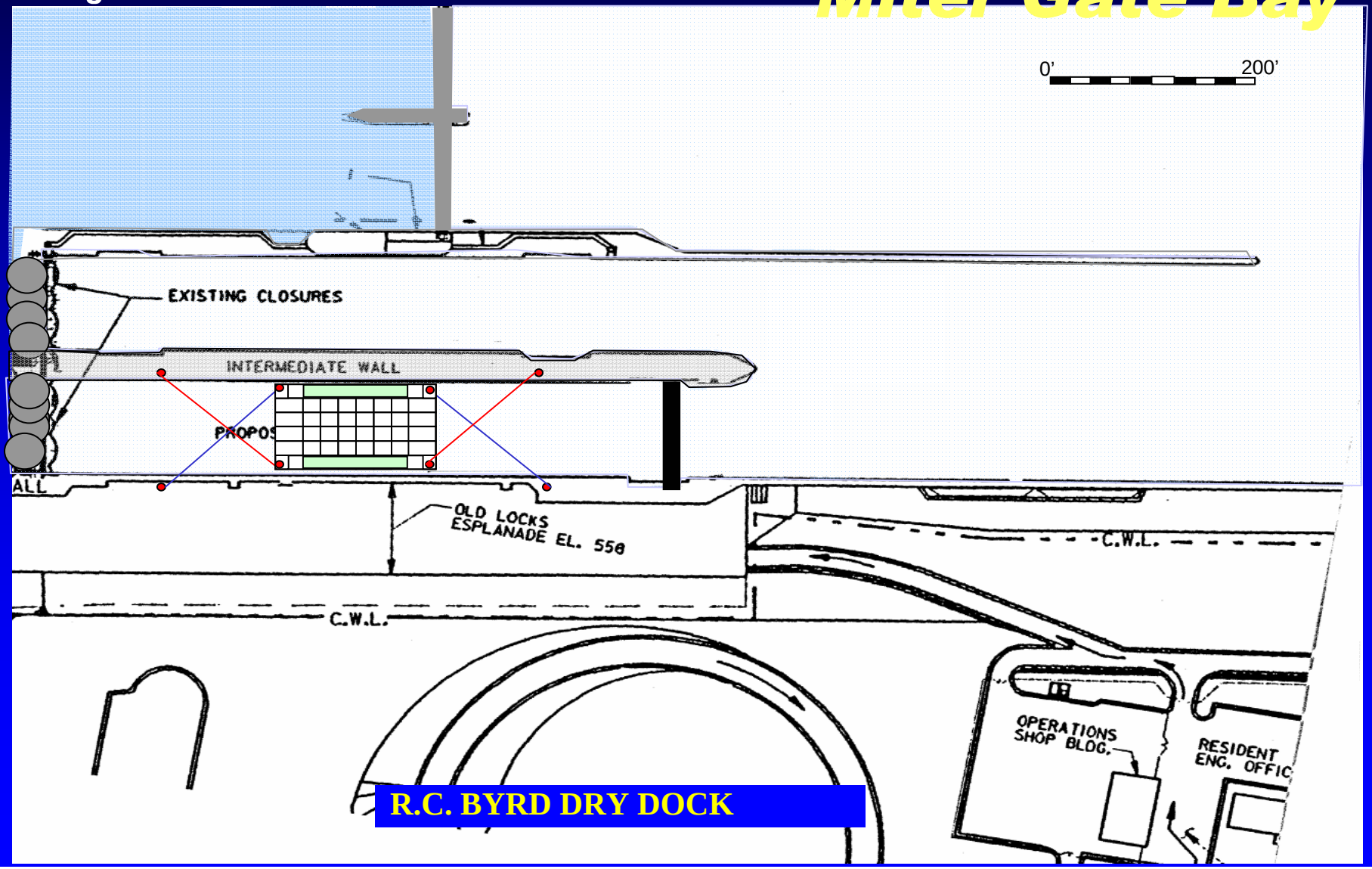
DRAFT	9.8 ft
FREEBOARD	6.2 ft
KEELCLEARANCE	13.2ft

Phase 1.B: Floating

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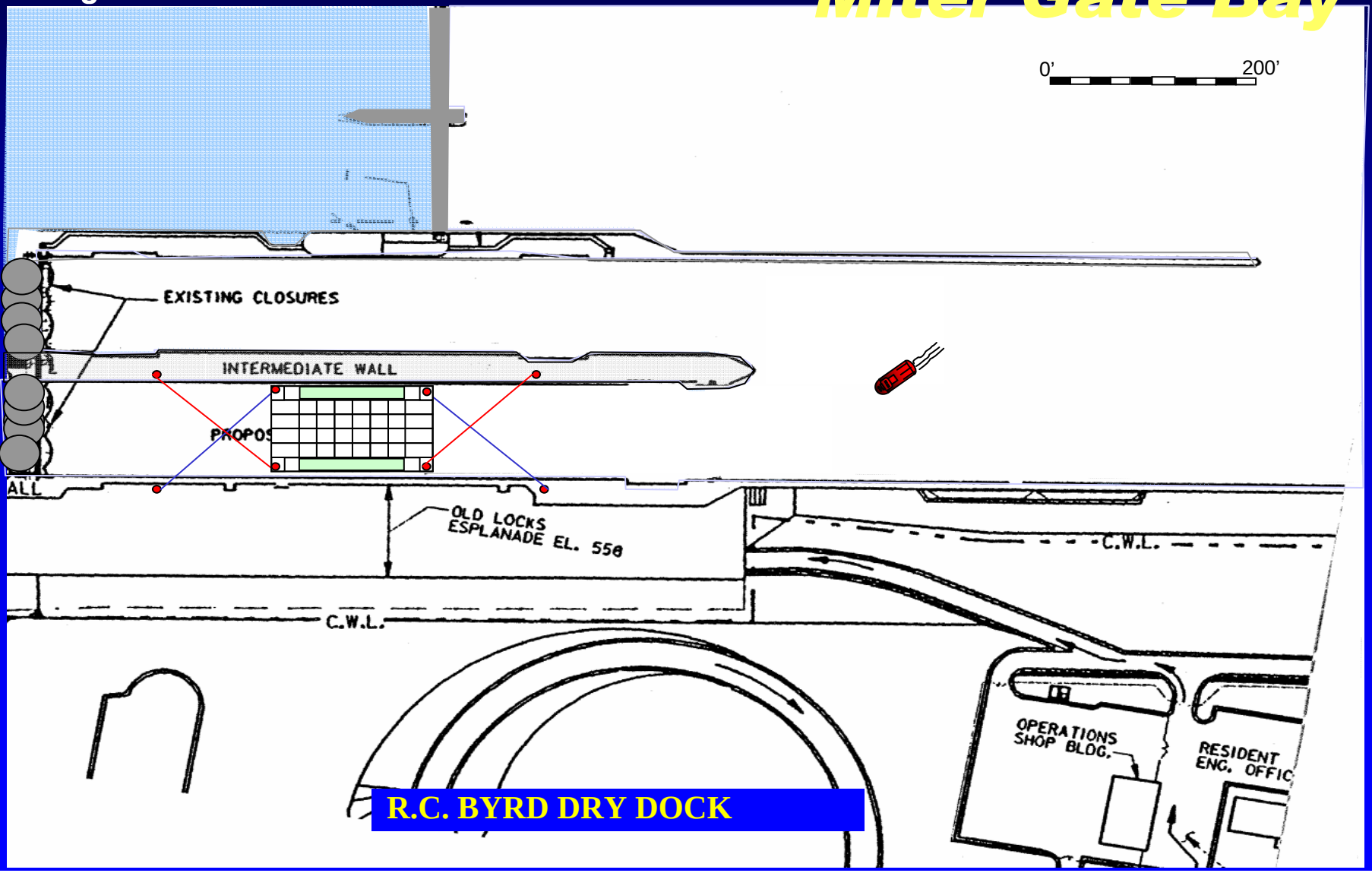
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Miter Gate Bay



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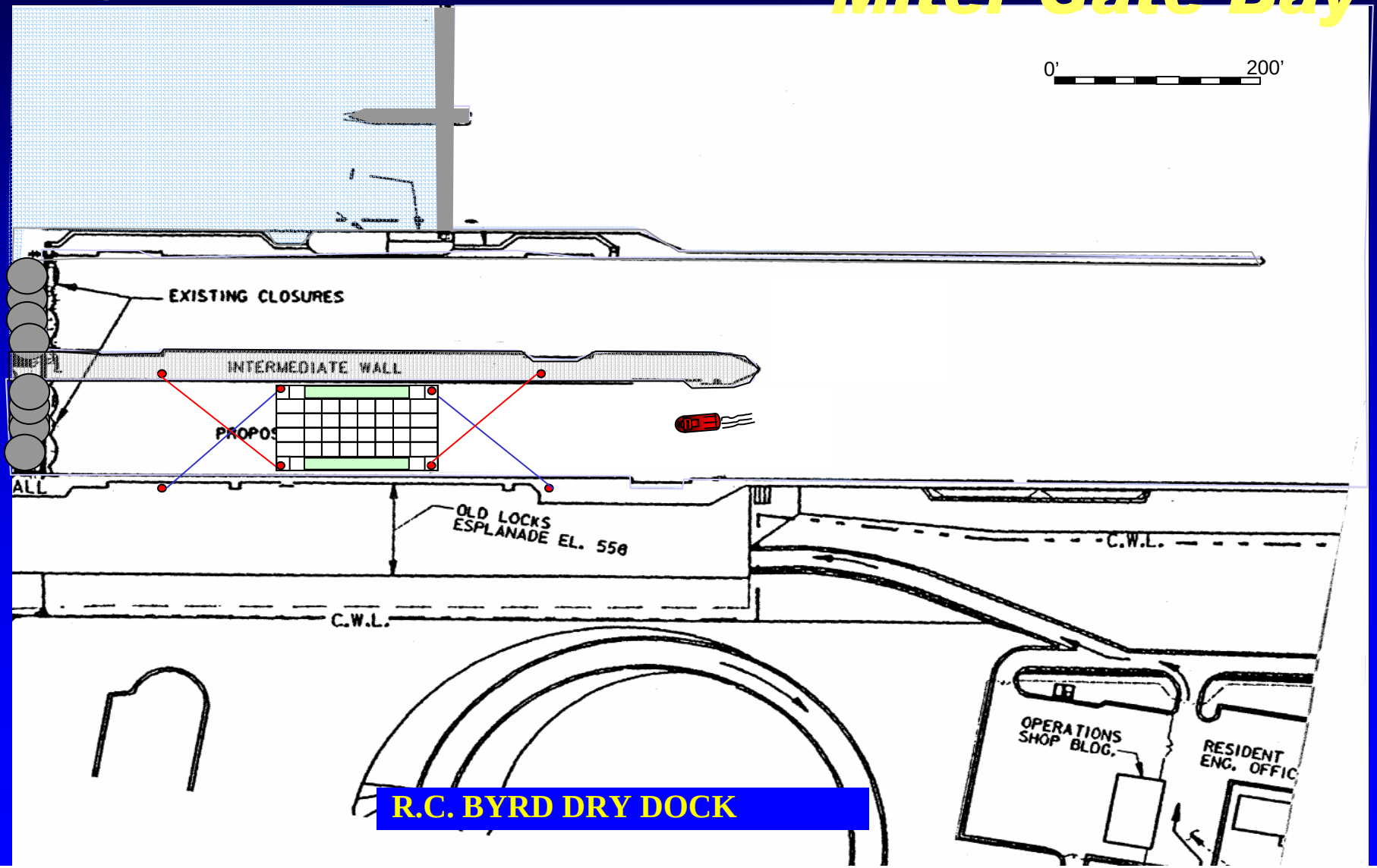
Environmental Conditions for Marine Operations

- *Mean wind speed below 35 mph*
- *Temperature above 35°F*
- *No fog*
- *Water velocity considerations*
- *Water level considerations*

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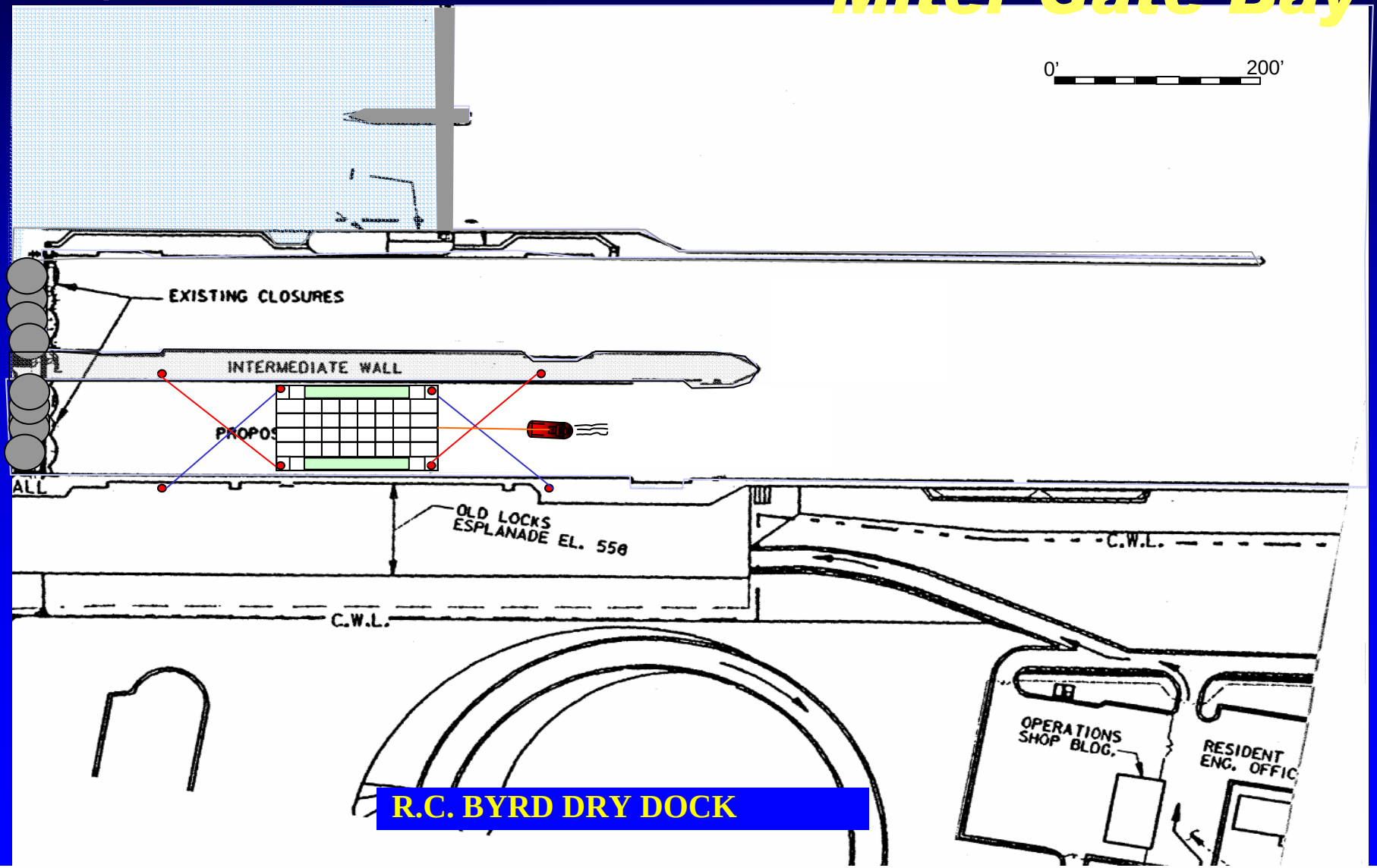
Greenup L&D
Miter Gate Bay



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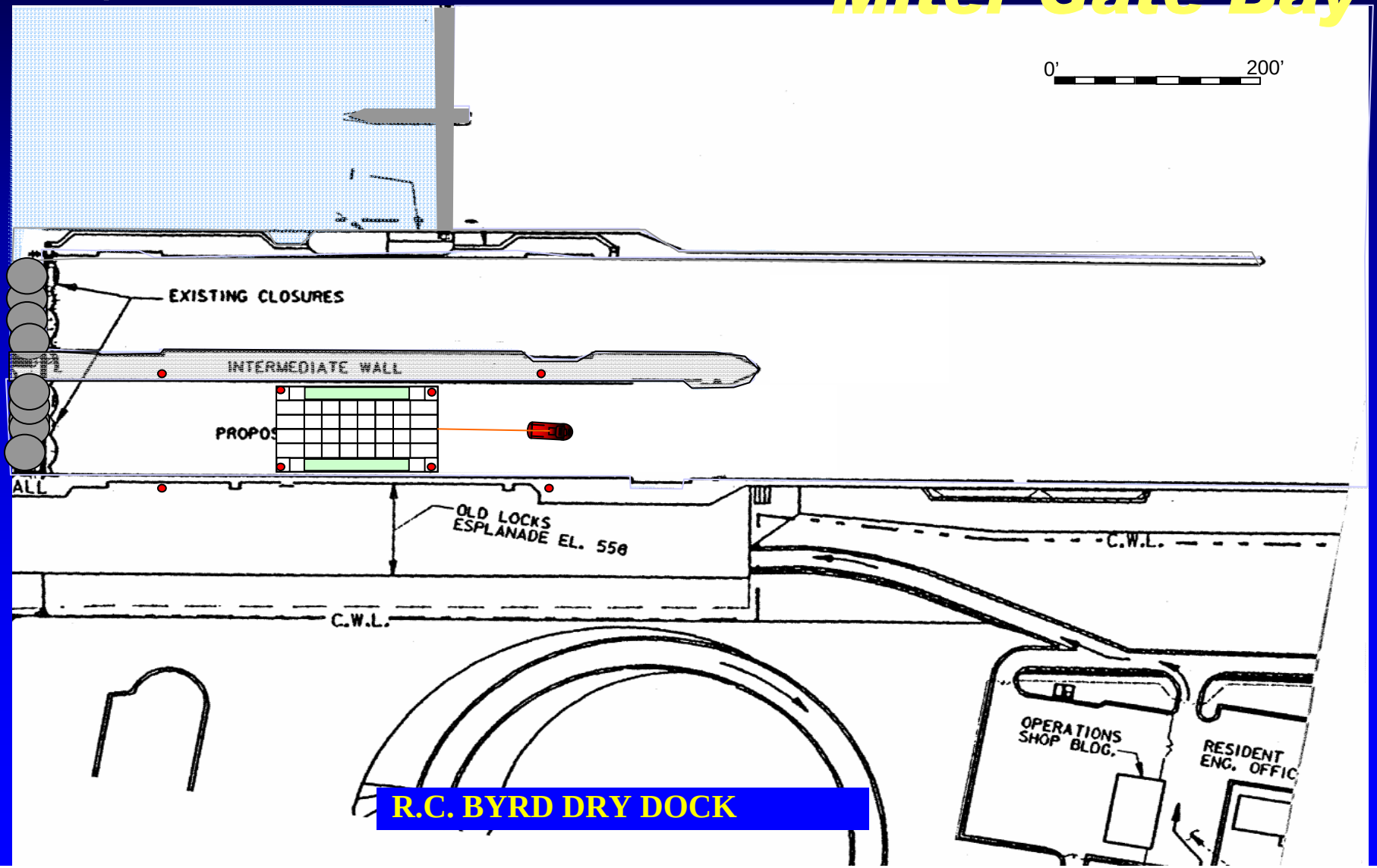
Greenup L&D
Miter Gate Bay



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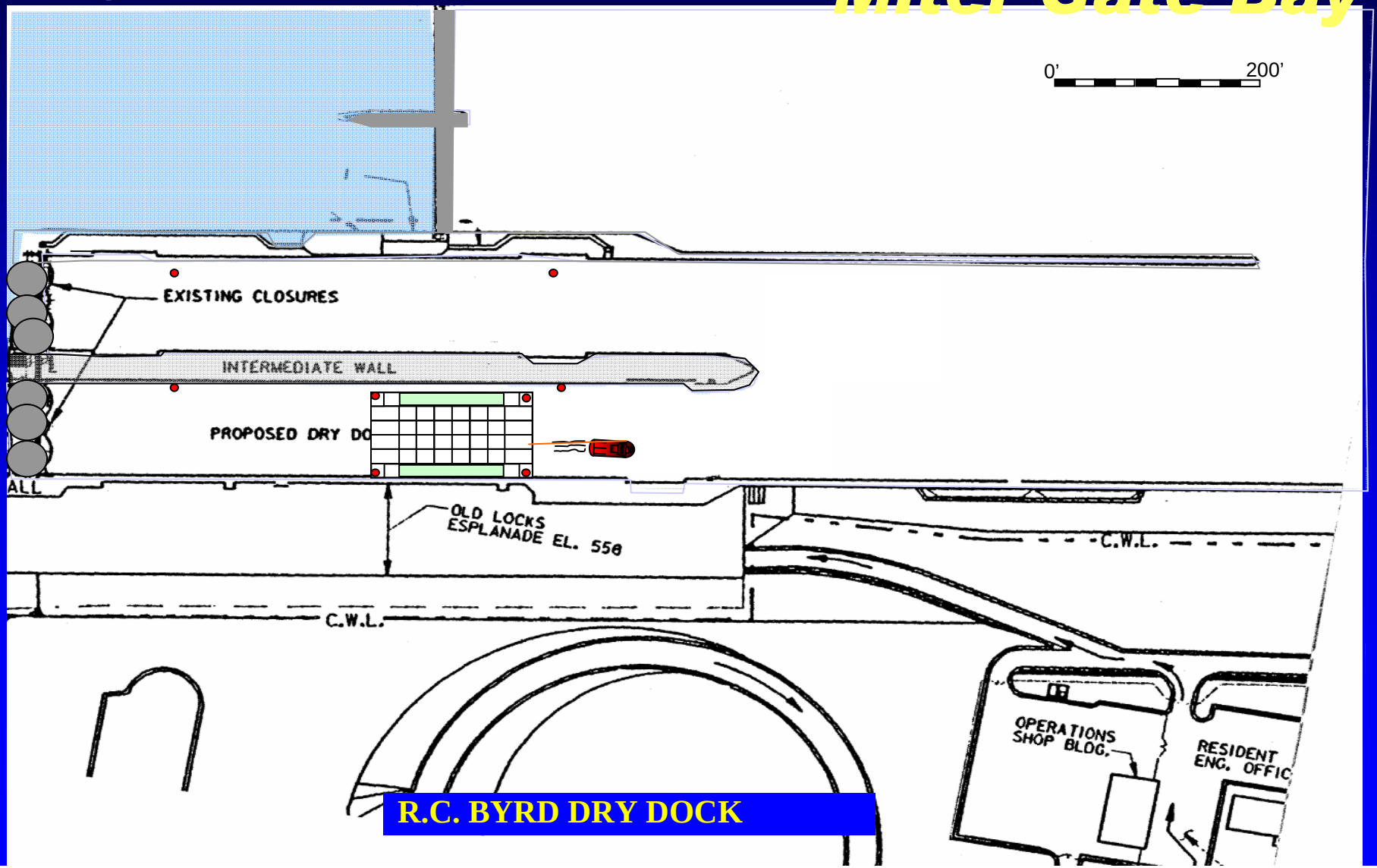
Greenup L&D
Miter Gate Bay



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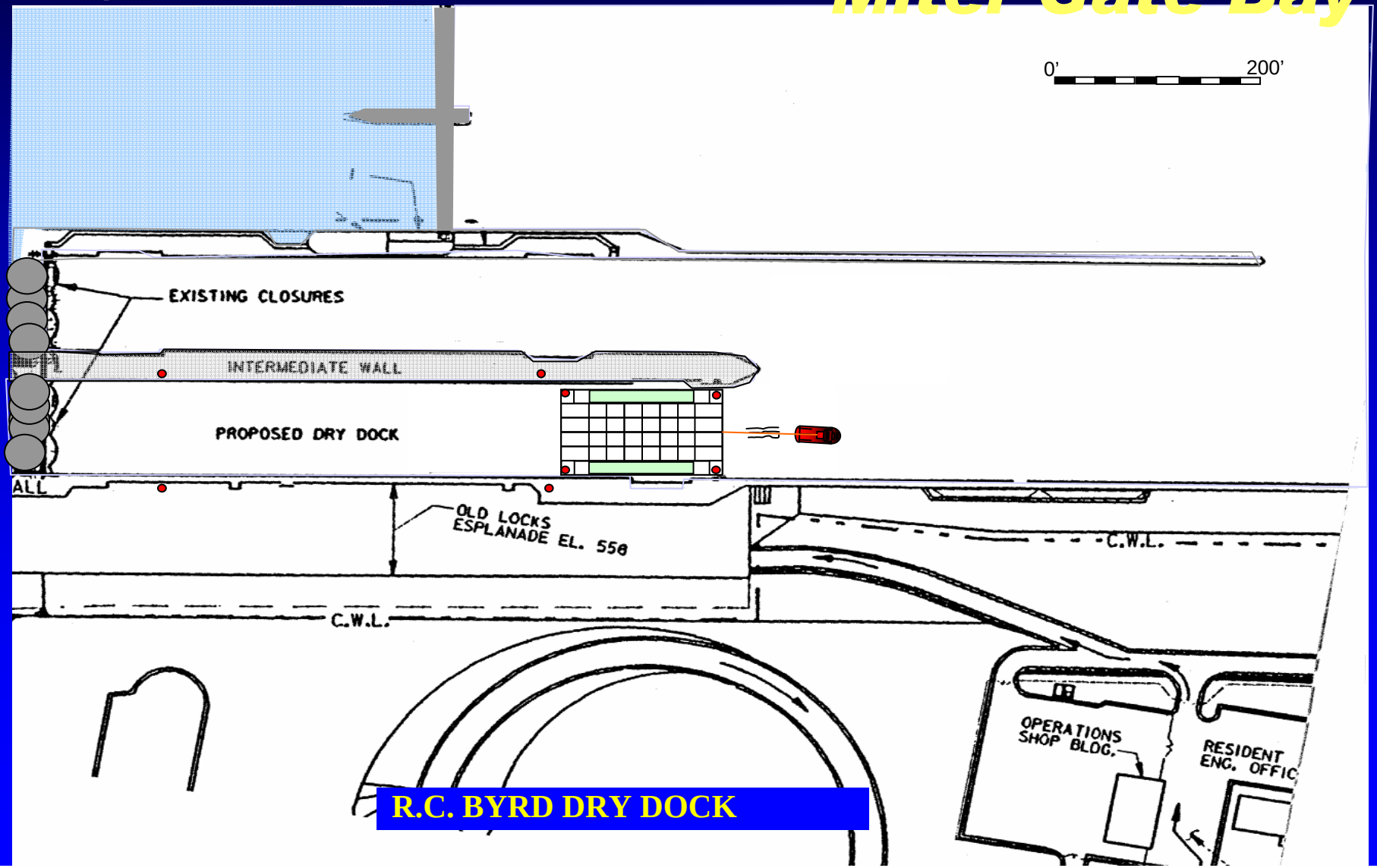
Greenup L&D
Miter Gate Bay



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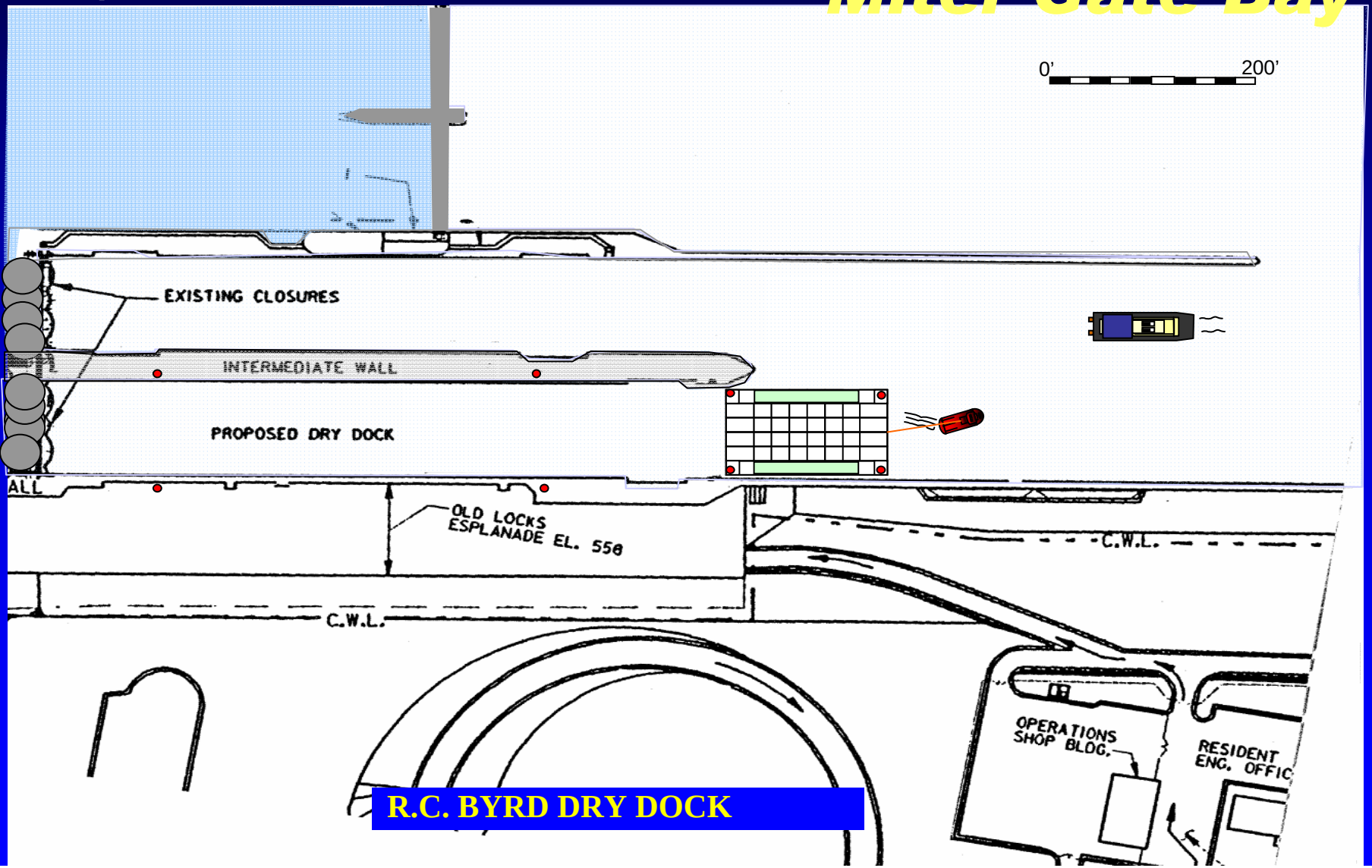
Greenup L&D
Miter Gate Bay



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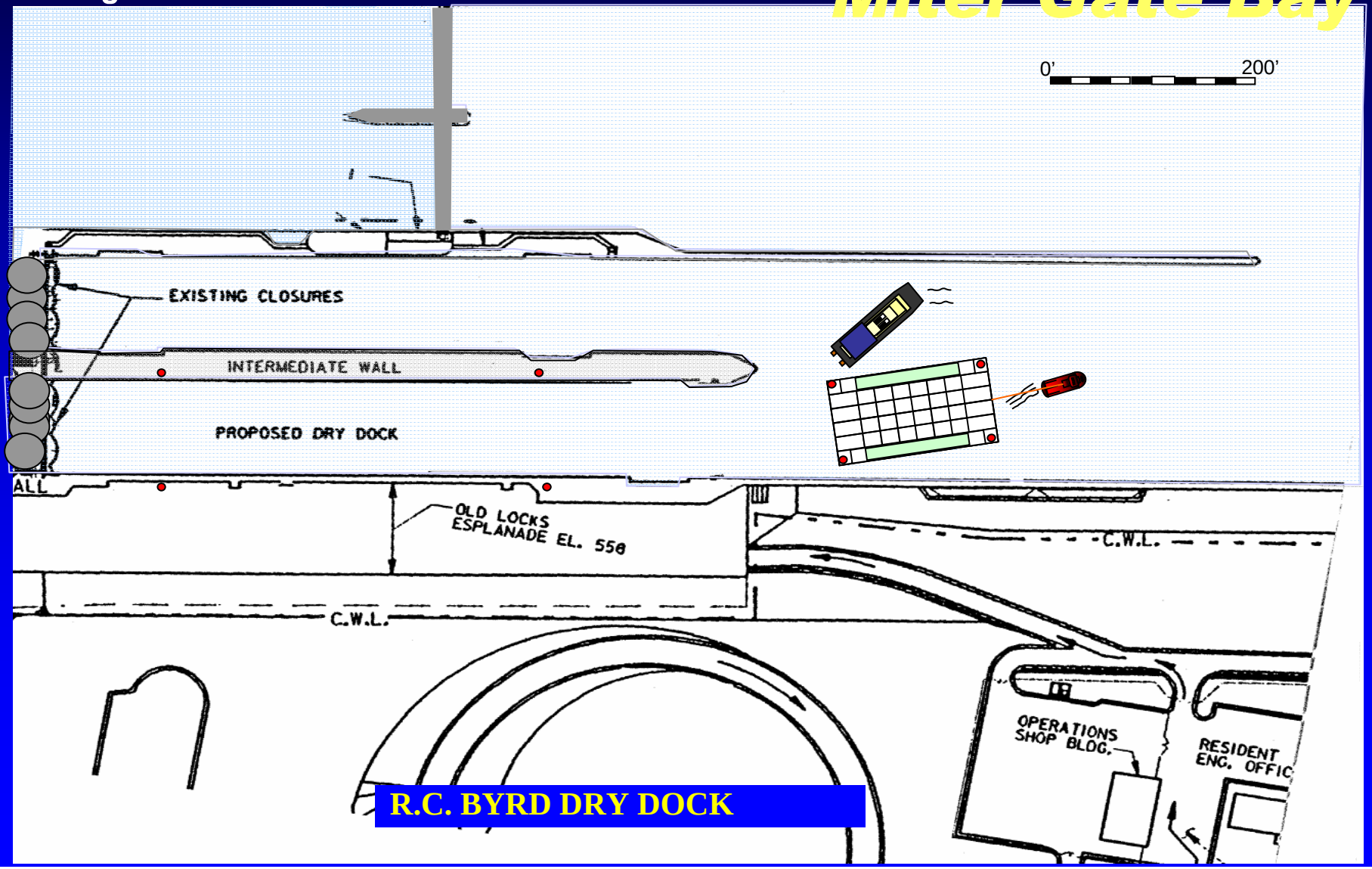
Greenup L&D
Miter Gate Bay



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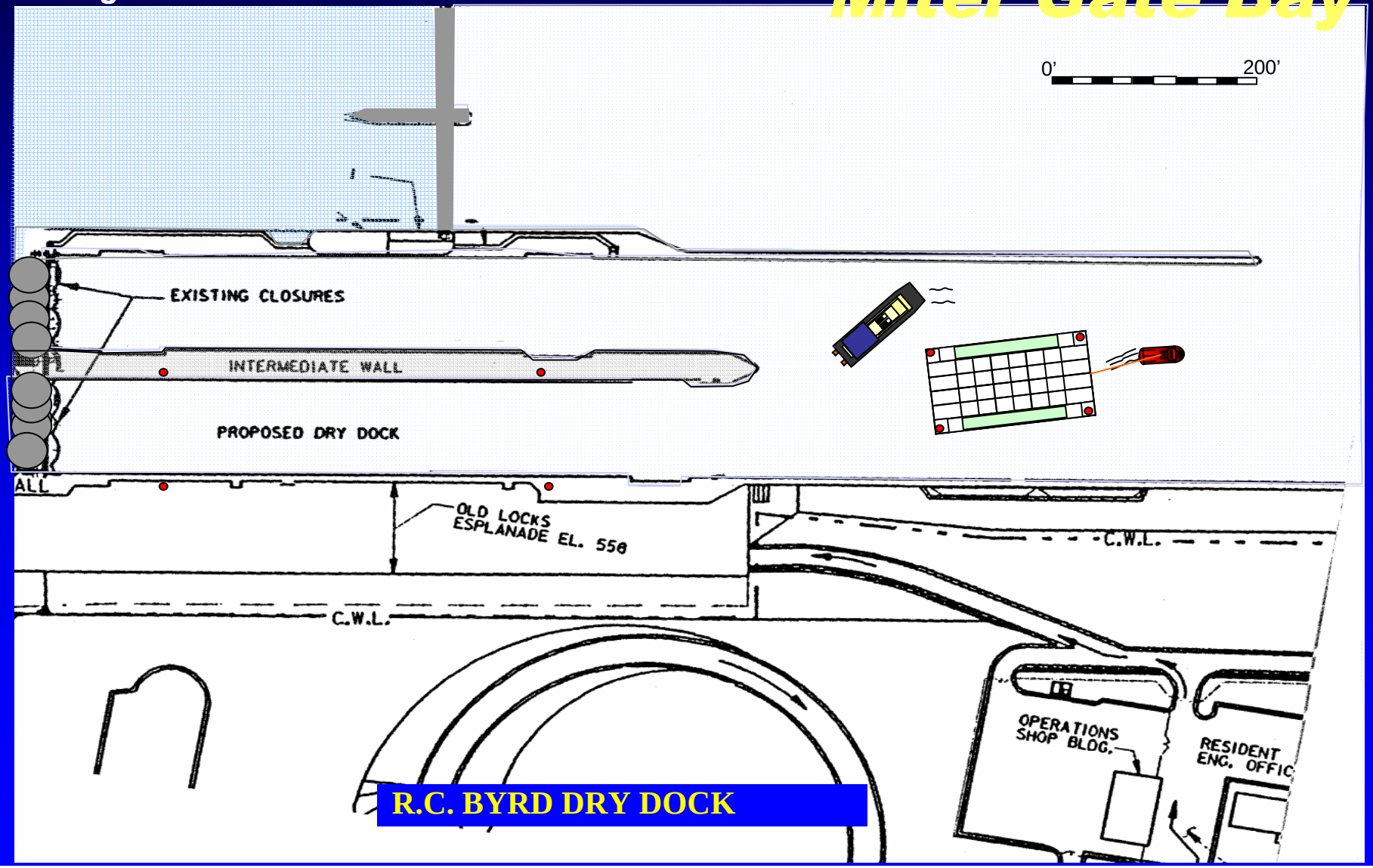
Greenup L&D
Miter Gate Bay



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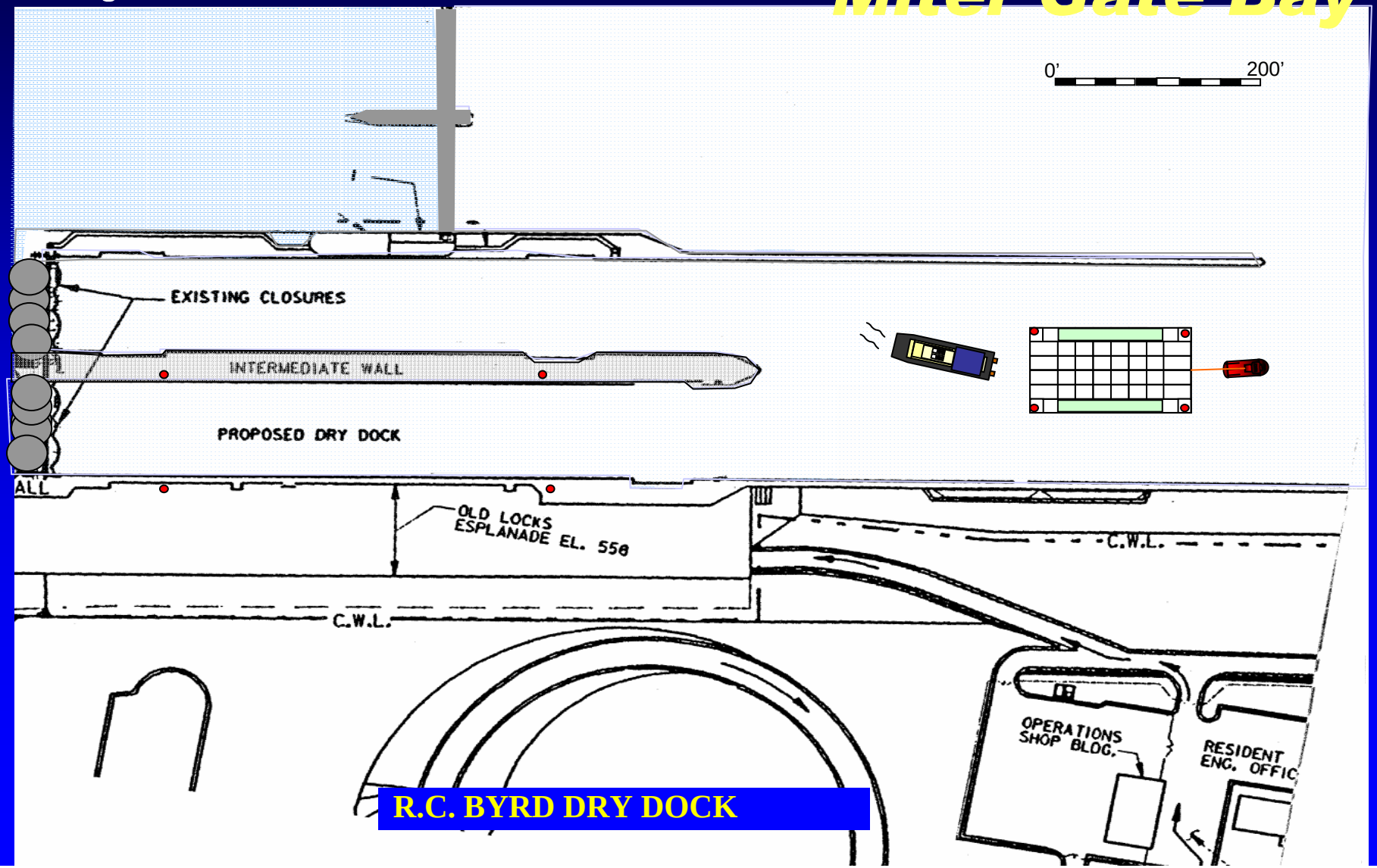
Greenup L&D
Miter Gate Bay



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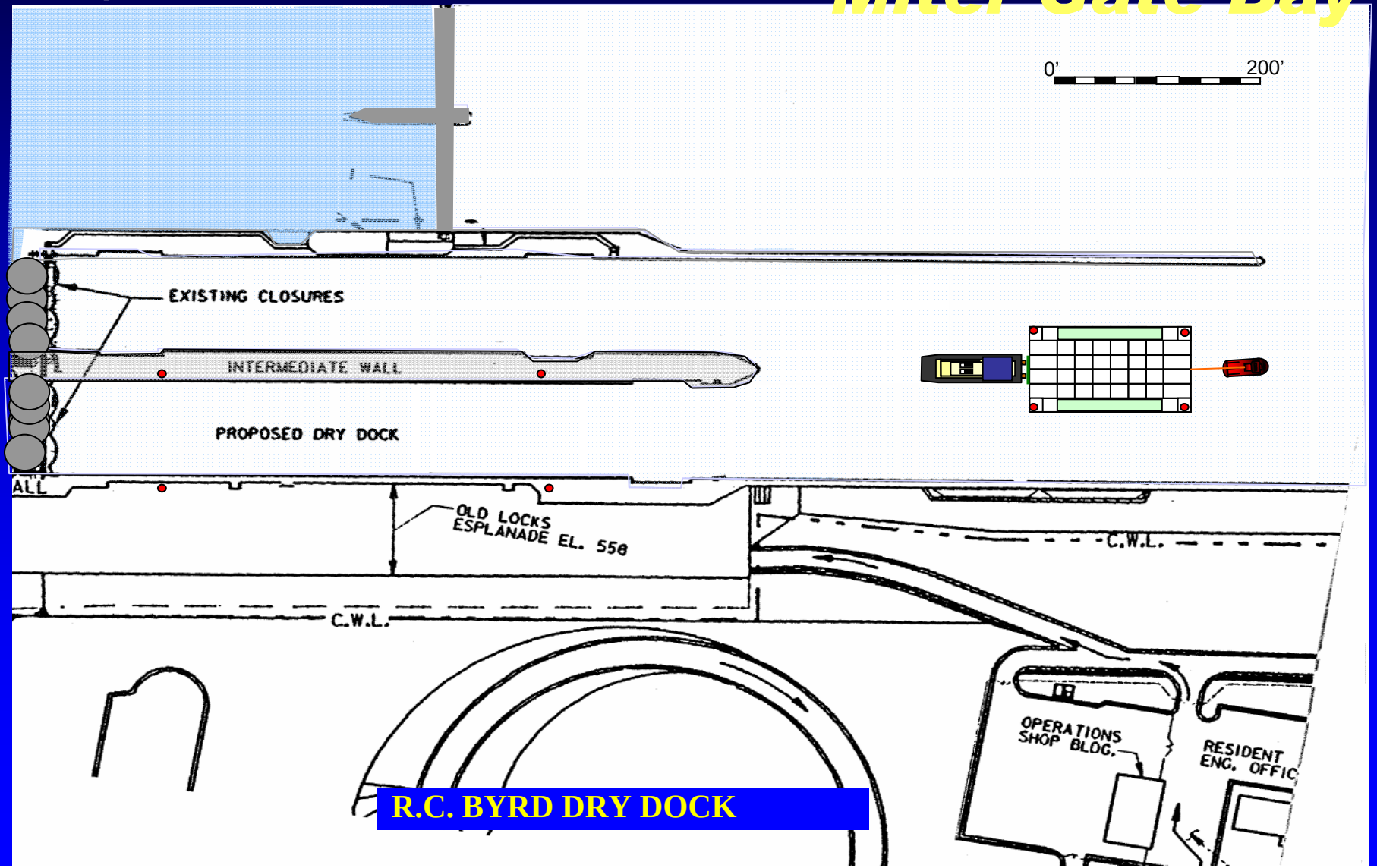
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Braddock Dam

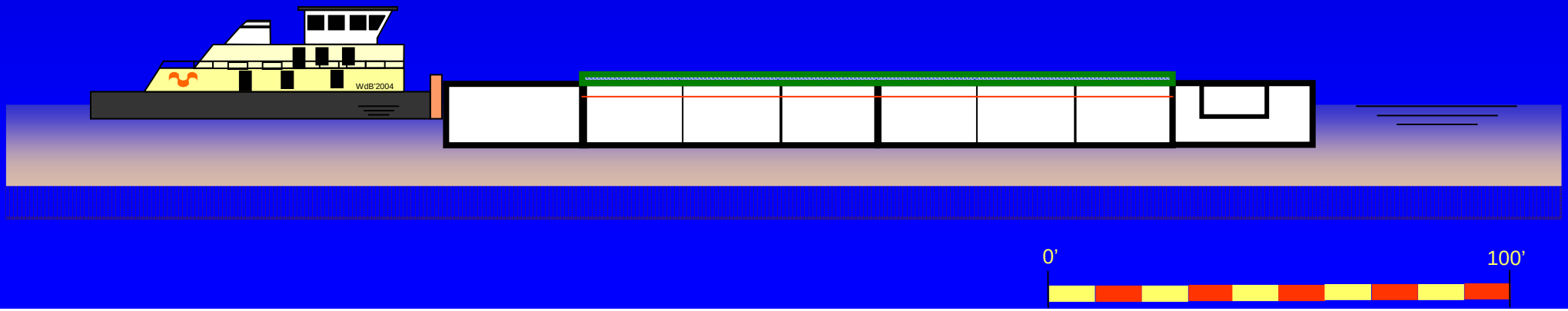
TOWBOAT

- Capacity 2100 – 2600 hp
- Similar to 35 short ton BP tug

VESSEL DIMENSIONS

- Braddock = 104’ X 333’
- Greenup = 105’ X 188’

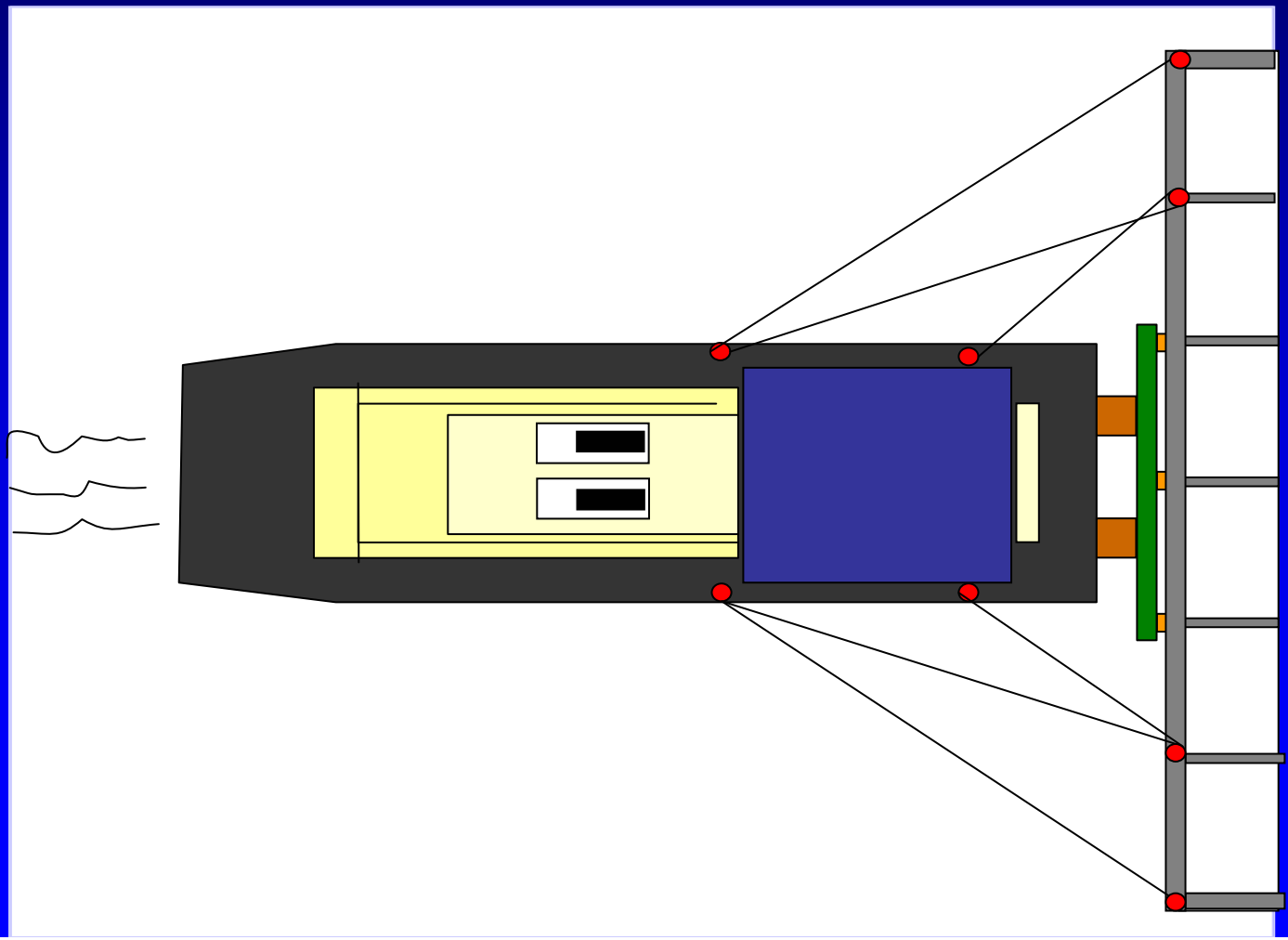




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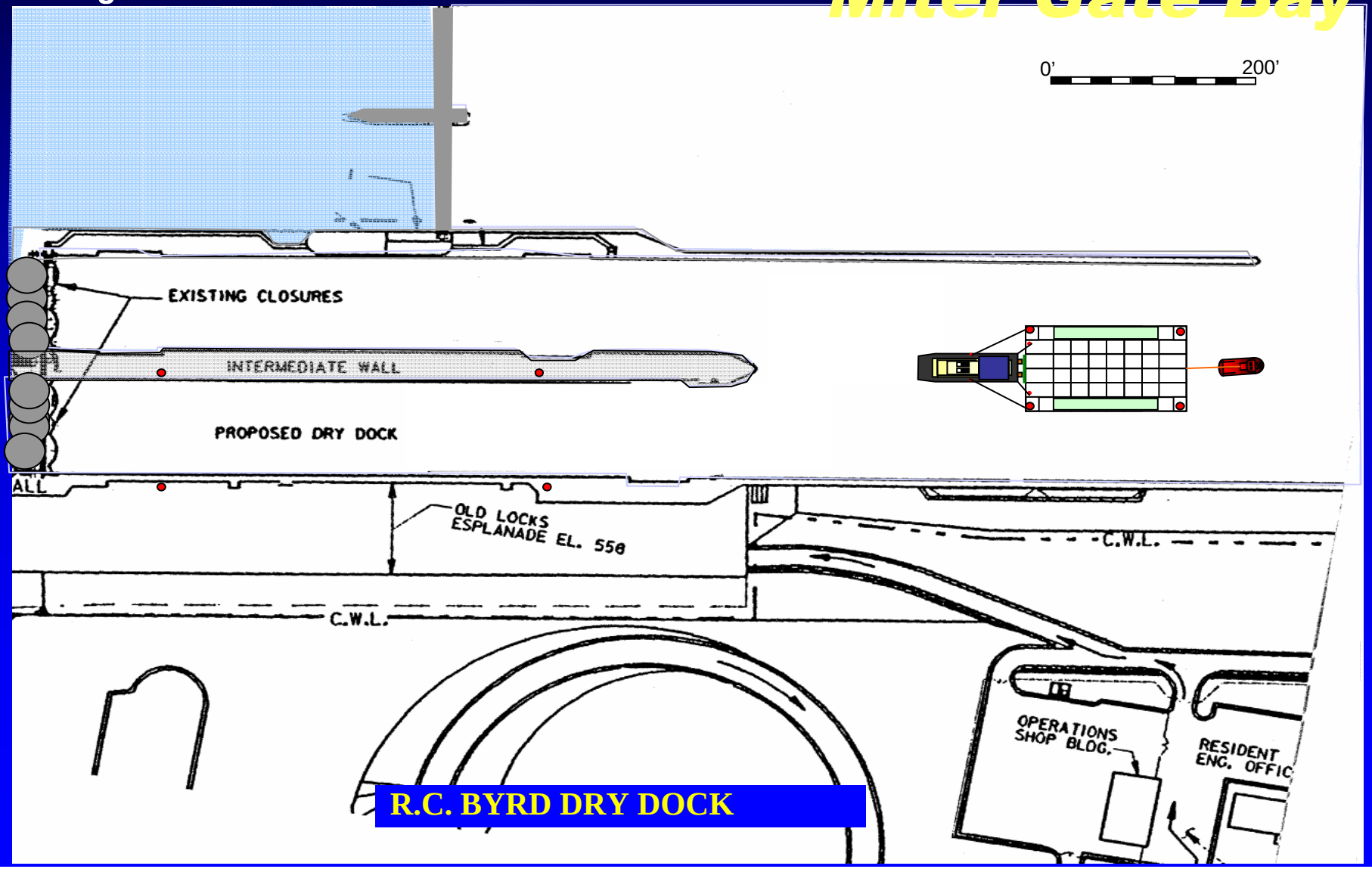
Greenup L&D
Miter Gate Bay



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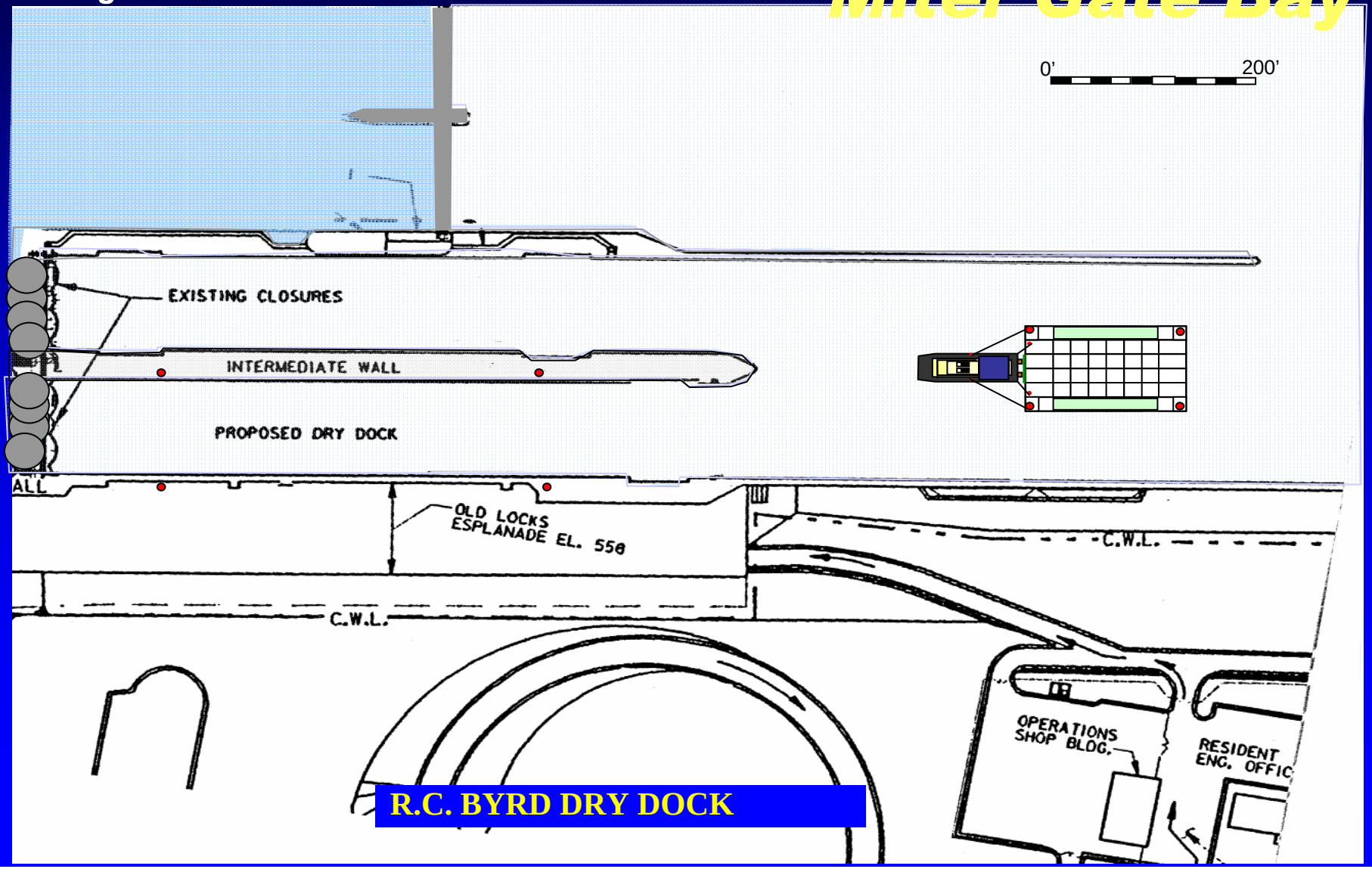
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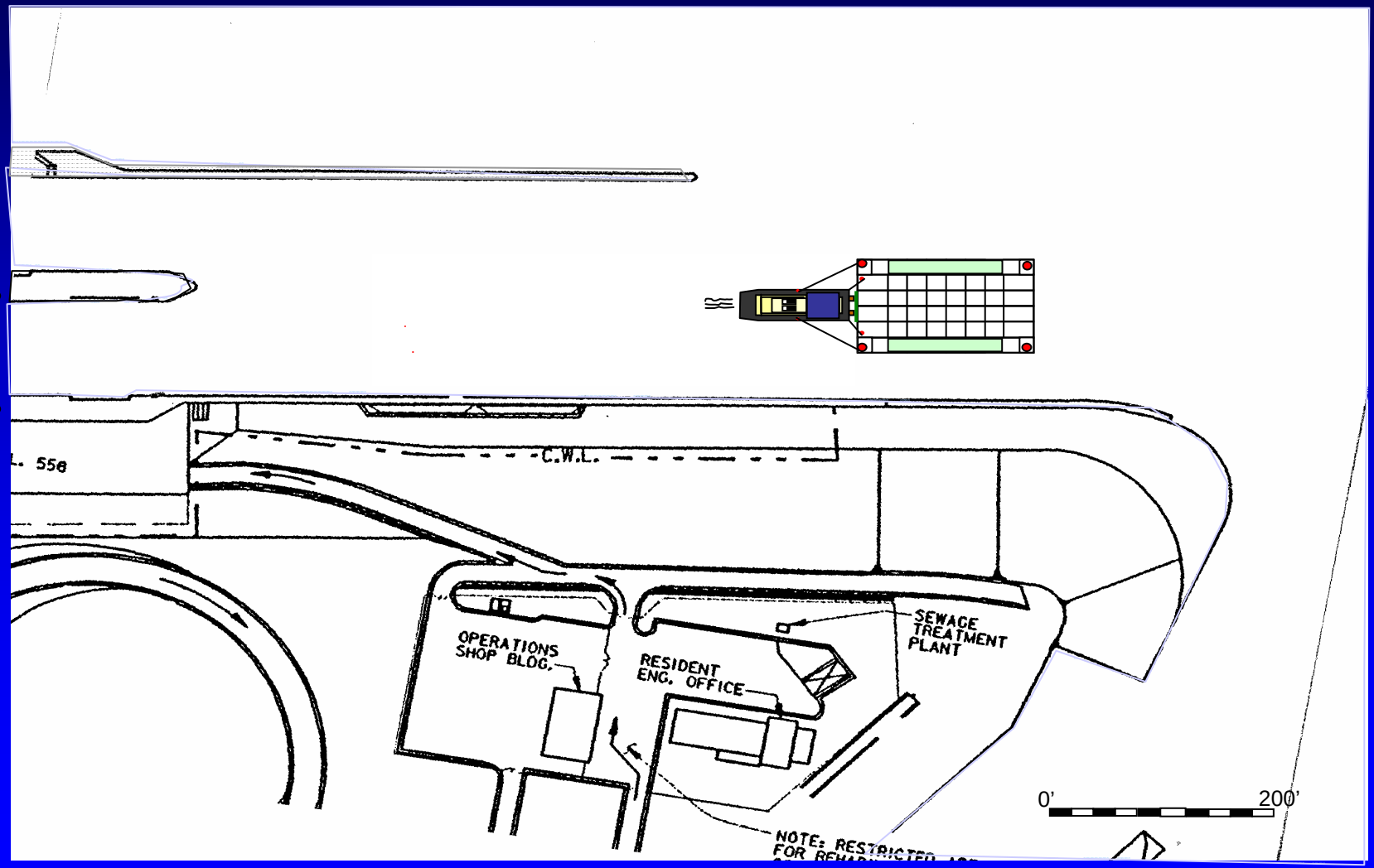
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Miter Gate Bay

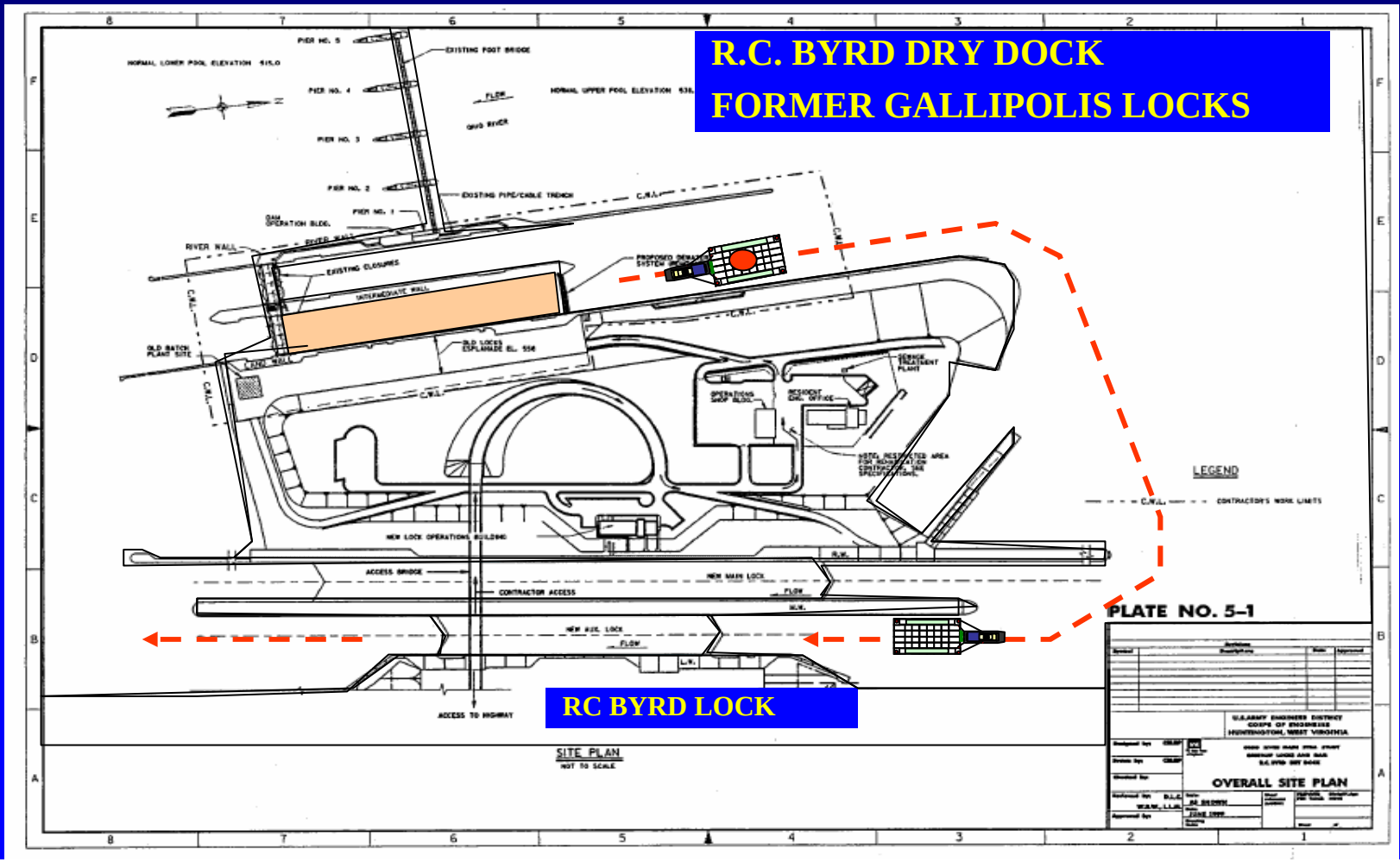


R.C. BYRD DRY DOCK

US Army Corps
of Engineers

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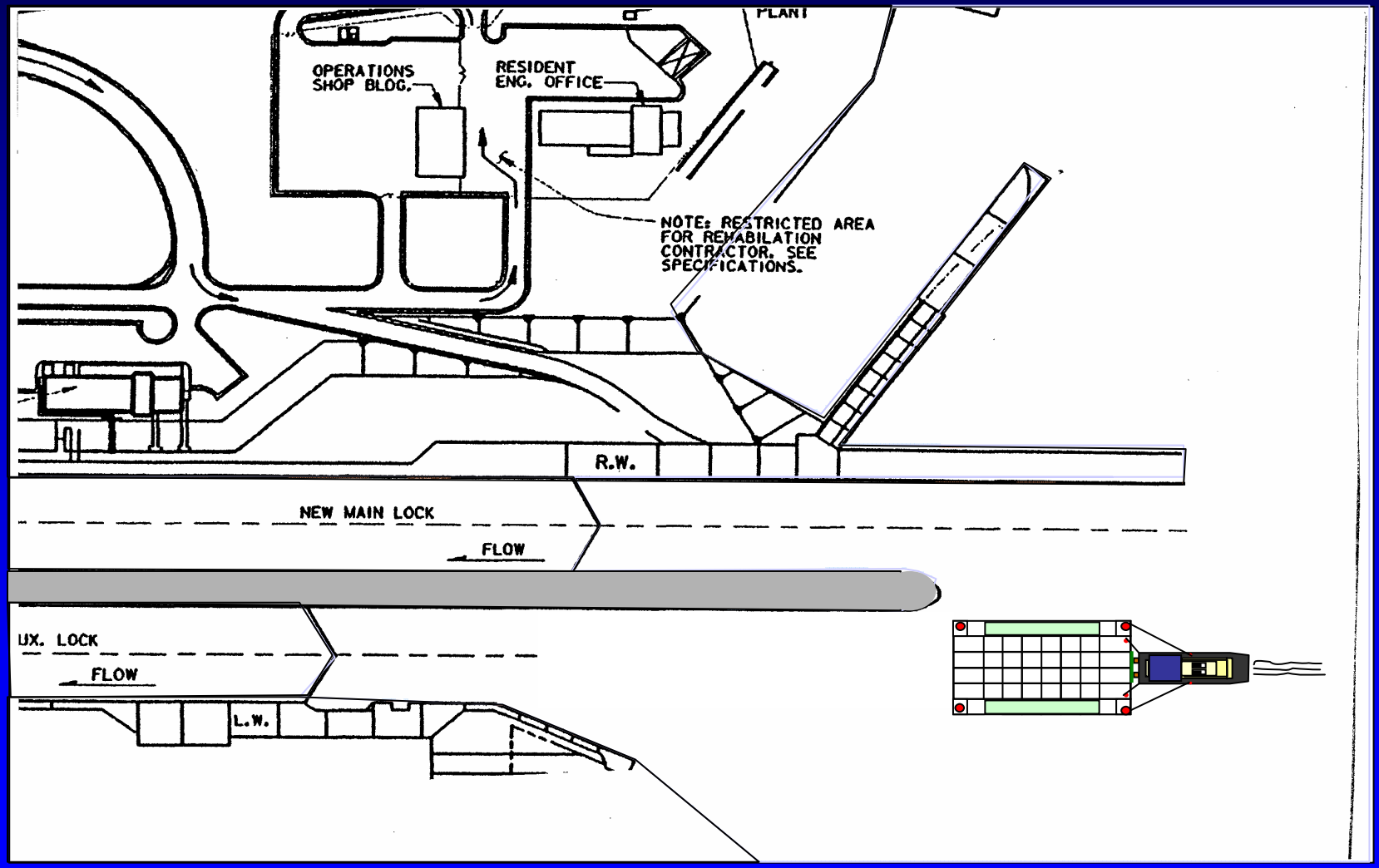
Greenup L&D
Miter Gate Bay



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Greenup L&D
Miter Gate Bay

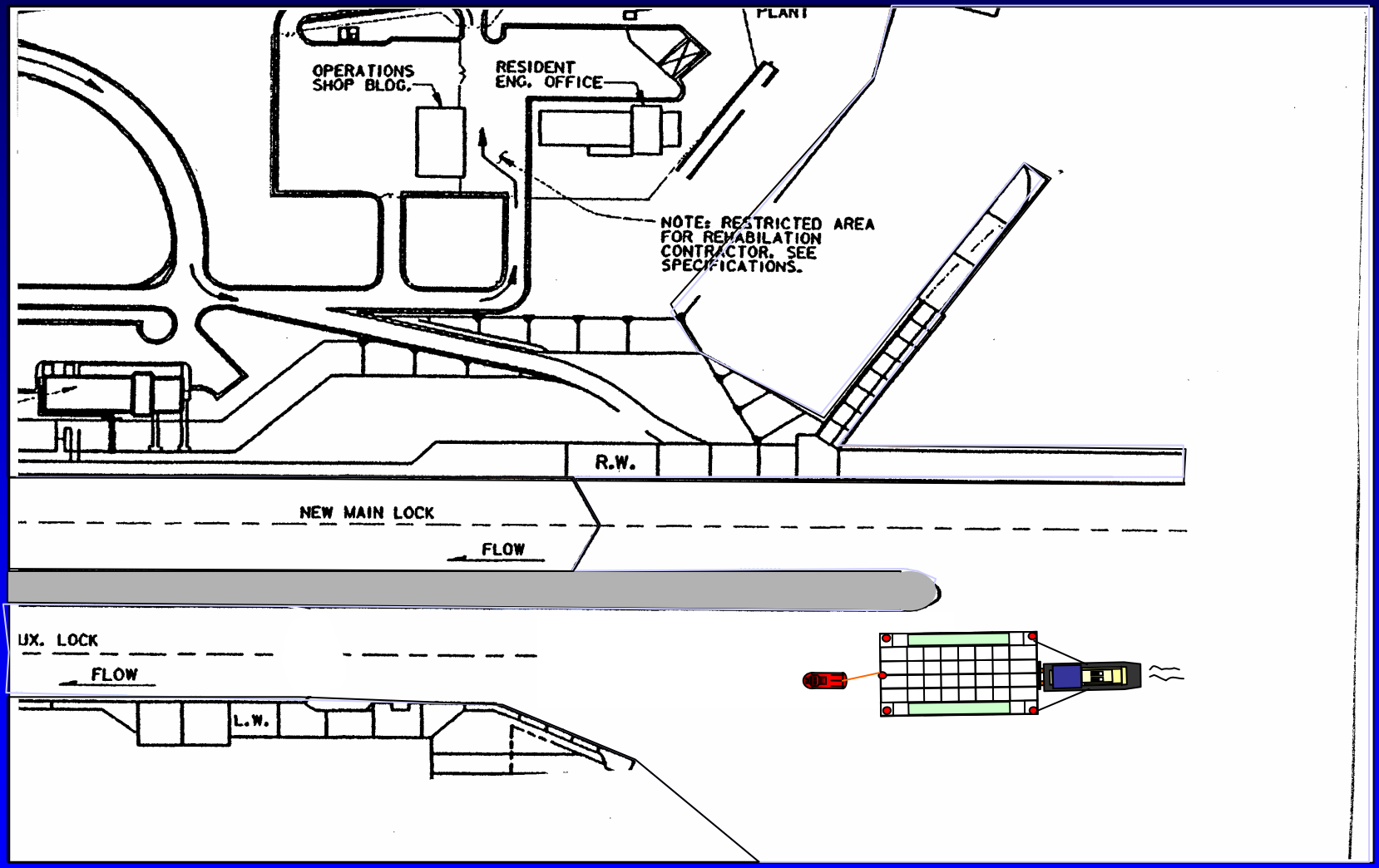


R.C. BYRD LOCKS AND DAM

US Army Corps of Engineers

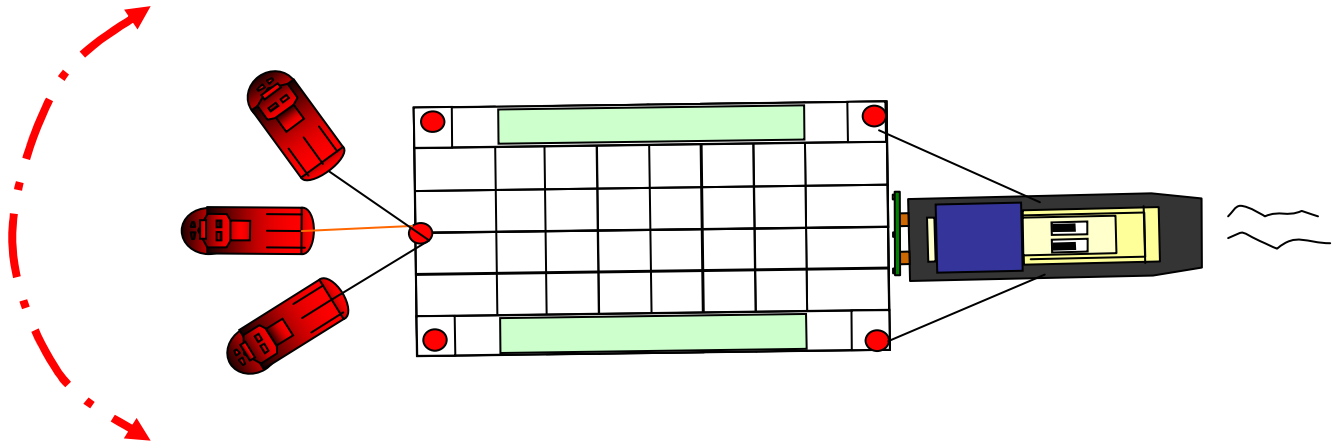
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Greenup L&D
Miter Gate Bay



R.C. BYRD LOCKS AND DAM

Greenup L&D
Miter Gate Bay

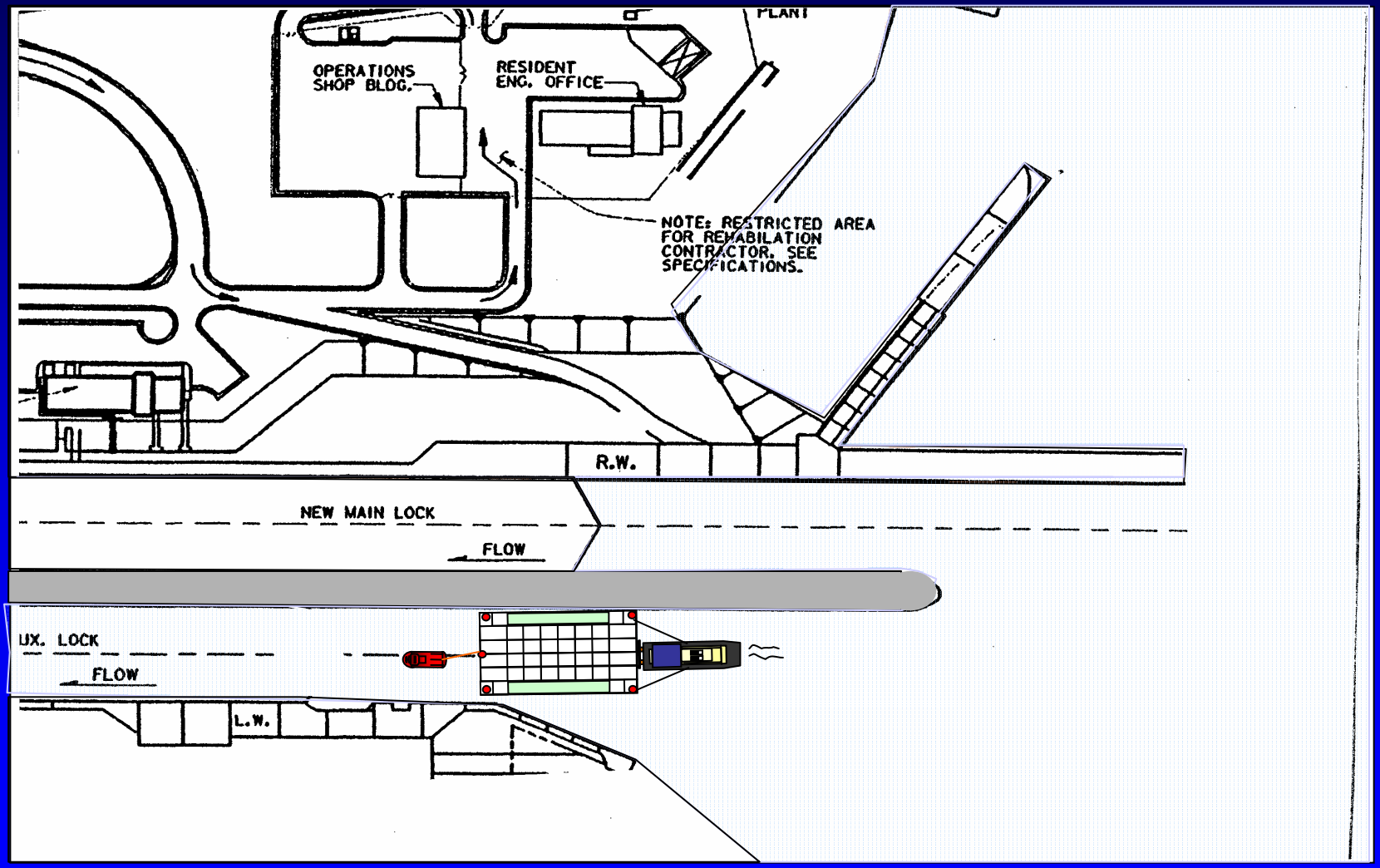


Correction of direction (short lines)

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Greenup L&D
Miter Gate Bay

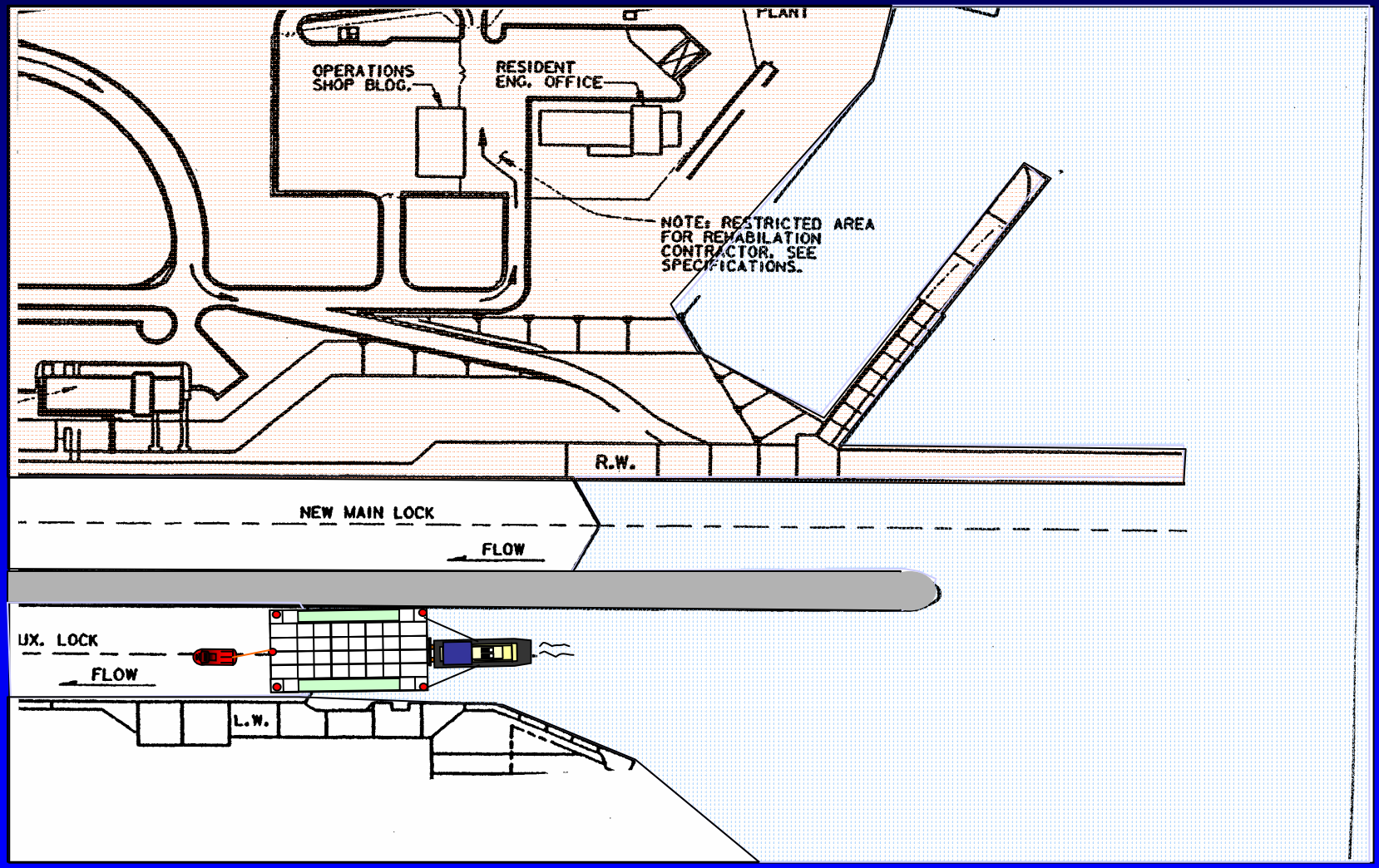


R.C. BYRD LOCKS AND DAM

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

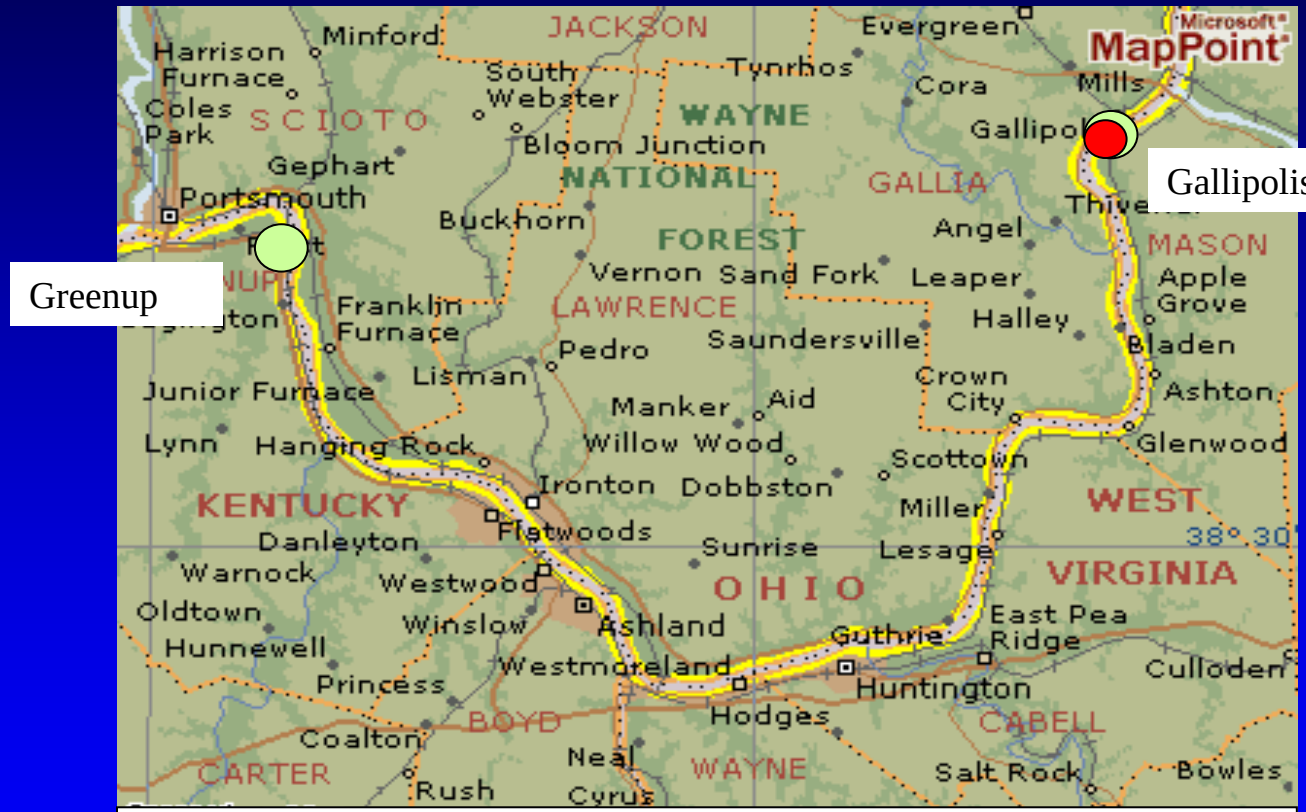


R.C. BYRD LOCKS AND DAM

US Army Corps of Engineers

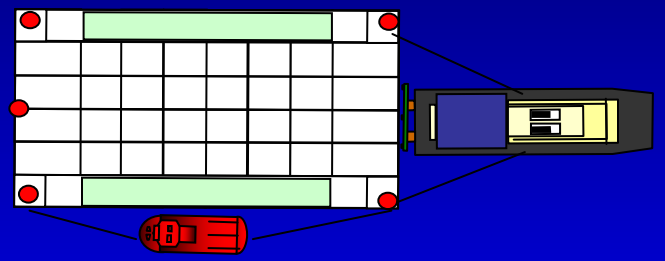
One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay



Greenup

Gallipolis



RIVER TOW

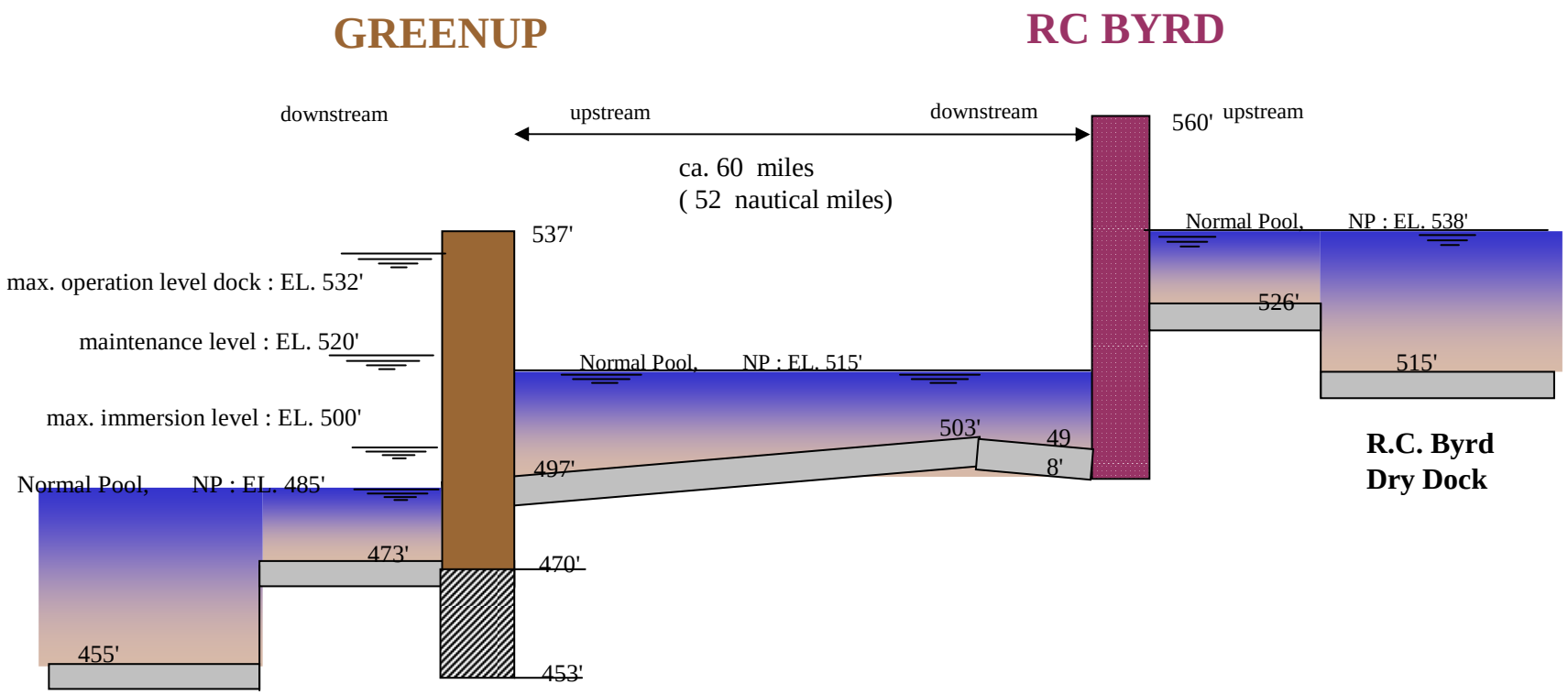
•Distance	60 miles (52 nautical miles)
•Avarage speed	5 to 6 mph
•Duration	12 to 16 hours (schedule 24 hrs)

Ohio River: R.C. Byrd to Greenup

US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

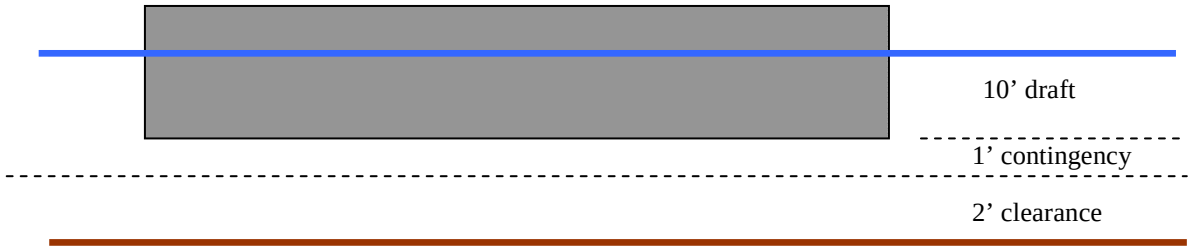


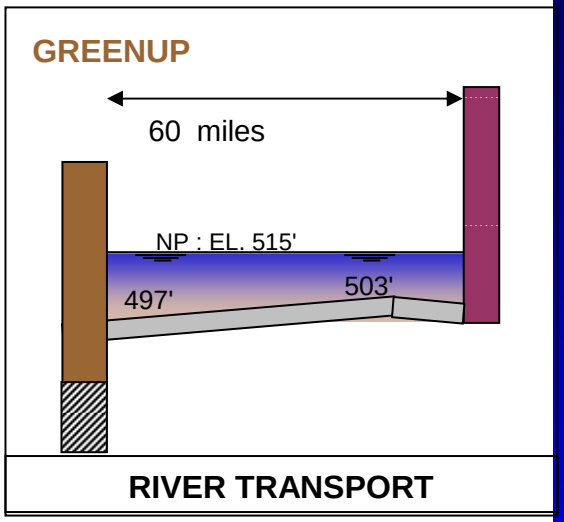
Elevations from R.C. Byrd to Greenup

US Army Corps of Engineers

One Corps Serving the Army and the Nation

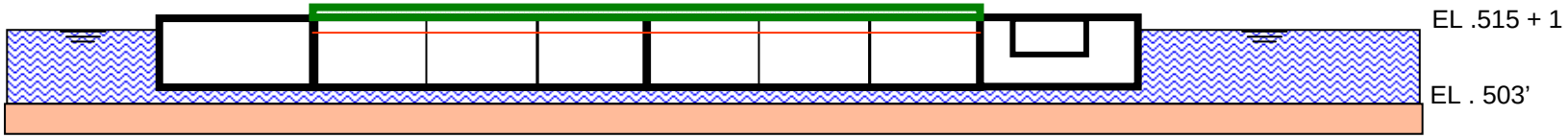
Greenup L&D
Miter Gate Bay





Dredge 1ft

or tow at normal pool +1ft



DRAFT	**10.0 ft**
FREEBOARD	**6.0 ft**
KEELCLEARANCE	**3.0 ft**

Phase 2: River Transport

US Army Corps
of Engineers

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Greenup L&D
Miter Gate Bay

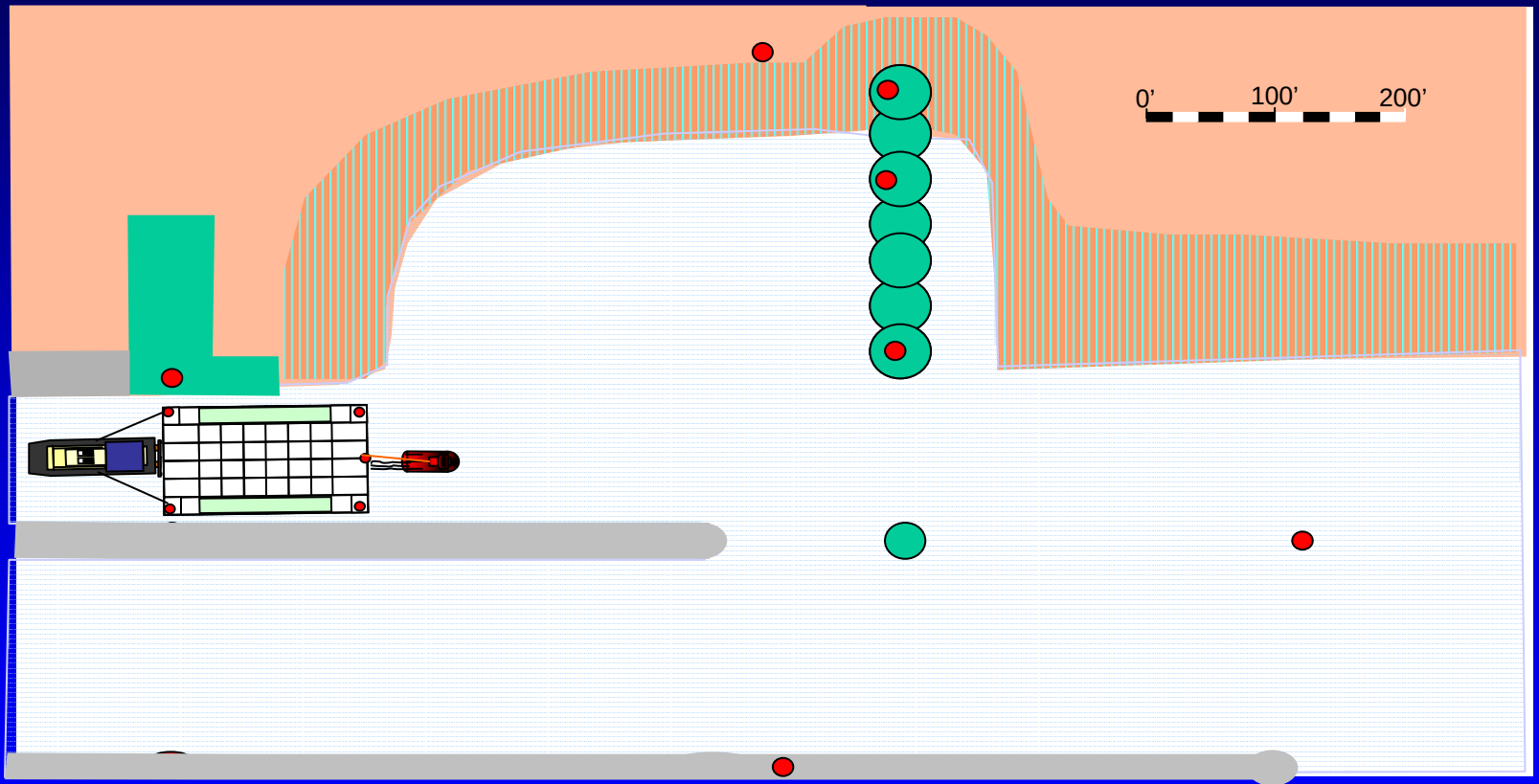


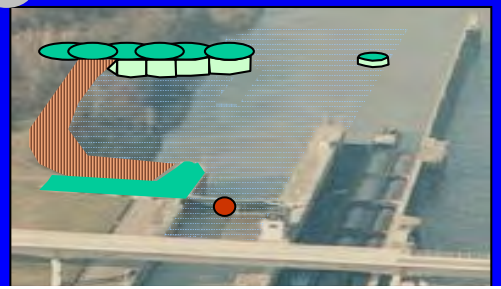
Cofferdam & Nose Cell Constructed

US Army Corps
of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

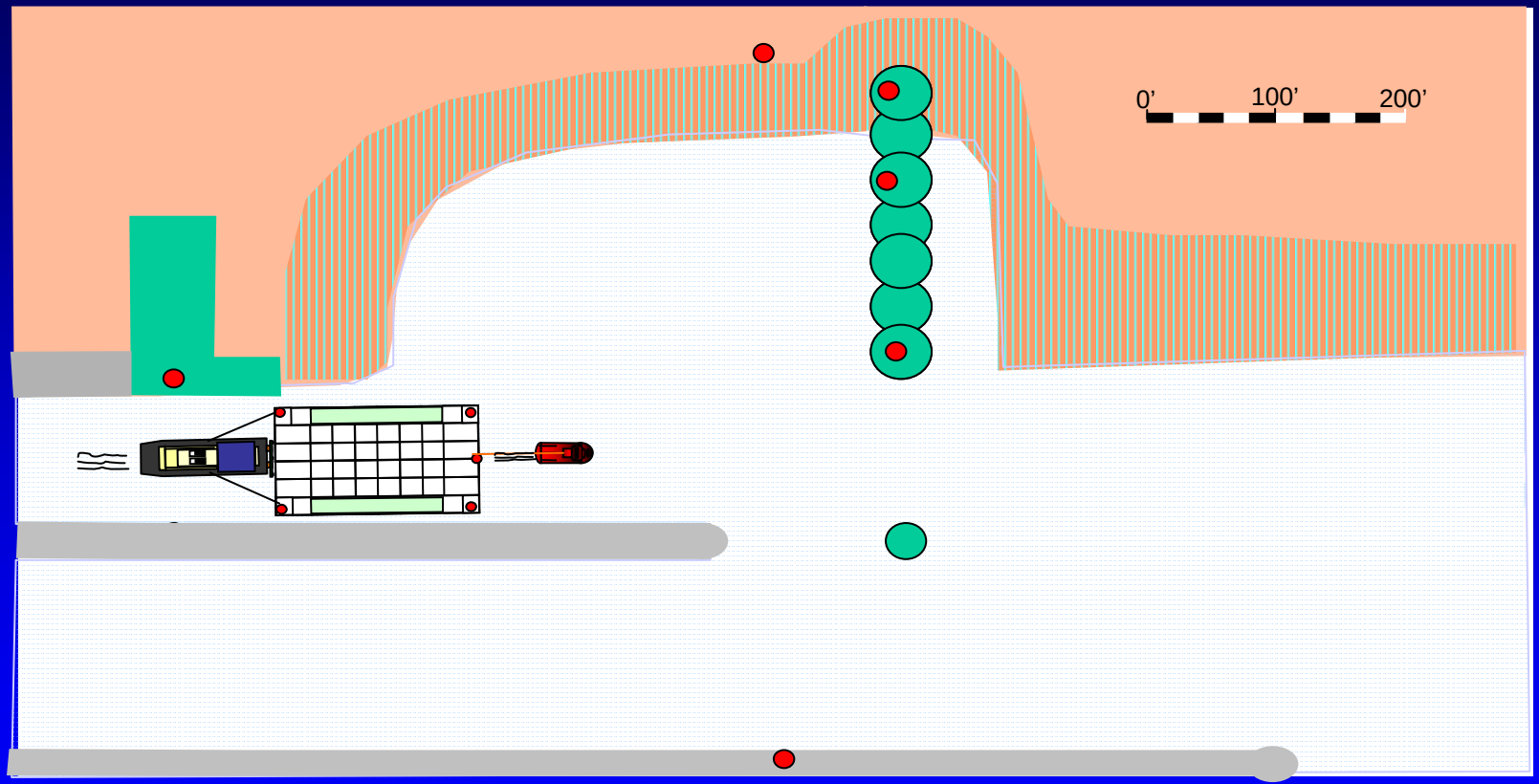




US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

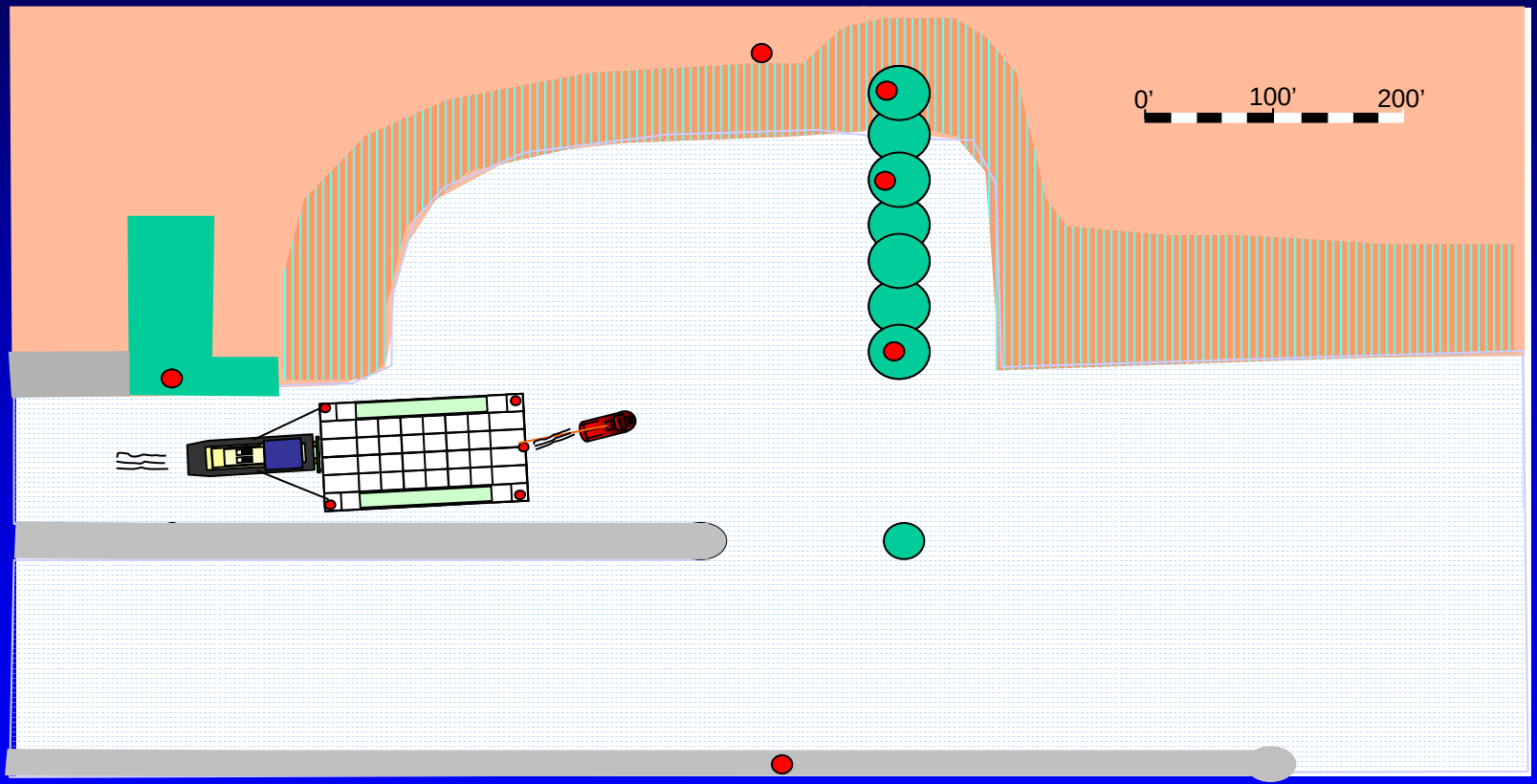




US Army Corps
of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

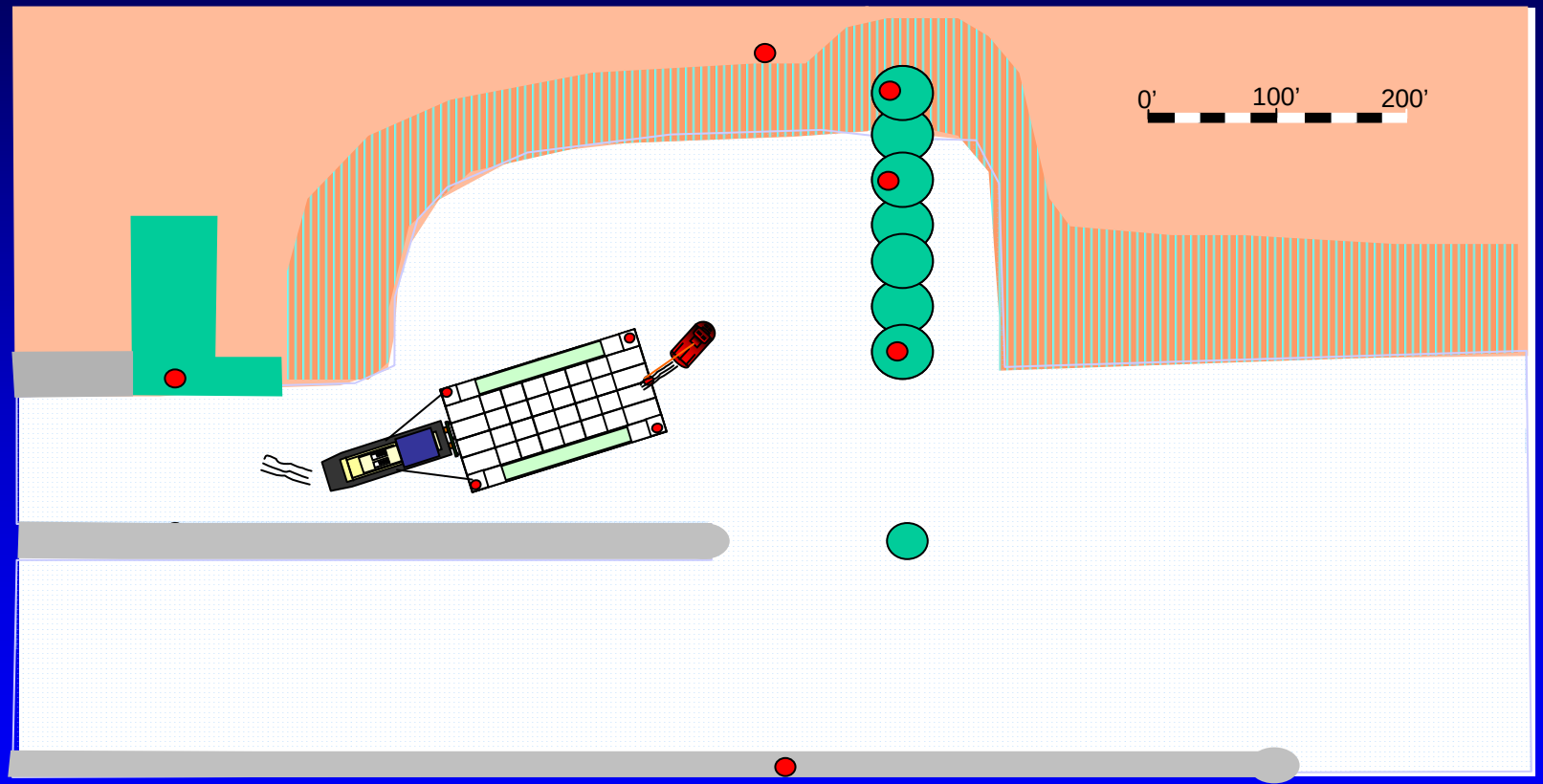




US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

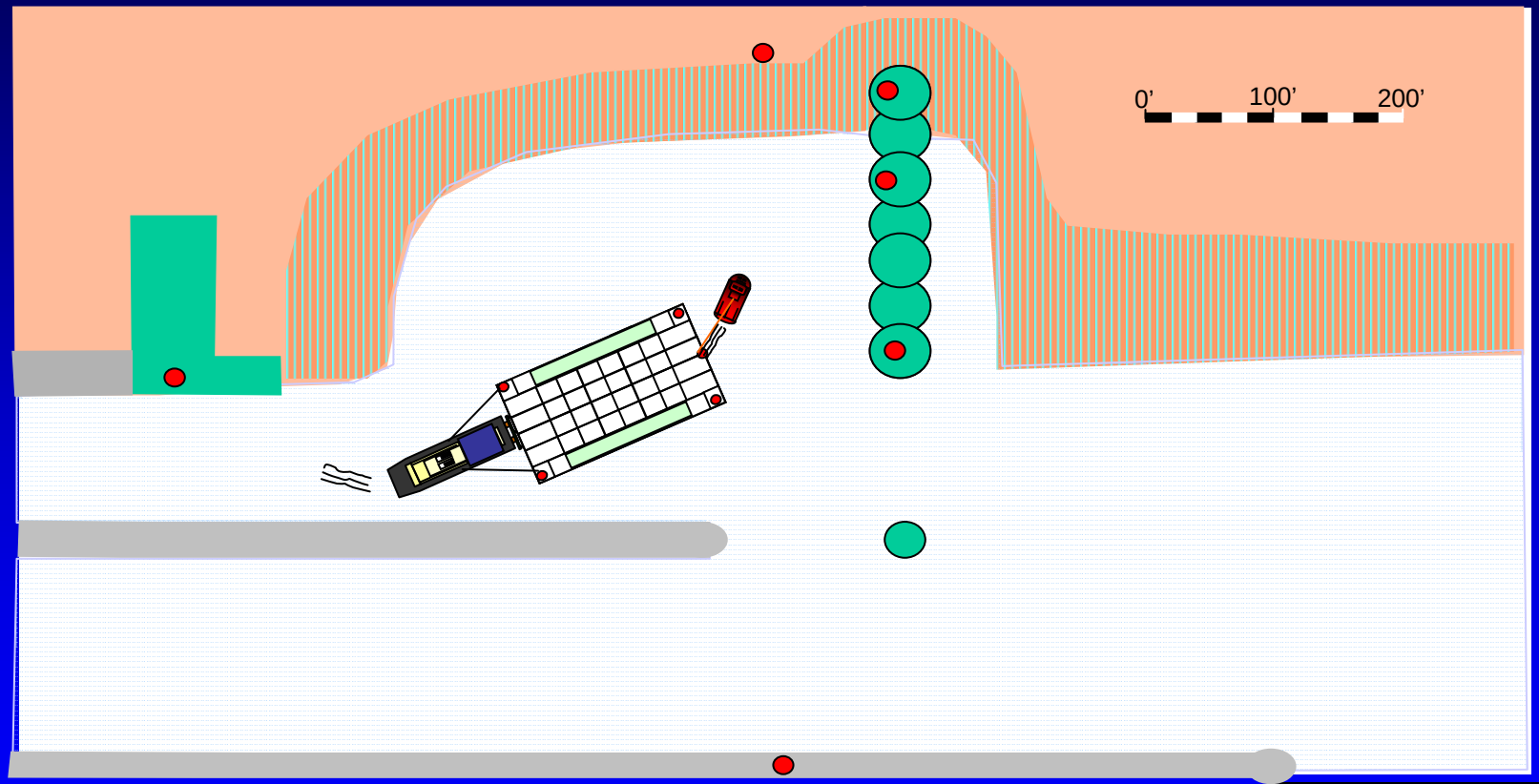


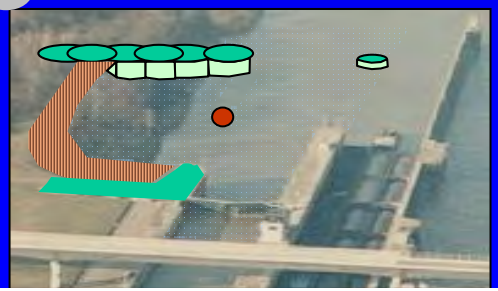


US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

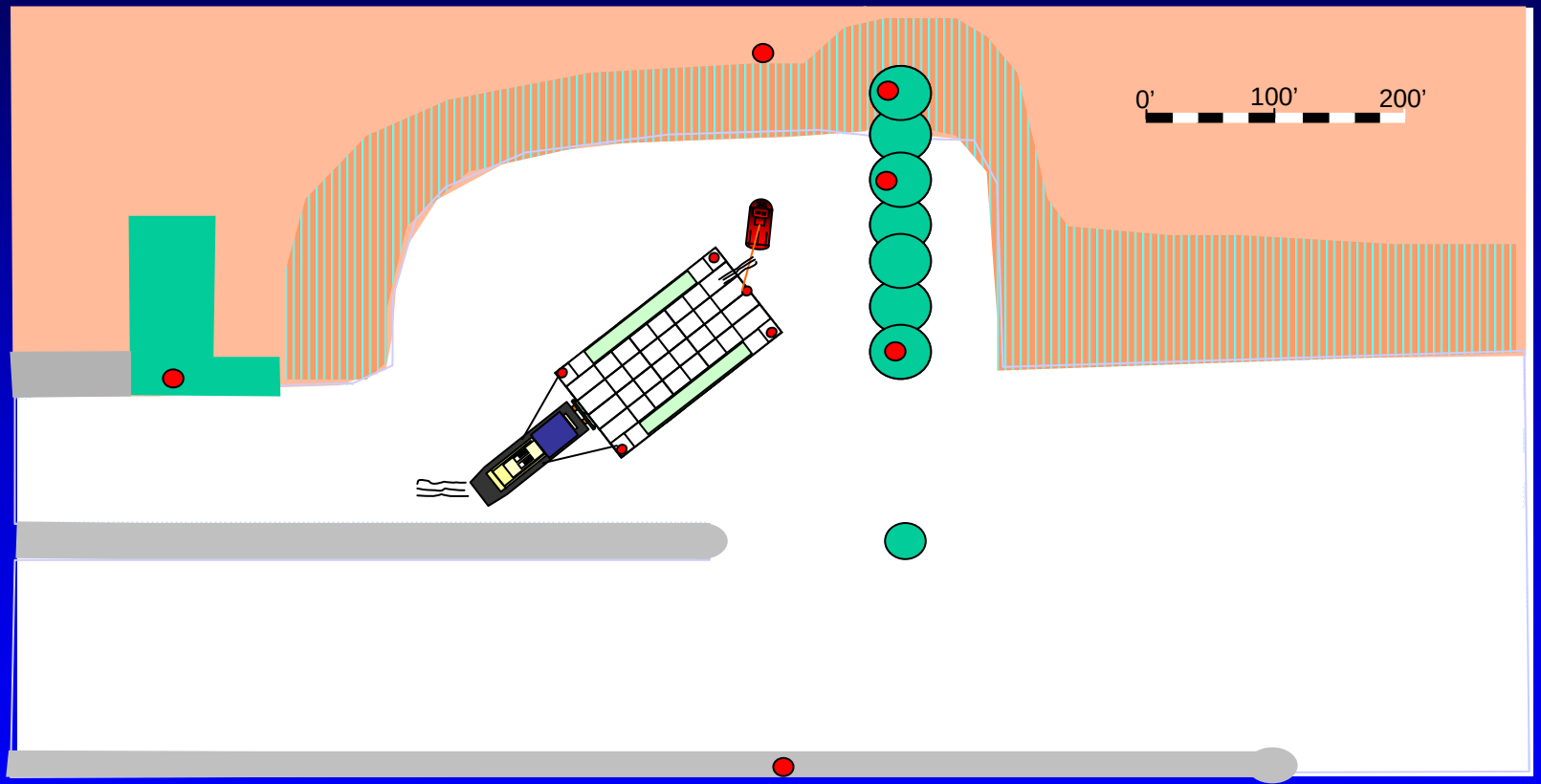




US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

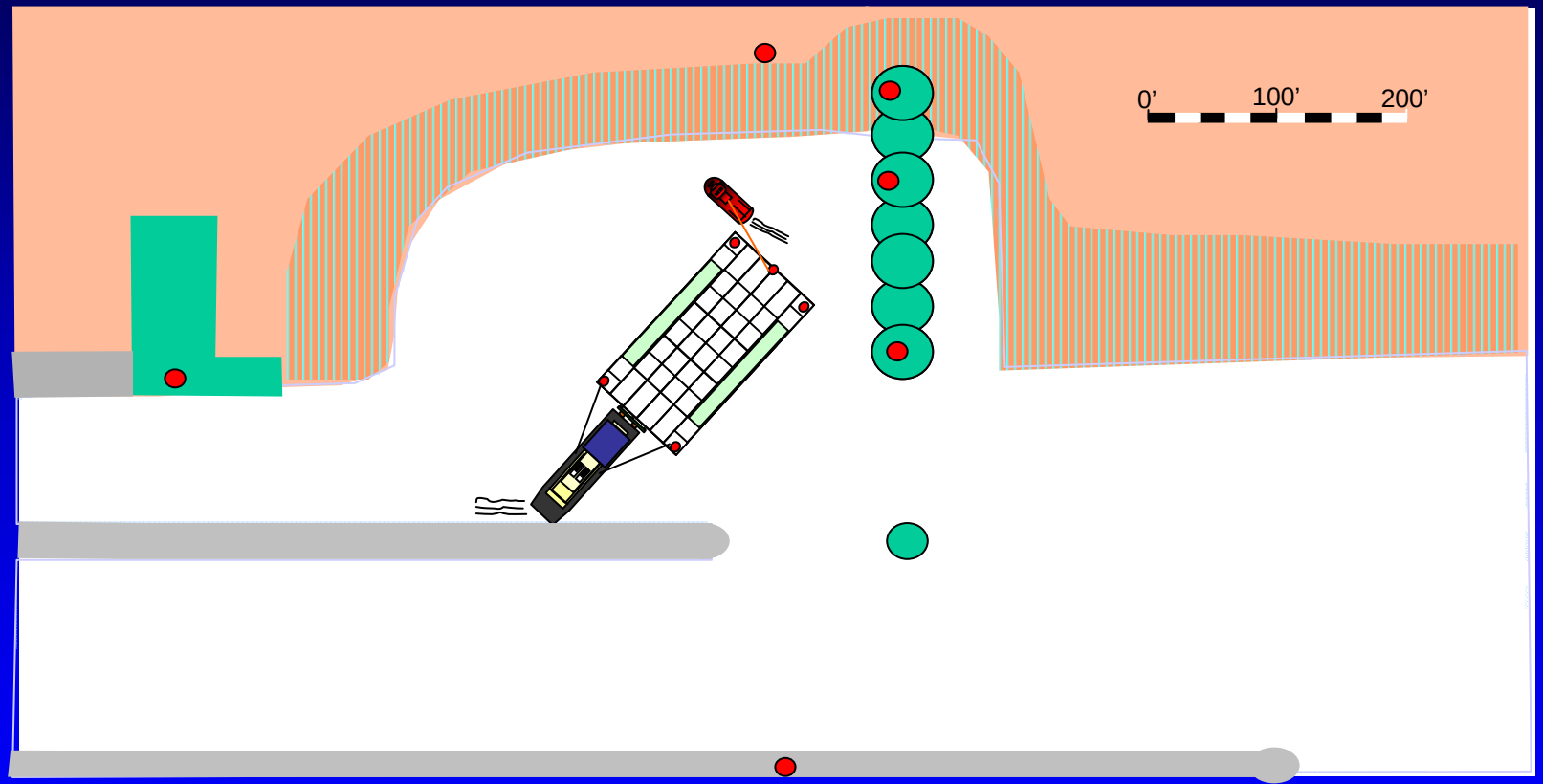


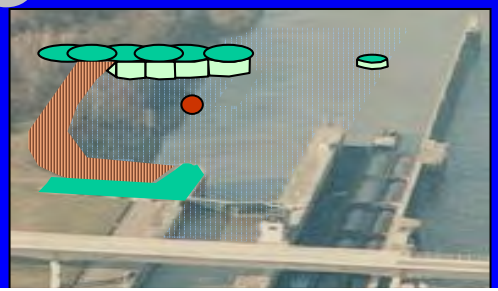


US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

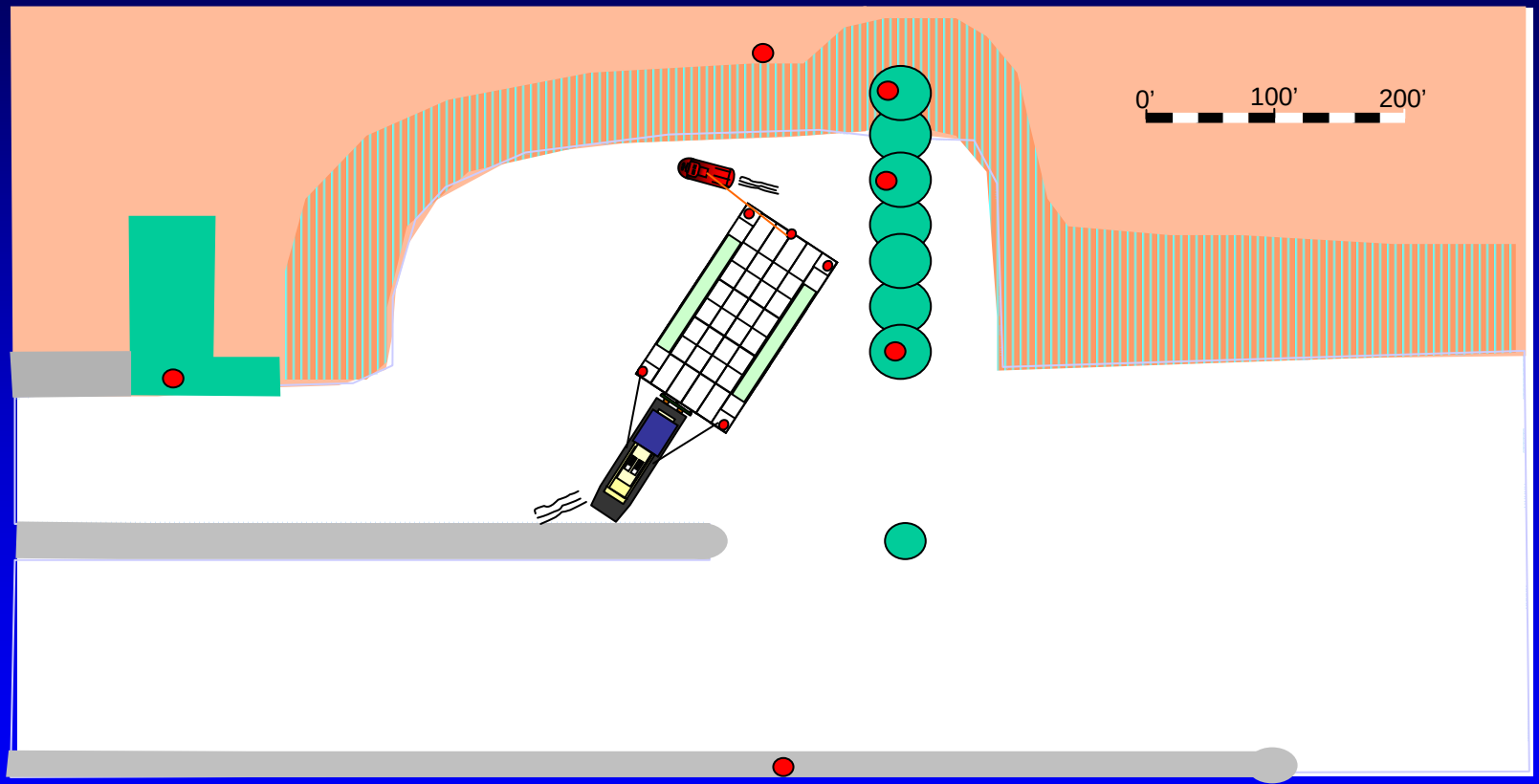




US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

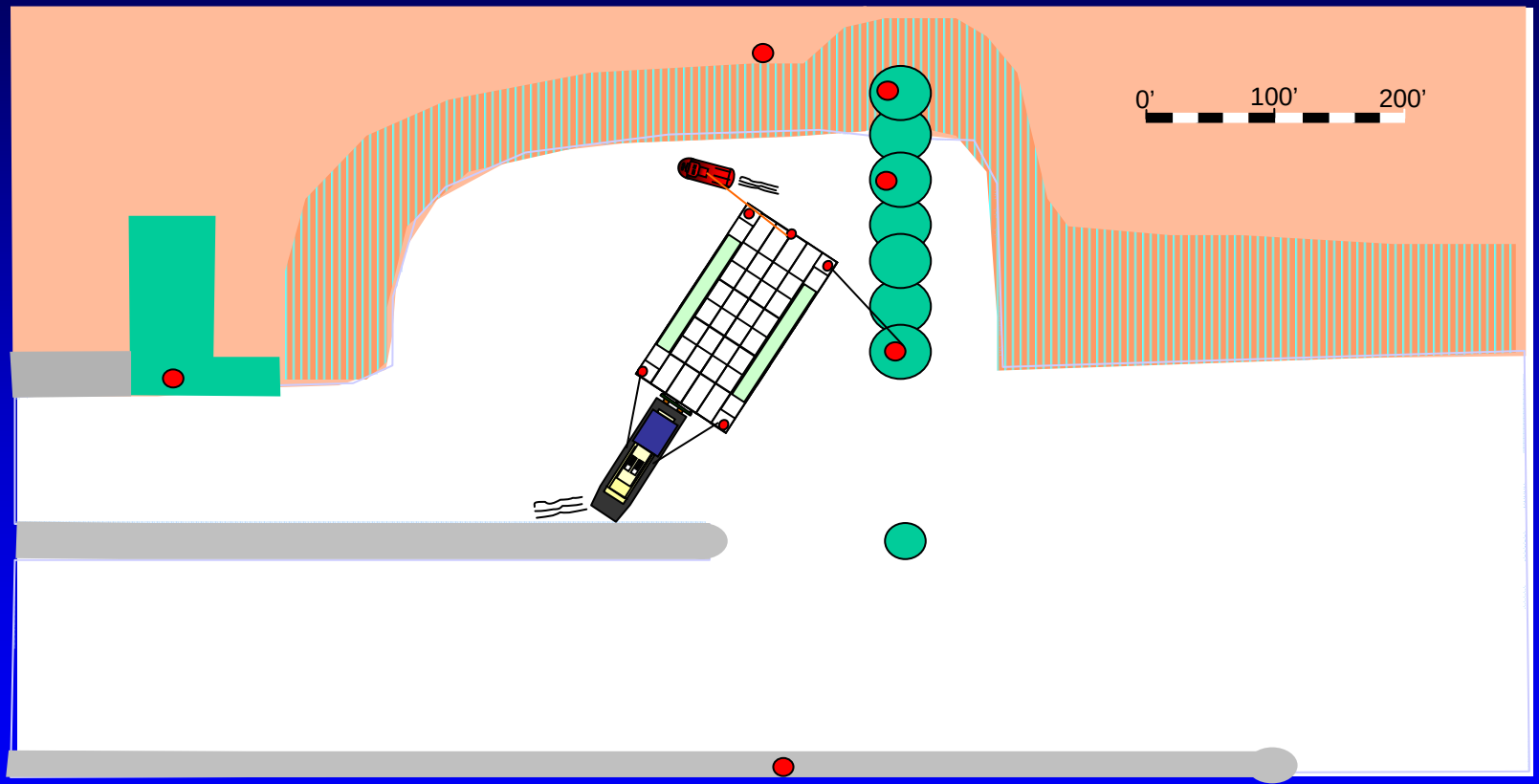


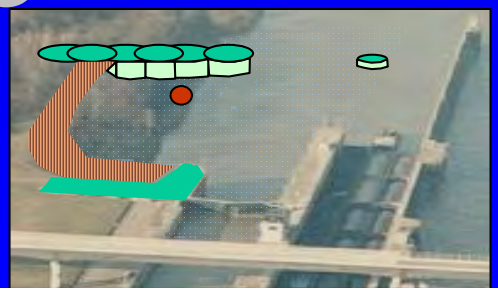


US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

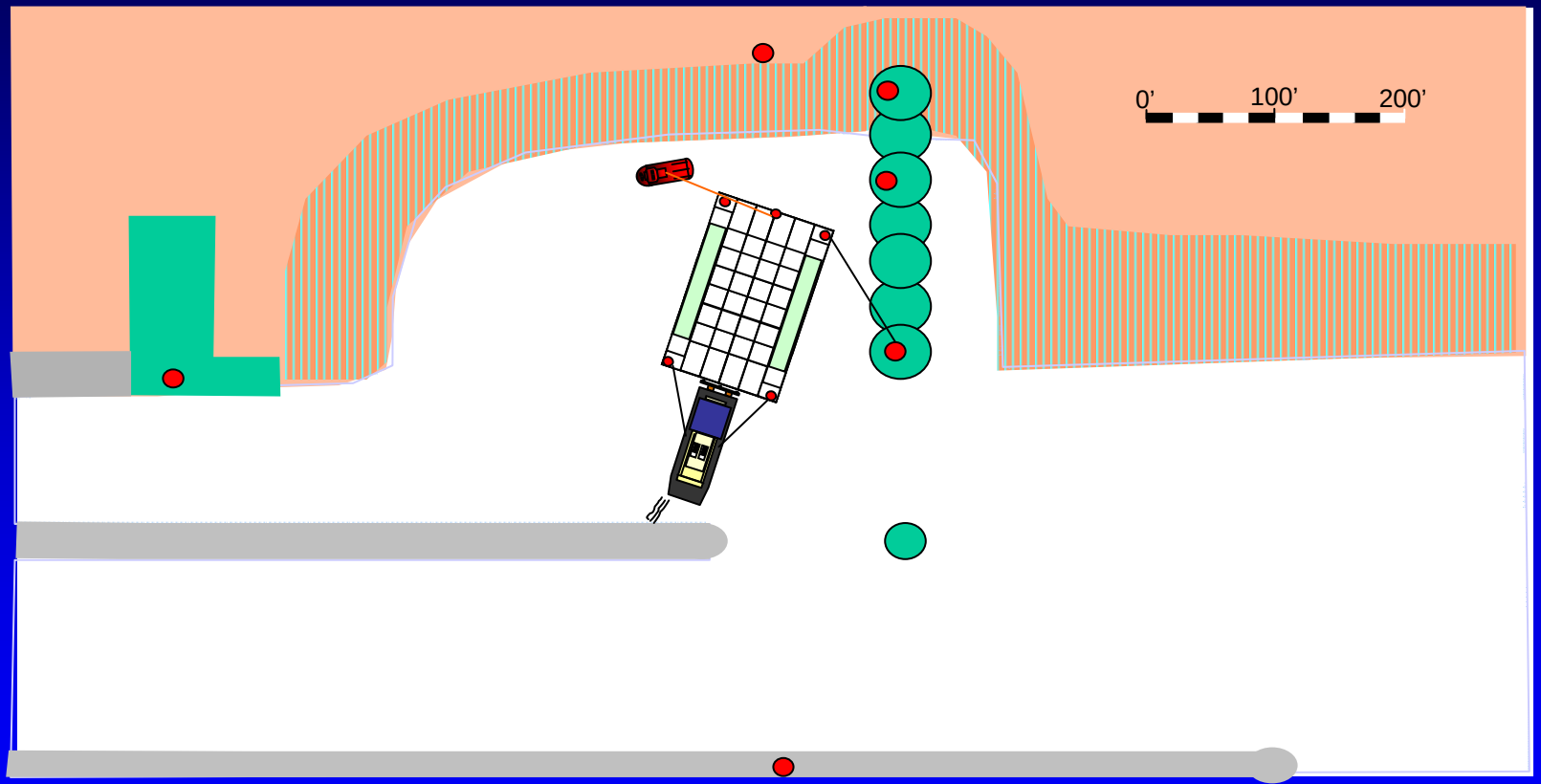




US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

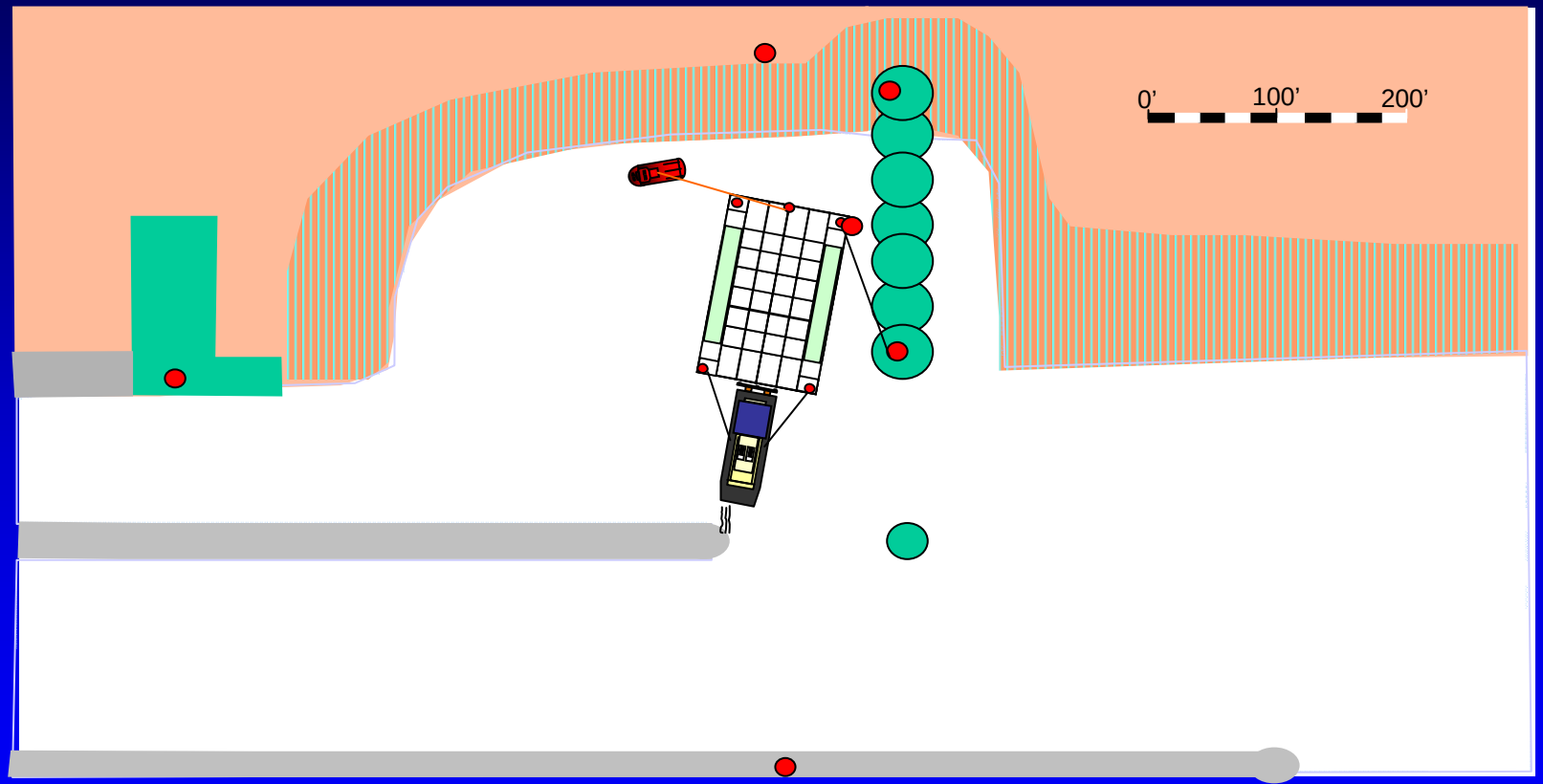


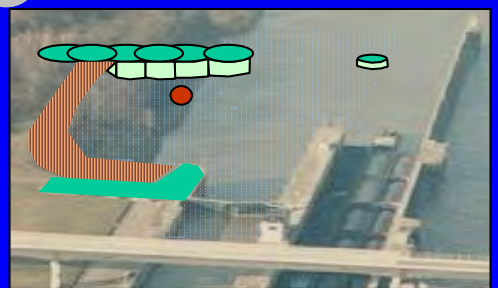


US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

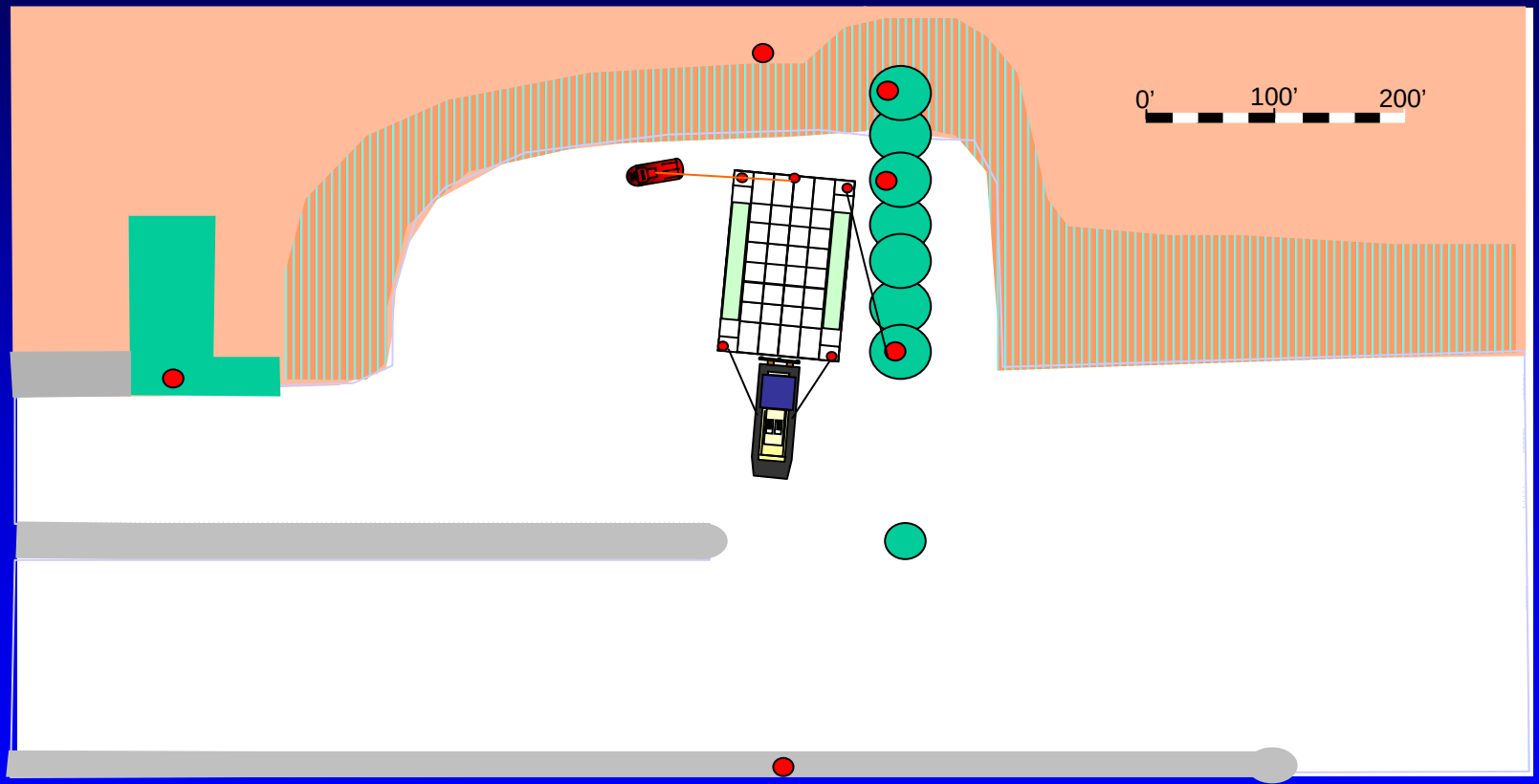




US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

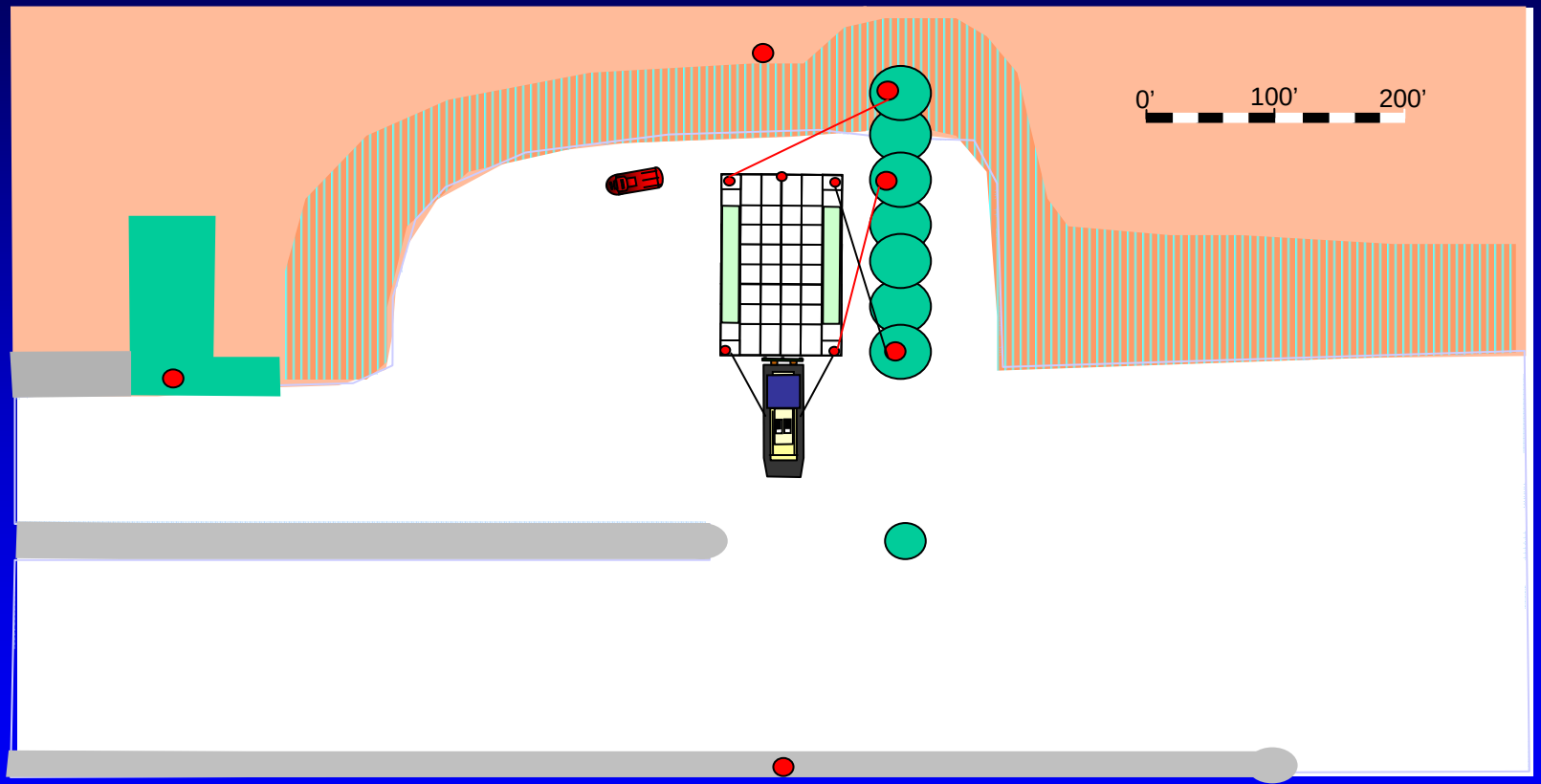




US Army Corps of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

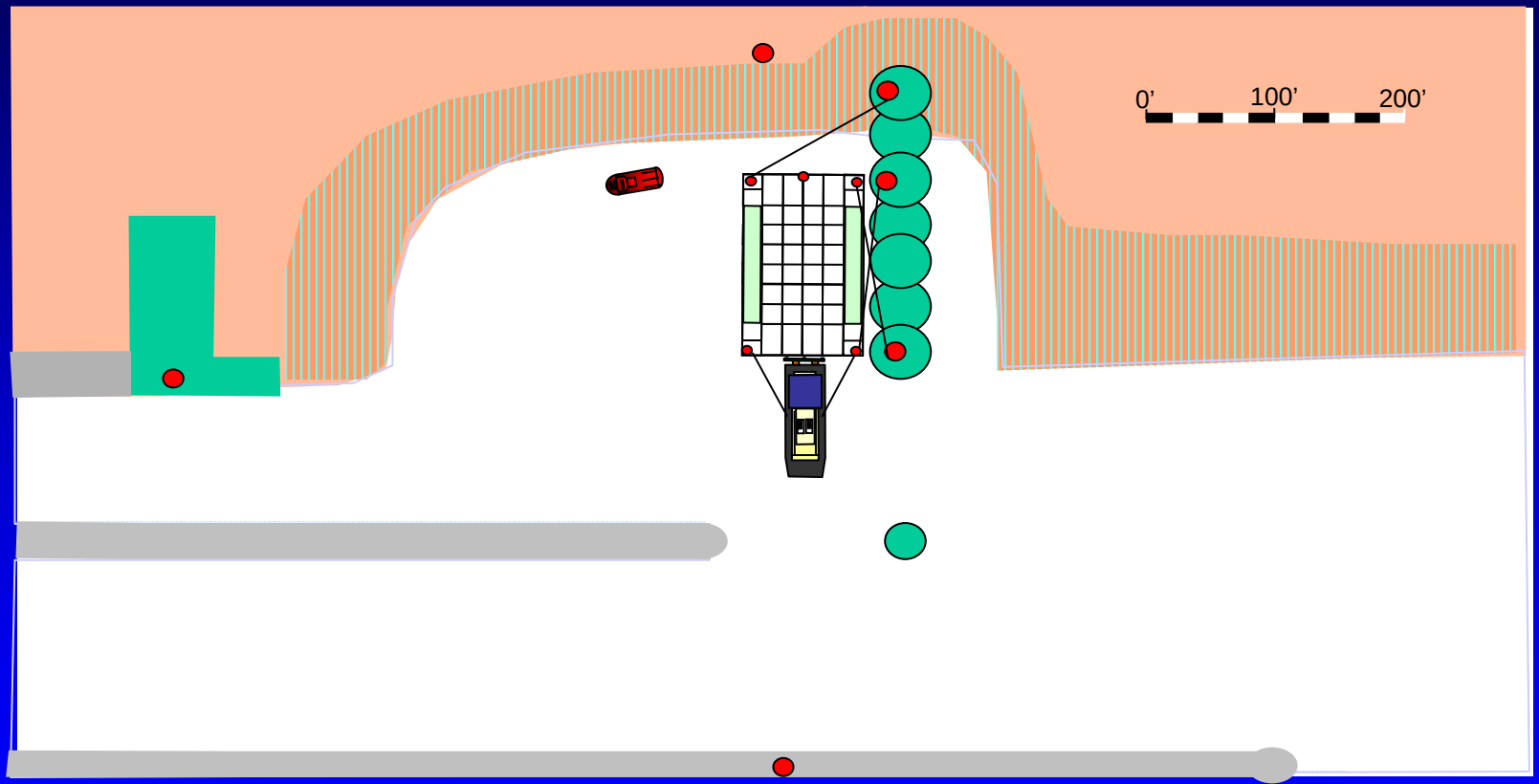




US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

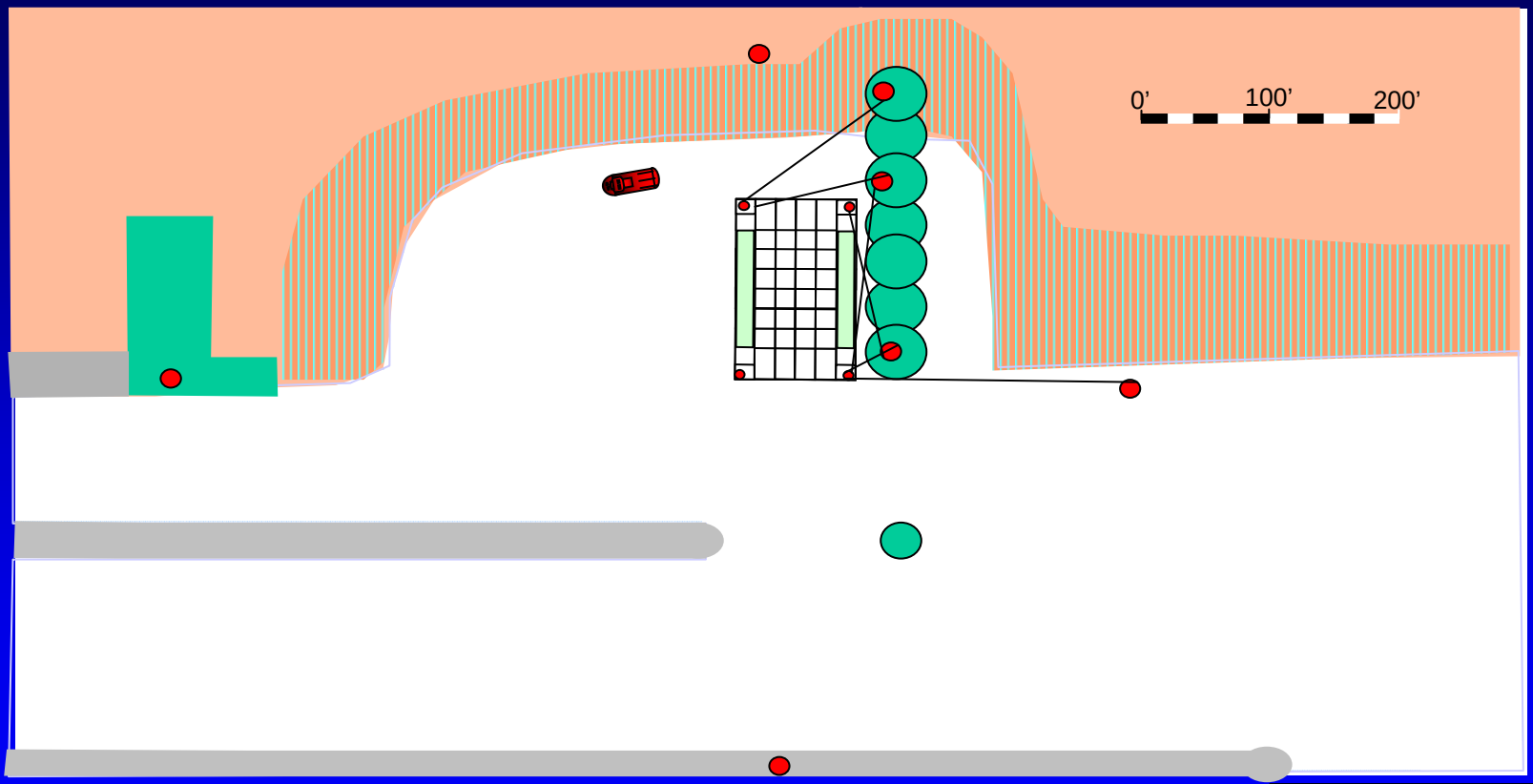




US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

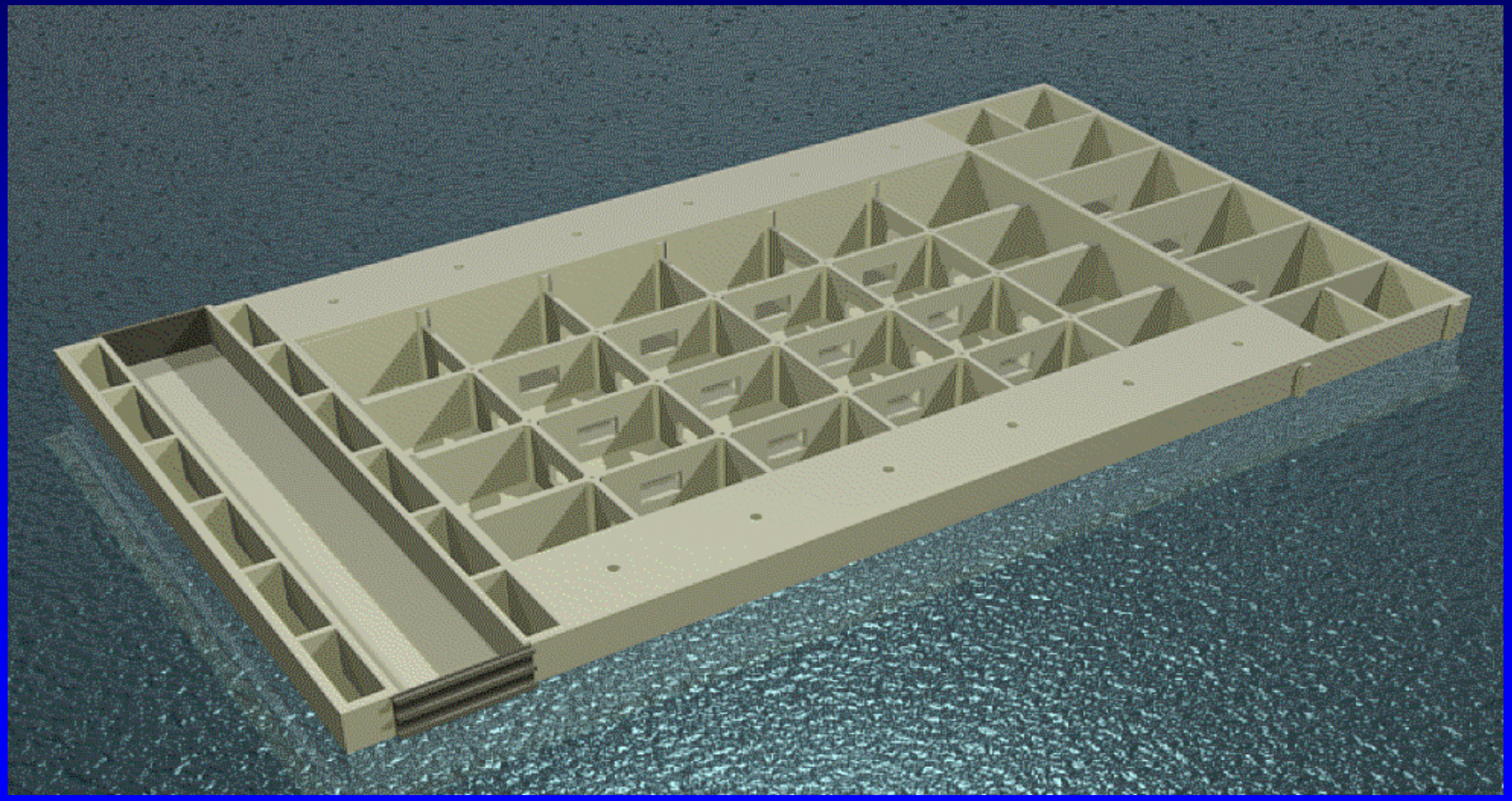




US Army Corps
of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

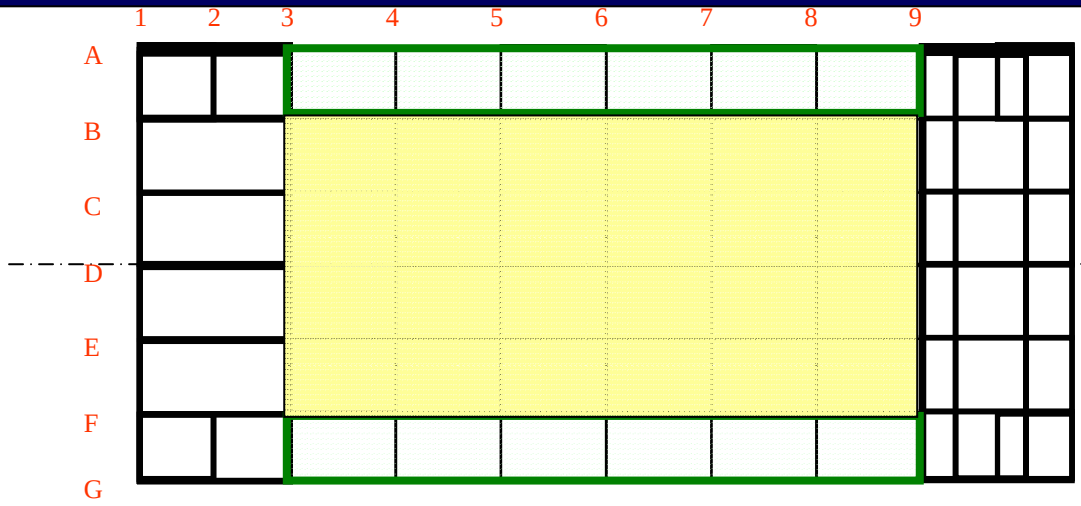


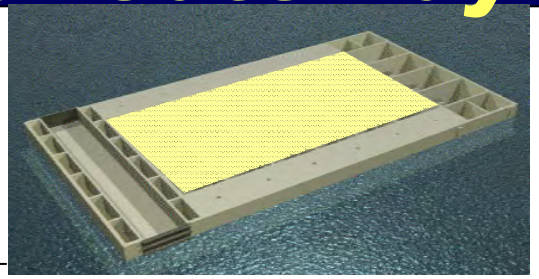
Phase 3: Arrival at floating construction site

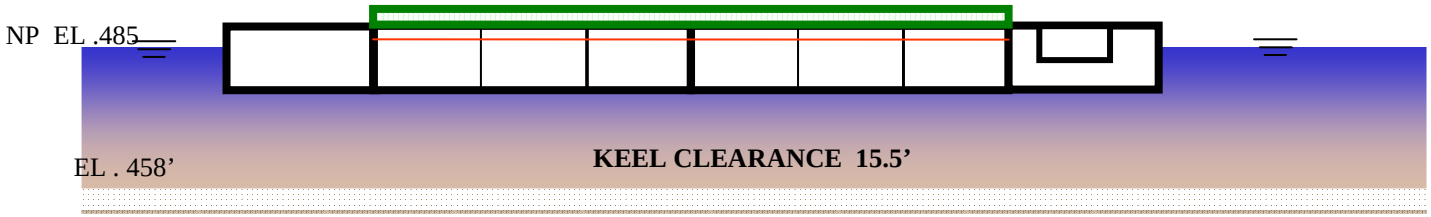
US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay







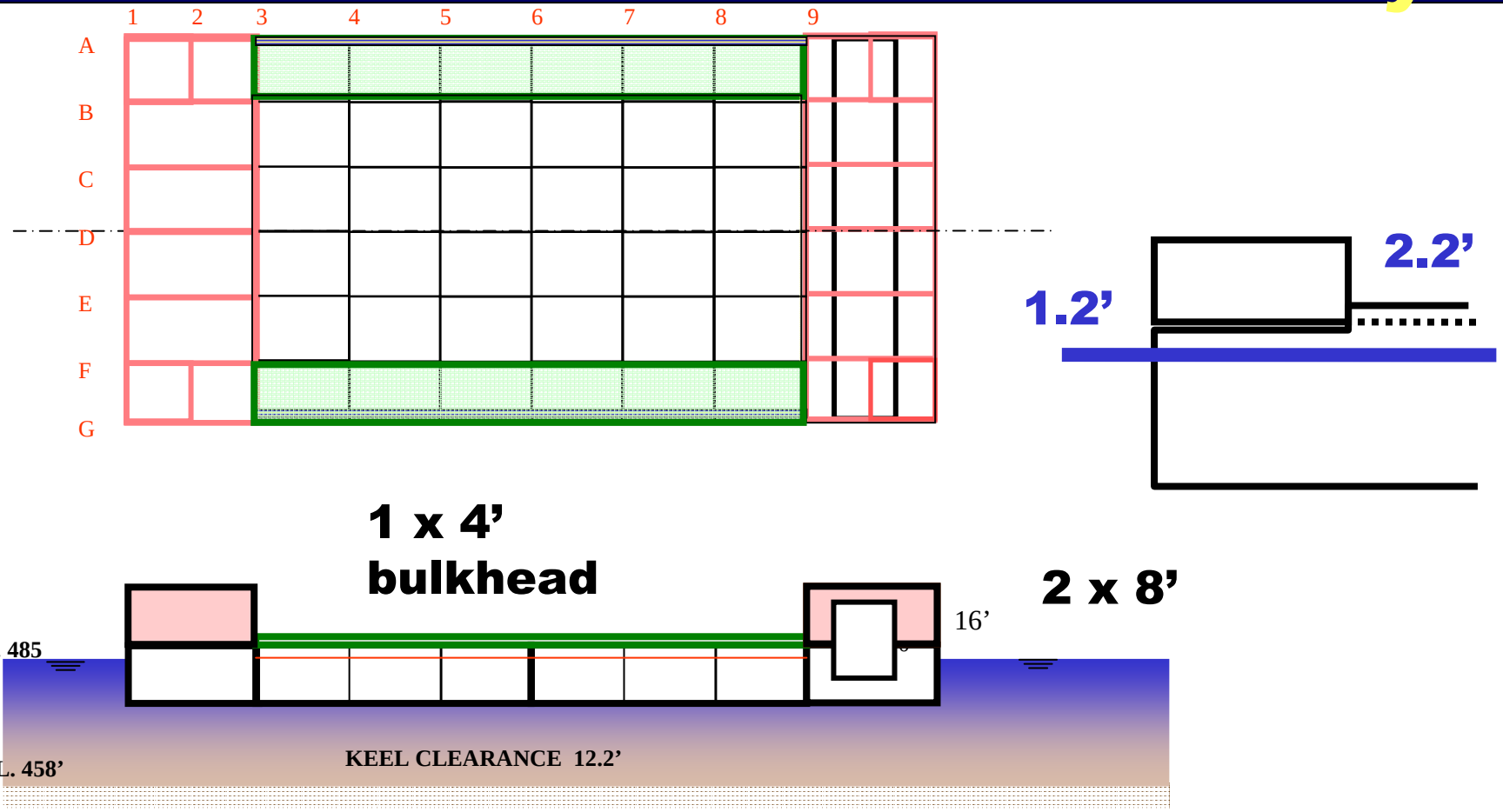
Phase 3A:
CONSTRUCTION deck BF_39

DRAFT	**11.5 ft**
FREEBOARD	**5.5 ft**
KEEL CLEARANCE	**15.5ft**

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay



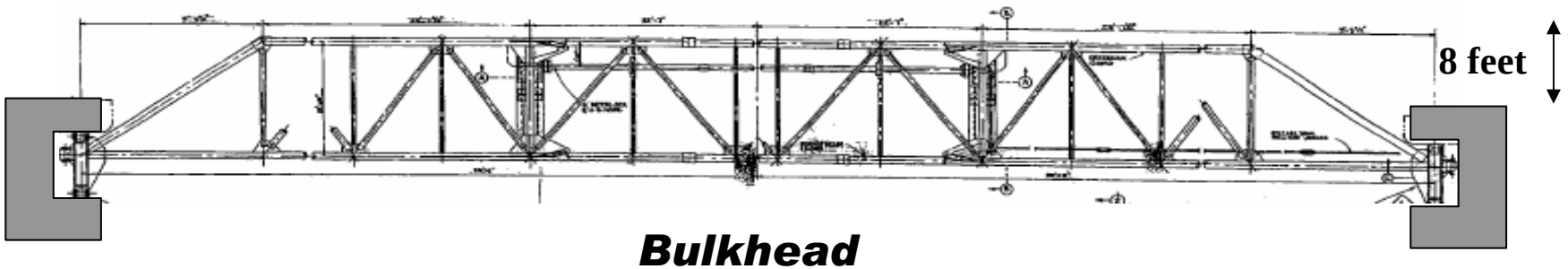
Phase 3B: SHAFTS, height 0-16 ft

DRAFT	**14.8 ft**
FREEBOARD	**2.2 ft**
KEEL CLEARANCE	**12.2ft**

US Army Corps of Engineers

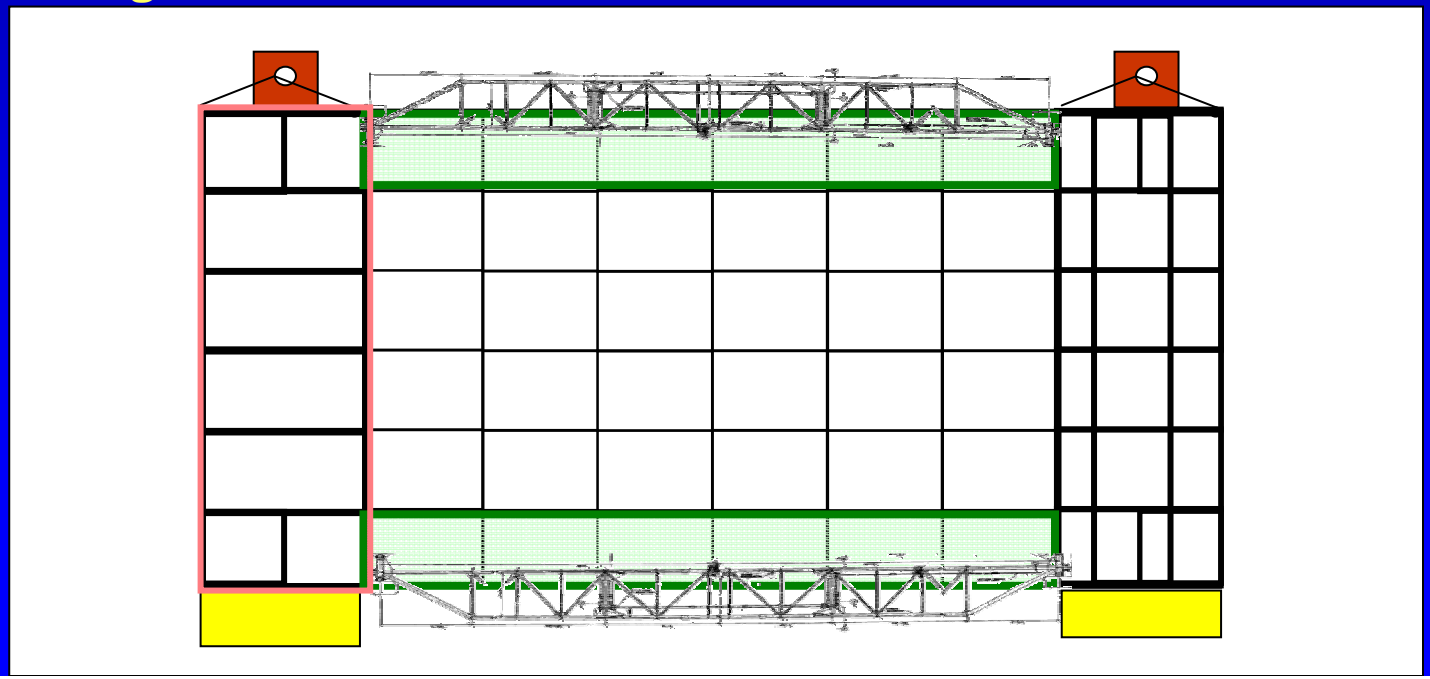
One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay



Bulkhead

Protective Barge



Spacer pontoons

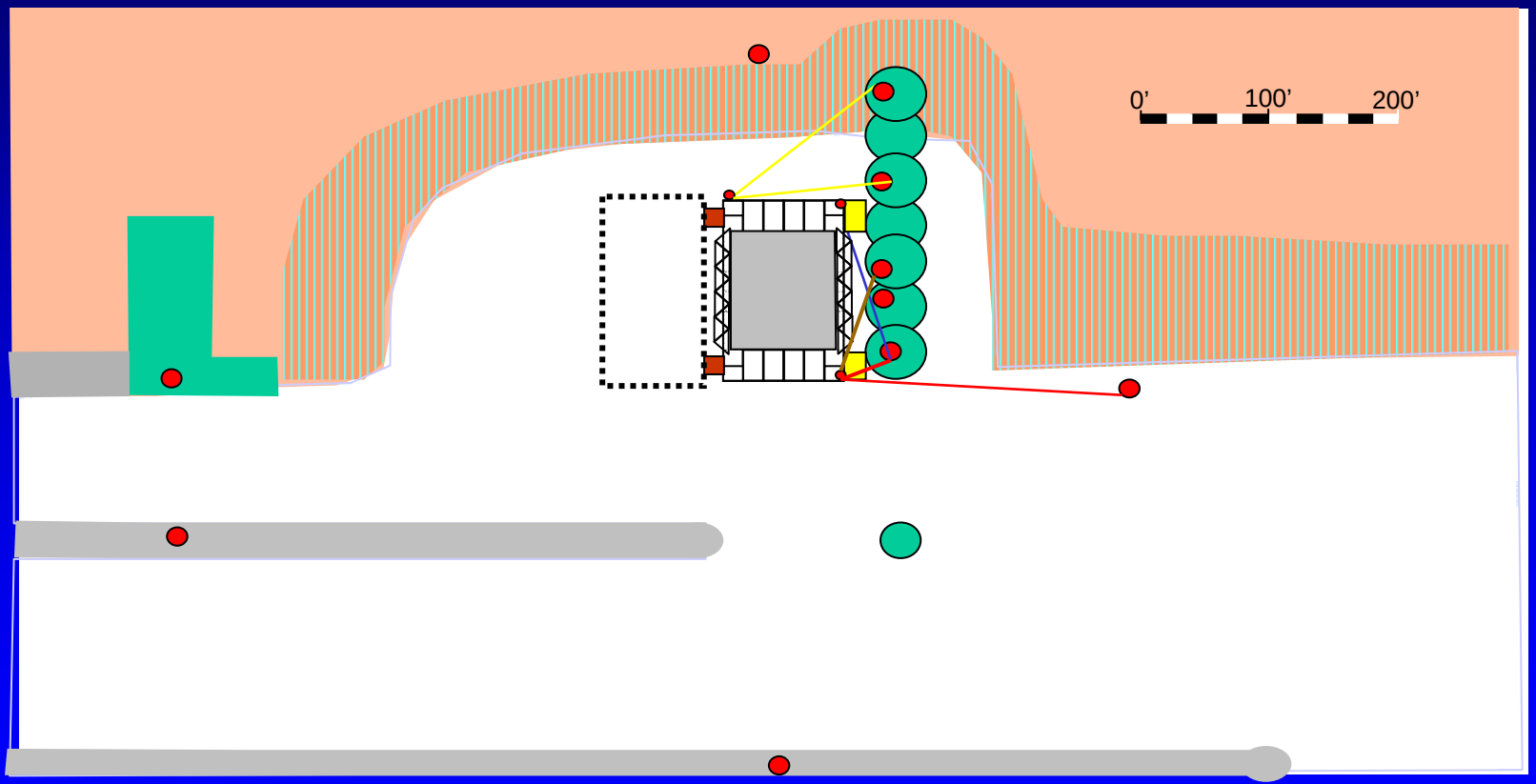
Cofferdam

Pontoons 40'x 8'x 8'

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

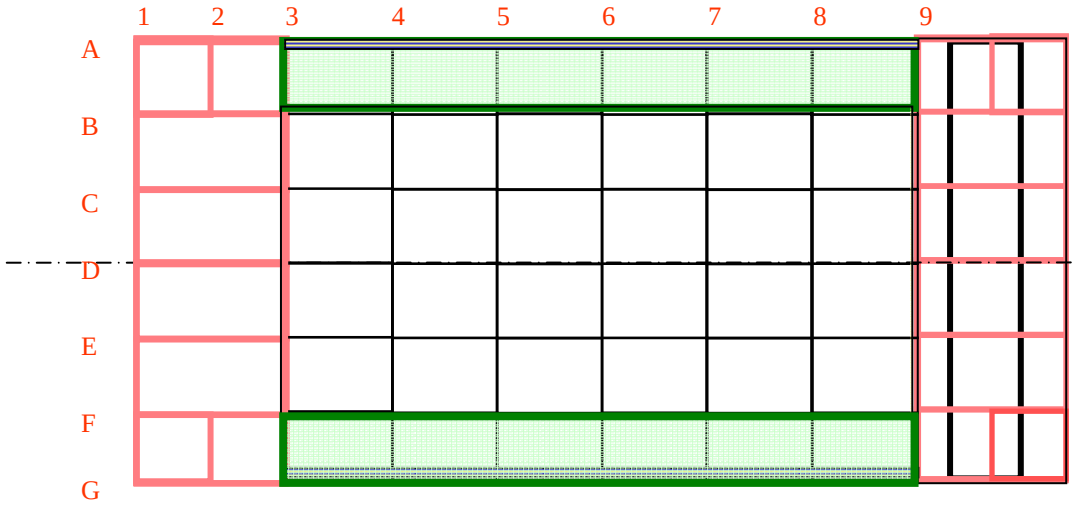


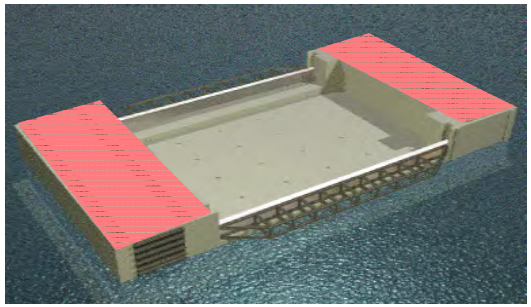
Mooring Configuration During Floating Construction

US Army Corps of Engineers

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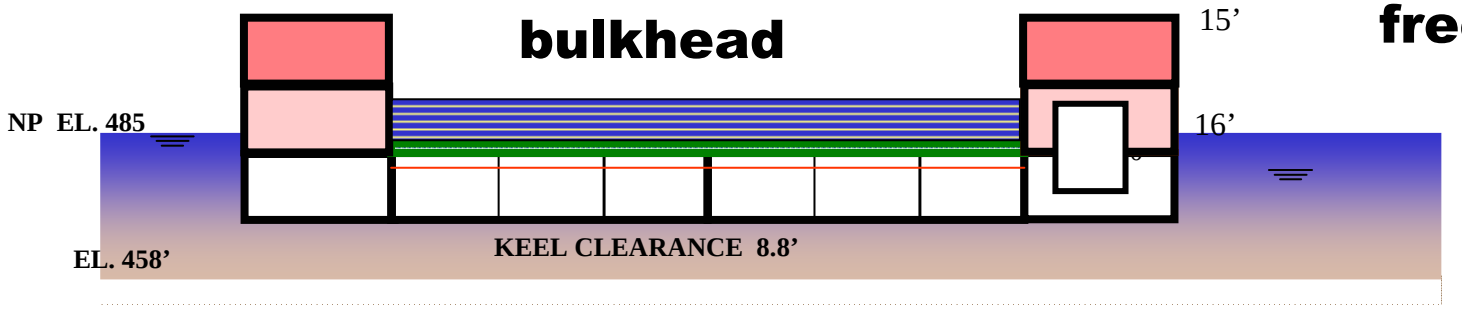
Greenup L&D
Miter Gate Bay





3 x 4’ bulkhead

10.8 ft freeboard



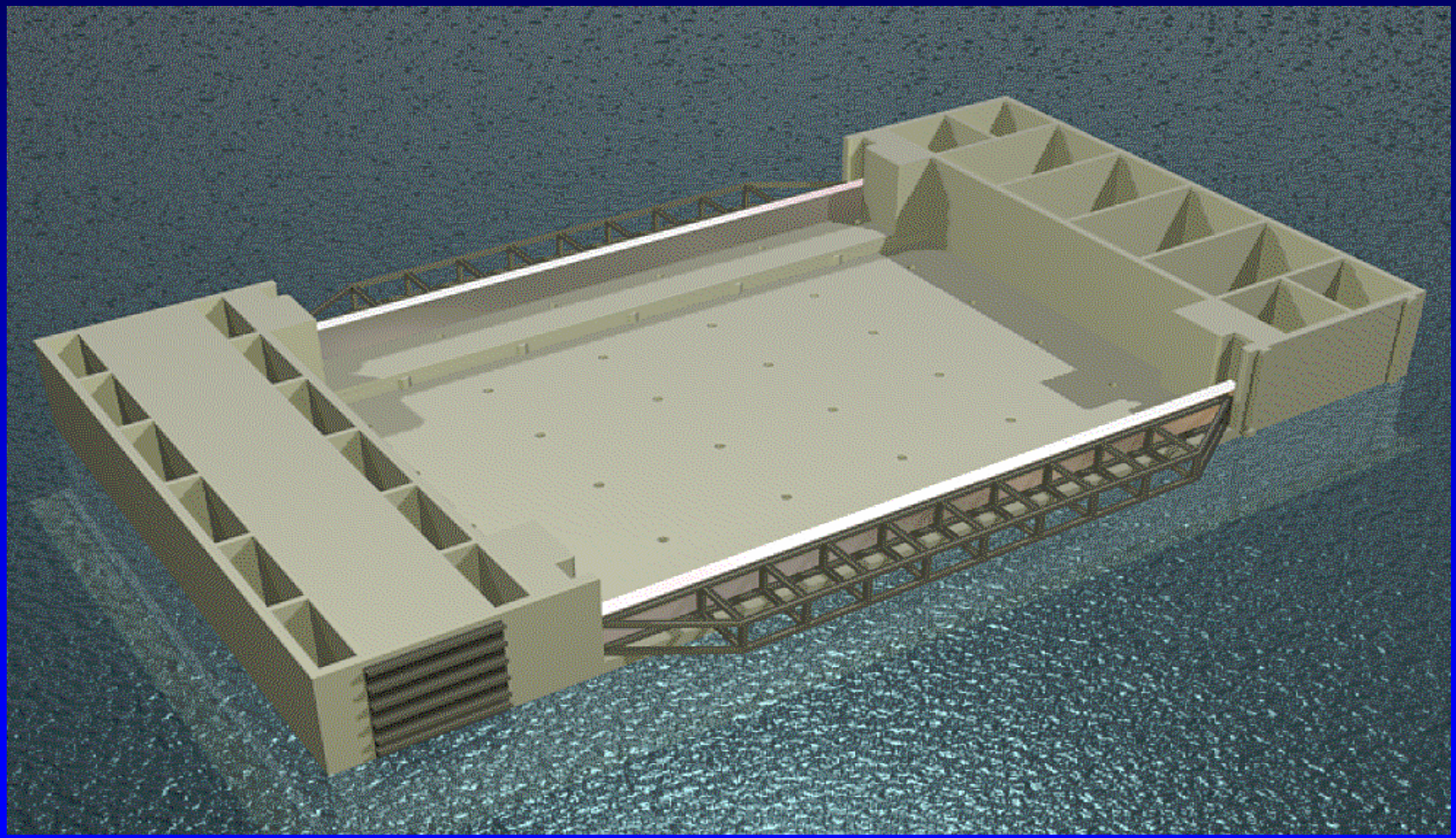
Phase 3C: SHAFTS, height 16-31 ft

DRAFT	**18.2 ft**
FREEBOARD	**8.8 ft**
KEEL CLEARANCE	**8.8 ft**

US Army Corps
of Engineers

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Greenup L&D
Miter Gate Bay

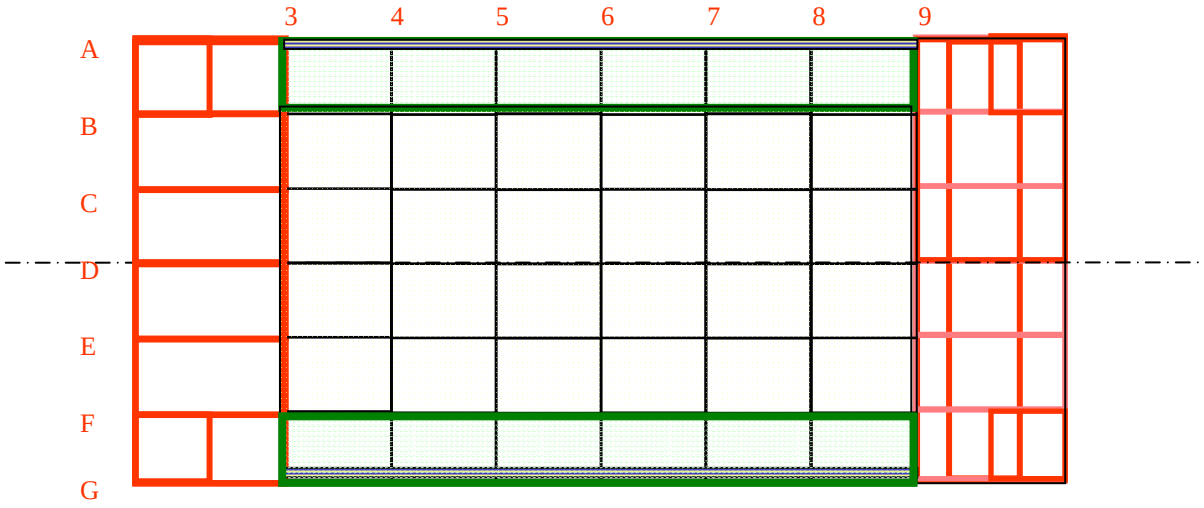


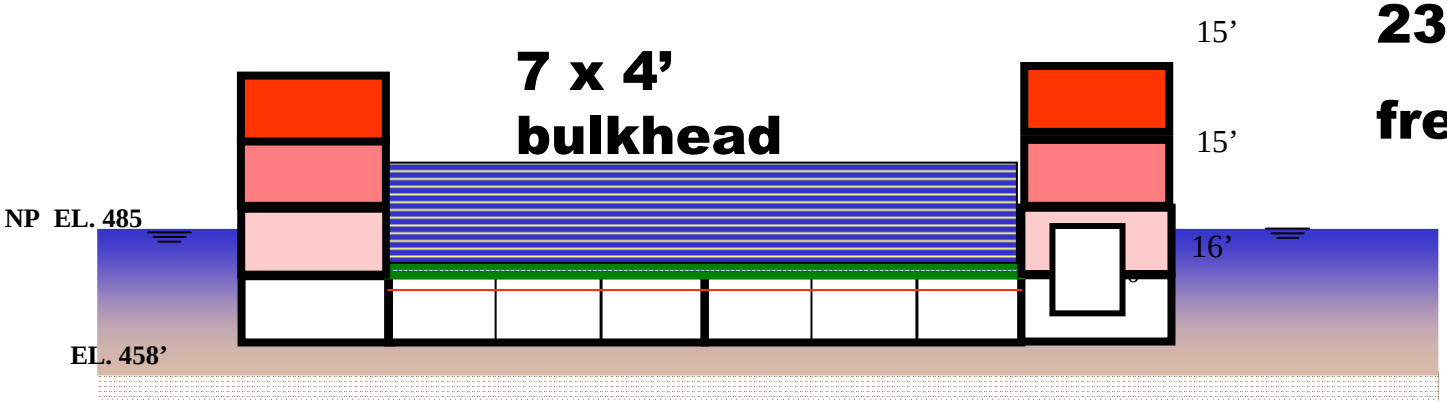
Phase 3C: SHAFTS, height 16-31 ft, incl. bulkheads

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay





23.7 ft freeboard

Phase 3D: SHAFTS, height 31-46 ft

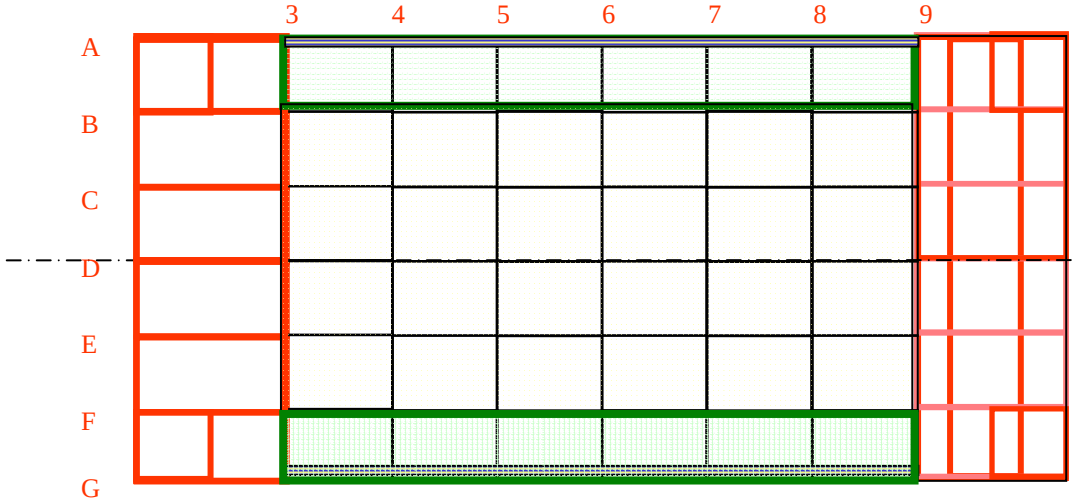
DRAFT	**21.3 ft**
FREEBOARD	**5.7 ft**
KEEL CLEARANCE	**5.7 ft**

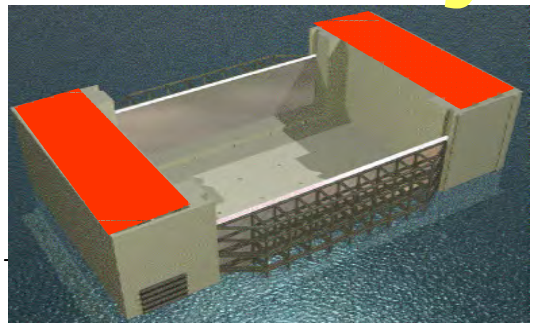
US Army Corps of Engineers

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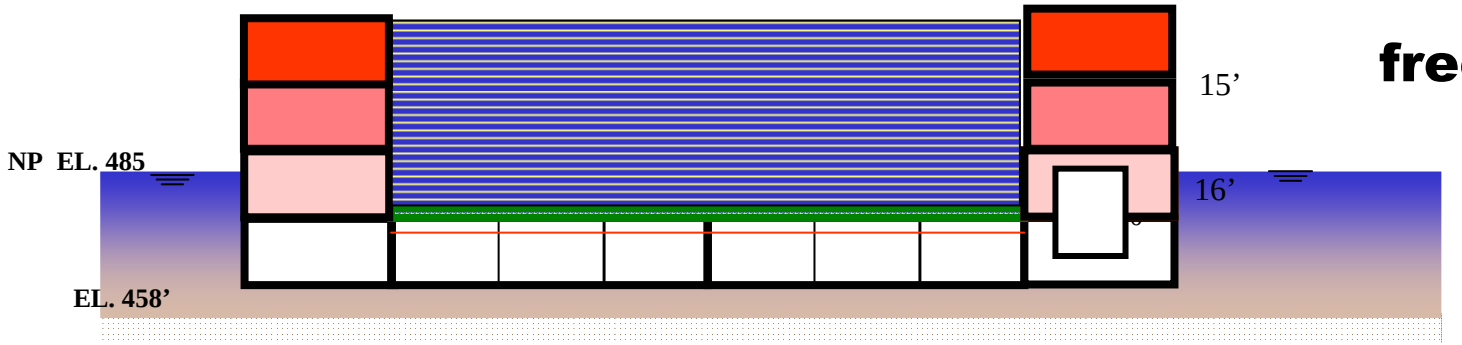
Greenup L&D

Miter Gate Bay





8 x 4’ bulkhead



39.5 ft freeboard

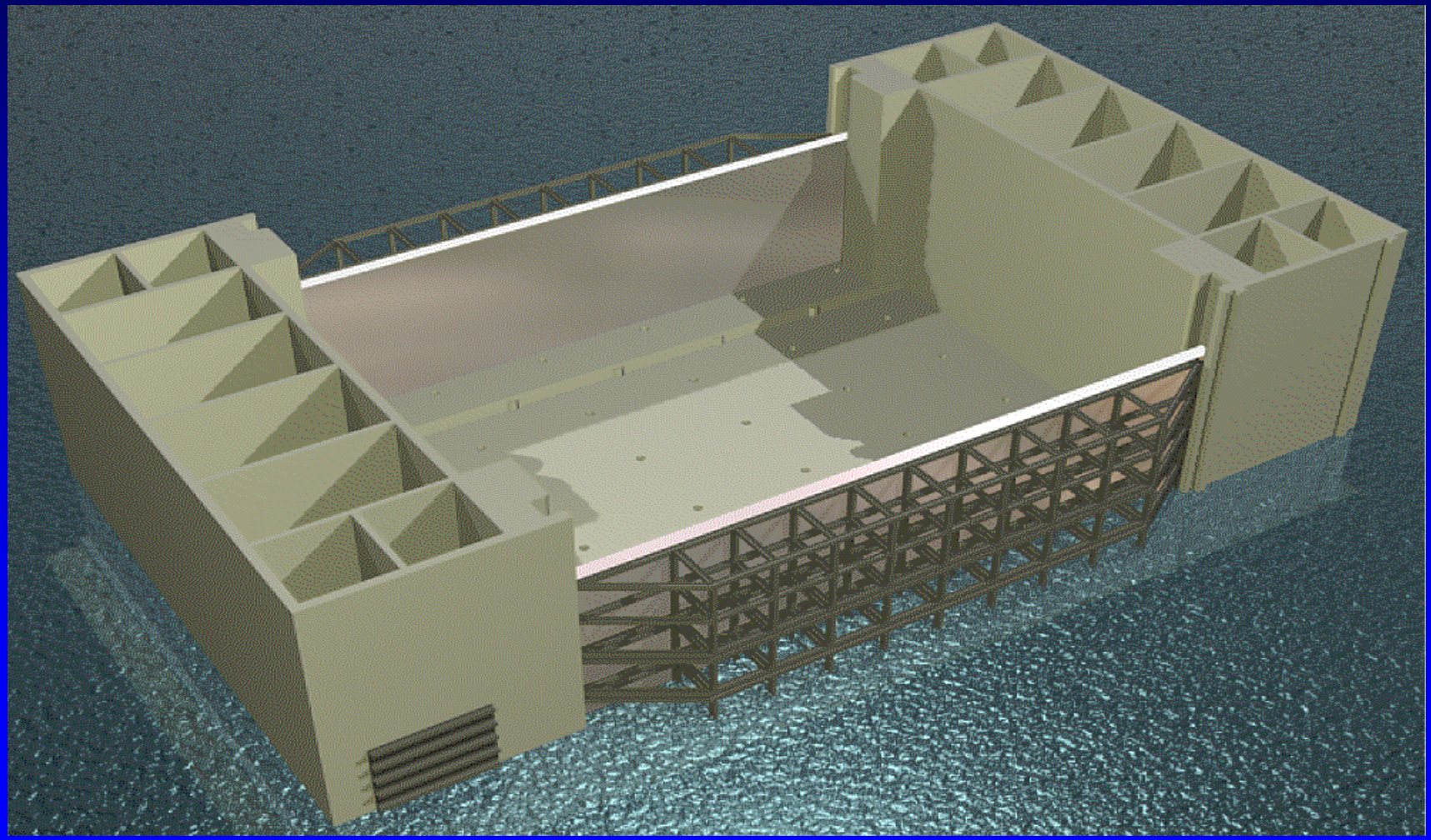
Phase 3E: Preparation for immersion

DRAFT	**21.5 ft**
FREEBOARD	**40.5 ft**
KEEL CLEARANCE	**5.5 ft**

US Army Corps
of Engineers

One Corps Serving the Army and the Nation

Greenup L&D
Miter Gate Bay

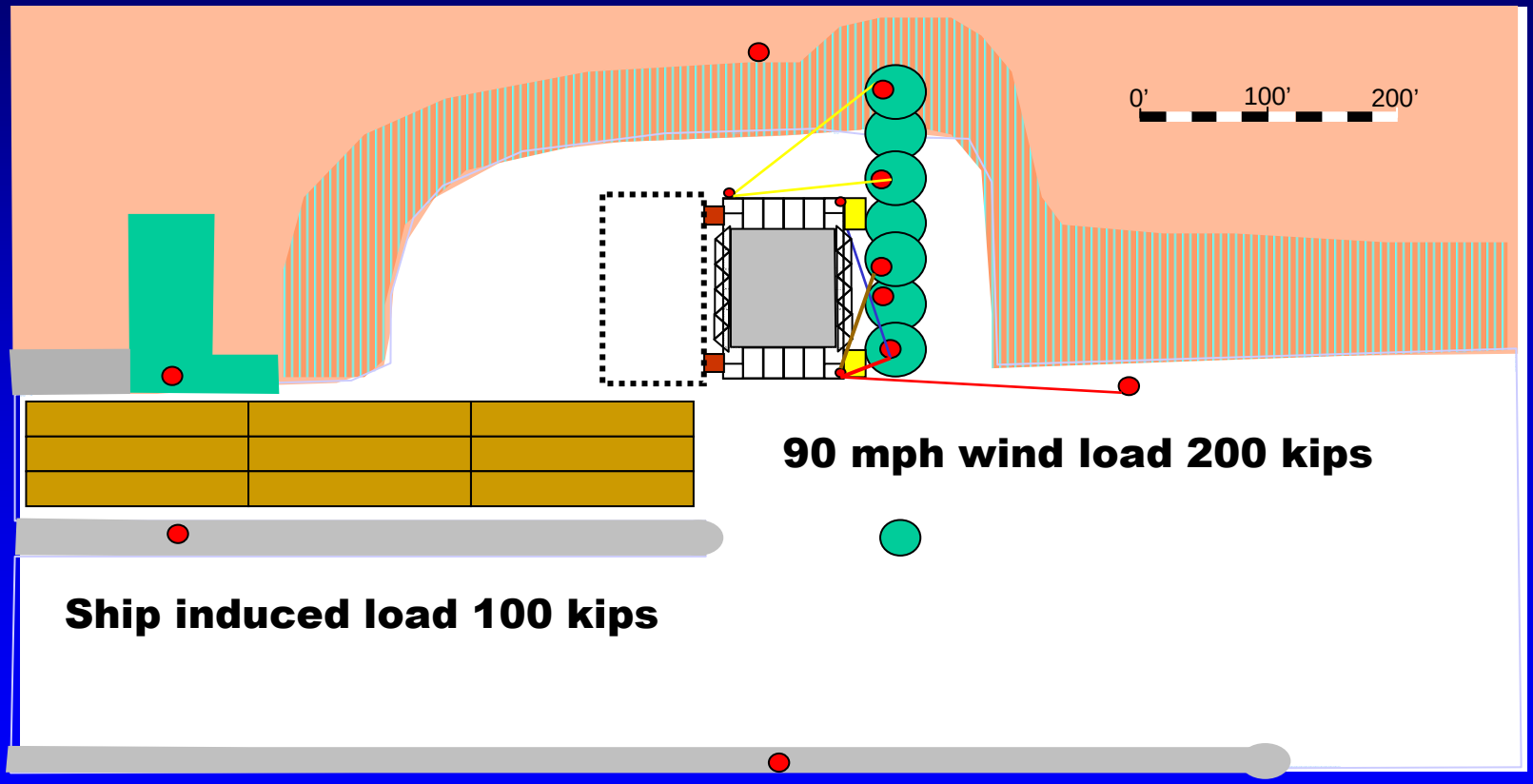


Phase 3E: Ready for Immersion

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

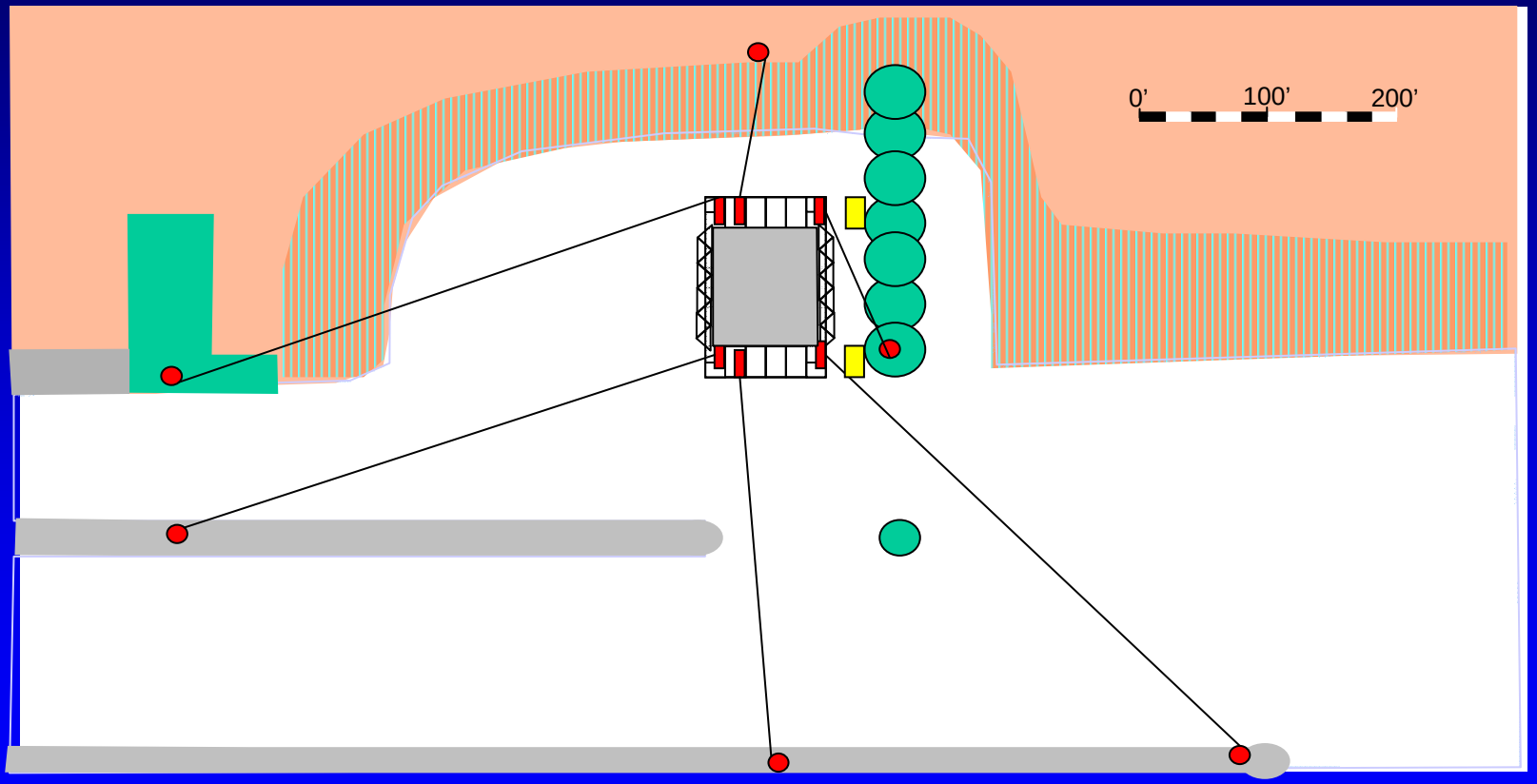


Mooring Configuration During Floating Construction

US Army Corps of Engineers

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Greenup L&D
Miter Gate Bay

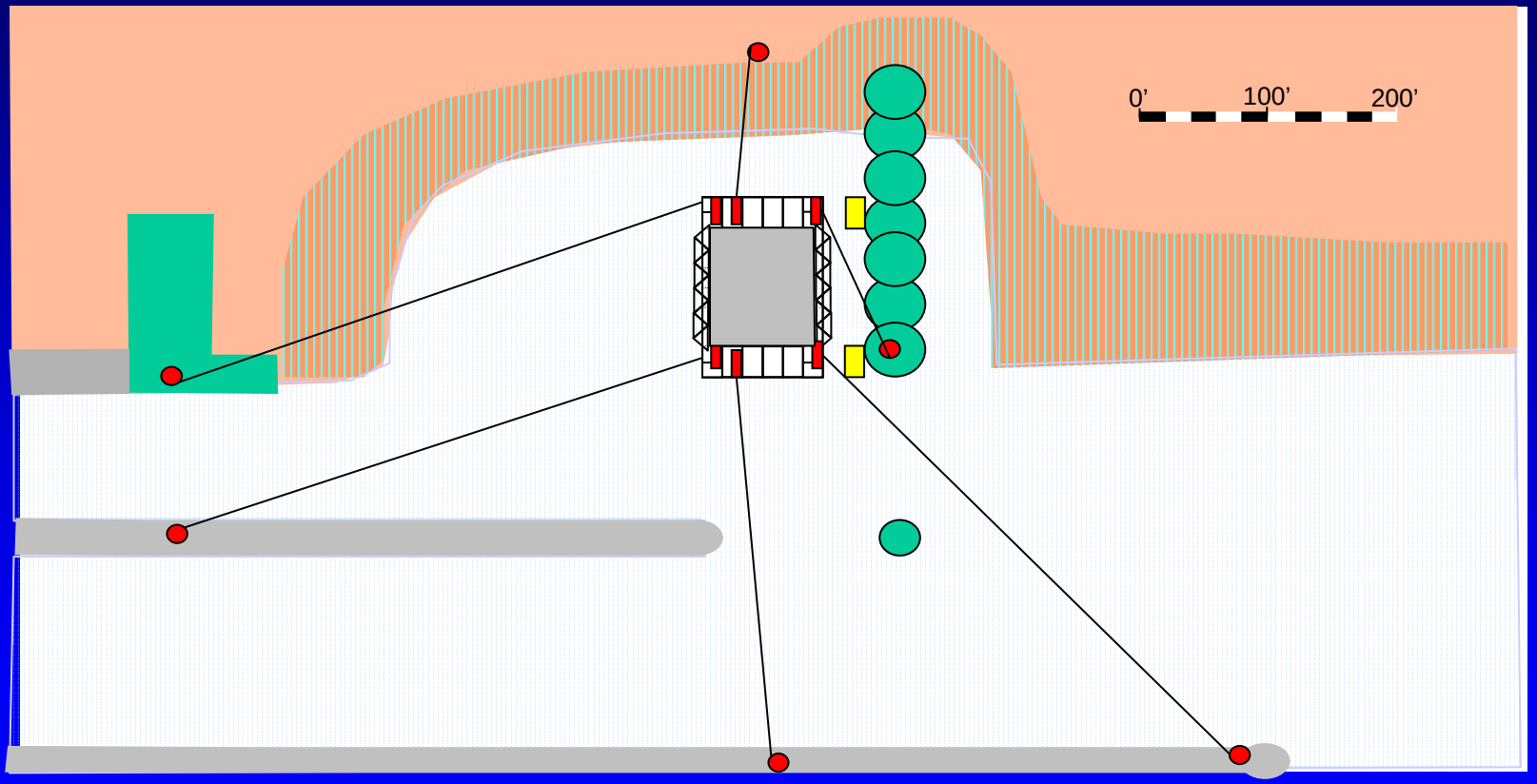


Start Ballasting at Deep Draft Location

US Army Corps of Engineers

One Corps Serving the Army and the Nation

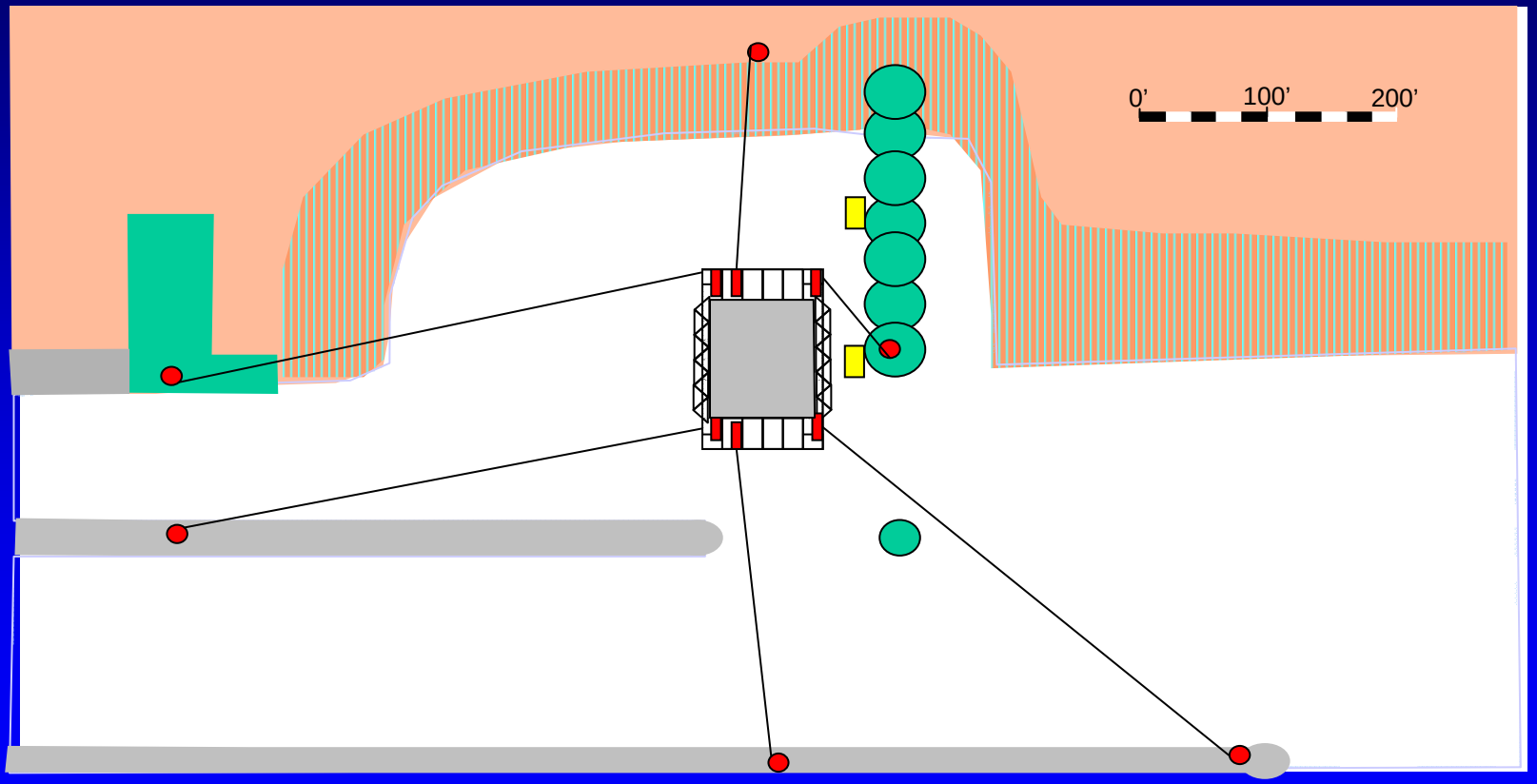
Greenup L&D
Miter Gate Bay



US Army Corps of Engineers

One Corps Serving the Army and the Nation

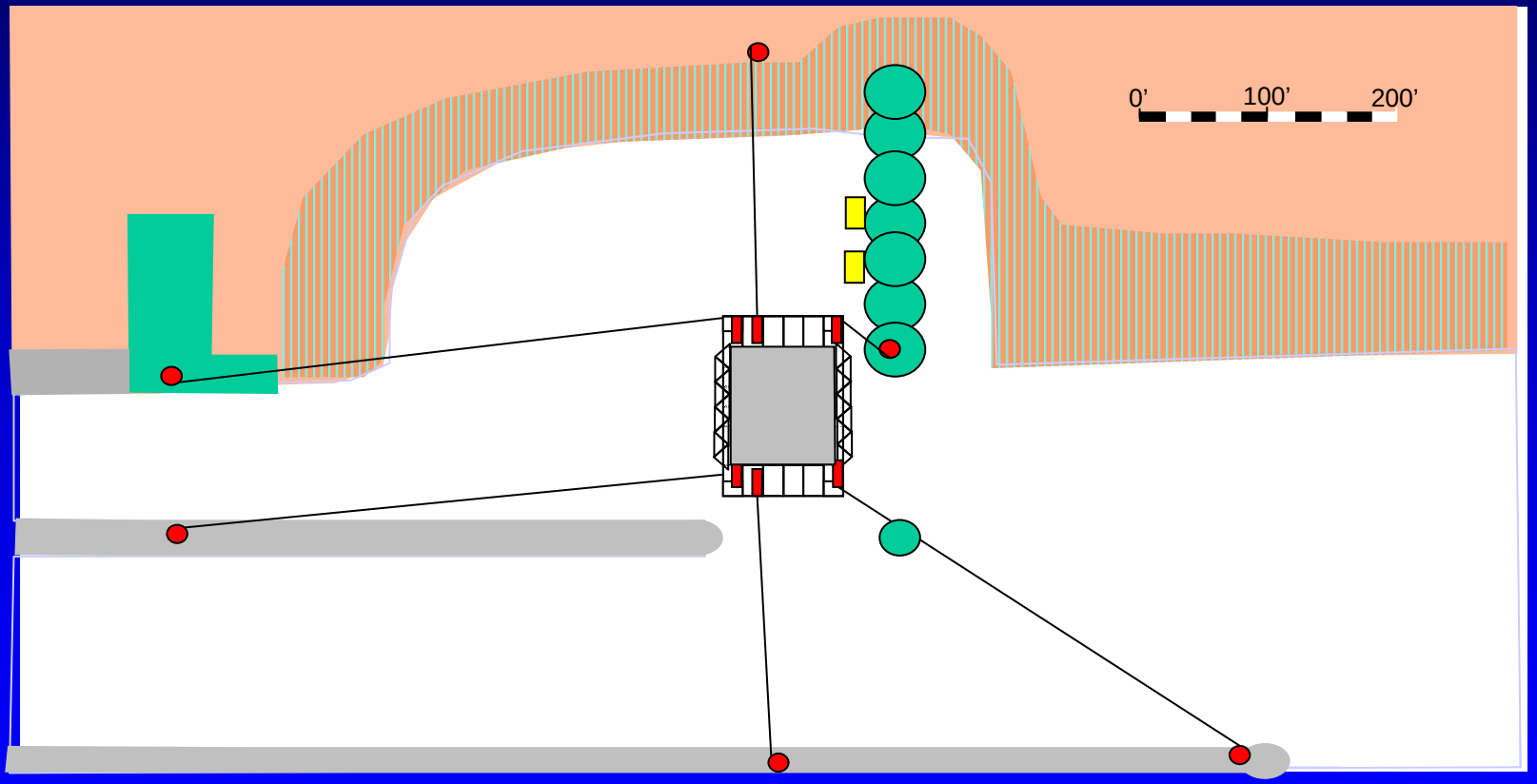
Greenup L&D
Miter Gate Bay



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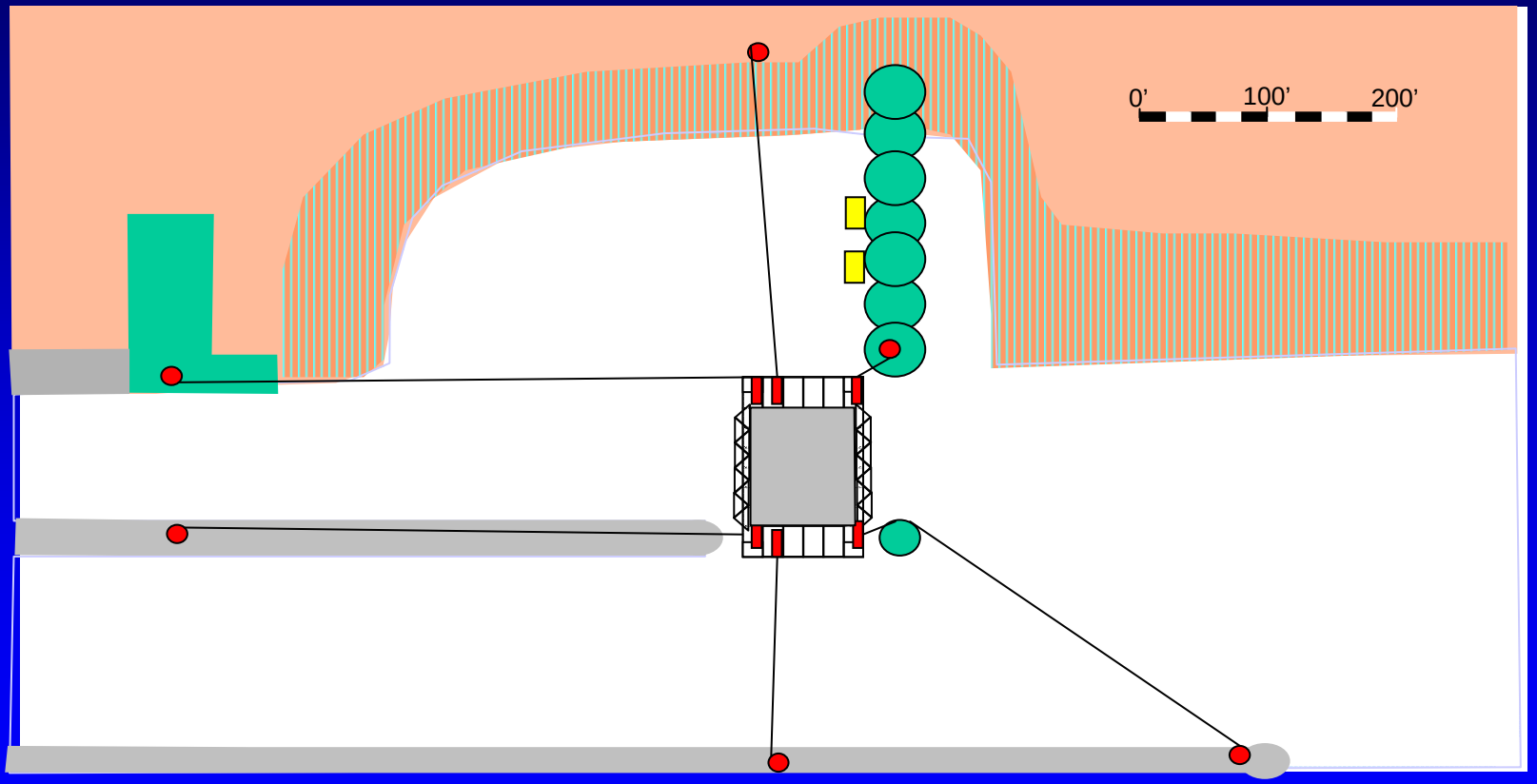
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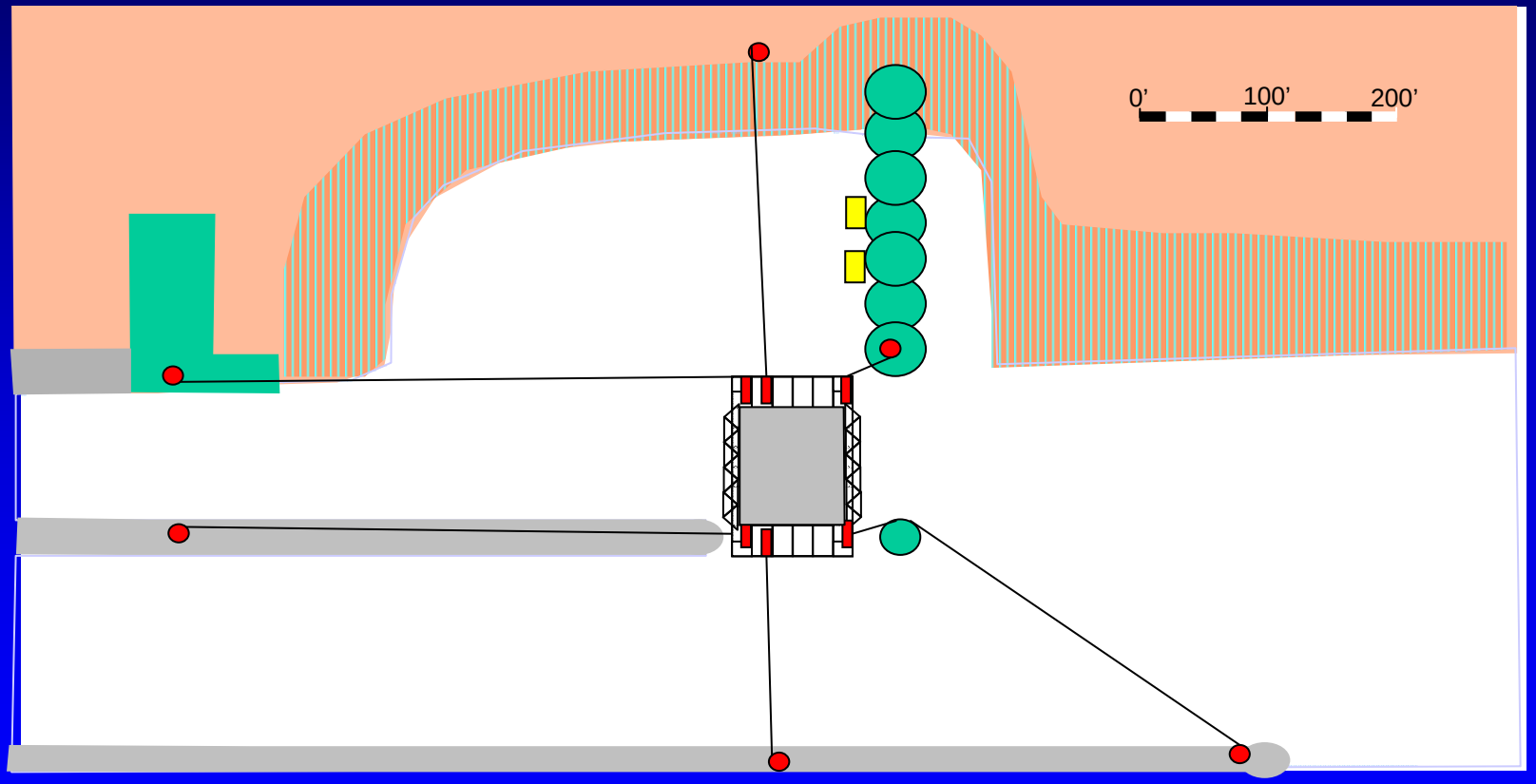
Greenup L&D
Miter Gate Bay



US Army Corps of Engineers

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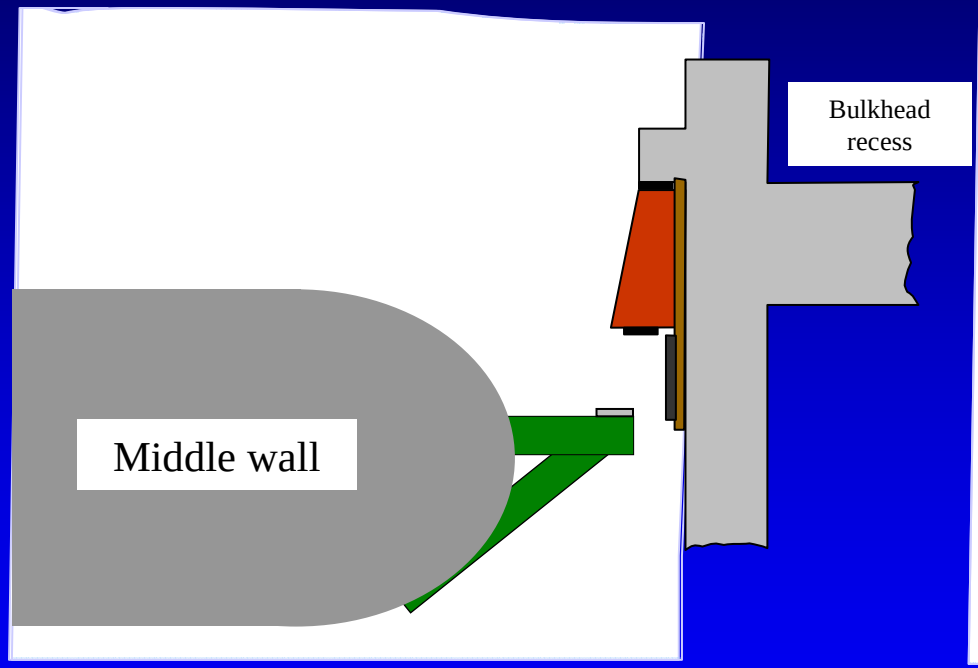


Pitching Set-Down Guide

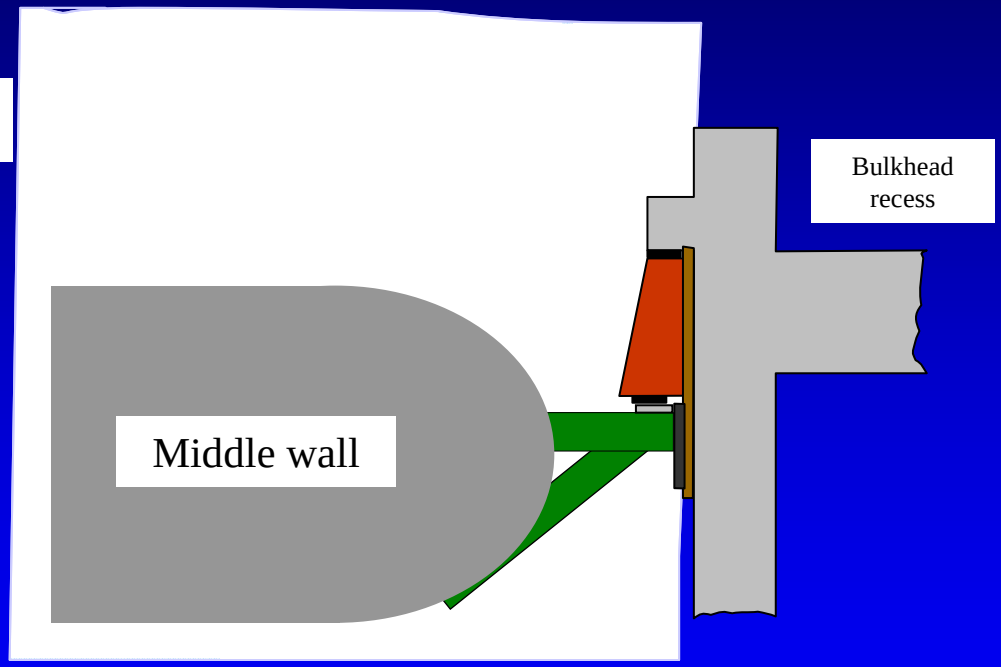
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Downstream Middle Wall



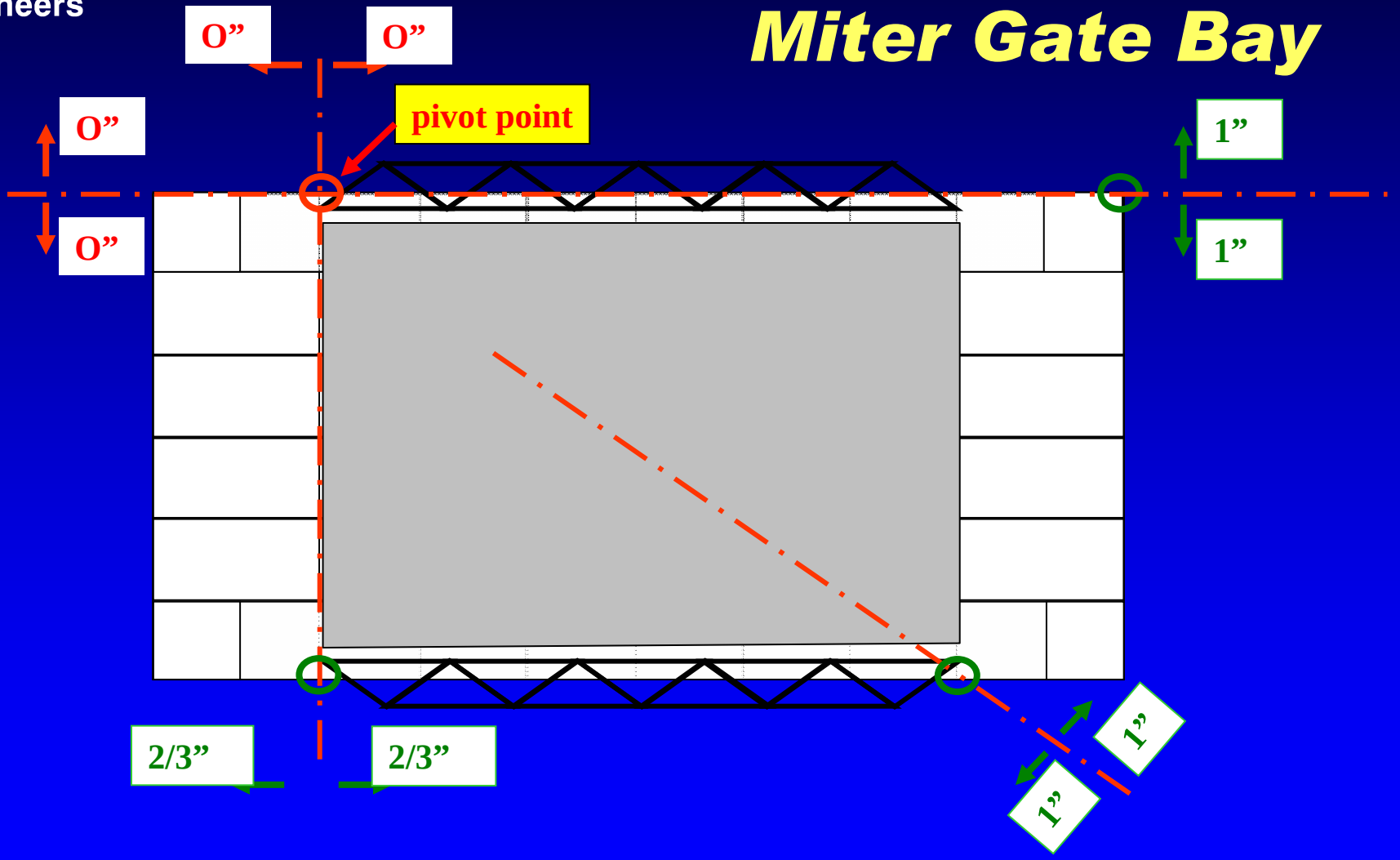
Final Position

Set-Down Guide

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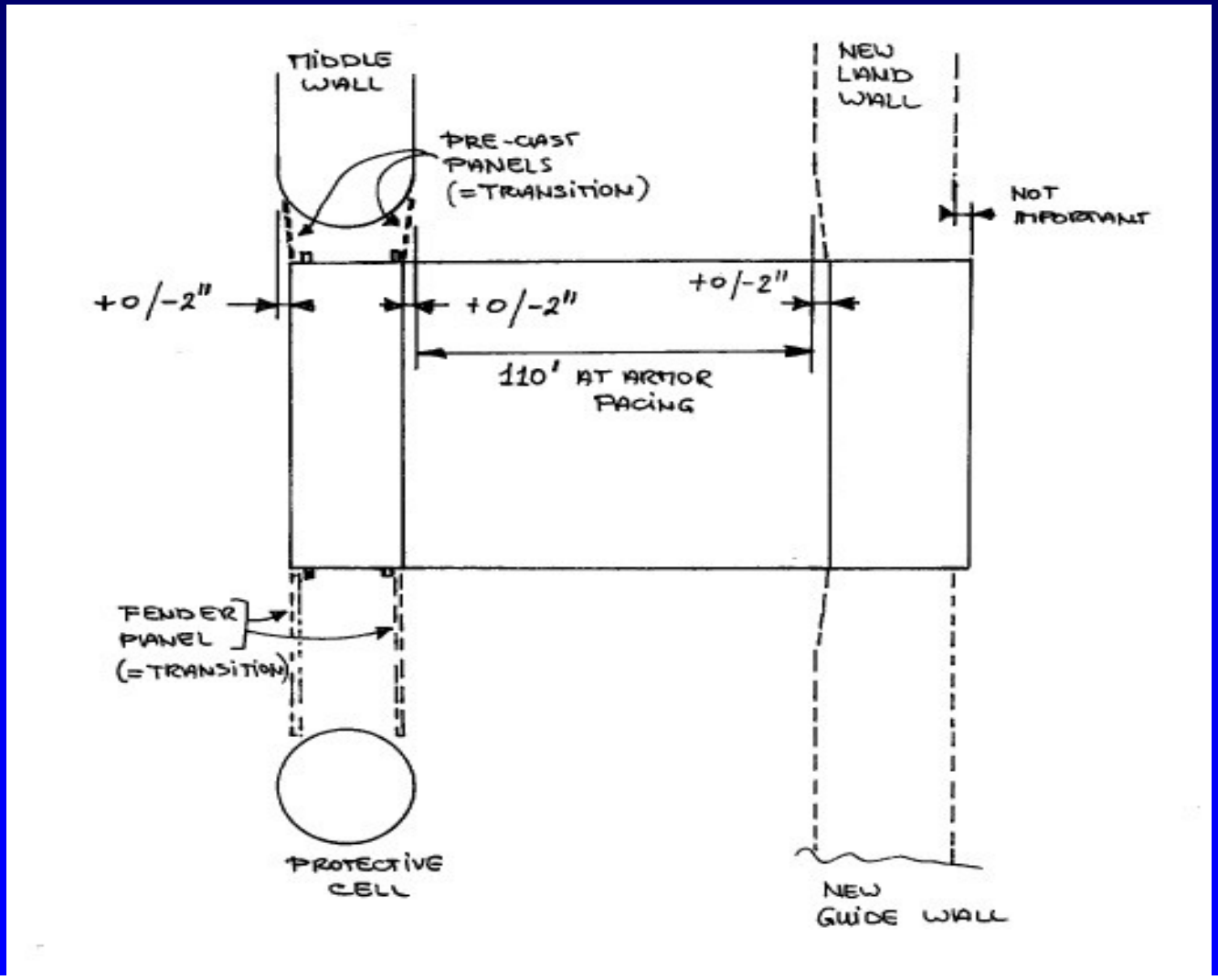


Installation Tolerances

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US Army Corps of Engineers

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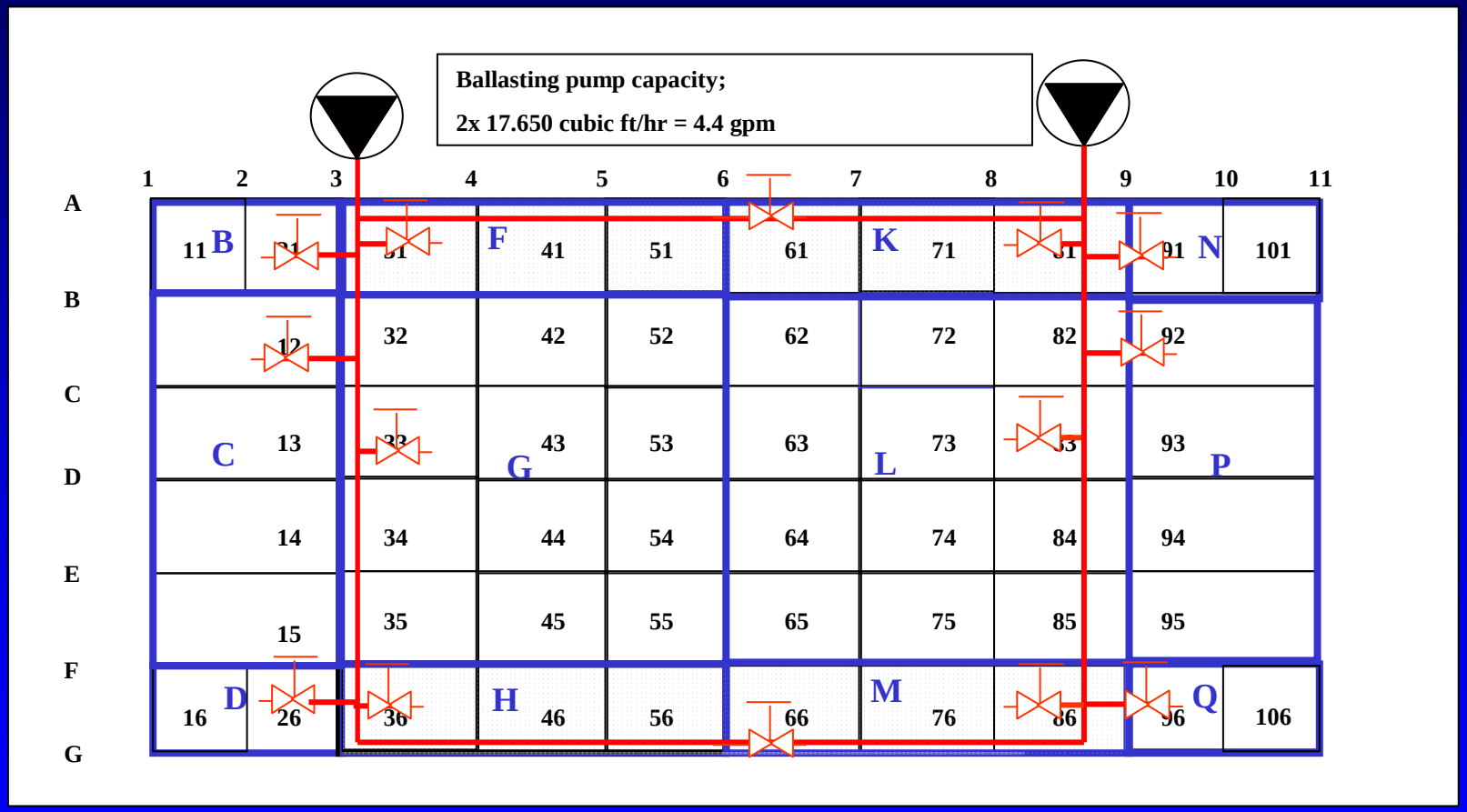
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Water Ballast System

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Ballast System

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Piping Water Ballast System

Great Belt Bridge Denmark - Installation Pylon Caisson

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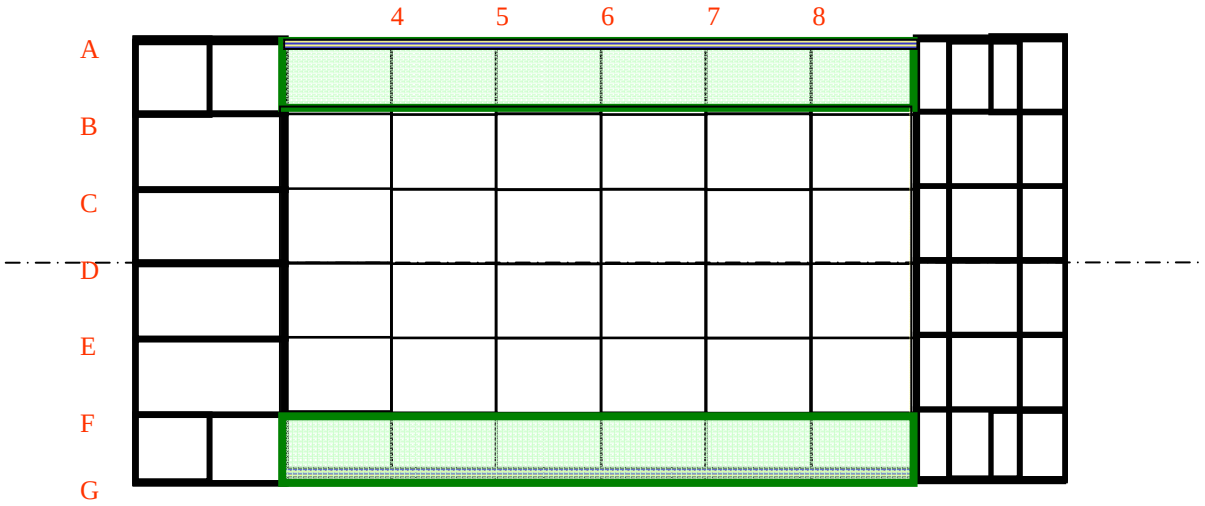
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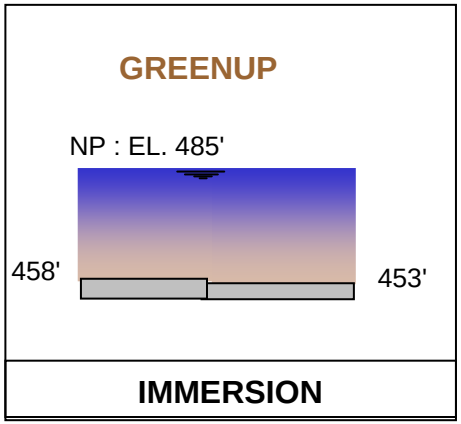
Immersion and Set Down

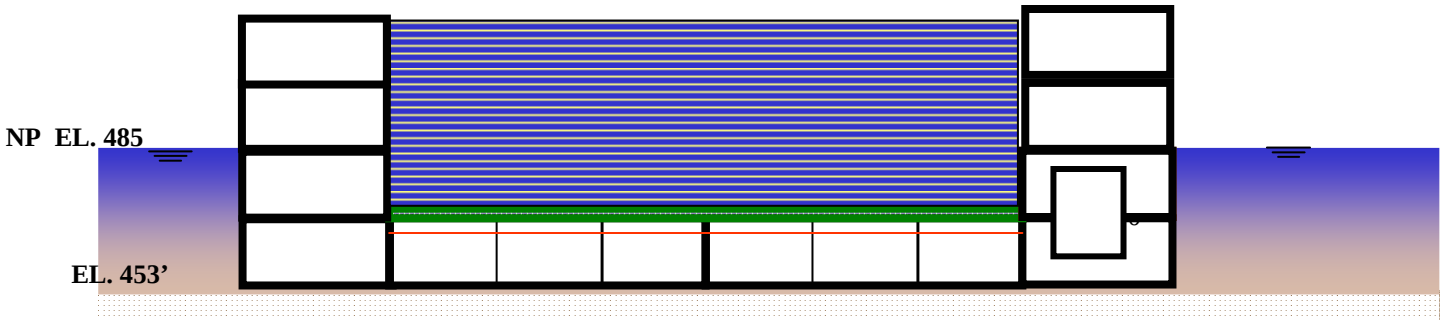
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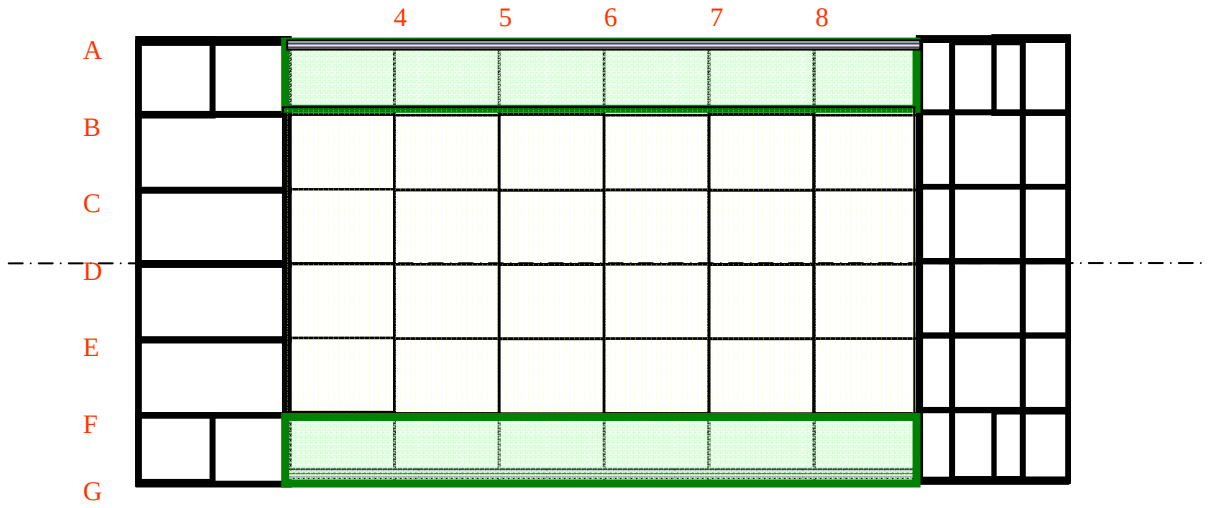
Phase 4A: Touch down at NP EL 485'

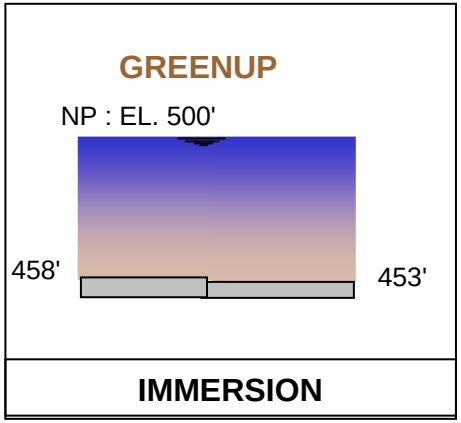
Waterballast (case 2)	**7,200 T**
Max. immersion speed	**3 ft/hr**

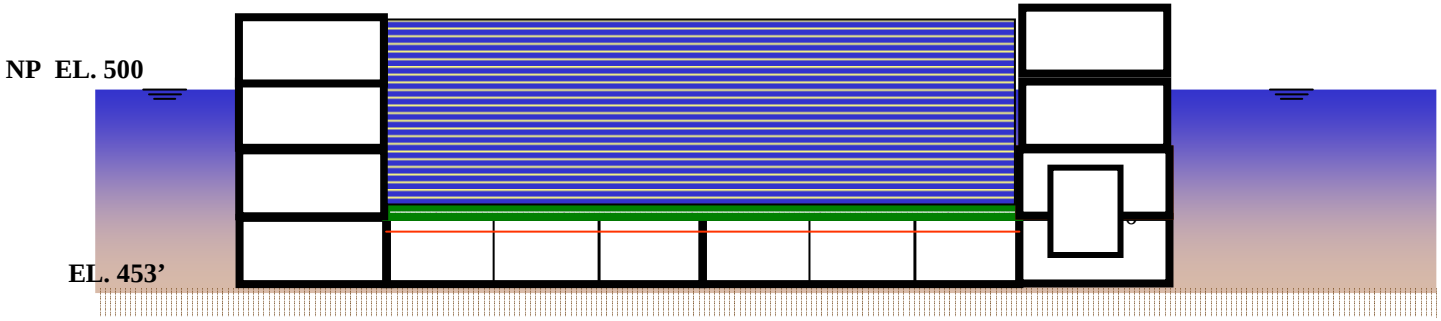
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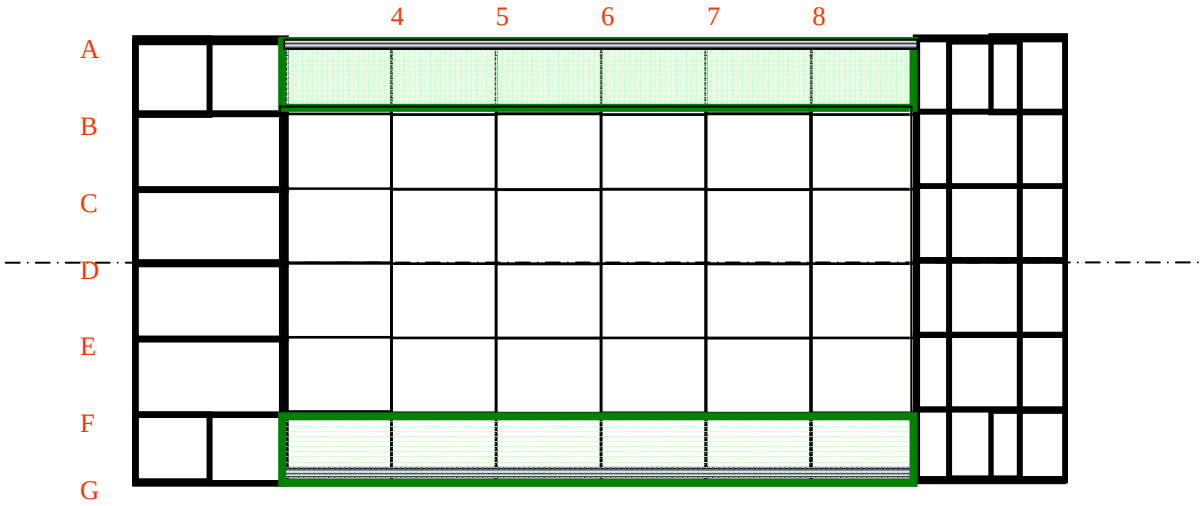
Phase 4B: Touch down at NP EL 500'

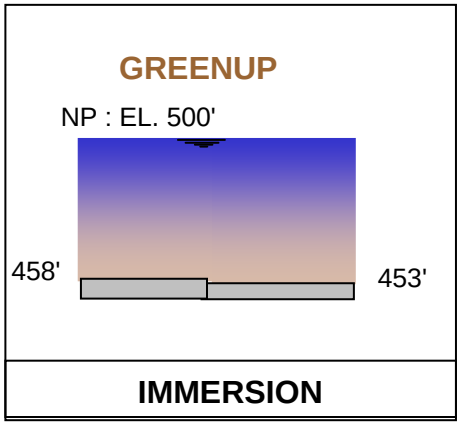
Waterballast (case 2)	**16.275 T**
Max. immersion speed	**3 ft/hr**

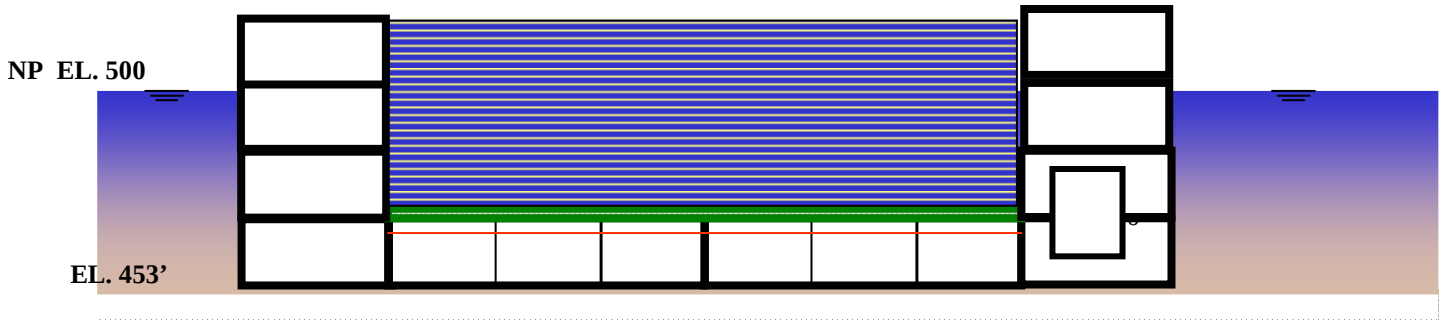
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Miter Gate Bay







Phase 4C:
Pre-load 9,000 kip at EL 500'

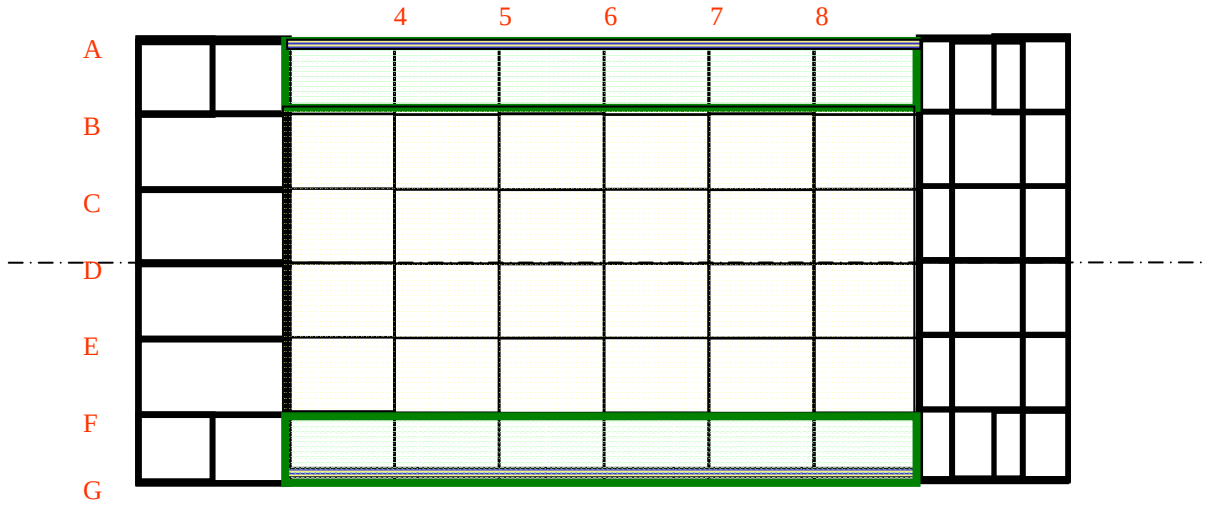
Waterballast (case 2) 20,800 T

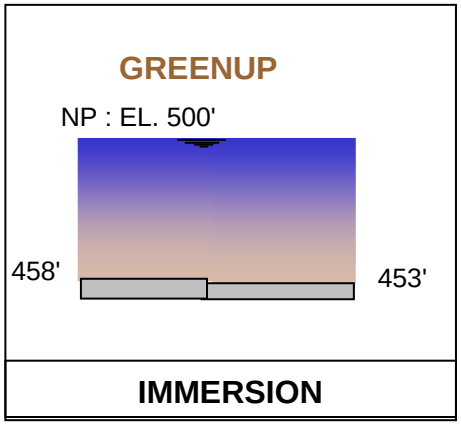
Max. ballasting speed **1,900 T/hr**

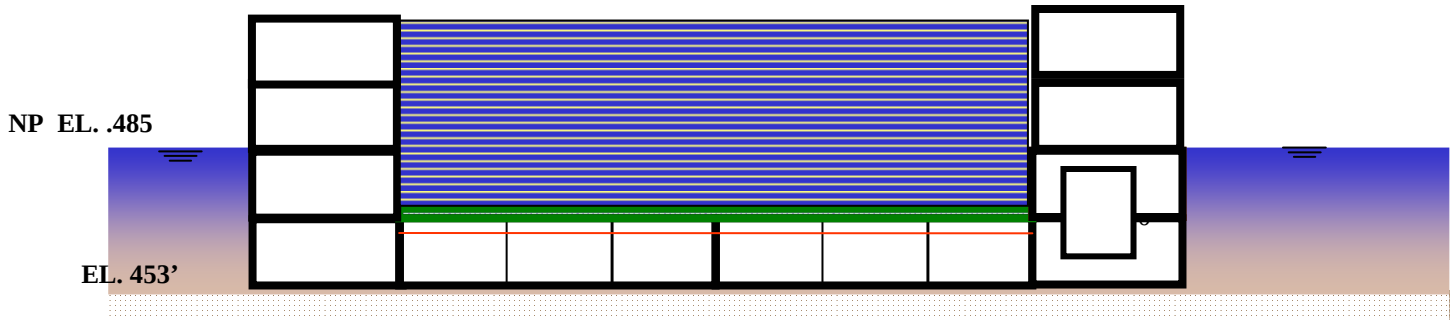
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Phase 4D:
Pre-load 9,000 kip at EL 485'

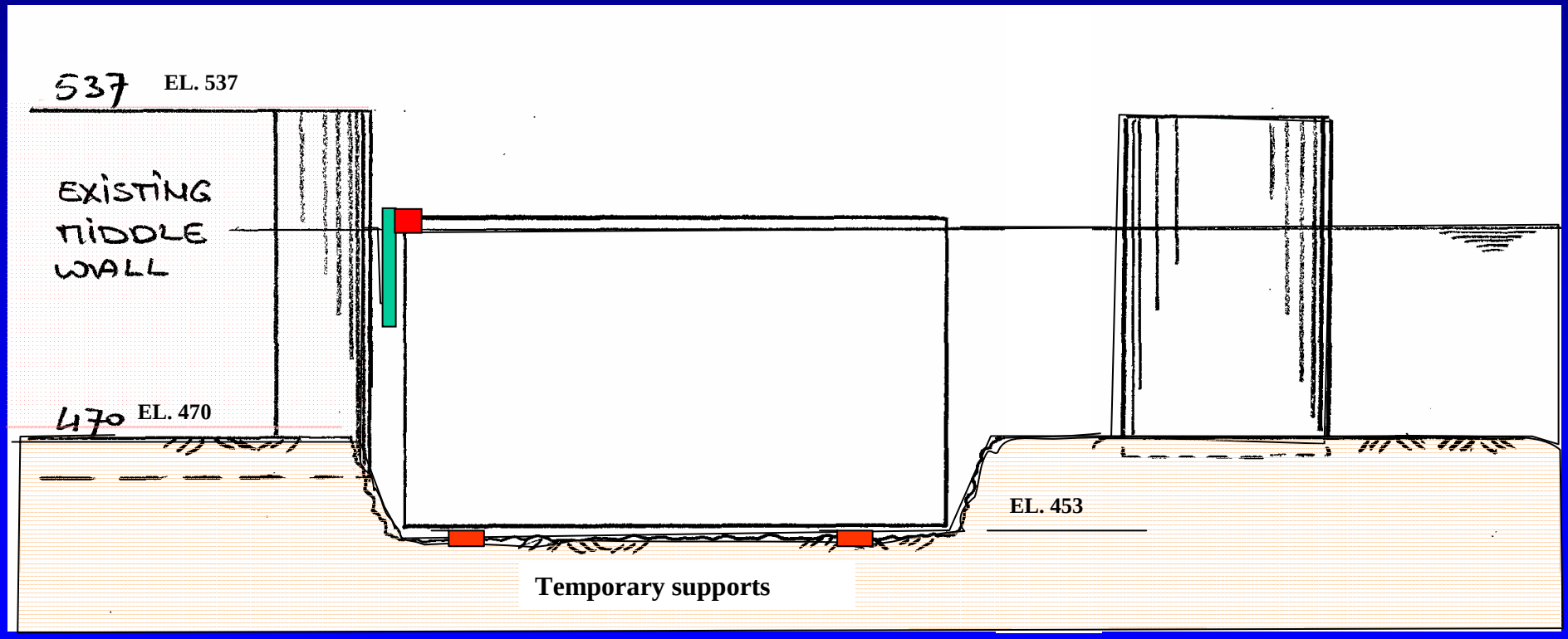
Waterballast (case 2) **11,700 T**

Max. ballasting speed **1,900 T/hr**

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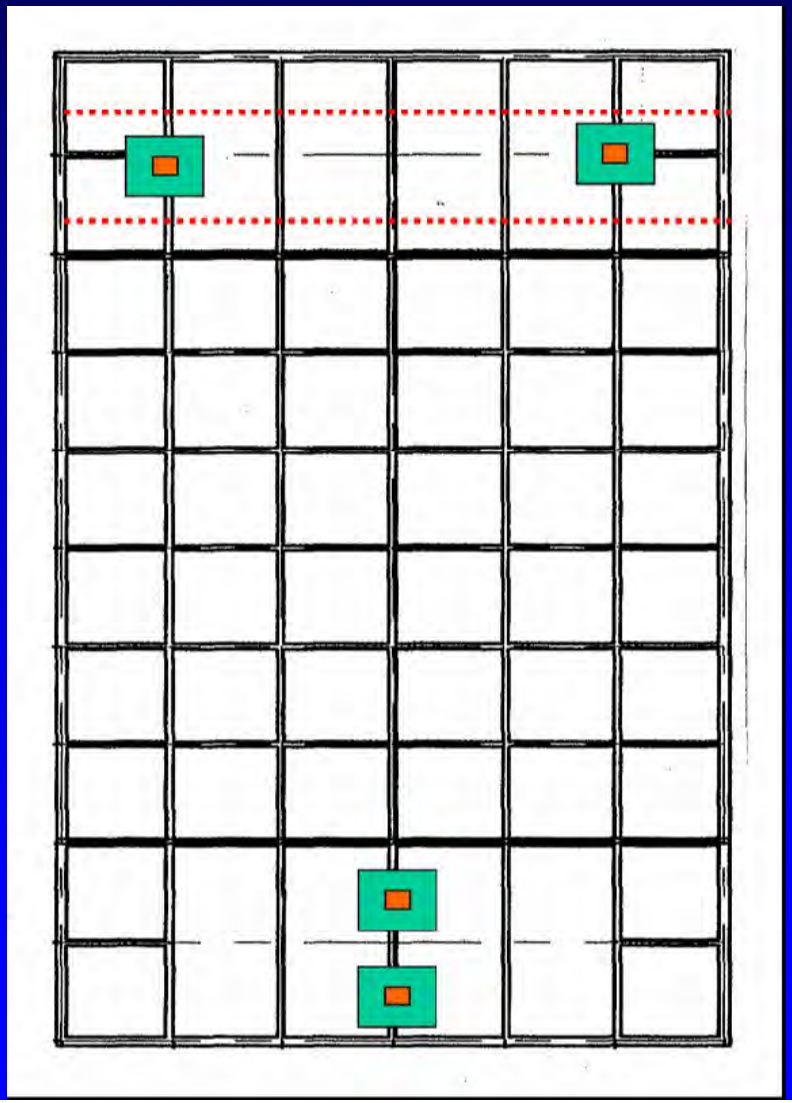
Greenup L&D
Miter Gate Bay

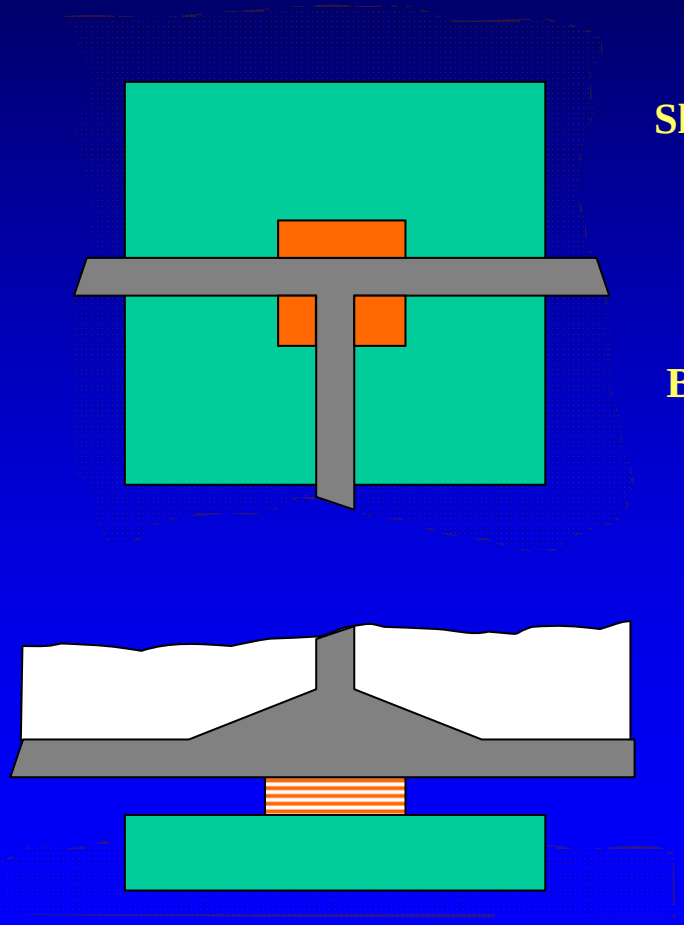


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Miter Gate Bay





Slab 10ft x 10ft

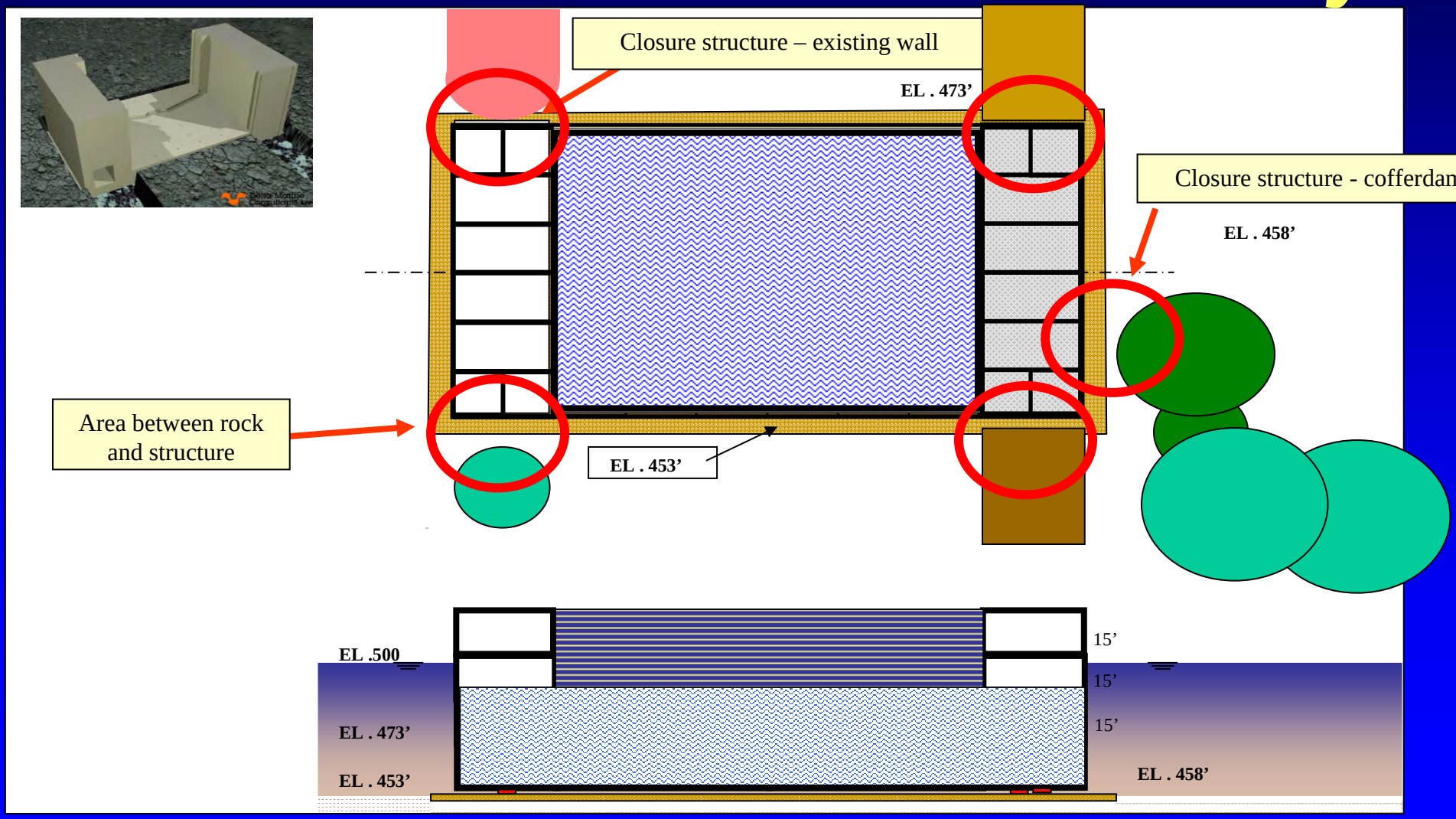
Bearing 3ft x 3ft

1000 MT Elastomeric bearing

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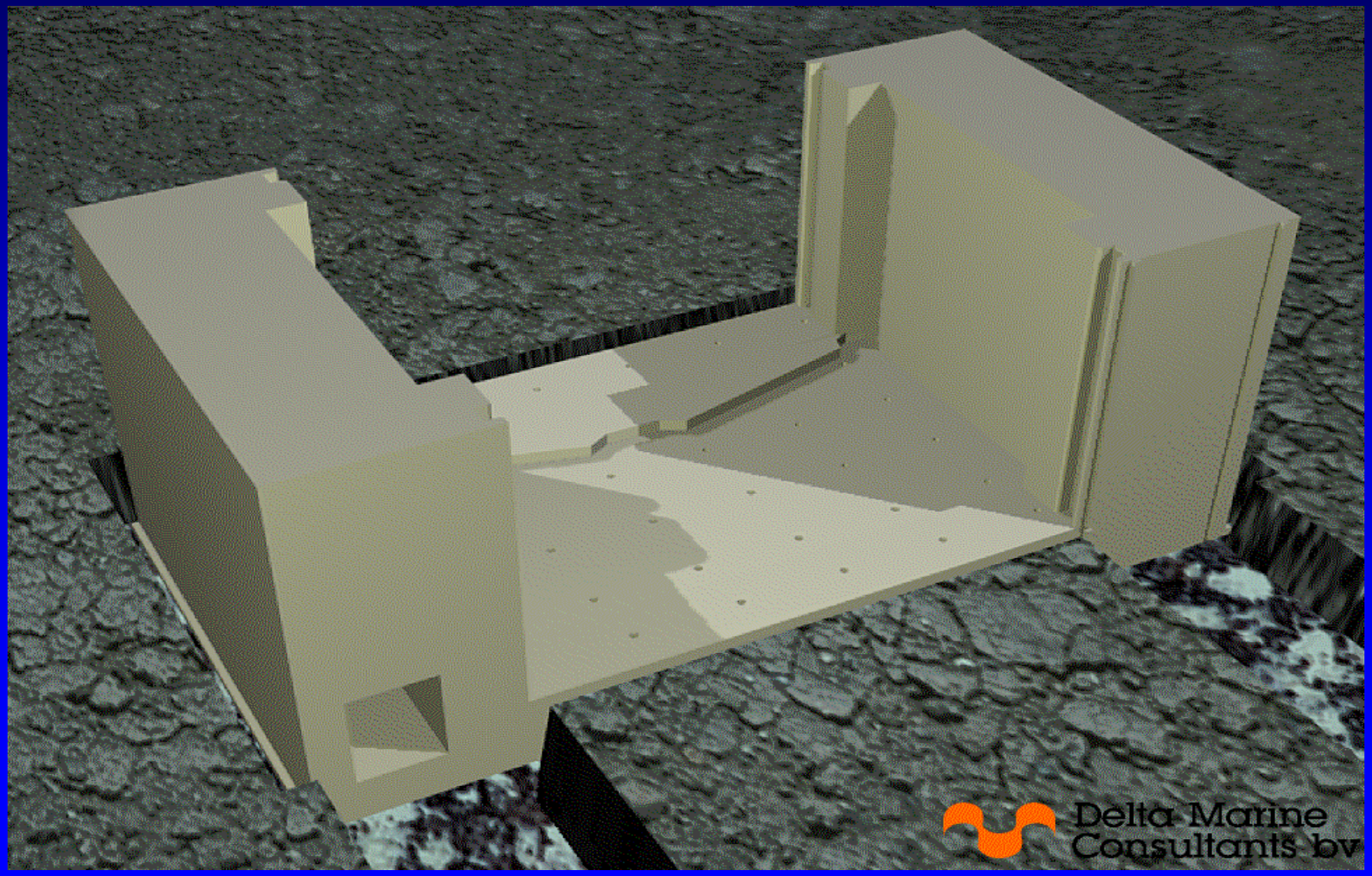
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Miter Gate Bay



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Miter Gate Bay



Greenup L&D Project Milestones (with 07 CG Start)

- **Mooring Cells Construction – 2007 to 2009**
- **Miter Gate Fabrication – 2007 to 2009**
- **Lock Extension Construction – 2010 to 2012**
- **Rehab Main Chamber – 2012 to 2014**
- **Total Project Completion 2014**

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U.S. Army Corps of Engineers
Huntington District
502 Eighth Street
Huntington, WV 25701
(304) 399-5170
rodneyc@lrh.usace.army.mil

US Army Corps of Engineers

McAlpine Lock Replacement Project

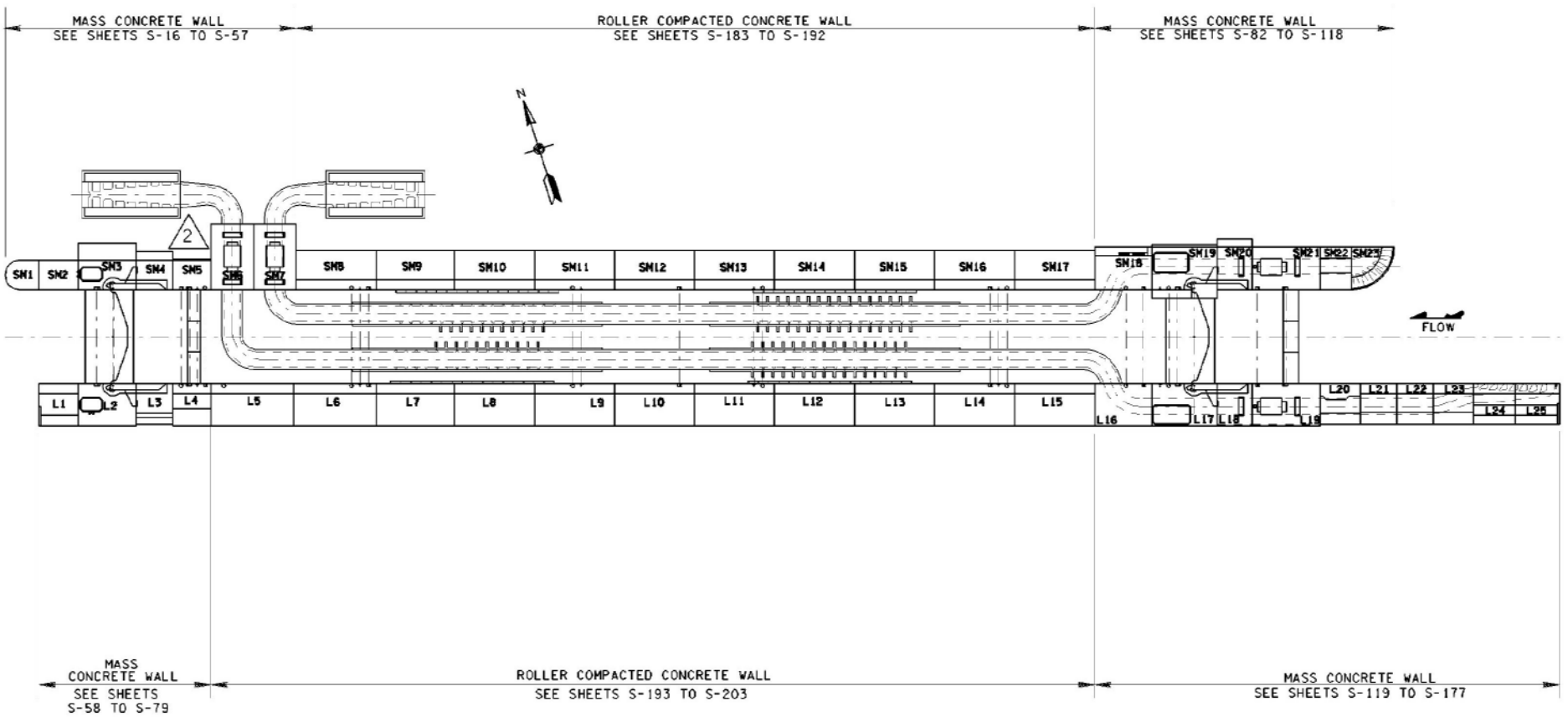
Roller Compacted Concrete Placement at McAlpine Lock

By
Larry Dalton, P.E.

US Army Corps of Engineers

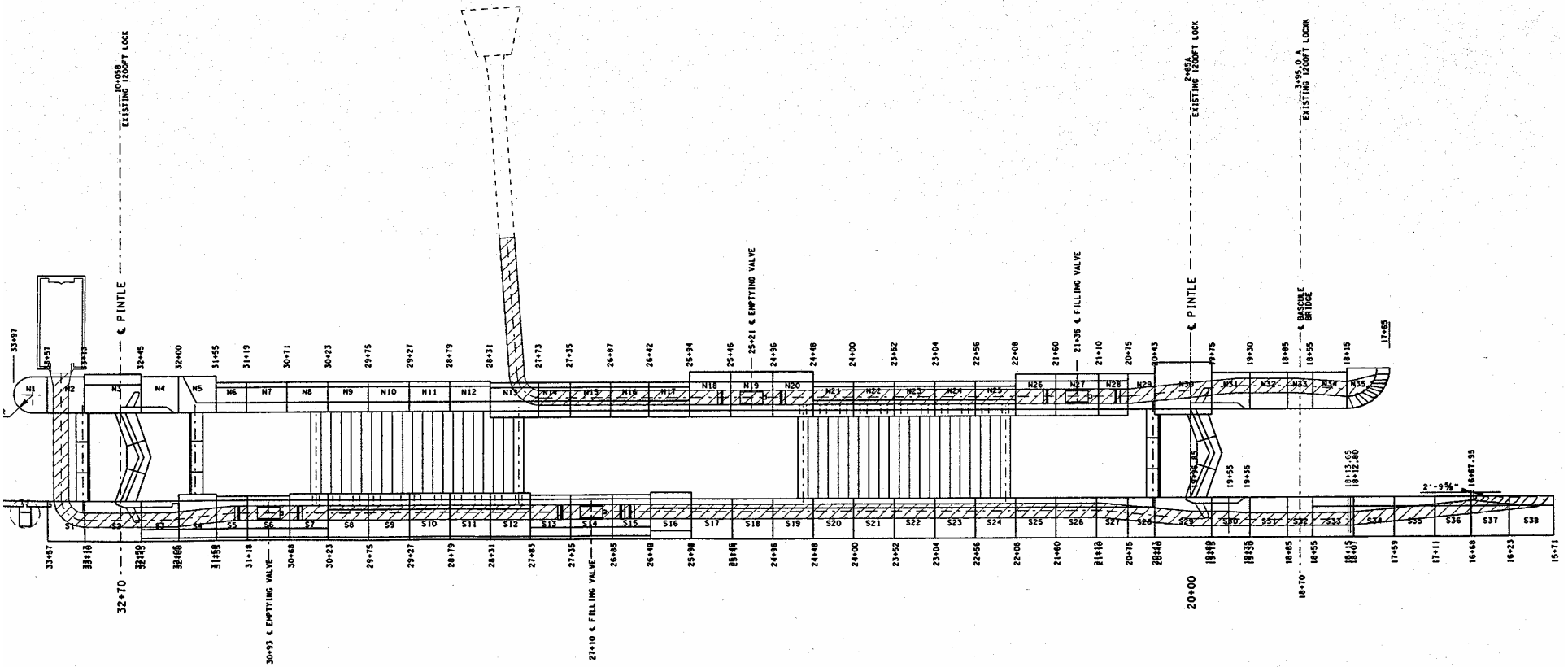
McAlpine Lock Replacement Project

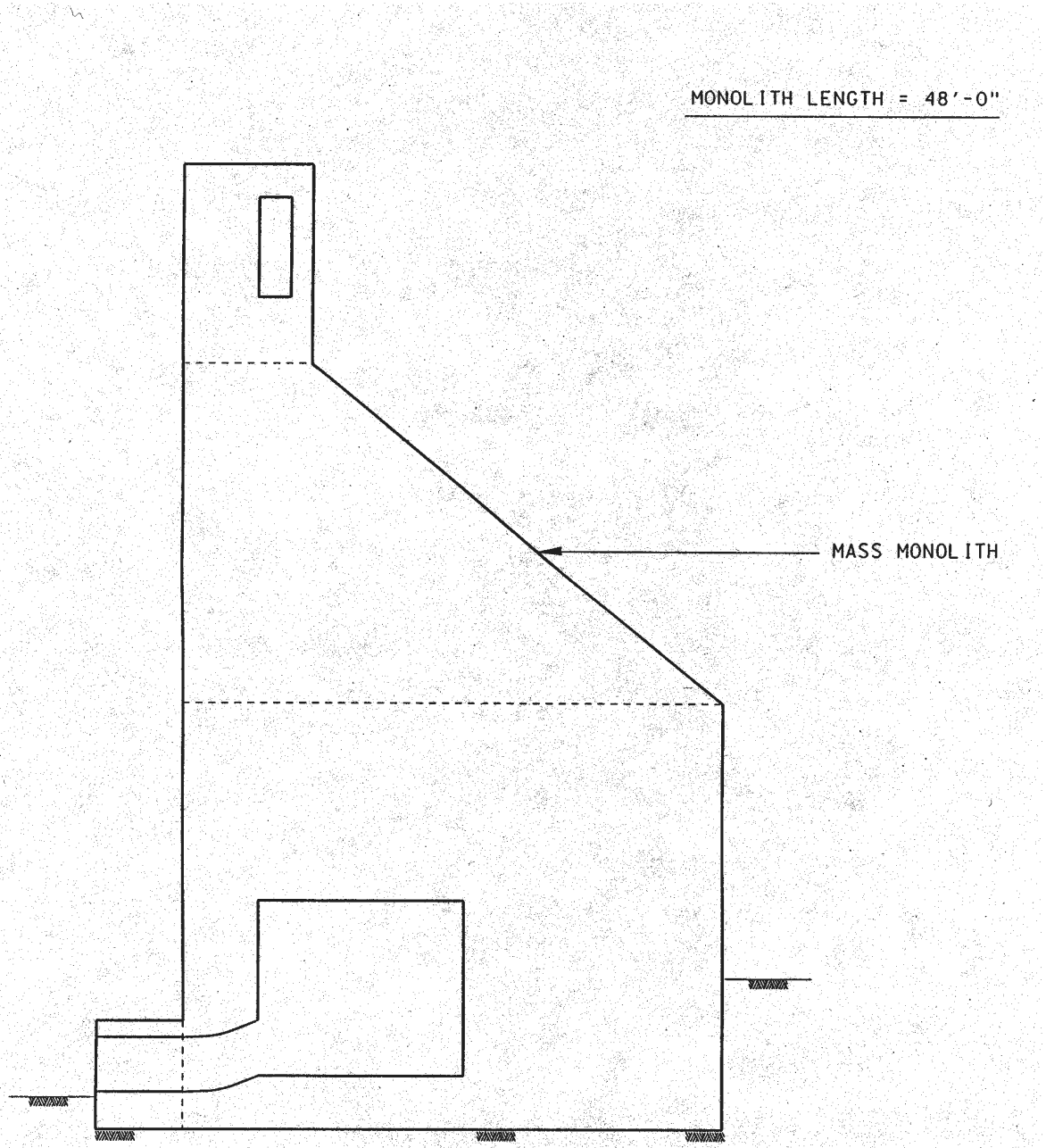
PURPOSE: Share results of the recent placement of Roller Compacted Concrete at the McAlpine Lock Replacement Project as well as Structural Lessons Learned.

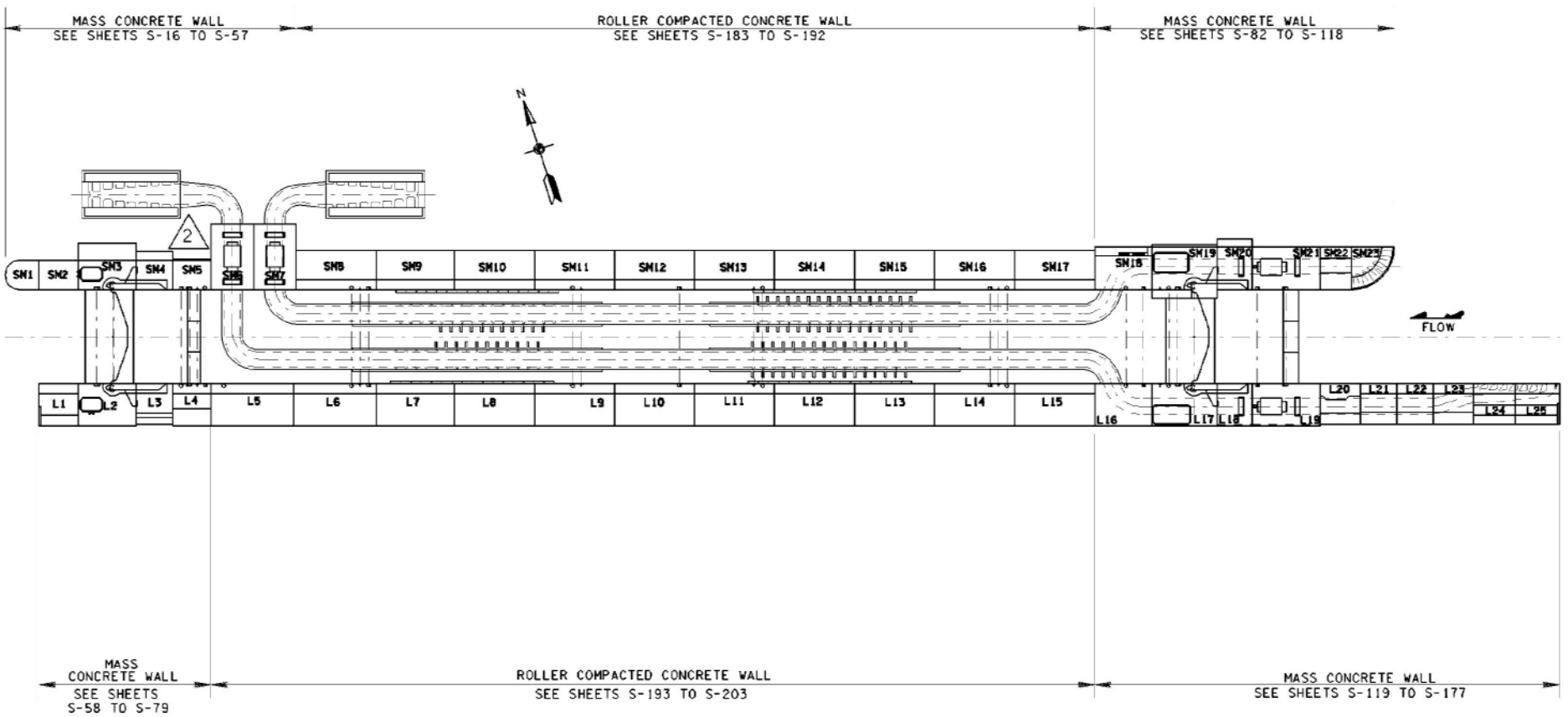


PLAN

SCALE: 1" = 100'-0"

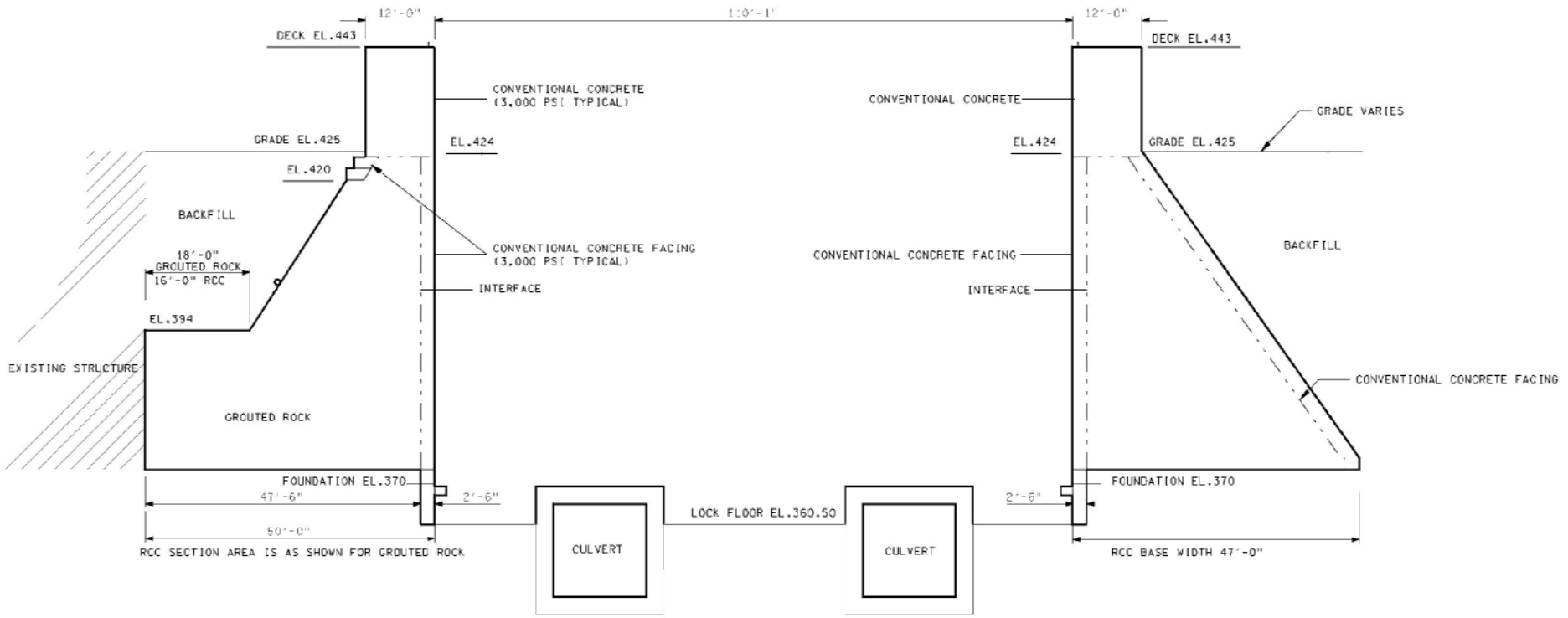

℄ PINTLE
EXISTING 1200FT LOCK
℄ EMPTYING VALVE
℄ FILLING VALVE
℄ BASCULE BRIDGE
32+70
30+93
27+10
20+00
18+70


MONOLITH LENGTH = 48'-0"
MASS MONOLITH
UPPER NORTH WALL



PLAN

SCALE: 1" = 100'-0"

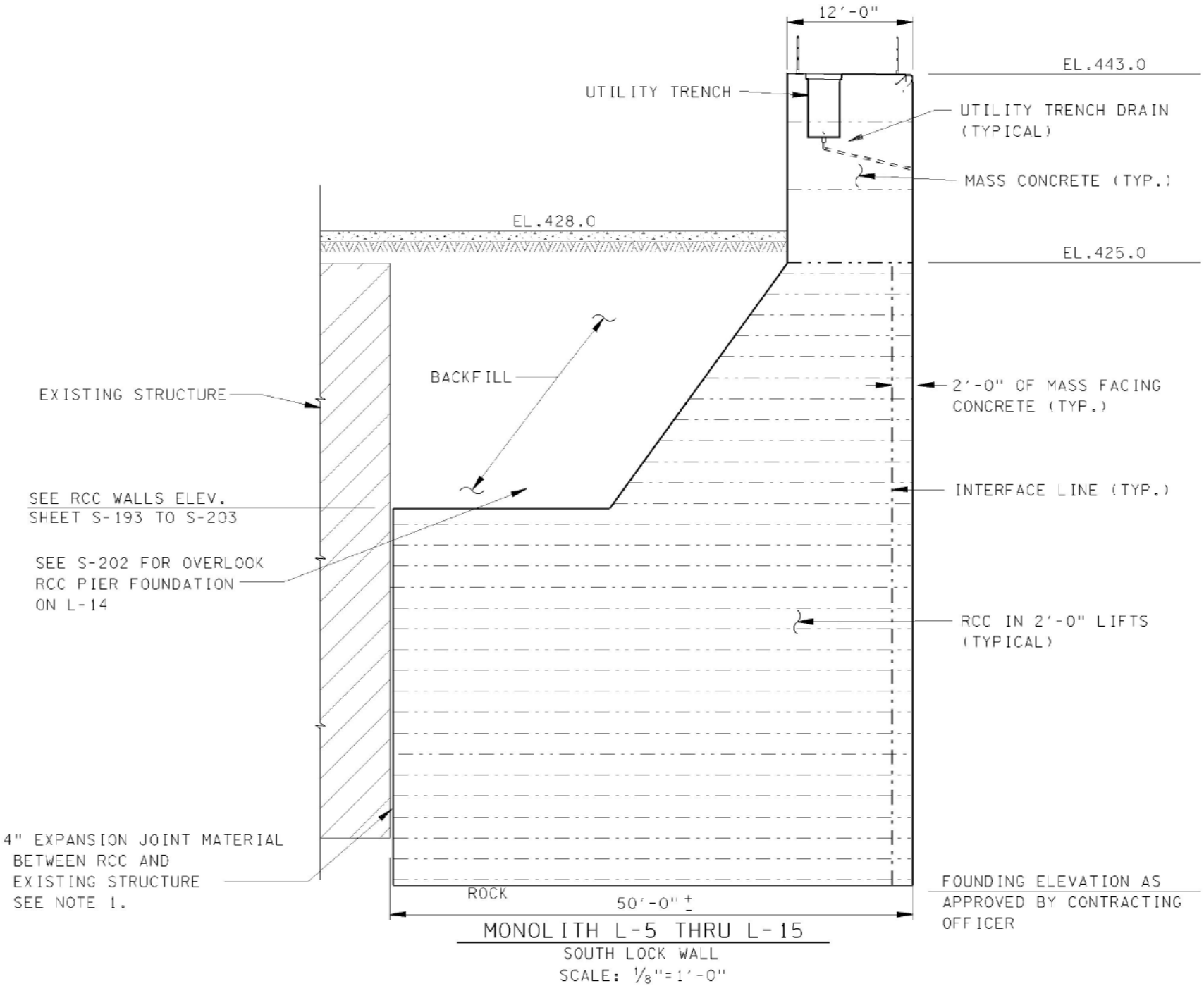


SOUTH WALL SECTION

INNOVATIVE CHAMBER WALL SECTION

SCALE: 1"= 10'

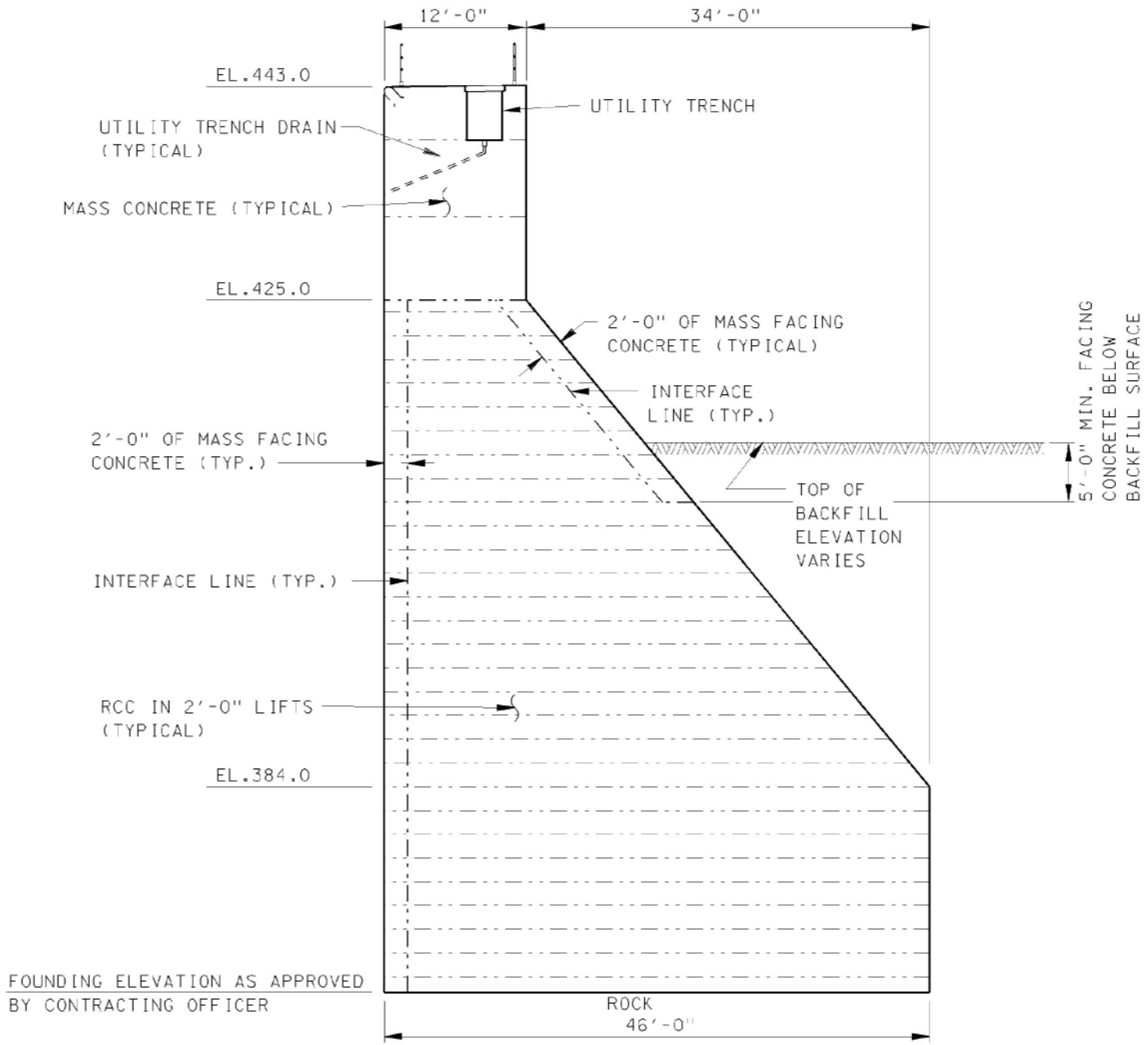
NORTH WALL SECTION



MONOLITH L-5 THRU L-15

SOUTH LOCK WALL

SCALE: 1/8"=1'-0"



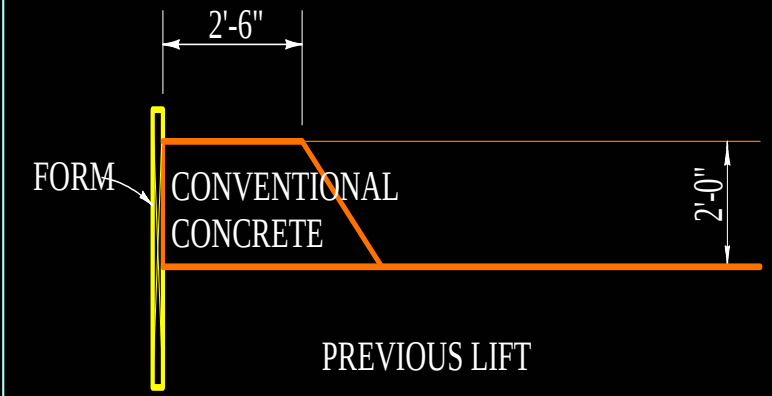
MONOLITH SM-11 THRU SM-12 AT STA.26+72.5

NORTH LOCK WALL

SCALE: 1/4"=1'-0"

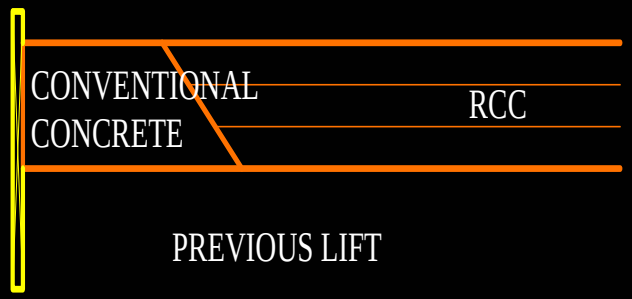
RCC PLACEMENT PROCEDURE

1



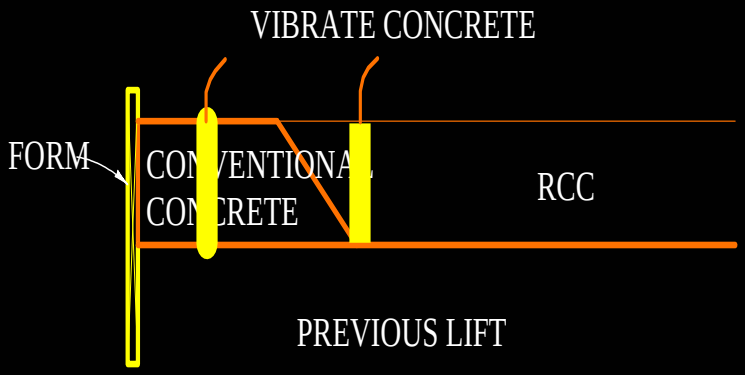
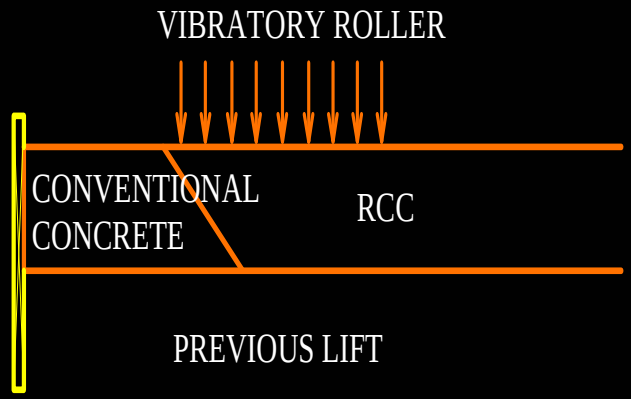
FOR EACH LIFT, CONVENTIONAL CONCRETE IS PLACED PRIOR TO ADJACENT RCC

2

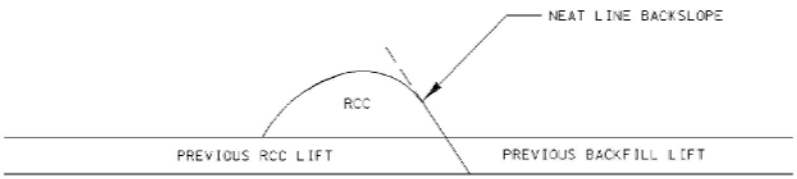
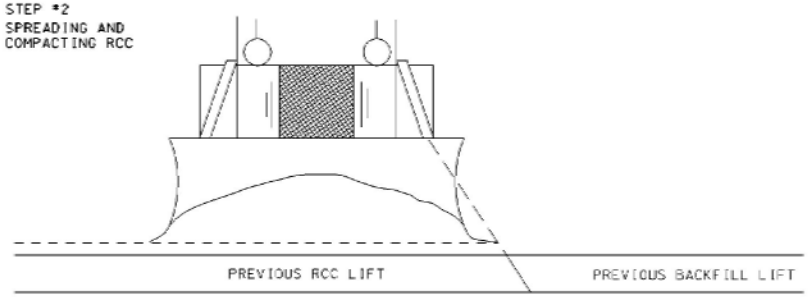
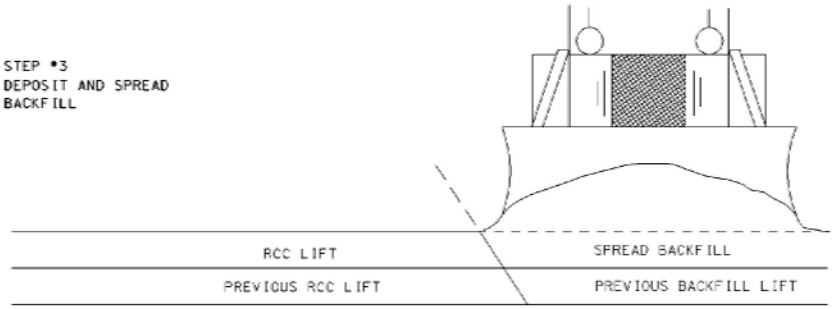
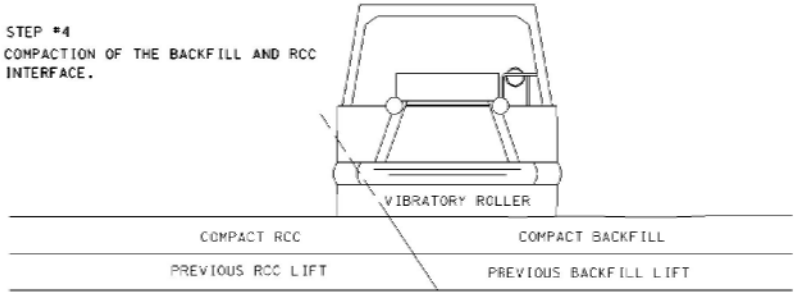


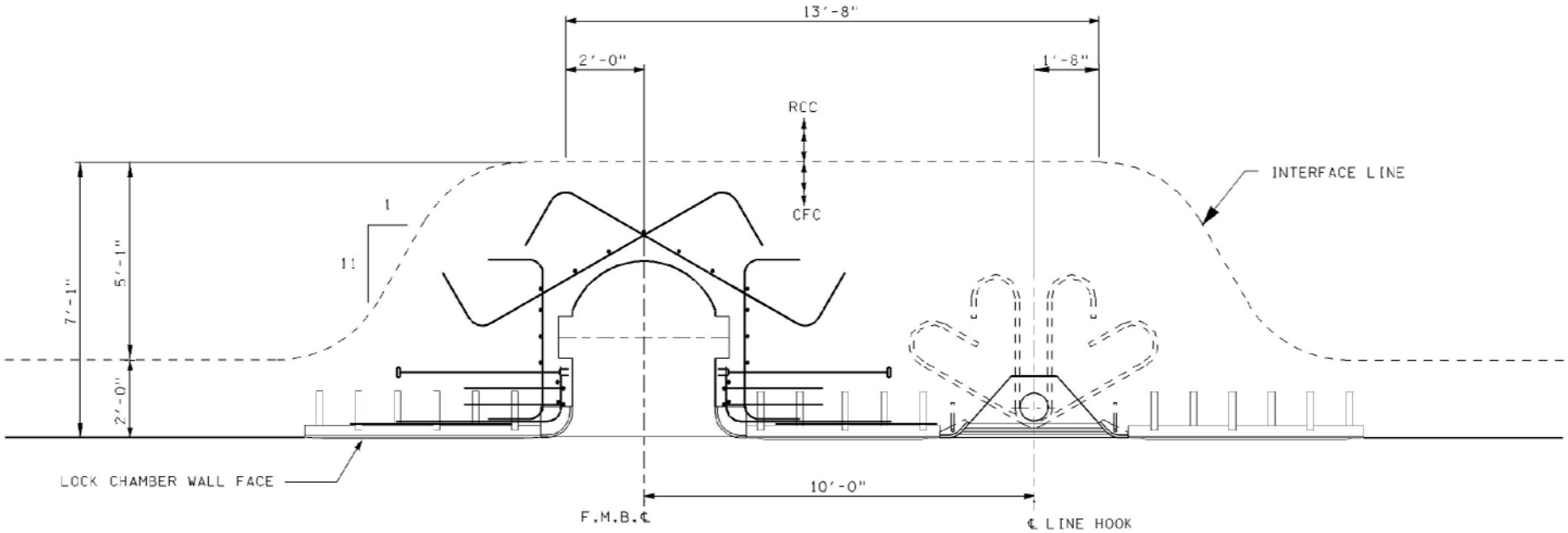
RCC IS SPREAD IN THIN LAYERS UNTIL FULL LIFT THICKNESS IS ACHIEVED.

RCC PLACEMENT PROCEDURE

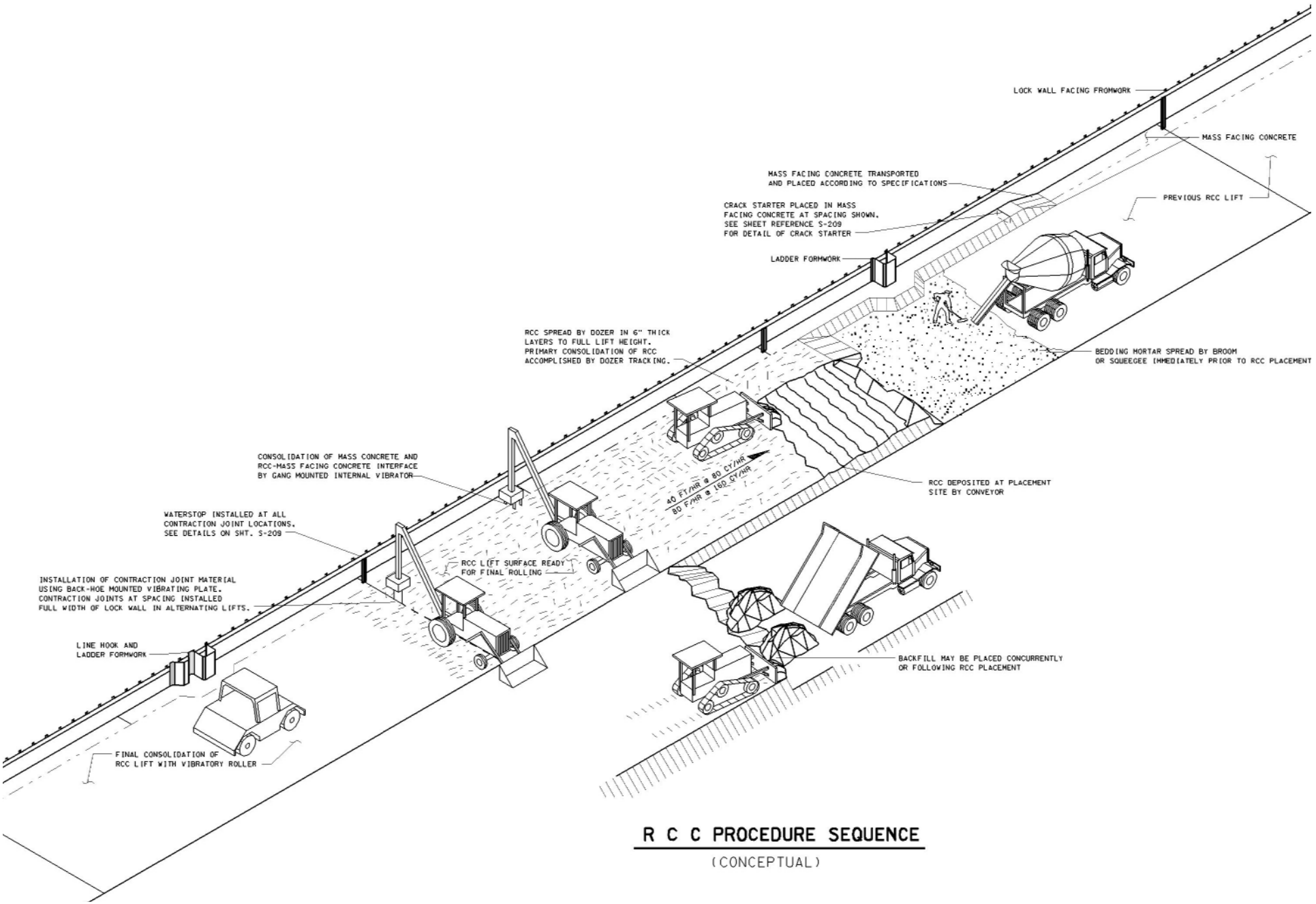
3		INTERFACE BETWEEN RCC AND CONVENTIONAL CONRETE IS THOROUGHLY VIBRATED
4		CONSOLIDATE RCC WITH VIBRATORY ROLLER AS CLOSE TO CONVENTIONAL CONCRETE AS POSSIBLE

PLACEMENT PROCEDURE AT INTERFACE BETWEEN RCC AND BACKFILL FOR CONCURRENT PLACEMENT

①	STEP *1 DEPOSIT RCC BY CONVEYOR  	RCC IS DEPOSITED, SPREAD AND CONSOLIDATED WITHIN THE SPECIFIED NEAT LINE.
②	STEP *2 SPREADING AND COMPACTING RCC  	RCC IS SPREAD IN 6" THICK LAYERS UNTIL FULL LIFT THICKNESS IS ACHIEVED.
③	STEP *3 DEPOSIT AND SPREAD BACKFILL  	BACKFILL IS SPREAD IN LAYERS MATCHING THE RCC LIFT.
④	STEP *4 COMPACTION OF THE BACKFILL AND RCC INTERFACE.  	VIBRATORY ROLLER IS USED TO COMPACT THE RCC AND BACKFILL AT THE INTERFACE.

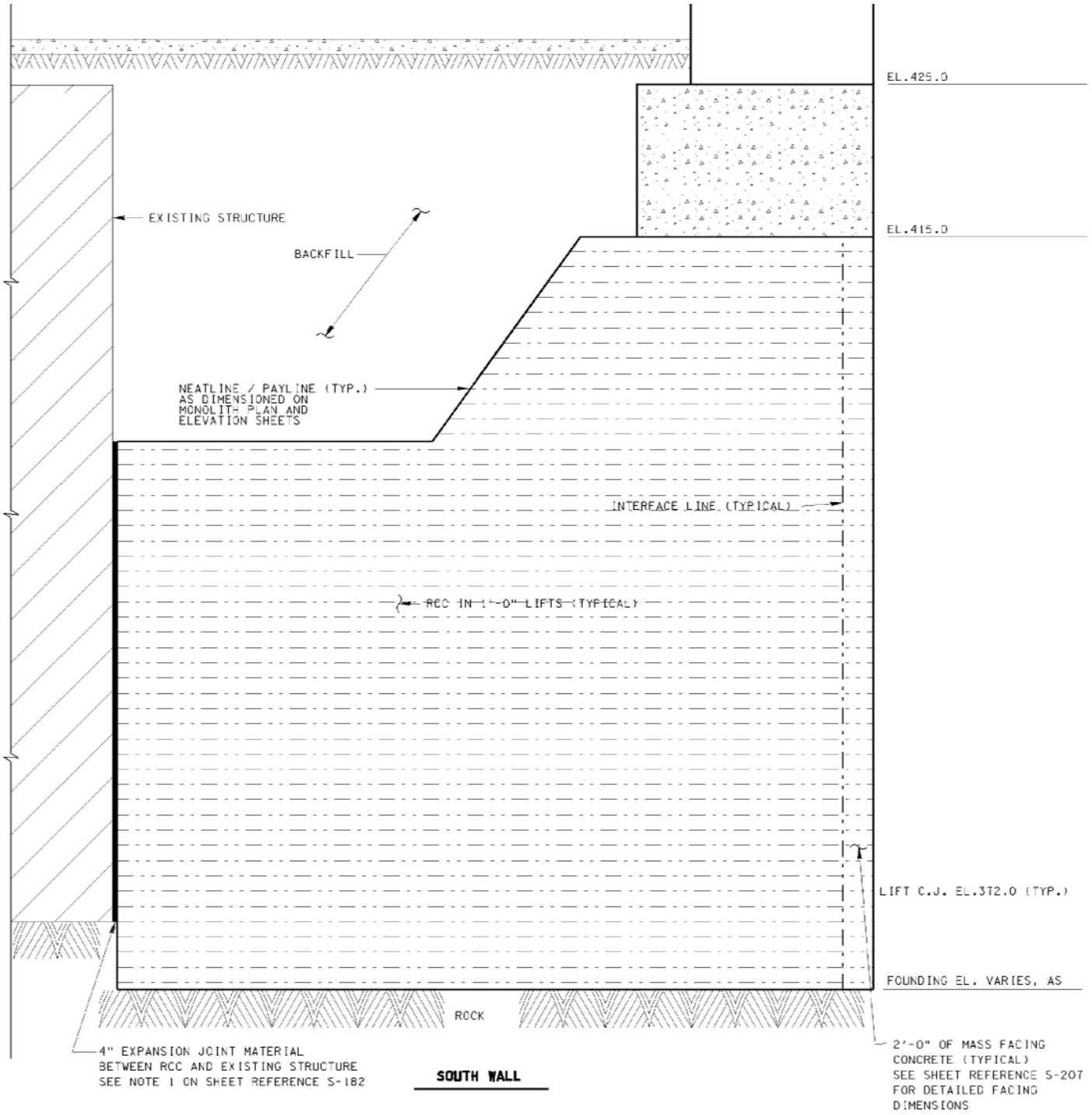


TYPICAL FLOATING MOORING BITT & LINE HOOK PLAN



R C C PROCEDURE SEQUENCE

(CONCEPTUAL)


EL.425.0
EXISTING STRUCTURE
EL.415.0
BACKFILL
NEATLINE / PAYLINE (TYP.)
AS DIMENSIONED ON
MONOLITH PLAN AND
ELEVATION SHEETS
INTERFACE LINE (TYPICAL)
RCC IN 1'-0" LIFTS (TYPICAL)
LIFT C.J. EL.372.0 (TYP.)
FOUNDING EL. VARIES, AS
ROCK
4" EXPANSION JOINT MATERIAL
BETWEEN RCC AND EXISTING STRUCTURE
SEE NOTE 1 ON SHEET REFERENCE S-182
2'-0" OF MASS FACING
CONCRETE (TYPICAL)
SEE SHEET REFERENCE S-207
FOR DETAILED FACING
DIMENSIONS

SOUTH WALL


TEREX






ERE
HOLT






310E










JOHN DEERE







DEERE








DEERE
L-13






E-13 | E-12


CLYDE
CAT
DEERE


CLYDE
CAT
RENTS



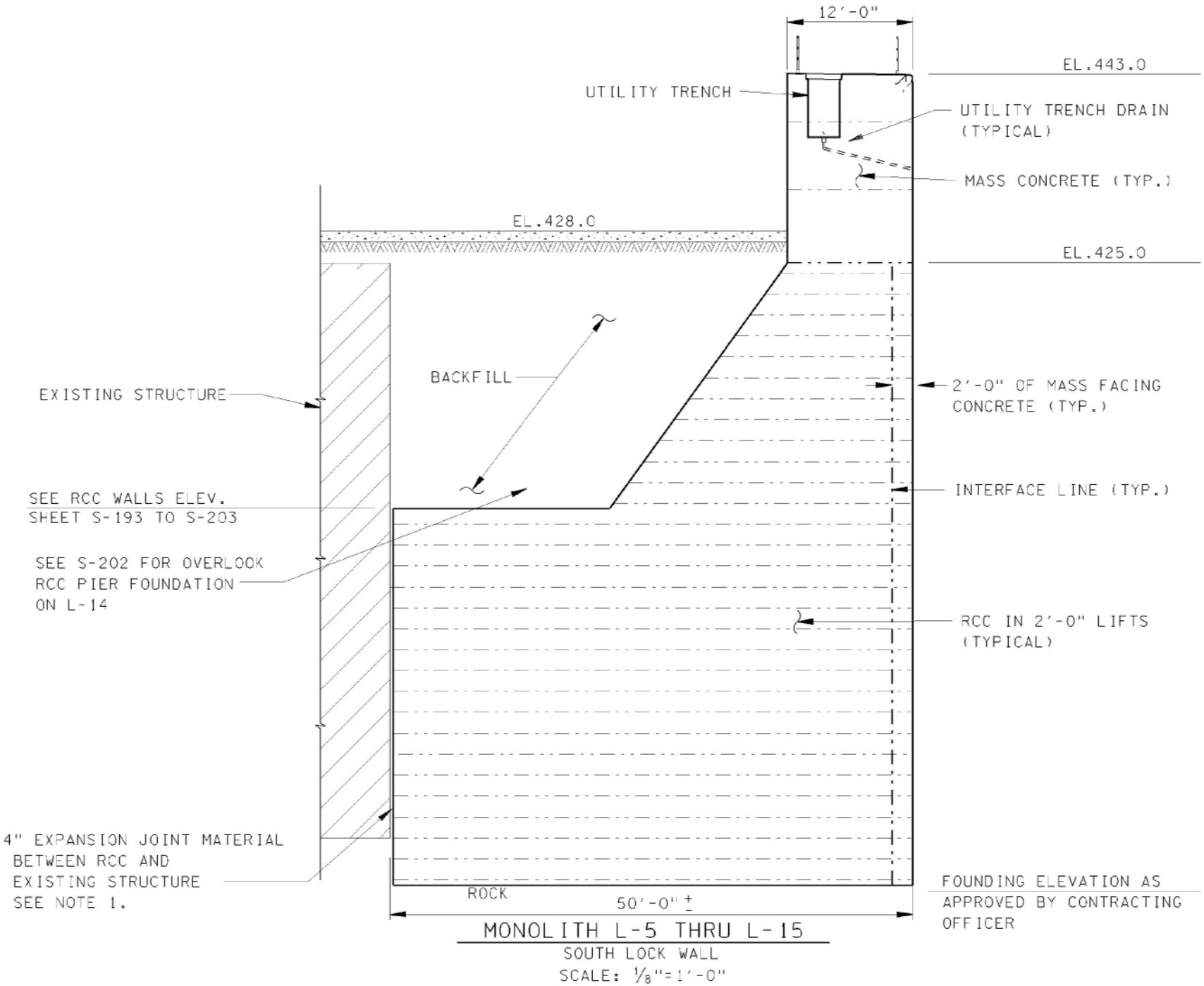

CAT
WAYNE
RENTS


CLYDE





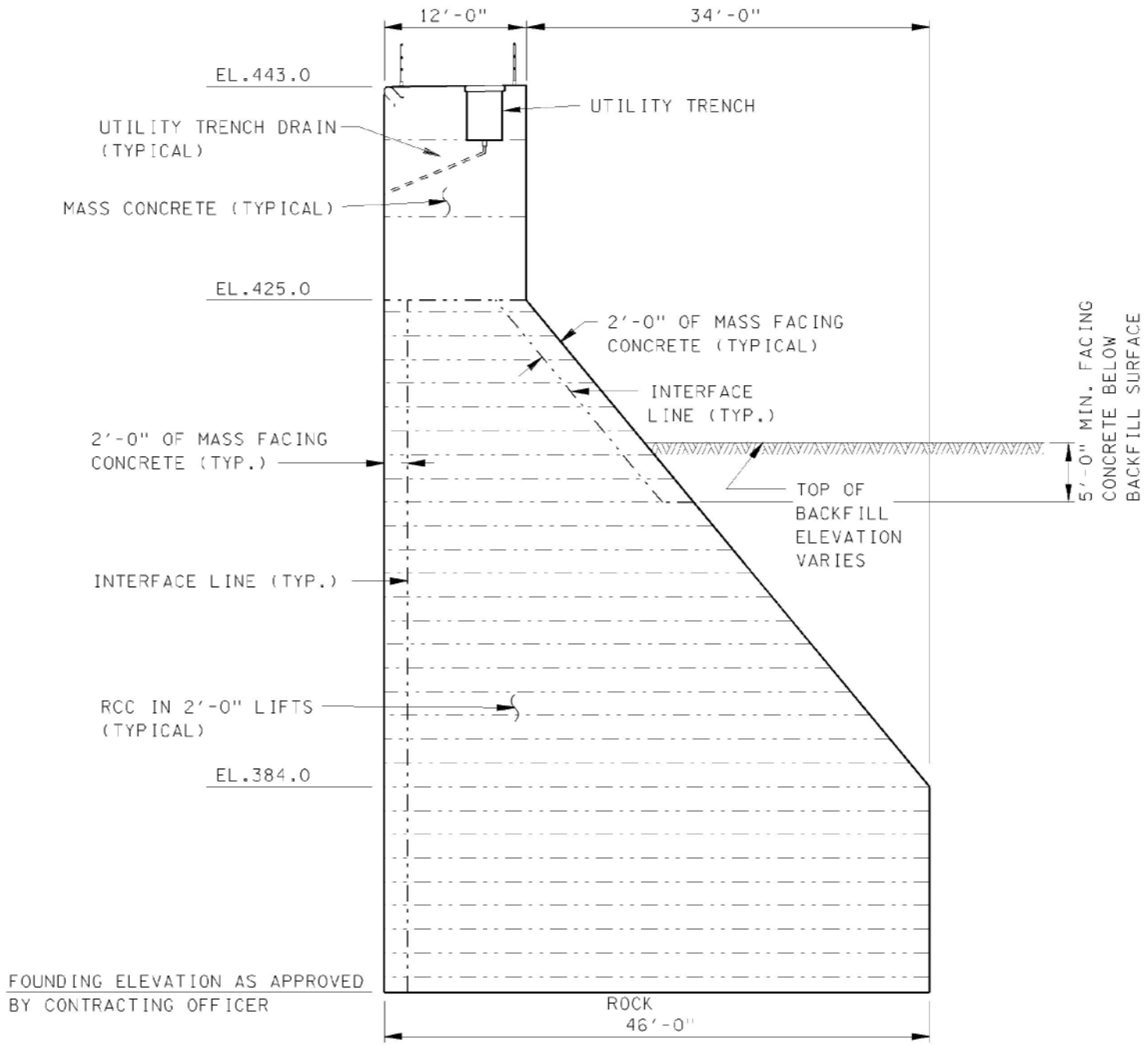




MONOLITH L-5 THRU L-15

SOUTH LOCK WALL

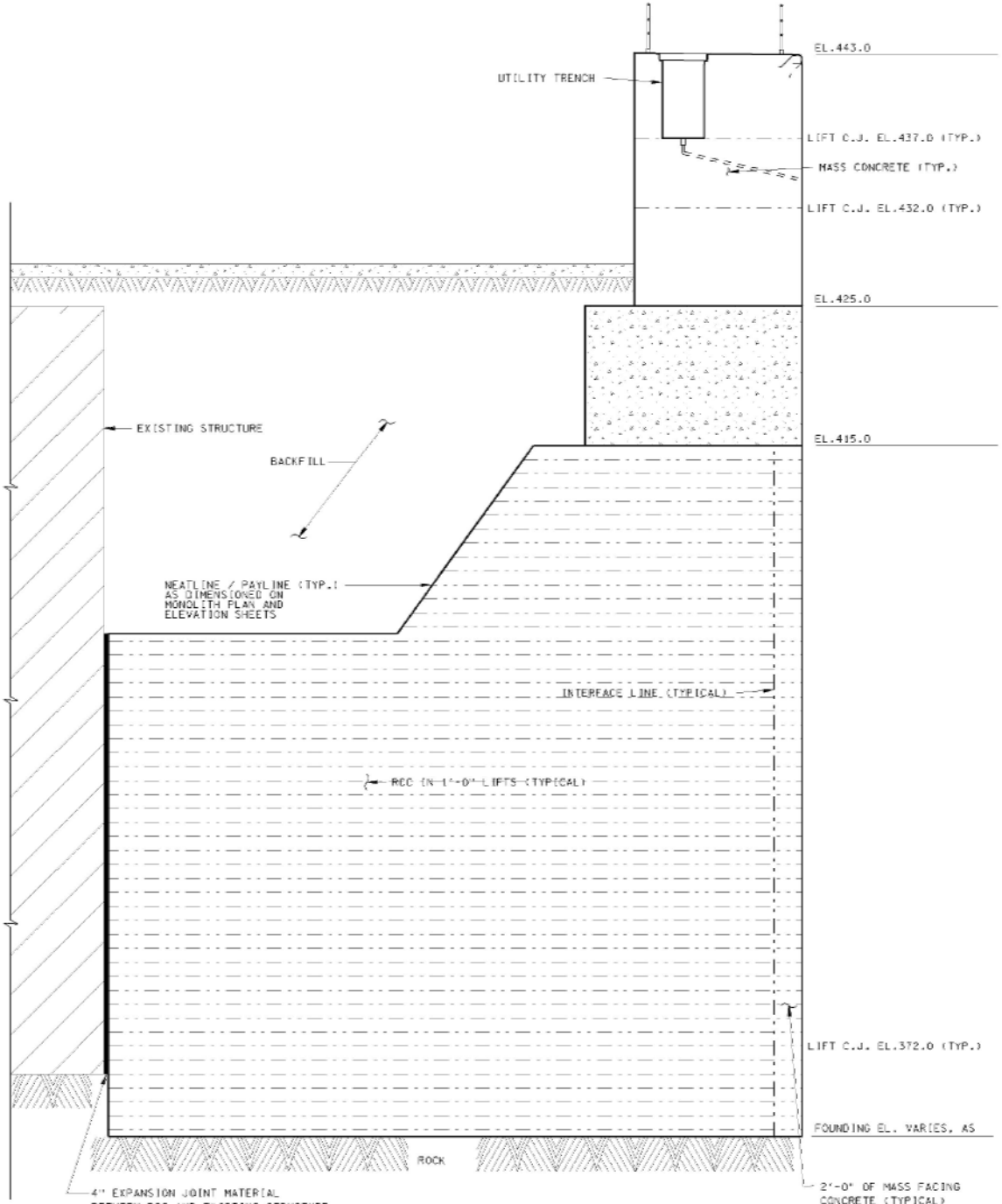
SCALE: 1/8"=1'-0"



MONOLITH SM-11 THRU SM-12 AT STA.26+72.5

NORTH LOCK WALL

SCALE: 1/4"=1'-0"


EL.443.0
UTILITY TRENCH
LIFT C.J. EL.437.0 (TYP.)
MASS CONCRETE (TYP.)
LIFT C.J. EL.432.0 (TYP.)
EL.425.0
EXISTING STRUCTURE
BACKFILL
EL.415.0
NEATLINE / PAYLINE (TYP.) AS DIMENSIONED ON MONOLITH PLAN AND ELEVATION SHEETS
INTERFACE LINE (TYPICAL)
RCC IN 1'-0" LIFTS (TYPICAL)
LIFT C.J. EL.372.0 (TYP.)
FOUNDING EL. VARIES, AS
ROCK
4" EXPANSION JOINT MATERIAL BETWEEN RCC AND EXISTING STRUCTURE SEE NOTE 1 ON SHEET REFERENCE S-182
2'-0" OF MASS FACING CONCRETE (TYPICAL) SEE SHEET REFERENCE S-207 FOR DETAILED FACING DIMENSIONS

SOUTH WALL



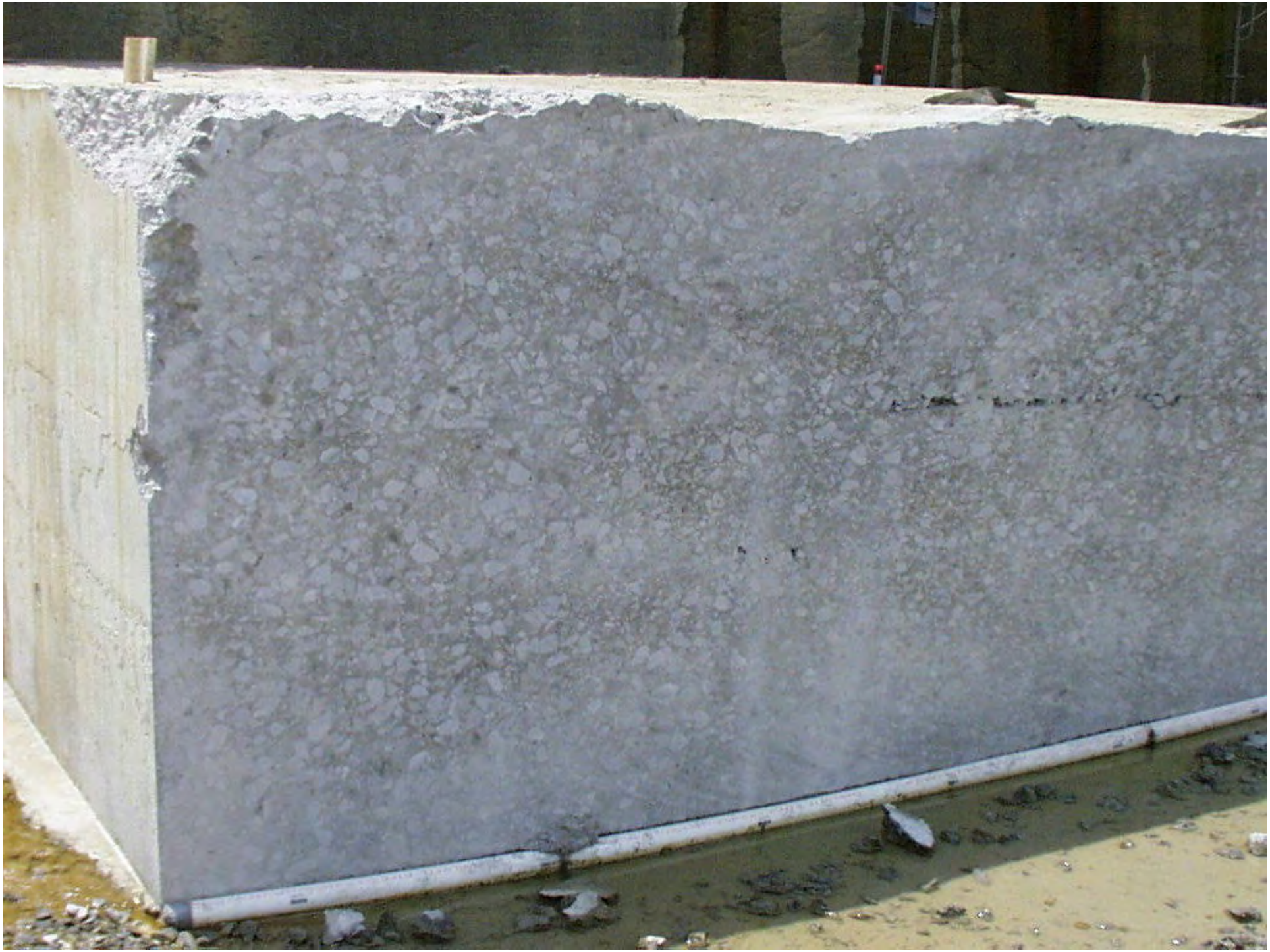





TEREX
TEREX


6/24
6/23
6/22


6/24
6/23
6/22











US Army Corps of Engineers

ROLLER COMPACTED CONCRETE

- MATERIAL PROPERTIES -

ITEM	Assumed For Design	Actual QA Test Results
Unit Weight	150 pcf	154 pcf
Compressive Strength	2000 psi	3300 psi
Phi	45 degrees	??
Cohesion	25 psi	??

US Army Corps of Engineers

ROLLER COMPACTED CONCRETE

- DESIGN CRITERIA -

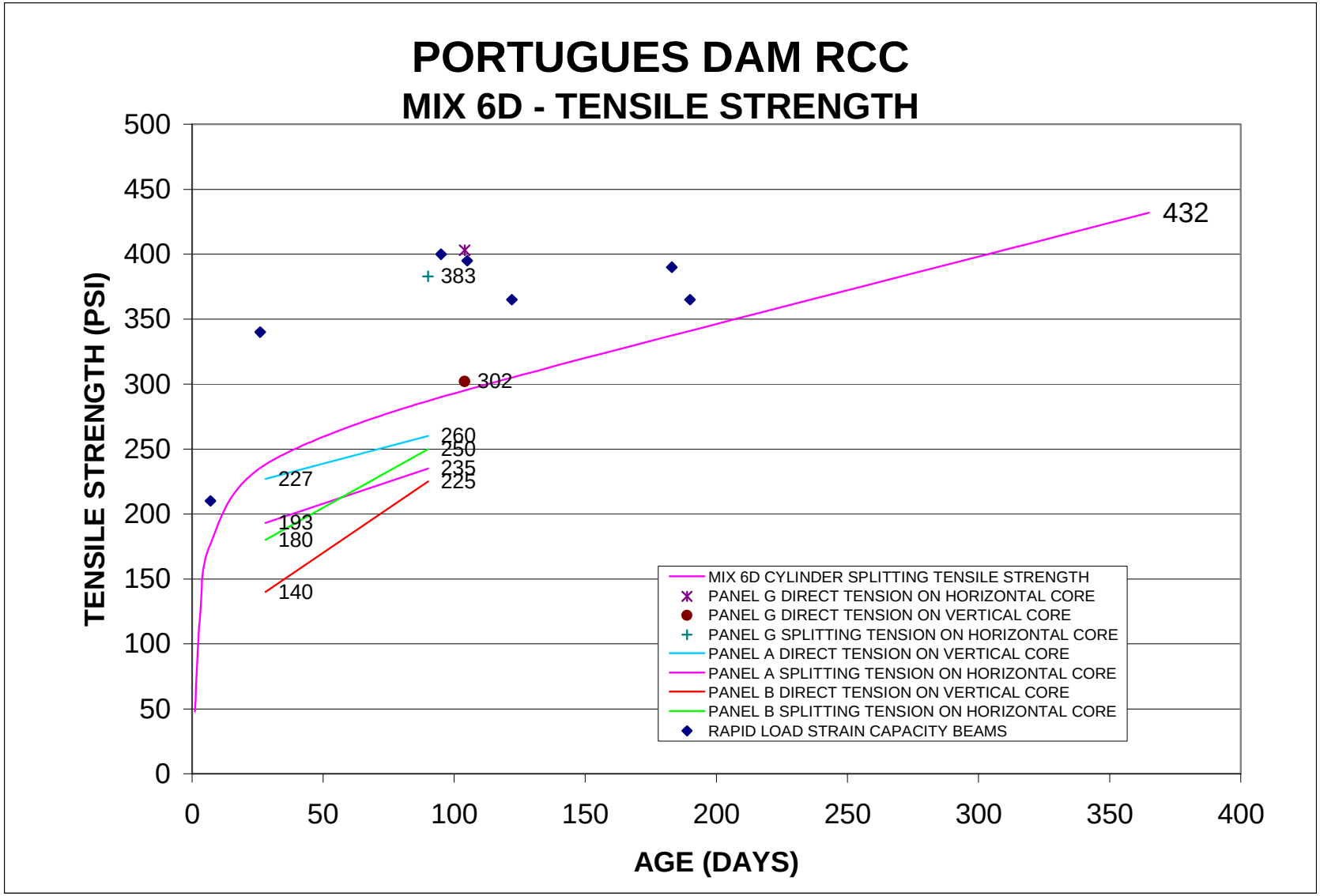
CRACKED PLANE (Full Uplift Assumed)

CHECKS
Location of Resultant for Overturning Stability
Factor of Safety Against Sliding
Compression Stresses Against Allowables

UNCRACKED PLANE (Reduced and Zero Uplift Assumed)

CHECKS
Factor of Safety Against Sliding
Compression and Tension Stresses Against Allowables
Allowable Tension Stress 25% of Table 4-1
(Design Value = 59.5 psi vs. 332 psi w/ 100% & QA values)
Allowable Compressive Stress 100% of Table 4-1
(Design Value = 1800 psi vs. 2970 psi w/ Actual QA values)

Bond Strength





Larry L. Dalton, PE
Louisville District, USACE
(502) 315-6279
Larry.L.Dalton@LRL02.usace.army.mil

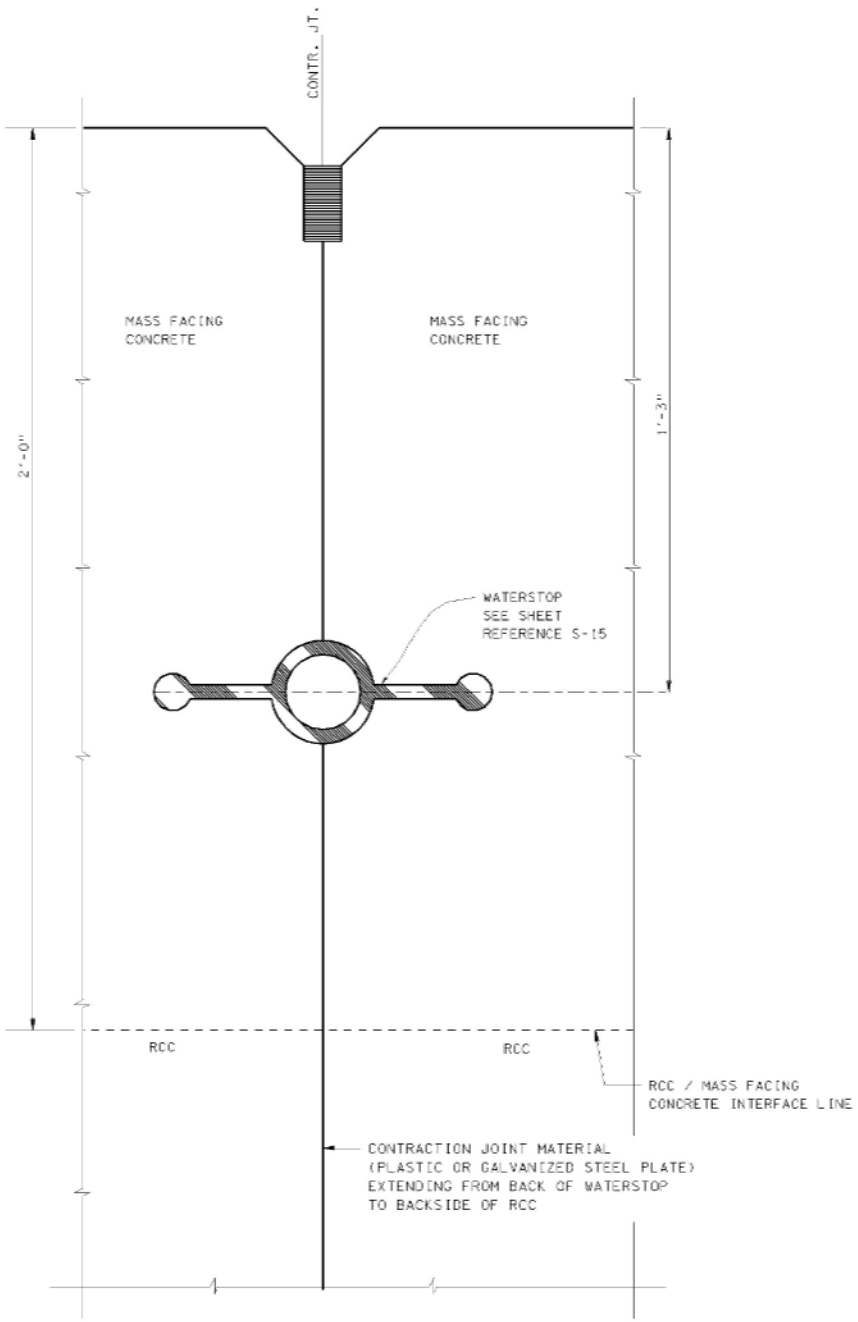


US Army Corps of Engineers

PRELIMINARY

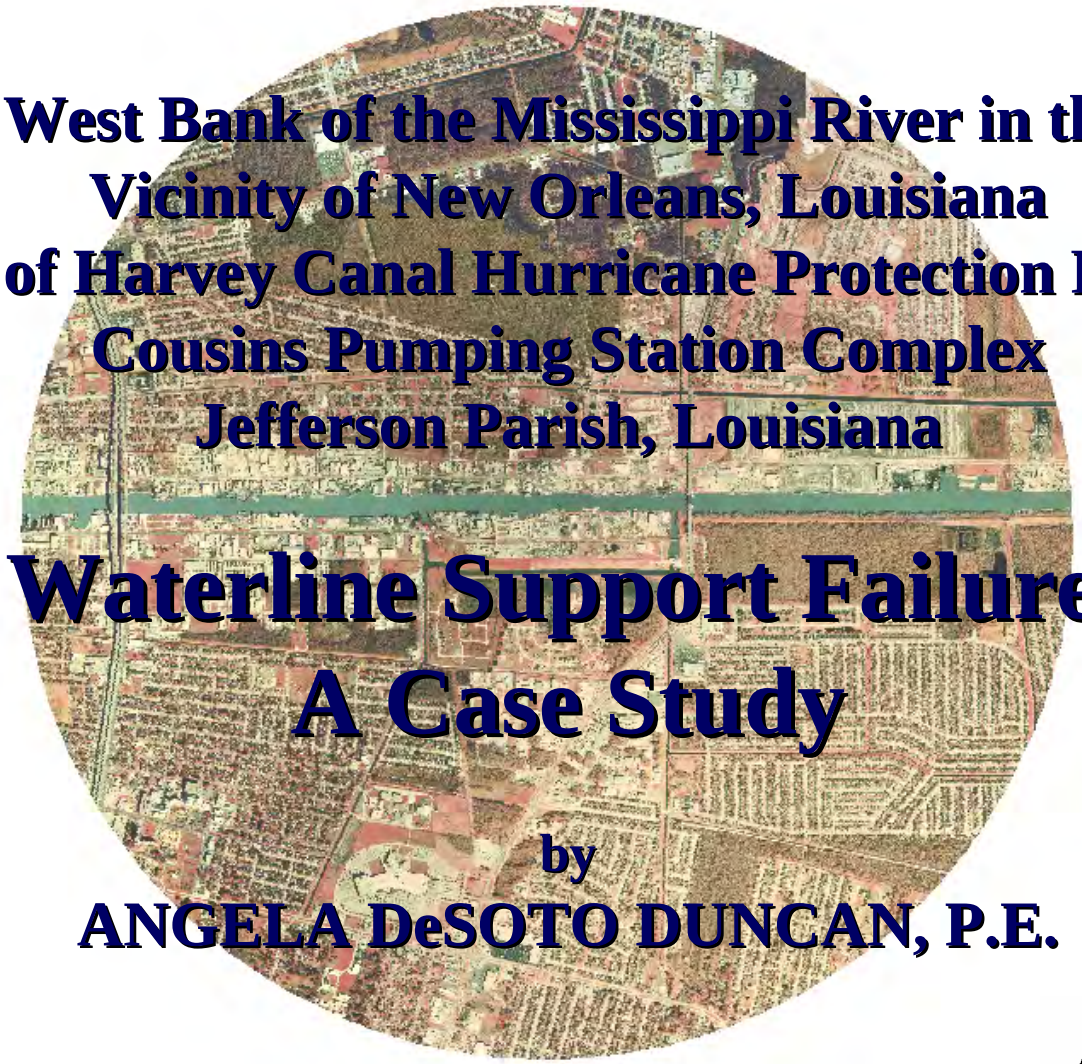
- *MIX PROPORTIONS* -

Material	Mixture No. 2 63mm NMSA RCC Natural Sand Fine Aggregate 35% Class F Fly Ash Mass, S.S.D. (lb)	Mixture No. 5 63mm NMSA RCC Limestone Fine Aggregate 35% Class F Fly Ash Mass, S.S.D. (lb)
Cement	130	156
Fly Ash	54	64
Fly Ash for Fines	104	0
Limestone Fines	0	1317
Natural Sand	1252	0
63 to 19.0 mm	1463	1400
19.0 to 4.75 mm	979	934
Water	168	221
WRA	12.0 fl oz	14.4 fl oz
Vebe (average)	15 sec	16 sec



CONTRACTION JOINT DETAIL

West Bank of the Mississippi River in the
Vicinity of New Orleans, Louisiana
East of Harvey Canal Hurricane Protection Project
Cousins Pumping Station Complex
Jefferson Parish, Louisiana



Waterline Support Failure:
A Case Study

by

ANGELA DeSOTO DUNCAN, P.E.

US Army Corps of Engineers
New Orleans District

WEST JEFFERSON ENGINEERING SERVICES
- A JOINT VENTURE GROUP -
BKI BURK-KLEINPETER, INC
Shaw Shaw Coastal, Inc.

WEST JEFFERSON LEVEE DISTRICT
BOARD OF COMMISSIONERS

Jean Baptiste Le Moyne



Sieur de Bienville

Founded New Orleans in 1718






WEST BANK AND VICINITY,
NEW ORLEANS, LA
HURRICANE PROTECTION PROJECT
TROPICAL STORM FRANCES SEPTEMBER 1998

West Bank & Vicinity, New Orleans, LA Facts

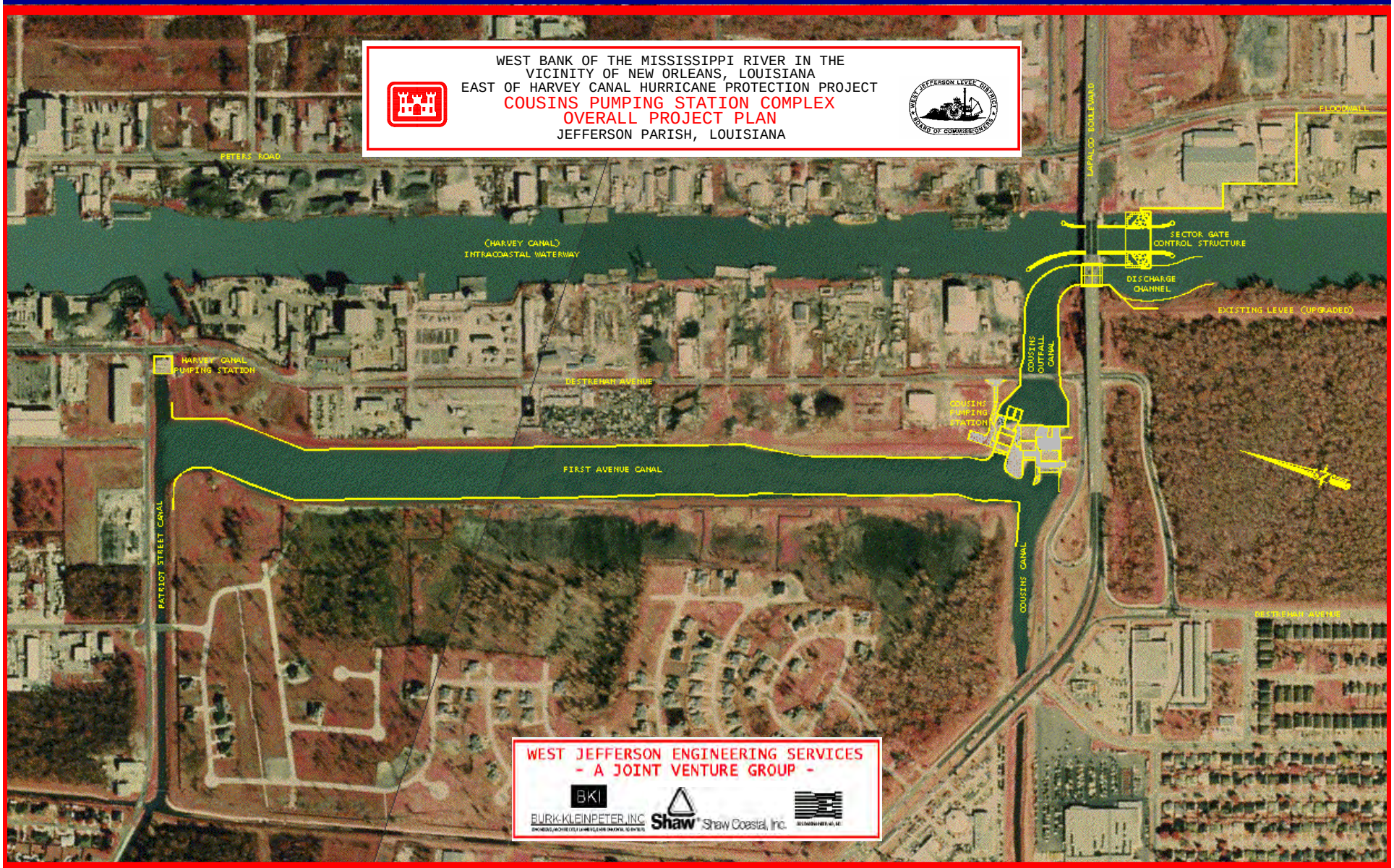
- **WRDA 1986**
  - **Authorized Westwego to Harvey Canal**
- **WRDA 1996**
  - **Modified project to add Lake Cataouatche**
  - **Also authorized East of Harvey Canal**
- **WRDA 1999**
  - **Combined the 3 projects into one**
- **Cost shared**
  - **65% Federal / 35% Non-federal**
- **Sponsor**
  - **LADOTD for construction & WJLD for O&M**
- **Current estimated total project cost: $340M**

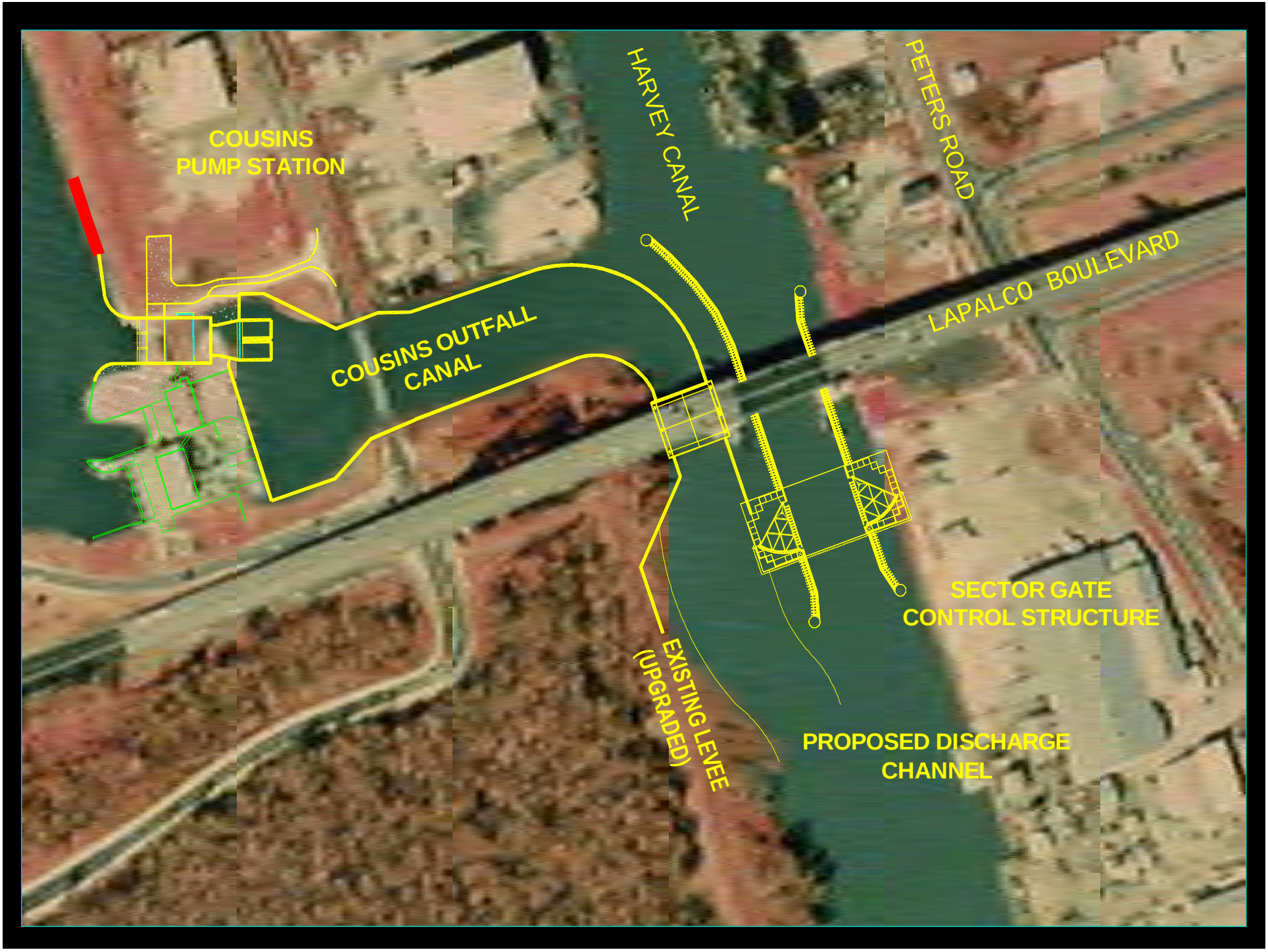
West Bank & Vicinity, New Orleans, LA Summary

- Will protect approximately 250,000 citizens
- Will protect over 65,000 homes and businesses in Orleans, Plaquemines and Jefferson Parishes
- When complete, will cover over 65 miles of levees, floodwalls and floodgates in the tri-parish area
- Through the end of 2004, federal & local sources have spent over $150 million
- Project is 38% complete; completion date 2018

West Bank & Vicinity, New Orleans, LA, Hurricane Protection Project

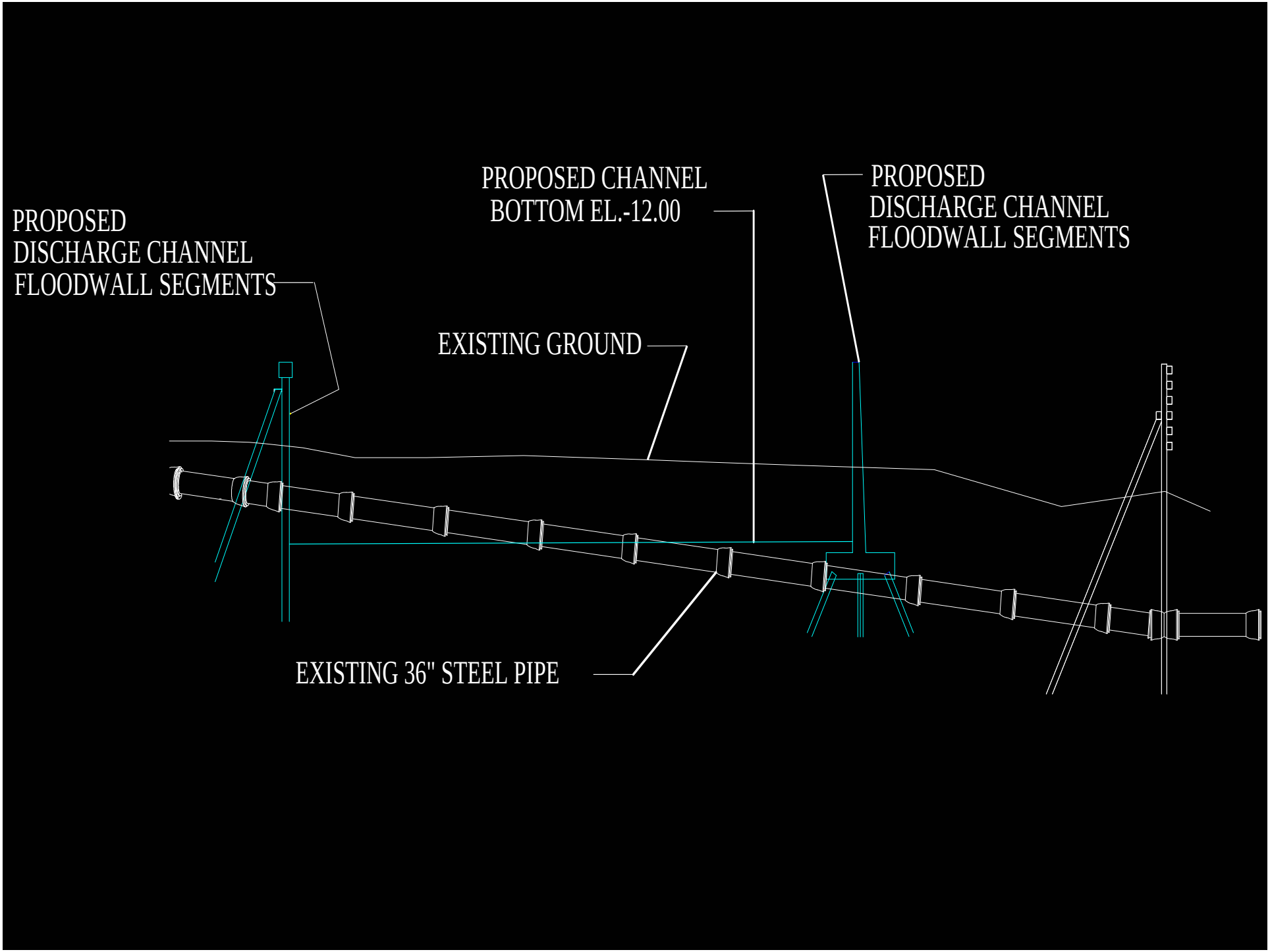


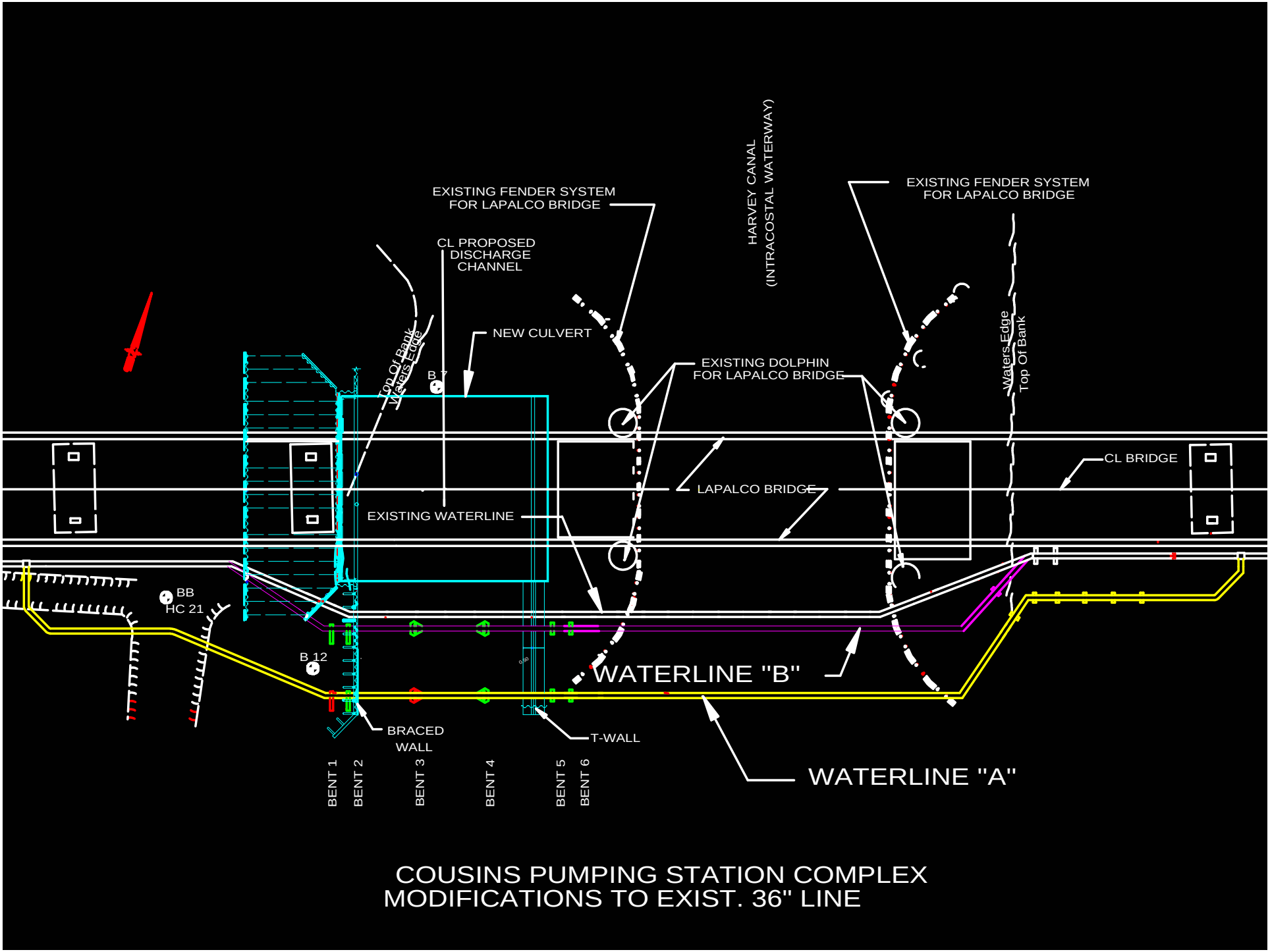

WEST BANK OF THE MISSISSIPPI RIVER IN THE
VICINITY OF NEW ORLEANS, LOUISIANA
EAST OF HARVEY CANAL HURRICANE PROTECTION PROJECT
COUSINS PUMPING STATION COMPLEX
OVERALL PROJECT PLAN
JEFFERSON PARISH, LOUISIANA
WEST JEFFERSON LEVEE DISTRICT BOARD OF COMMISSIONERS
PETERS ROAD
(HARVEY CANAL)
INTRACOASTAL WATERWAY
LAPALCO BOULEVARD
FLOODWALL
SECTOR GATE
CONTROL STRUCTURE
DISCHARGE
CHANNEL
EXISTING LEVEE (UPGRADED)
COUSINS
OUTFALL
CANAL
HARVEY CANAL
PUMPING STATION
DESTREHAN AVENUE
COUSINS
PUMPING
STATION
FIRST AVENUE CANAL
PATRIOT STREET CANAL
COUSINS CANAL
DESTREHAN AVENUE
WEST JEFFERSON ENGINEERING SERVICES
- A JOINT VENTURE GROUP -
BKI
BURK-KLEINPETER, INC.
Shaw
Shaw Coastal, Inc.


COUSINS
PUMP STATION
HARVEY CANAL
PETERS ROAD
LAPALCO BOULEVARD
COUSINS OUTFALL
CANAL
SECTOR GATE
CONTROL STRUCTURE
EXISTING LEVEE
(UPGRADED)
PROPOSED DISCHARGE
CHANNEL

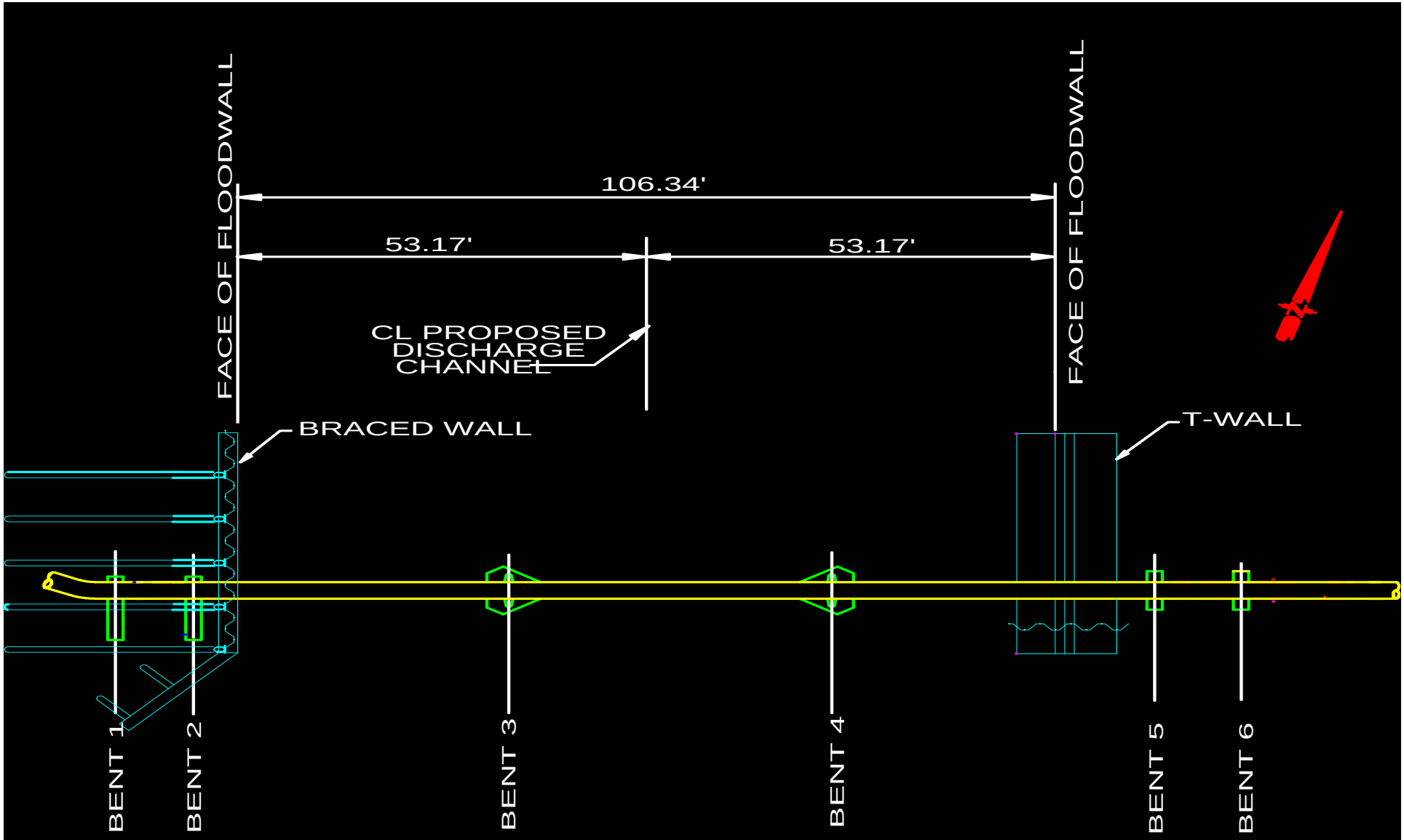


First Ave. Canal &
Cousins Pumping Station


PROPOSED CHANNEL
BOTTOM EL.-12.00
PROPOSED
DISCHARGE CHANNEL
FLOODWALL SEGMENTS
PROPOSED
DISCHARGE CHANNEL
FLOODWALL SEGMENTS
EXISTING GROUND
EXISTING 36" STEEL PIPE

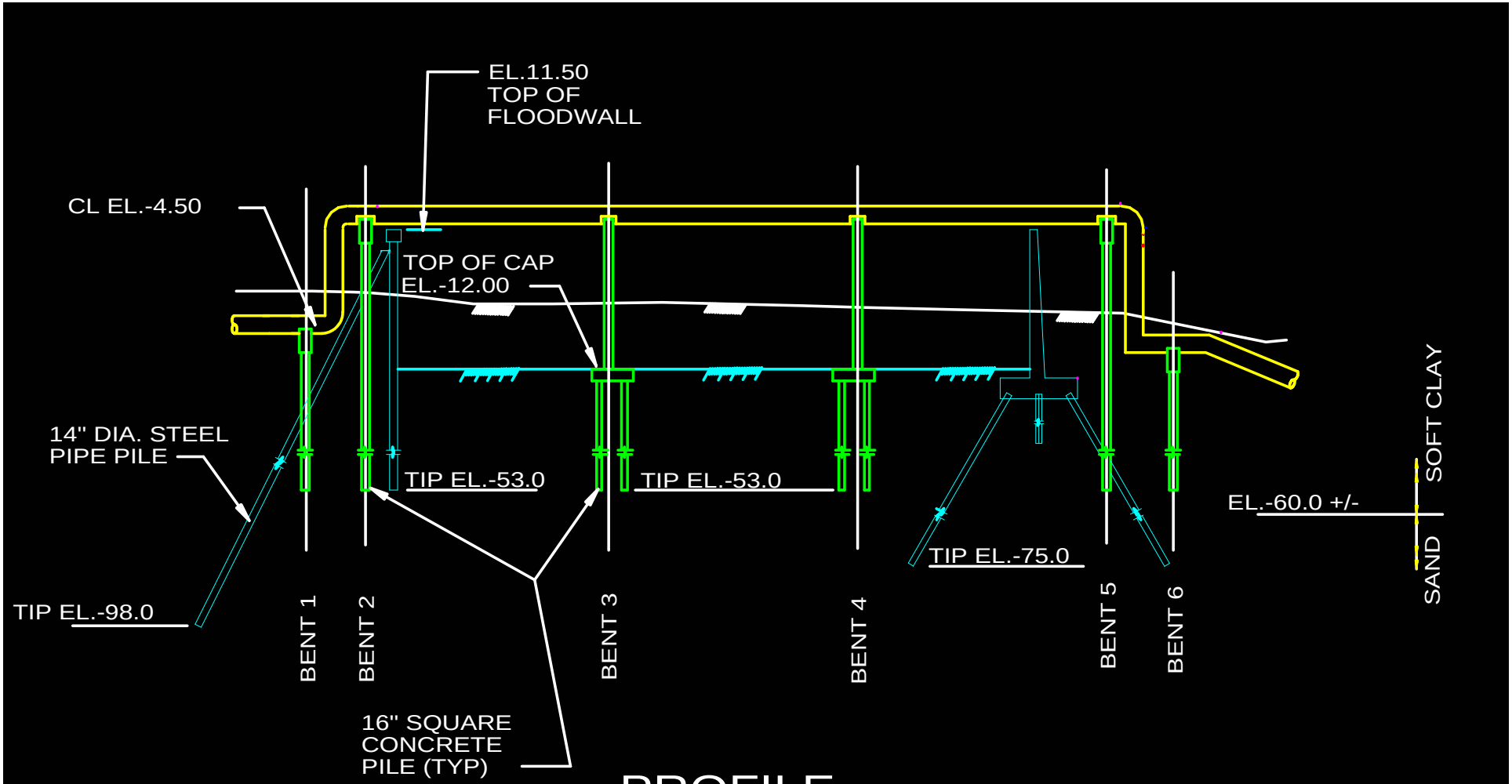


COUSINS PUMPING STATION COMPLEX
MODIFICATIONS TO EXIST. 36" LINE



PLAN

COUSINS PUMPING STATION COMPLEX
ORIGINAL WATERLINE CROSSING
(WATERLINES "A" AND "B")



PROFILE

COUSINS PUMPING STATION COMPLEX
ORIGINAL WATERLINE CROSSING
(WATERLINES "A" AND "B")

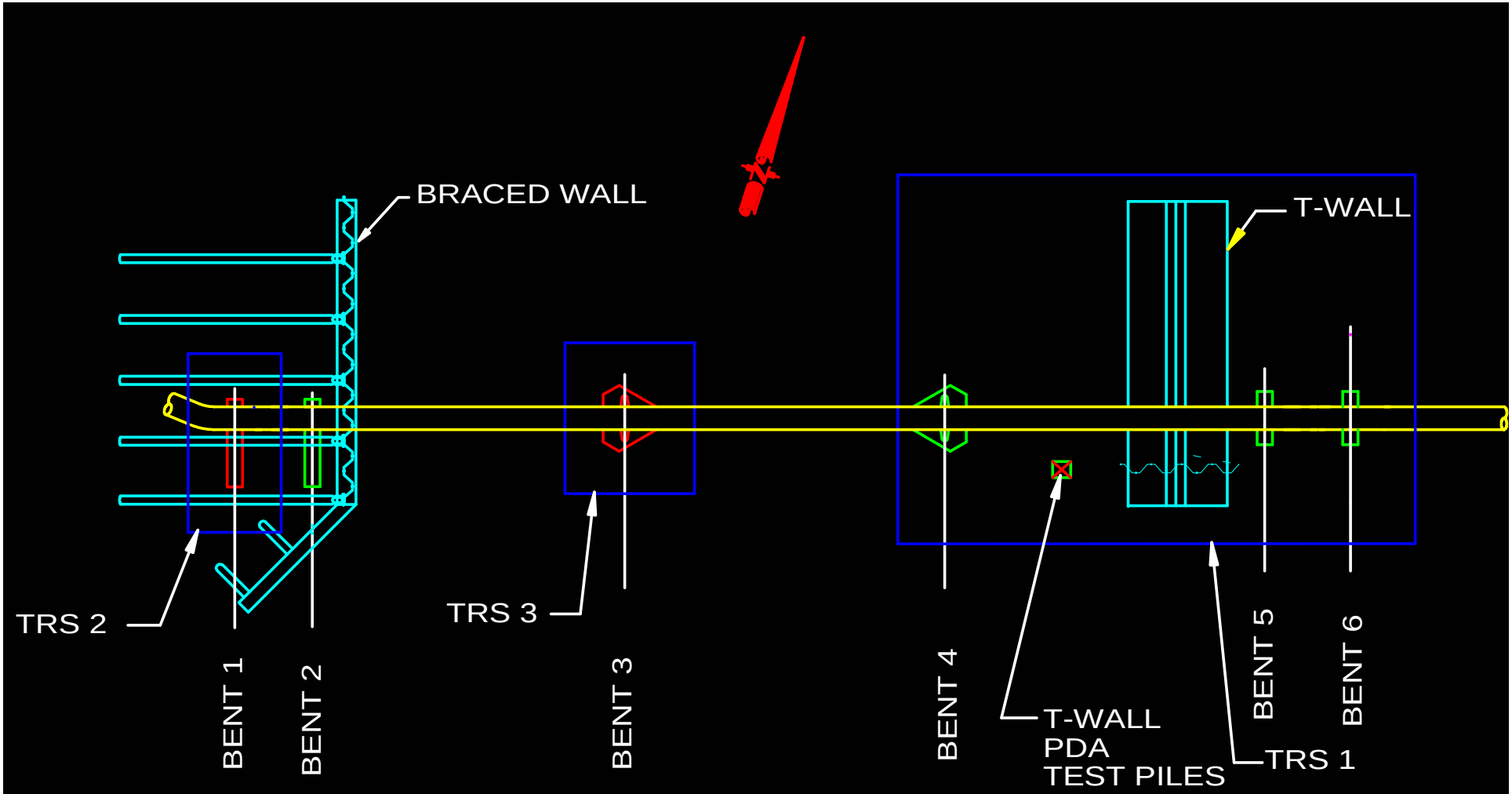


Pile Driving by Waterline “A”



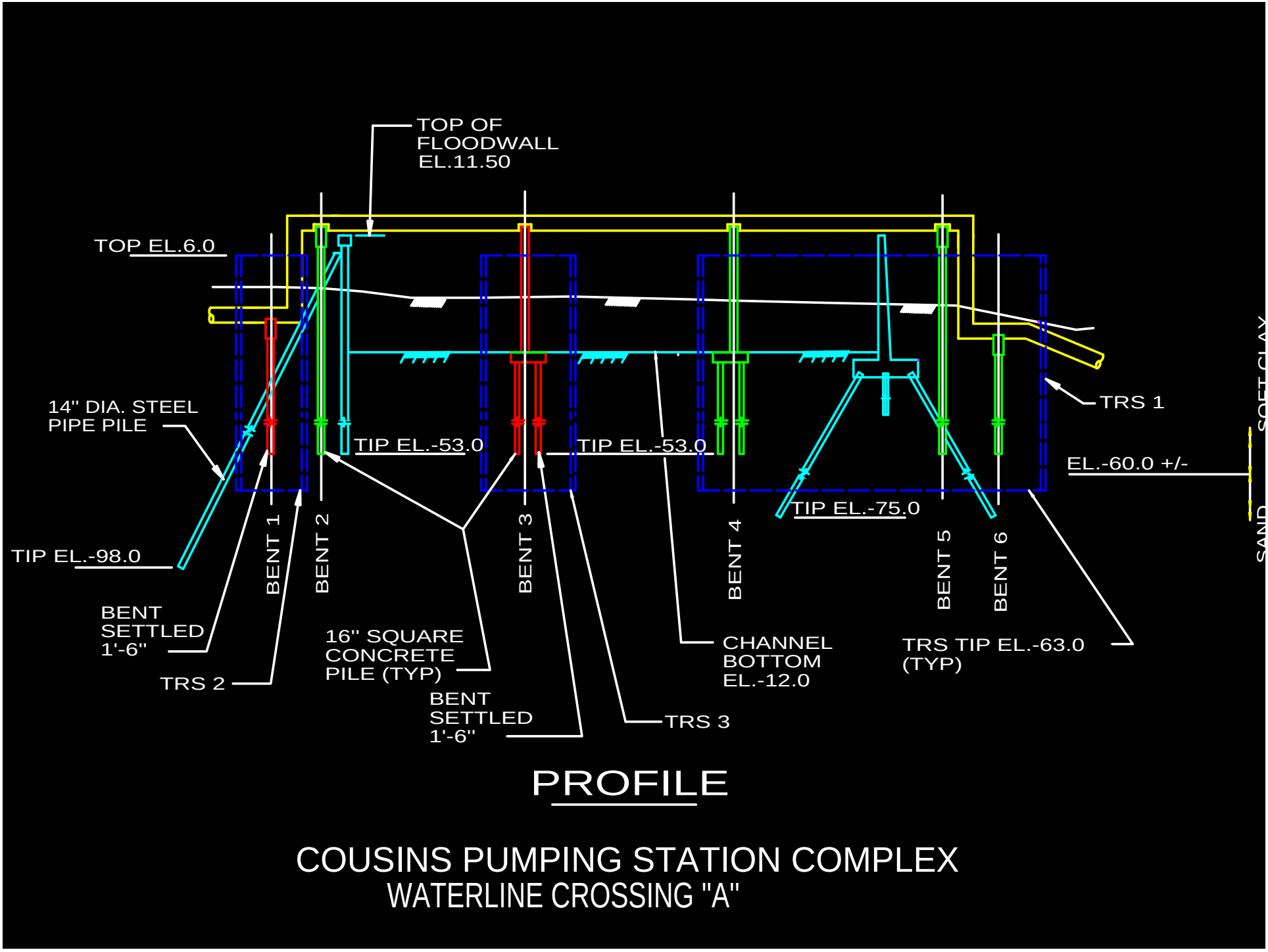
Waterline Segment





PLAN

COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"



PROFILE

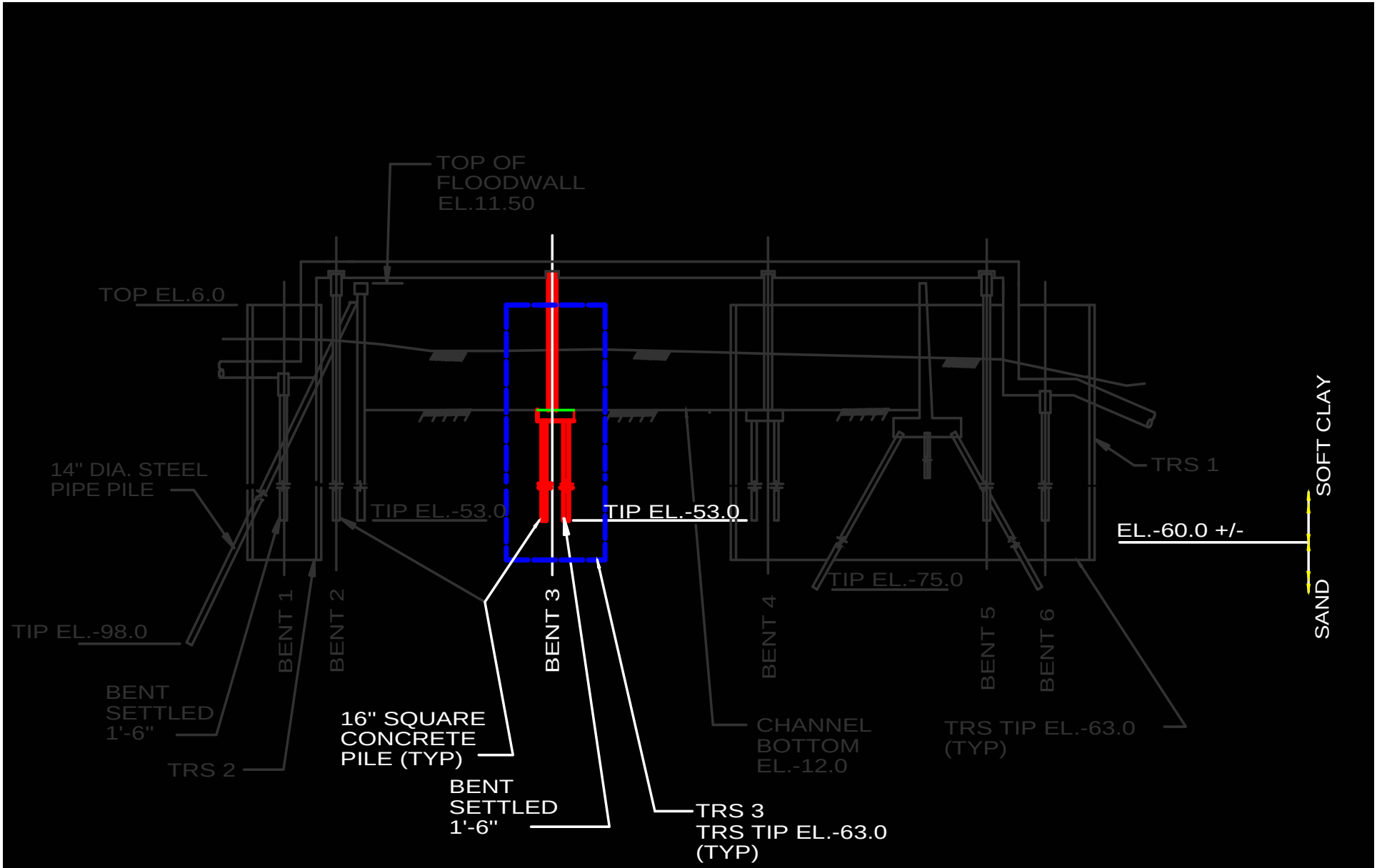
COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"

Event Timeline - 2004

- Jan 8 & 9 – Contractor pulls cofferdam sheet piling around bent A-3
- Jan 12 – Contractor reports settlement of bent A-3. Bent surveyed. Settlement = 1’-6”
- Jan 26 – First Modification issued

Potential Cause

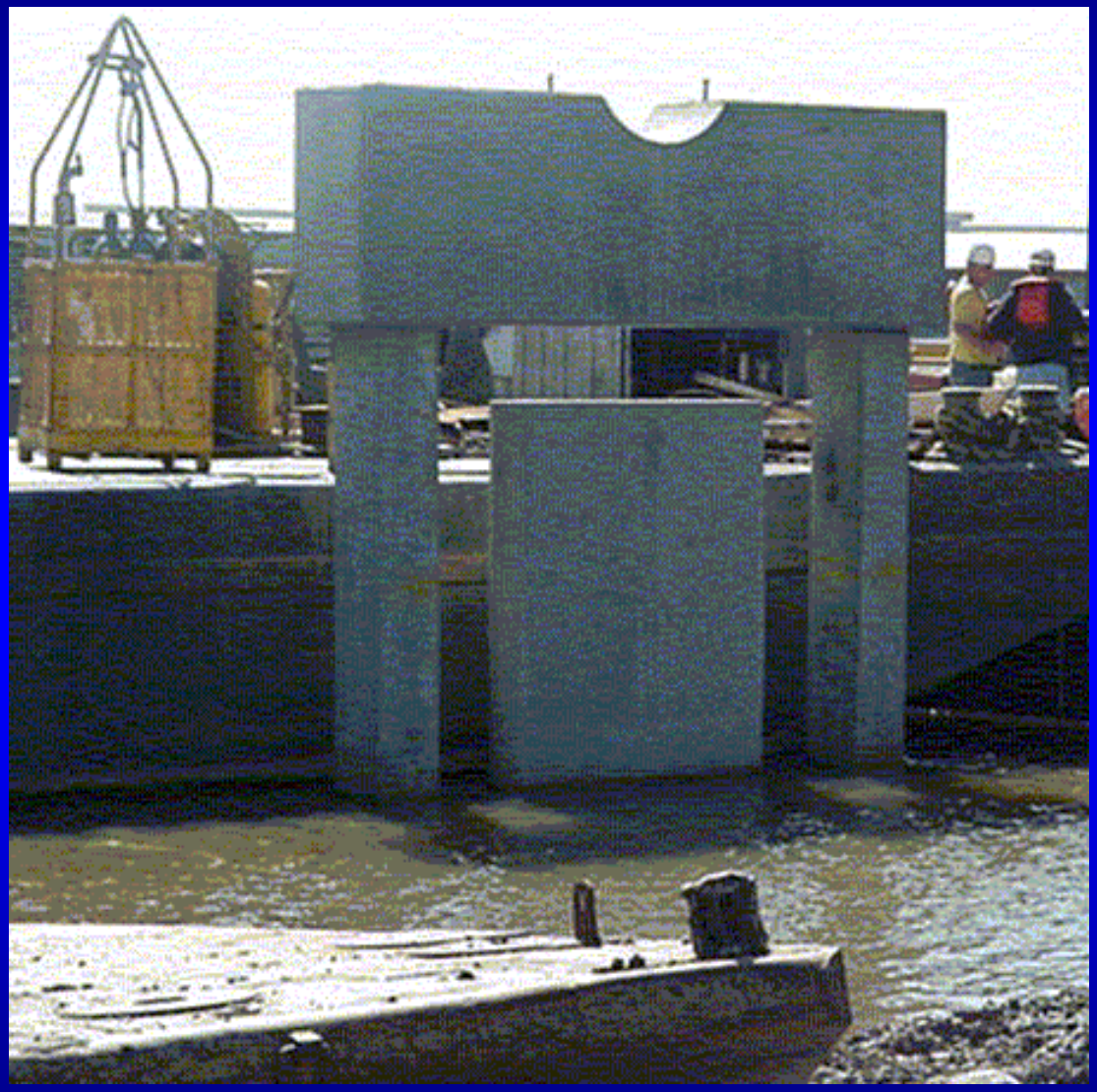
- Soil Wedge Filled the Void Caused by Cofferdam Removal
- Permanent Piles were COMPLETELY in the Soil Wedge that Moved



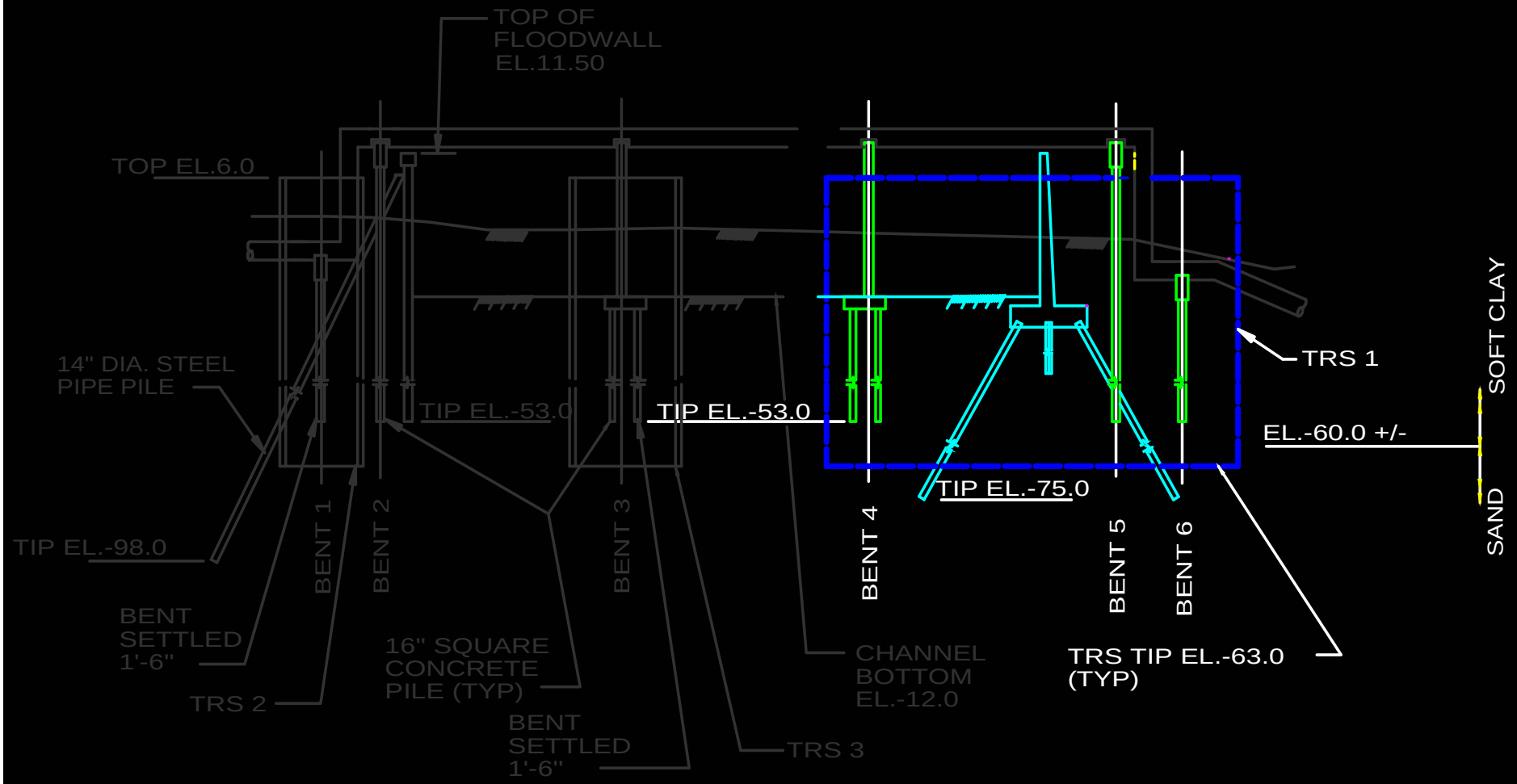
TRS 3

COUSINS PUMPING STATION COMPLEX

WATERLINE CROSSING "A"

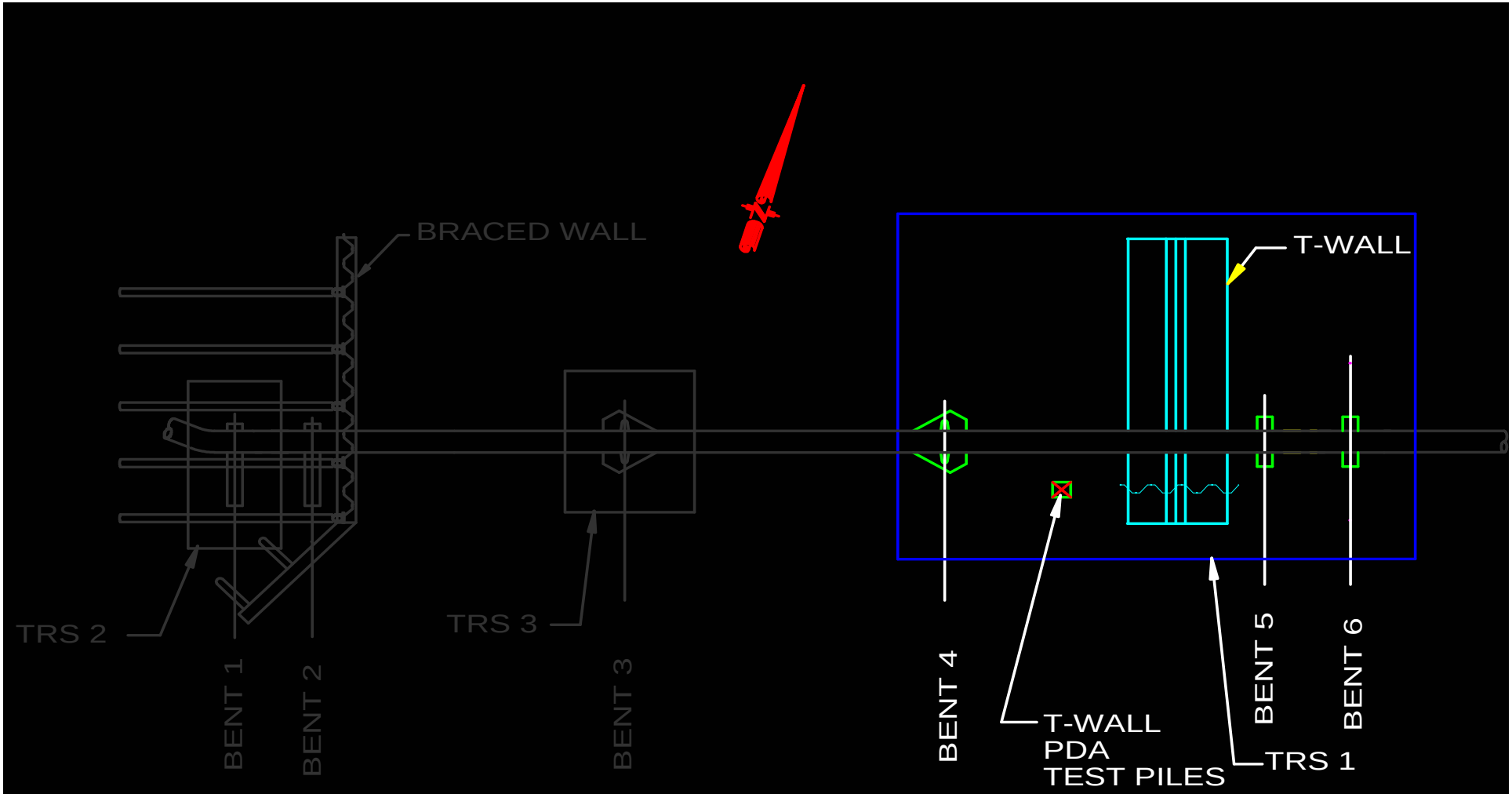



04 07 2004



TRS 1

COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"



PLAN

COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"




03/10/2004

Pile Integrity Test – Bent A-6

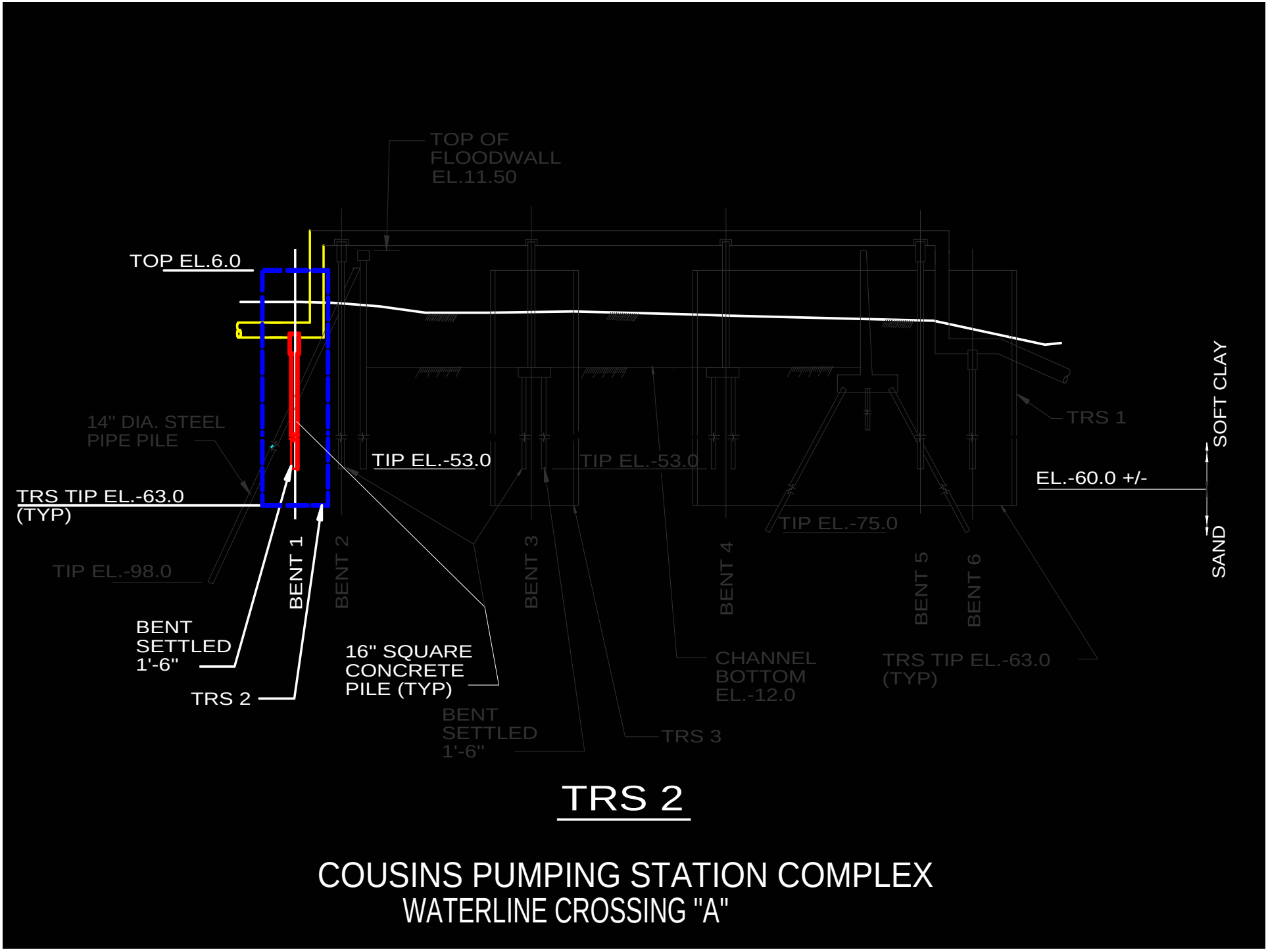


Event Timeline - 2004

- Late Nov 2003 – Contractor pulls TRS-2 cofferdam sheet piling.
- Dec-Jan – Contractor drives permanent sheet piling and battered pipe piles for the braced wall.
- Jan 22 – Contractor reports waterline pipe on bent A-1 out of alignment
- Feb 4 – Contractor exposes and surveys bent A-1. Settlement = 1’-6”
- Mar 10 – Pile Integrity Test performed on bents A-1 and A-6
- Mar 19 – Second Modification issued
- May – First Waterline Complete and In Service

Potential Causes

- Soil Wedge Filled the Void Caused by Cofferdam Removal.
- Permanent Piles were COMPLETELY in the Soil Wedge that Moved.
- Vibrations from Driving the Adjacent Permanent Sheet Piling and Steel Pipe Piles for the Braced Wall.



TRS 2

COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"

Bent A-1



Bent A-1

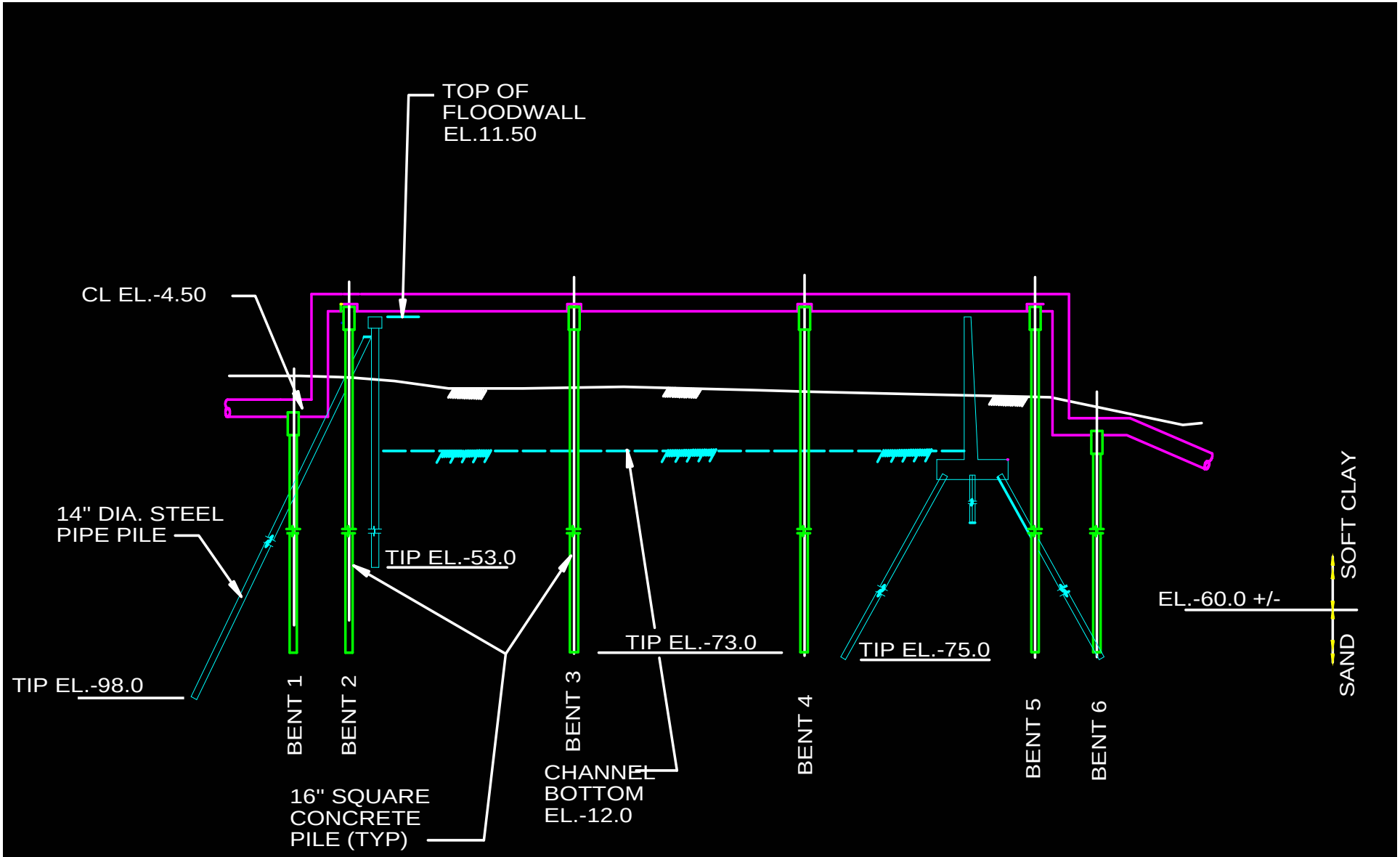


Pile Integrity Test – Bent A-1



Bent A-2





PROFILE

COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "B"

Waterline “A”






12 11 2004 12:40

Lessons Learned

- During Pile Design, Carefully Consider the Effects of Adjacent Construction, INCLUDING Temporary Construction.
- Compare Tip Elevations of Permanent Piles and Temporary Piles.
- Permanent Pile Tip Elevations Should ALWAYS be Lower than the Active Wedge of Temporary Piles.
- Don’t Design with Blinders On.
- Communicate, Communicate, Communicate!


01 06 2005


PETREX
01 06 2005






United States
Army Corps of Engineers
New Orleans District
Angela DeSoto Duncan, P.E.
Angela.L.DeSoto@mvn02.usace.army.mil
(504)862-2733
THANKS...


U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS
DISTRICT
SERVING THE ARMY...SERVING THE NATION



Comite River Diversion Project

Presented to

NDIA Tri-Services Infrastructure Conference

4 August 2005

Picture of the Comite River, Louisiana in Flood Source: T. Davison 1983

Project Sponsors

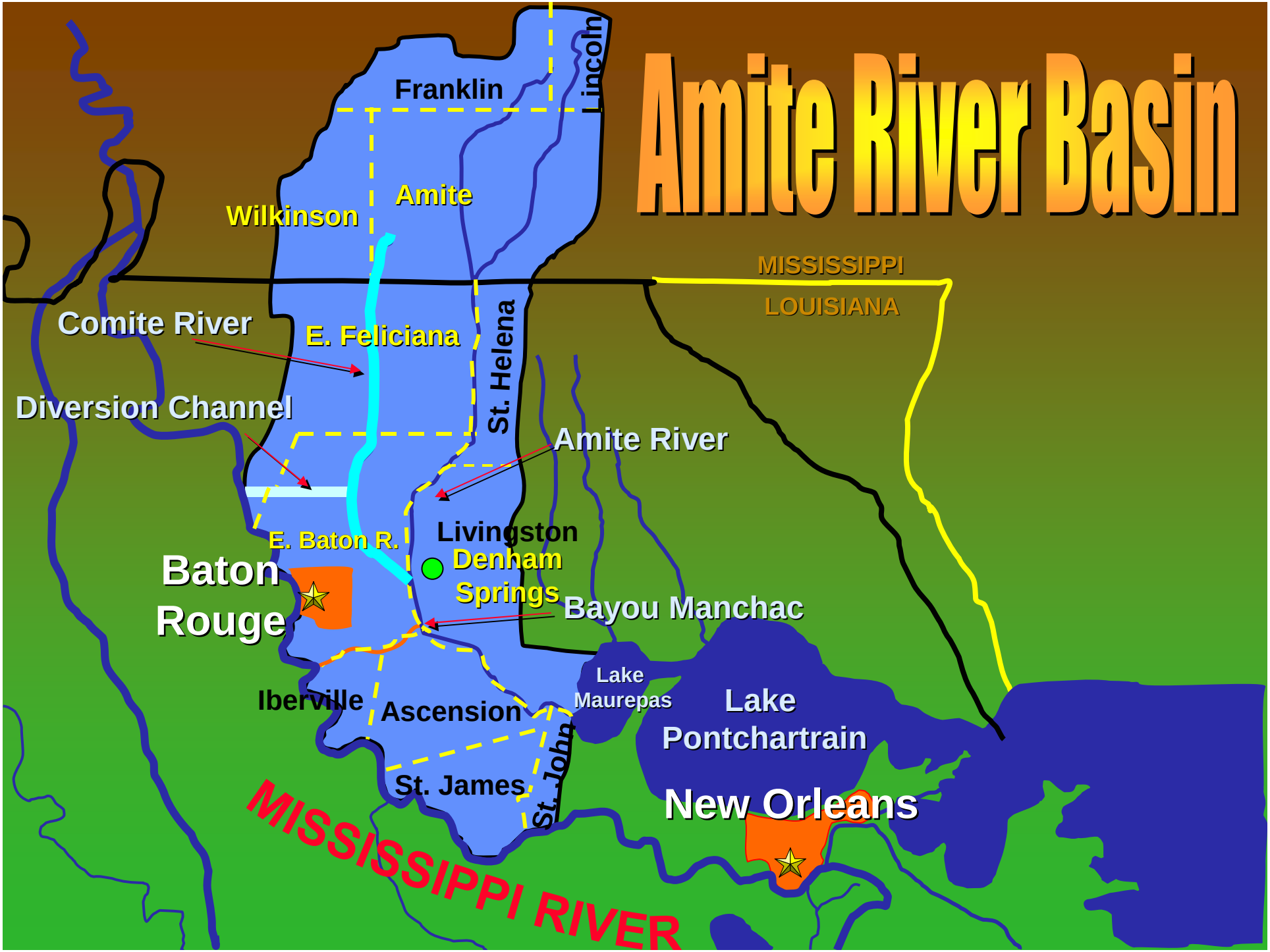
Non-Federal Sponsors

Louisiana Department of Transportation and Development (LADOTD)

City of Baton Rouge, Parish of East Baton Rouge (CITY-PARISH)

Amite River Basin and Water Conservation District (ARBC)

Project Location


Amite River Basin
Franklin
Lincoln
Amite
Wilkinson
MISSISSIPPI
LOUISIANA
Comite River
E. Feliciana
St. Helena
Diversion Channel
Amite River
E. Baton R.
Livingston
Denham
Springs
Baton
Rouge
Bayou Manchac
Lake
Maurepas
Lake
Pontchartrain
Iberville
Ascension
St. James
St. John
New Orleans
MISSISSIPPI RIVER

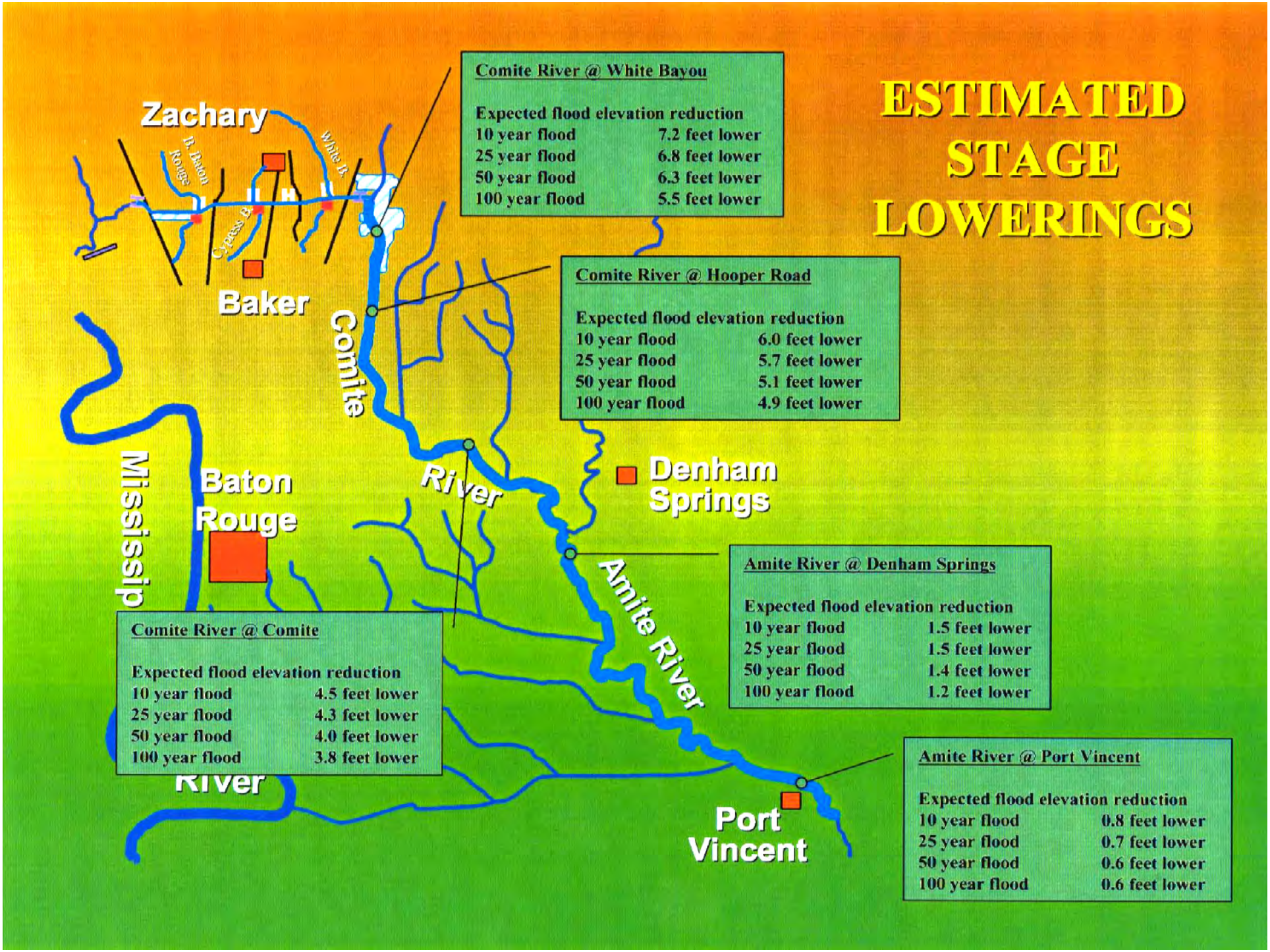
Project Purpose

Project Purpose

- To provide flood protection for the residents of the Comite and Lower Amite River Basins

- The authorized project will reduce stages:
  - On the Comite River from the diversion point to the confluence with the Amite River
  - On the Amite River from the confluence with the Comite River near Denham Springs to Port Vincent
  - On White Bayou, Cypress Bayou, and Bayou Baton Rouge

- Total Cost = $165 million

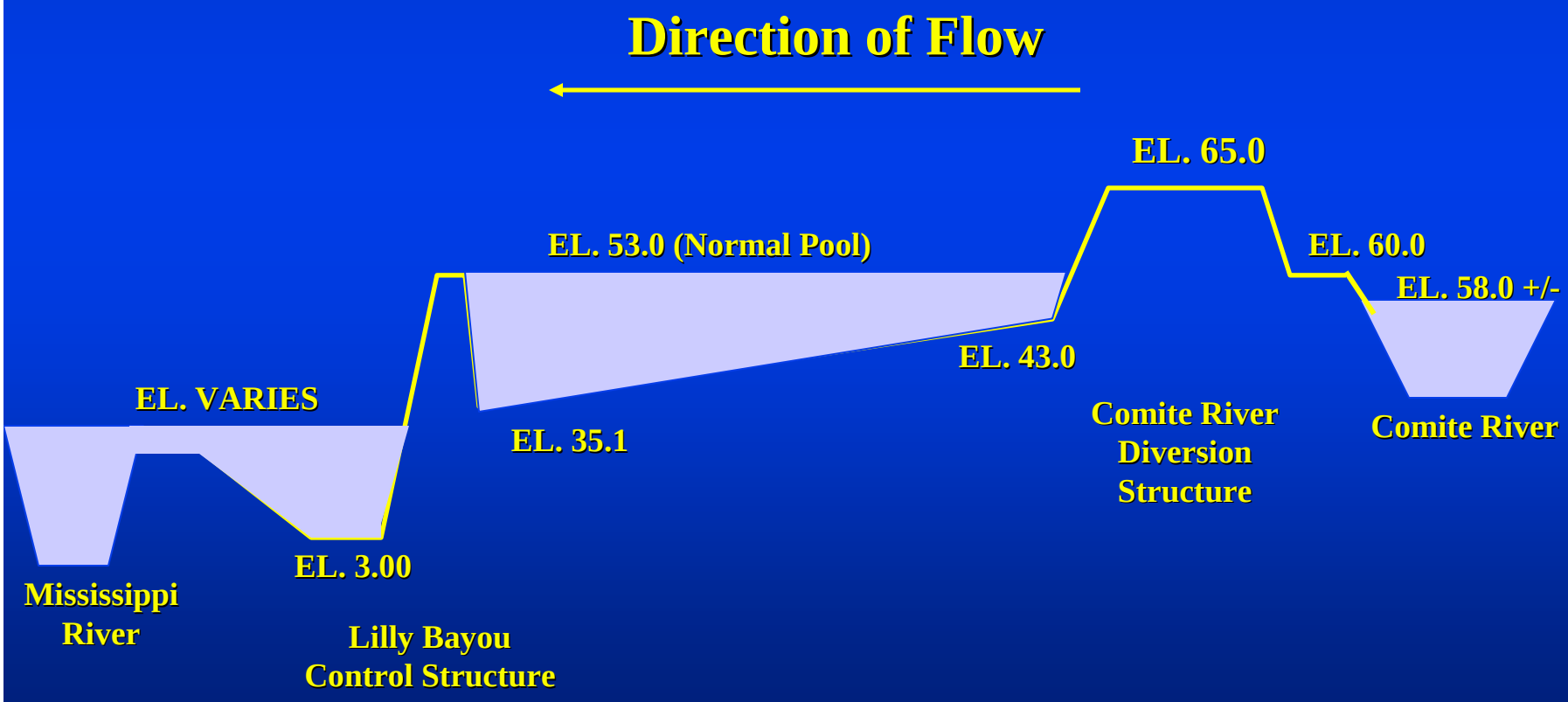

ESTIMATED STAGE LOWERINGS
Comite River @ White Bayou
Expected flood elevation reduction
10 year flood 7.2 feet lower
25 year flood 6.8 feet lower
50 year flood 6.3 feet lower
100 year flood 5.5 feet lower
Comite River @ Hooper Road
Expected flood elevation reduction
10 year flood 6.0 feet lower
25 year flood 5.7 feet lower
50 year flood 5.1 feet lower
100 year flood 4.9 feet lower
Amite River @ Denham Springs
Expected flood elevation reduction
10 year flood 1.5 feet lower
25 year flood 1.5 feet lower
50 year flood 1.4 feet lower
100 year flood 1.2 feet lower
Comite River @ Comite
Expected flood elevation reduction
10 year flood 4.5 feet lower
25 year flood 4.3 feet lower
50 year flood 4.0 feet lower
100 year flood 3.8 feet lower
Amite River @ Port Vincent
Expected flood elevation reduction
10 year flood 0.8 feet lower
25 year flood 0.7 feet lower
50 year flood 0.6 feet lower
100 year flood 0.6 feet lower
Zachary
Baker
Comite
River
Baton Rouge
Denham Springs
Amite River
Port Vincent
River

Overview of Project Features

COMITE RIVER DIVERSION PROJECT FEATURES



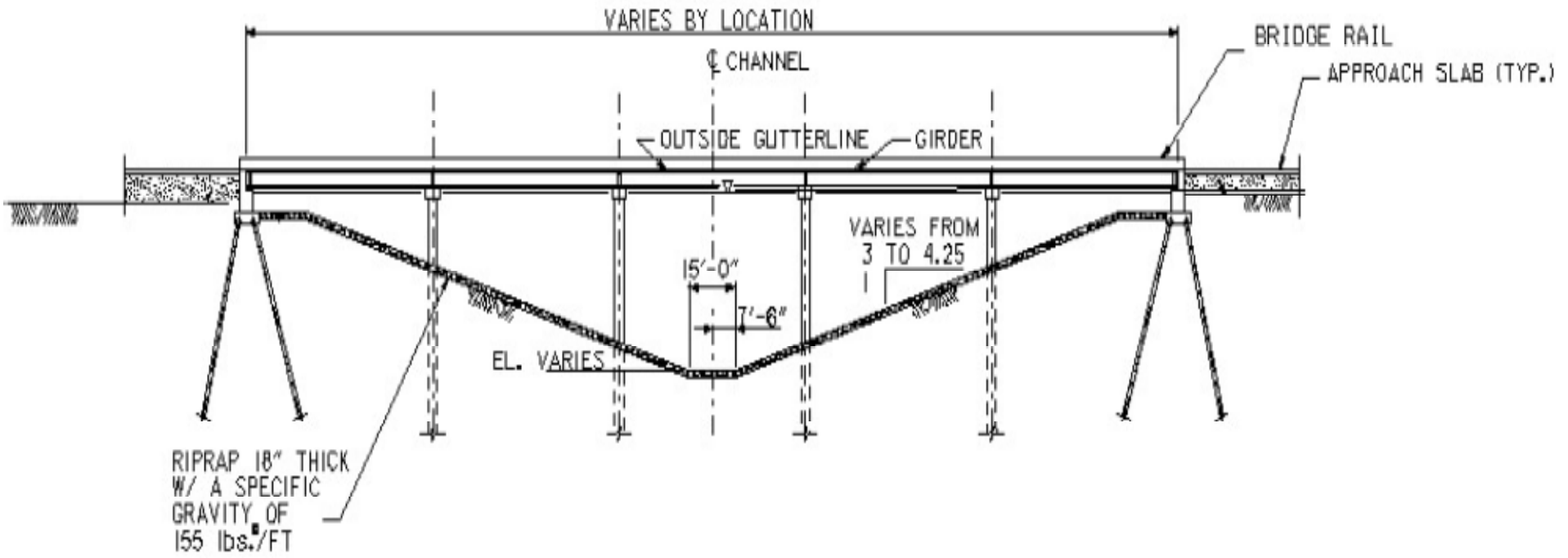
Comite River Diversion Channel Channel Profile



Comite River Diversion Channel

- Drainage Area of Approximately 308 Square Miles
- "Wet" Channel
- Area of Impoundment of Approximately 102 Acres (At Normal Pool)
- Reason for a "Wet" Channel:
  - Improved Slope Stability
  - Less Maintenance

Comite River Diversion Channel



CHANNEL CROSS-SECTION

Lilly Bayou Control Structure

Purposes of the Lilly Bayou Control Structure

1. To dissipate energy resulting from substantial drops in both water surface elevation and channel invert to minimize costs of erosion protection downstream.

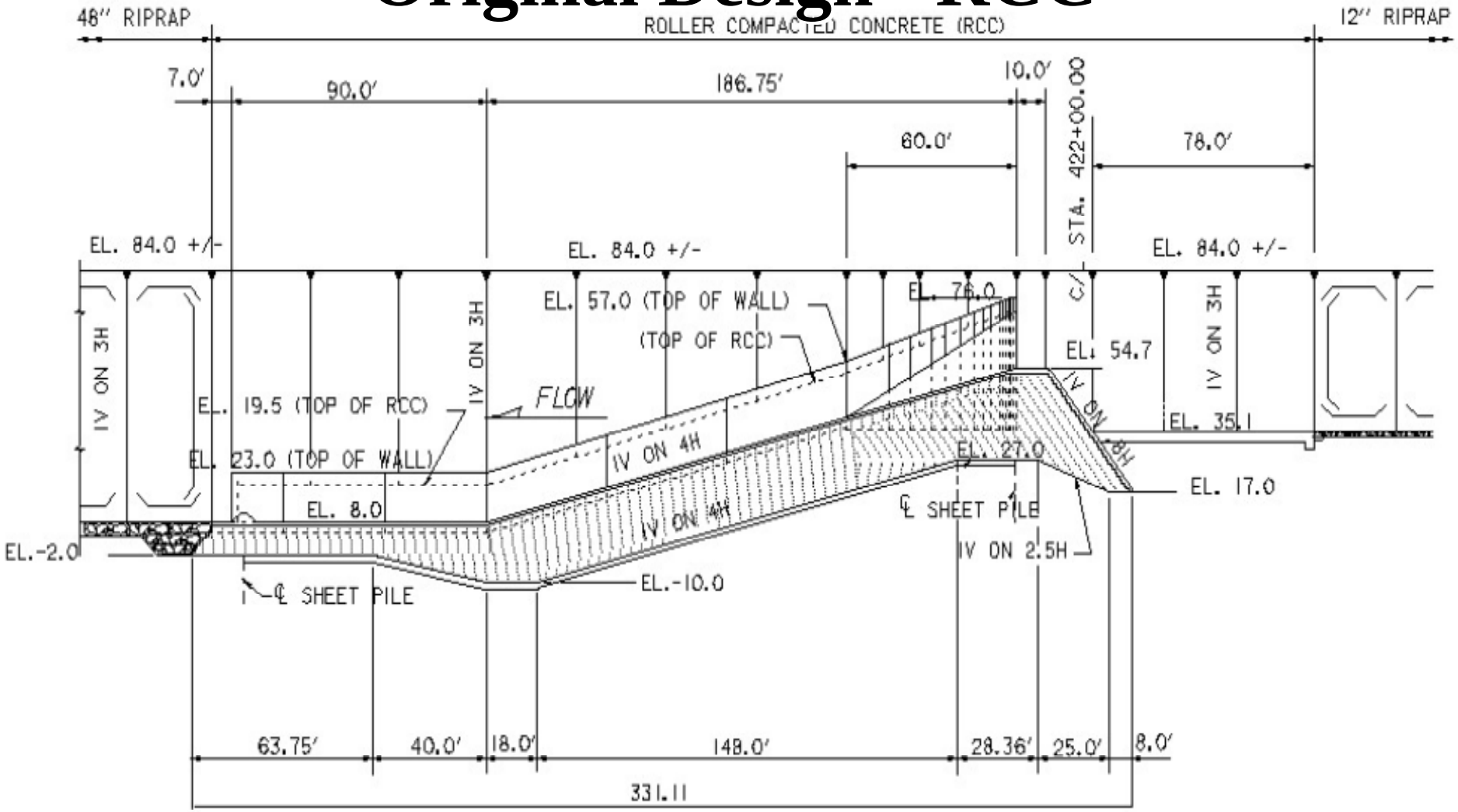
2. To provide a hard point at which head-cutting erosion is prevented from moving further upstream.

3. To limit the velocity of flow of the Comite River Diversion Canal to acceptable levels during design floods.

4. To impound water in the Comite River Diversion Canal to prevent slope failures

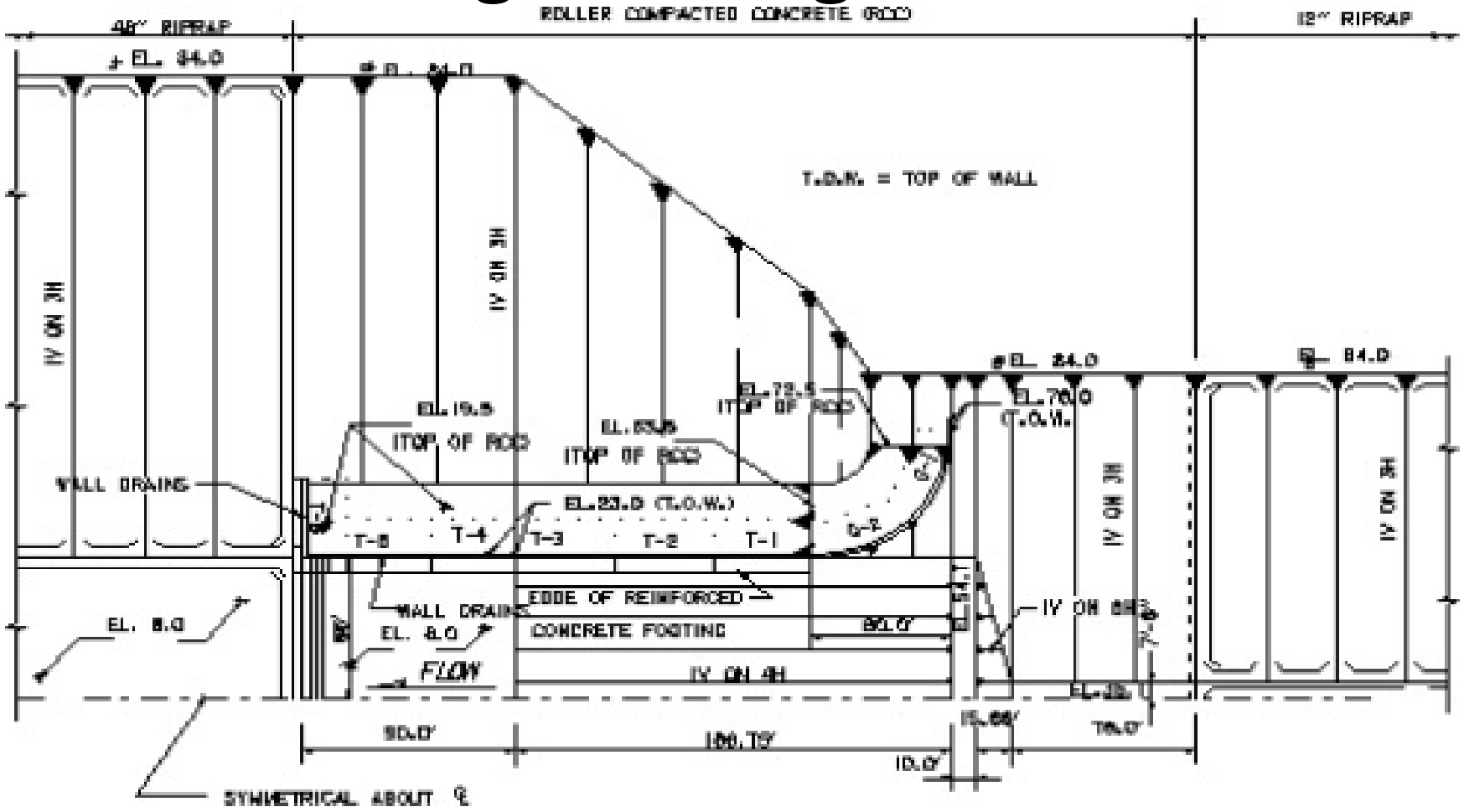
5. To prevent the intrusion of Mississippi River floodwaters into the Comite River Diversion Canal

Lilly Bayou Control Structure
Original Design - RCC



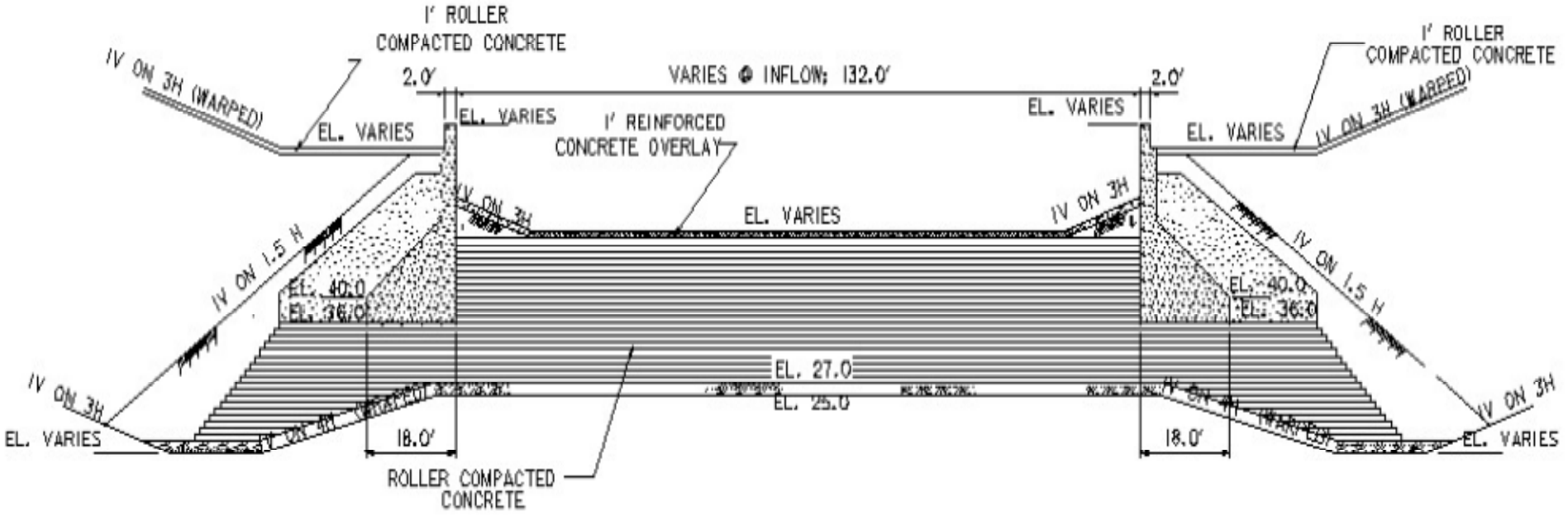
CENTERLINE PROFILE

Lilly Bayou Control Structure
Original Design - RCC



HALF PLAN

Lilly Bayou Control Structure
Original Design - RCC



SECTION

Lilly Bayou Control Structure: From RCC to CIP

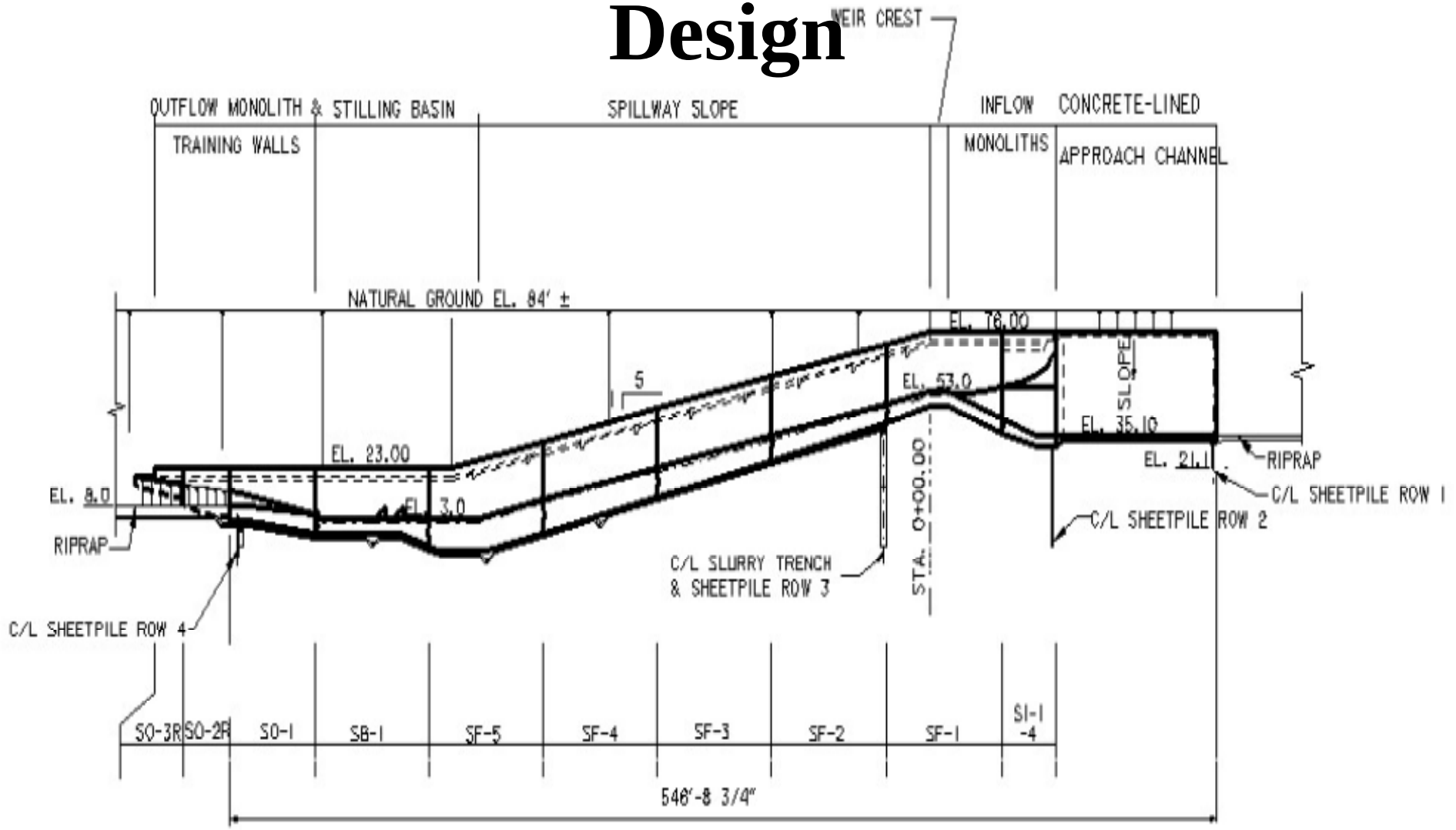
- Not typical application of RCC:
  - Atypical RCC structure geometry
  - Highly-erodible soil foundation (not rock)
  - RCC not widely used in this region
  - Relatively "thin" for an RCC structure
    - Concerns with cracking causing loss of foundation material, risking failure of structure
- Costs
  - Seepage-prevention measures between lifts increased costs
  - No in-situ aggregates available for mixture, so not optimum site for RCC (i.e. limestone would have to be hauled in)

Lilly Bayou Control Structure: From RCC to CIP

- **Major Concerns: Uplift and Slope Stability**

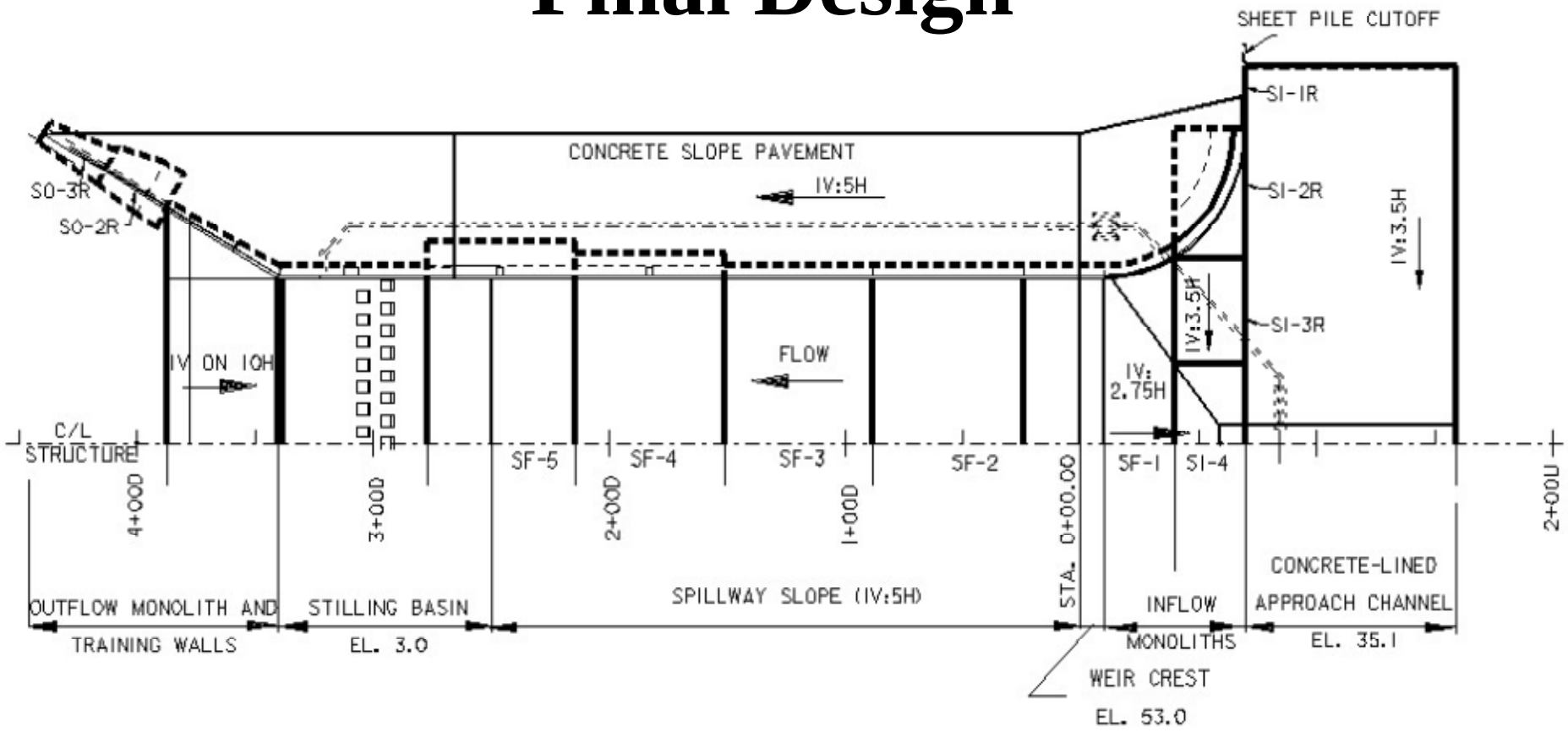
- **Alternatives investigated:**
  - Piles or Drilled Shafts
  - Ground Anchors
  - Heavy-Weight Concrete (250 pcf)

Lilly Bayou Control Structure Final Design



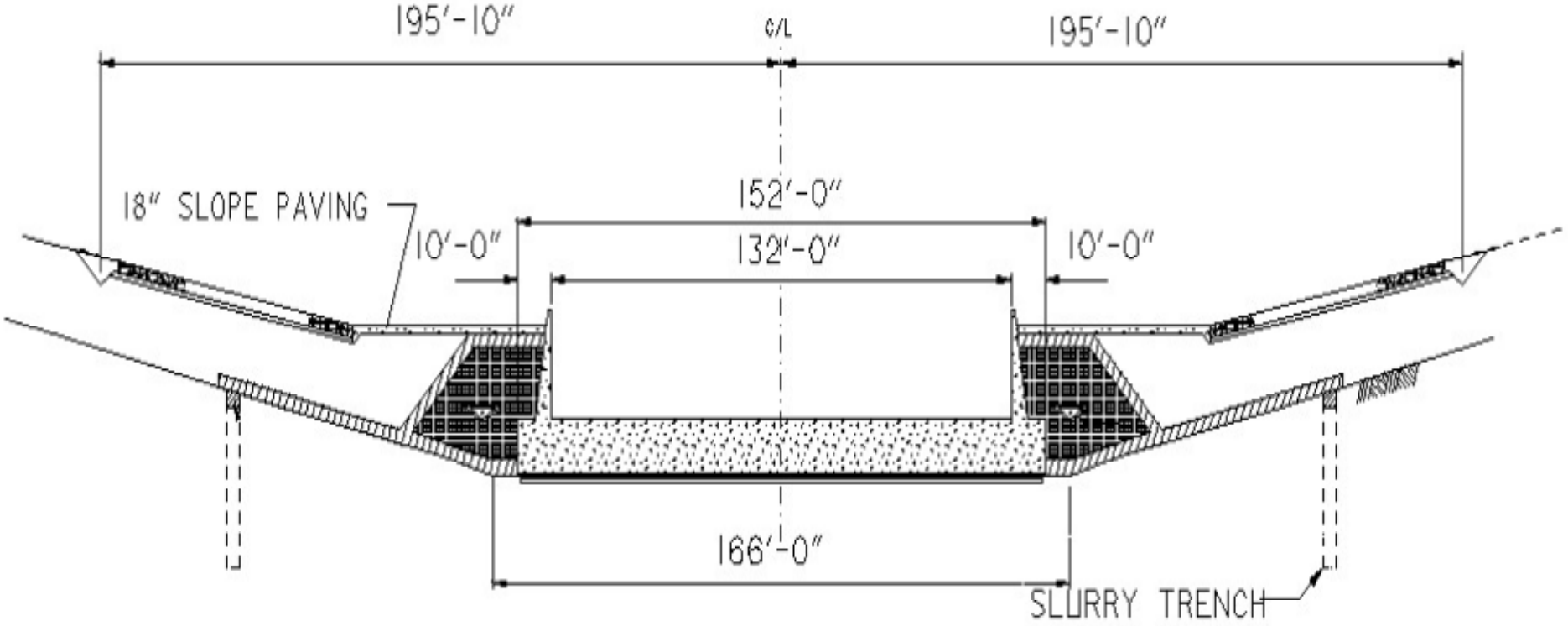
CENTERLINE PROFILE

Lilly Bayou Control Structure
Final Design



HALF PLAN

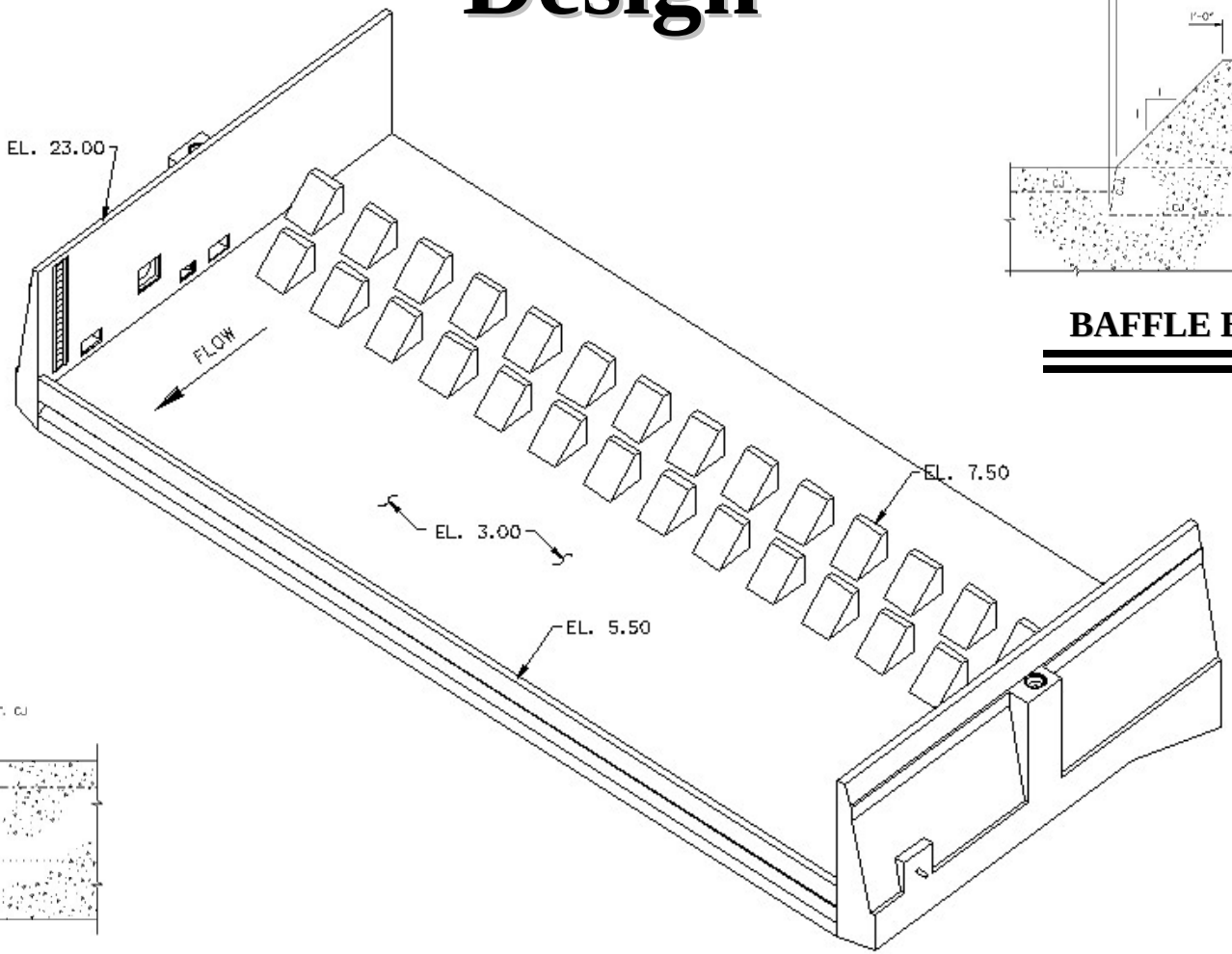
Lilly Bayou Control Structure
Final Design



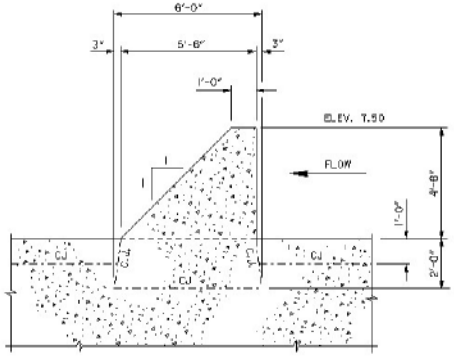
STA. 1+51.0D

SECTION

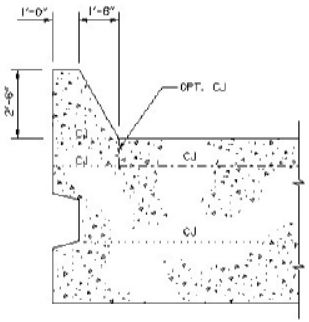
Lilly Bayou Control Structure Final Design



STILLING BASIN

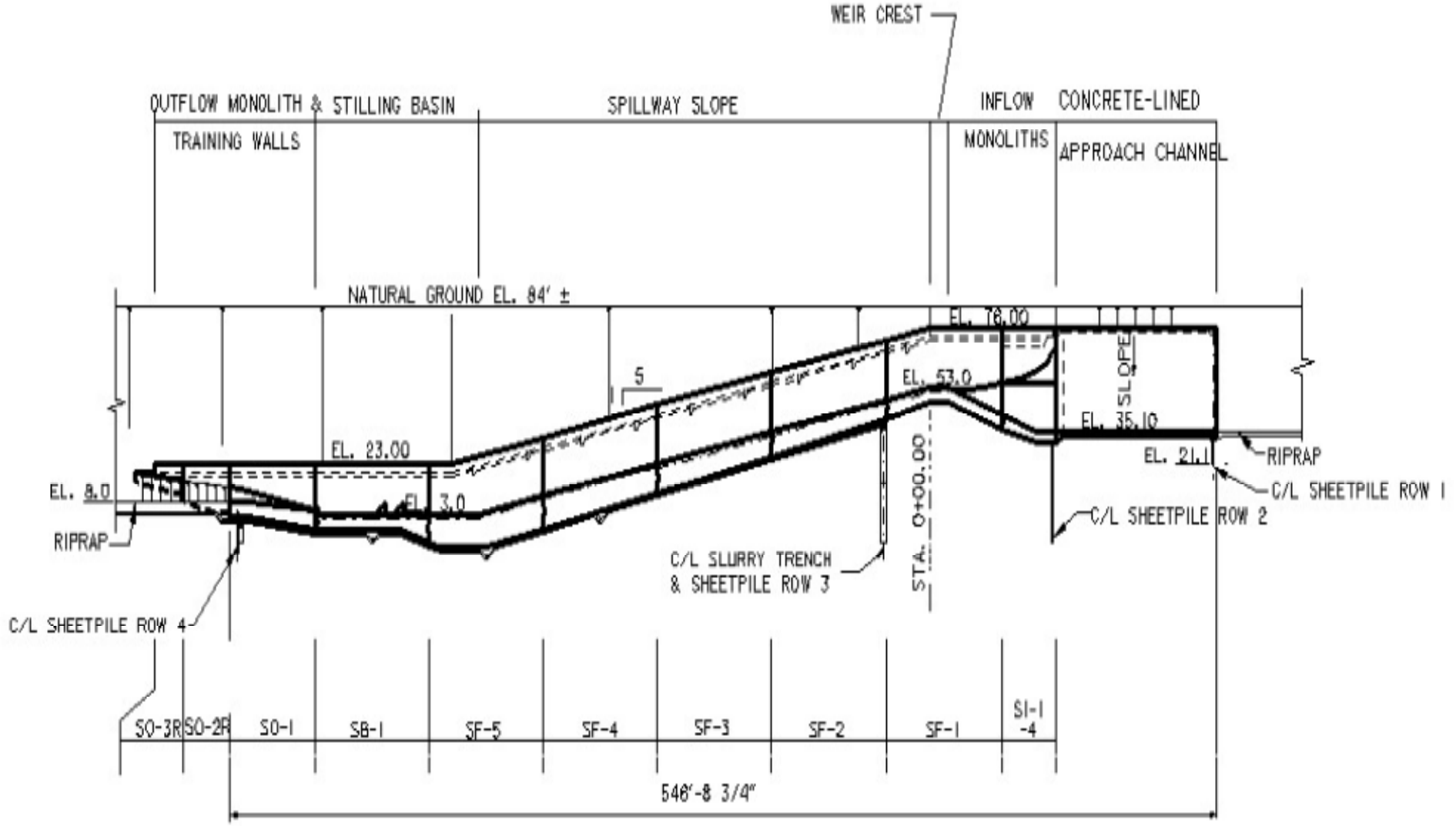


BAFFLE BLOCKS



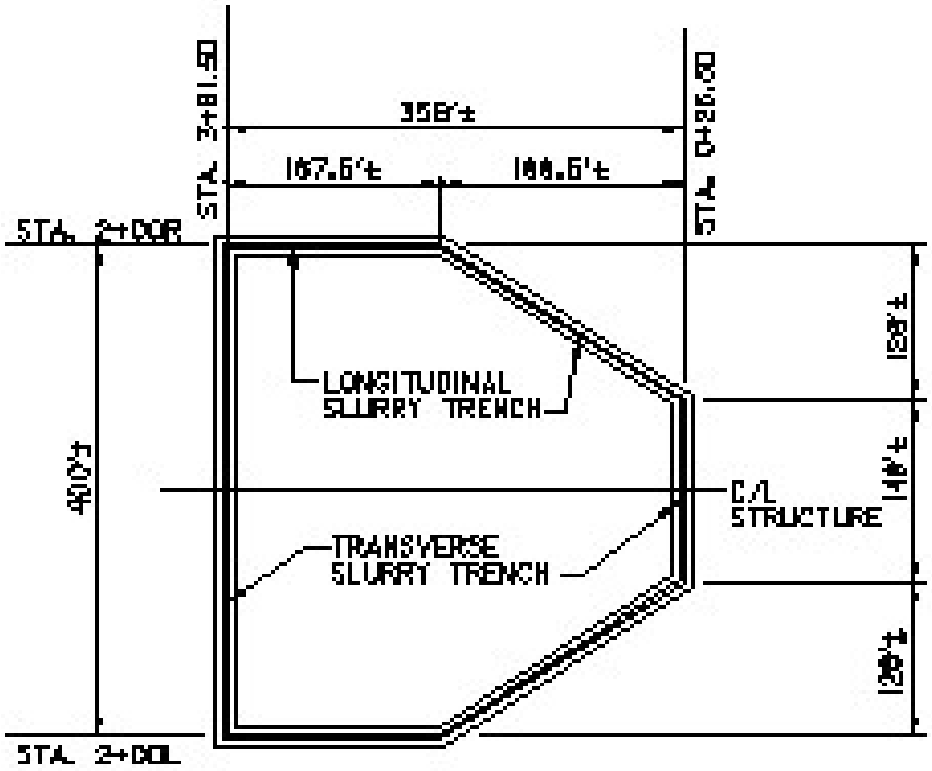
END SILL

Flotation Stability



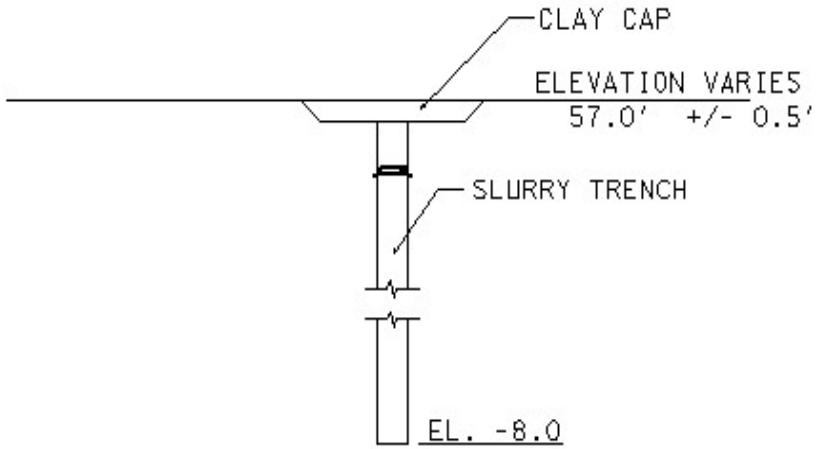
CENTERLINE PROFILE

Flotation Stability

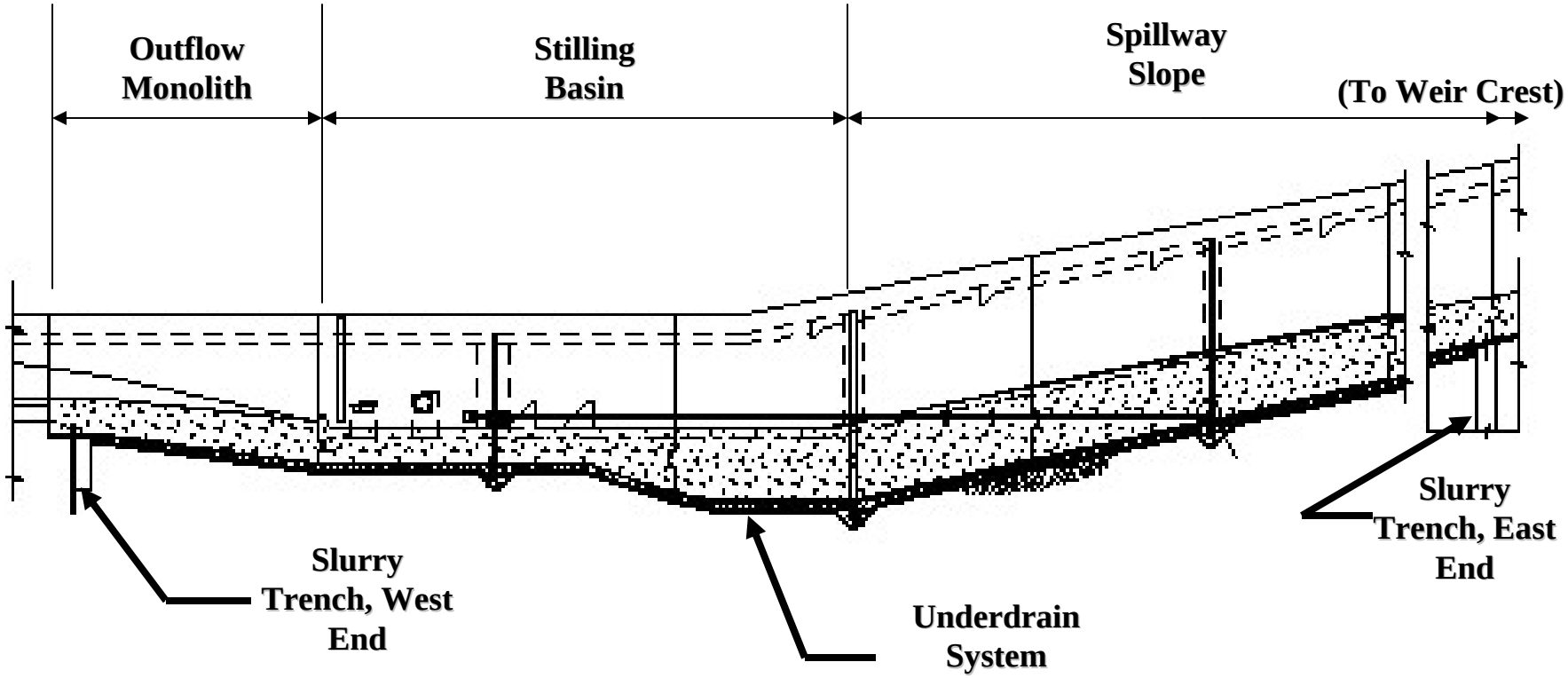


SLURRY TRENCH DETAIL

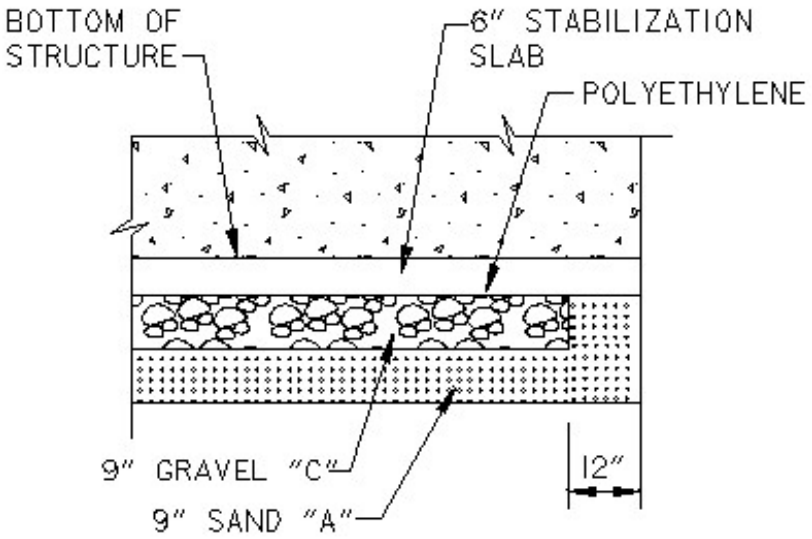
N.T.S.



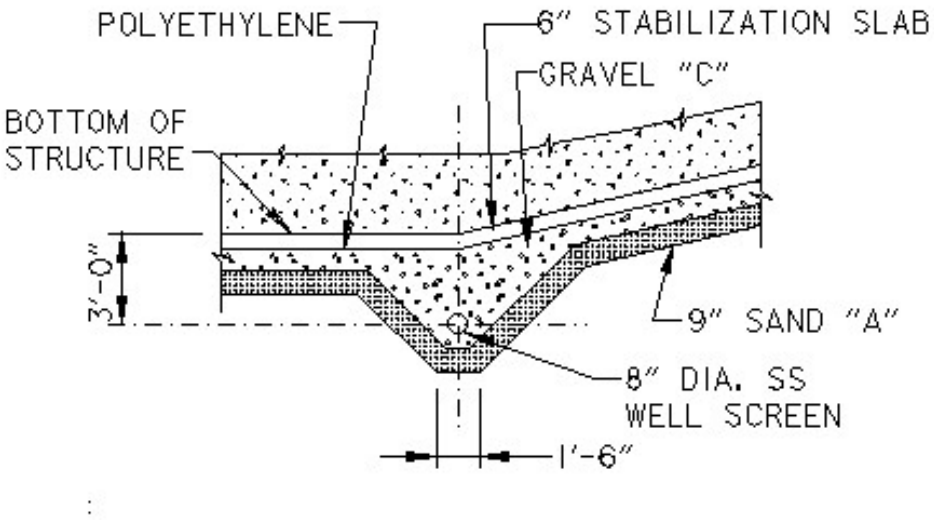
Flotation Stability



Flotation Stability



Section at Edge of Monolith

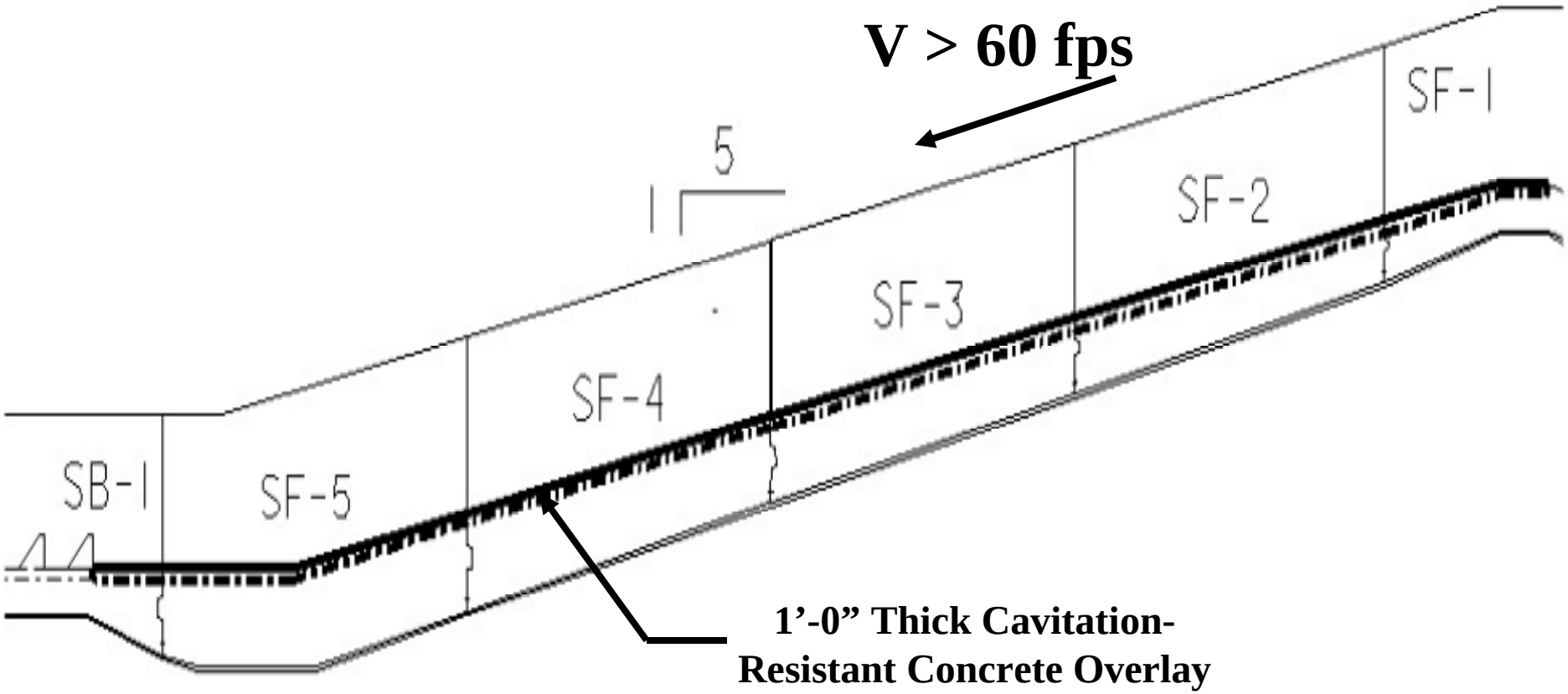


Section at Well Screen

Concrete Considerations

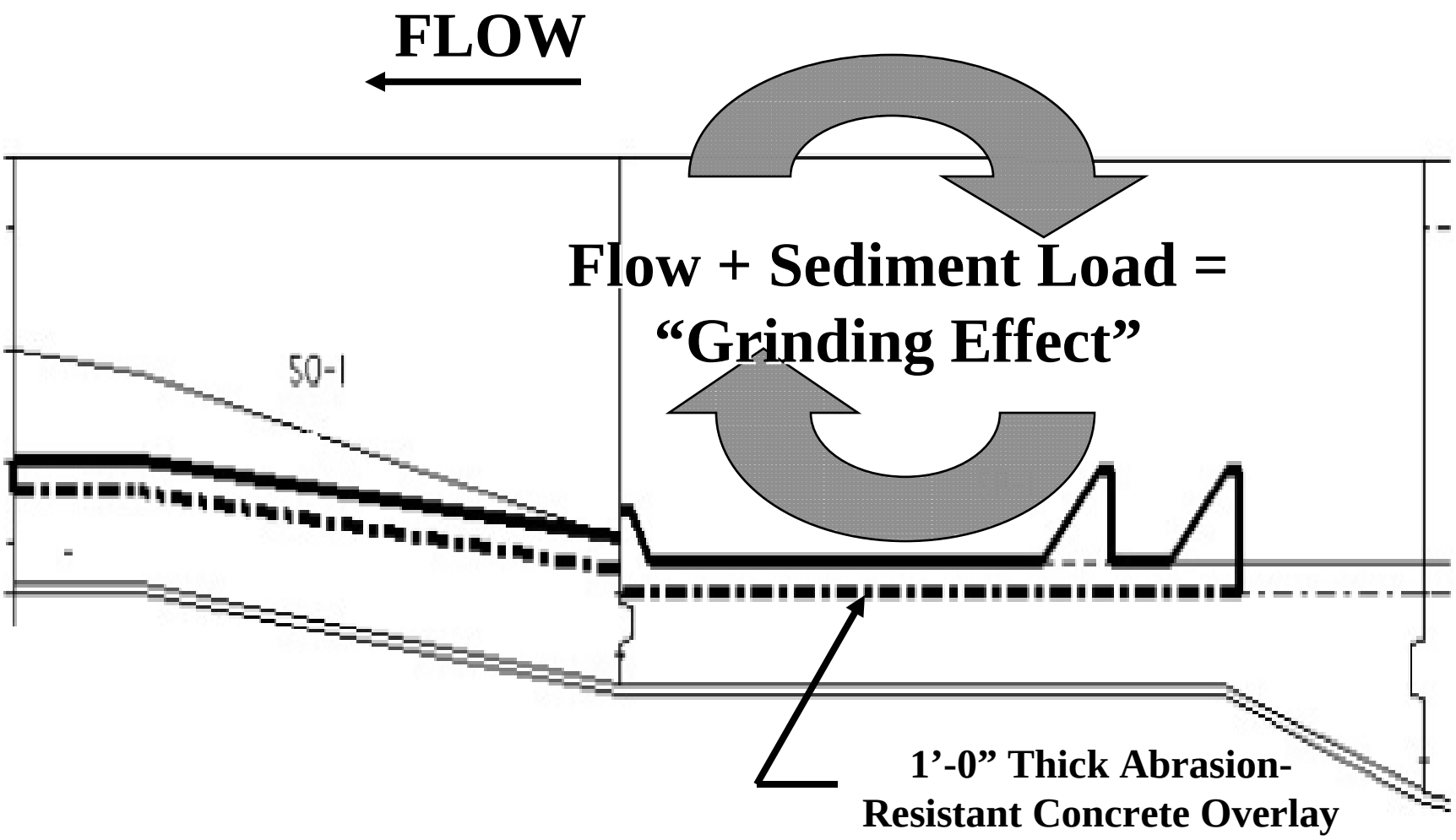
- Mass Concrete
  - Some base slabs in excess of 10 feet thick
  - Thermal cracking a concern
  - ERDC performed materials investigation and thermal study
  - To assist in providing the “coolest” mix possible:
    - Design f’c = 3000 psi
    - Limestone required for aggregate
    - Combination of GGBF Slag and Fly Ash required

Cavitation-Resistant Concrete



CENTERLINE PROFILE

Abrasion-Resistant Concrete



CENTERLINE PROFILE

Lilly Bayou Control Structure

- Construction proceeding in two phases:
- Phase I
  - Consisted of site grading, initial excavation and slurry wall construction
  - Awarded March 2003 to James Construction Group, Inc for $2.4 Million
  - Completed in December 2003
- Phase II
  - Consists of completing the excavation and constructing all remaining features
  - Design complete
  - Awarded September 2004 to B&K Construction, Inc., for $27.6 Million

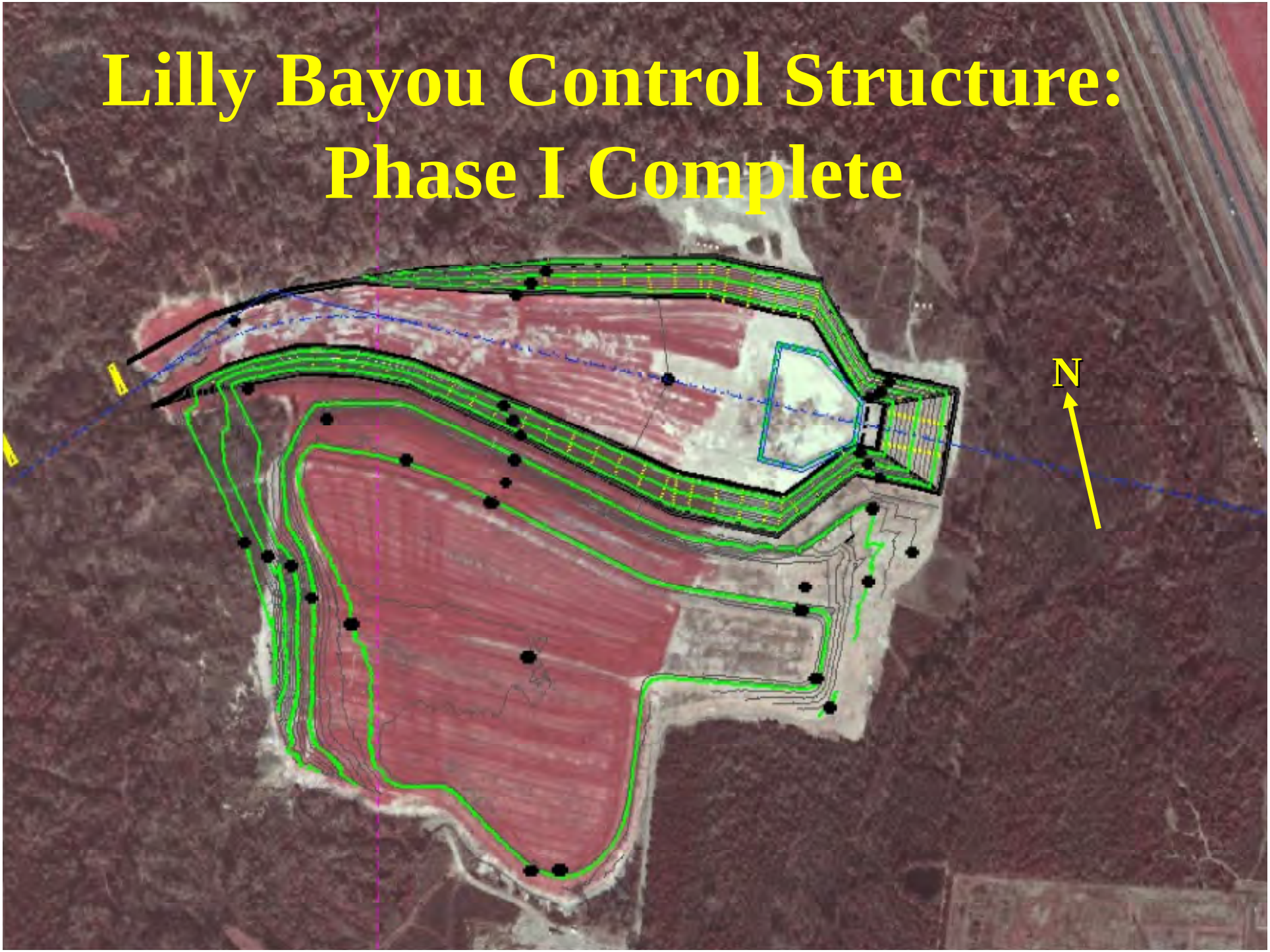
Lilly Bayou Control Structure: Phase I



Lilly Bayou Control Structure: Phase I



Lilly Bayou Control Structure: Phase I Complete



Lilly Bayou Control Structure: Phase II



Lilly Bayou Control Structure: Phase II



Lilly Bayou Control Structure: Phase II



Lilly Bayou: Lessons Learned

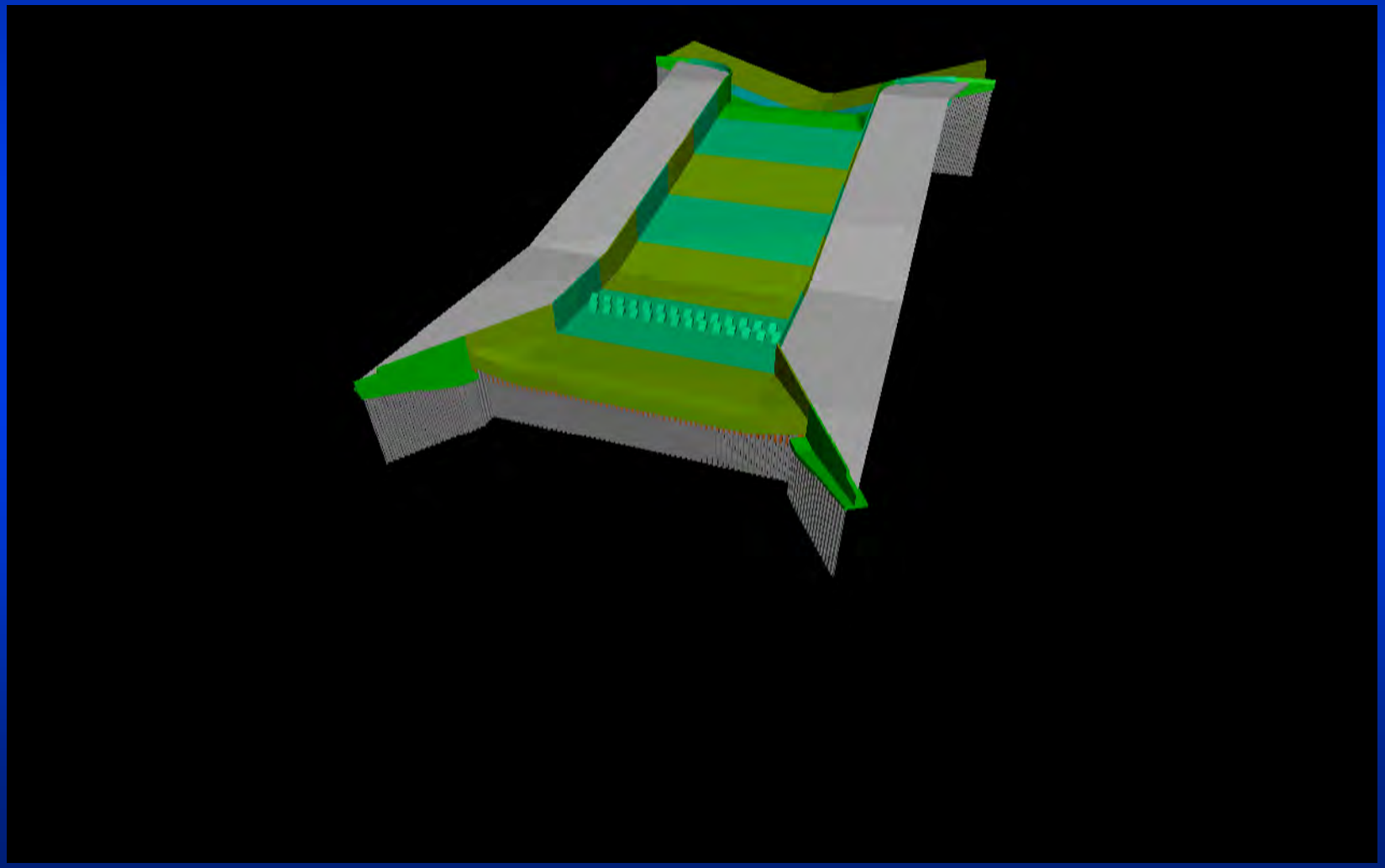
Lilly Bayou Control Structure Design Team



Some Lessons Learned: Virtual Teaming & Other "Stuff"

- Communicate, Communicate, Communicate
- Virtual Teaming Software (Groove, etc.)
- Drafting Contracts
- Maintain independence of ITR Team and ensure ITRs performed in timely manner
- Start materials investigations as early as practicable
- Keep PDT engaged

Questions?




THANK YOU

McAlpine Lock Replacement Project

Project Summary and Status of Construction

Kathy Feger, PE

Louisville District, USACE


Scheduled Completion 2008
Preliminary Digital Photographic Rendering

Project Site

US Army Corps of Engineers

Welcome To McAlpine Locks and Dam

Vision Statement

The world's premier engineering organization.
Trained and ready to provide support anytime, anyplace.
A full spectrum Engineer Force of high quality,
Dedicated soldiers and civilians:

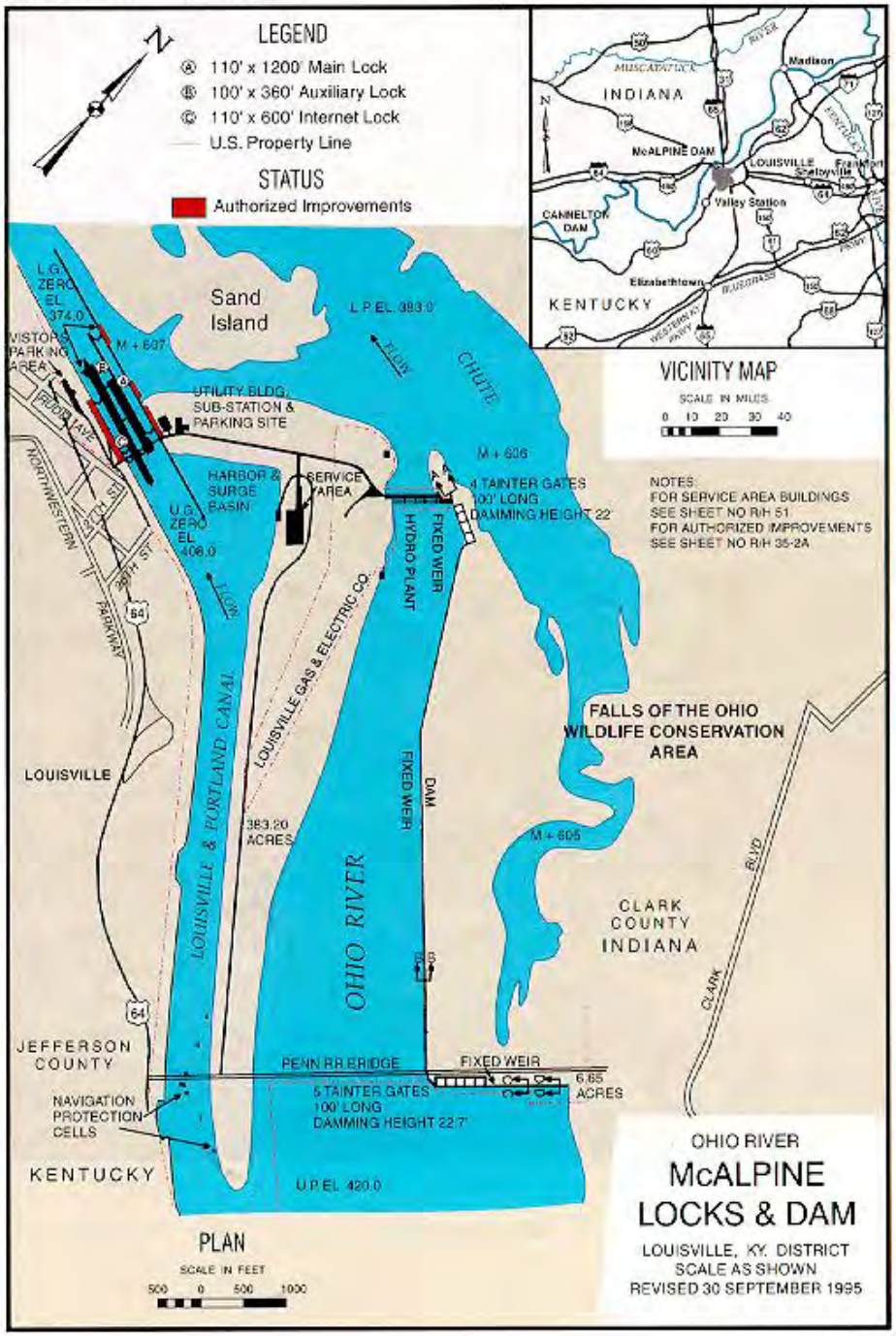
- Trained and ready;
- A vital part of the Army;
- Dedicated to public service;
- An Army values-based organization;

One Corps Serving the Army And the Nation




McAlpine Locks
Before Construction
1998

OHIO RIVER R/H 35-2



Project Scope


BEFORE
AFTER
Scheduled Completion 2008
Preliminary Digital Photographic Rend


November 2002







Downstream Cofferdam Cell Armor


May 2002

Downstream Approach



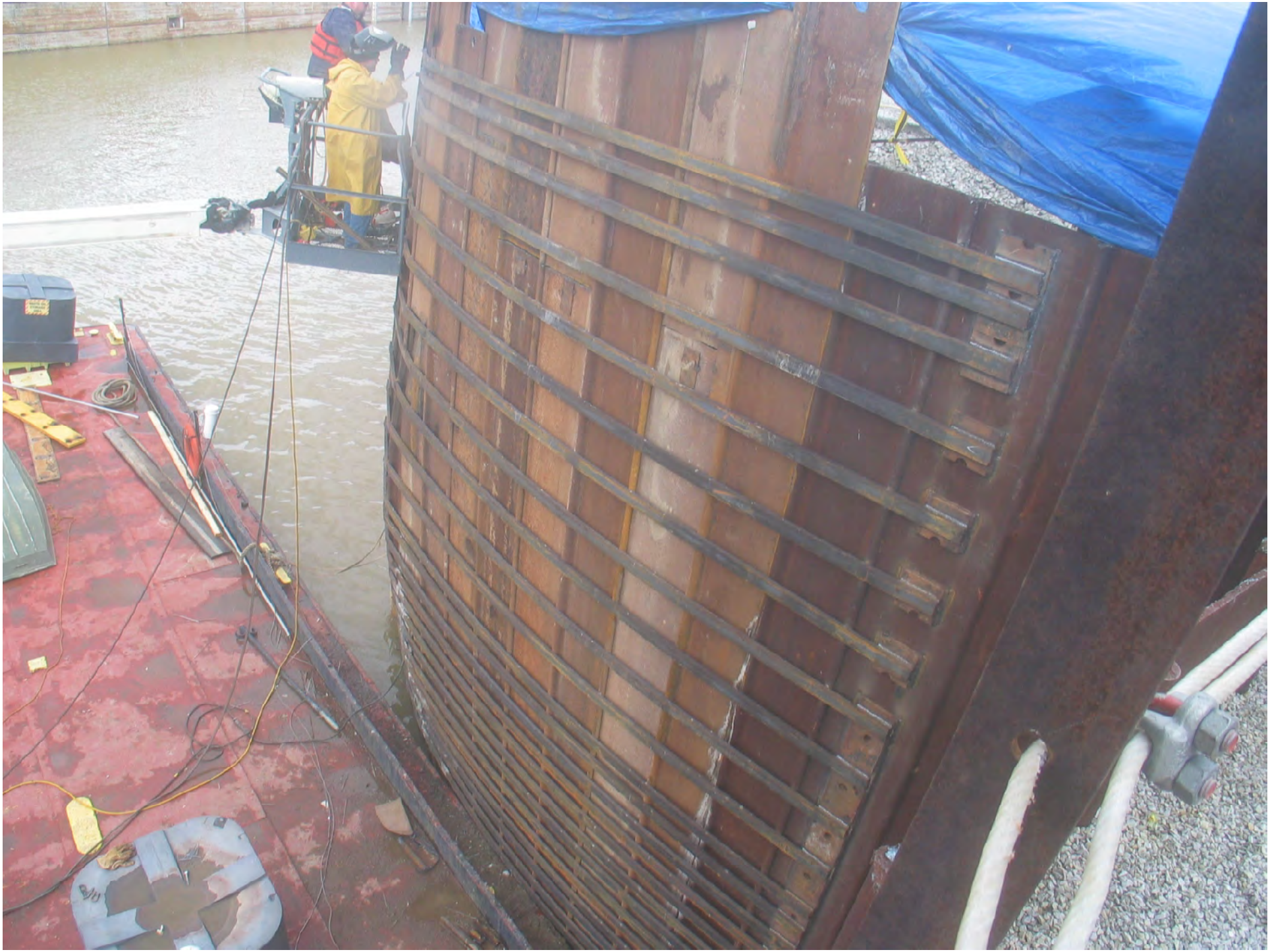



DANGER DANGER DANGER

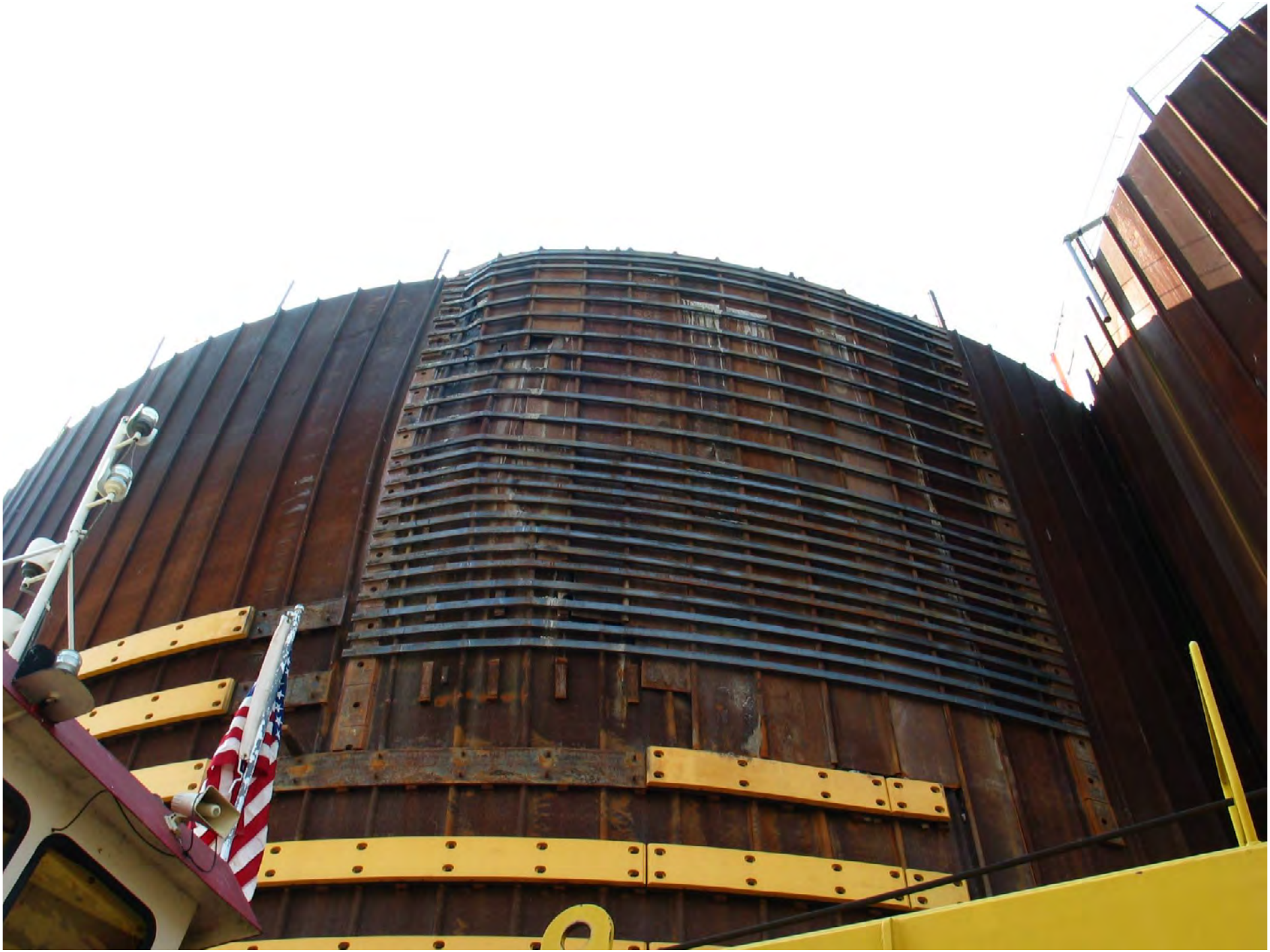




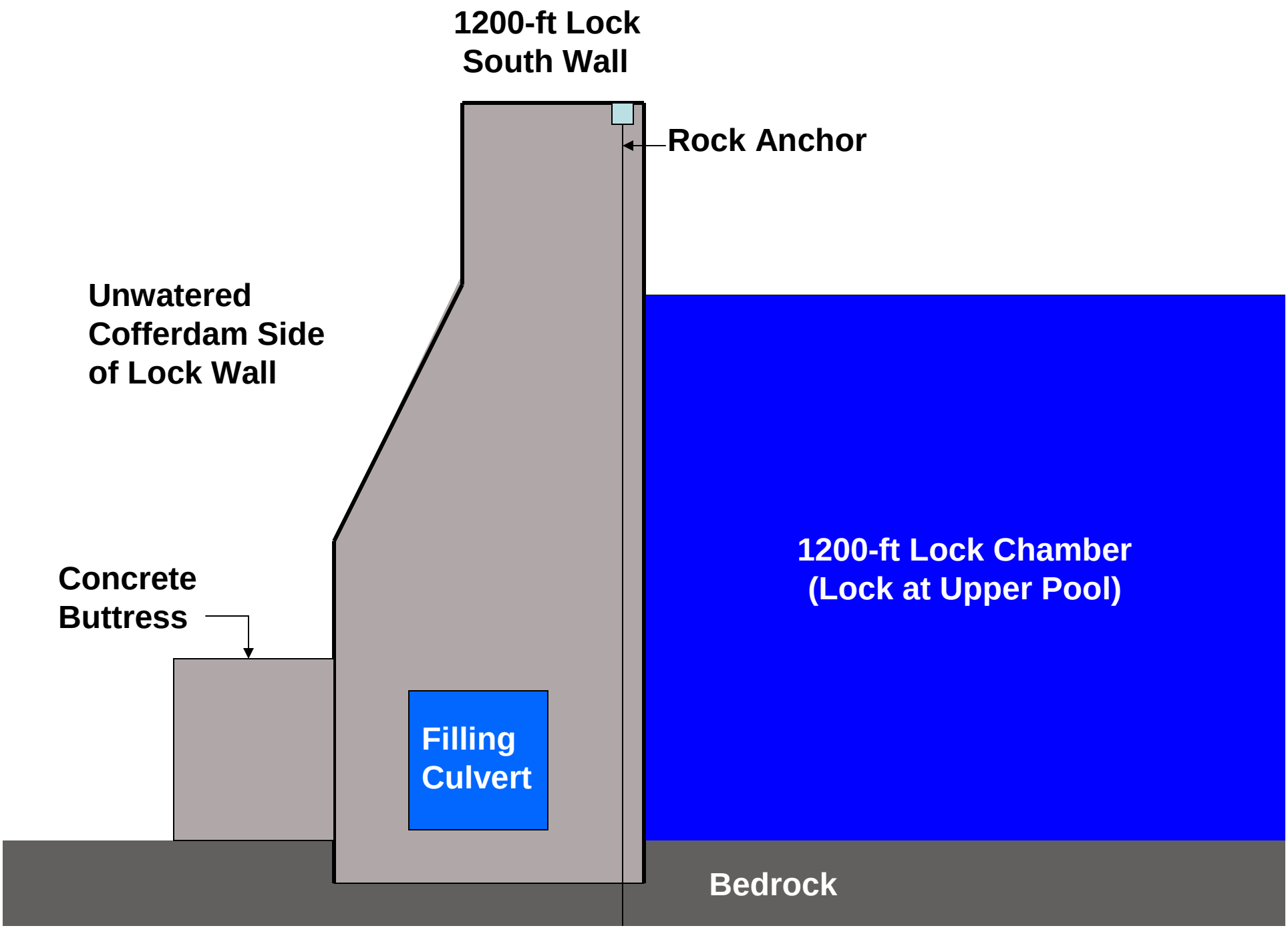

200
150
100
LOTTES




200
106
106
LIED
587-9507

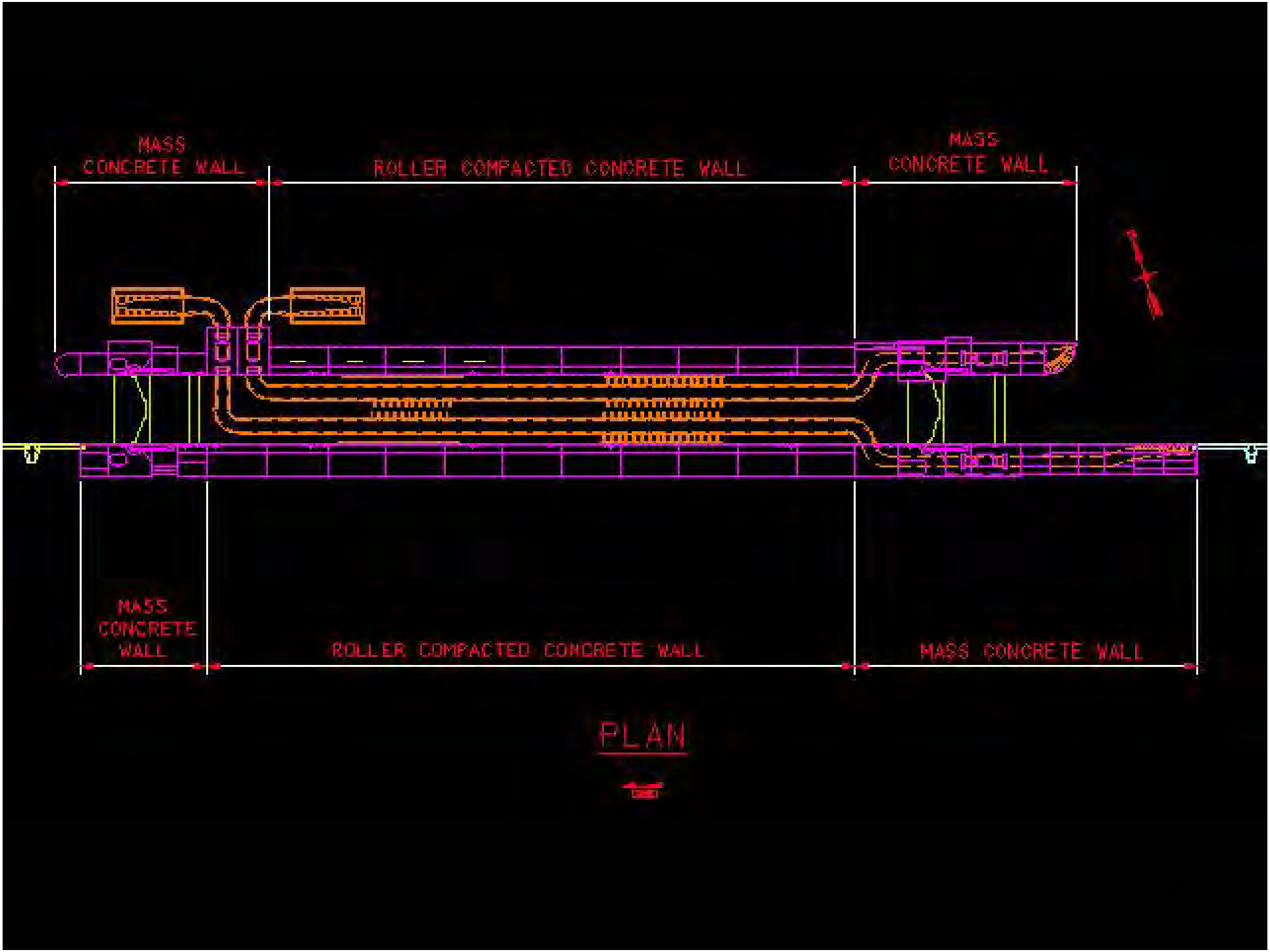


Project Scope - continued


1200-ft Lock
South Wall
Rock Anchor
Unwatered
Cofferdam Side
of Lock Wall
1200-ft Lock Chamber
(Lock at Upper Pool)
Concrete
Buttress
Filling
Culvert
Bedrock






MASS CONCRETE WALL
ROLLER COMPACTED CONCRETE WALL
MASS CONCRETE WALL
MASS CONCRETE WALL
ROLLER COMPACTED CONCRETE WALL
MASS CONCRETE WALL

PLAN






GAIL ANN
BOB HULL

Status of Construction


May 2005



Construction Dates

Finish South Wall RCC	Done
Start Control Buildings	Aug. 05
Finish North Wall RCC	Oct. 05
Open New Bridge to Traffic	Dec. 05
Start Setting Miter Gates	Feb. 06
Finish Mass Concrete	Sept. 06
Rewater Cofferdam	June 07
Contract Completion	April 08
Scheduled Completion	June 08

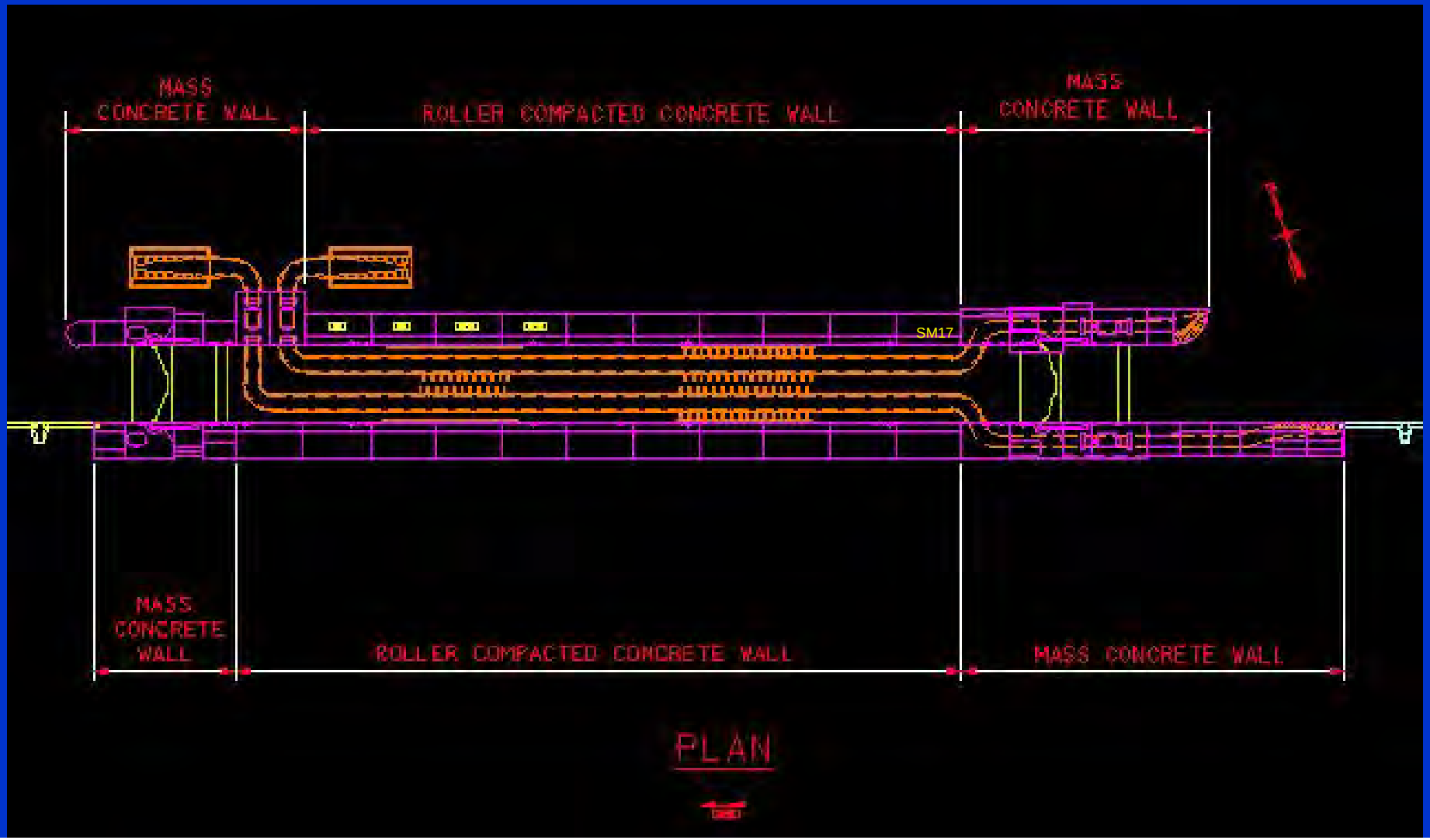

May 2005

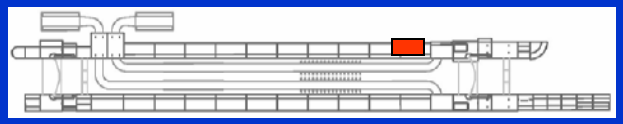
Construction Issue

Monolith Foundations

Conventional Concrete and RCC lock walls

- Founded on rock
- Different founding elevations due to culverts






C
B
A







Two Rock Strength Parameters are Affected:

Shear Strength Along the Offset Seam

&

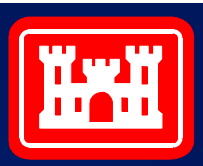
Bearing Capacity of Rock Mass



Kathy Feger, PE
Louisville District, USACE
(502) 315-6284
Kathleen.B.Feger@LRL02.usace.army.mil

URS A/E Team

USACE
New Orleans
District



Mark Gonski, PE - New Orleans District

Topics:

Project, Overview

INNER HARBOR NAVIGATION CANAL (IHNC) LOCK REPLACEMENT

URS

A/E Team



URS A/E Team

USACE
New Orleans
District

Agenda

- **Mark Gonski, PE - New Orleans District**
  - Topics: Project, Overview
- **David Lapene, PE - URS Corporation**
  - Topics: Team Overview, Design Criteria, Operational Design
- **Dale Miller, PE - INCA Engineers, Inc**
  - Topics: Float in Construction Sequence & Design
- **Mark Gonski, PE - New Orleans District**
  - Topics: Lessons Learned from Harvey Canal, IHNC CIP Study


Site Layout
Corps of Engineers
New Orleans District
Lake Ponchartrain
GIWW
Graving Site
New Lock Location
Claiborne Ave. Bridge
Existing Lock
St. Claude Ave. Bridge
Mississippi River



Inner Harbor Navigation Canal Lock Replacement Project

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Project Schedule

- Feasibility Report Submitted — Mar 1997
- Construction Authorization
- Design Report Complete — Nov 2005
- P&S Completion — Jan 2007
- Lock Construction Start — Oct 2007

Construction Status



Test Pile Contract
Completed Aug 2003

Galvez St. Wharf
Completed Feb 2003

9 Mooring buoys
Completed Apr 2003

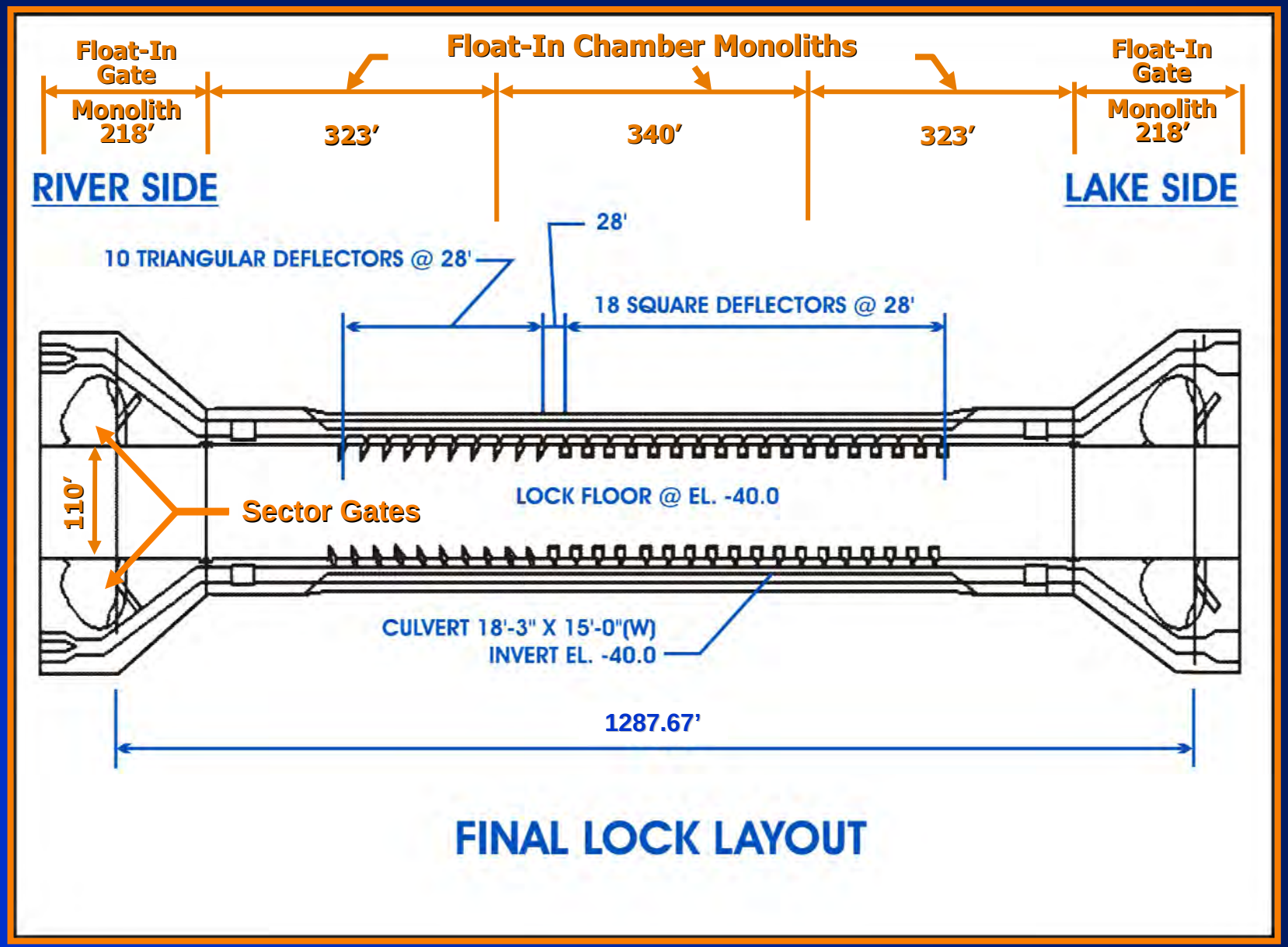
T.E.R.C. Contract
Completed Dec 2004

Actual construction began in January, 2001 – T.E.R.C. Contract


Test Pile Contact

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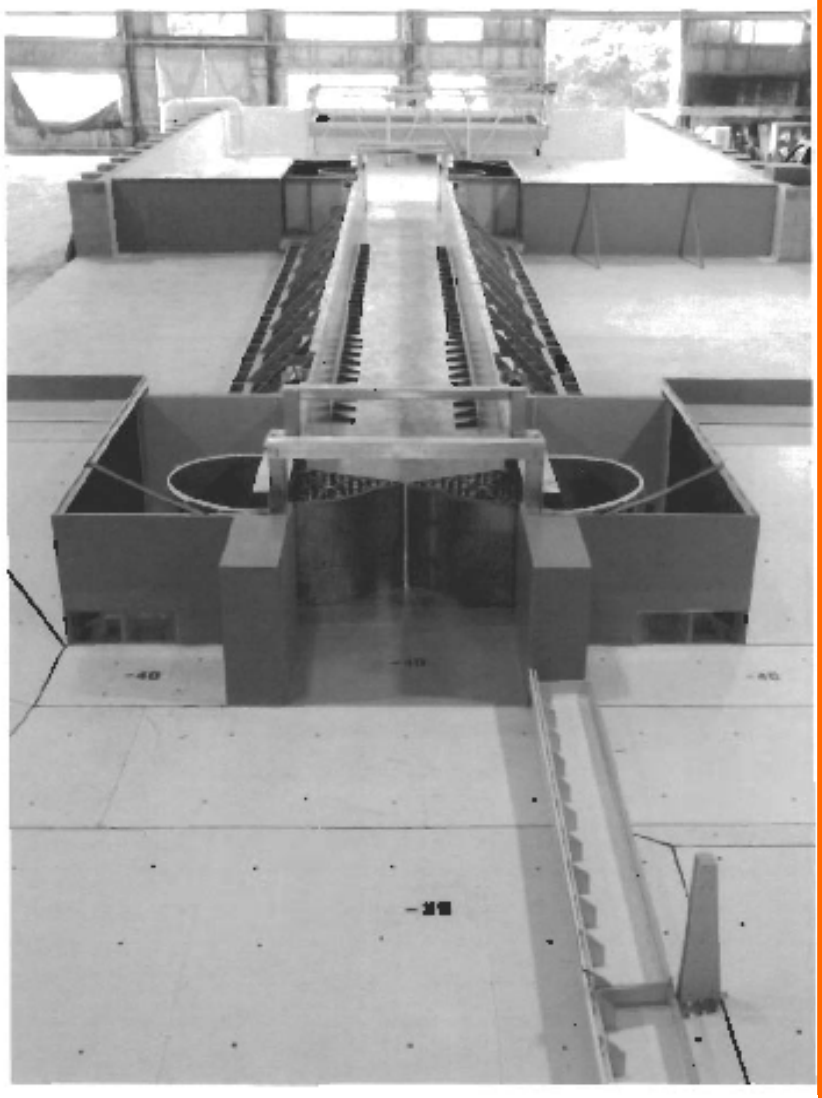
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District



FINAL LOCK LAYOUT

URS A/E Team

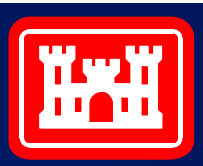
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District



Model - Looking from river side

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New Orleans
District



David Lapene, PE - URS Corporation

Topics:

Team Overview, Design Criteria, Operational Design, Module Draft Study

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New Orleans
District

INNER HARBOR NAVIGATION CANAL LOCK REPLACEMENT

USACE New Orleans District

URS A/E Team Major Firms Include:

URS Group, Inc.,
Brown, Cunningham, & Gannuch, Inc.,
Jacobs Civil, Inc.,
INCA Engineers, Inc.,
Ben C. Gerwick, Inc.,
The Glosten Associates, Inc., and
Eustis Engineering Company, Inc.

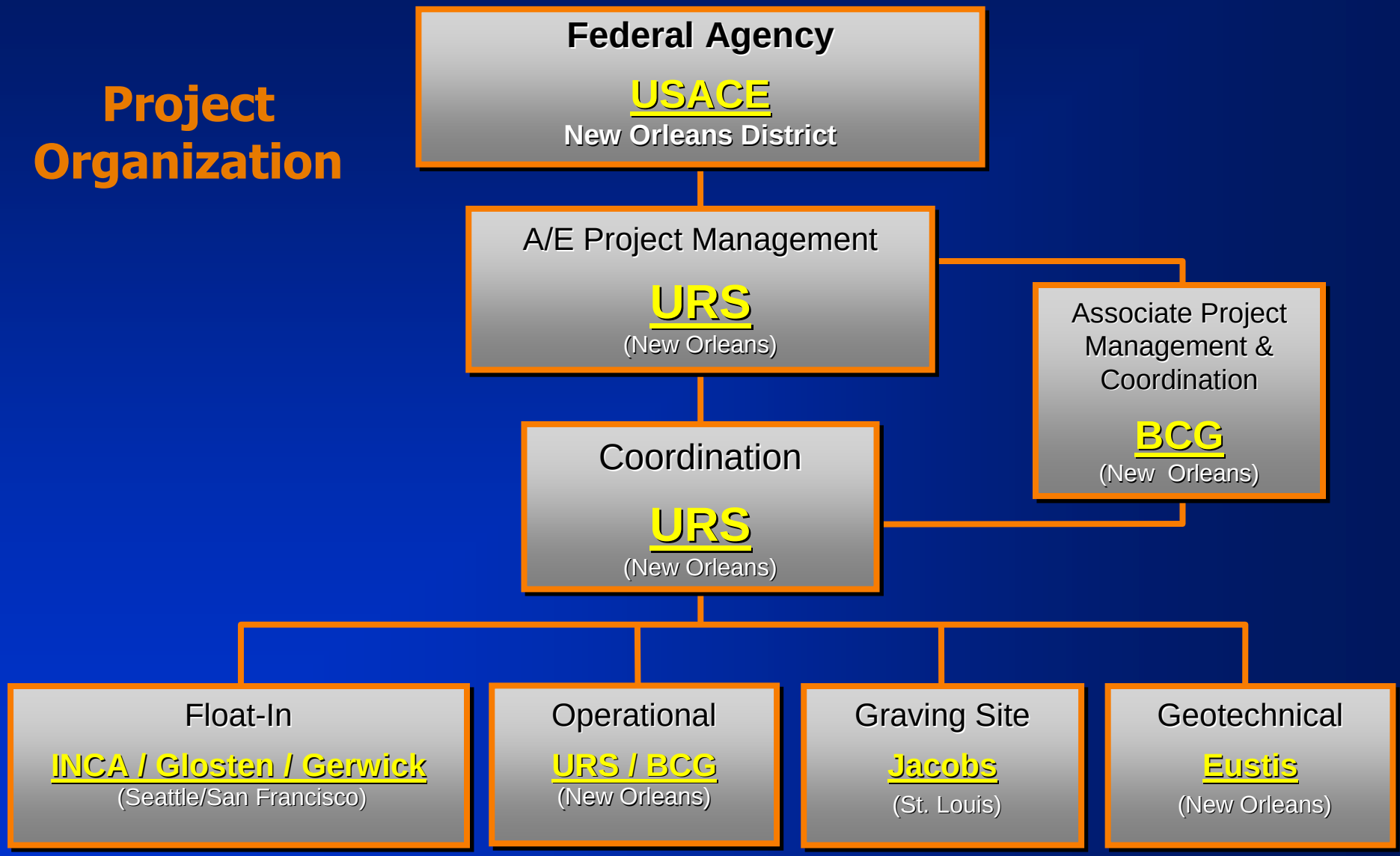
How Did URS Select Team Firms?

- What expertise does the project require?
  - Depth and breadth in project management
  - Staff with lock knowledge and experience
  - Float-in and naval architecture expertise
  - Intimate knowledge of local soil characteristics

URS A/E Team

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New Orleans
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Project Organization



Coordination Process

- Progress and coordination schedule
  - Developed on MS Project and distributed
- Team management teleconference every two weeks between PM's of all offices
  - Schedule / budget / technical quality / deliverables
- URS / BCG project management face to face meeting every two weeks (or as required)
  - Client relationships / contract obligation / budget / team directives

Coordination Process Continued

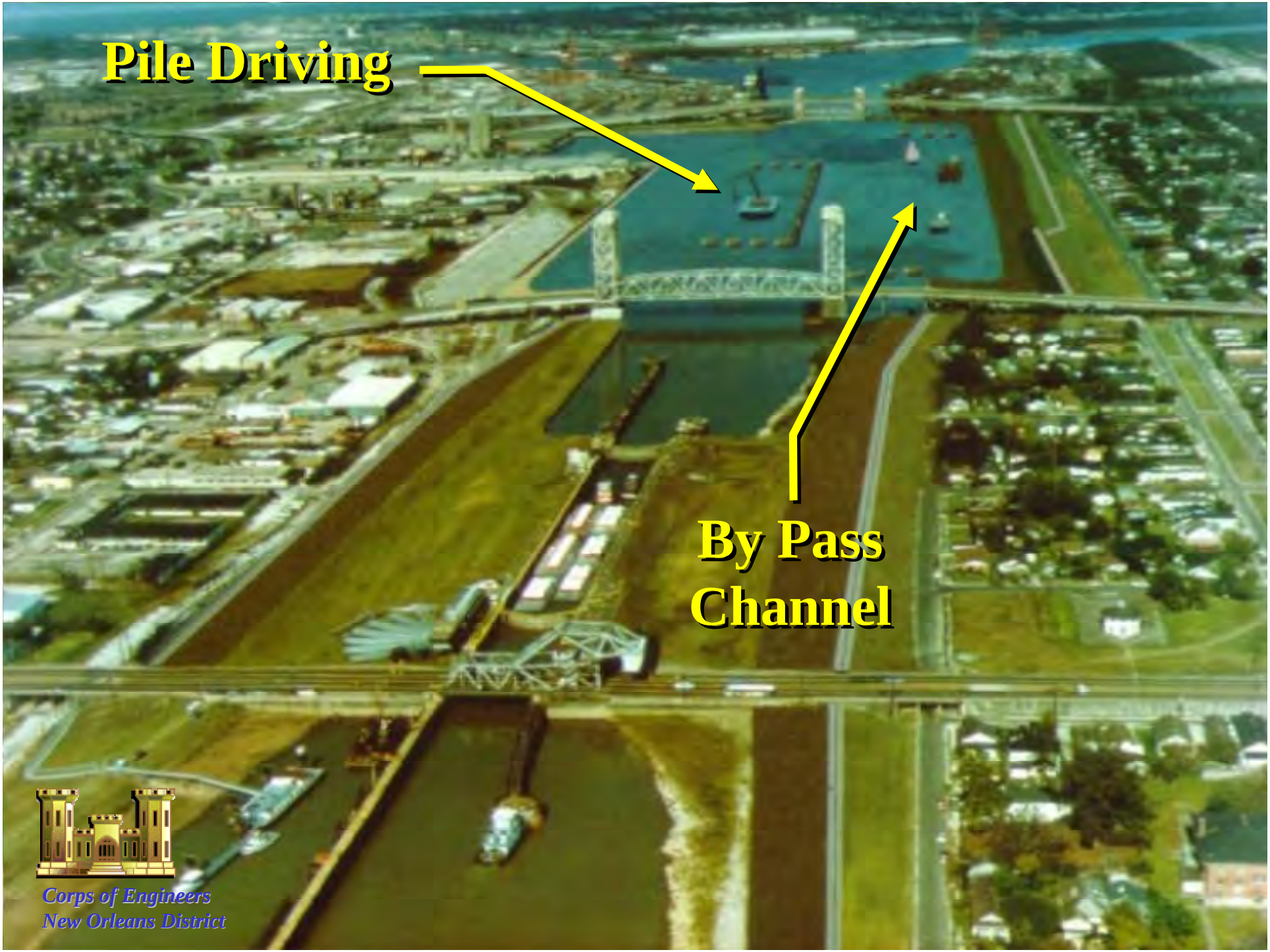
- **Design coordination teleconferences biweekly**
  - Design methodology and philosophy / exchange of data / schedule / drawing standards / DCD / construction methodology
- **Progress and coordination drawing reviews**
  - Approximately every three months

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Quality Control and Quality Assurance
(Every Submittal)

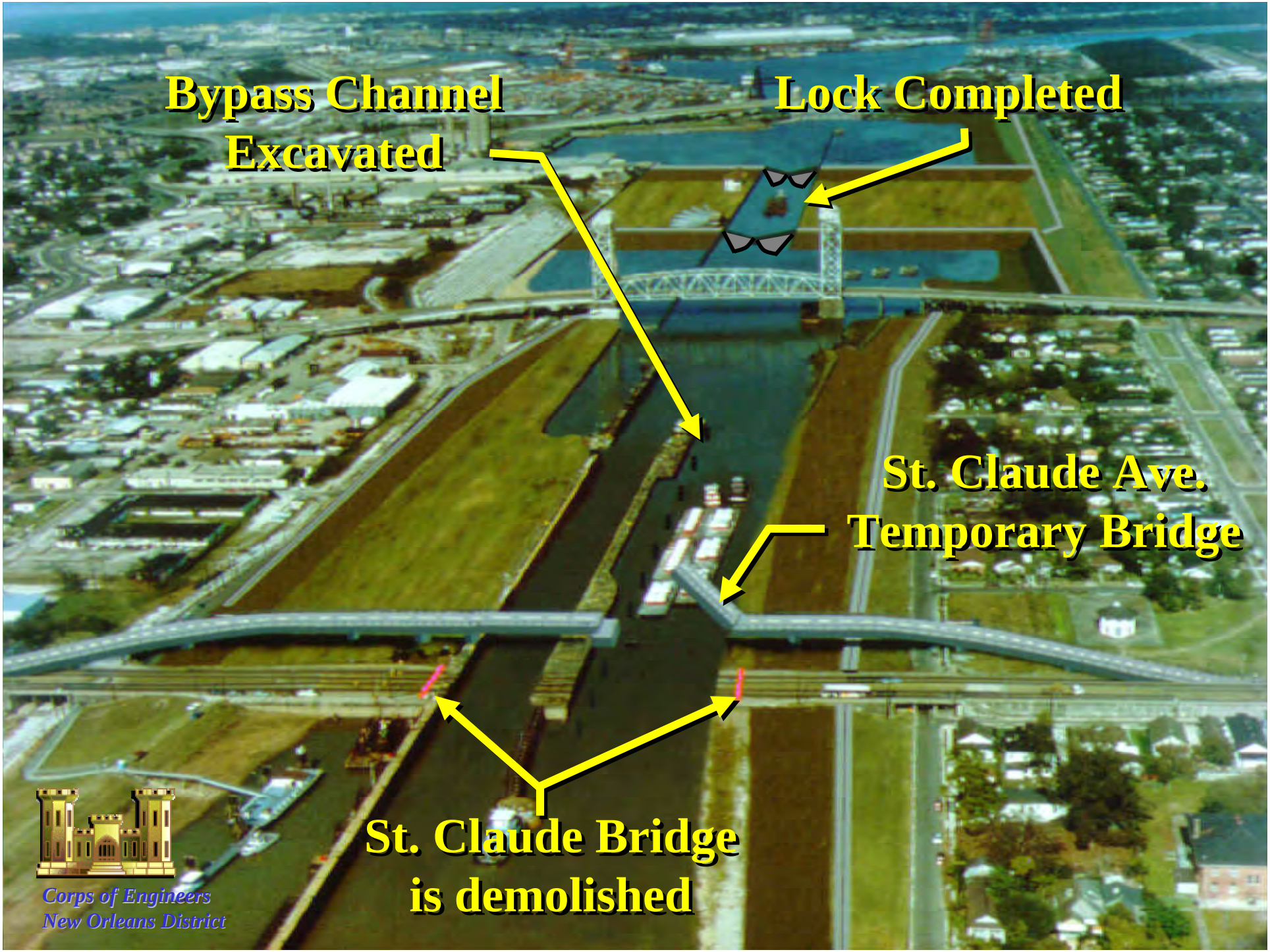
- **Page by page quantitative check by each firm**
  - Documentation provided to USACE
- **Independent Technical Review**
  - Qualitative review by each firm for design philosophy and methodology
  - Documentation provided to USACE
- **Project-wide ITR**
  - Qualitative check of all disciplines and designs as a whole by senior personnel with USACE lock experience
  - Documentation provided to USACE

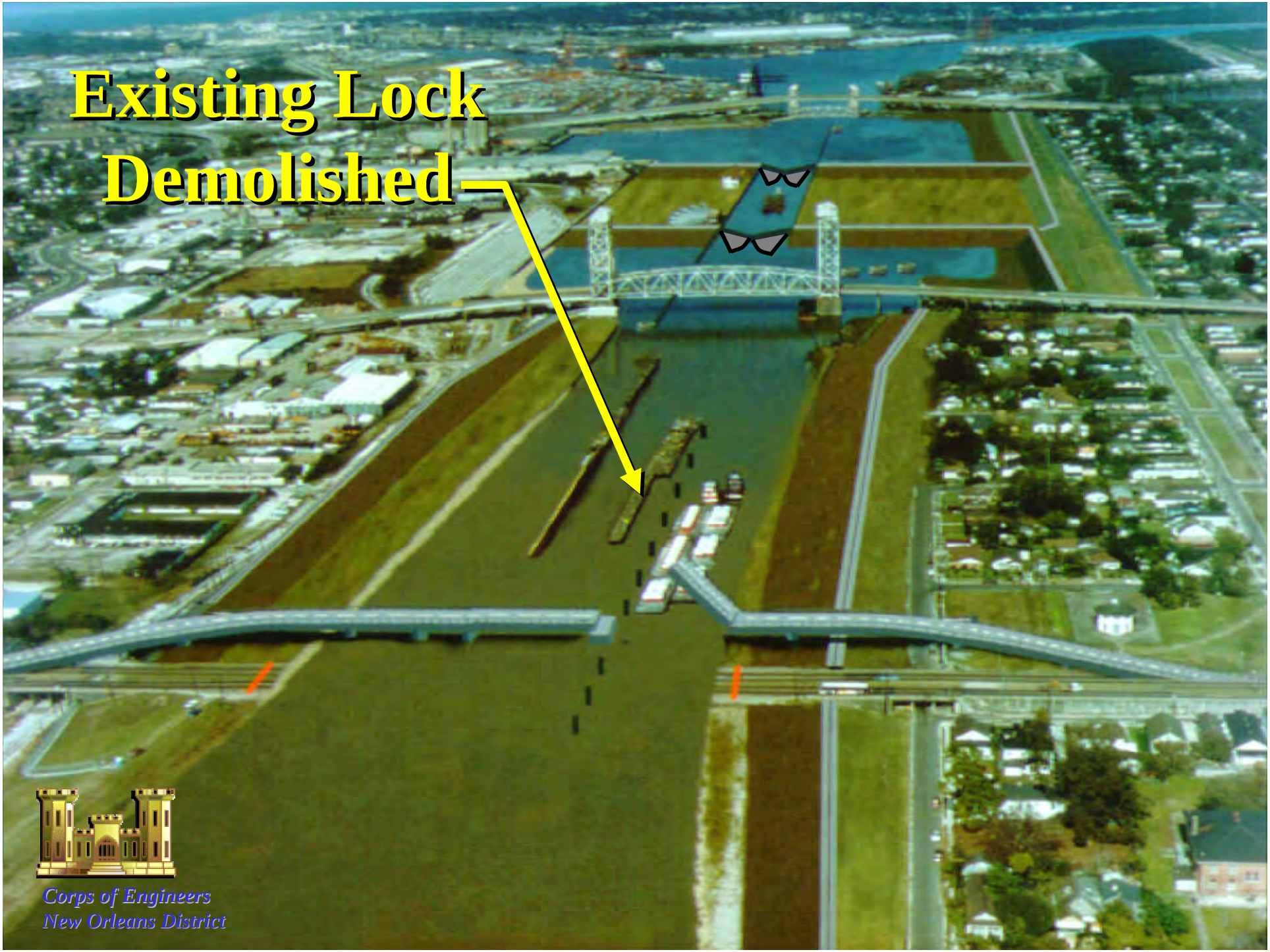


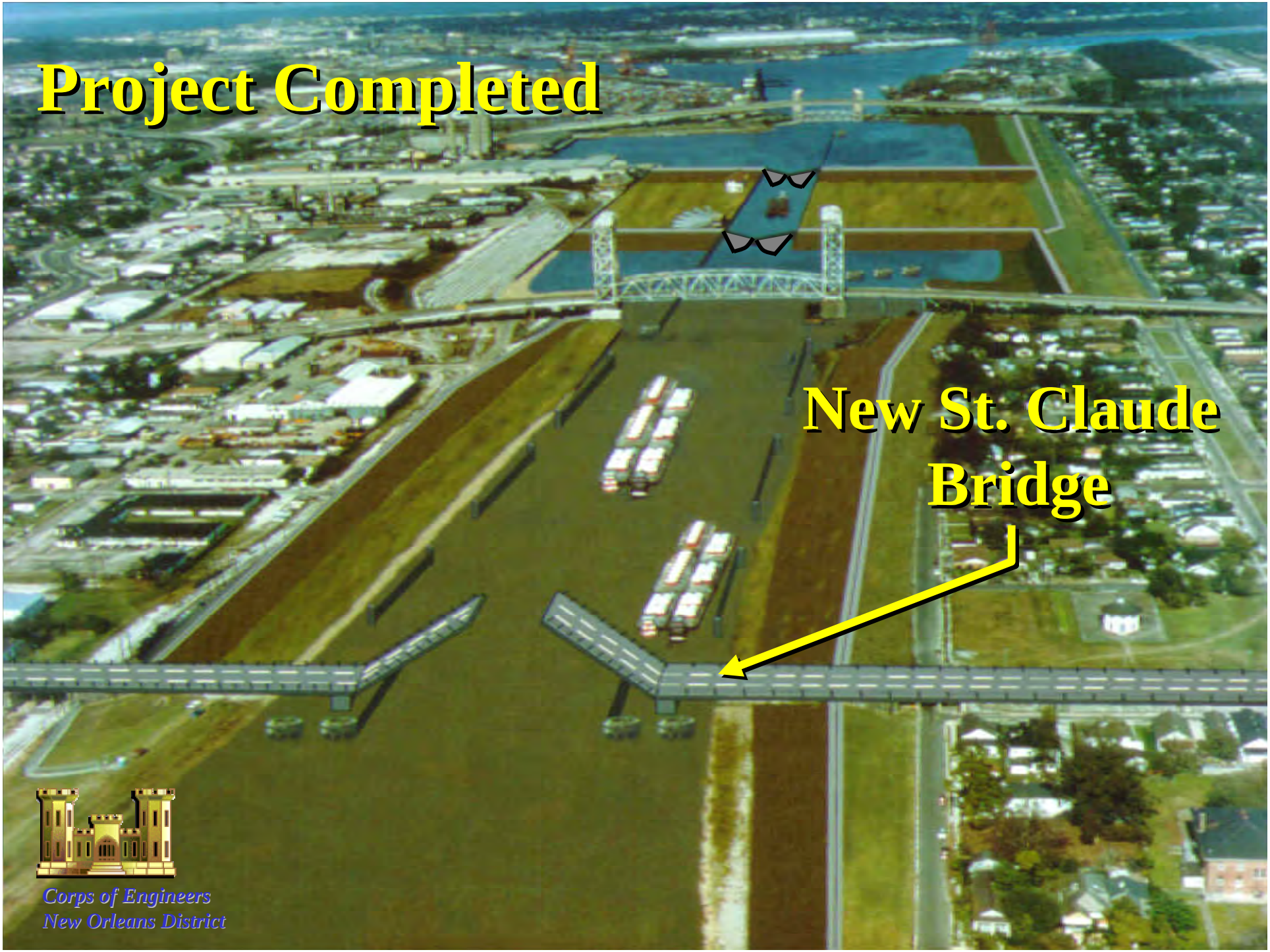
Corps of Engineers
New Orleans District



Corps of Engineers
New Orleans District

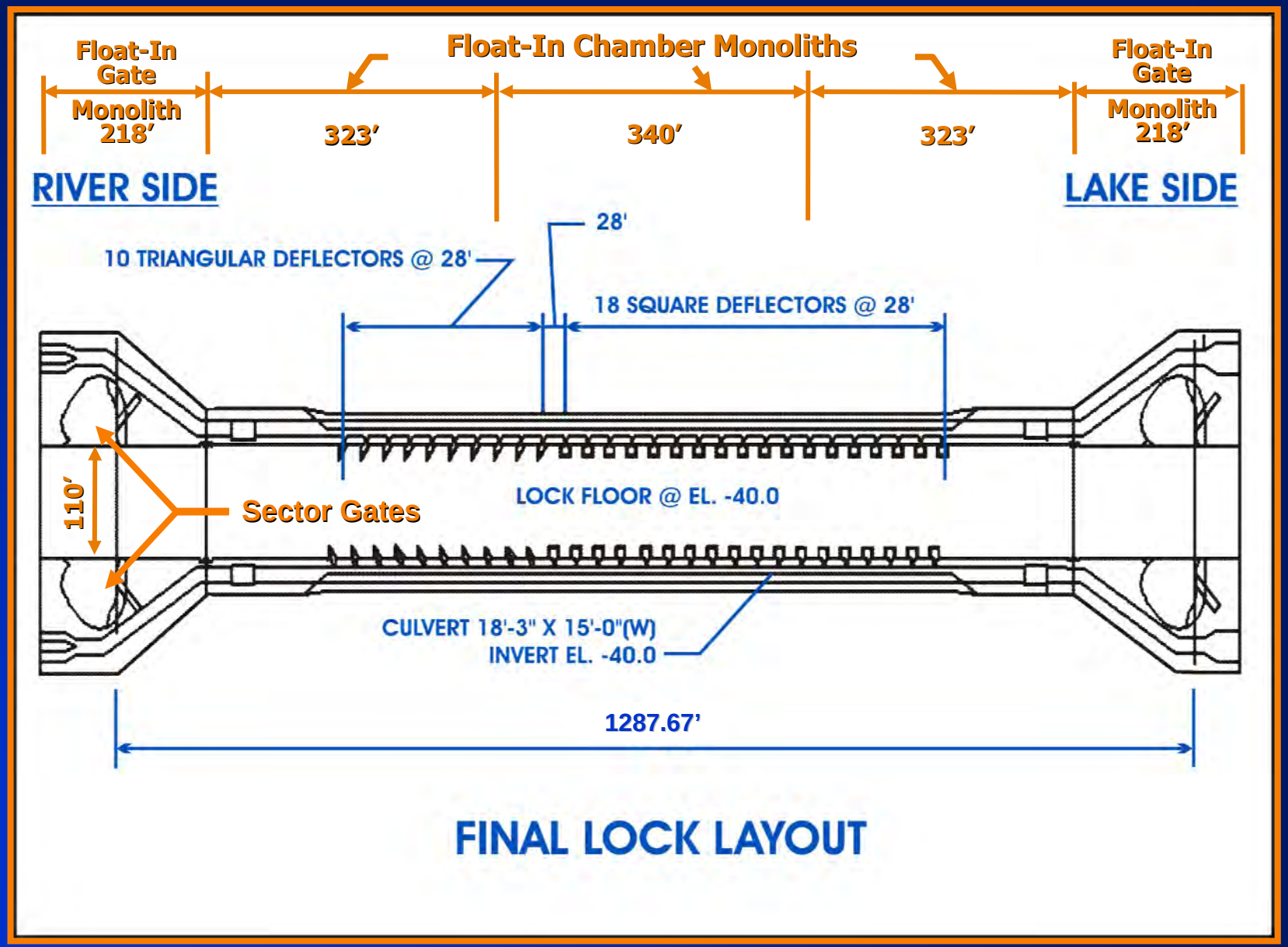

Bypass Channel Excavated
Lock Completed
St. Claude Ave. Temporary Bridge
St. Claude Bridge is demolished
Corps of Engineers
New Orleans District


Existing Lock
Demolished
Corps of Engineers
New Orleans District


Project Completed
New St. Claude Bridge
Corps of Engineers
New Orleans District

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FINAL LOCK LAYOUT

URS A/E Team

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New Orleans
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Water Stages

Case	Riverside	Lakeside	Head Difference
Normal Range (Transport & Construction)	EL. 0.0 to 3.0	EL 0.0 to 3.0	
Normal Operation	EL. 10.0	EL. 1.0	9’
Direct Head	EL. 18.0	EL. 0.0	18’
Hurricane	EL. 0.0	EL. 13.0	13’ (Reverse Head)
Maintenance Dewatering	EL. 10.0	EL. 5.0	64’ (Uplift Head)

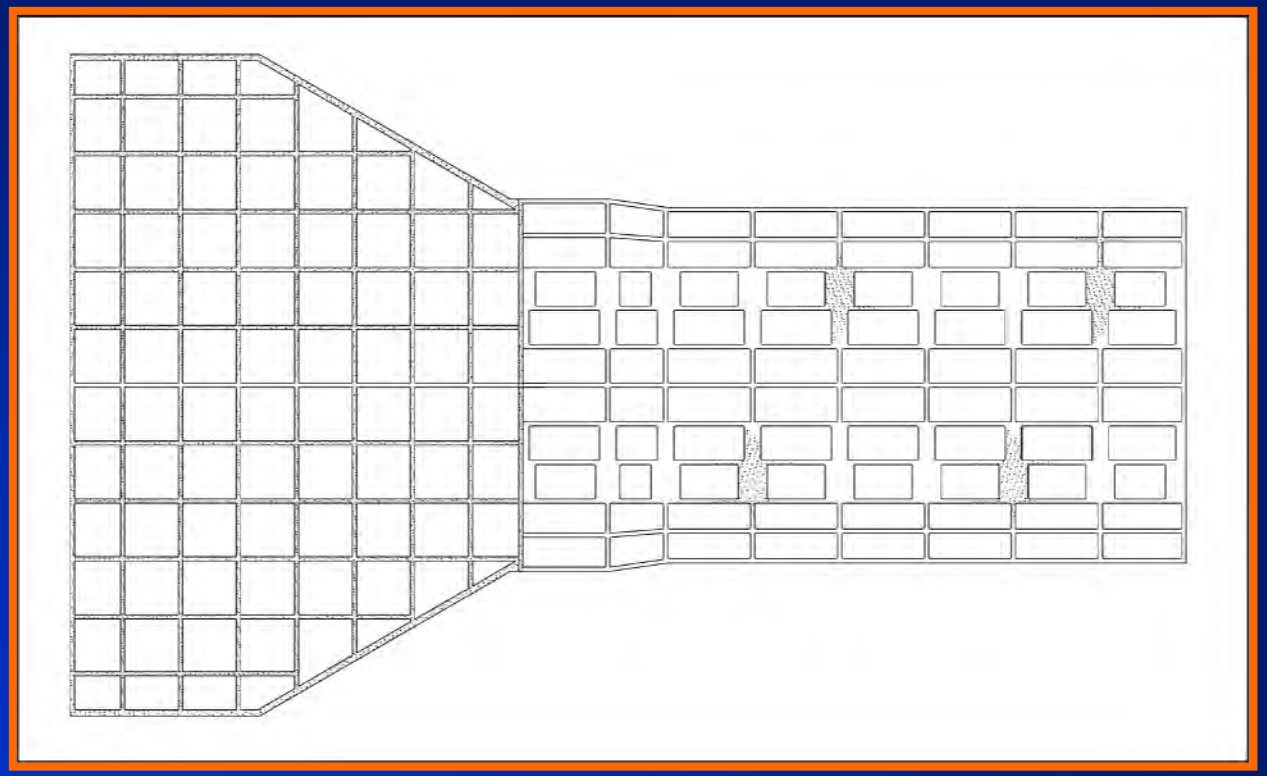
Governs

Governs

Operational Monolith Design Criteria

- EM 1110-2-2104 / ACI 318
- No load transfer between monoliths
- Shell f'_c = 5000psi
  - Structural infill = 3000psi
  - Nonstructural infill = 2000psi
  - Fy = 60ksi
- Normal-weight concrete
- Overstress factors
  - O/S = 1.167 → construction / usual maintenance dewatering
  - O/S = 1.33 → max. direct head / unusual maintenance dewatering
- Service load displacements
  - Settlement ≤ 0.5”
  - Lateral displacement (usual cases) ≤ 0.5”
  - Lateral displacement (unusual cases) ≤ 1.5”

Infill Concrete in Base



- 24” bottom slab is not adequate to take beam shear from piles
- Considering half height structural infill concrete in cells
- Upper half to be nonstructural infill

Foundation Piles

- 48” ϕ X 120’ pipe piles selected
  - 900k compressive capacity
  - 320k tensile capacity
  - 14’ X 14’ grid at walls / 14’ X 20’ grid at chamber floor
  - Average compressive pile load → 75% capacity
  - Approximate cost in place = $47,000,000
- Alternative pile study
  - Considered 36” X 120’ pipe piles
  - Approximately $4,000,000 more than 48” piles

Module Draft Study

Evaluate Two Drafts for the Float-in Modules

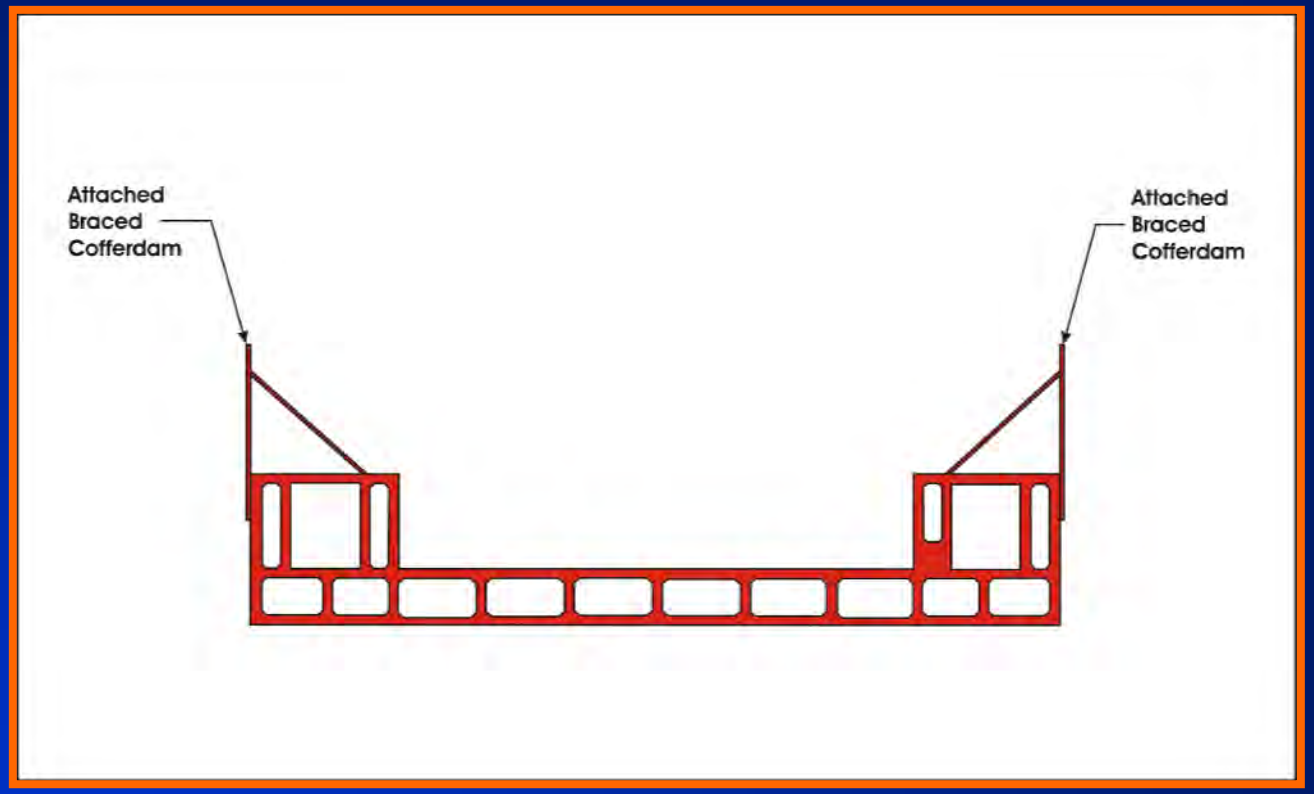
- **Shallow Draft**
  - 25’ allowable draft
  - Build to EL. (-) 19.75 in graving site and transport with attached cofferdam
  - Graving site invert EL. (-) 28.00

- **Deep Draft**
  - 32’ allowable draft
  - Build to minimum EL. 6.00 – no cofferdam needed at set down
  - Graving site invert EL. (-) 38.00

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Shallow Draft Chamber Module

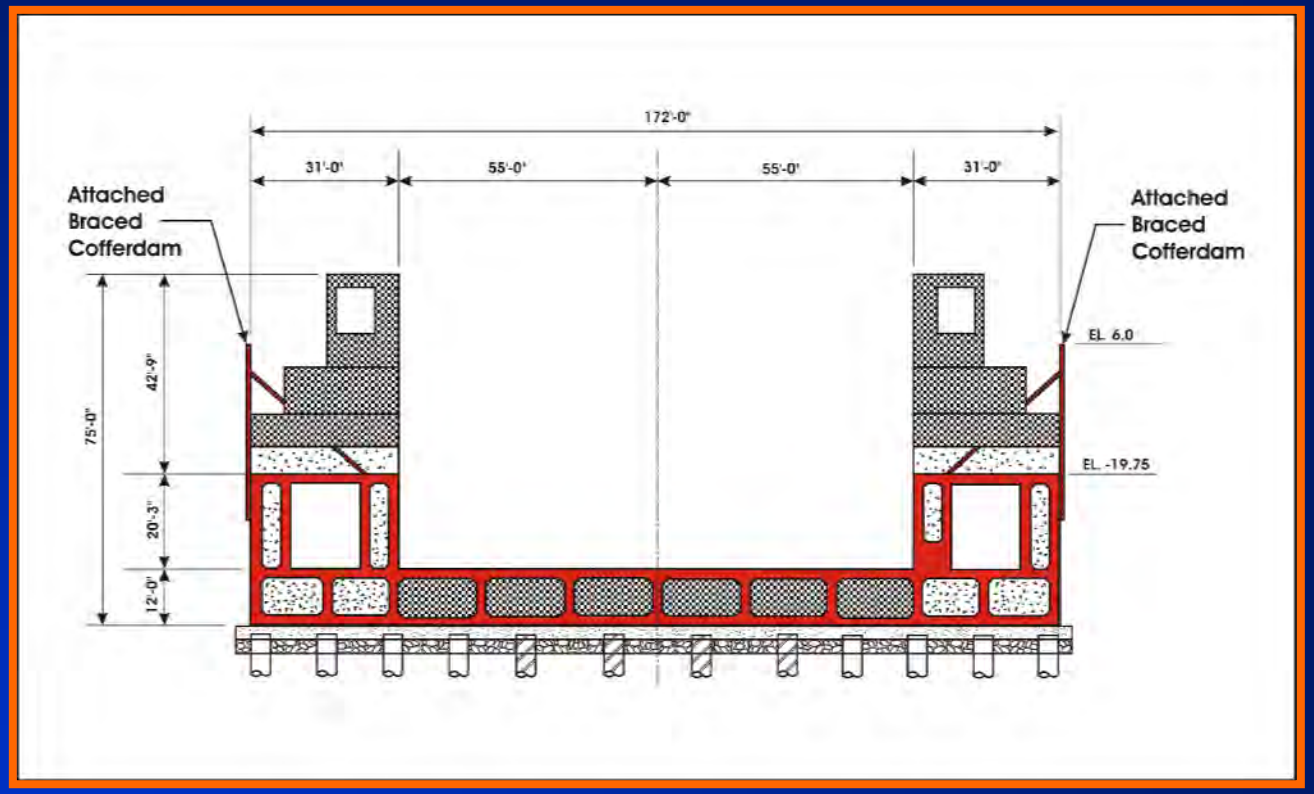


- Red denotes Float-in module built in graving site
- Allowable draft during transport 25’ with 2’ under keel clearance
- Attached cofferdam needed for set down

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District

Shallow Draft Chamber Module

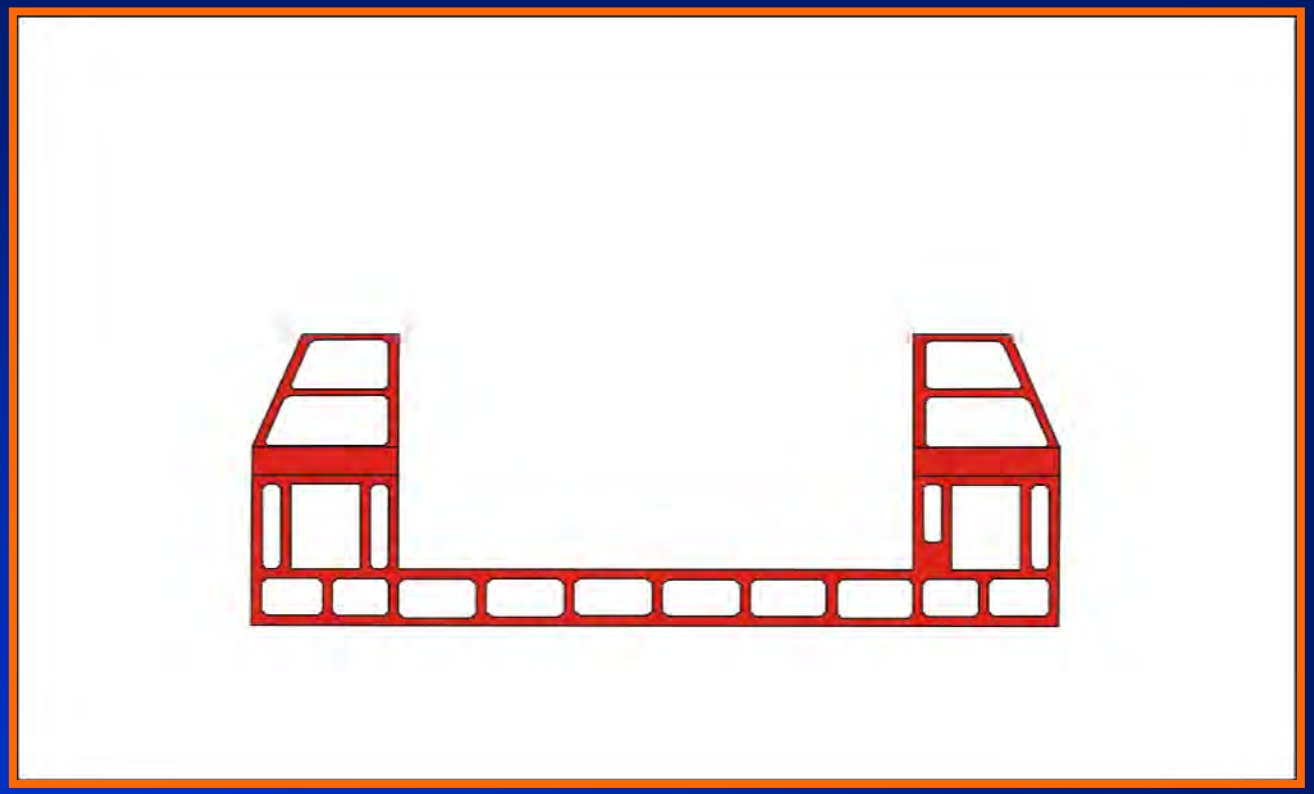


- Red denotes Float-in module built in graving site
- Allowable draft during transport 25’ with 2’ under keel clearance
- Attached cofferdam needed for set down

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Deep Draft Chamber Module

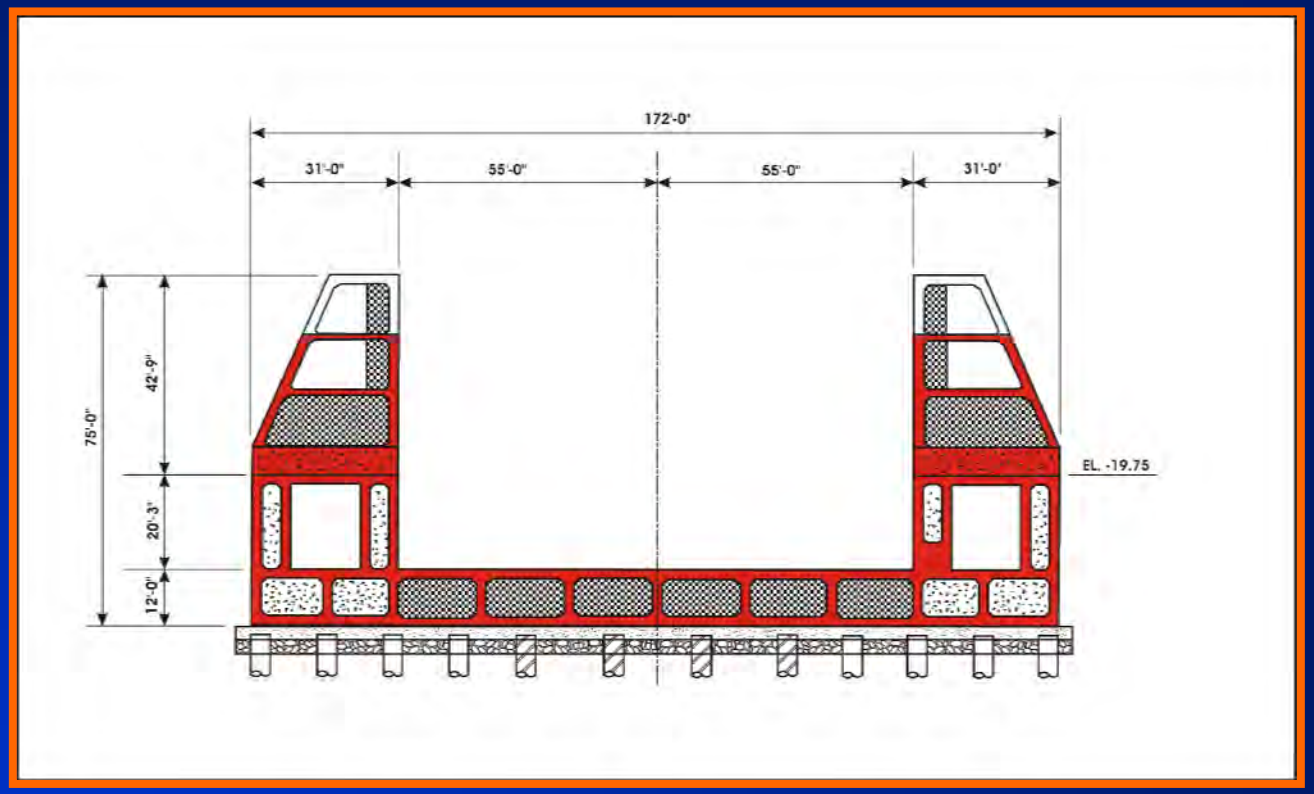


- Red denotes Float-in module built in graving site
- Allowable draft during transport 32’ with 2’ under keel clearance
- No cofferdam needed for set down

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Deep Draft Chamber Module



- Red denotes Float-in module built in graving site
- Allowable draft during transport 32’ with 2’ under keel clearance
- No cofferdam needed for set down

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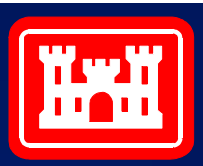
Draft Study Conclusions

→ Shallow Draft Configuration is Recommended ←

- Shallow draft is $3.2m less expensive
- No dredging required at Florida Ave. bridge
- Less reinforcing due to less hogging and sagging
- Easier to construct and transport
- Less construction time required
- Depth of excavation at graving site more appropriate for soils

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Dale Miller, PE - INCA Engineers, Inc

Topics:

- Float in Construction Sequence & Design

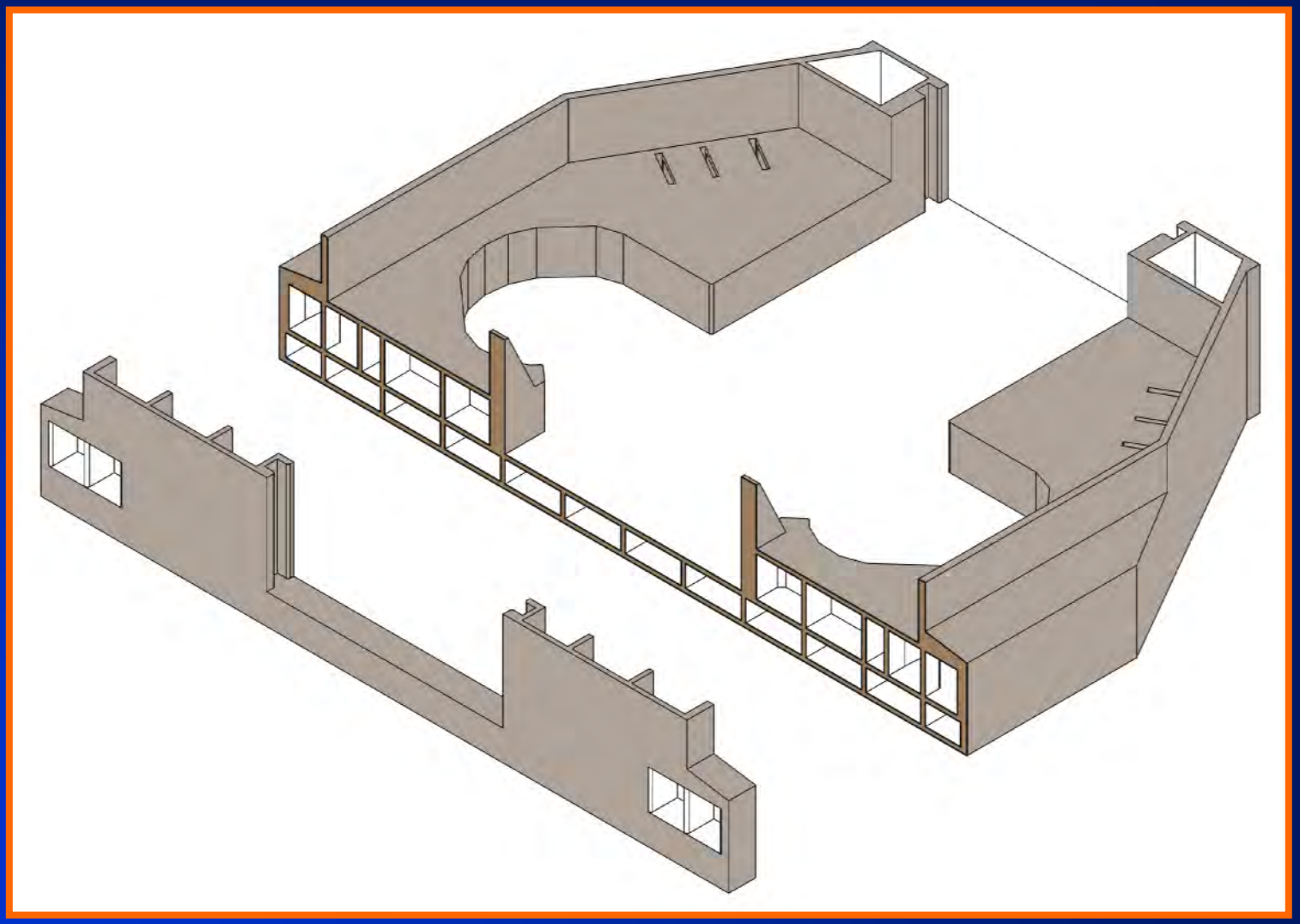
Lock Construction

- Graving Site
- Transport
- Set down
- Foundation Integration
- Monolith Completion
- Monolith Joints

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Gate Bay Section Isometric



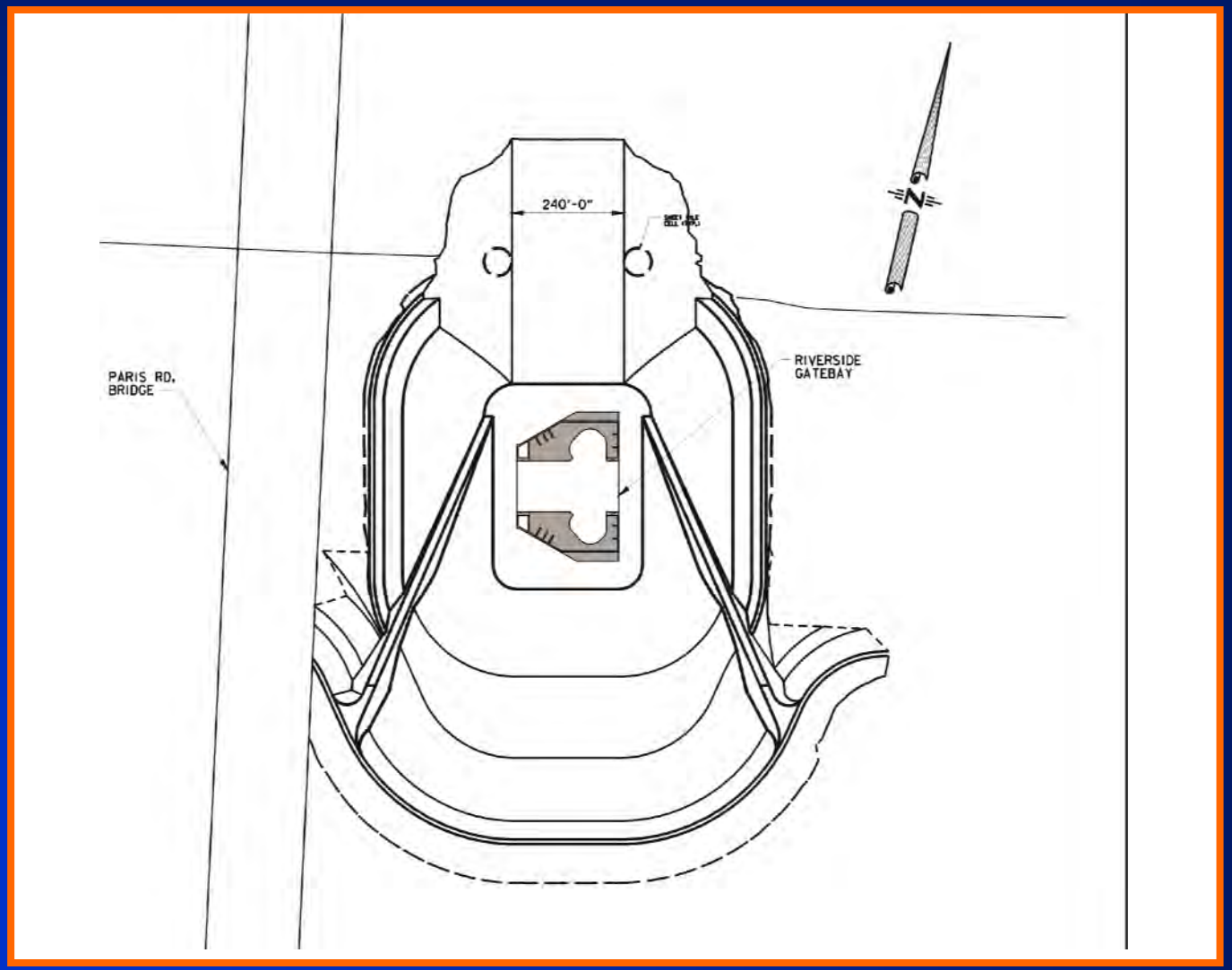
Concrete Shells

- 12’ to 14’ deep cellular base for transport
- Gatebays: 28’ X 28’ cells with 24” top and bottom slabs
- Chambers: 19’ X 42’ cells with 24” top and bottom slabs
- 24” bottom slab is not adequate to take beam shear from piles
- Considering half height structural infill concrete in cells
- Upper half to be nonstructural infill

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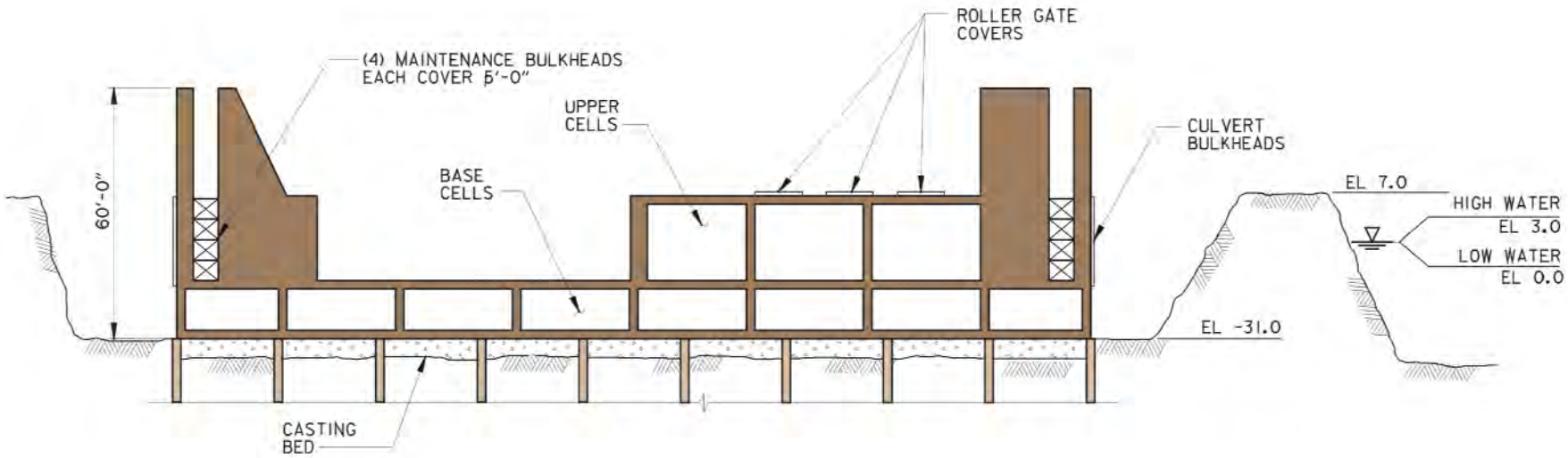
Graving Site



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Longitudinal Section Thru Bulkhead Slots

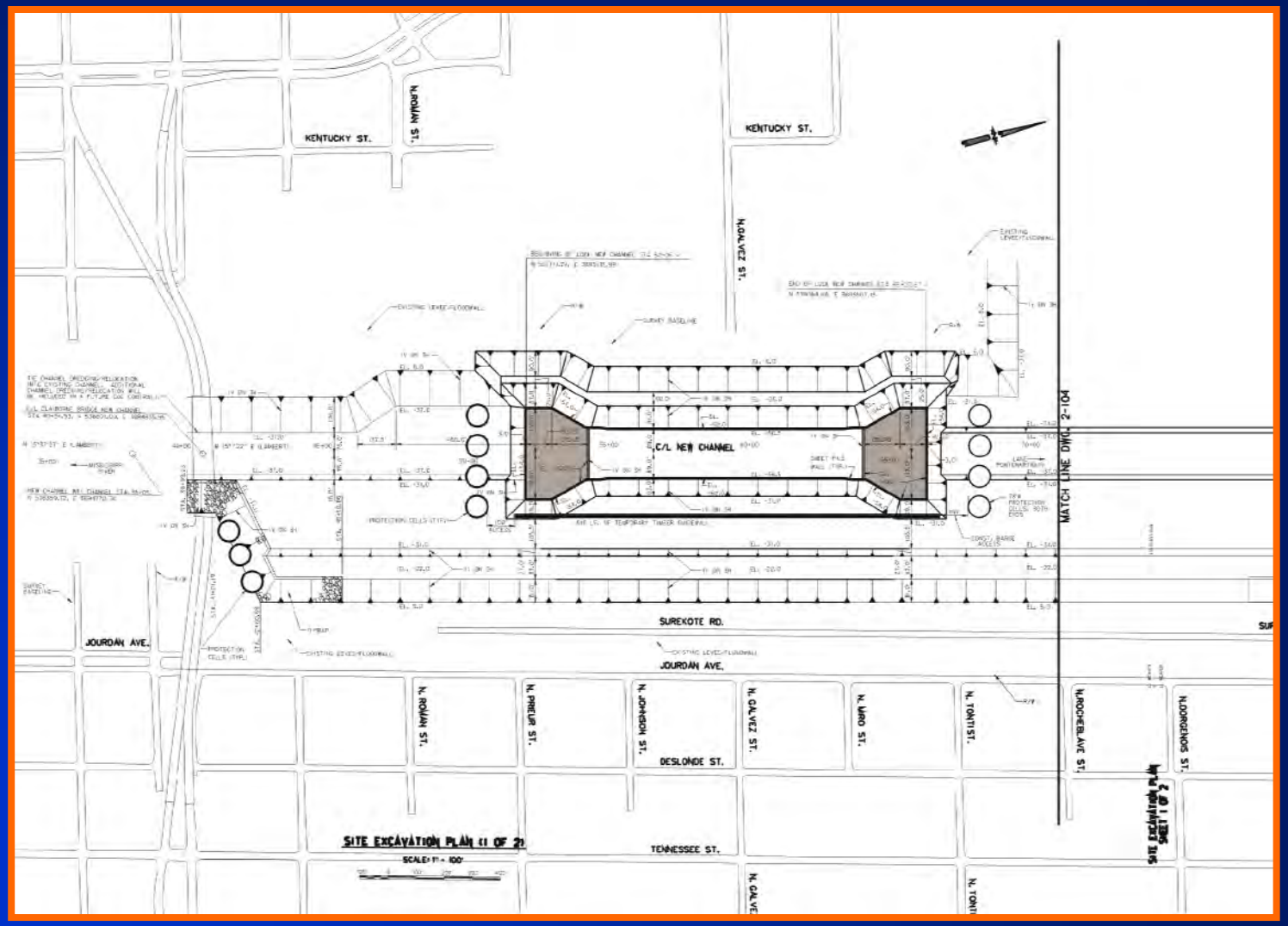


- Grade Beams
- Intermediate Sand Bed

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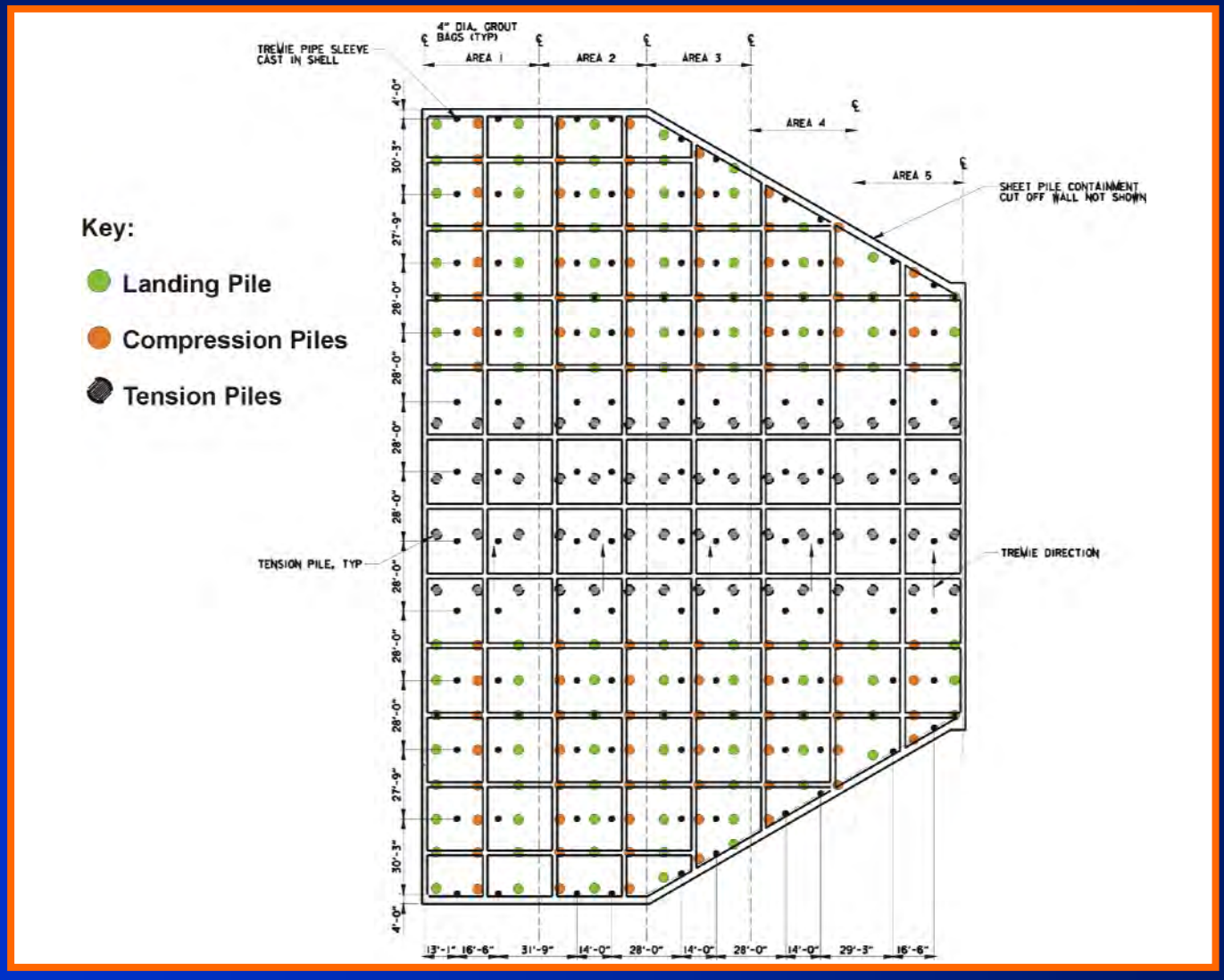
Lock Site



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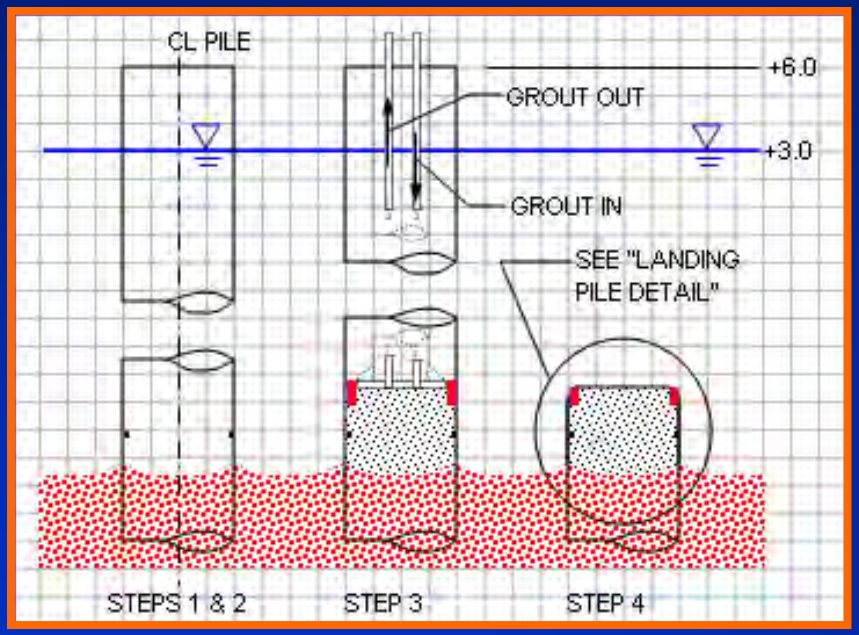
Pile Plan

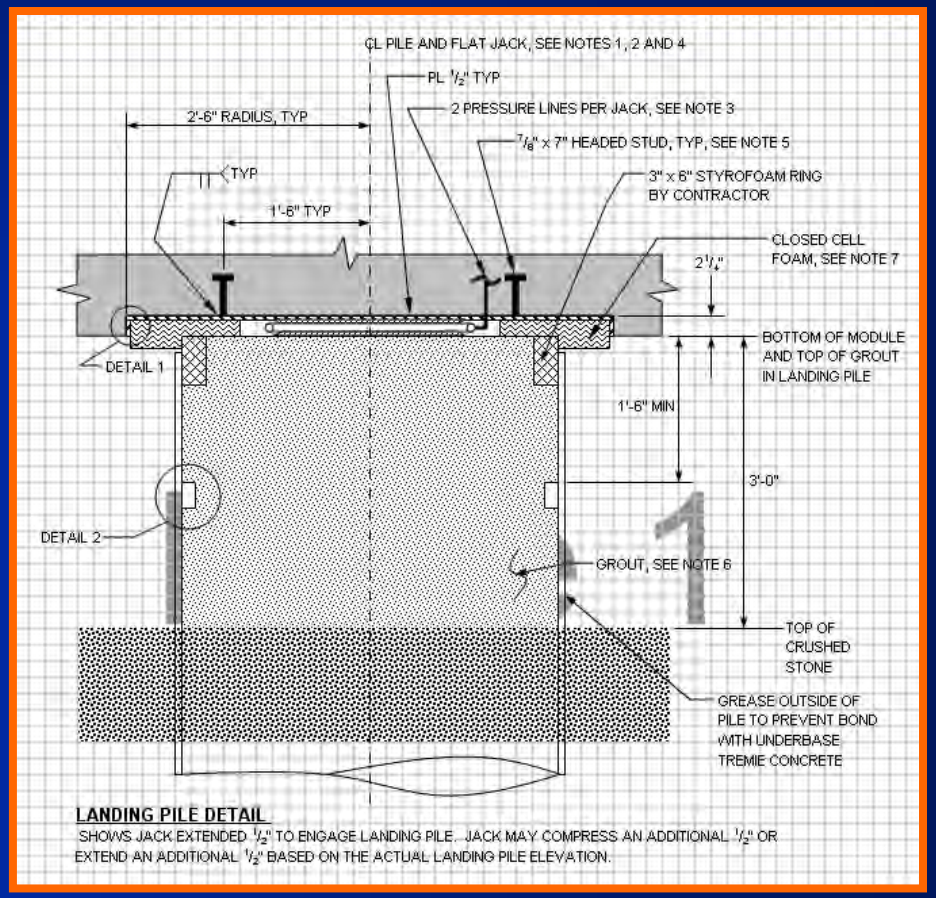


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Landing Pile Preparation

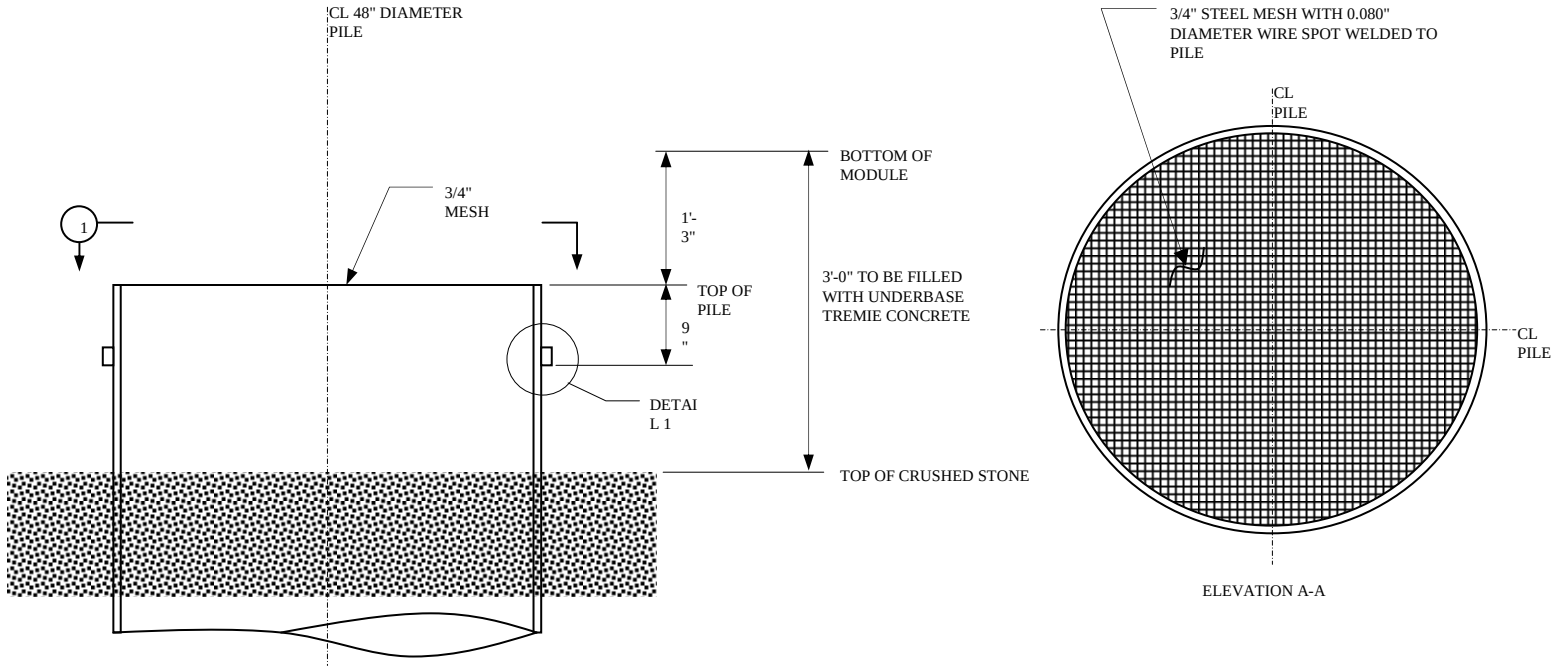




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Compression Piles

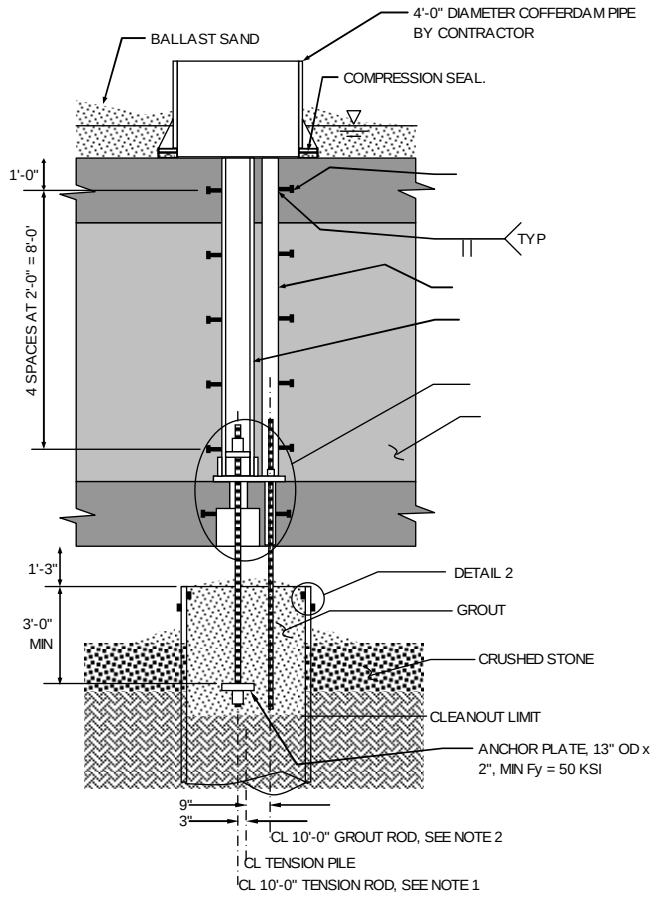


- Mesh to Prevent Excess Tremie Infill
- Compression Load to 3” x 11/2” x Continuous Shear Key

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Tension Pile Connection



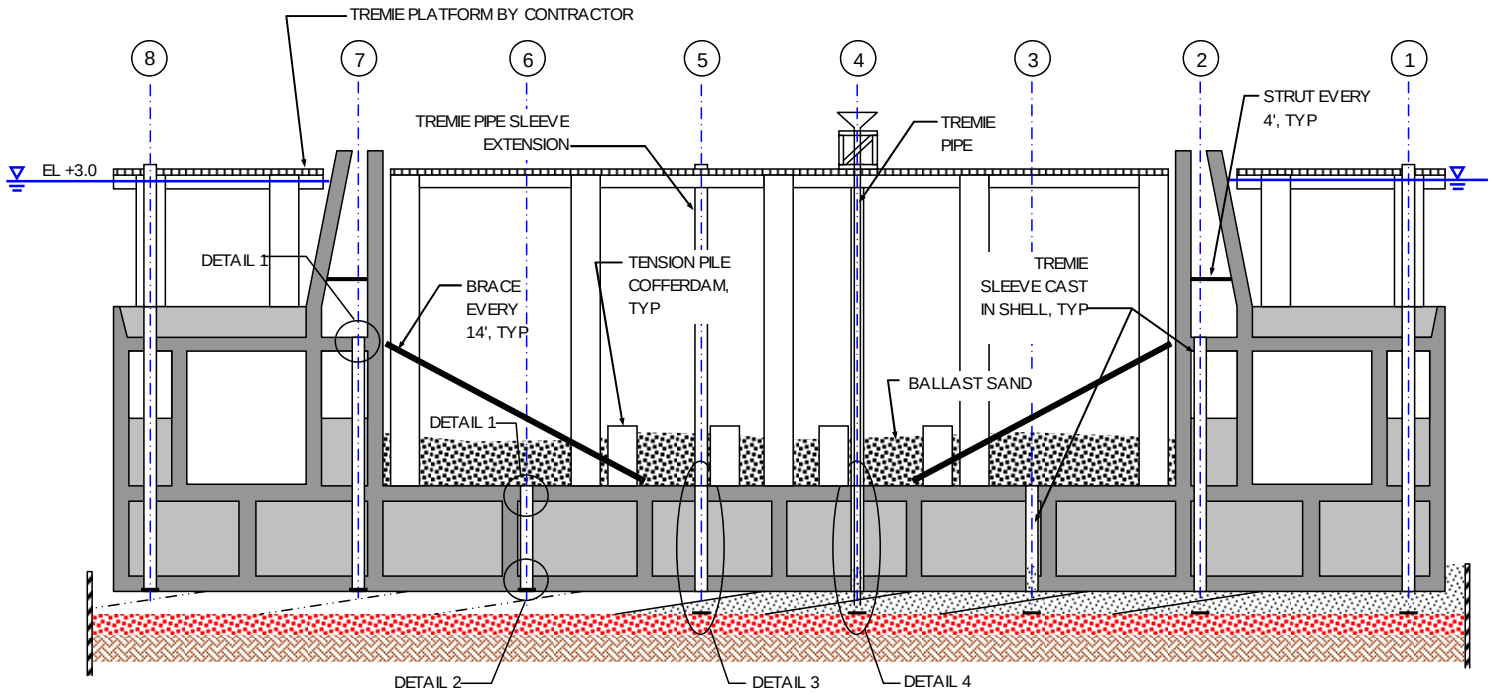
LOWERED TENSION PILE CONNECTION

- Initially Retracted and Sealed
- Lowered and Grouted

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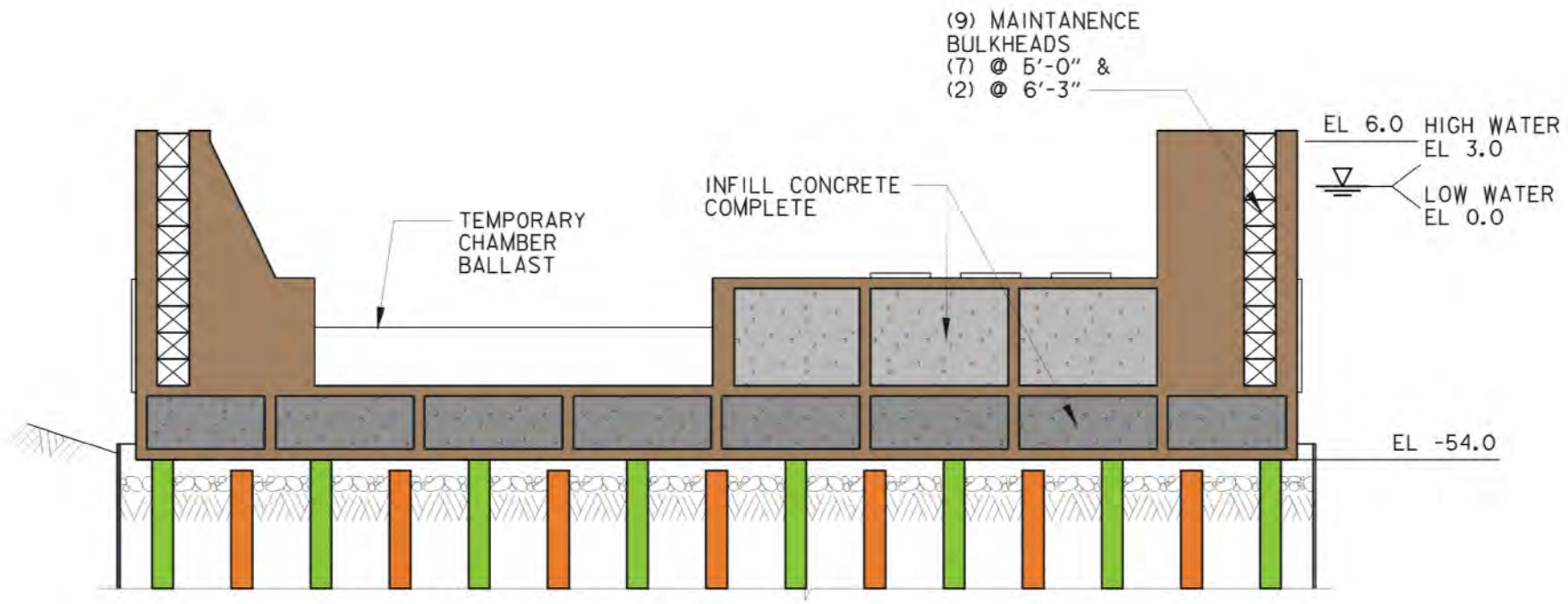
Underbase Tremie Placement



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Set-Down

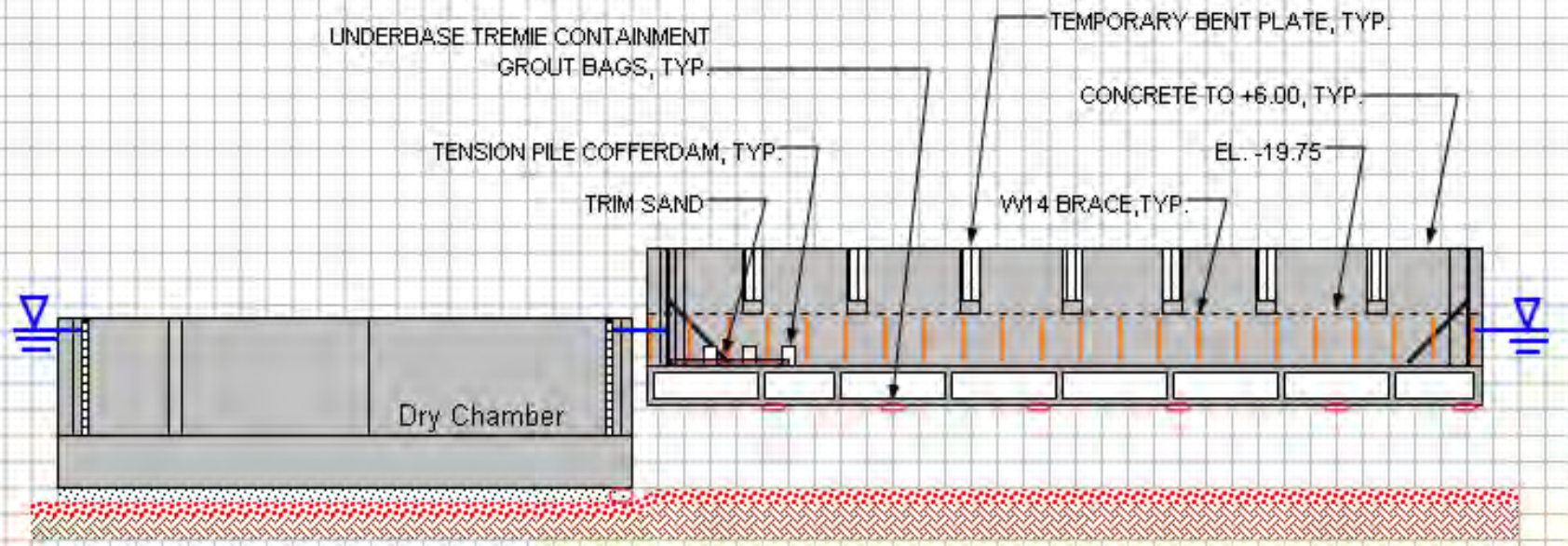


- 5% Negative Buoyancy on Landing Piles

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Construction Sequence



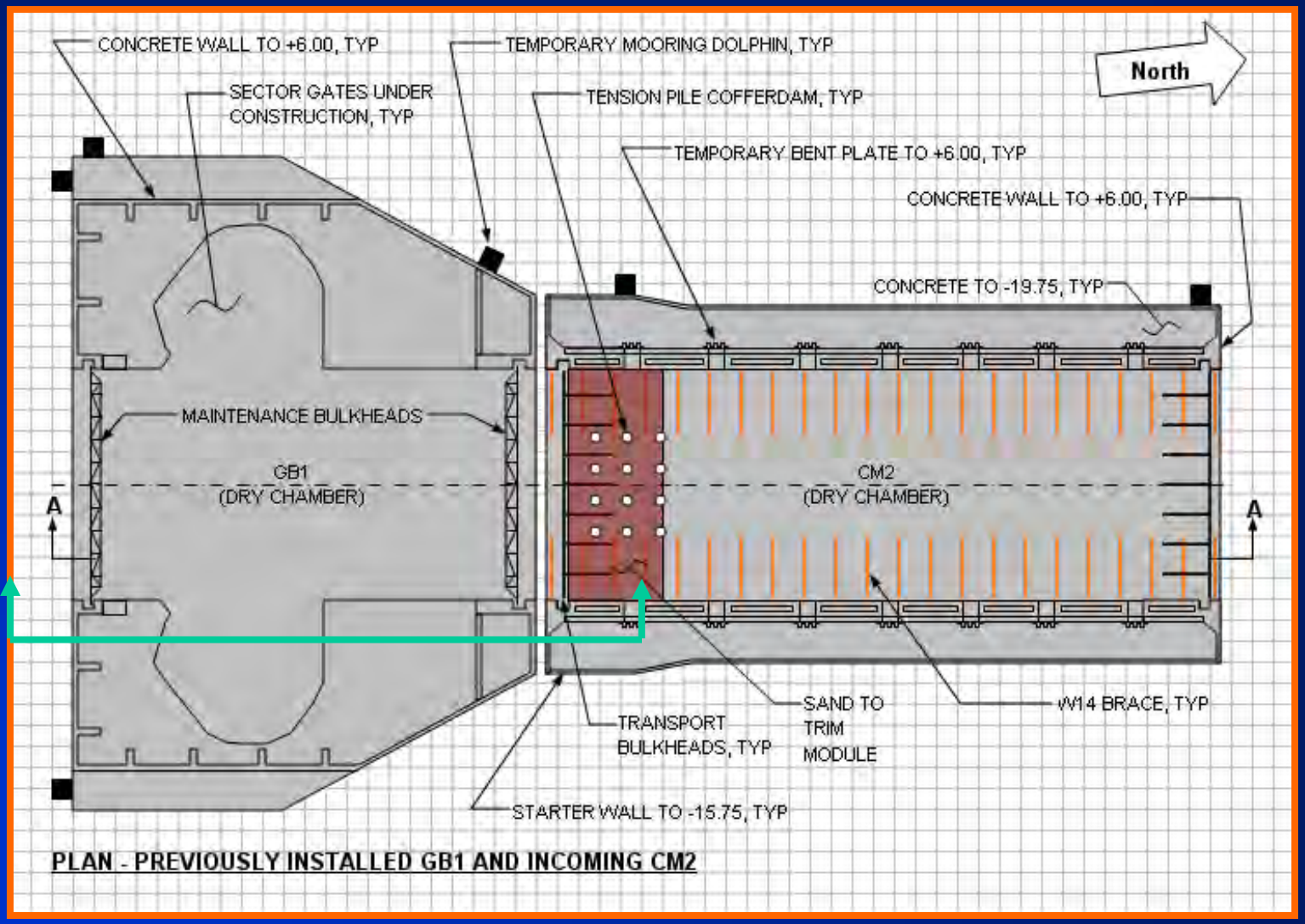
SECTION A-A

STEP 1) CM2 ARRIVES AT LOCK SITE AND IS MOORED TO DOLPHINS AND THE PREVIOUSLY INSTALLED GB1. UNDERBASE TREMIE CONTAINMENT GROUT BAGS ARE WRAPPED AROUND THE MODULE.

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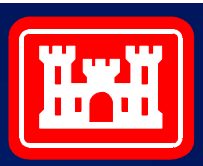
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Construction Sequence



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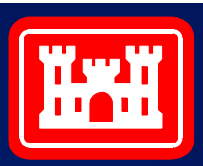
Mark Gonski, PE - New Orleans District

Topics:

Lessons Learned from Harvey Canal, IHNC CIP Study

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Lessons From Harvey Sector July 2005

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Harvey Sector Gate Float-in Low Bid =

- Insert plan of gate

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Harvey Sector Gate CIP (rebid)
Low Bid =

- Insert plan of gate

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Best Value Contracting Method

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Best Value Lessons Learned

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H.S.G. Summary of Lessons Learned

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INDUSTRIAL CANAL LOCK REPLACEMENT

CIP FEASIBILITY STUDY

U.S. ARMY ENGINEER DISTRICT

NEW ORLEANS

Why is a cast-in-place option being explored?

a.) Harvey Sector Gate

I. **$35 million CIP vs. $42 million Float-In.**
   - **$35 million cost could have been further reduced if time had permitted**

II. **Contractors increase cost for risk and marine costs when bidding on a Float-In construction.**
   - **Braddock and Olmstead costs are also significantly higher than proposed.**

b.) Based on Contractor responses to URS A/E Team questionnaire.

I. Sufficient room for CIP excavation provided cellular cofferdam is furnished on east side (need PM to further explore one-lane north by-pass as suggested by Users)

c.) Cost comparison to float-in.

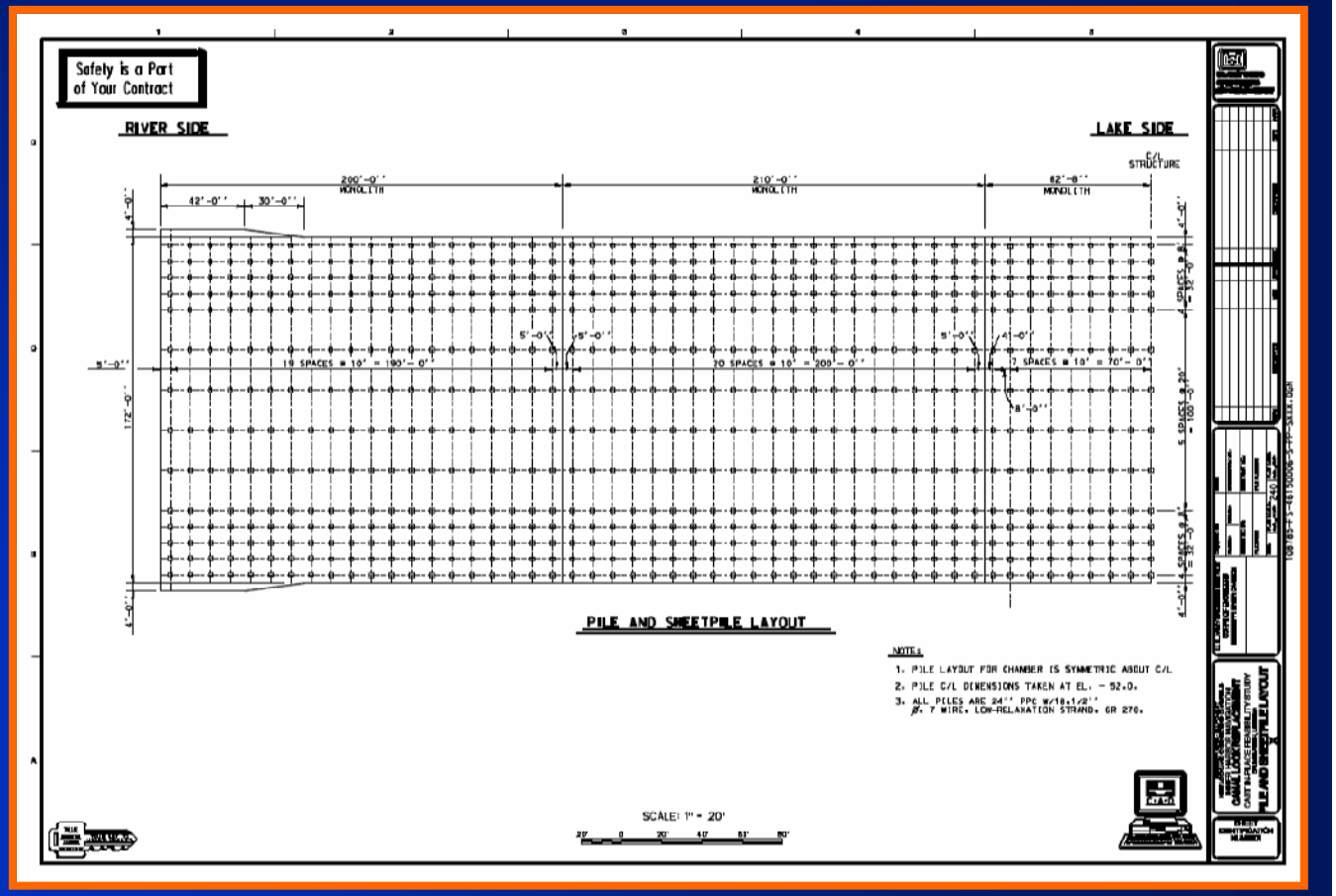
I. Need unit costs from URS applicable to N.O. area at 95% submittal, of Phase I design

d.) Risk

I. With risks involved, bids may come in significantly higher than anticipated for float-in construction.

C. Foundation Design

I. Used 24” square PPC piles spaced at 8’ (10’ in chamber)



II. Gatebay

A. 2D sections taken utilizing flexible base design w/ pile capacities provided by springs.

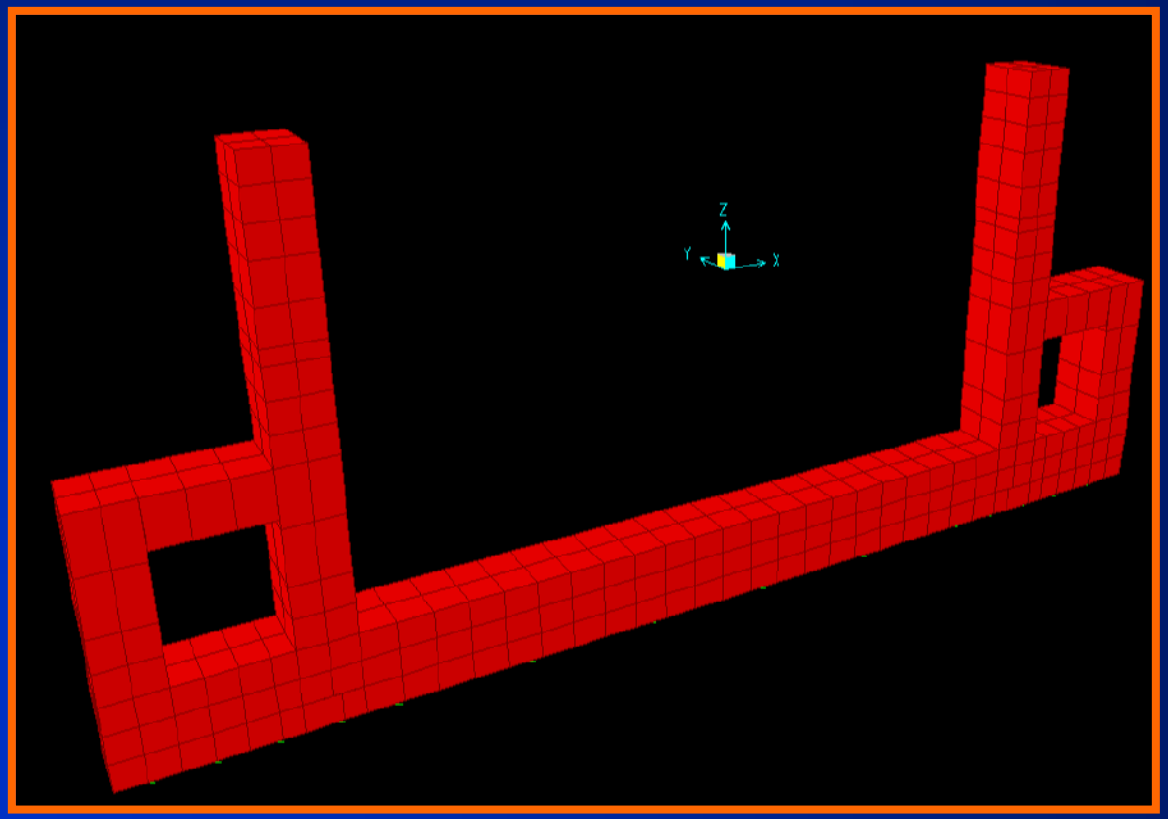
B. Exterior walls designed as panels fixed on 3 sides and free at the top.

C. Interior walls designed as counterforts. Designed for lateral load from opposing walls and dead and live loads from top slab.

D. A 3D FE model will be developed in SAP2000 for P&S design.

I. Chamber

A. For feasibility level design, 2D analysis was performed using both CWFRAME and SAP2000.



Discuss Advantages & Disadvantages of Float-In

INNER HARBOR NAVIGATION CANAL (IHNC) LOCK REPLACEMENT

URS

A/E Team



John Day Navigation Lock
Monolith Repair

Presented by Matthew D. Hanson, P.E.
Portland District



August 4, 2005

John Day Navigation Lock
Catastrophic Failure Prevention and Monolith Repair

Presented by Matthew D. Hanson, P.E.
Portland District



August 4, 2005

JOHN DAY DAM



JOHN DAY NAVIGATION LOCK



Historical

- **1968 - Project completed and pool filled.**
- **Post tension anchors installed in navigation lock gate and tainter valve monoliths (5,6,29,30,27,28,7,8,) as a result of problems at Ice Harbor before lock was filled.**
- **Seepage noted at D/S toe of North embankment (right abutment) 5 days into initial filling @ pool .**
- **July 1968 structural inspection cited areas of spalling concrete and water flowing down stair treads in the powerhouse gallery.**

Historical Cont'd

- **March 1969: First Periodic Inspection cited spalling, cracking, inadequate reinforcement**
- **Subsequent reports indicate increasing amount of cracking, spalling, failed waterstops and leaking.**
- **Continuous monitoring and repairs on lock monoliths, concrete, etc.**
- **Waterstop repair contract, tainter valve shaft concrete removal contracts (2001)**

Historical Contd'

- **Primary Problems necessitating repair (2003)**
  - **Monolith 8 split in two pieces**
  - **Monolith 27 in danger of failure**
  - **Monolith 8 valve shaft spalling and Tainter valve out of service – no operational redundancy**
  - **Leakage into backfill and boneyard (sinkholes)**
  - **Monolith movement, cracking, spalling, etc.**
  - **Customer complaints**

Boneyard Sink Hole







Settlement



Monolith 8 Service Gallery – Tainter Valve Shaft

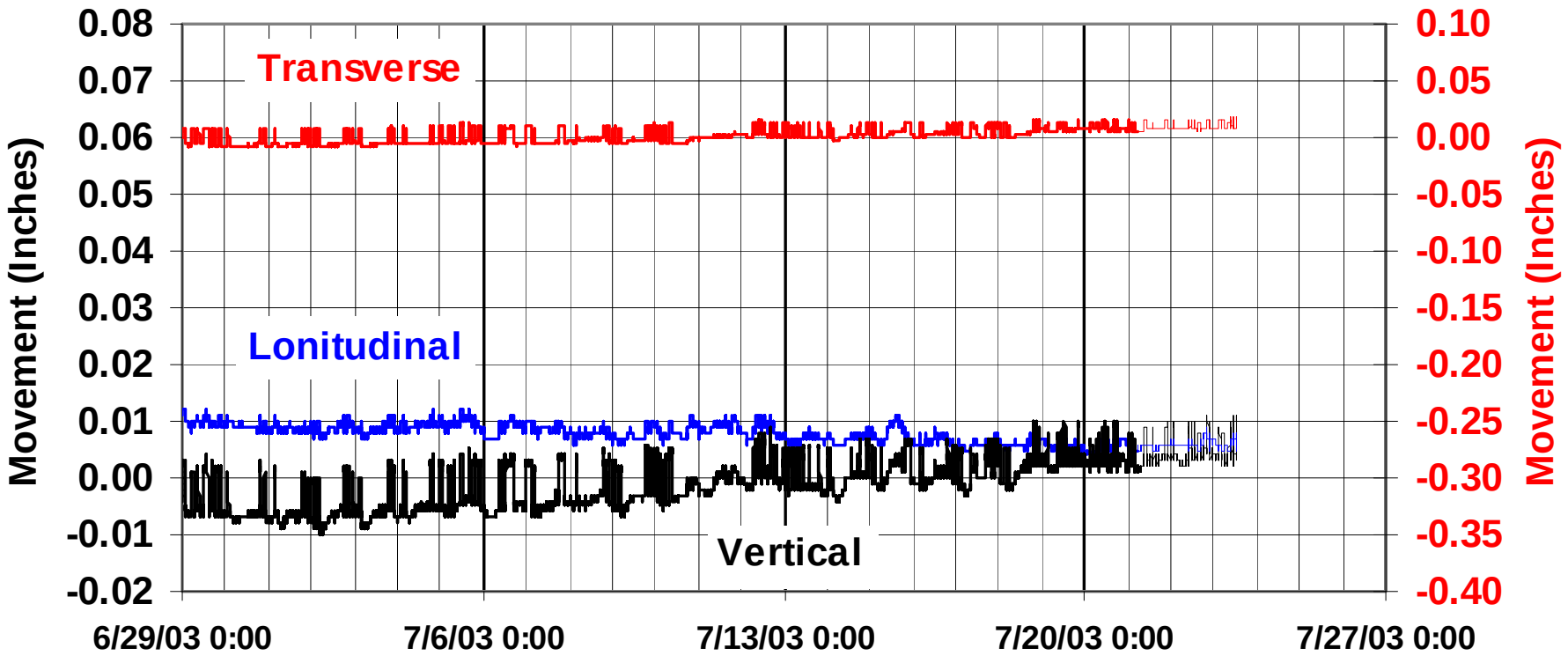


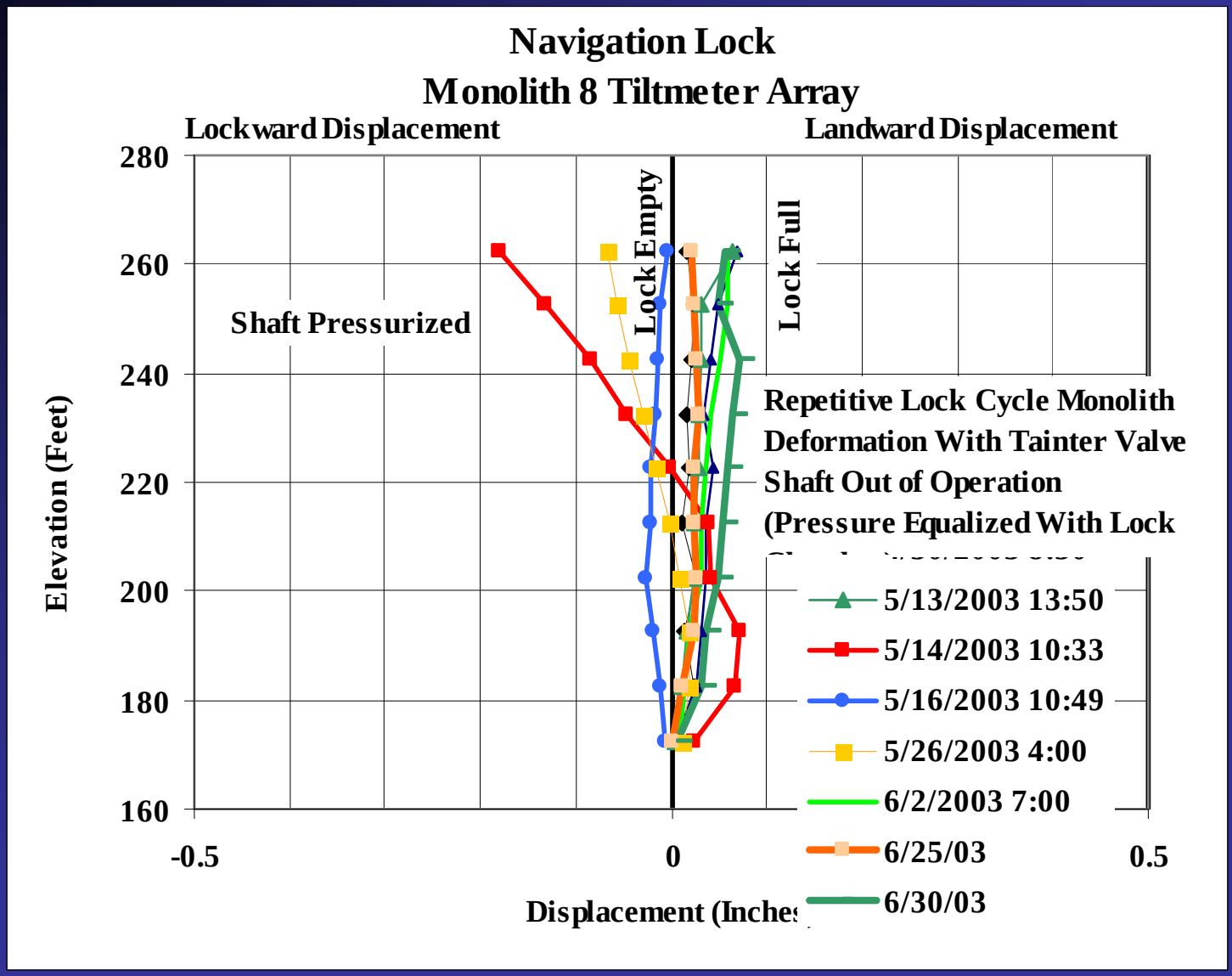




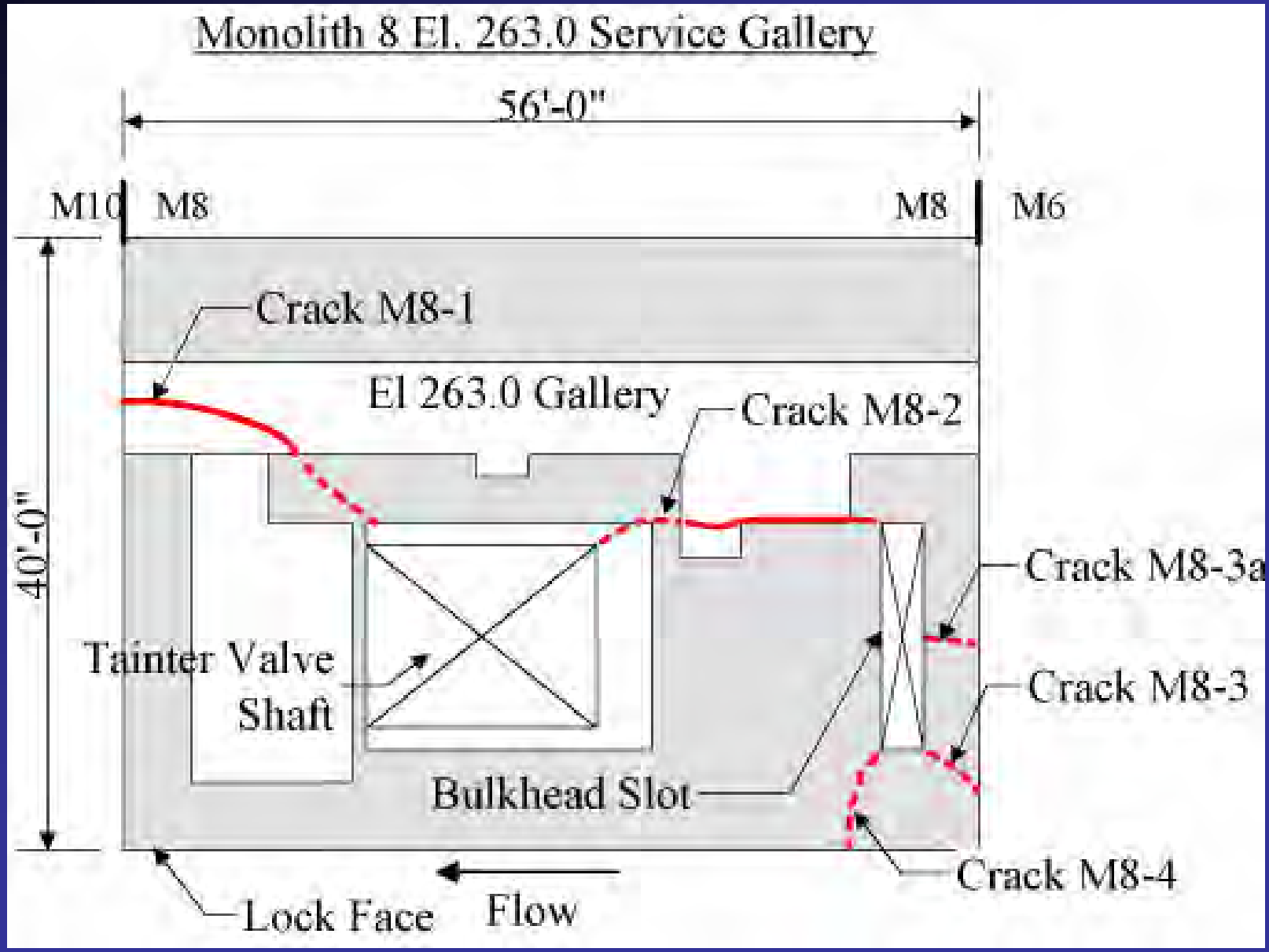
Monolith 8 Service Gallery

Concrete Cracking

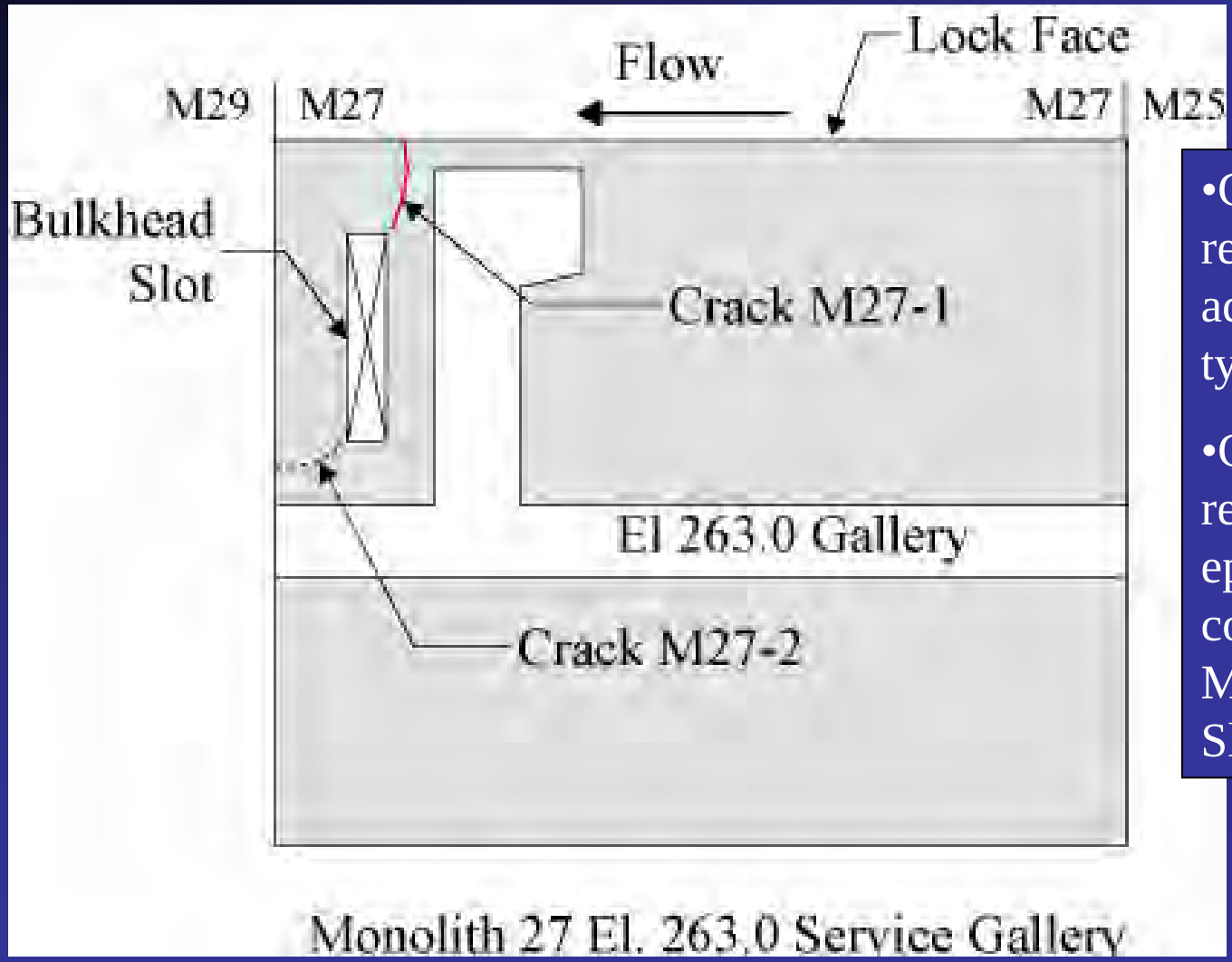

John Day Lock Crackmeter 1
Movement (Inches)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
-0.02
Transverse
Lonitudinal
Vertical
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
Movement (Inches)
6/29/03 0:00
7/6/03 0:00
7/13/03 0:00
7/20/03 0:00
7/27/03 0:00


Navigation Lock
Monolith 8 Tiltmeter Array
Lockward Displacement
Landward Displacement
Lock Empty
Lock Full
Shaft Pressurized
Repetitive Lock Cycle Monolith Deformation With Tainter Valve Shaft Out of Operation (Pressure Equalized With Lock
Elevation (Feet)
280
260
240
220
200
180
160
-0.5
0
0.5
Displacement (Inches)
5/13/2003 13:50
5/14/2003 10:33
5/16/2003 10:49
5/26/2003 4:00
6/2/2003 7:00
6/25/03
6/30/03

John Day Navigation Lock – Confirmed Crack Planes

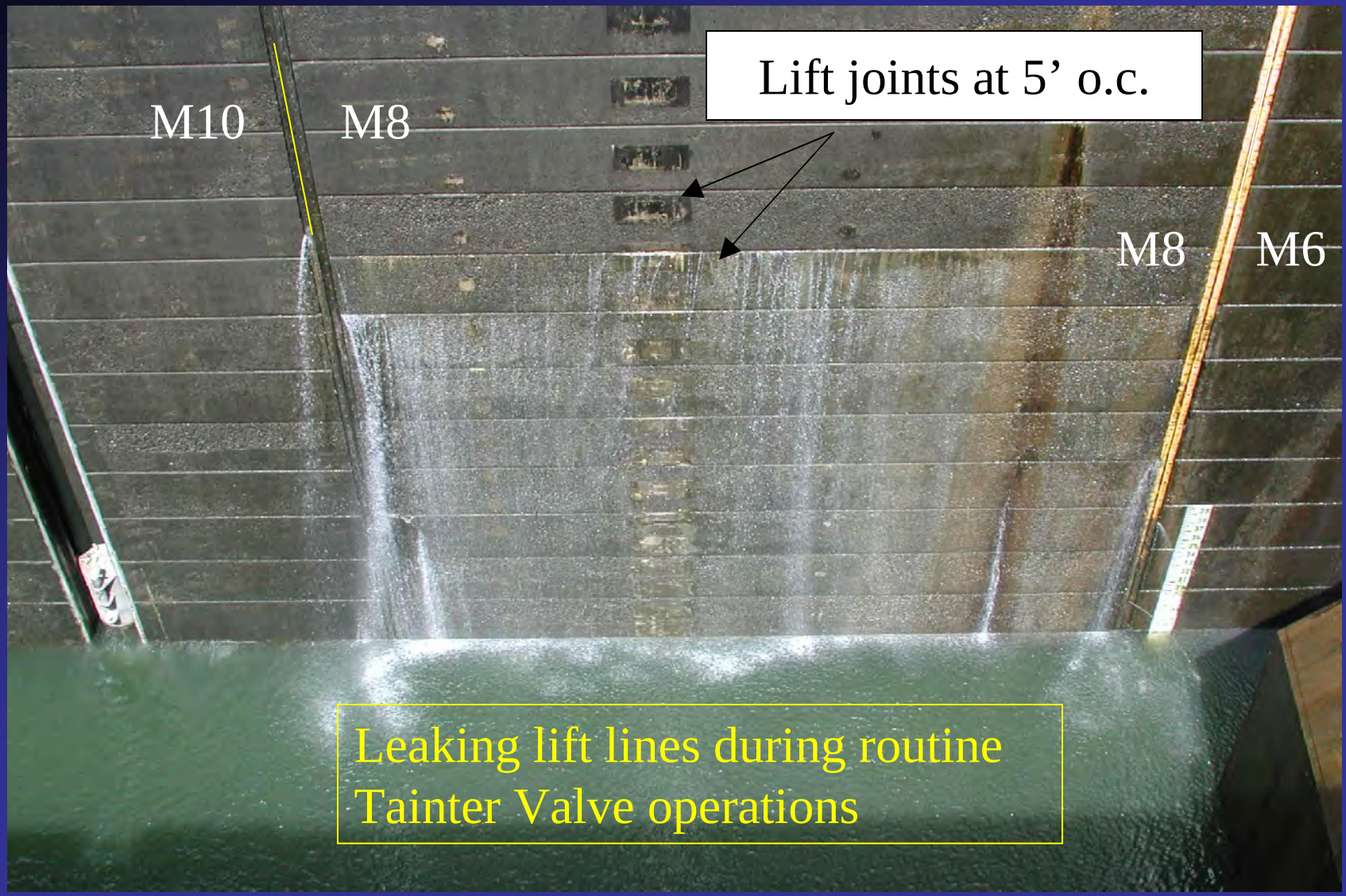


John Day Navigation Lock – Confirmed Crack Planes



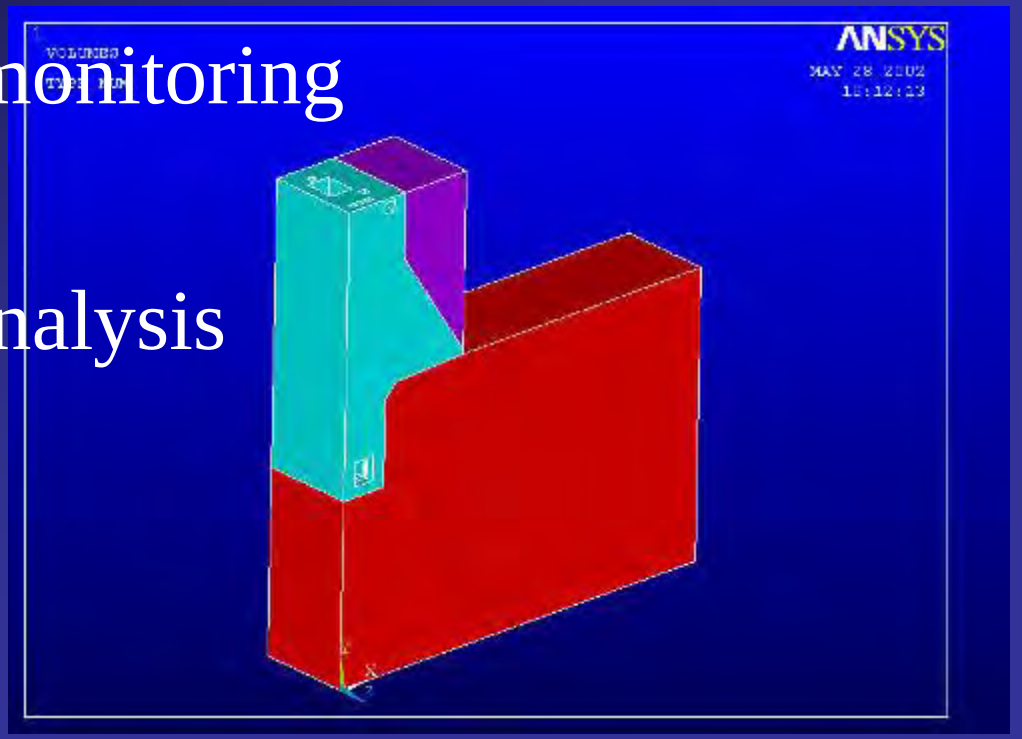
- Crack M27-1 to be repaired using epoxy adhesive grout in typical fashion.
- Crack M27-2 to be repaired using paste-epoxy adhesive for condition similar to Monolith 8 Bulkhead Slot

John Day Navigation Lock – Concrete Rehabilitation



John Day Monolith Repair Contract Investigation

- Stress analysis
- Monolith drilling for crack location
- Instrumentation/monitoring
- Concrete testing
- Finite Element Analysis



John Day Monolith Repair Contract
How/Why did this happen?

- Navigation Lock is not reinforced adequately
- Concrete strength/quality is variable
- Foundation is inconsistent and of questionable quality
- Previous repair measures may have caused cracks which have progressed
- Waterstop failure due to movement of monoliths allows water into monolith

Monolith Repair - Contract



Lift Joint Repair, Monolith 6&8 Crack Repairs

Monolith 8 Structural Repair



Monolith 27 lift joint and Structural Repair



Concrete Removal and Precast Panel Installation



John Day Monolith Repair
Construction issues

- Construction scheduling/considerations of high concern due to lock outage impacts
- Schedule shift due to Anchor testing
- Lock outage in march to be extended to 1 month to perform below tailwater drilling
- 12 hour outages above tailwater after outage
- Best Value contracting method determined in best interest of the Government
- Critical Contract/Last chance for repair

John Day Navigation Lock Monolith 8

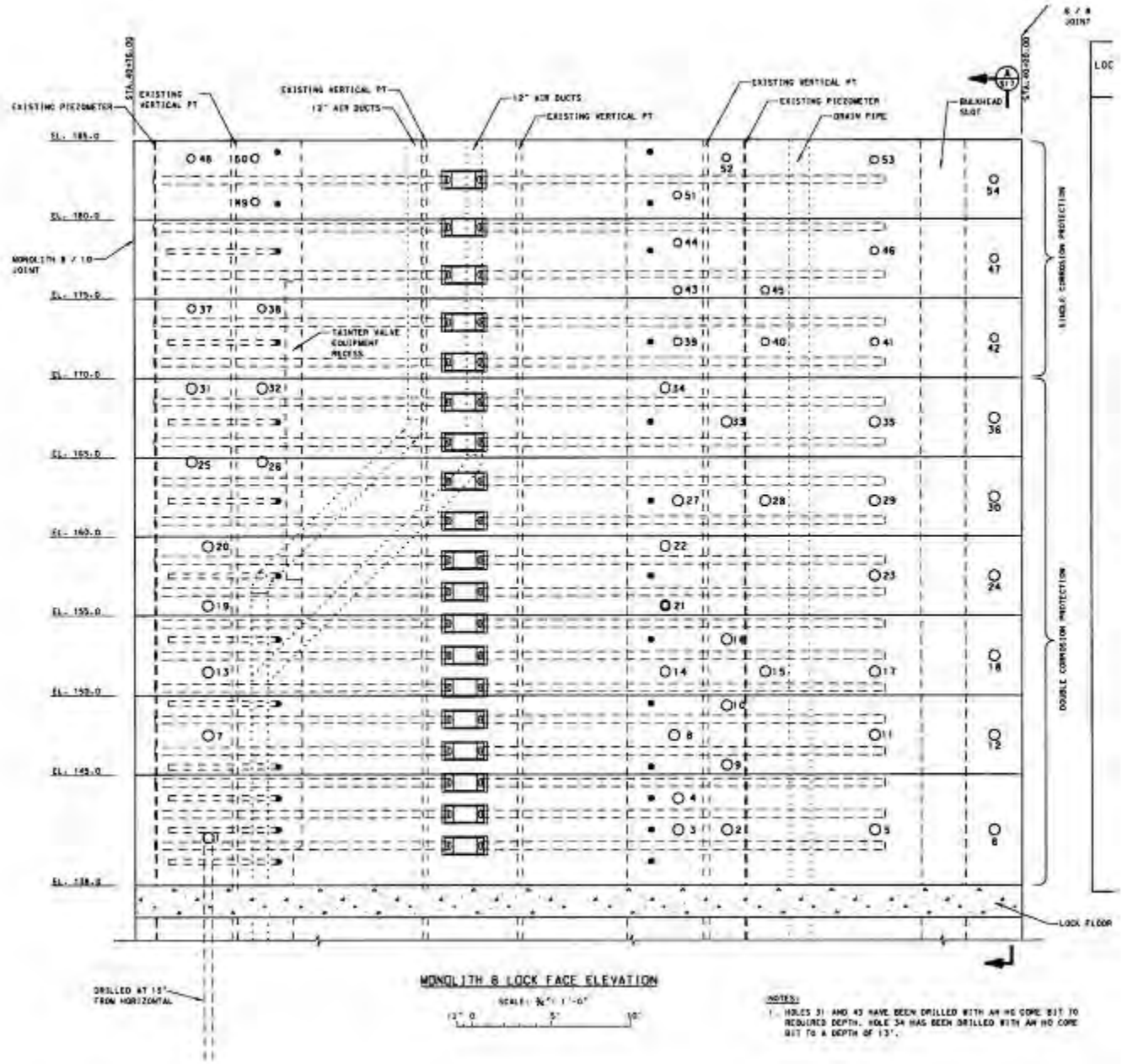
- Post Tensioning Design
  - Solid A722 150 ksi Anchors were selected for design.
  - Anchors were designed to resist the hydrostatic load at 0.6Fy.
  - An additional 40% increase in required number of bars was then allocated.
  - In addition, drilling tolerances have been reduced to ½ a degree – or within 4” in a 40’ deep core.
  - Tight tolerances will also help prevent hitting existing PT, existing shafts, existing voids, etc.

John Day Navigation Lock Monolith 8

- Anchor Stressing
  - Every anchor is proof tested to 150% of the design load (0.6Fy).
  - Several anchors in rock are creep tested to 150% DL for 8 hours.
  - 150% DL is the Corp's single anchor failure criterion. (PTI Criteria 133% DL)
  - Anchors locked off at 0.6Fu.

John Day Navigation Lock Monolith 8/27

- Anchor Details
  - Double corrosion protection for anchors installed in rock.
  - Single corrosion protection for anchors installed in concrete.
  - Recessed Anchorage zones with tensile zone reinforcement.
  - Removable anchor caps to allow for retensioning/lift off testing.

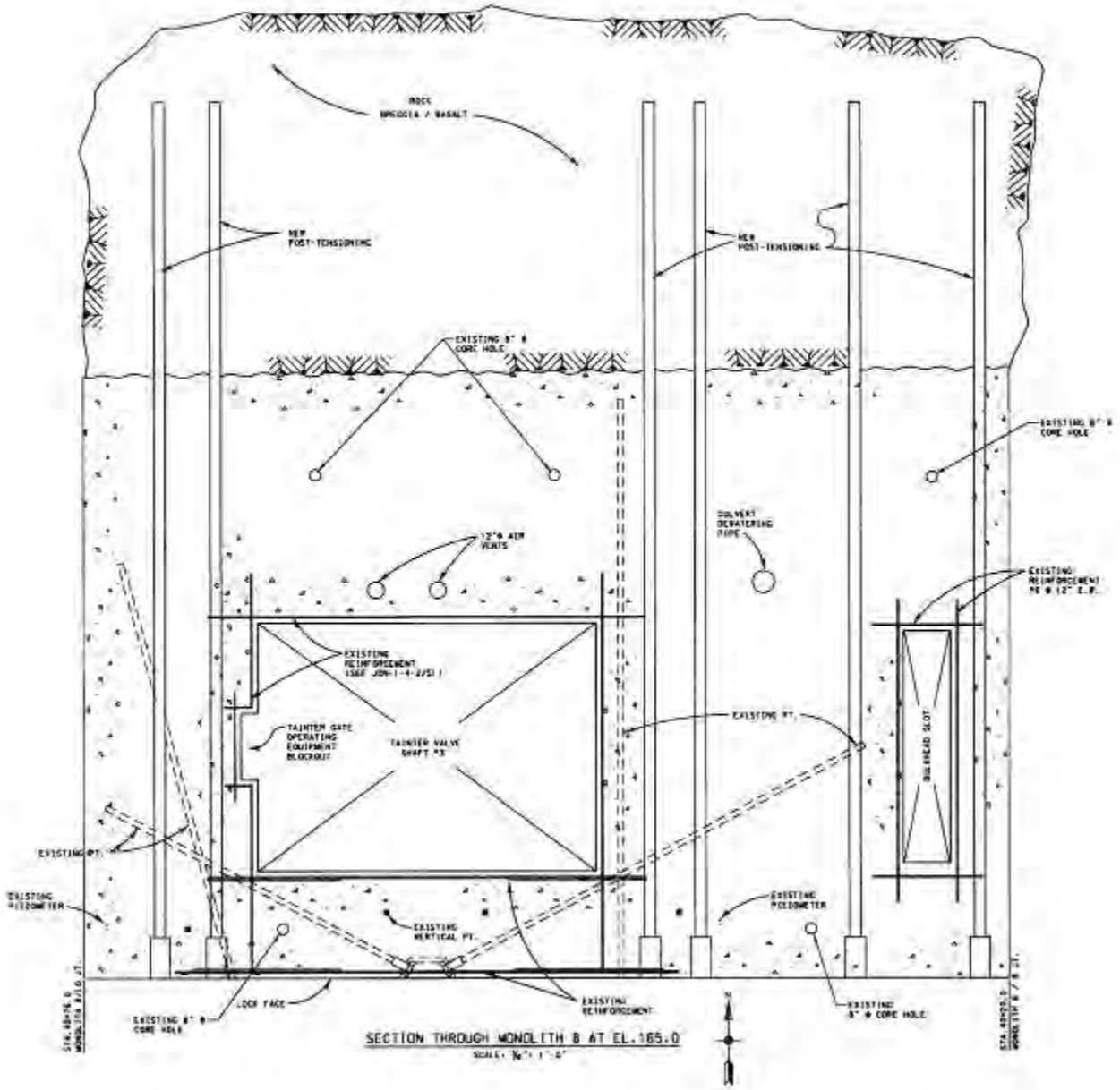


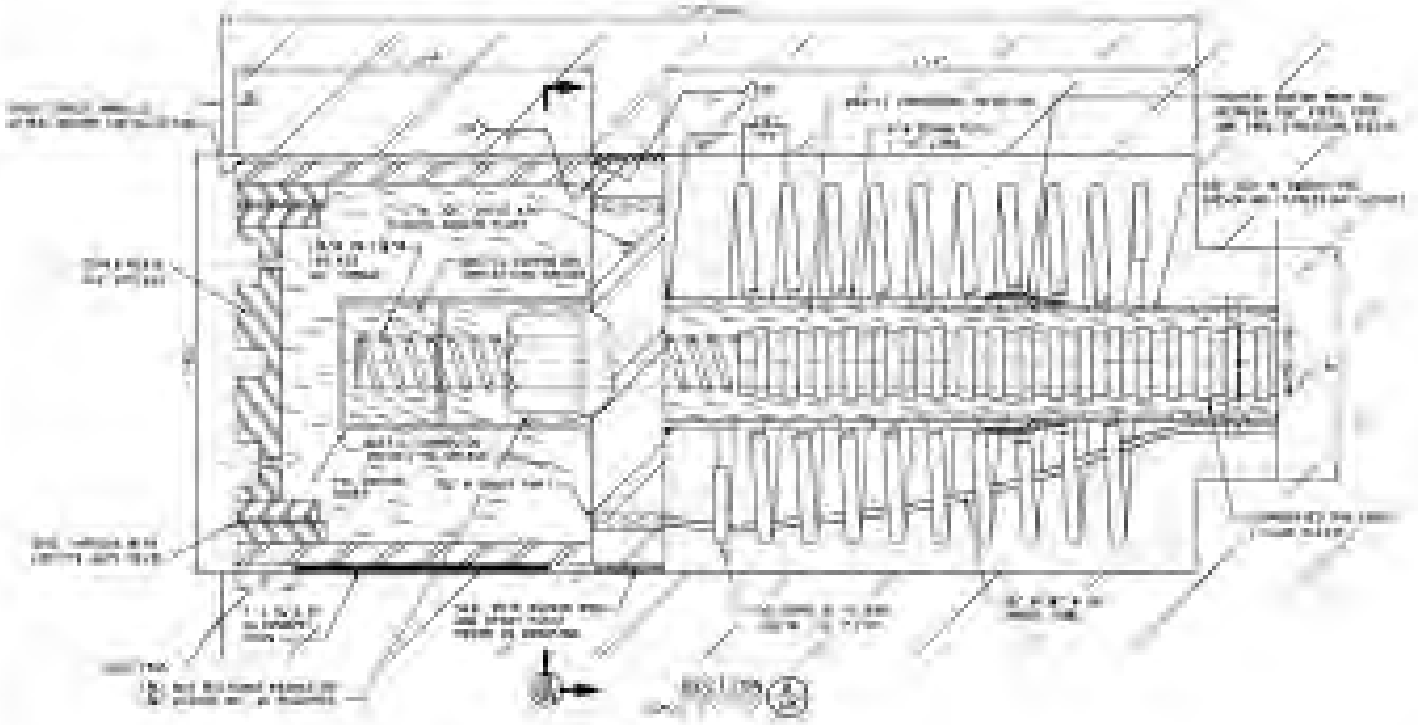
MONOLITH 8 LOCK FACE ELEVATION

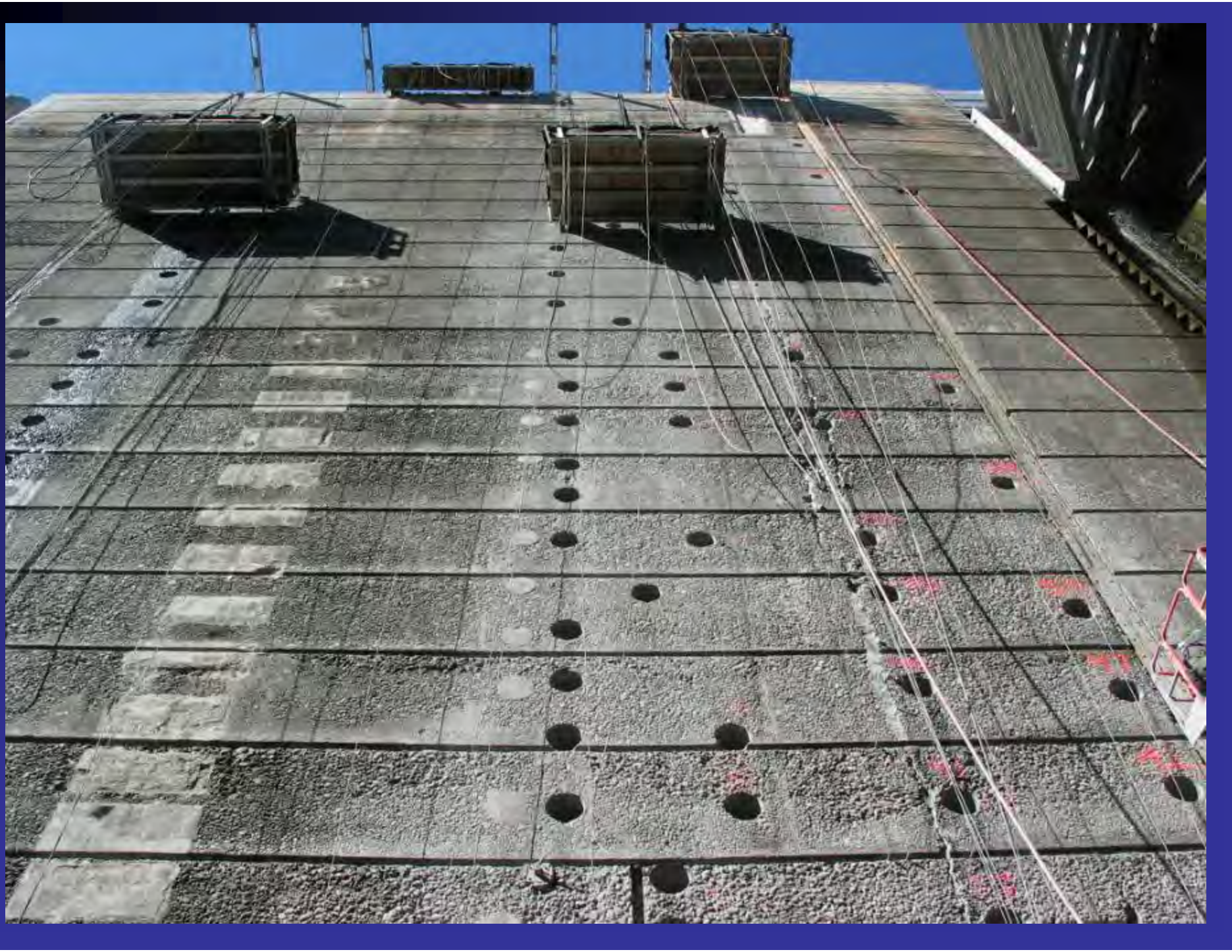
SCALE: 3/16" = 1'-0"

NOTES:

1. HOLES 31 AND 43 HAVE BEEN DRILLED WITH AN HQ CORE BIT TO REQUIRED DEPTH. HOLE 34 HAS BEEN DRILLED WITH AN HQ CORE BIT TO A DEPTH OF 13'.


ROCK
BRECCIA / BASALT
NEW
POST-TENSIONING
NEW
POST-TENSIONING
EXISTING 8" Ø
CORE HOLE
EXISTING 8" Ø
CORE HOLE
12"Ø AIR
VENTS
CULVERT
DEWATERING
PIPE
EXISTING
REINFORCEMENT
(SEE JOB-1-4-2/S1)
EXISTING
REINFORCEMENT
@ 12" C.C.
TAINTER GATE
OPERATING
EQUIPMENT
BLOCKOUT
TAINTER VALVE
SHAFT #3
EXISTING PT.
BULKHEAD SLOT
EXISTING PT.
EXISTING
PIEZOMETER
EXISTING
PIEZOMETER
EXISTING
VERTICAL PT.
EXISTING
REINFORCEMENT
LOCK FACE
EXISTING 8" Ø
CORE HOLE
EXISTING
8" Ø CORE HOLE
SECTION THROUGH MONOLITH 8 AT EL.165.0
SCALE: 3/8" = 1'-0"





John Day Monolith Repair - Construction

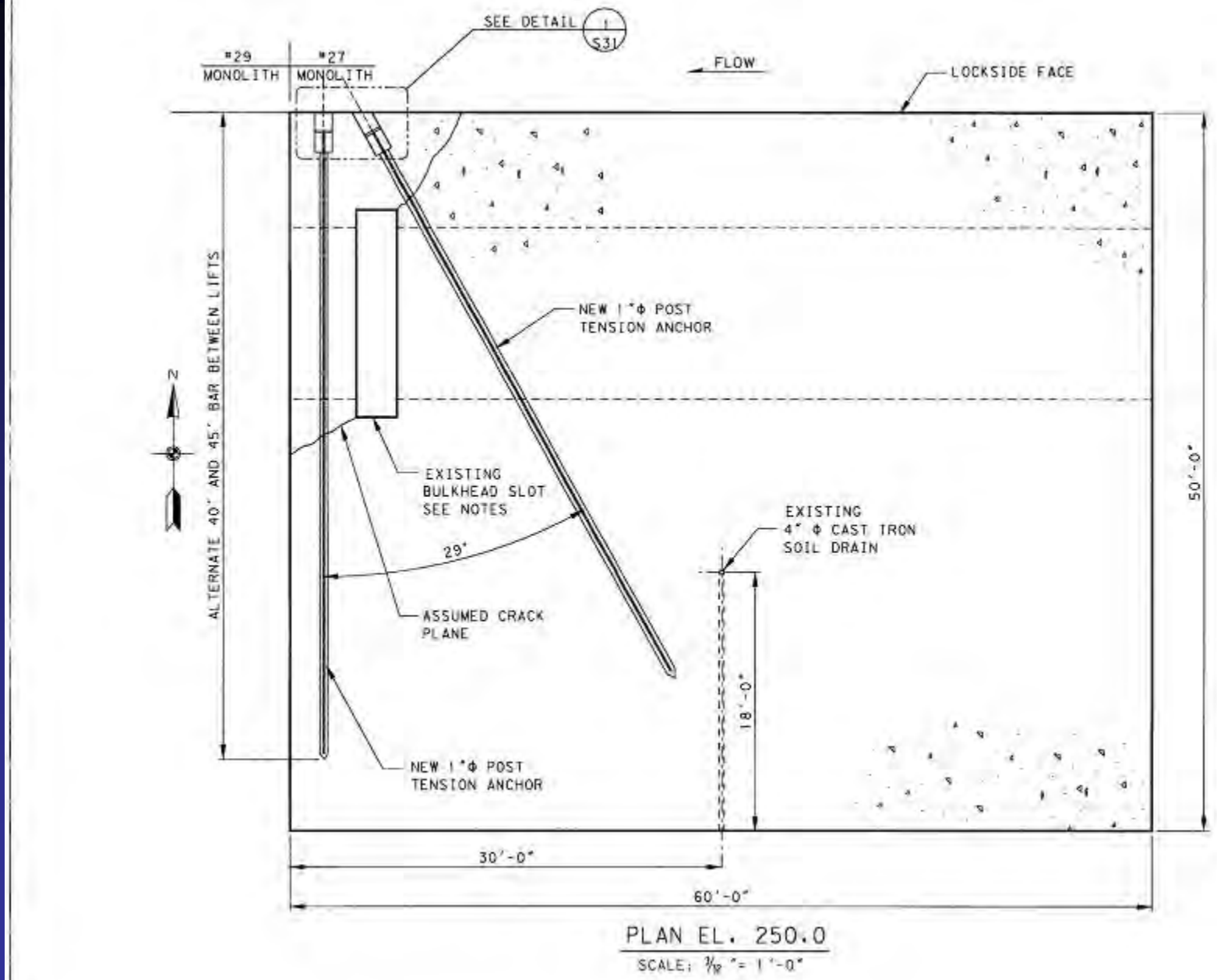






John Day Navigation Lock Monolith 27

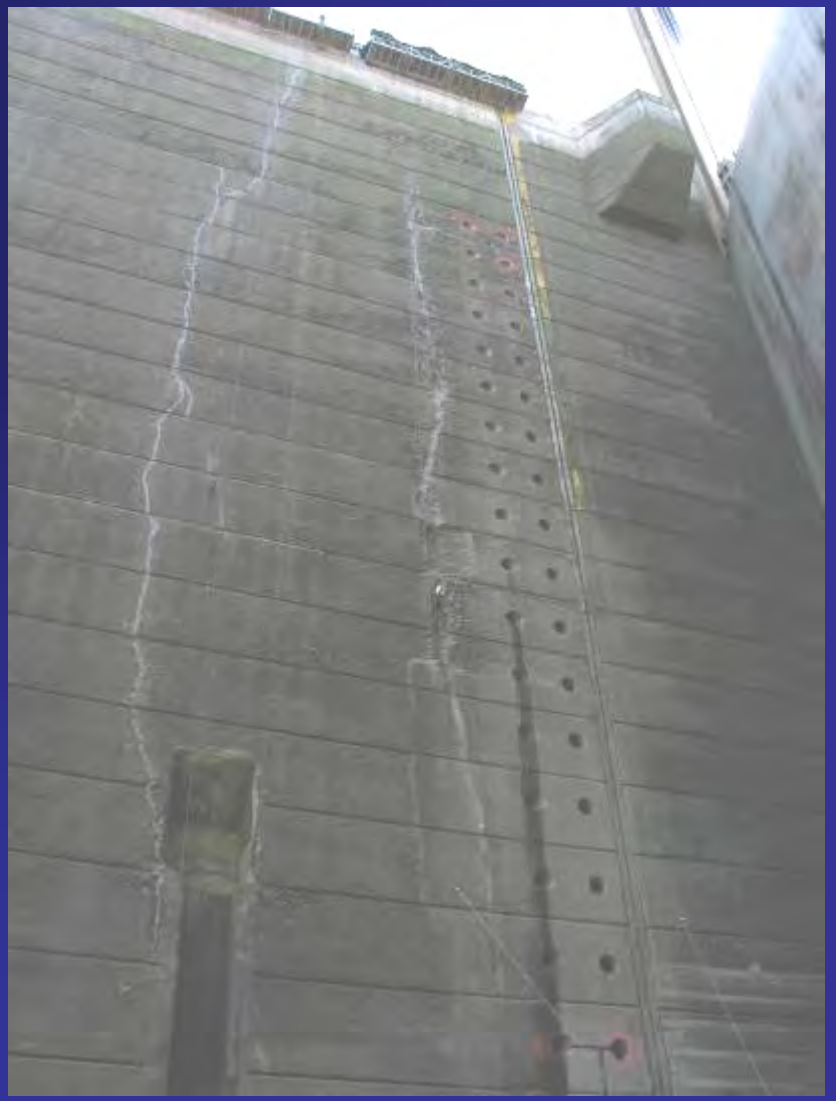
- Monolith 27 Post Tensioning Design Cont…:
  - New PT was angled and smaller bars were used to eliminate the need to develop bars in the rock strata.
  - Fewer monolith penetrations and the no existing PT made the location of these new anchors much less complicated.
  - Anchorage details similar to monolith 8 repairs.



PLAN EL. 250.0

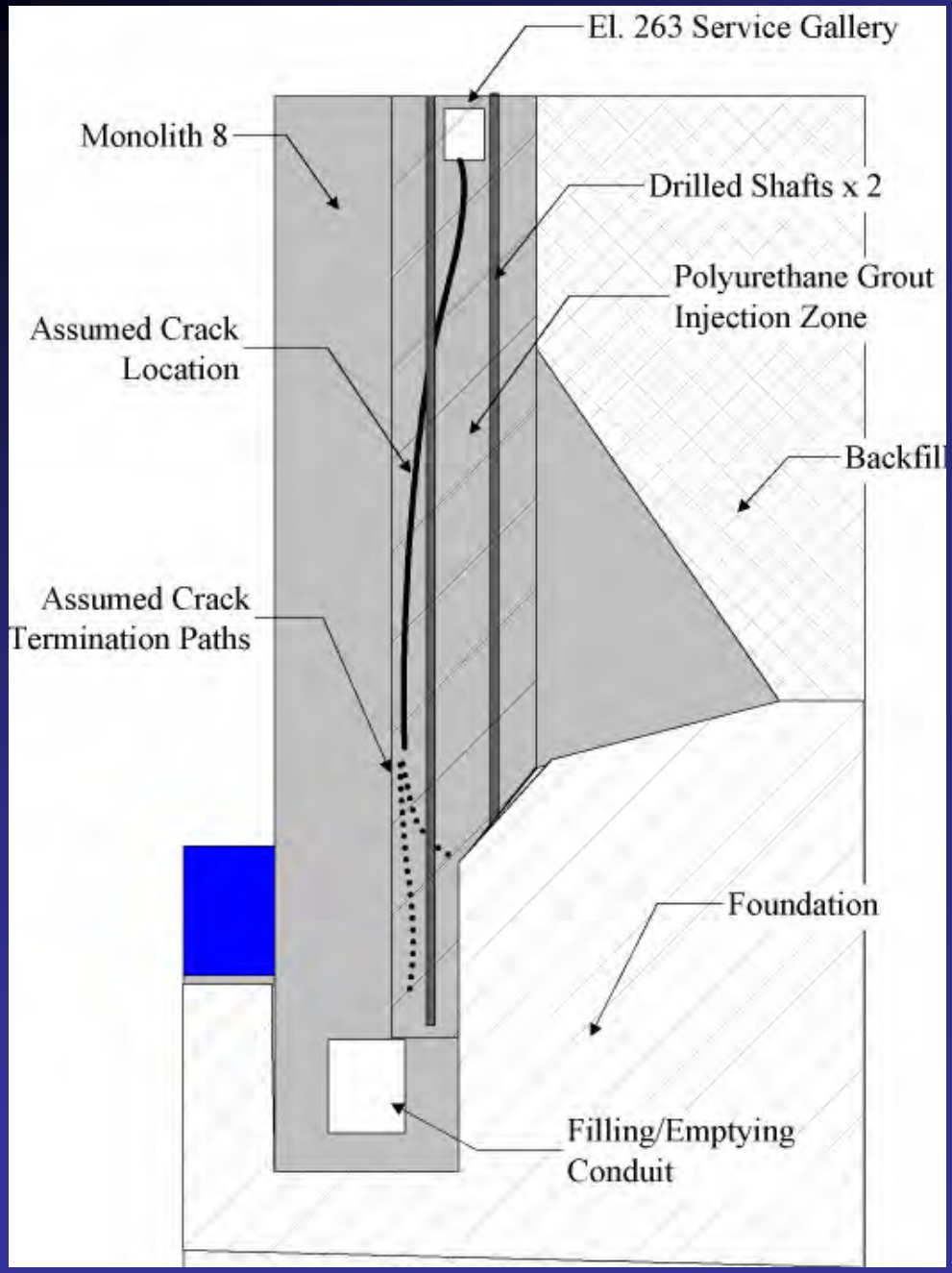
SCALE: 1/8" = 1'-0"

John Day Navigation Lock Monolith 27



John Day Navigation Lock Concrete Rehabilitation

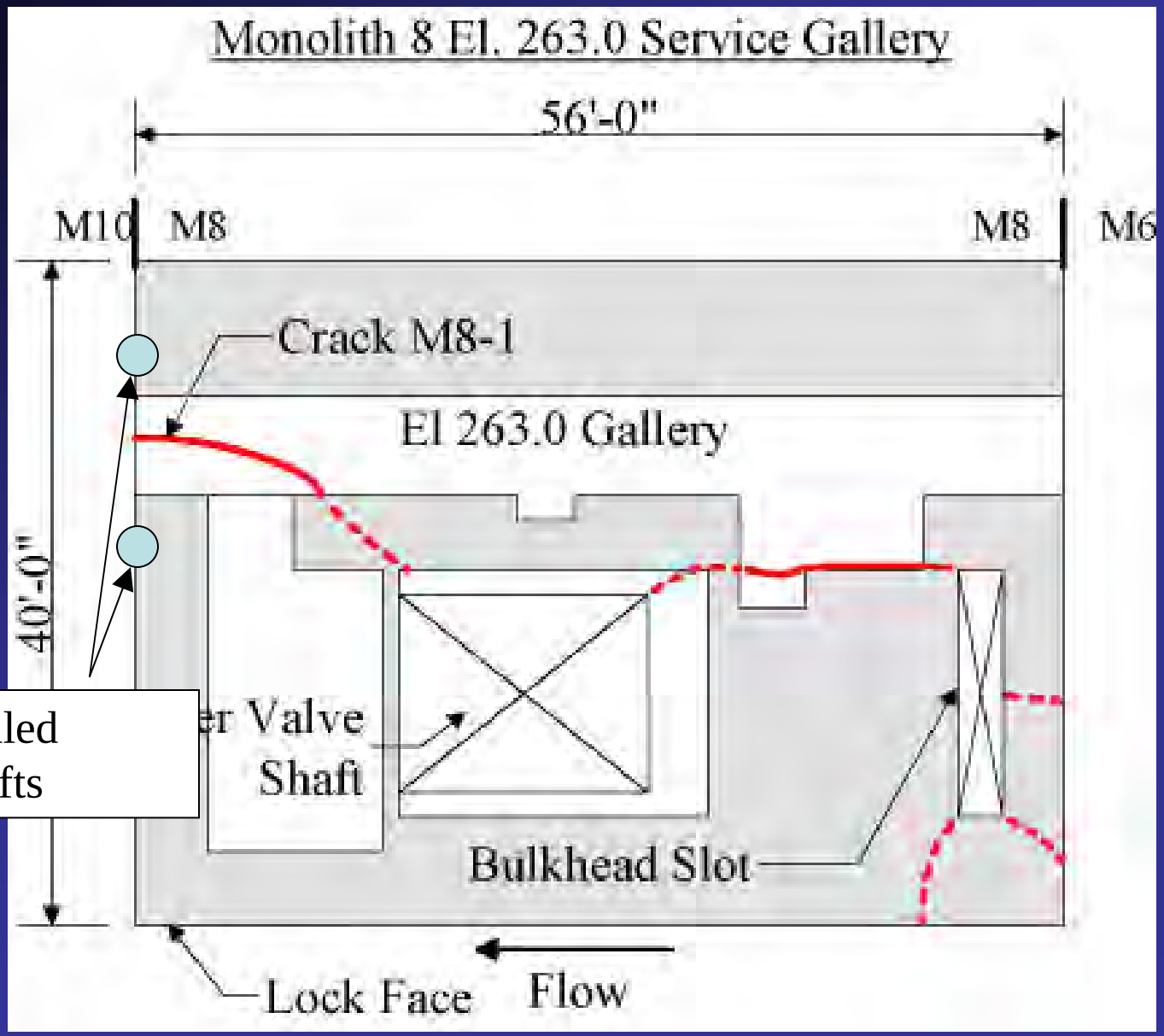
- Monolith Joint Isolation/Sealing
- Concrete Repair Monolith 6
- Concrete Lift Sealing
- Crack Sealing/Repair
- Backfill Drain Rerouting



Monolith 8/10 Joint Isolation

1. Isolate joint from crack to prevent epoxy grout from bonding joint.
2. Drill two vertical 10-inch dia access shafts.
3. Place expanding chemical “foaming” grout to fill Polyurethane Injection Zone
4. Grout Crack.

John Day Navigation Lock – Concrete Rehabilitation



John Day Monolith Repair Contract
Joint Sealing Mock-up Testing



Drilled shaft

Simulated monolith joint

Effectiveness of joint filler



Monolith Joint - Paste Epoxy Injection



Monolith joint

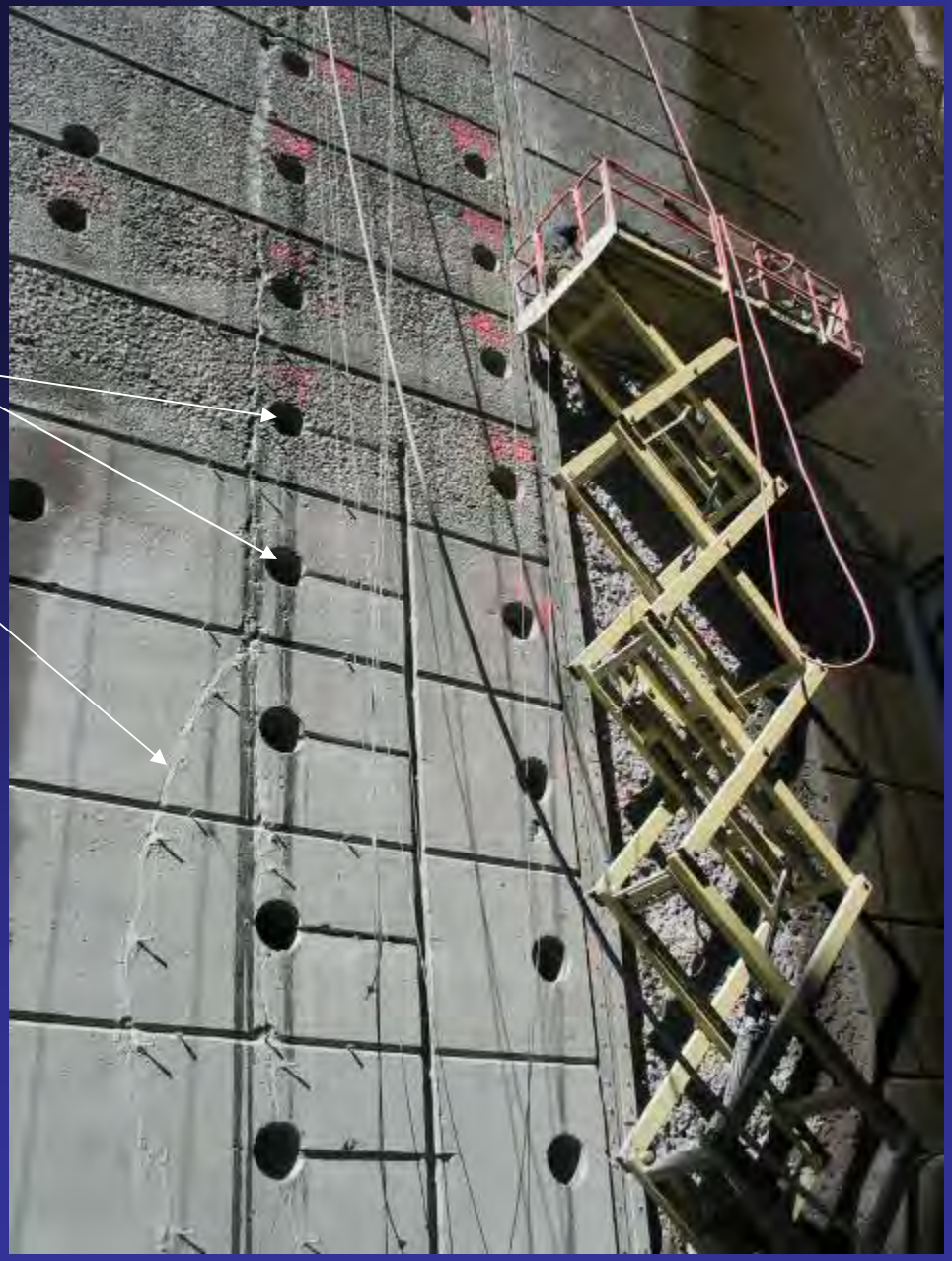
Injection Ports

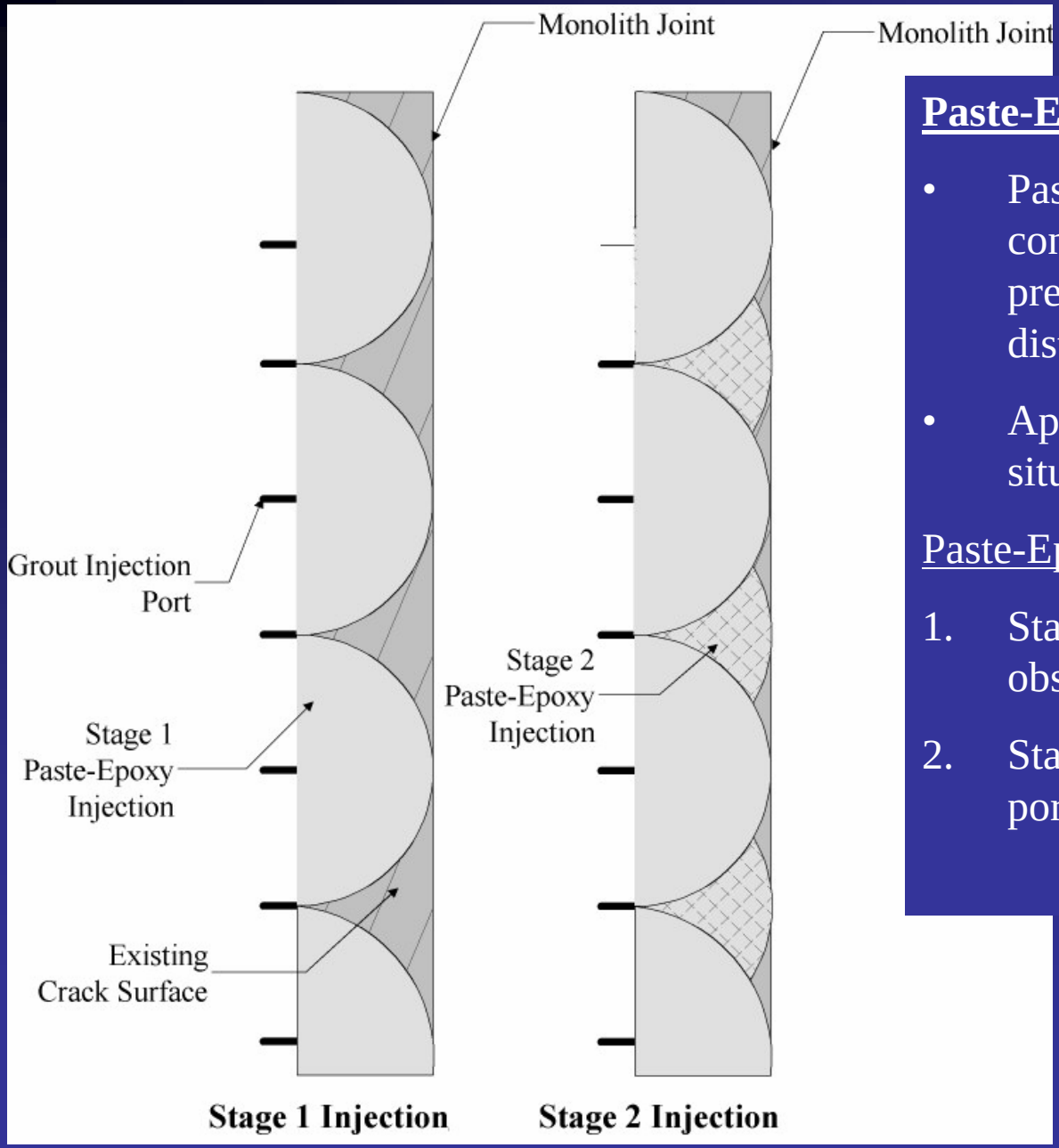




Post Tension anchor holes

Epoxy Injection Ports





Paste-Epoxy Injection

- Paste-Epoxy injection allows a controlled placement due to a predictable and consistent epoxy distribution "bulb."
- Applicable in a "blind" crack situation

Paste-Epoxy Injection Procedure

1. Stage 1 injection until epoxy is observed at 2nd port above.
2. Stage 2 injection at intermediate ports.

John Day Navigation Lock Monolith Repair Successes

- Structural Integrity restored
- Normal Lock Operation
- Leakage to backfill reduced
- Leakage to lock face reduced
- Joints/cracks sealed
- No significant contract claims

John Day Navigation Lock Monolith Repair Costs

- Original contract estimate $5.6 million
- Contract Cost $11.7 million

High cost due to

Tight timeframe

Tight Construction Tolerances

Work Within an Operating Lock

John Day Navigation Lock



Portland District
Corps of Engineers



Thanks for
Listening

Questions ?

Presentation
to the

2005 Tri-Service Infrastructure Systems Conference & Exhibition

DES MOINES RIVERWALK



by

Thomas D. Heinold, P.E.

Project Engineer and Acting Chief of Specifications
Rock Island District, U.S. Army Corps of Engineers

August 4, 2005

US Army Corps of Engineers®

U.S. Army Corps of Engineers

- The Corps' mission:
  - Water Resources Development
  - Environment
  - Infrastructure
  - Disasters
  - Warfighting



US Army Corps of Engineers®

Rock Island District

- Navigation
- Flood Control
- Recreation
- Environmental Restoration
- Emergency Management
- Disaster Relief

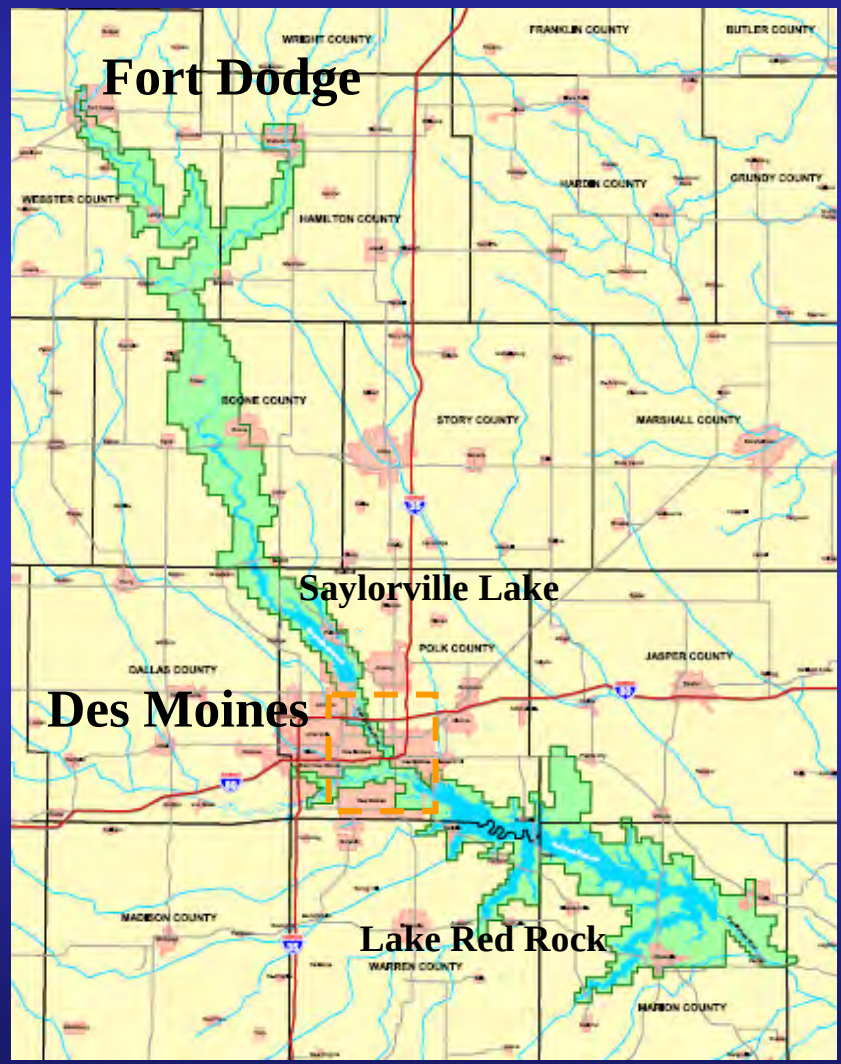


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Des Moines Riverwalk

CITY OF DES MOINES

- The Recreational River and Greenbelt Authority
- Trail System from Fort Dodge, Iowa to the Lake Red Rock Dam on the Des Moines River.
- City of Des Moines is the Federal Sponsor



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Des Moines Riverwalk

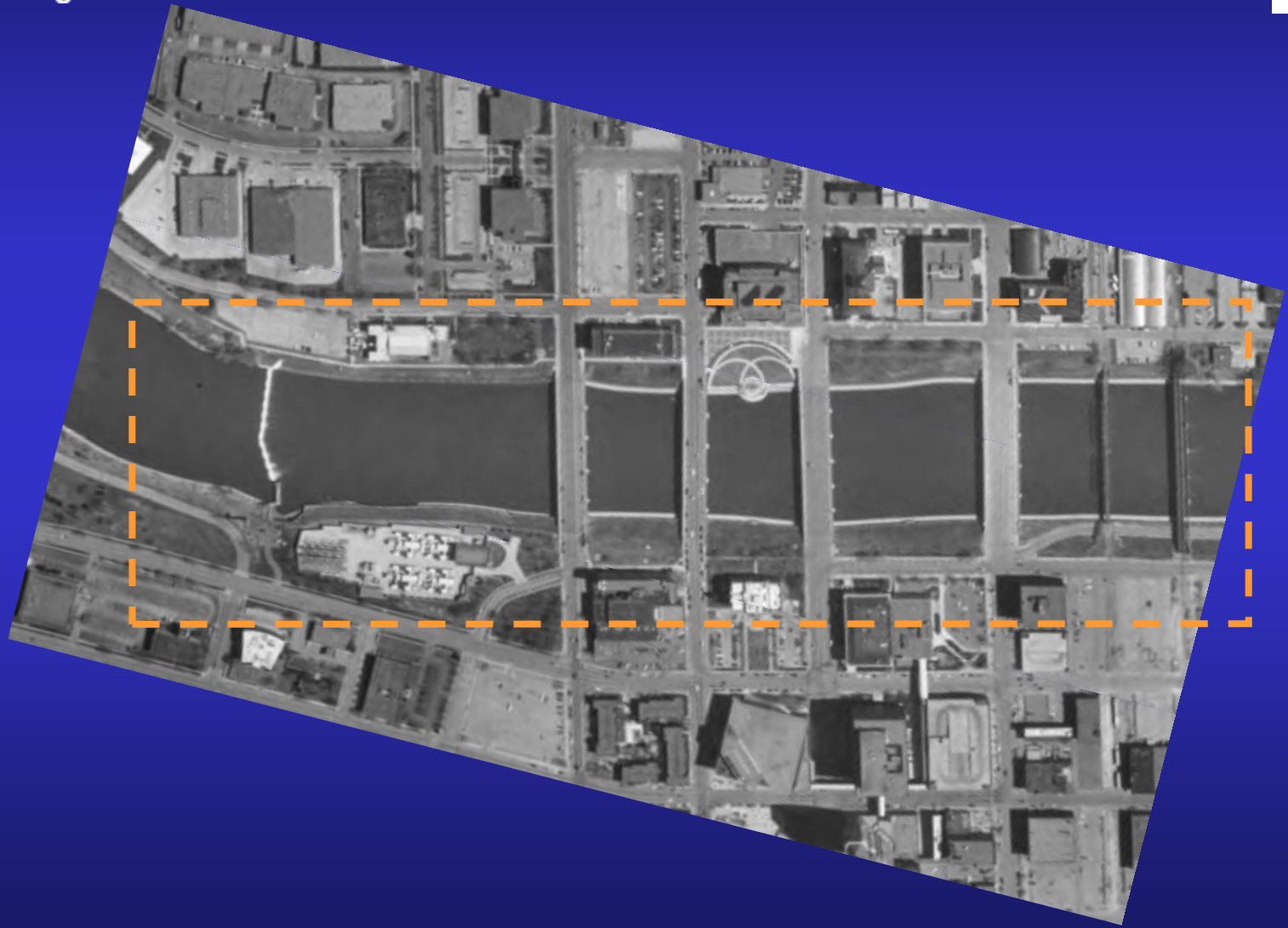
CITY OF DES MOINES



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Des Moines Riverwalk

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Des Moines Riverwalk

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Des Moines Riverwalk

- Court Avenue Plaza

CITY OF DES MOINES



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Des Moines Riverwalk

▪ Court Avenue Plaza

CITY OF DES MOINES



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Des Moines Riverwalk

- Court Avenue Plaza

CITY OF DES MOINES





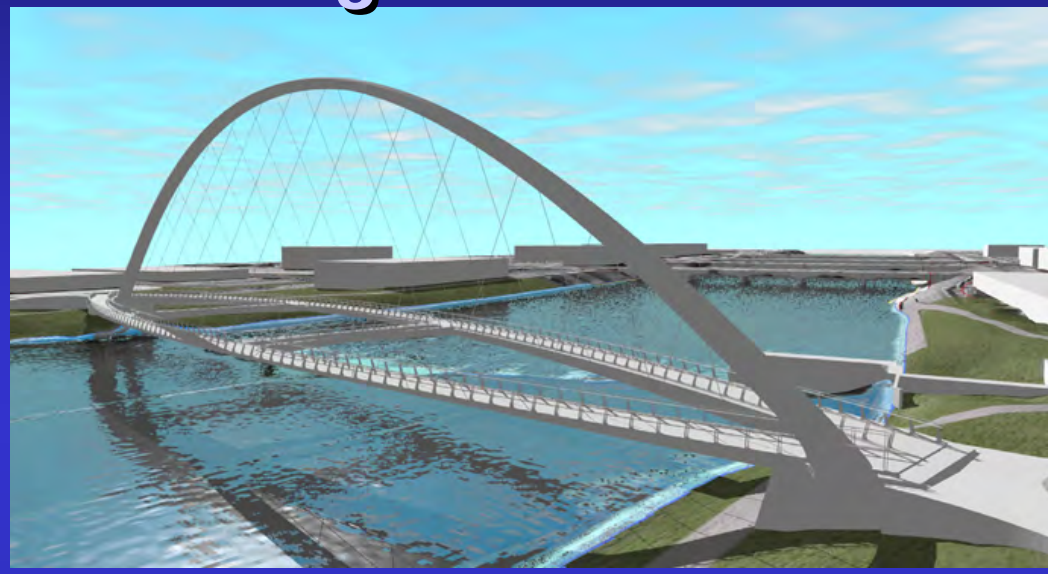
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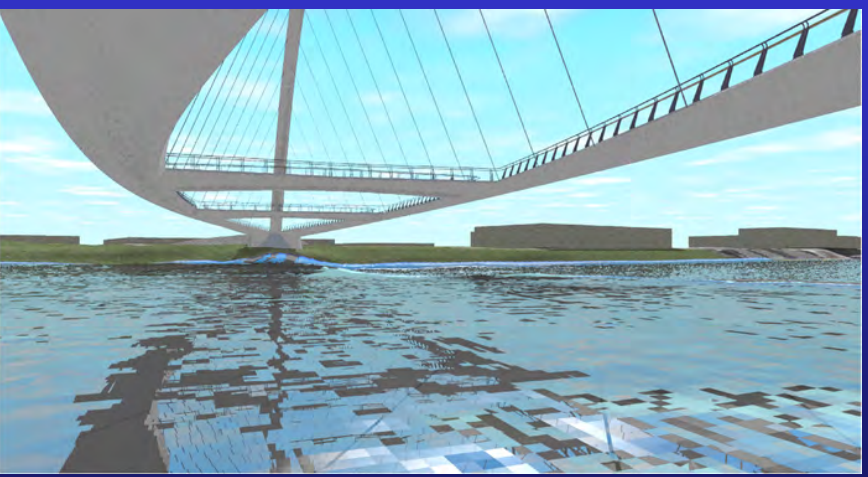
Des Moines Riverwalk

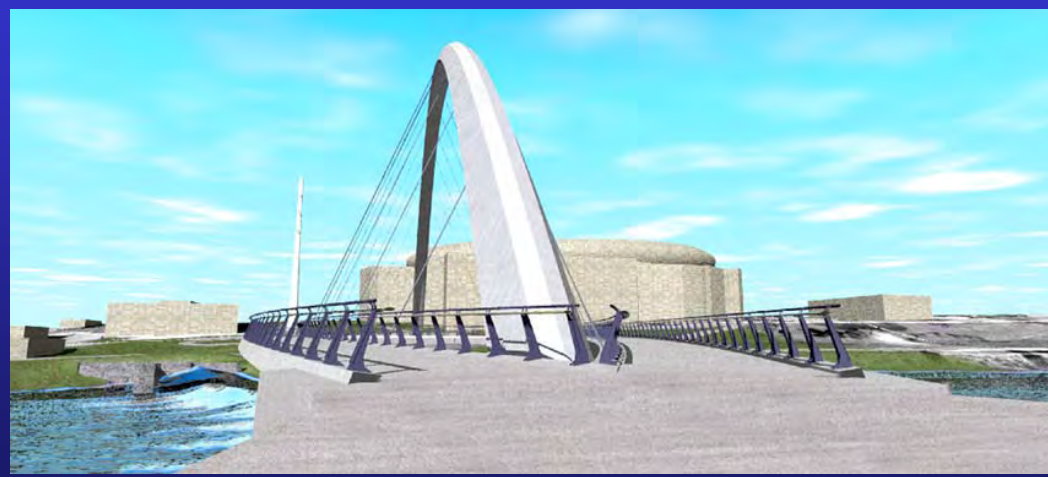
- Center Street Bridge

CITY OF DES MOINES









US Army Corps of Engineers®

Des Moines Riverwalk

- Union Railway Bridge

CITY OF DES MOINES



US Army Corps of Engineers®

Des Moines Riverwalk

- Union Railway Bridge

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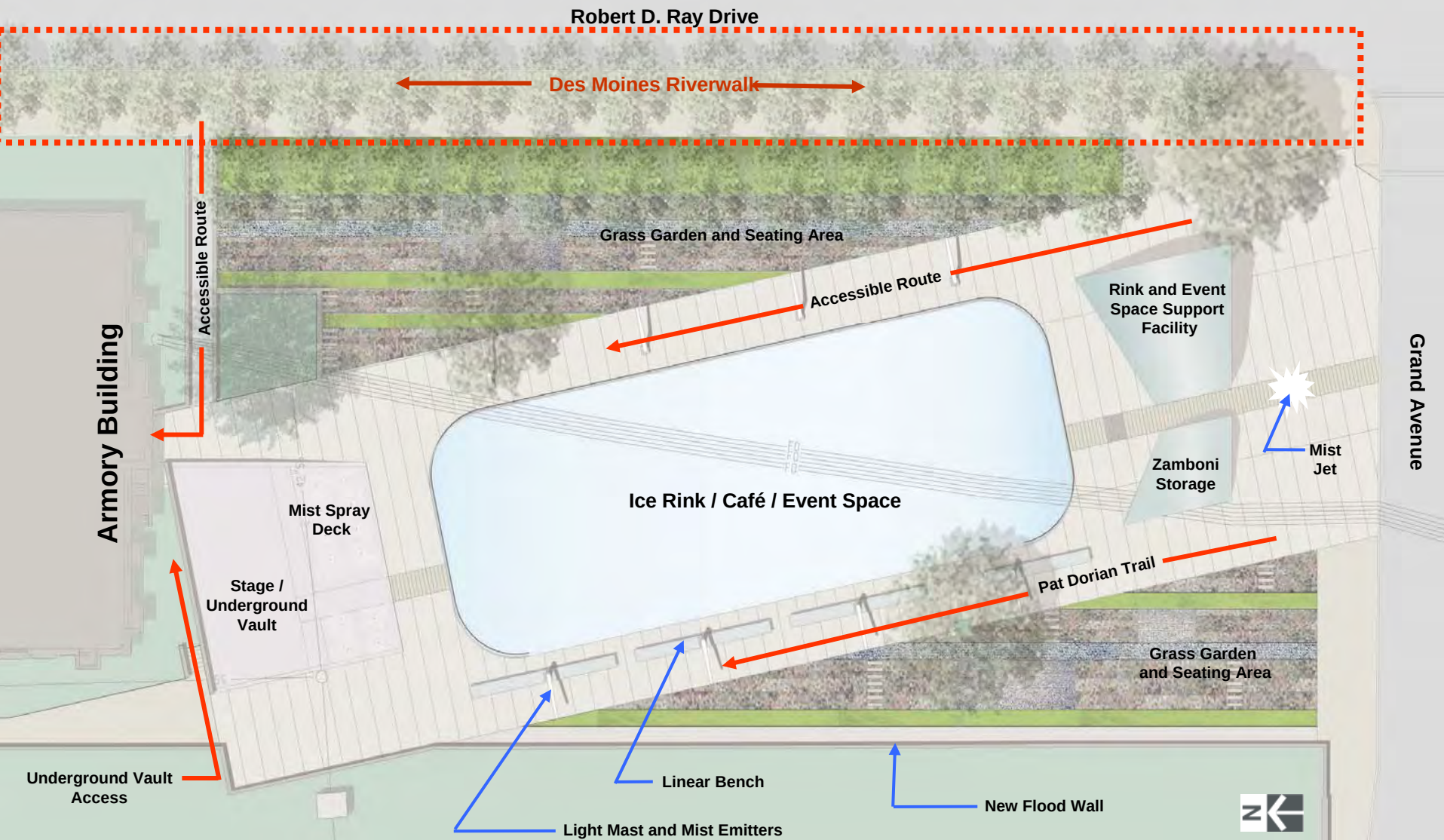


Des Moines Riverwalk

▪ Ice Skating Plaza

US Army Corps of Engineers®

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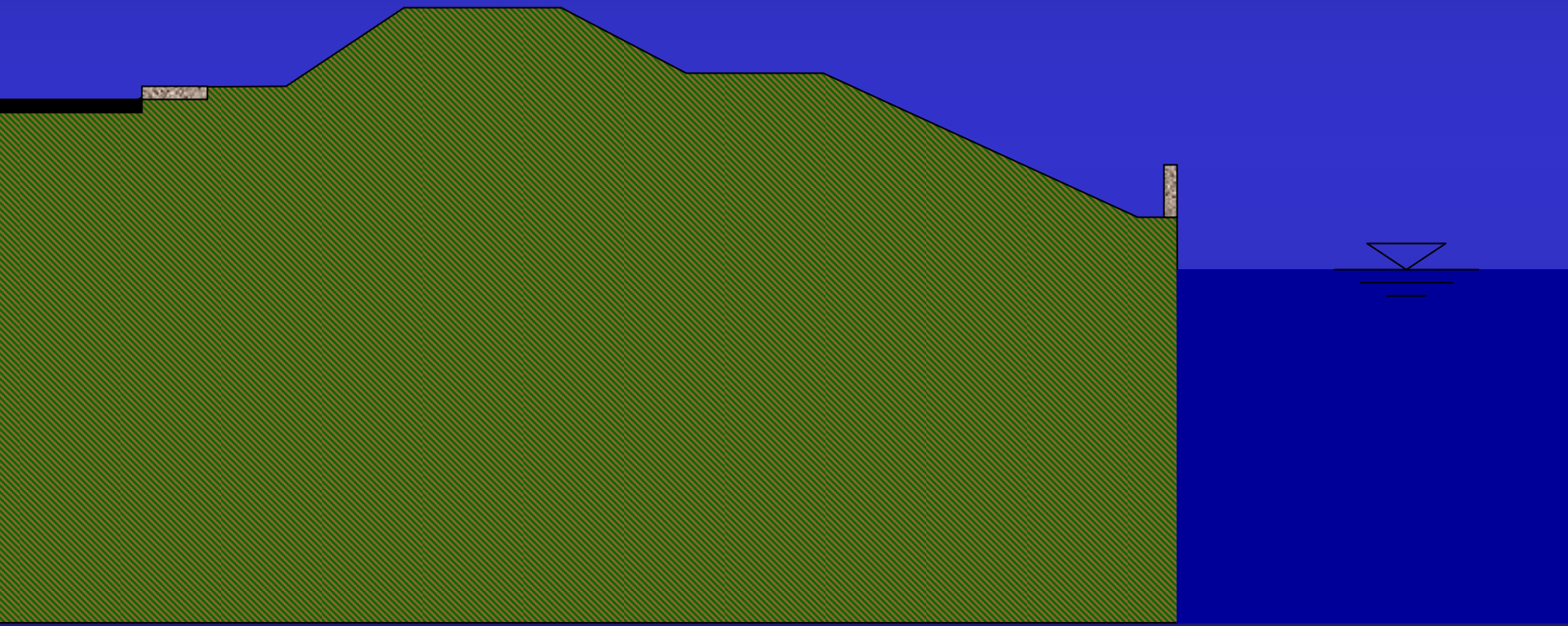


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CITY OF DES MOINES

- Coordination with a CSO project

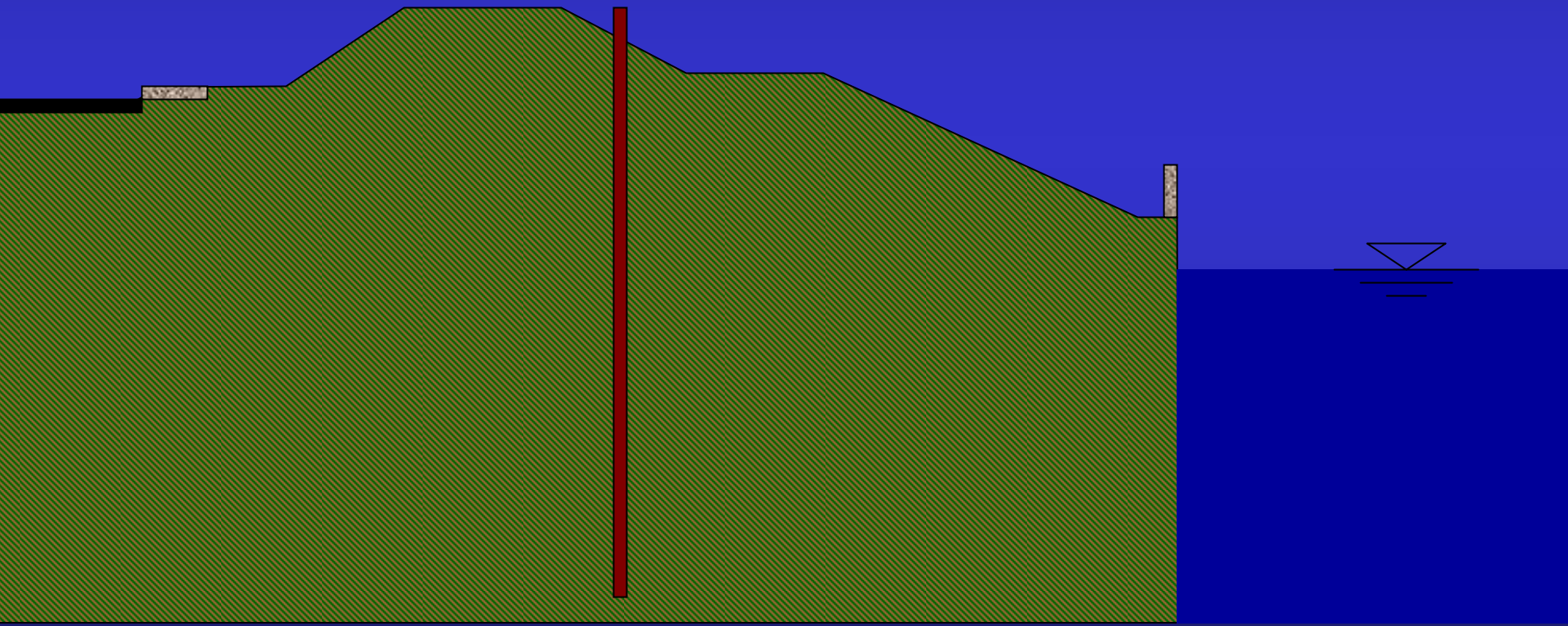


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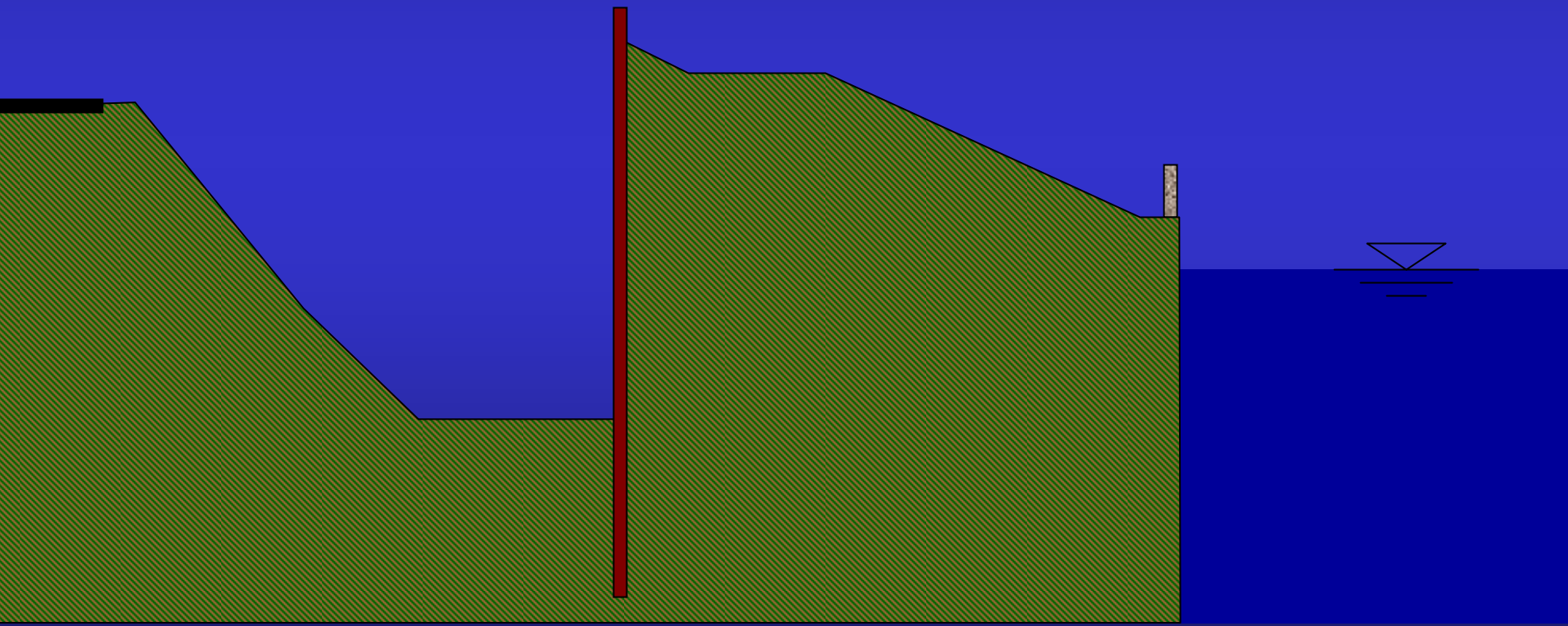


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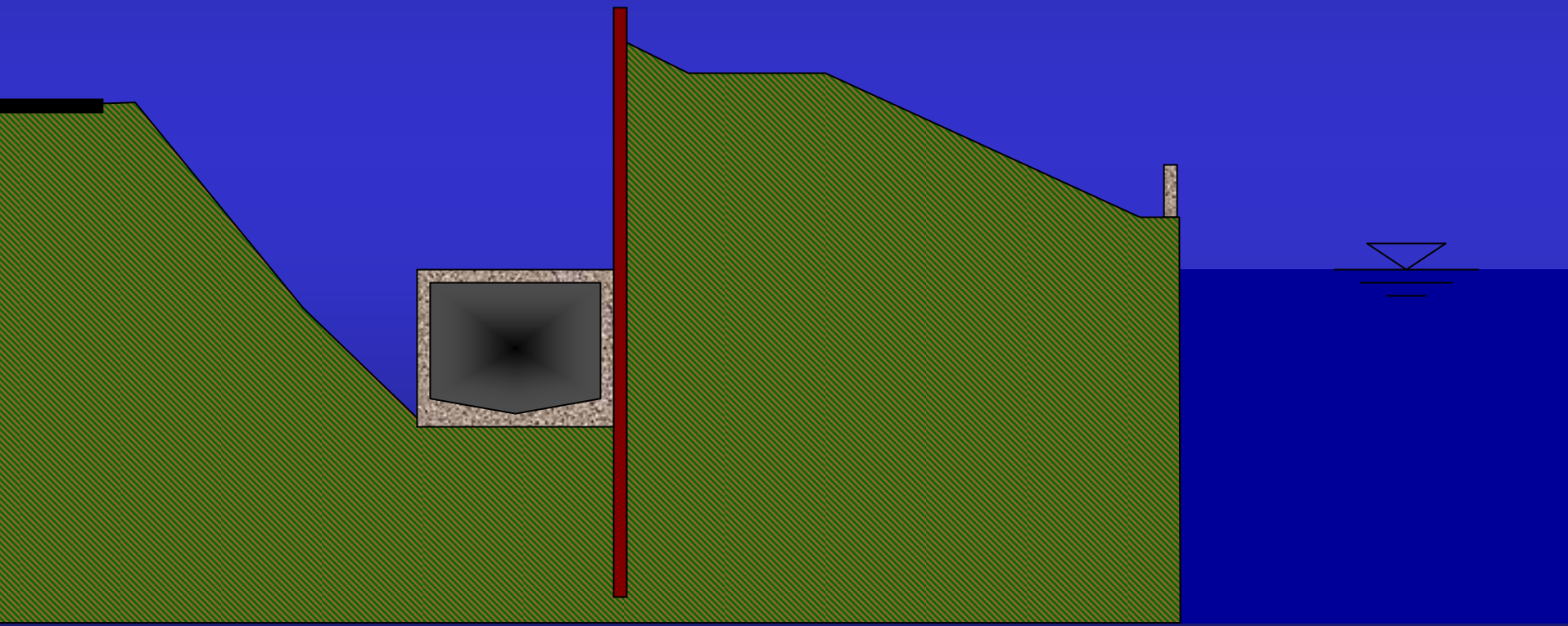


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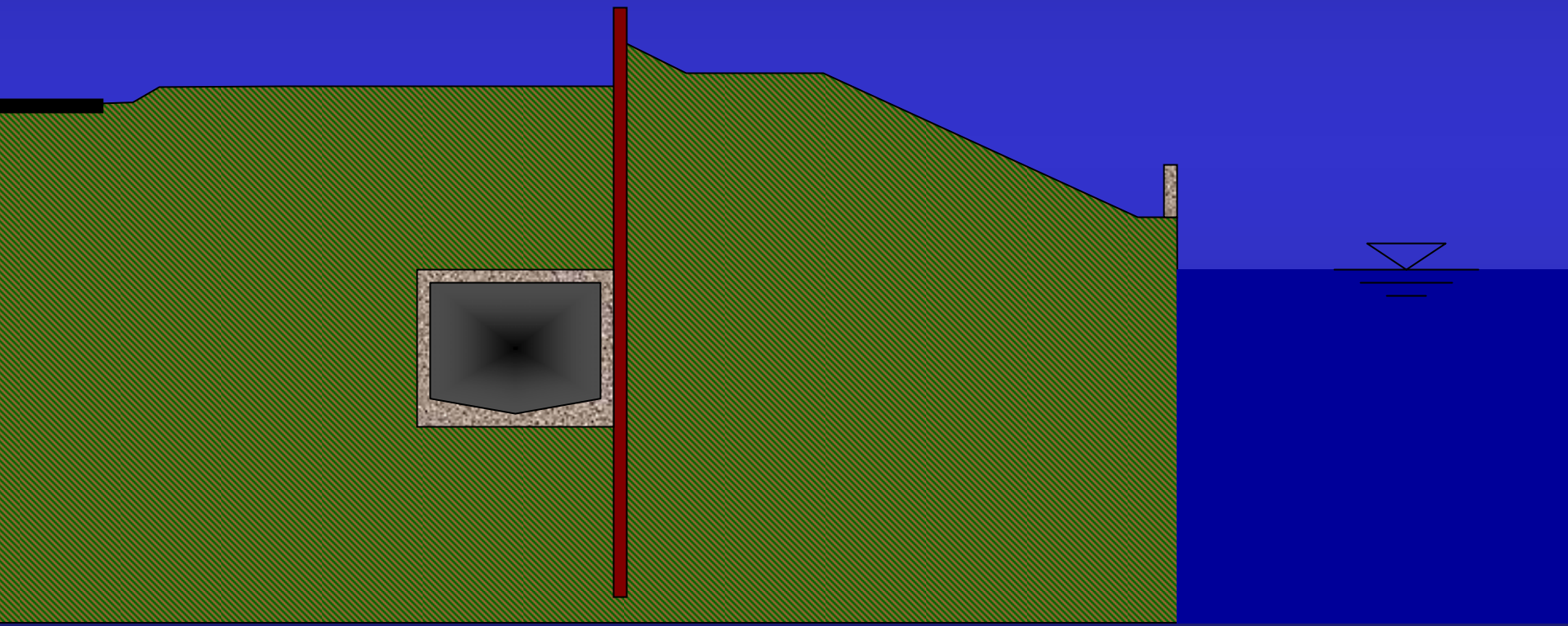


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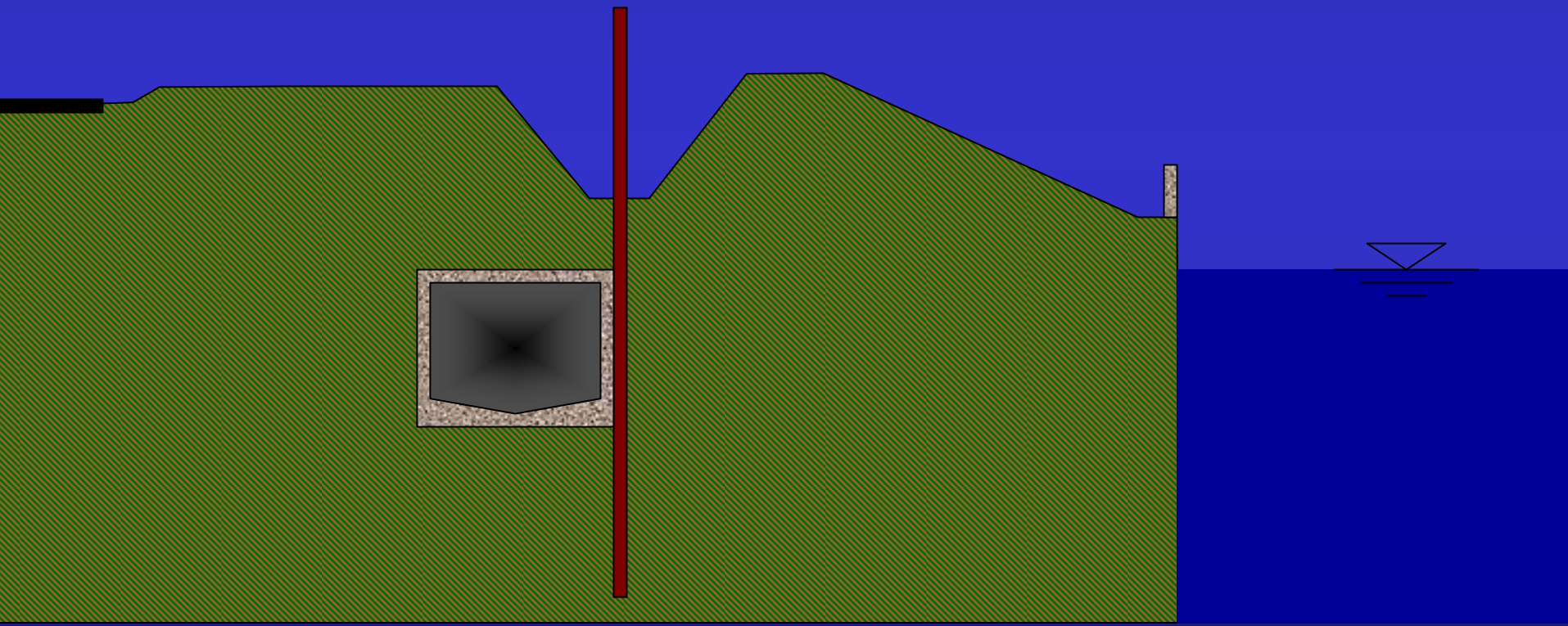


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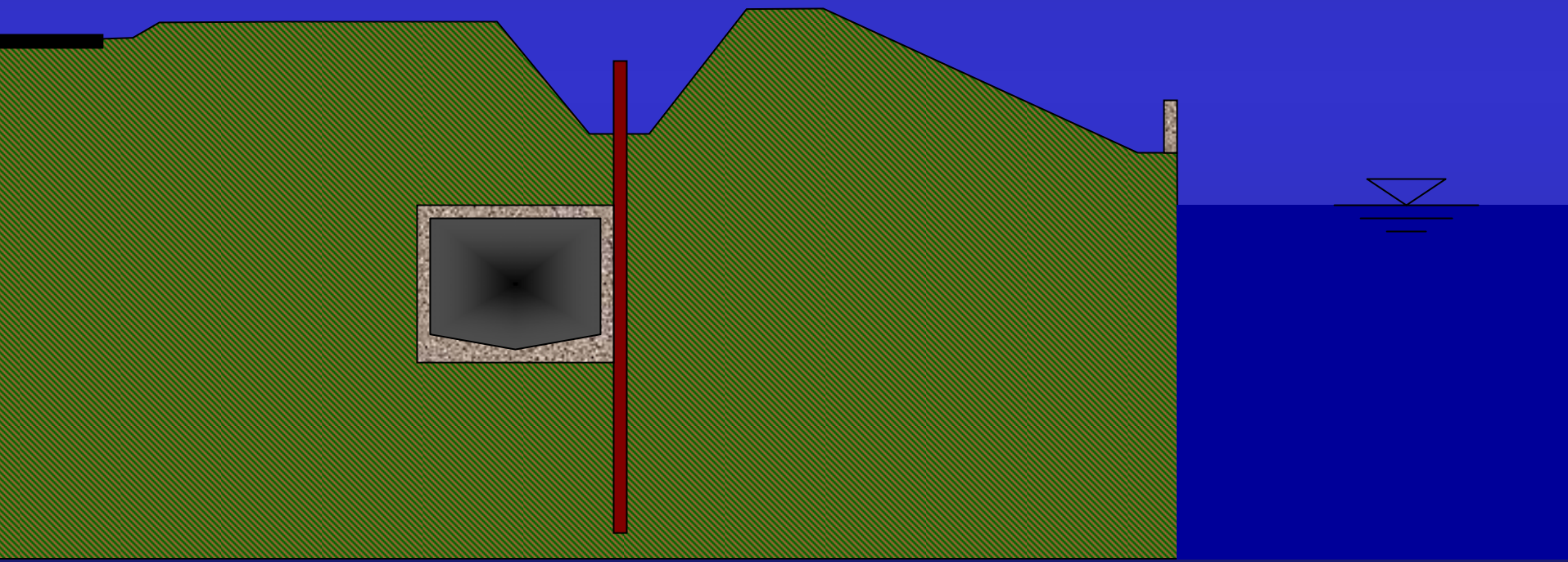


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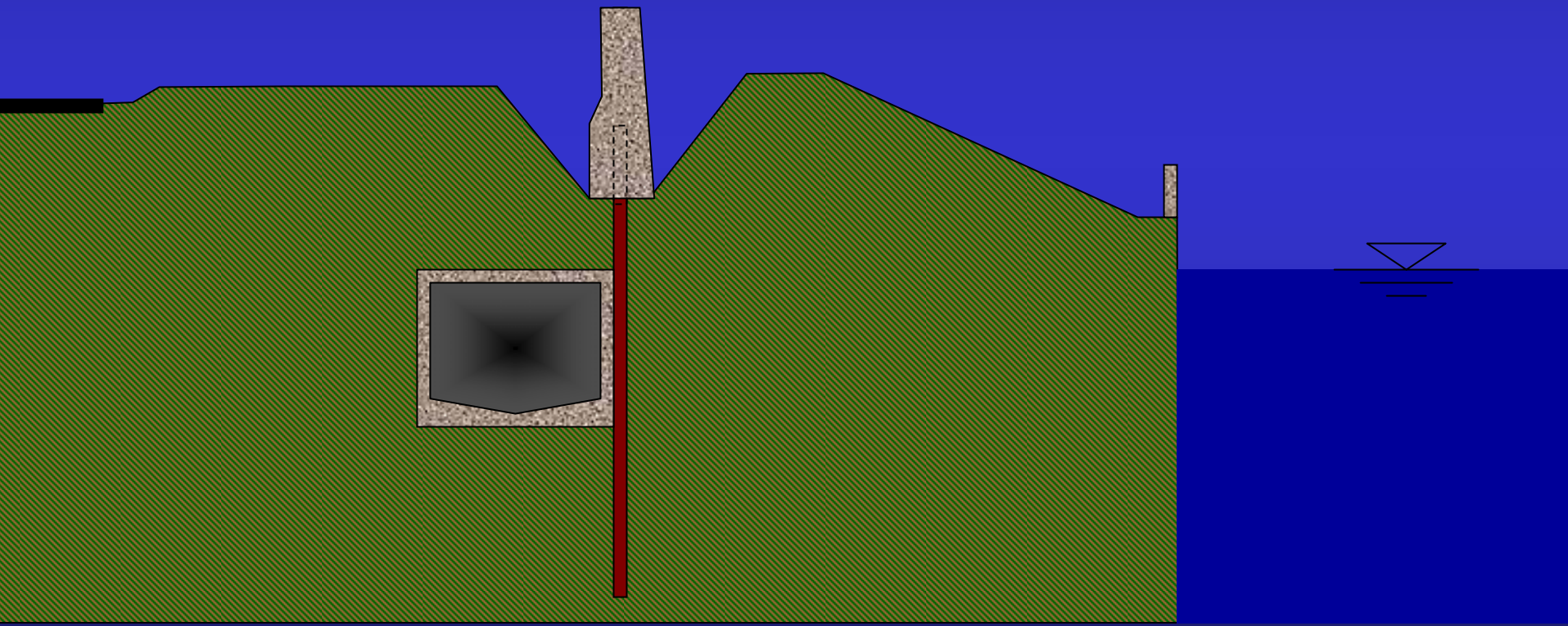


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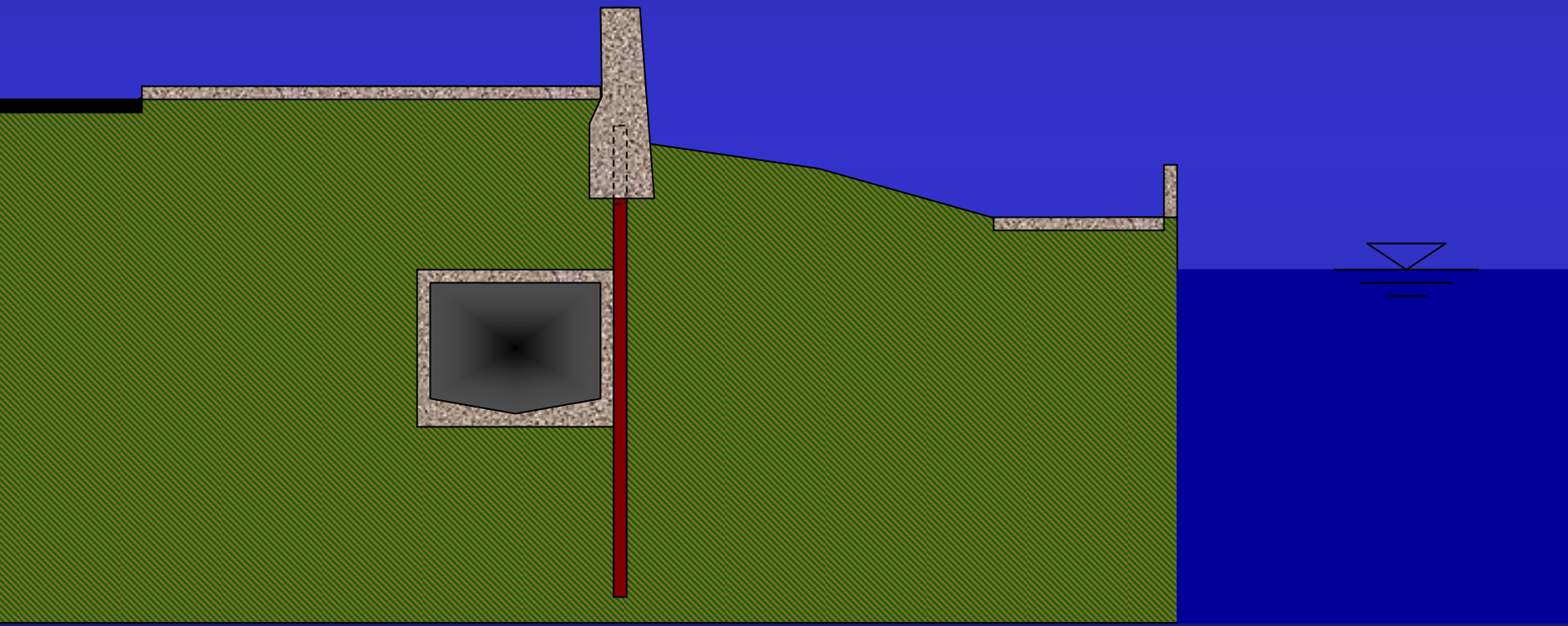


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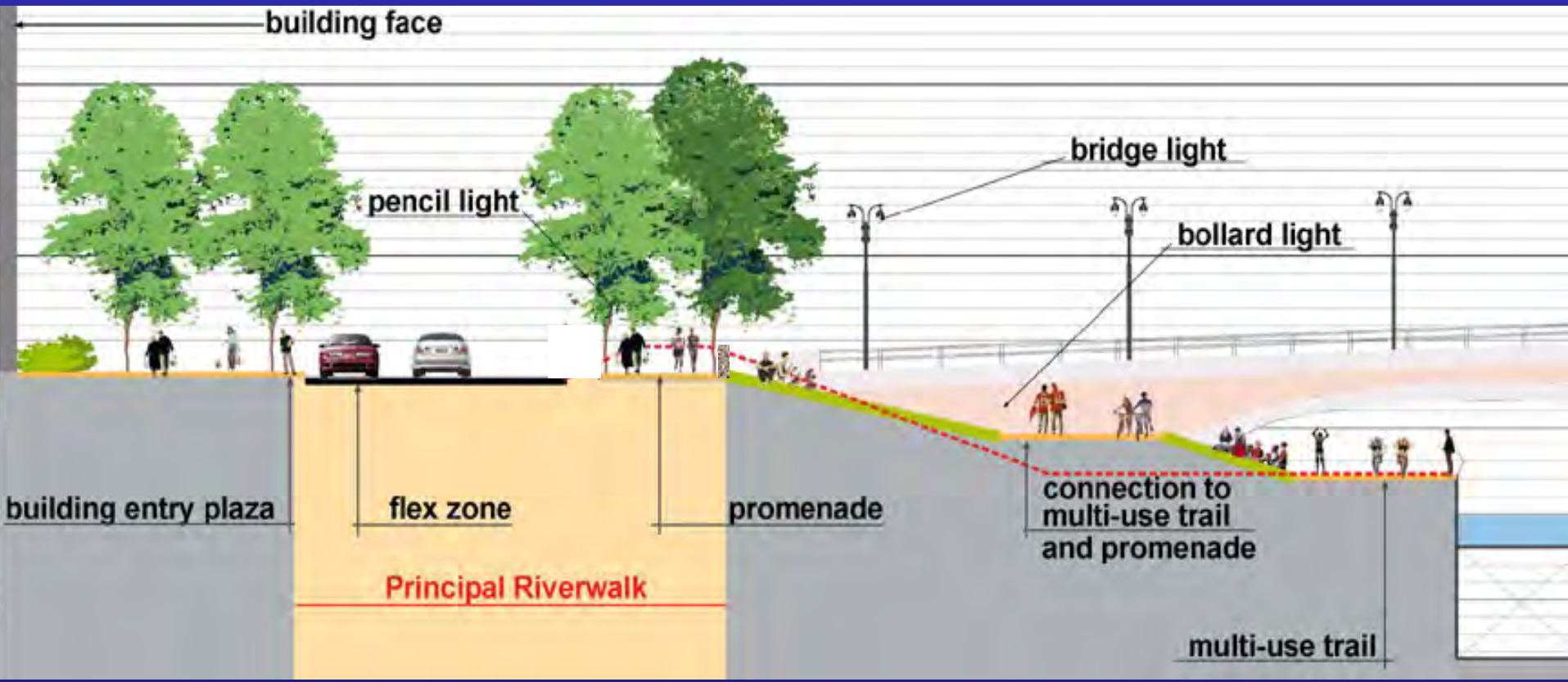
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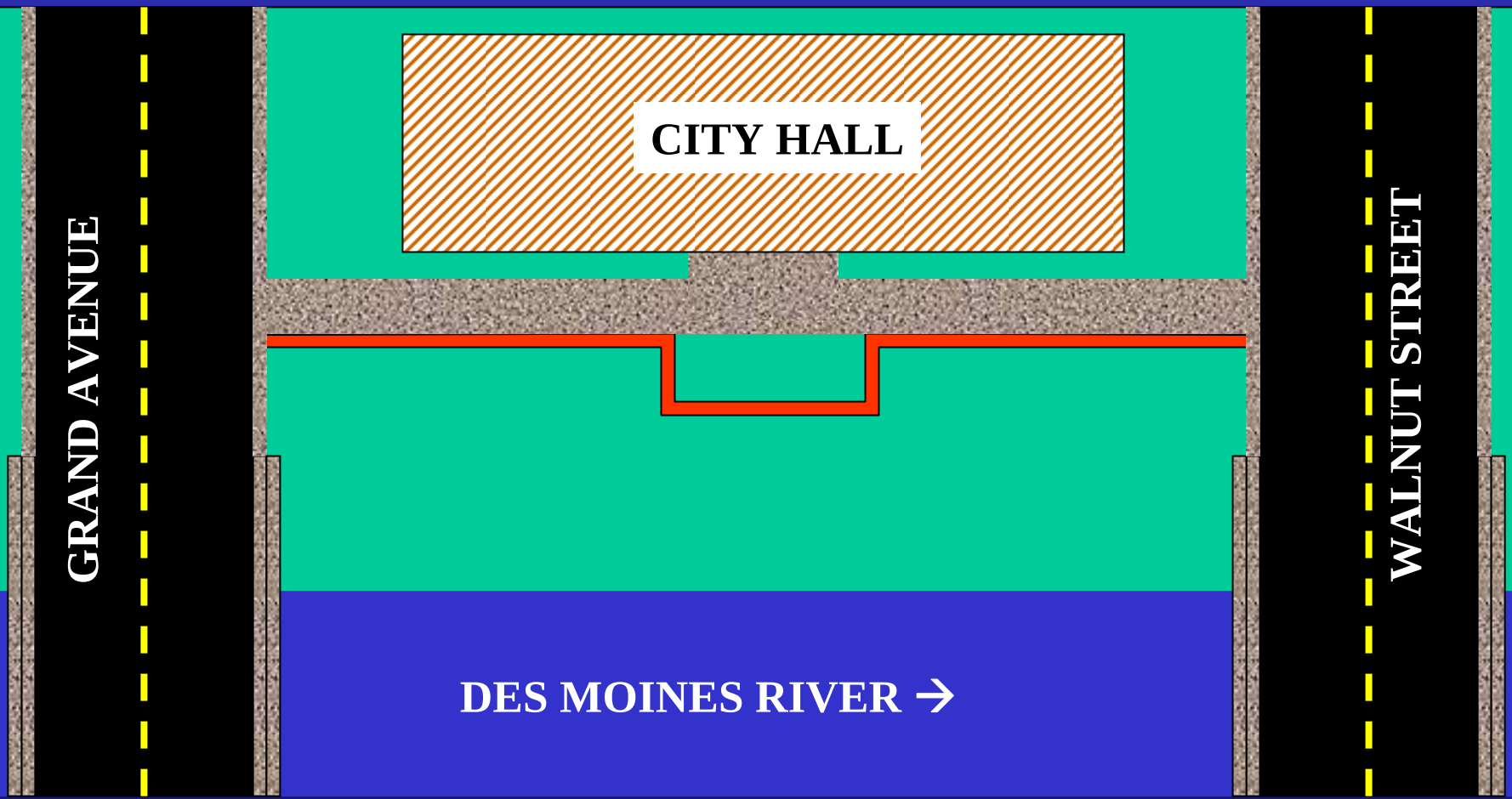


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CITY OF DES MOINES

- Layout of new floodwalls & gates at City Hall

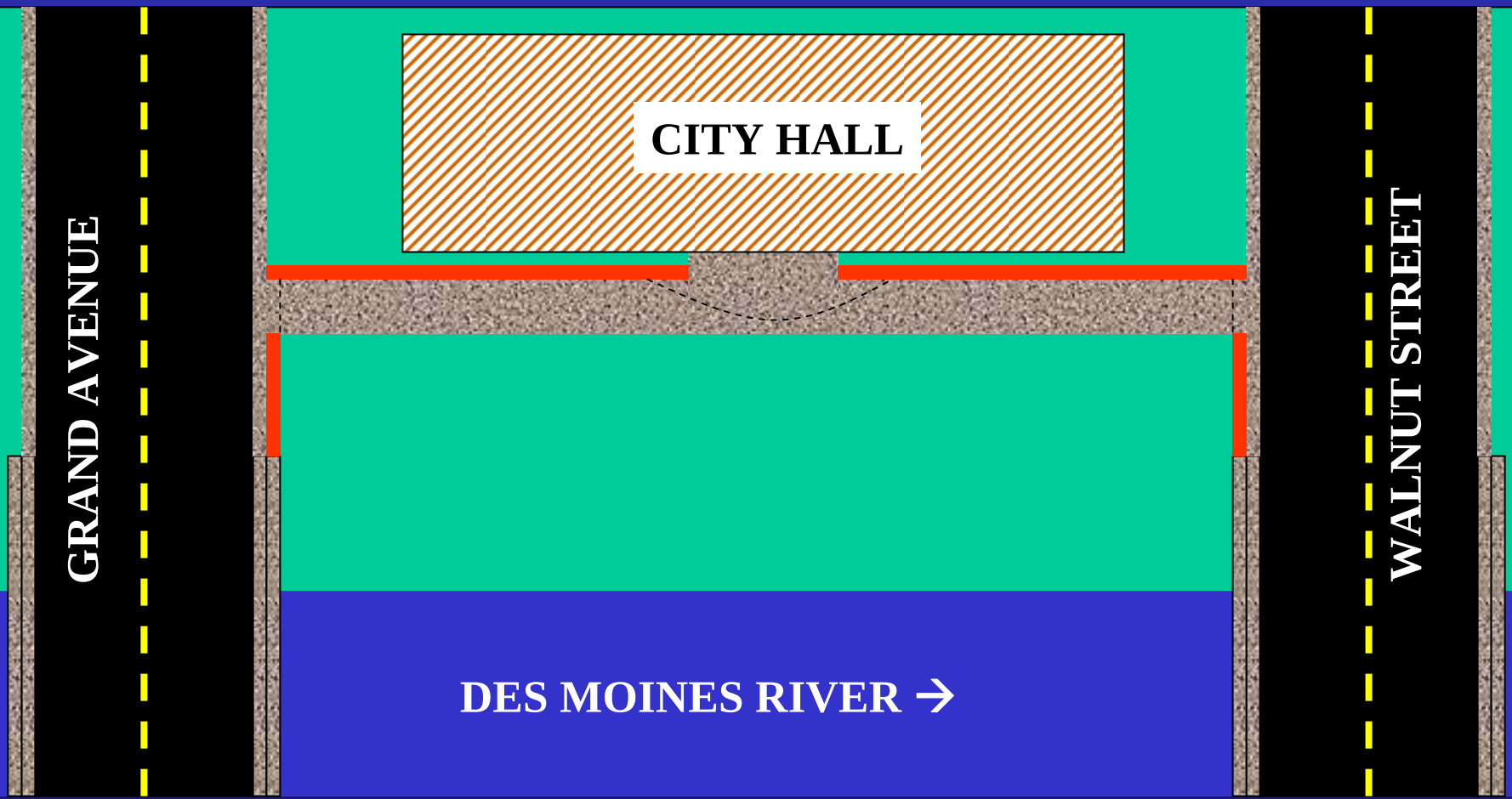


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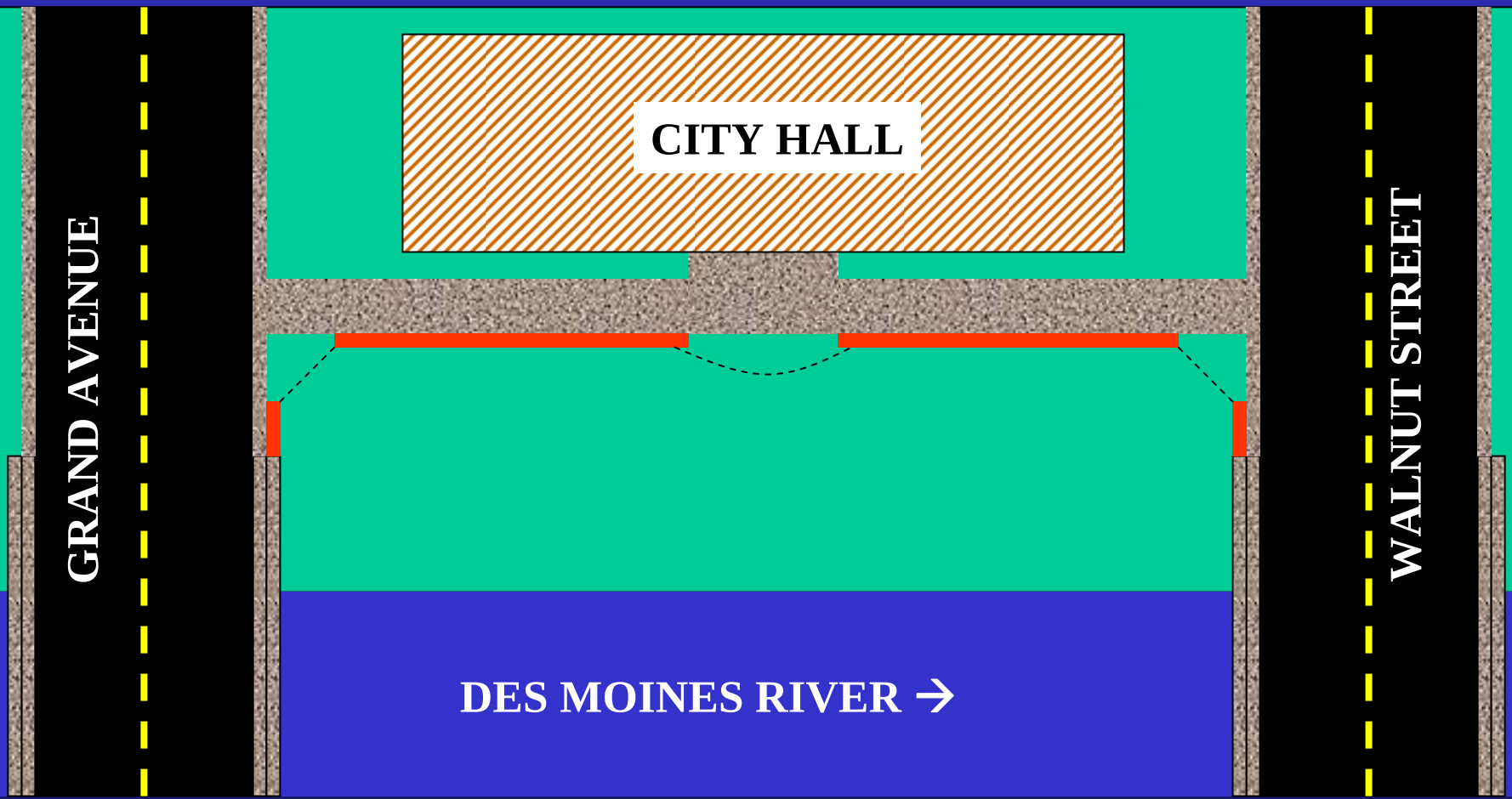


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CITY OF DES MOINES

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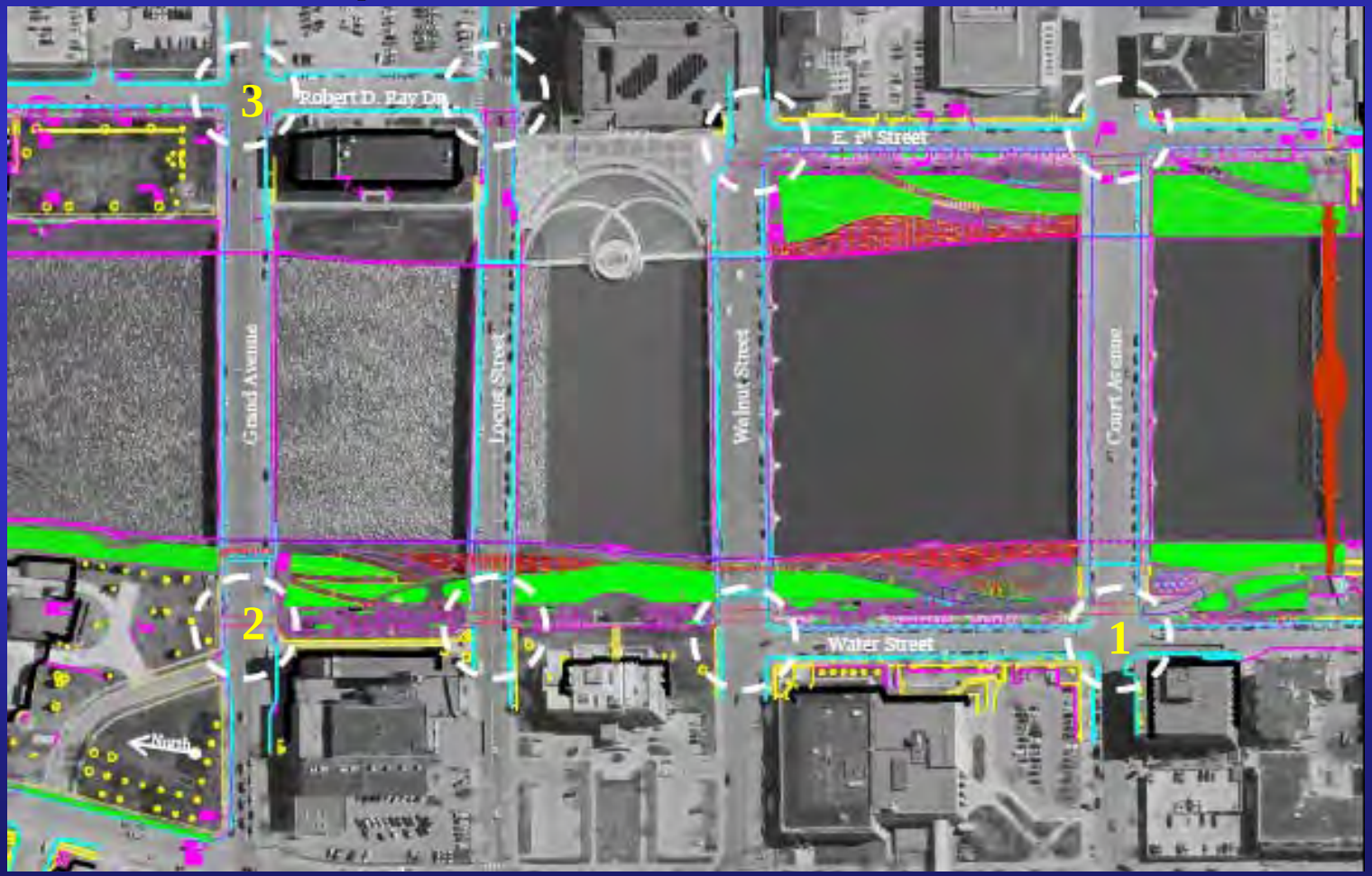


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- Pedestrian / Vehicular Traffic Concerns

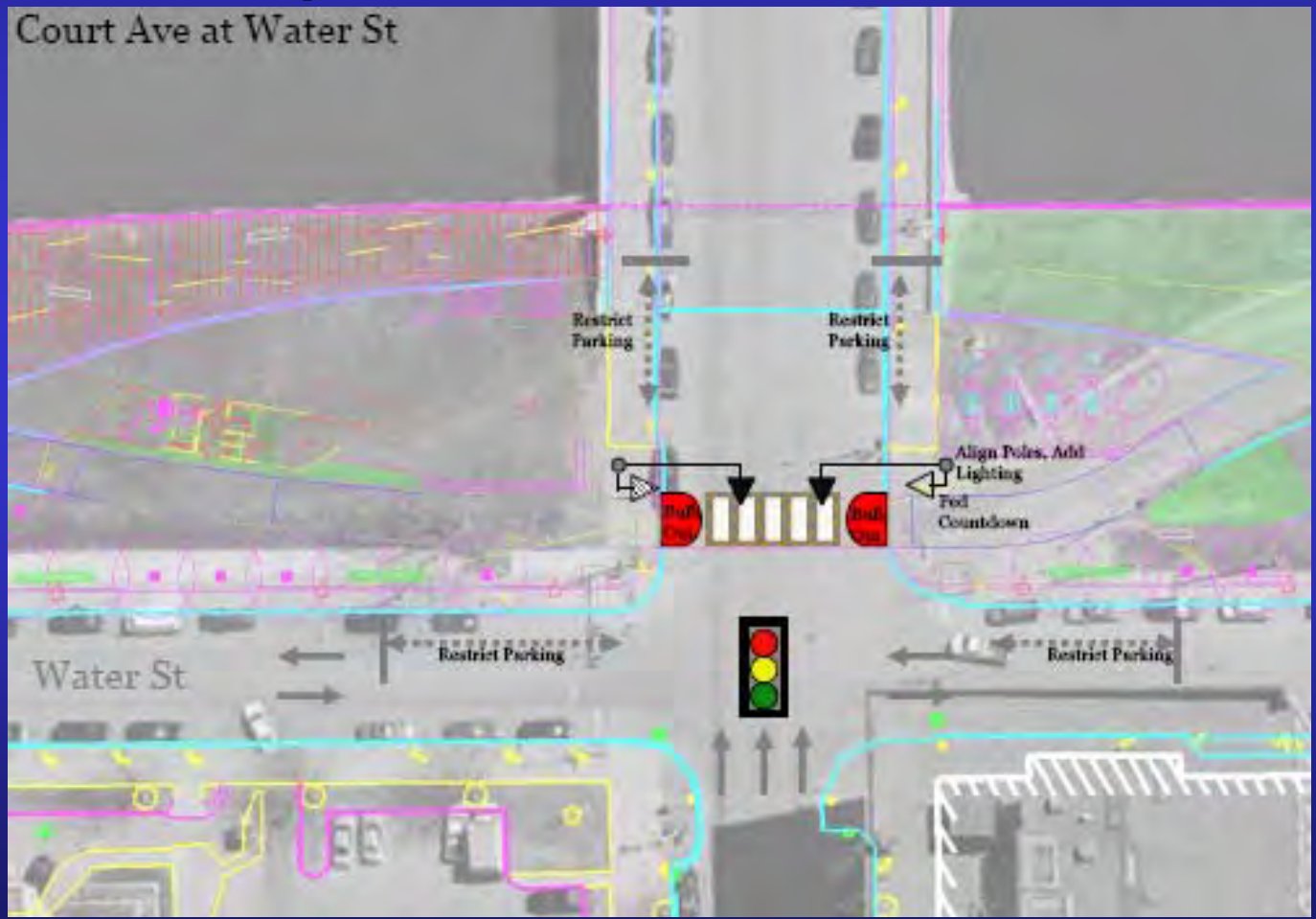


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- Pedestrian / Vehicular Traffic Concerns



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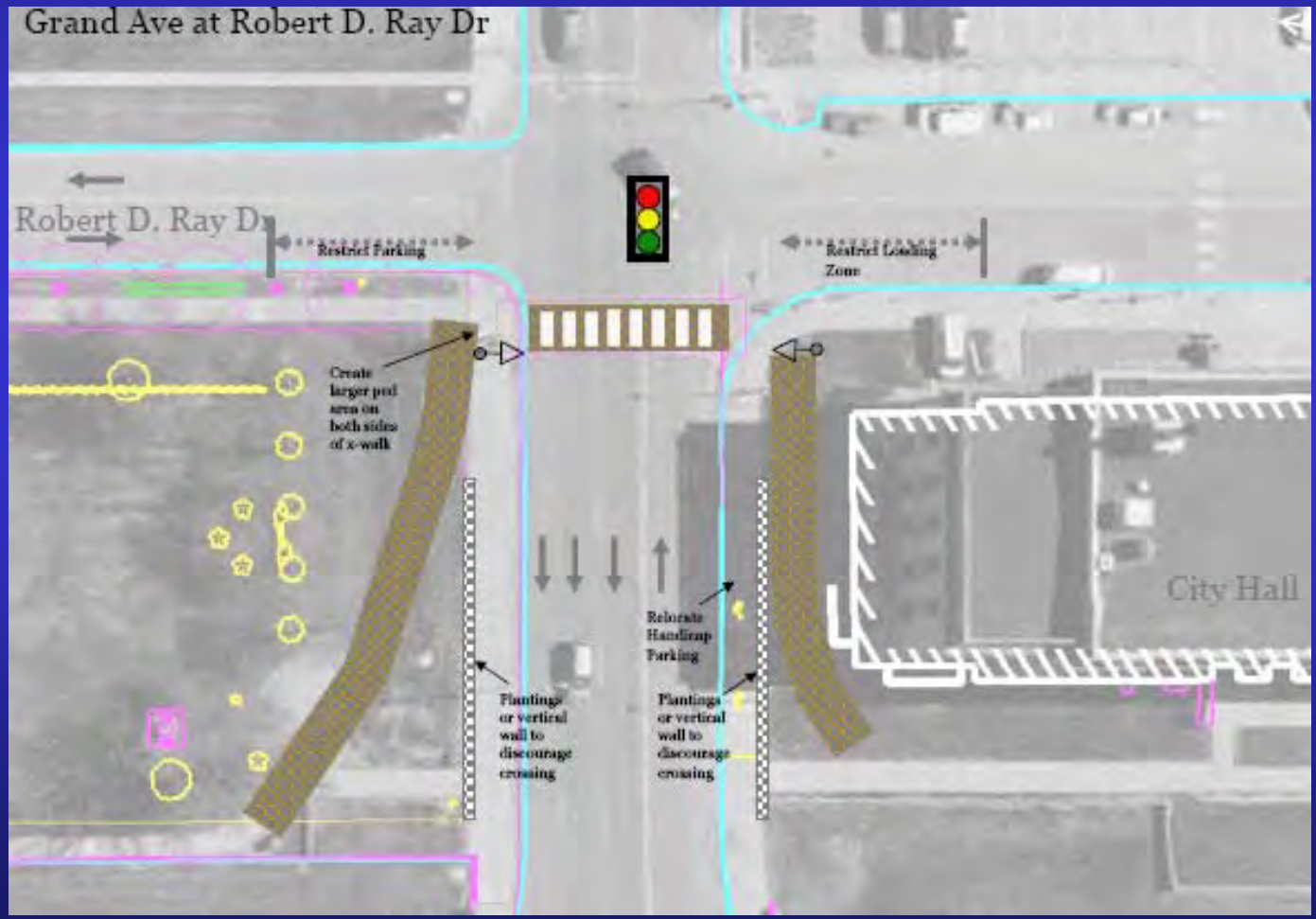


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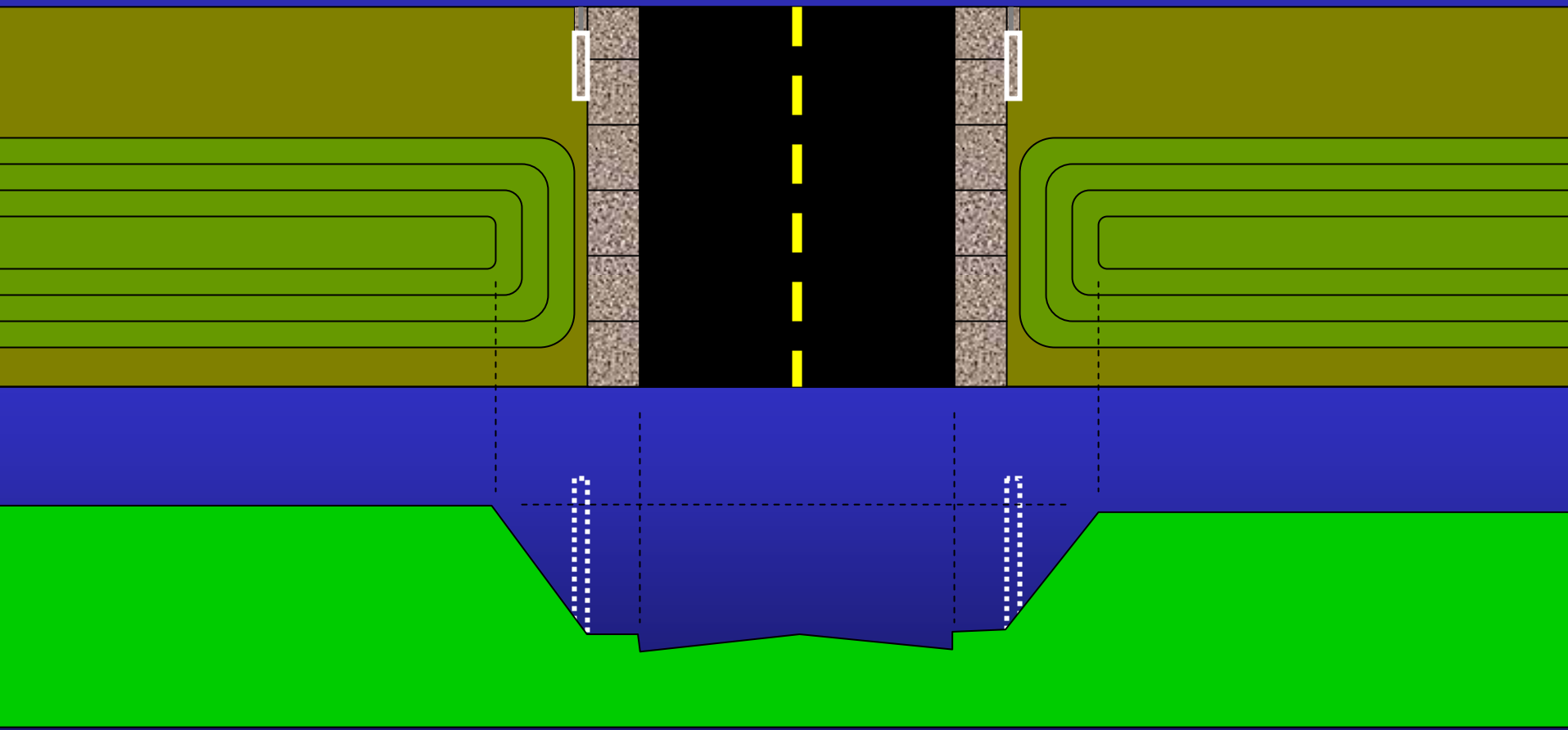


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- Integration with Flood Control

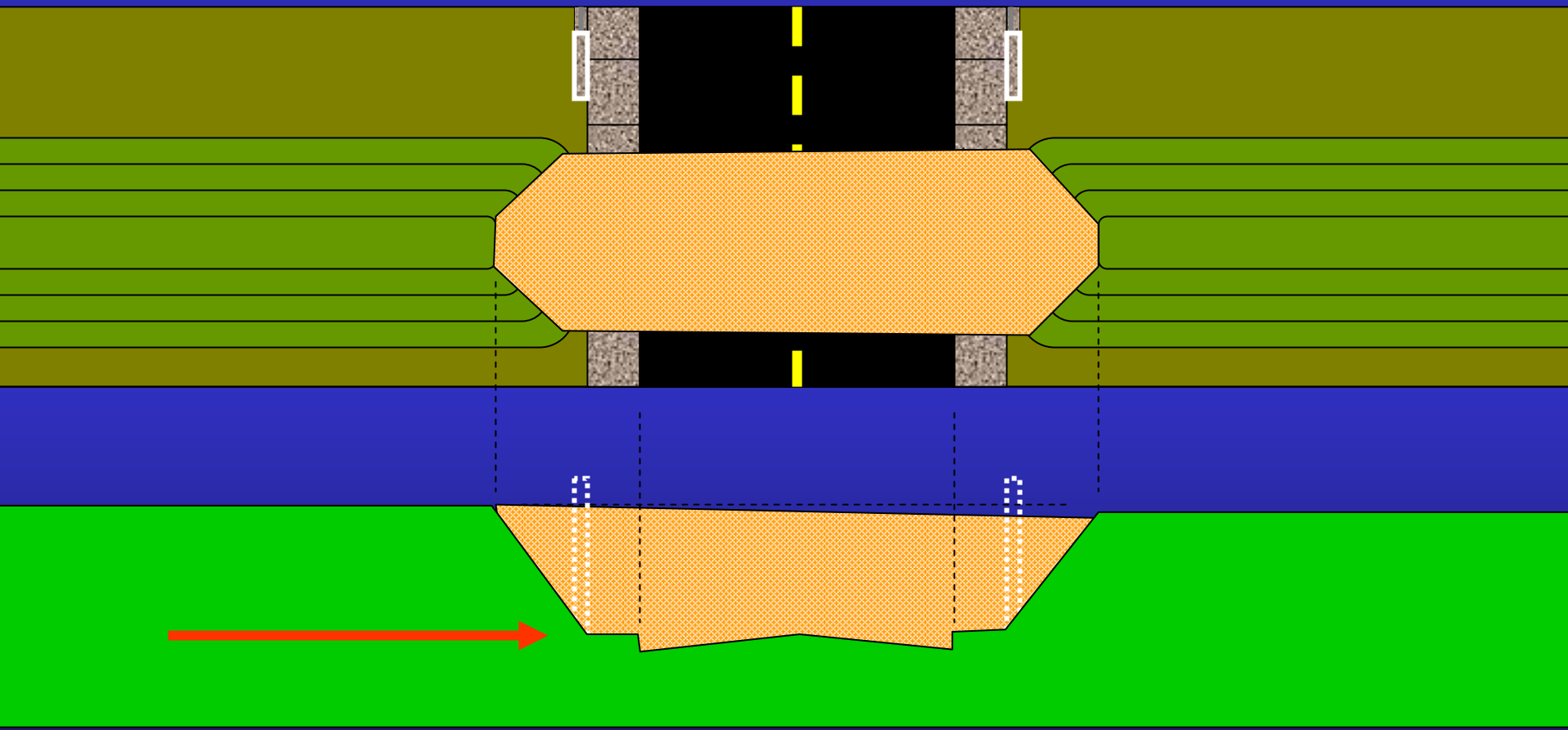


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- Integration with Flood Control

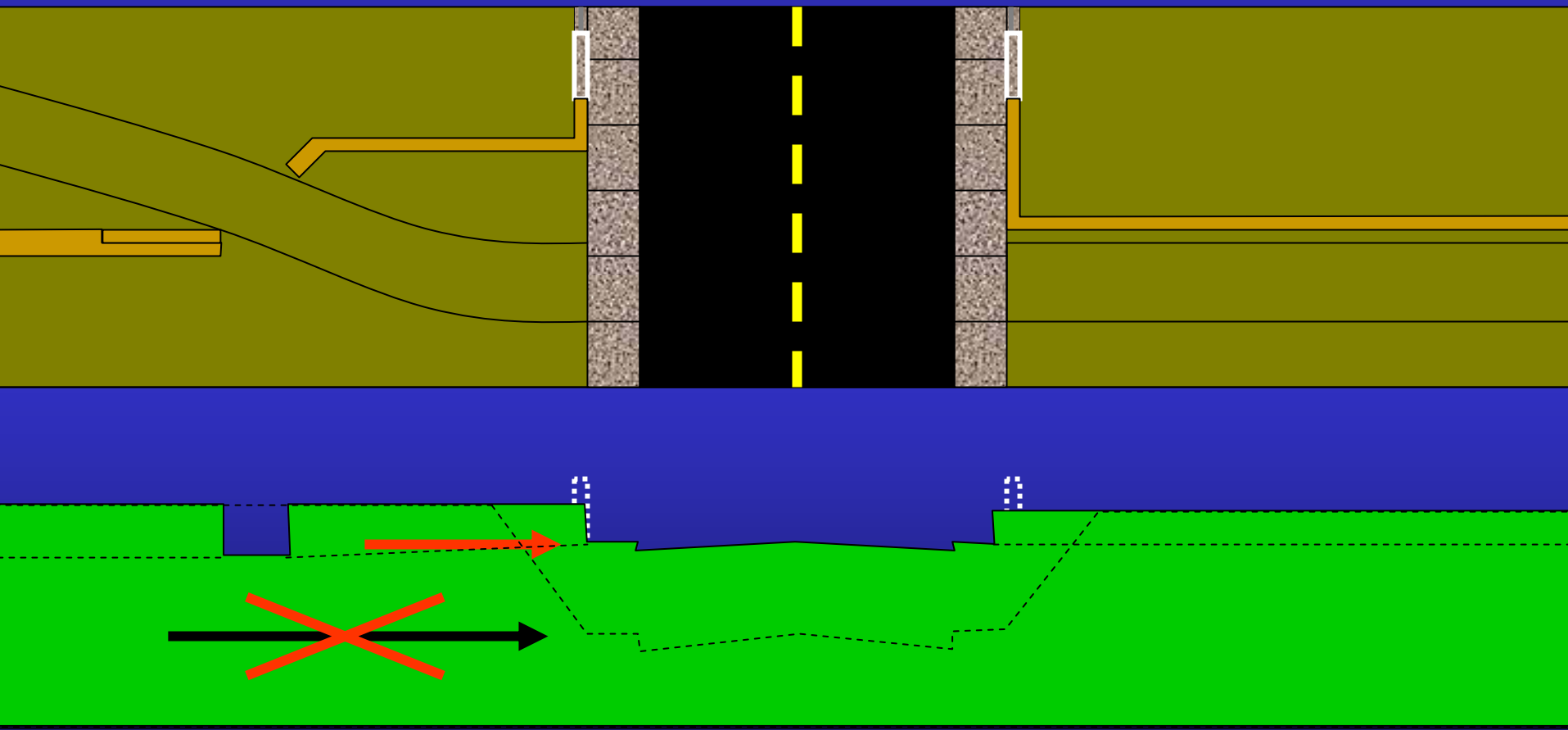


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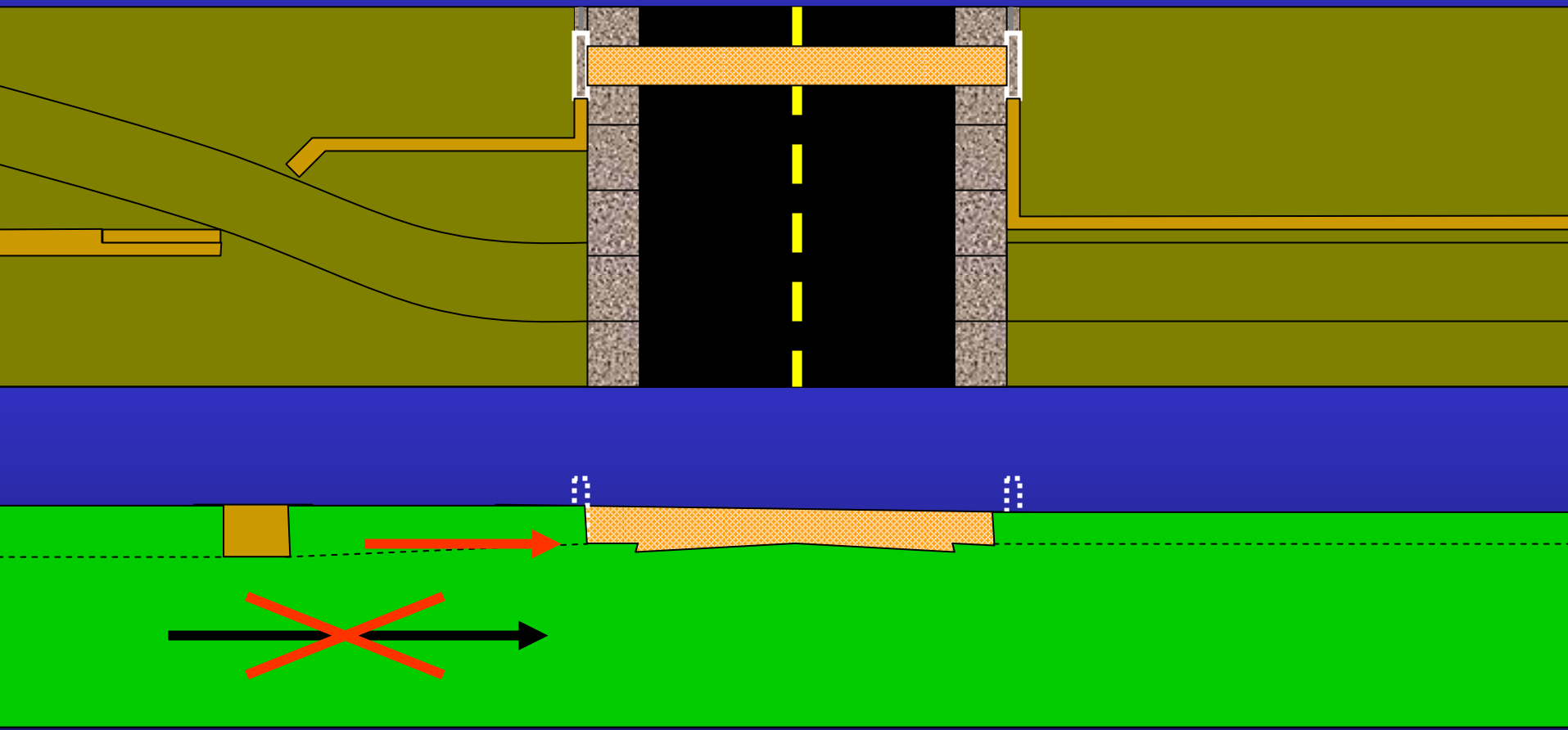


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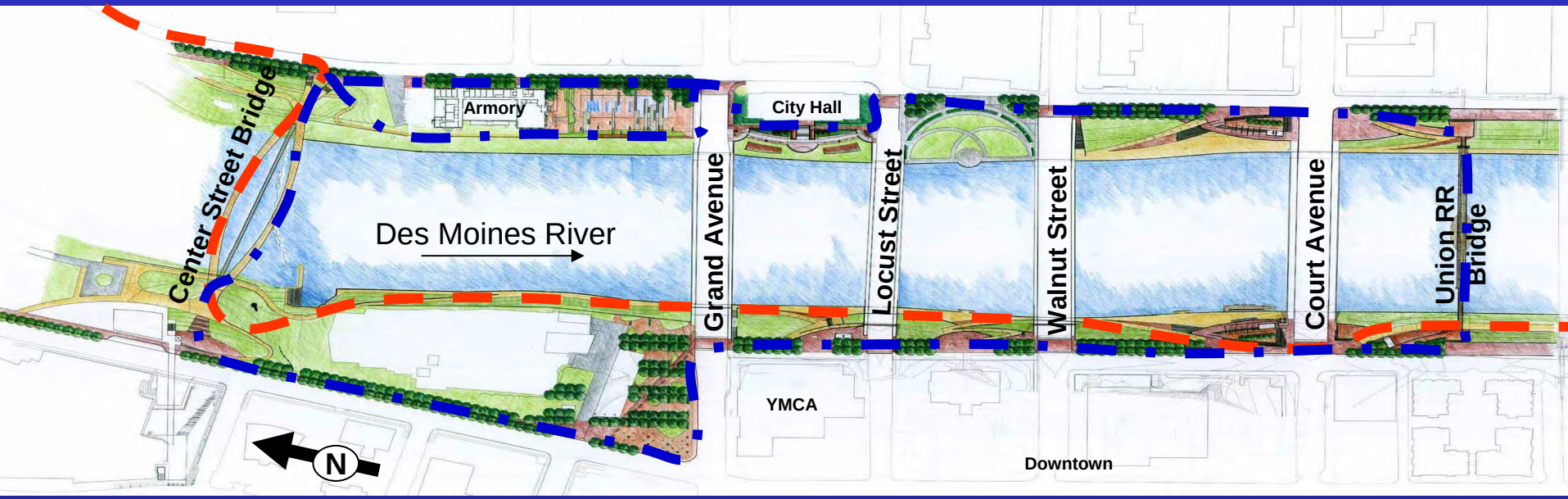
- Integration with Flood Control



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- Acknowledgments
  - Stanley Consultants / INCA Joint Venture
    - ♦ Wallace, Roberts and Todd, LLC
  - The Weitz Group
  - Principal Financial Group
  - The Hanson Company
  - Center for Traffic Research and Education
    - ♦ Iowa State University

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Des Moines Riverwalk

CITY OF DES MOINES

Thomas D. Heinold, P.E.

Project Engineer and Acting Chief of Specifications

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thomas.d.heinold@usace.army.mil

U.S. Army Engineer District, Rock Island
Clock Tower Building
Rock Island, Illinois, 61204-2004


Public Appeal of Major civil Projects
The Good, the Bad and the Ugly
Presented by
Kevin Holden, Landscape Architect
Kirk Sunderman, Civil Engineer
August 4, 2005

US Army Corps
of Engineers

One Corps Serving the Army and the Nation

2005 INFRASTRUCTURE SYSTEMS CONFERENCE

MARMET LOCKS AND DAM LOCK REPLACEMENT PROJECT

by
Jeffrey S. Maynard, E.I.
CELRH-EC-DS

3 August 2005

US Army Corps of Engineers

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Marmet Locks and Dam

67.7 Miles from the Mouth of the Kanawha River

Approximately 20 Minute Drive to the State Capital in Charleston, WV



US Army Corps of Engineers

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Marmet Locks and Dam Existing Project

- Authorized by River and Harbors Act of 1930
- Began operations in 1934
- Twin 56 by 360 feet lock chambers
- Standard barge design vessel
- Five 110 feet roller gates
- Nine feet navigable depth

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Marmet Locks and Dam
Existing Project



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Marmet Locks and Dam Existing Project



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Marmet Locks and Dam
Existing Project



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Marmet Locks and Dam
Existing Project



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Marmet Locks Original Construction



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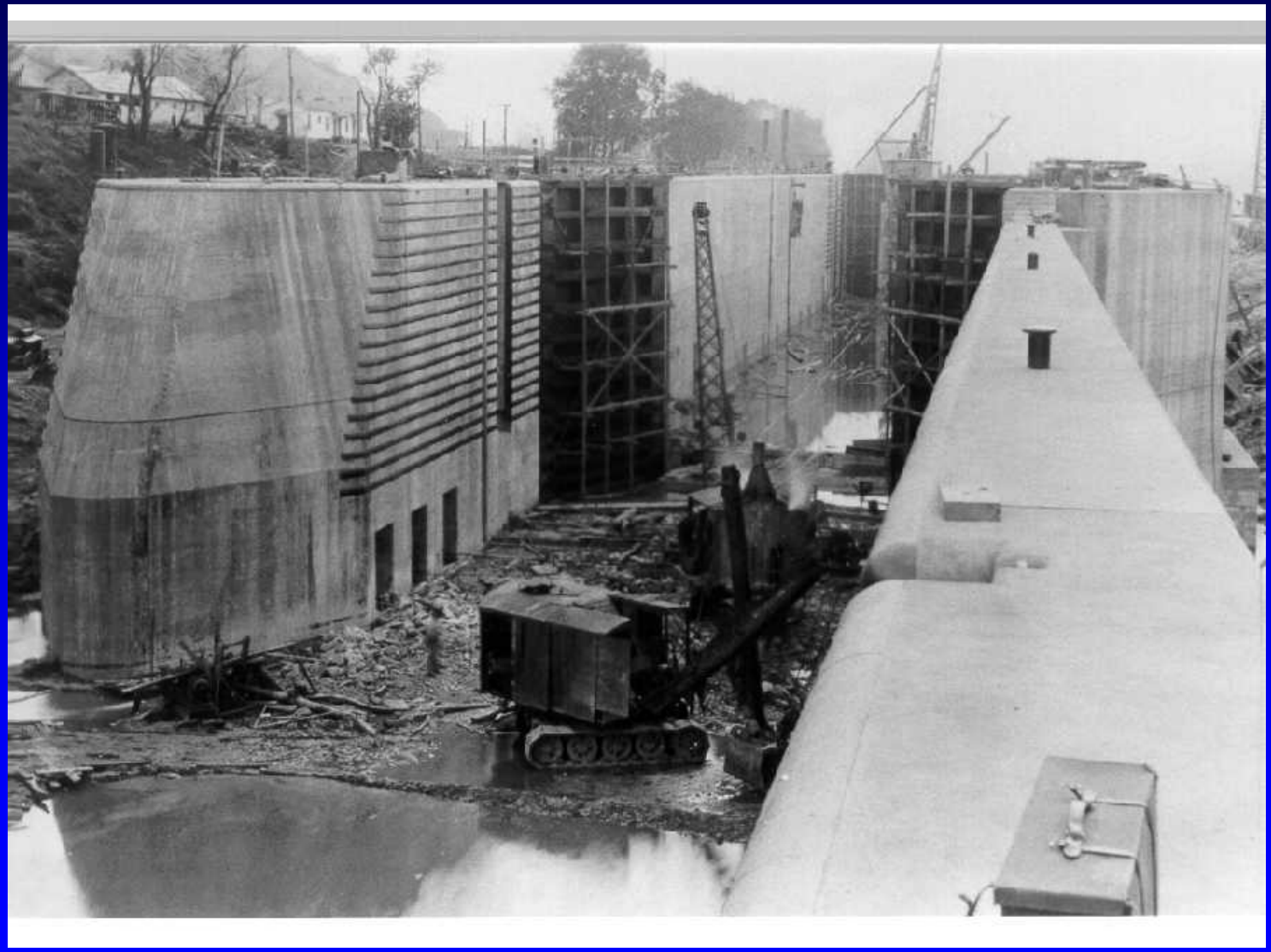
Marmet Locks Original Construction



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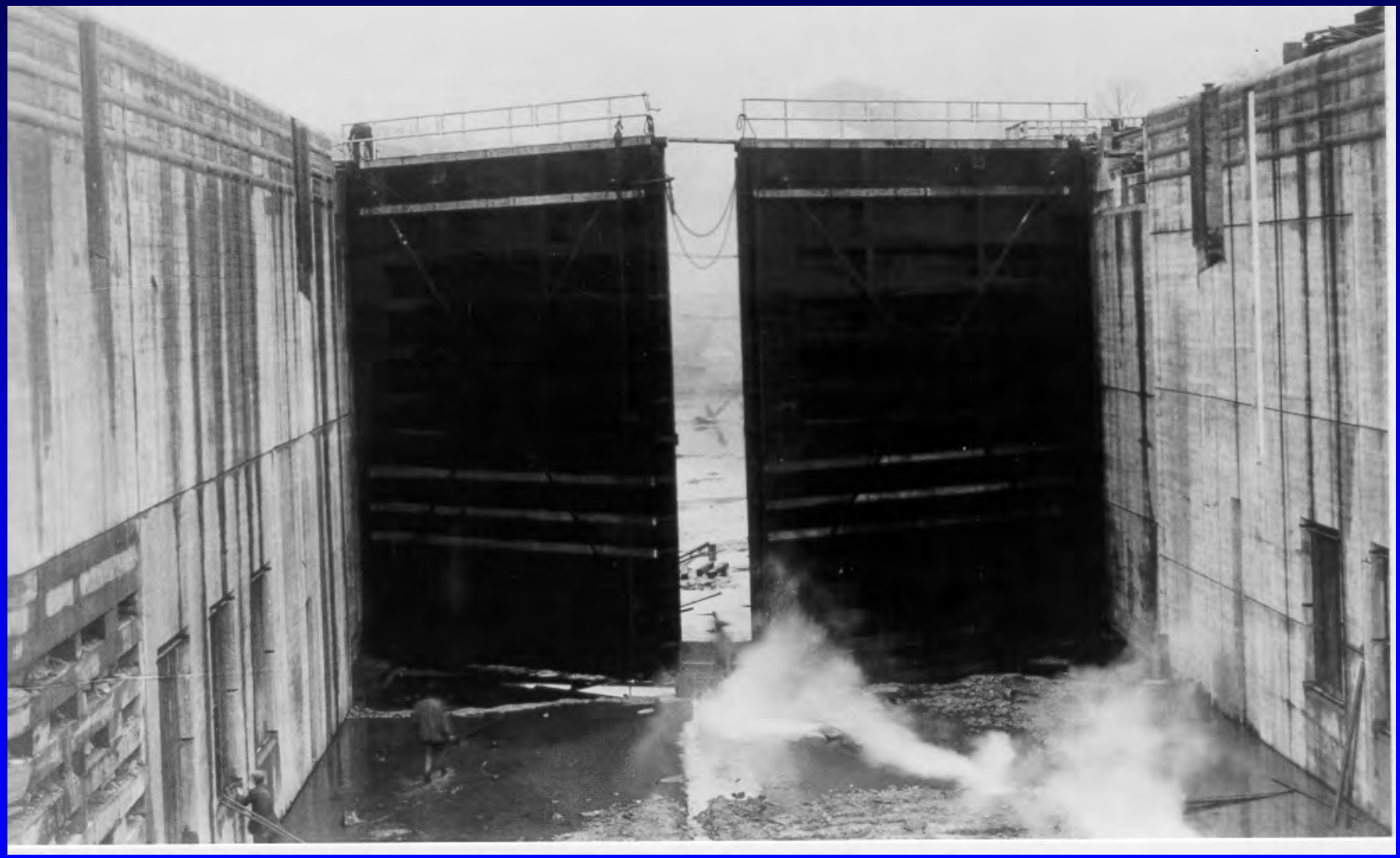
Marmet Locks Original Construction



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Marmet Locks Original Construction



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Marmet Locks Original Lock



Deteriorating Concrete

US Army Corps of Engineers

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Marmet Lock Replacement Project

Twin 56’ by 360’ locks
13.8 million tons (95% Coal)
5 Lockages per tow
Average Delays 4.7 hours/tow





216 Tracts Real Estate
252 Relocations
New 110’ by 800’ lock
Contract Award May 02
Total Project Cost: $333 M

US Army Corps of Engineers

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Marmet Lock Replacement Project

- Authorized by Water Resources Development Act of 1996
- New 110-ft by 800-ft additional lock
- Acquisition of about 250 structures
- Construction contract award May 02
- Scheduled completion June 09
- Total project cost $333 M

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Marmet Lock Replacement Project



US Army Corps of Engineers

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Marmet Lock Replacement Project

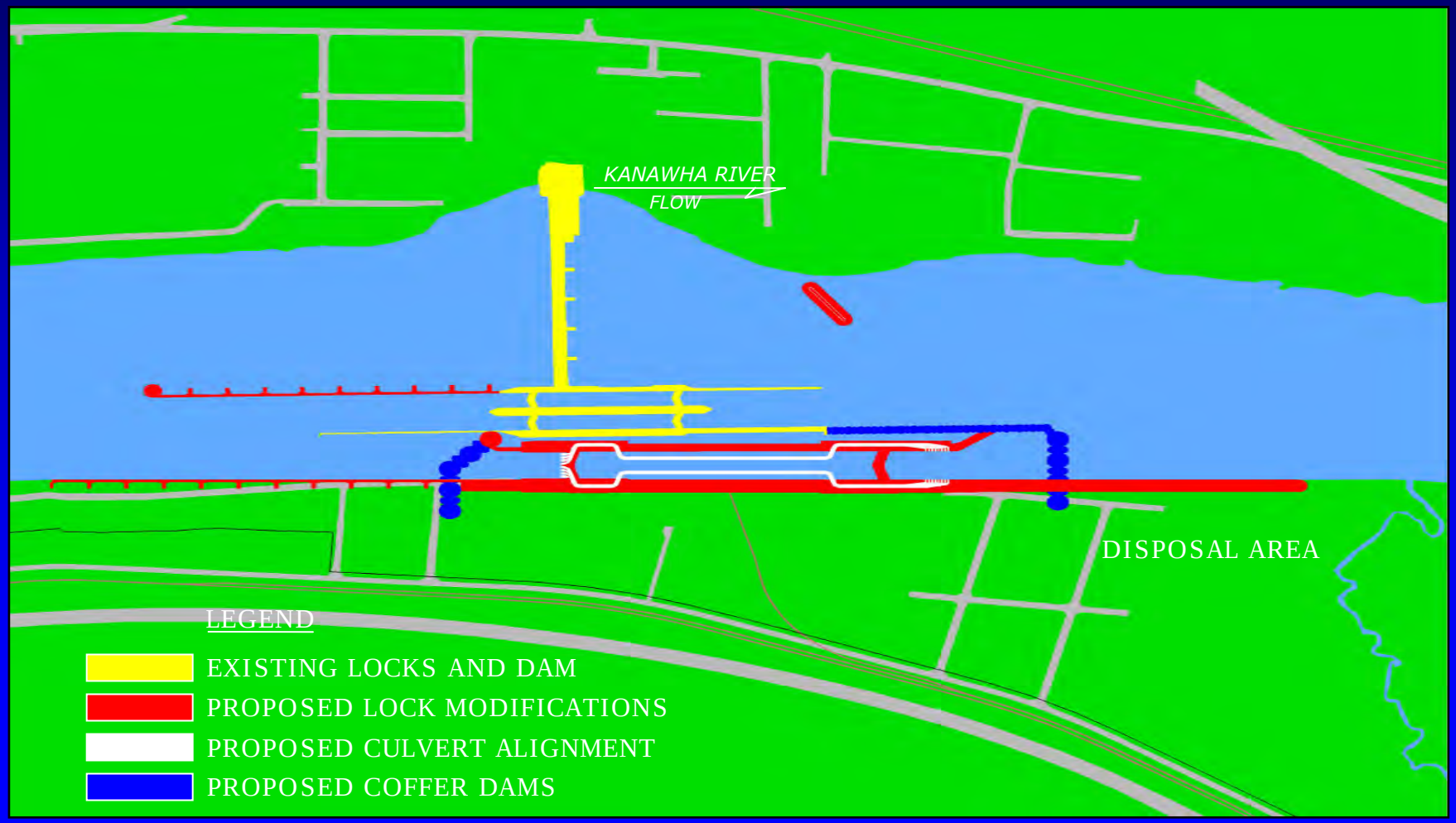
Project Schedule

• Initiate Real Estate Acquisition	FY 98
• Complete Plans & Specs	FY 01
• Complete Phase 1 & 2 Real Estate	FY 01
• Initiate Construction	FY 02
• Complete Phase 3 Real Estate	FY 02
• Lock Operational	FY 08
• Completion	FY 09

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Marmet Lock Replacement Project



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Marmet Lock Replacement Project

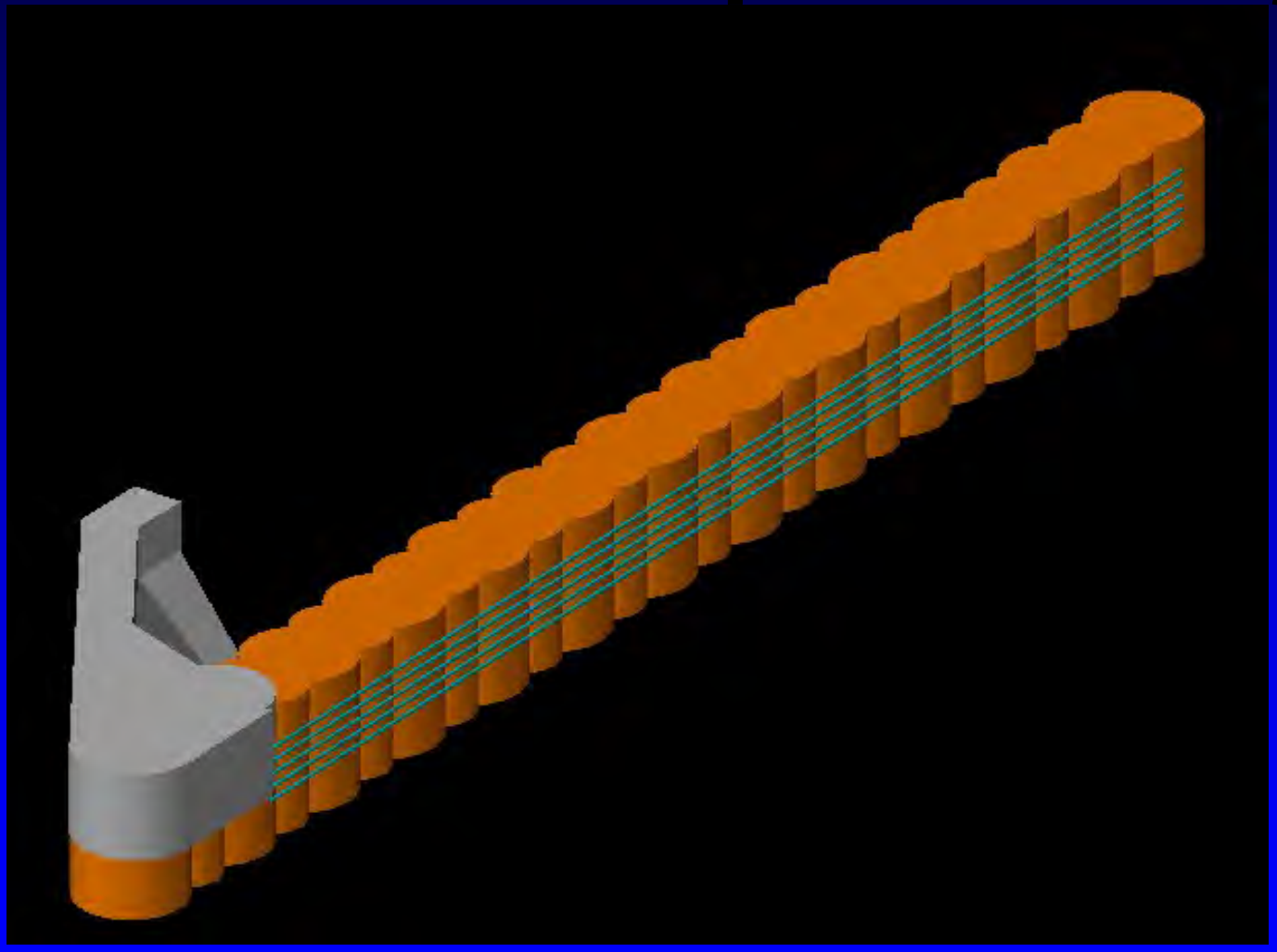
Estimated Quantities

• Soil Excavation	2,900,000 CY
• Rock Excavation	110,000 CY
• Steel Sheet Piling	145,000 LF
• Rock Anchors	39,800 LF
• Concrete	290,000 CY
• Concrete Reinforcement	3,800,000 LB
• Portland Cement	714,500 CWT
• Pozzolan (Fly Ash)	215,000 CWT
• Structural Steel	1,800,000 LB

US Army Corps of Engineers

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Marmet Lock Replacement Project

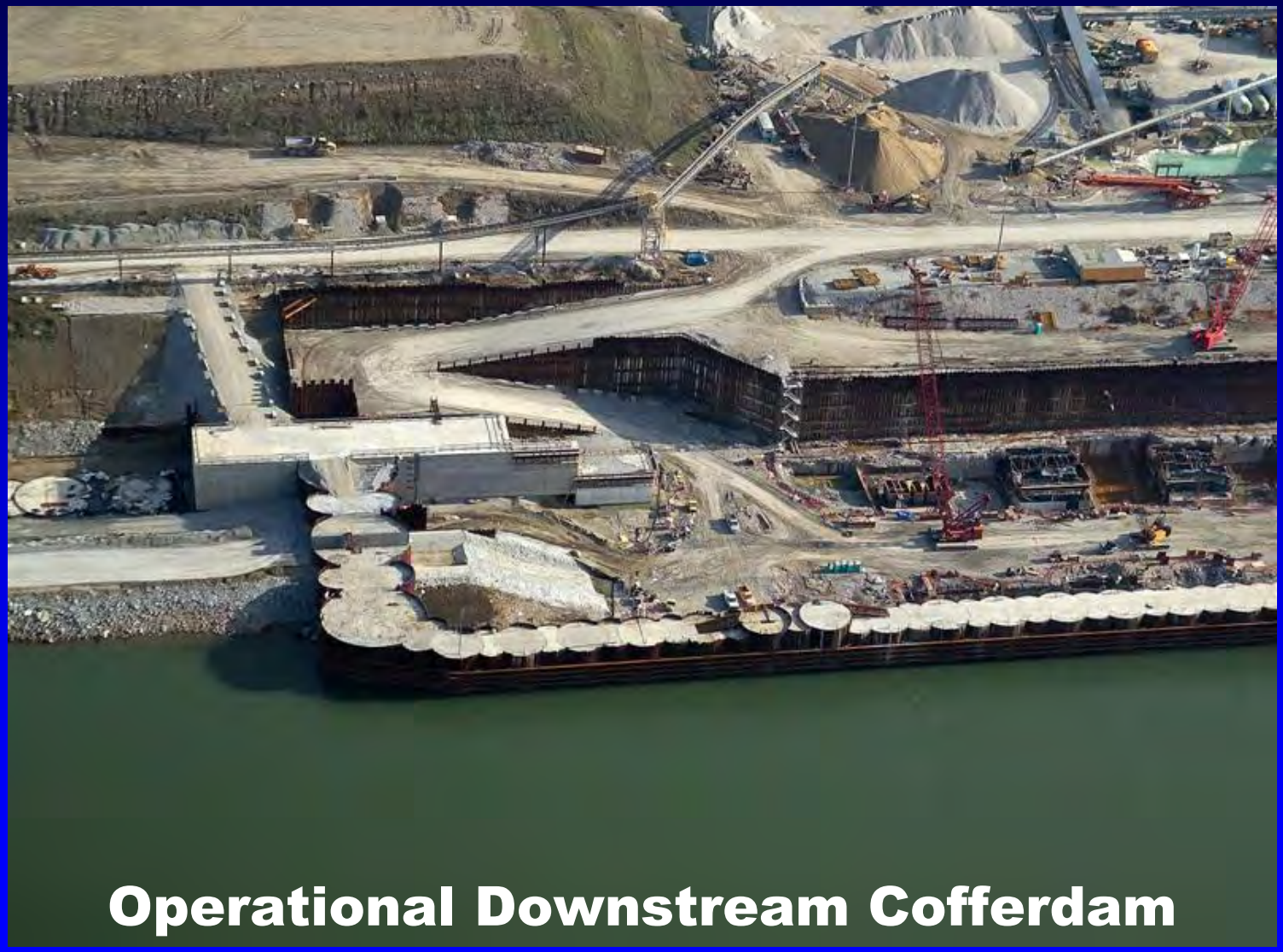


Cofferdam New Lock Tie-In

US Army Corps of Engineers

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Marmet Lock Replacement Project

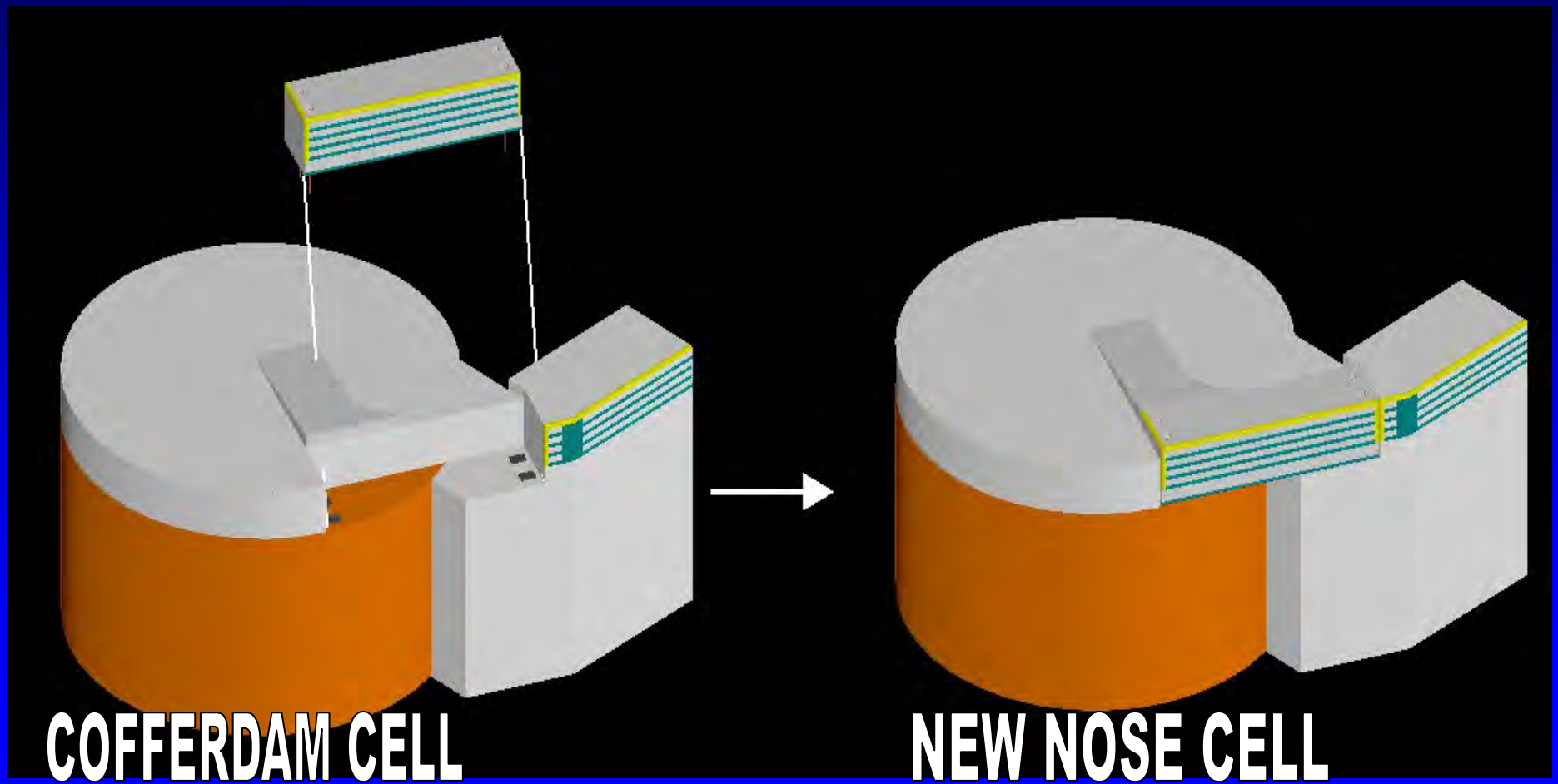


Operational Downstream Cofferdam

US Army Corps of Engineers

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Marmet Lock Replacement Project



US Army Corps of Engineers

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Marmet Lock Replacement Project

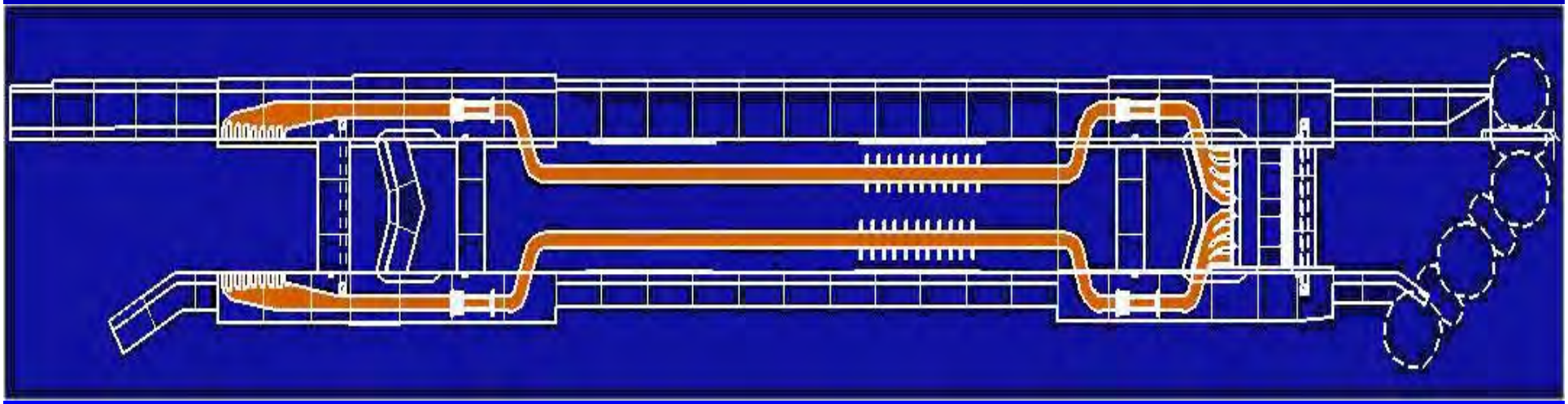


Operational Upstream Cofferdam

US Army Corps of Engineers

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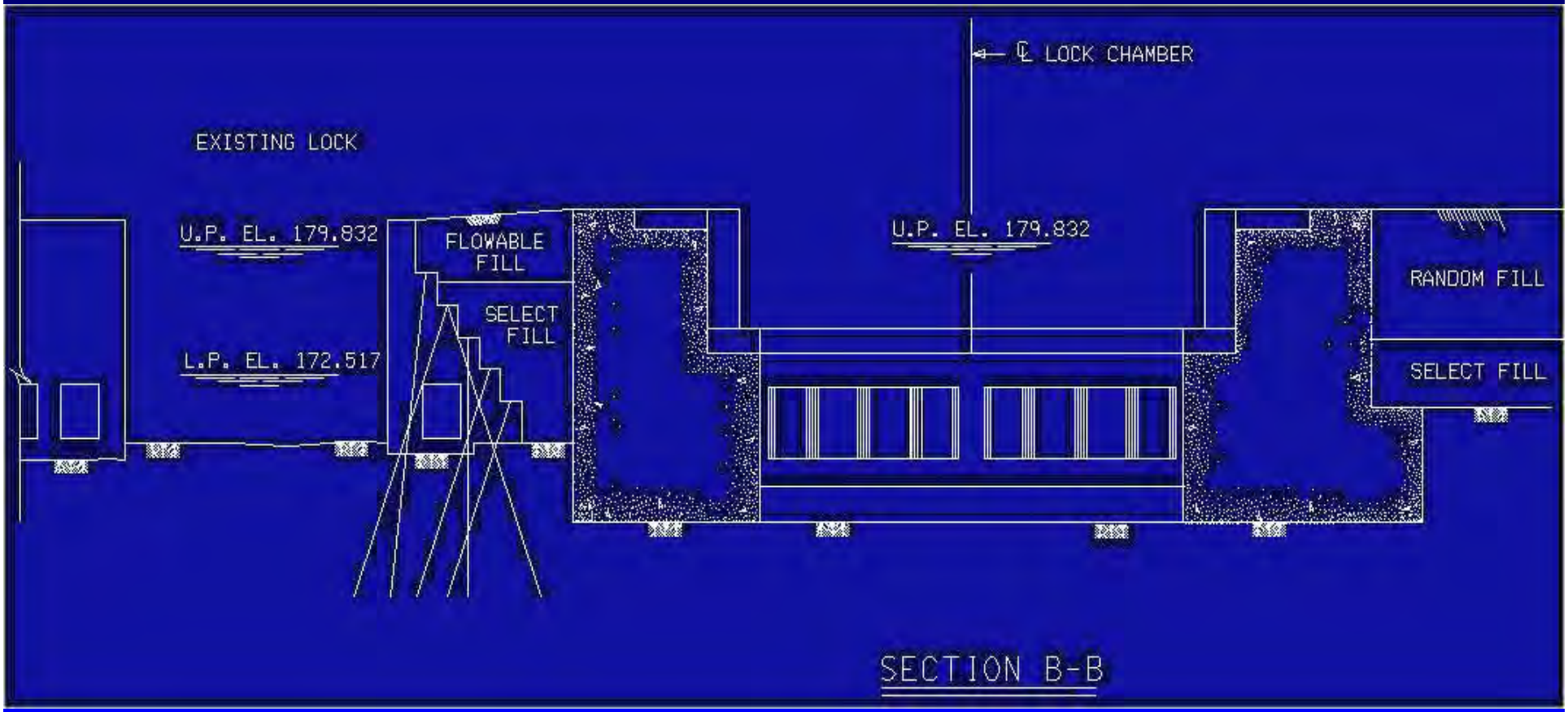
Filling and Emptying System



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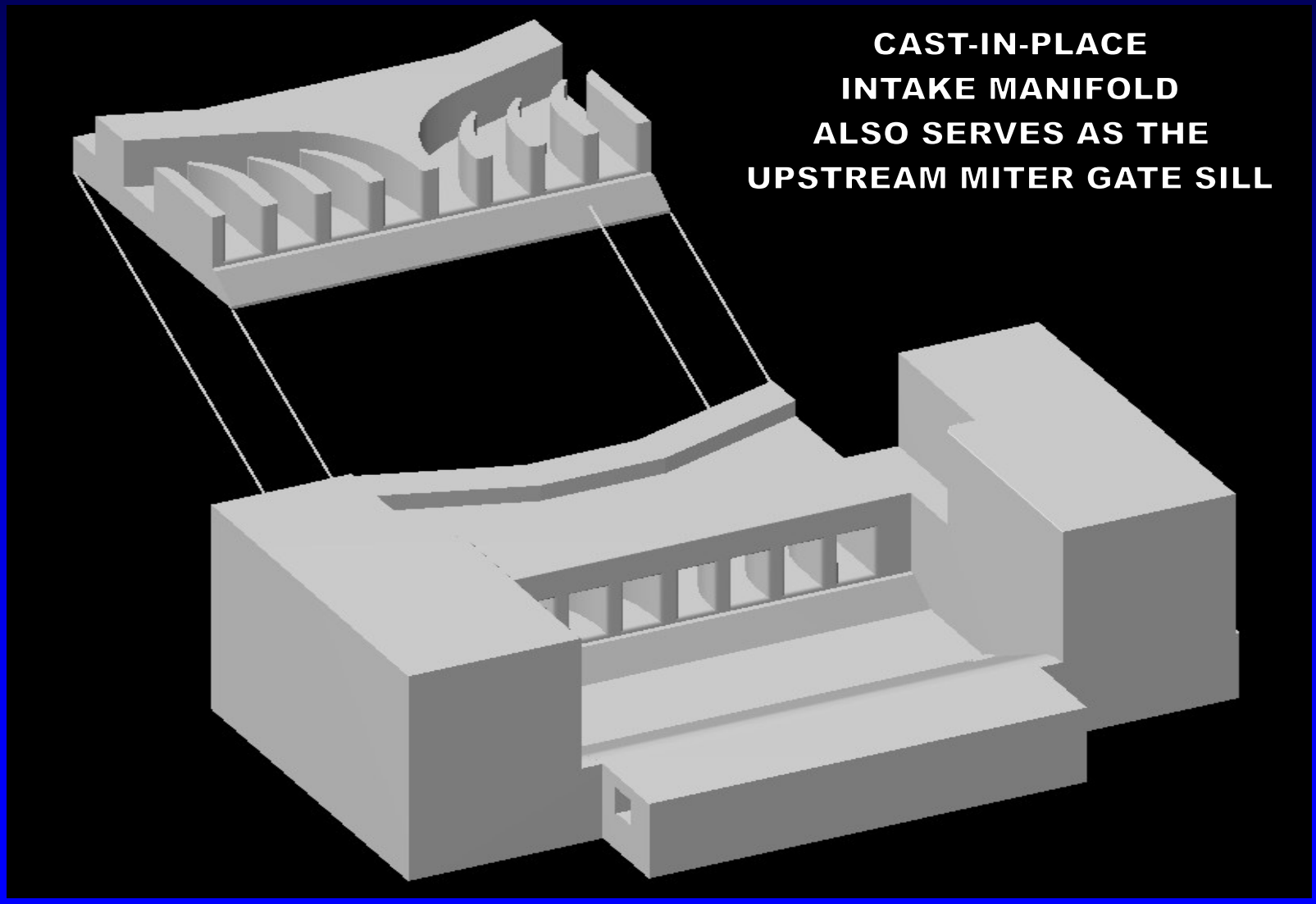
Through-the-Sill Filling Intake



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Through-the-Sill Filling Intake



US Army Corps
of Engineers

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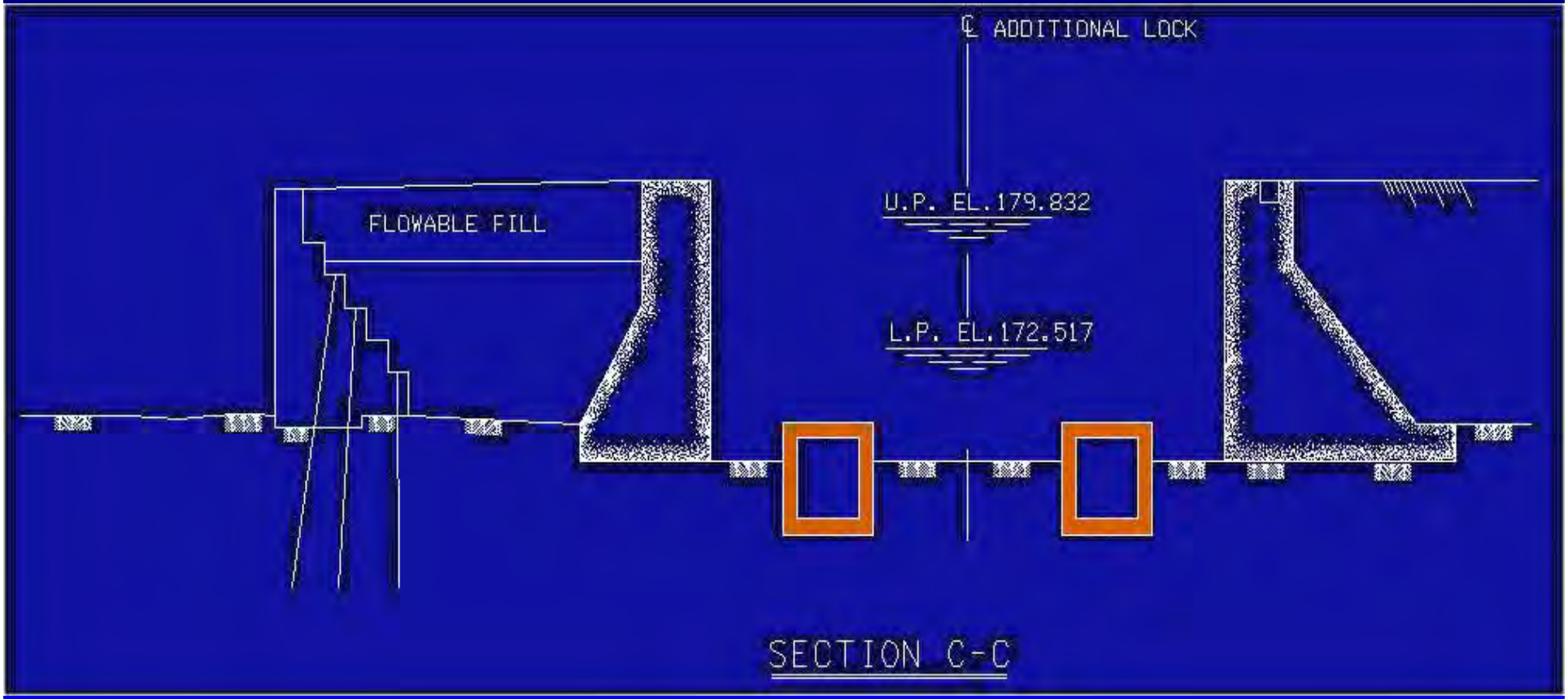
Upstream Sill Excavation



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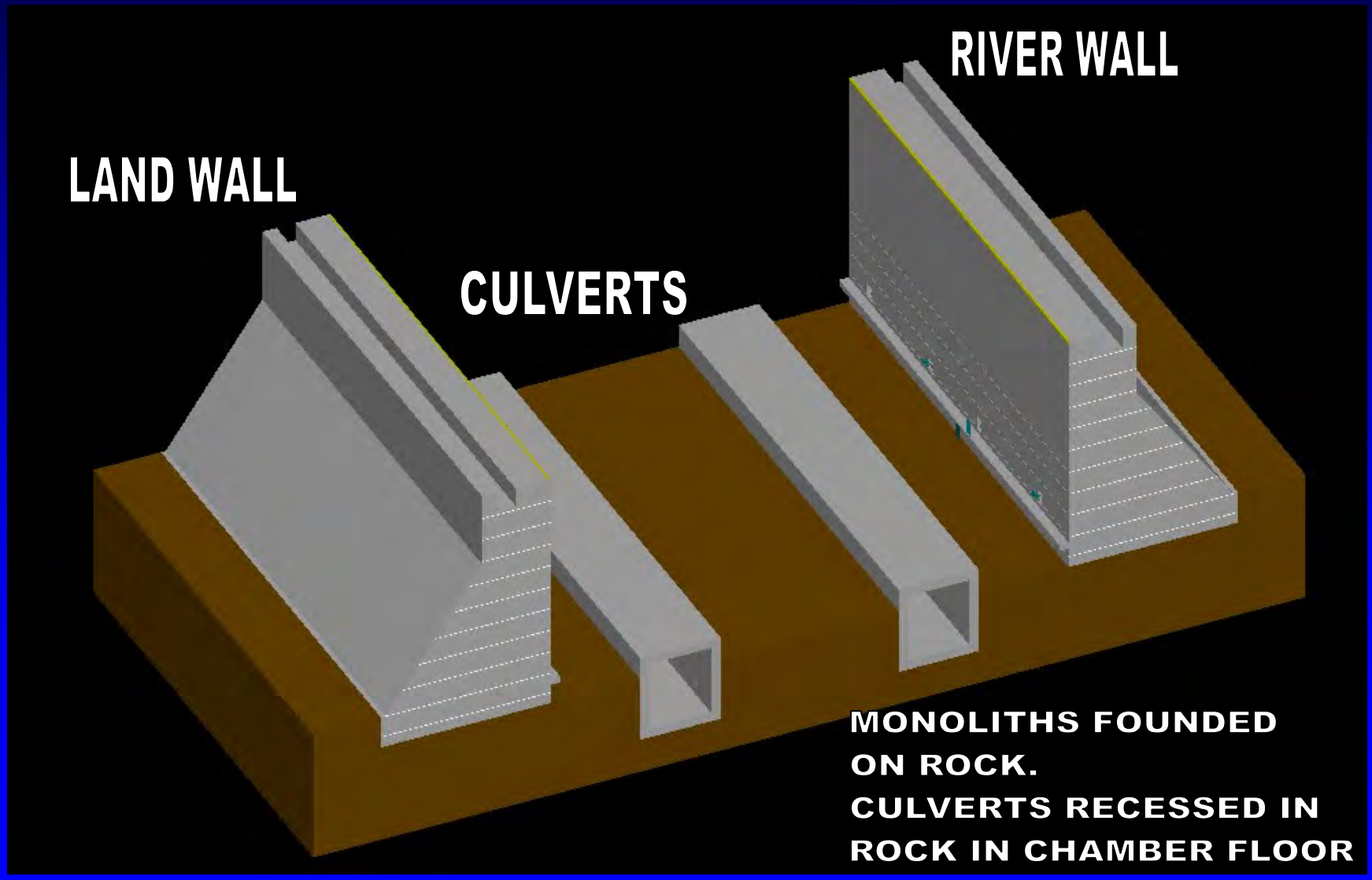
Filling and Emptying Culverts



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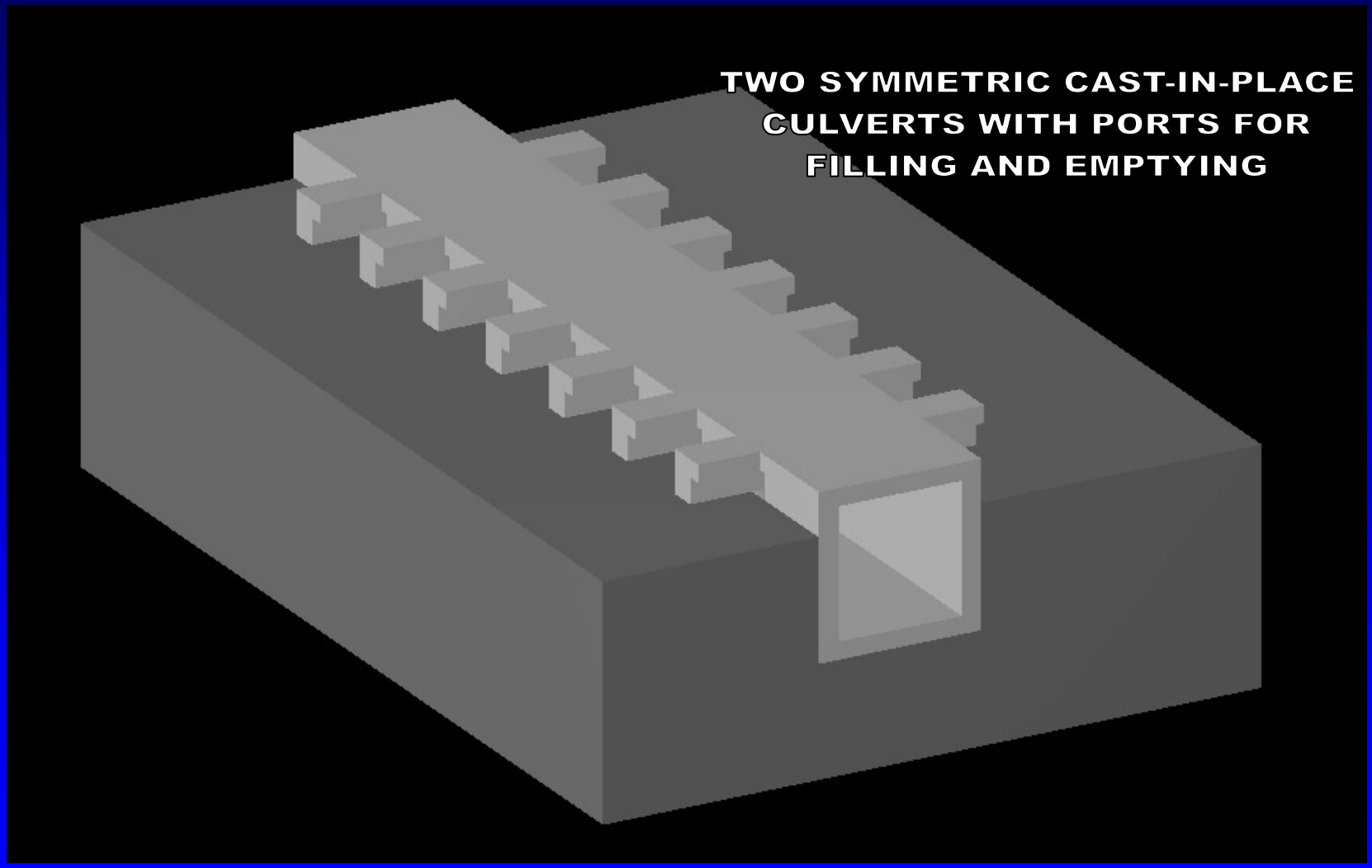
Typical Chamber Configuration



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Typical Culvert Port Configuration



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of Engineers

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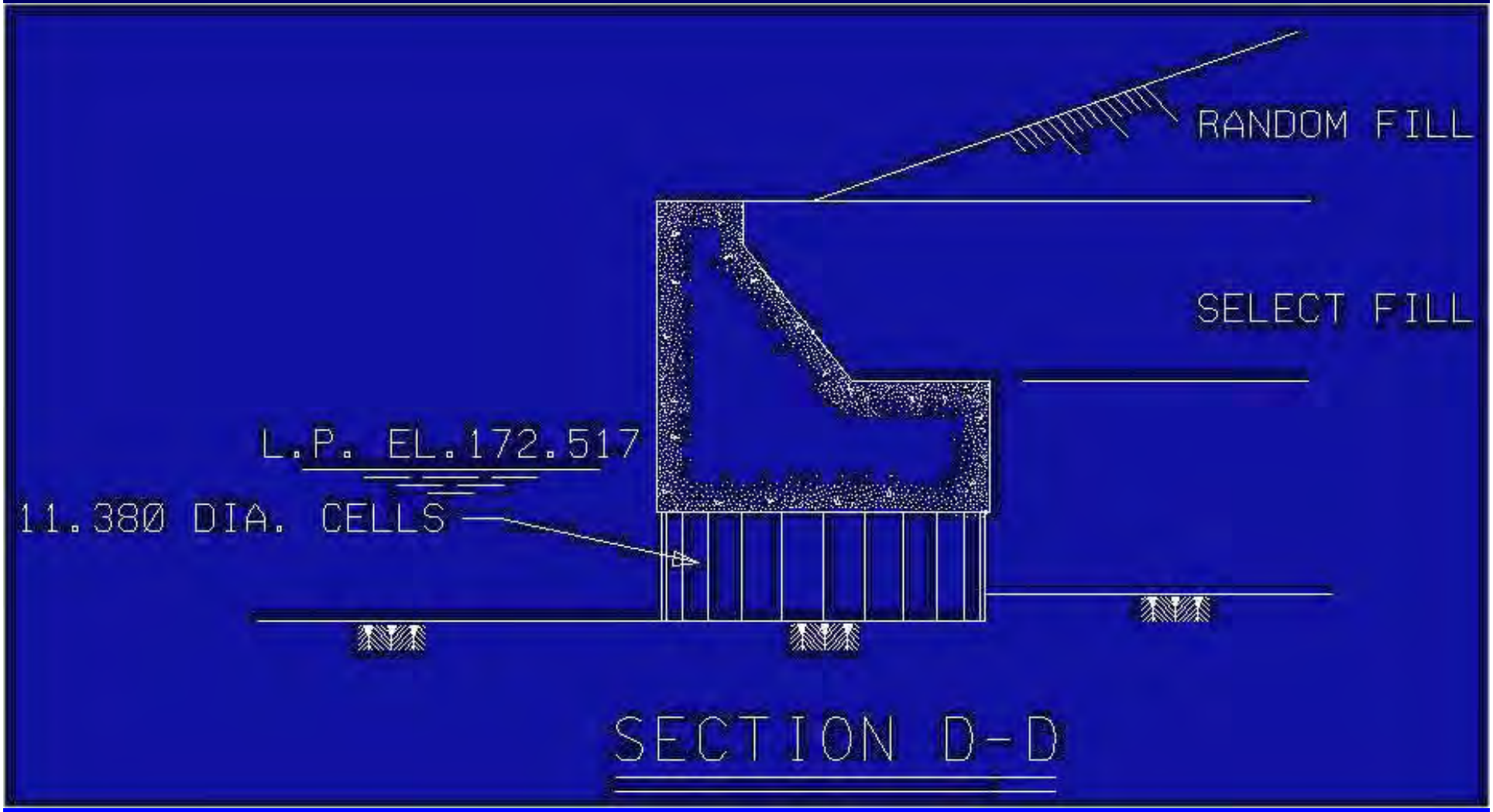
Culvert Rock Excavation



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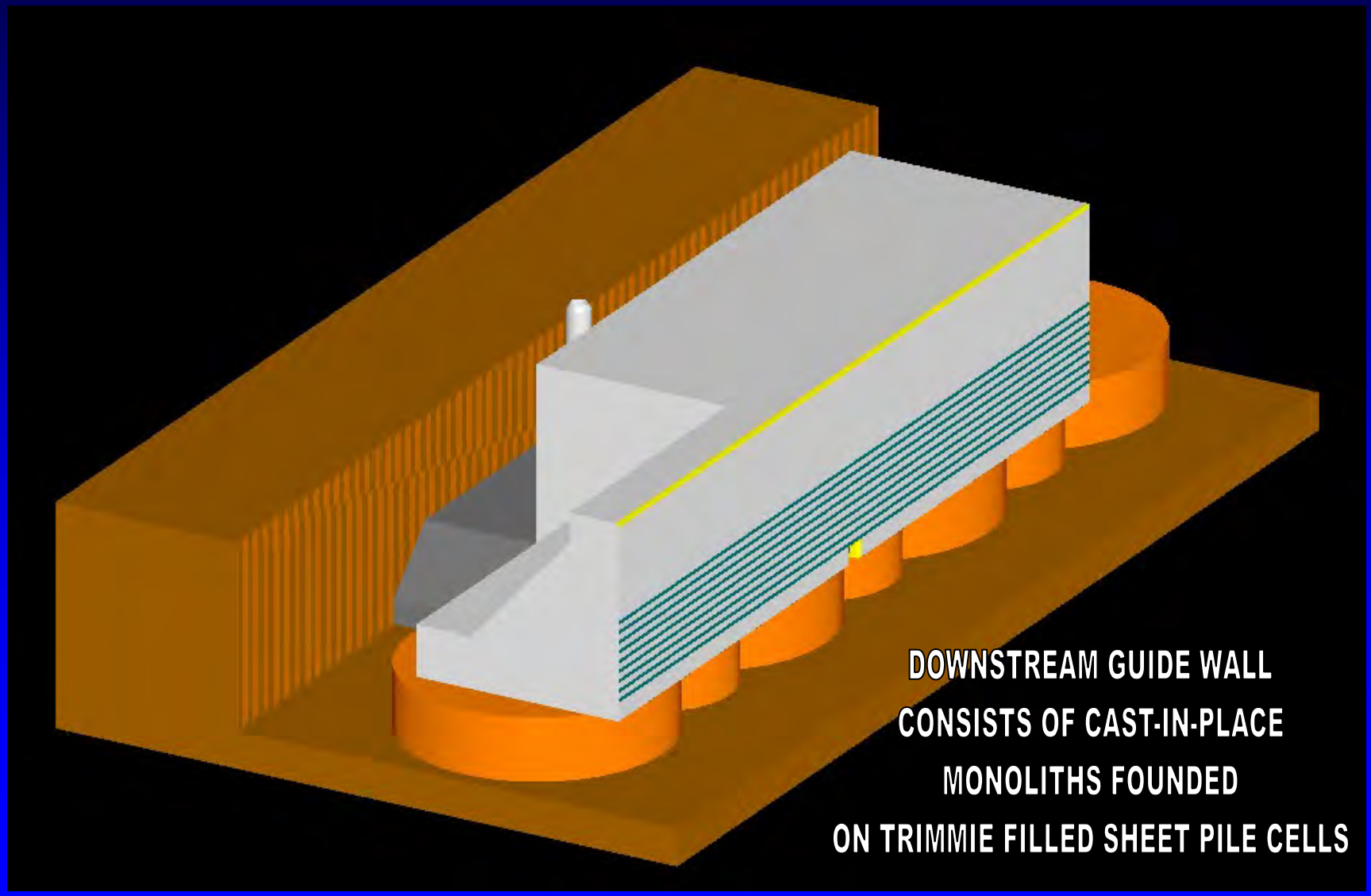
Typical Downstream Guide Wall



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Typical Downstream Guide Wall



US Army Corps of Engineers

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Typical Downstream Guide Wall

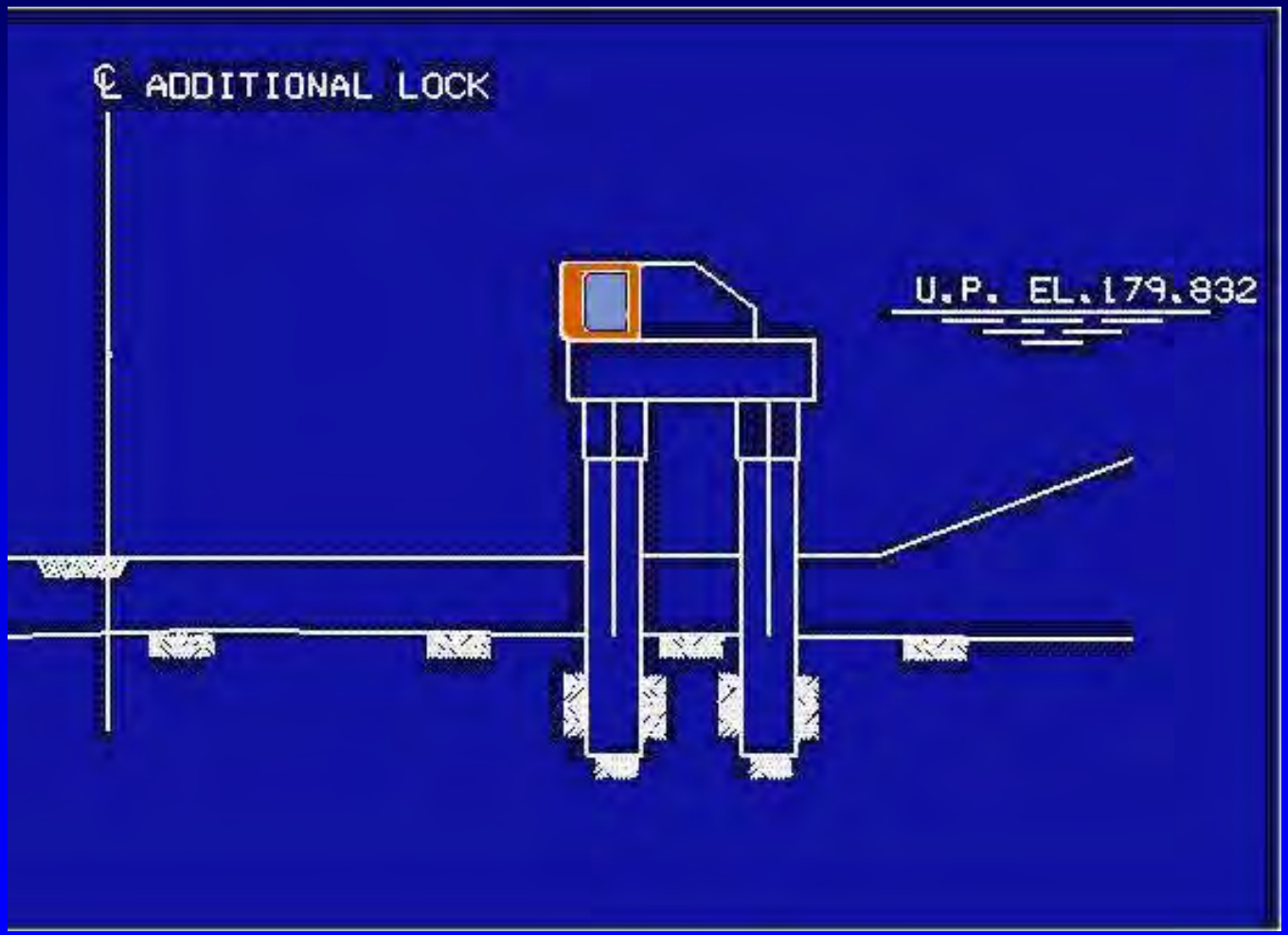


Dec 04 – Guide Wall Construction

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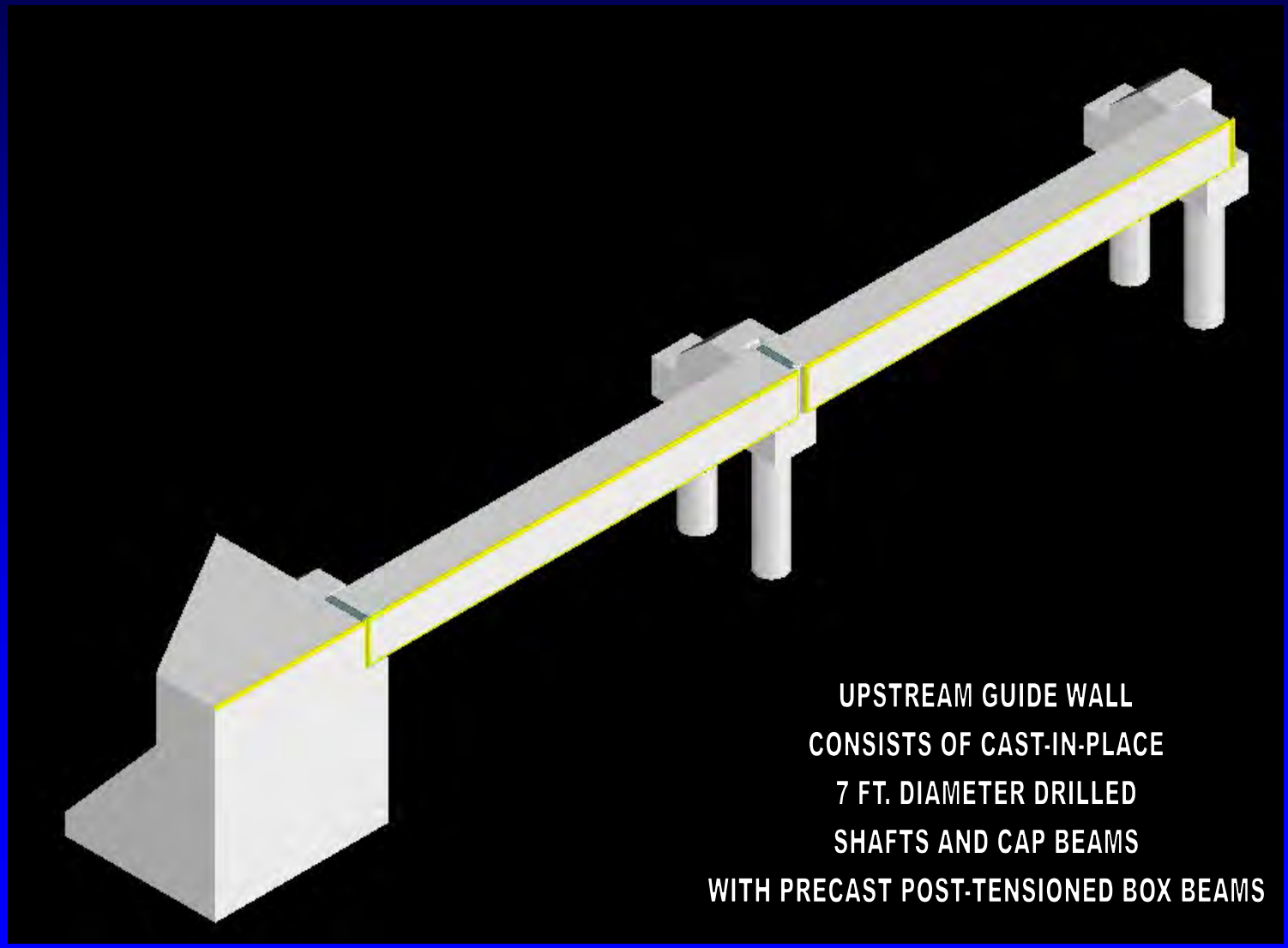
Typical Upstream Guide Wall



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Typical Upstream Guide Wall



UPSTREAM GUIDE WALL
CONSISTS OF CAST-IN-PLACE
7 FT. DIAMETER DRILLED
SHAFTS AND CAP BEAMS
WITH PRECAST POST-TENSIONED BOX BEAMS

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Typical Upstream Guide Wall



INSTALLING 7 FT. DIAMTER CASING THRU SOIL TO ROCK
DRILLING 7 FT. DIAMETER SHAFTS WITH BAER BG-40
PLACING SHAFT CONCRETE WITH TREMIE CONCRETE



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Typical Upstream Guide Wall



Forming and Casting Post-Tensioned Box Beam

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Lock Wall Concrete Placement



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Lock Wall Concrete Placement



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Lock Wall Concrete Placement



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Proposed Finished Lock





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?? QUESTIONS ??

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of Engineers
Louisville District

U.S. Army Corps of Engineers

Louisville District

Olmsted L&D,
Dam
In-the-wet Construction

Byron McClellan, P.E.
Dale Berner, PhD, P.E.
Kenneth Burg, P.E.

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Louisville District

Olmsted Locks & Dam Project

1996 rendering of completed project

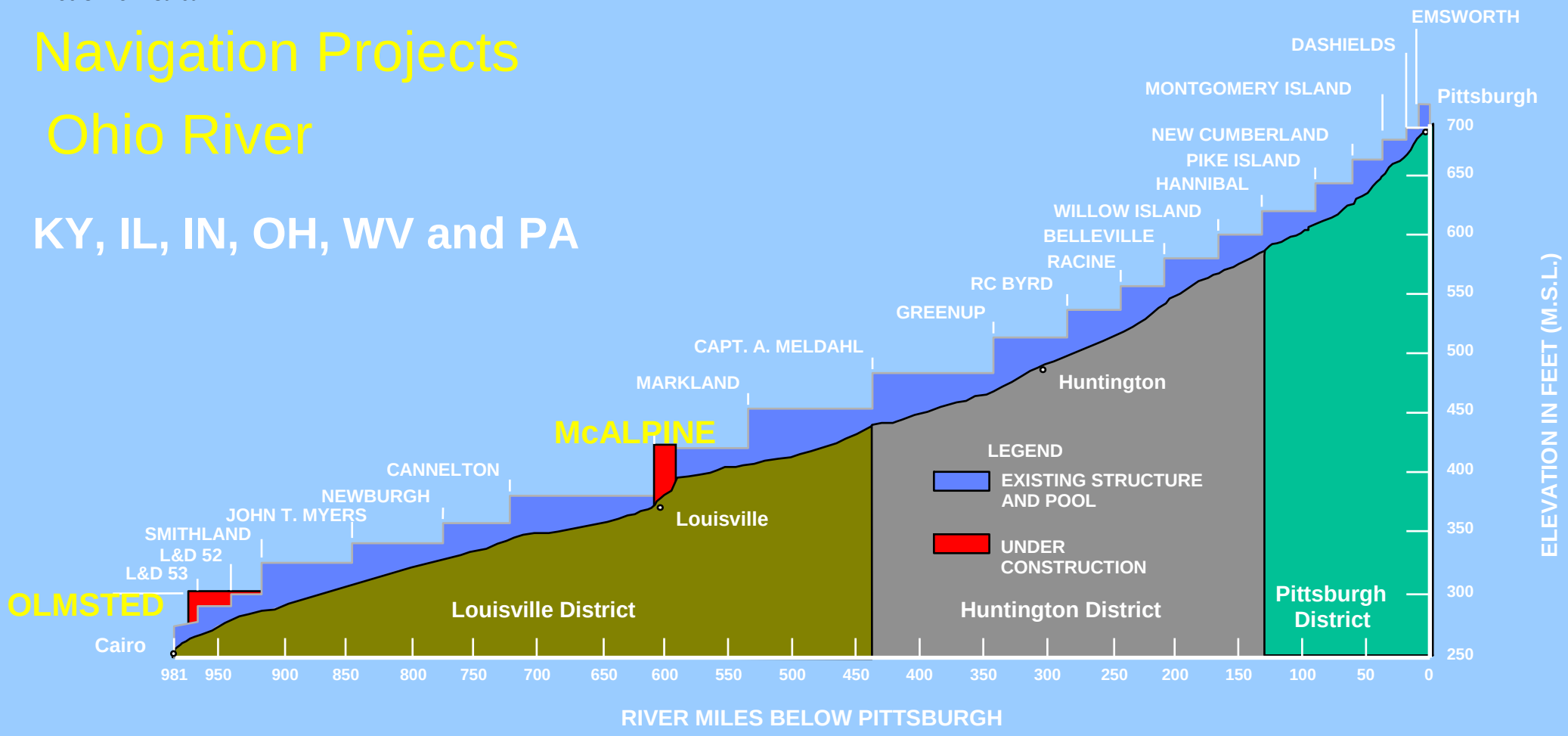


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Louisville District

Navigation Projects

Ohio River

KY, IL, IN, OH, WV and PA



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Olmsted Dam
Cost Reimbursable Contract

Contractor: Washington Group/Alberici

Award: 31 March 2004

Estimated Cost: $564,148,484.00

Completion Date: 30 November 2011

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Louisville District

Olmsted Dam Cost Reimbursable Contract (Cost –Plus- Award Fee)

- ***Risk is shared***
- ***Collaboration:***
  - ***Contractor***
  - ***Design AE***
  - ***Corps***
- ***Work is Controlled with "WAD's"***
- ***Items purchased are Corps' Property***
- ***Contractor's Award Fee based upon performance.***

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Brief History
Dam Construction Studies

- ***Cellular Cofferdam***
- ***Braced Single – Wall Cofferdam***
- ***Mobile Cofferdam***
- ***In - the - Wet Construction***

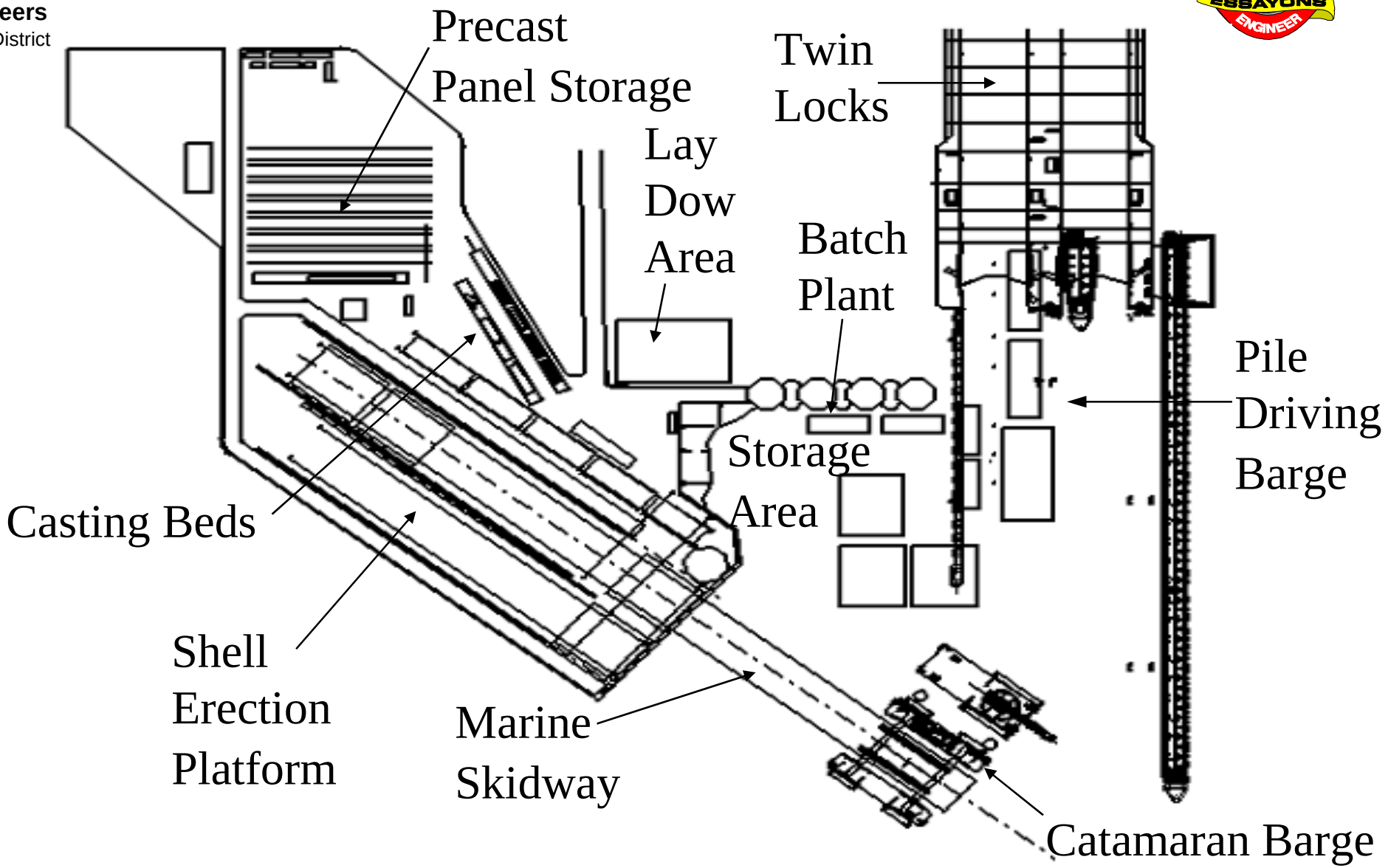
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In – the – Wet Construction

- **Pre-cast Shell Construction**
  - On – site casting yard
  - Marine way to lower shells to river
  - Lifting frames to stiffen shells
- **Foundation Prep In – the – Wet**
- **Set shells with catamaran barge**
- **Fill shells with tremie concrete**
- **Set Tainter Gates**

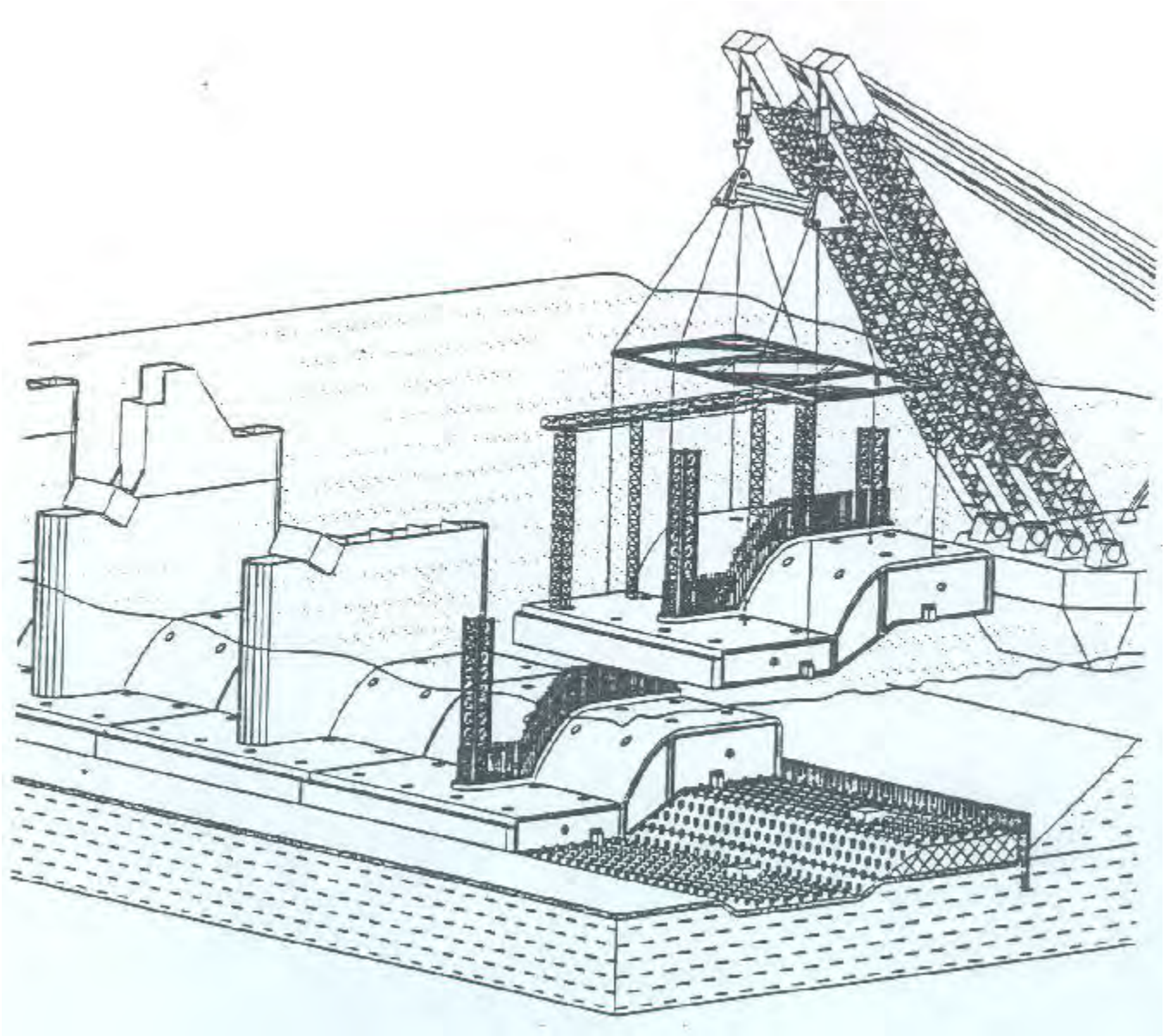
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Precast Yard



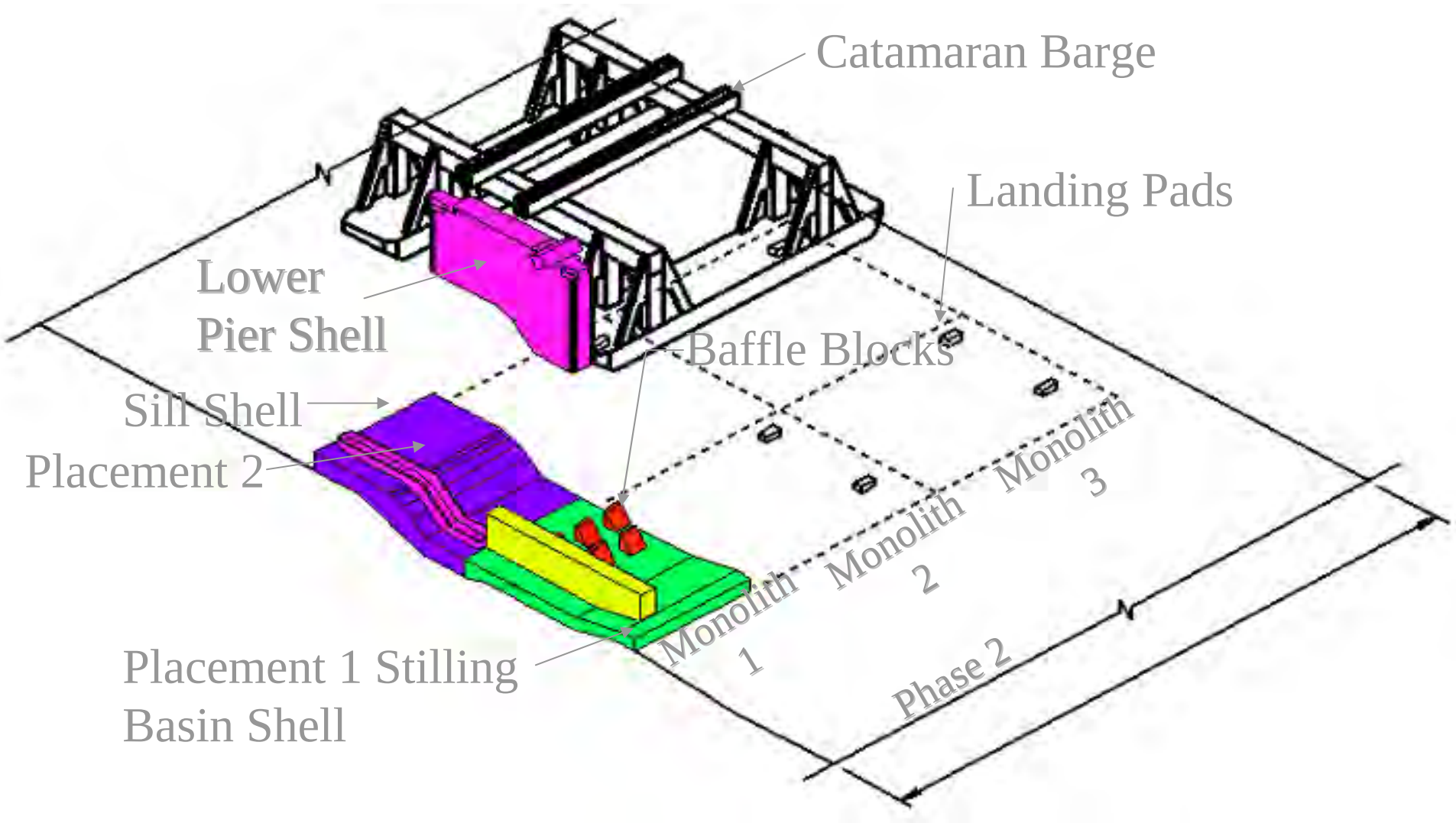
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Dam



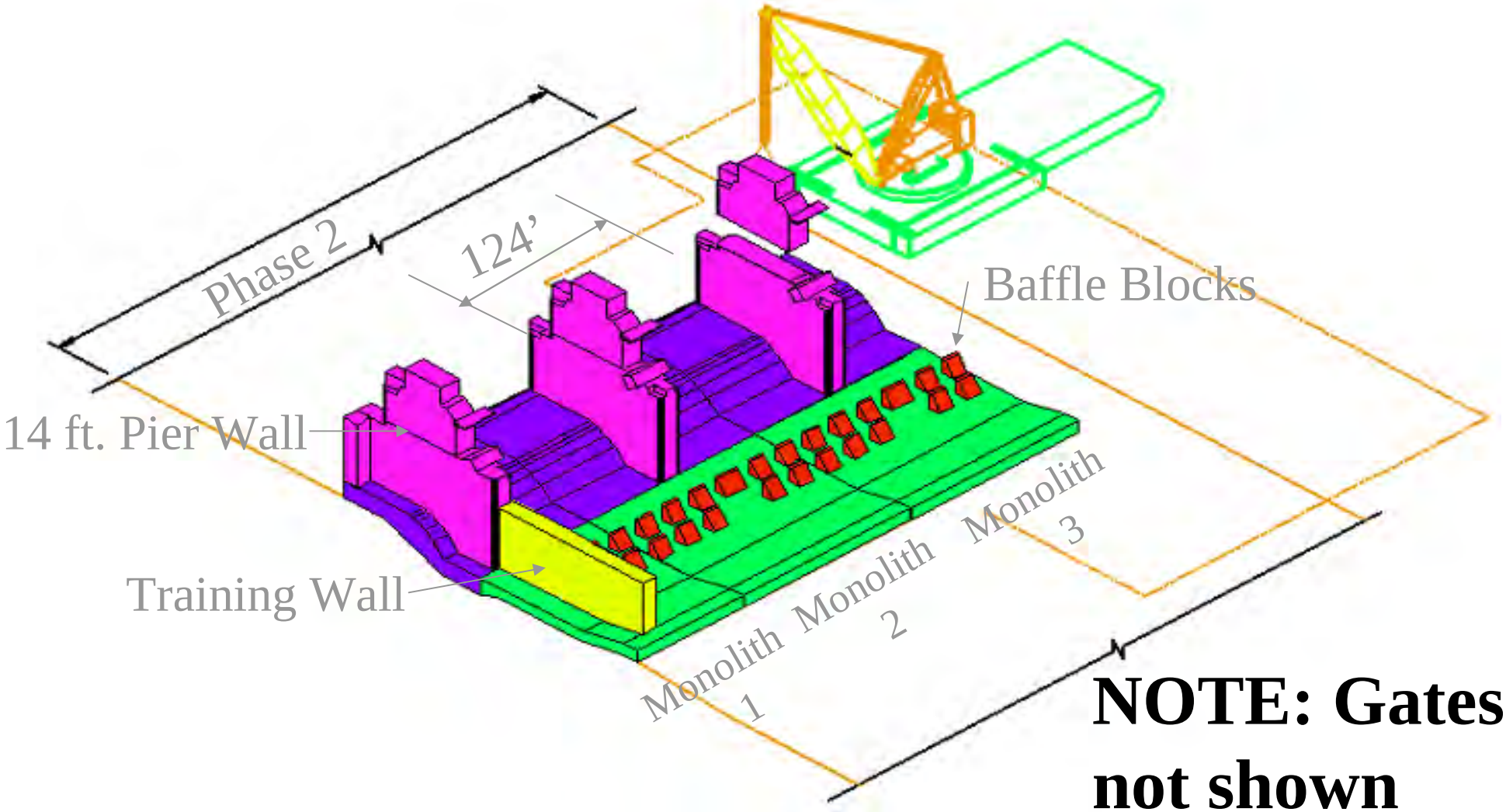
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Catamaran with Lower Pier Shell



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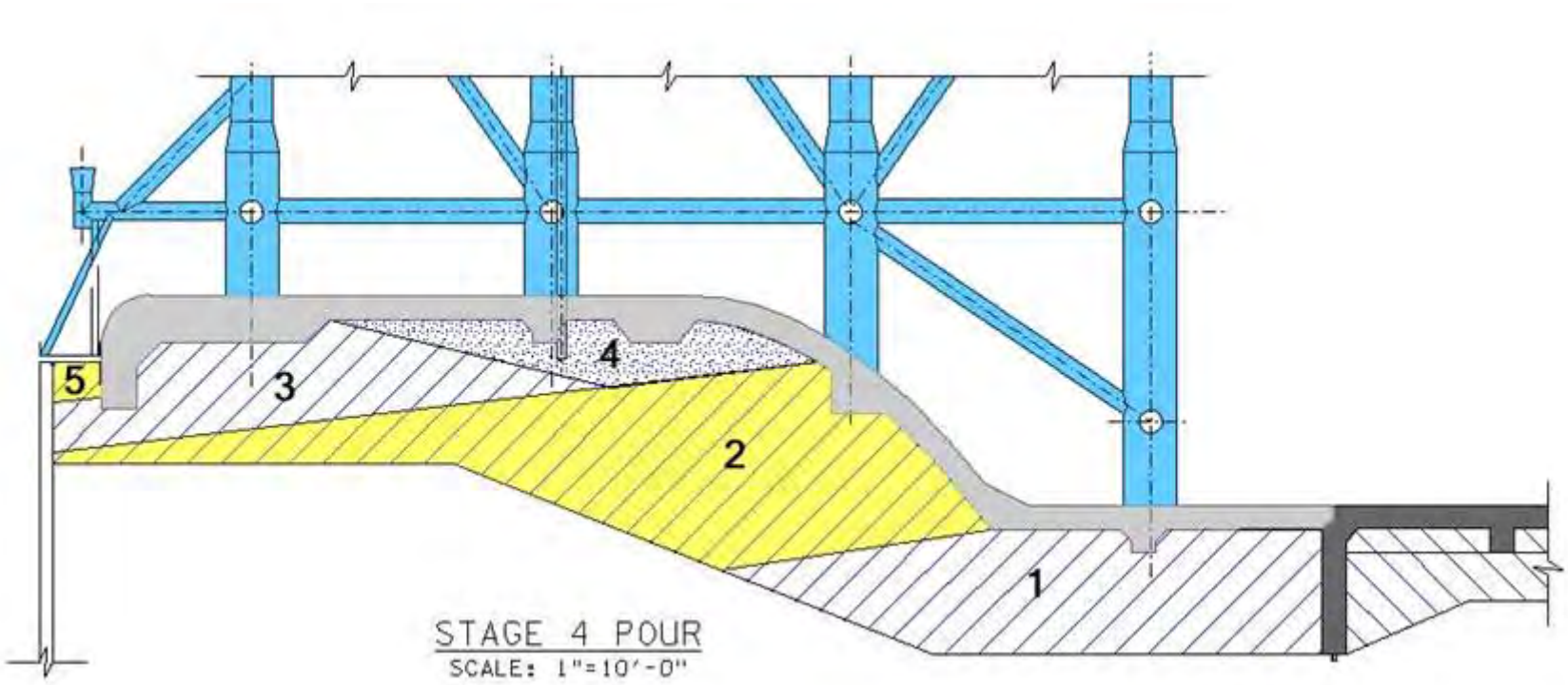
Placement of Upper Pier Shell Elements



NOTE: Gates not shown

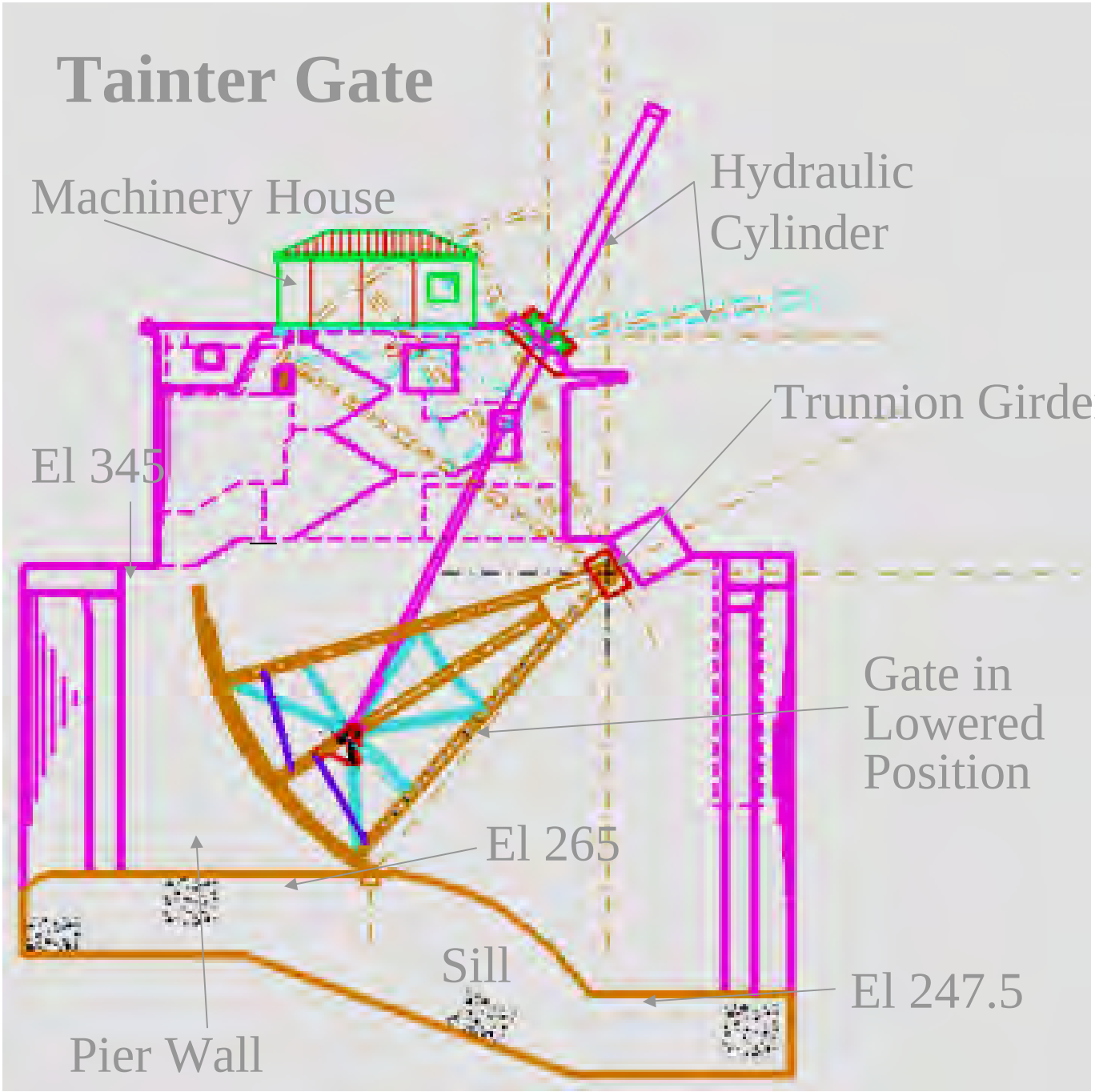
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Tremie Concrete Sequence



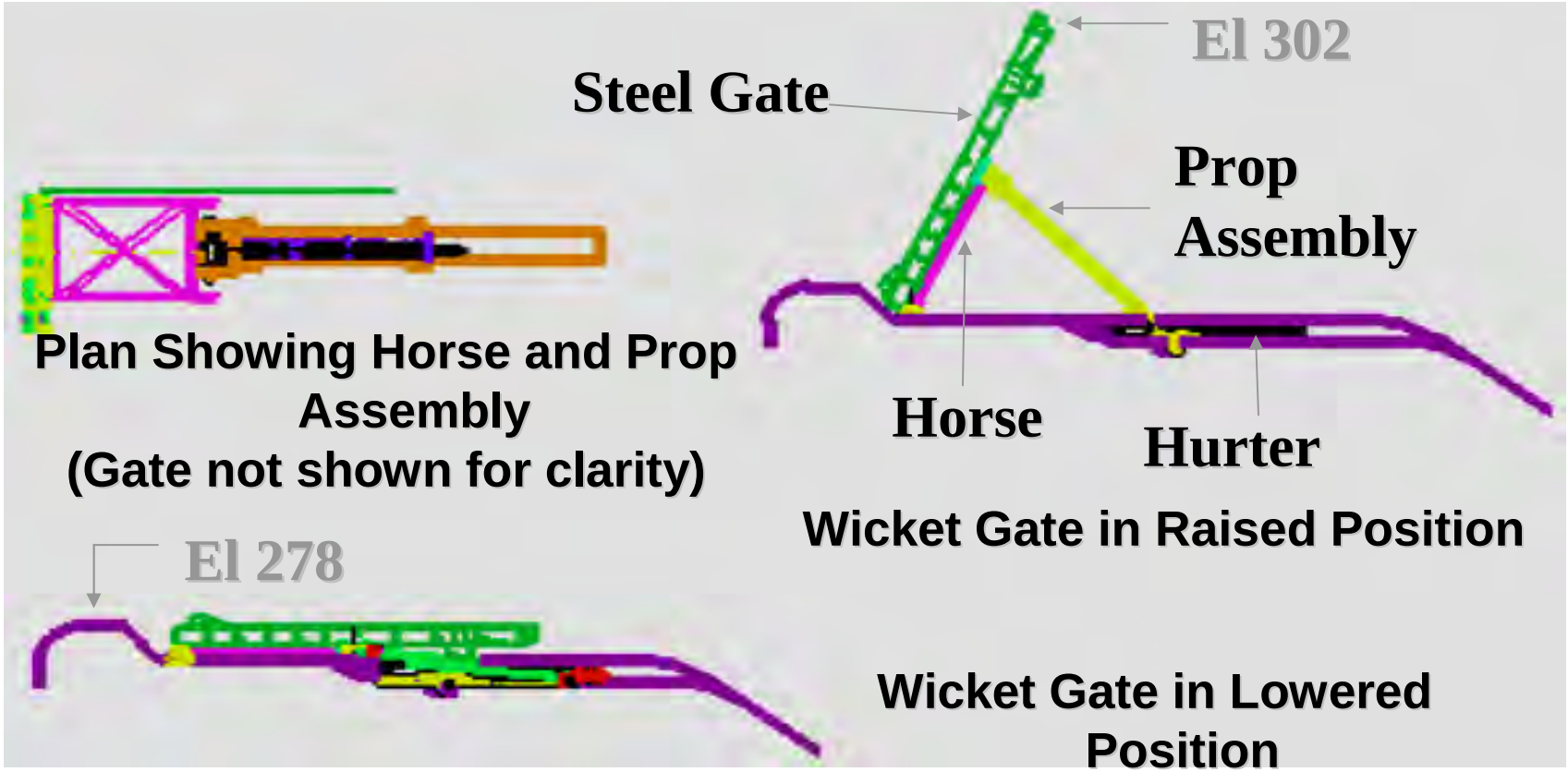
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Tainter Gate



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of Engineers
Louisville District

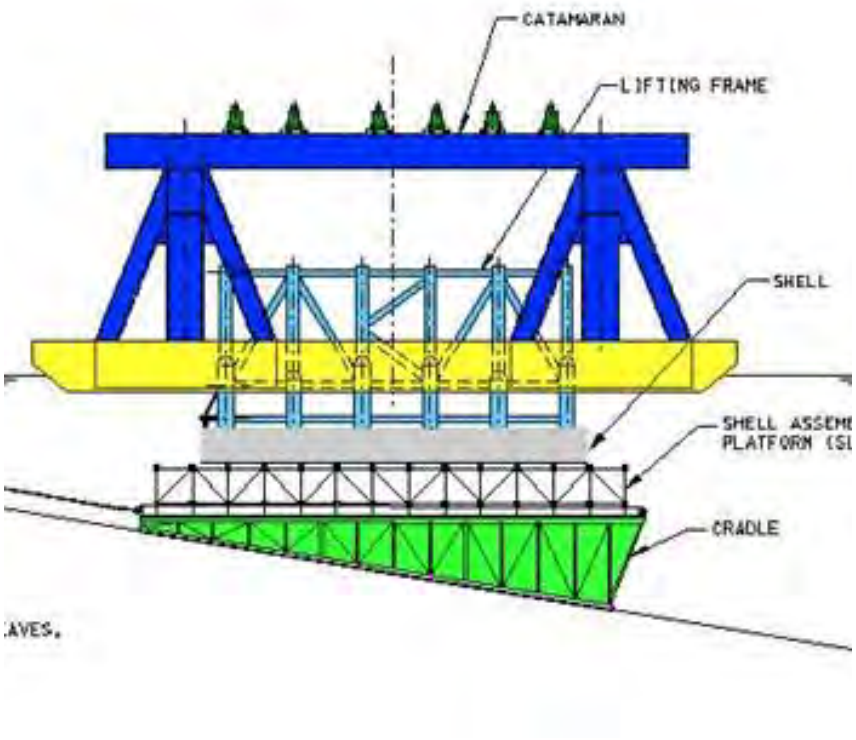
Wicket Assembly



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Relative Scale





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Dam Site May 2005



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Original Scope

- + Government only provided conceptual design on means and methods. Gave Contractor considerable latitude to propose changes.
- + Government if requested would provide design engineer to finish conceptual designs (means and methods) or redesign features of work if contractor had a better idea.

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2005 Infrastructure Systems Conference

Design Changes to Tainter Gate Shells
for
Super Gantry Method of Construction
at
The Olmsted Dam Project
Jacobs / Gerwick - A Joint Venture
in Partnership With
The Louisville District, COE

Presented By: Dale Berner, PhD, PE

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Louisville District

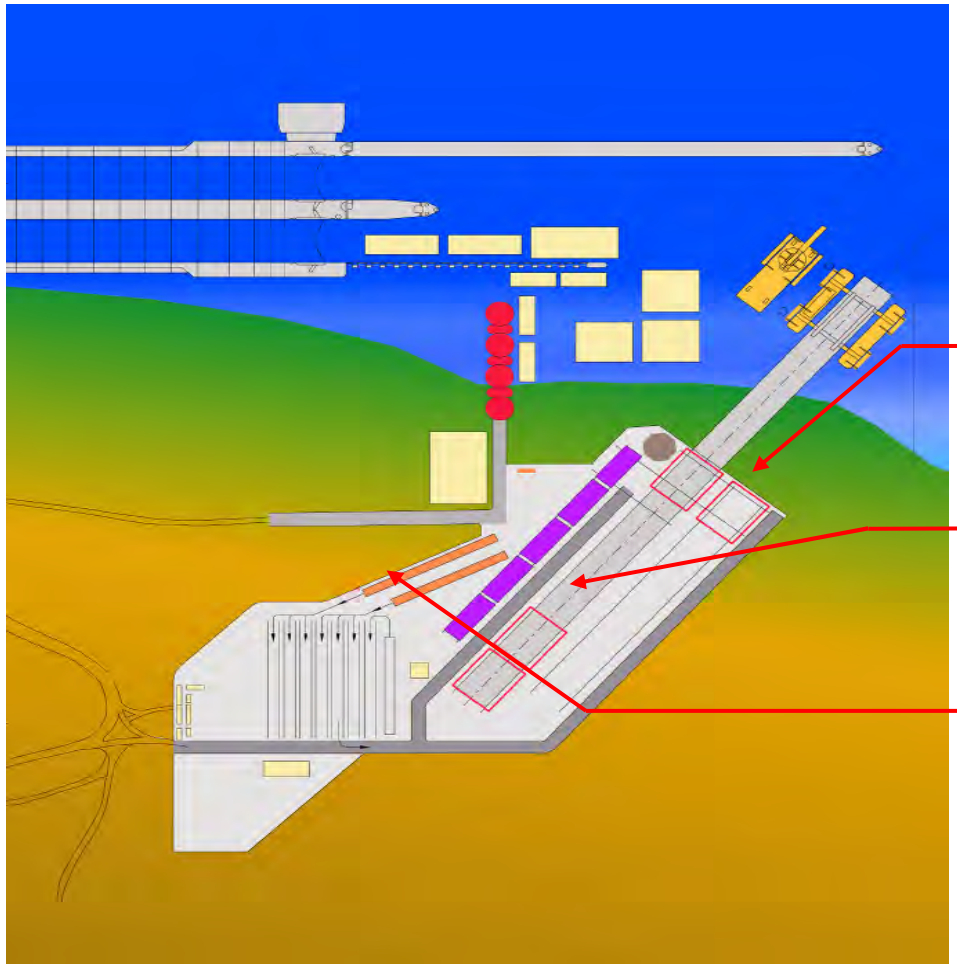
Differences between the Initial and the Super Gantry Construction Methods

- ***INITIAL Plan***
- ***Precast Elements for Building the Shells.***
- ***Shells Built on Sleds.***
- ***Shells Can Only be Lifted Submerged.***
- ***Tremie Reinforcing Mats Pre-Installed.***
- ***Uses Temporary Scour Articulated Concrete Mats***
- ***Tremie from Floating Plant.***

- ***SUPER-GANTRY PLAN***
- ***The Shells Are Cast-in-Place.***
- ***Shells Built on Slabs.***
- ***Shells Can be Lifted In-the-Dry.***
- ***Tremie Mats Lifted-in with the Shells.***
- ***Uses Permanent Grout Mats for Scour Control.***
- ***Tremie from Land Plant.***

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Initial Precast Yard Concept



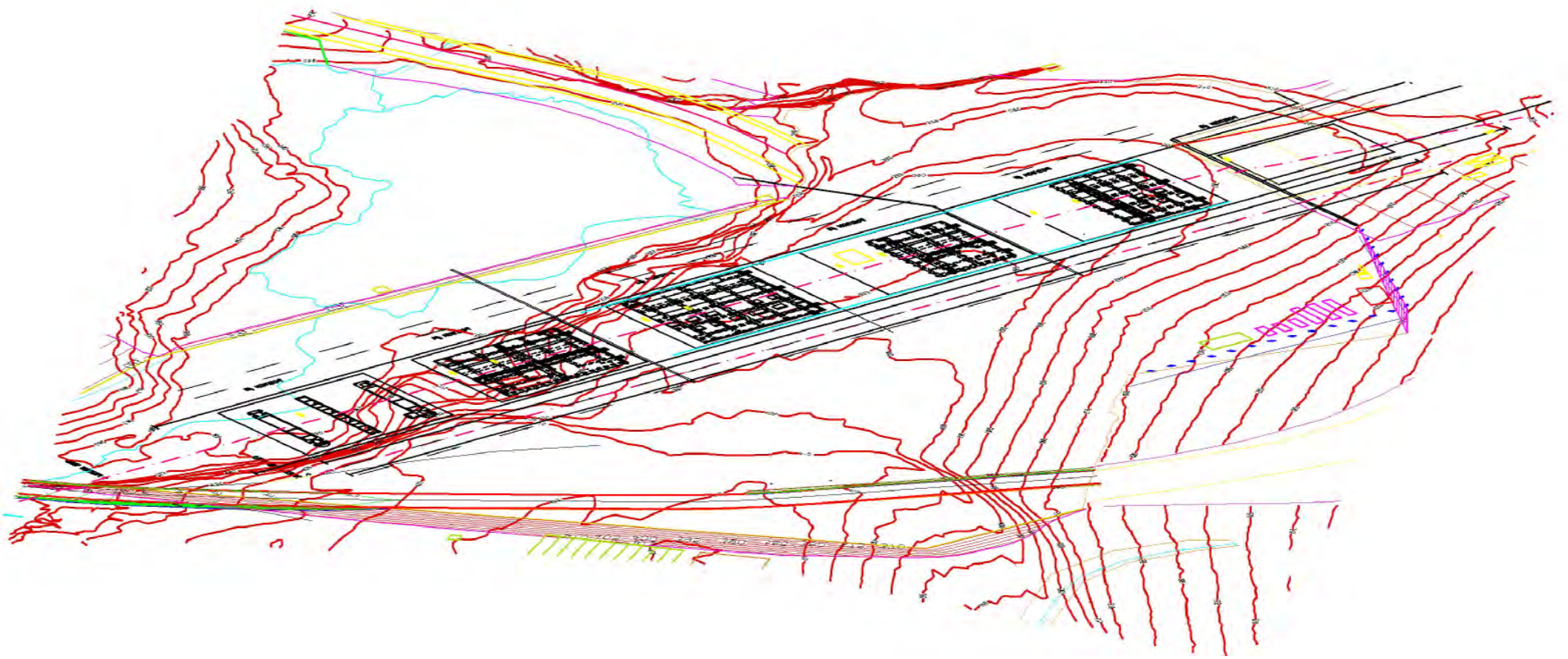
MARINE SKIDWAY

LANDBASE SKIDWAY

PRECAST BEDS

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Super Gantry Casting Bed Alignment



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Preparation for Marine Skidway



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Typical Casting Slab on Grade



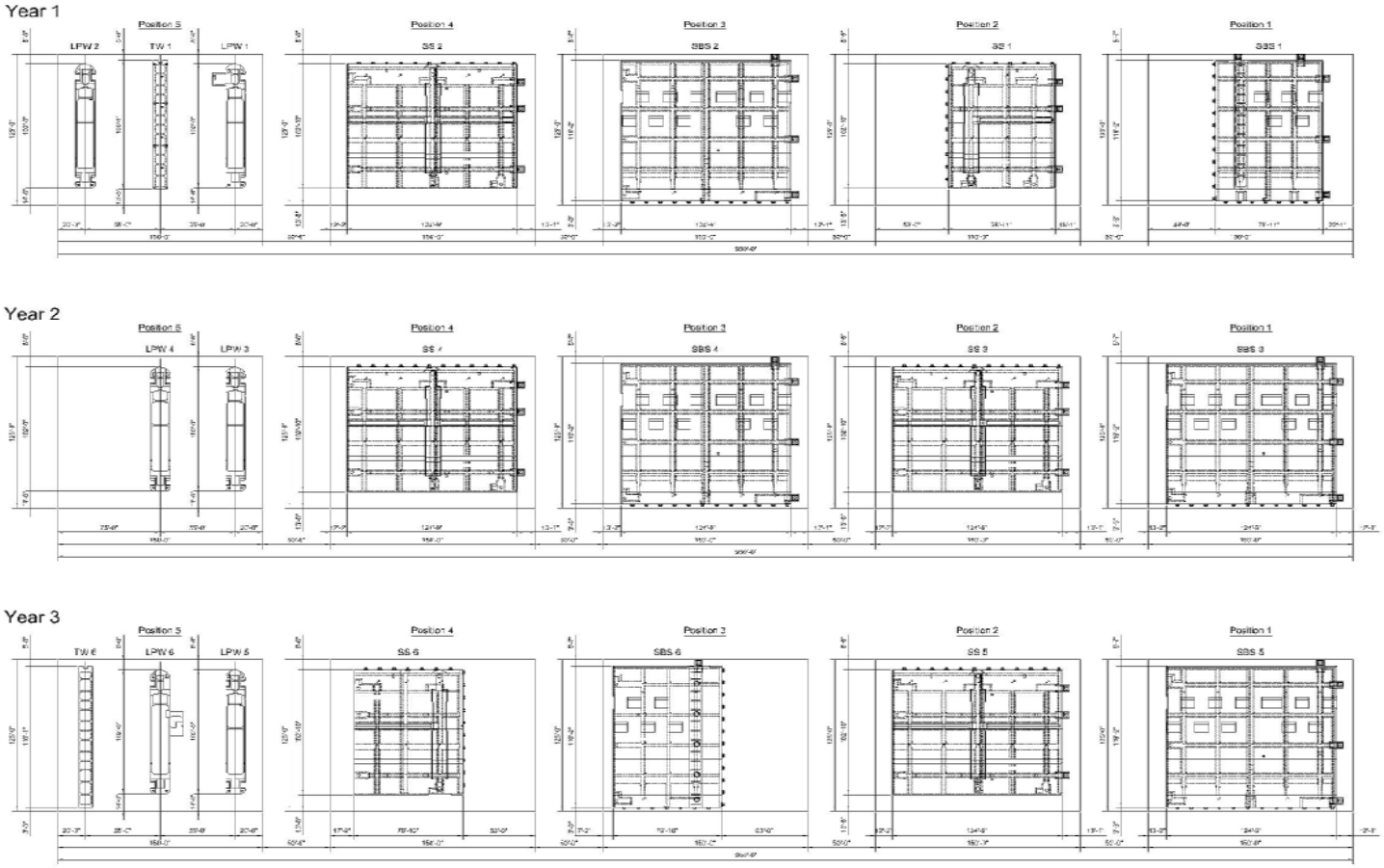
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Preparation for Pile Supported Casting Slab



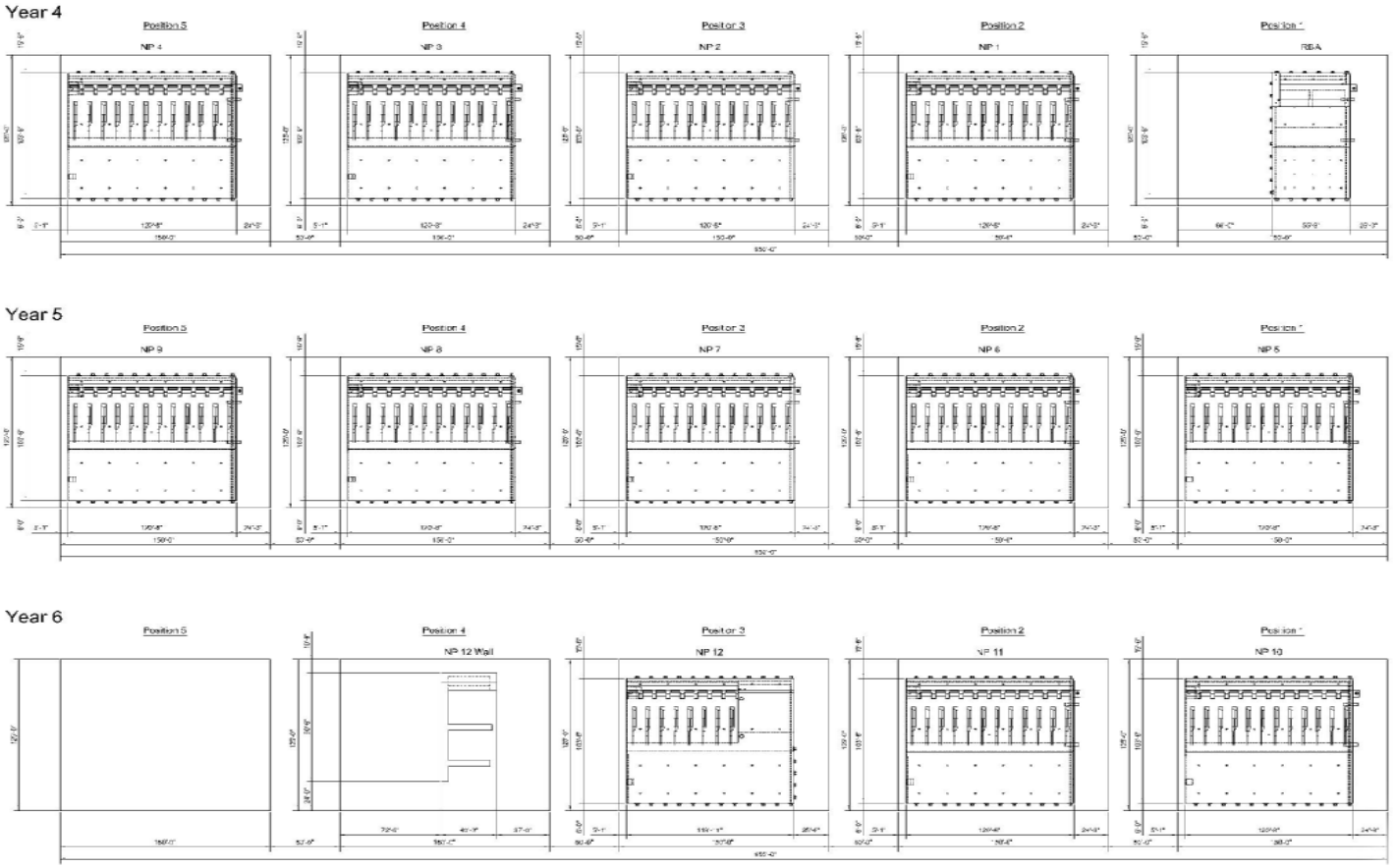
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Casting Sequence for Tainter Gate Shells



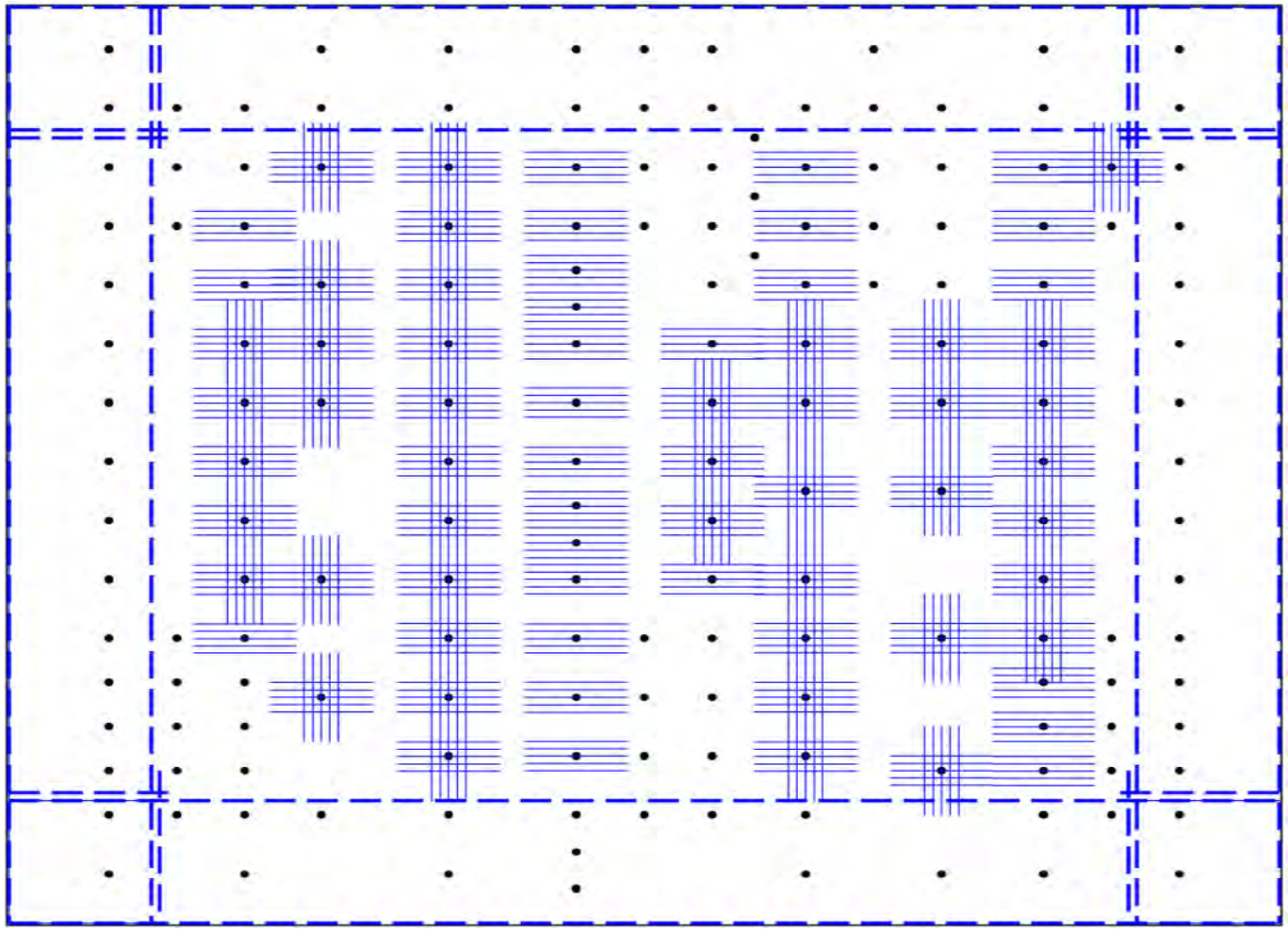
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Casting Sequence for Navigable Pass Shells



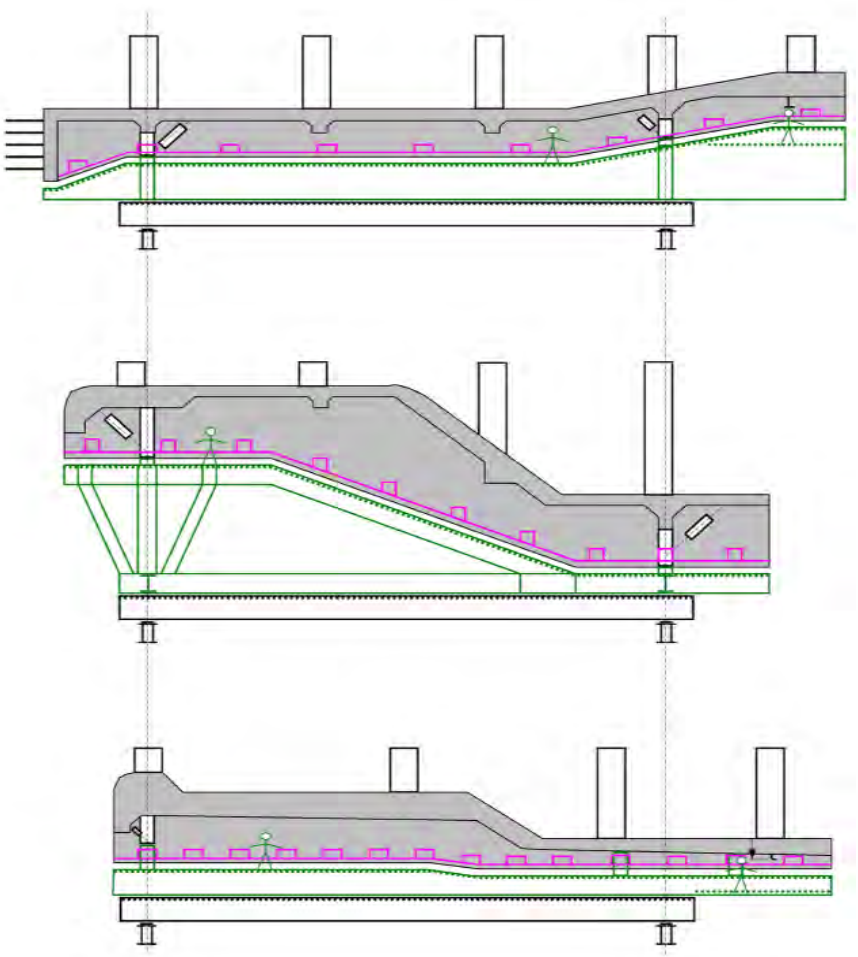
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Localized Supplemental Reinforcing in a Typical Slab



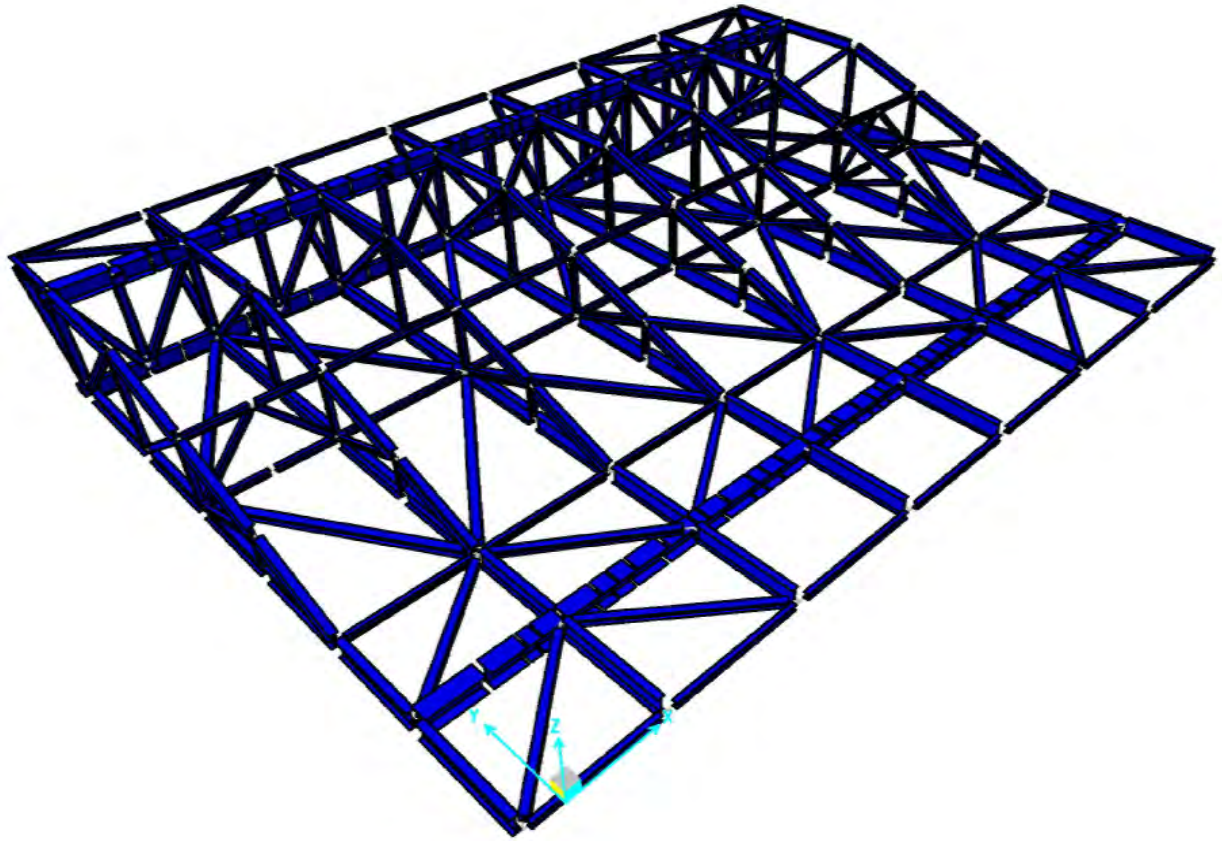
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Common Types of Shells and Tremie Mat Templates



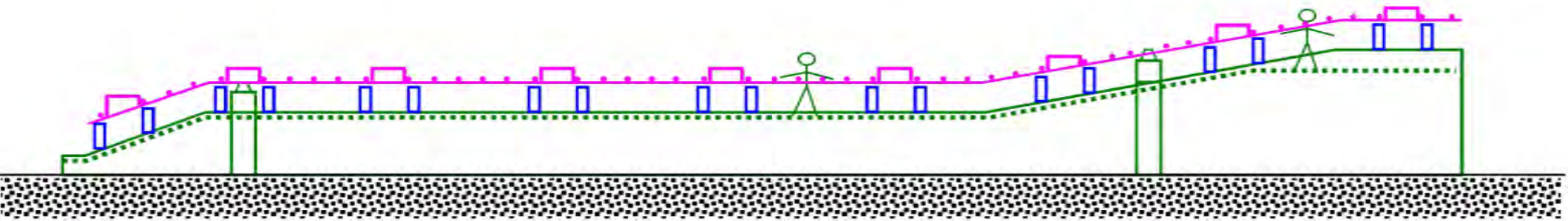
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Typical Template for Tremie Concrete Reinforcing Mat



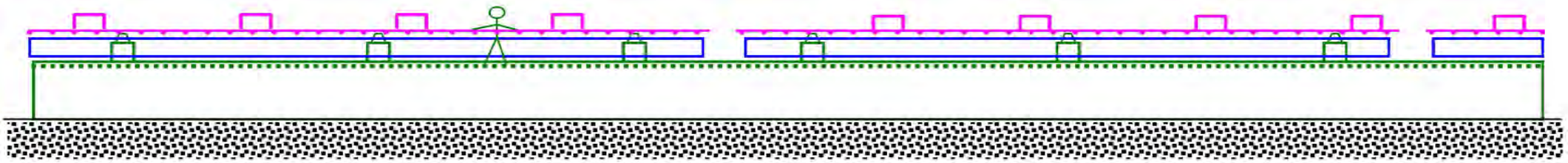
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Typical Tremie Rebar Mat on Template



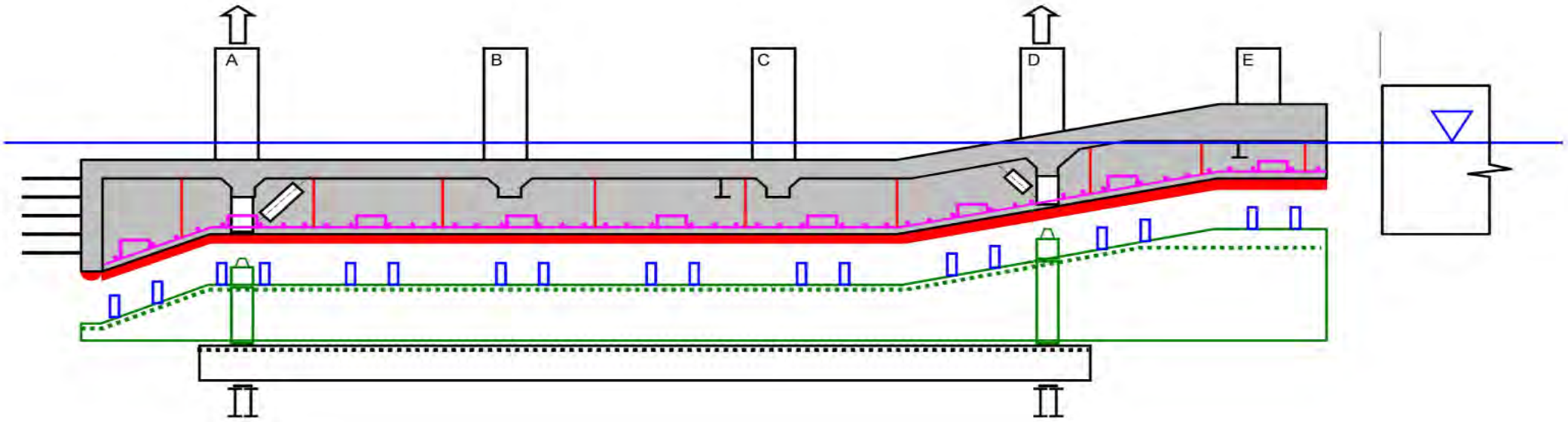
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Typical Cross-Section of Tremie Rebar Mat on Template



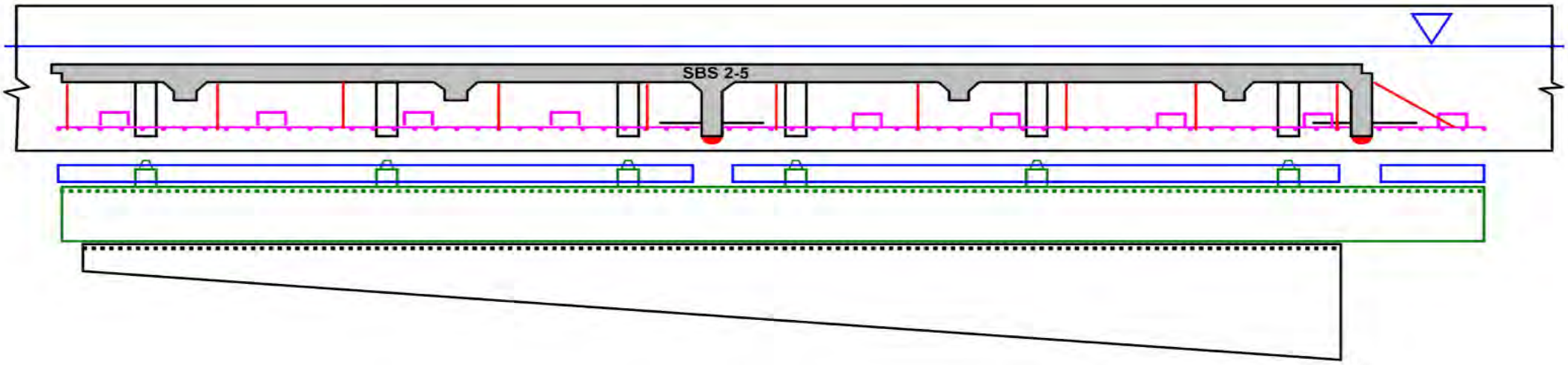
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Typical Shell Lifted By Super Gantry Crane onto Tremie Mat



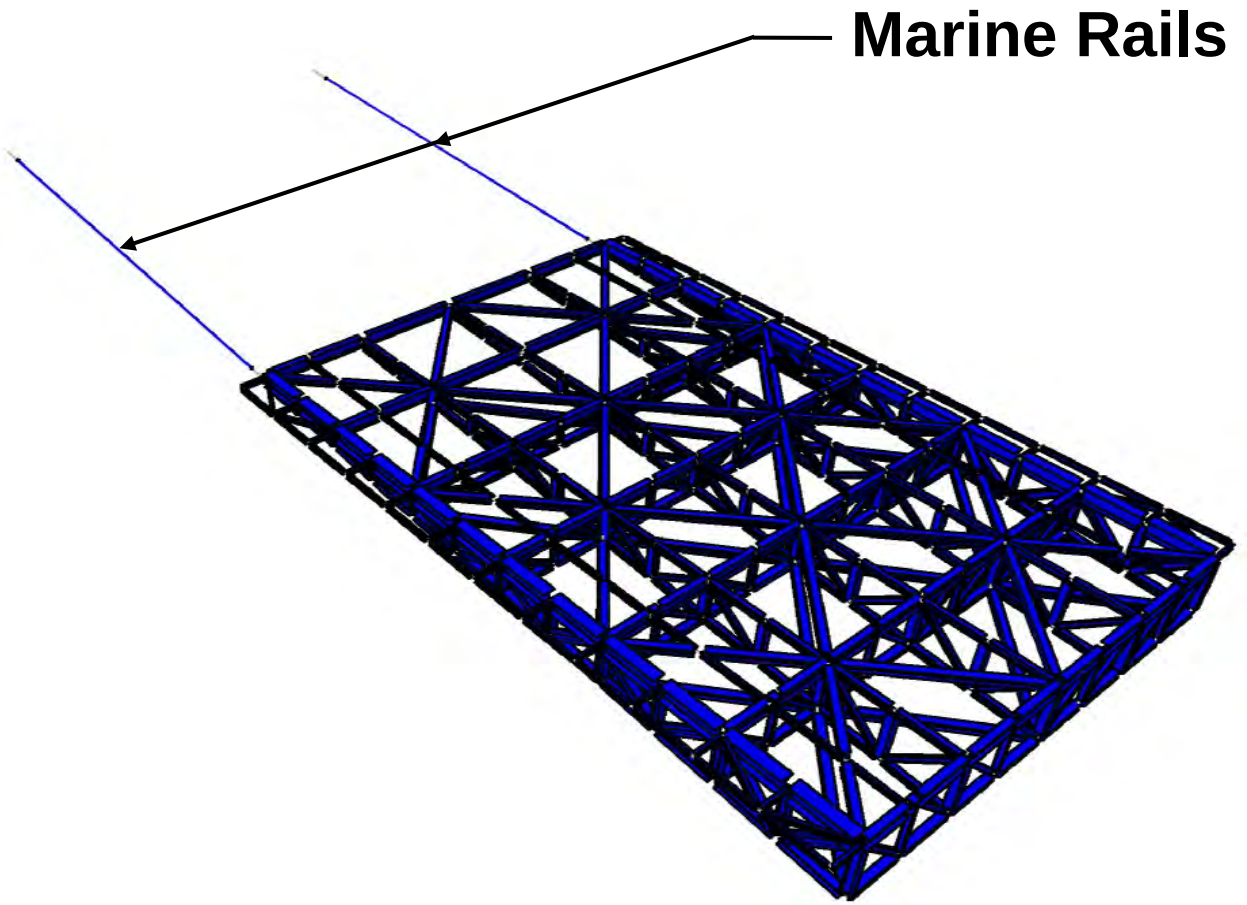
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Typical Shell / Rebar Mat / Template on Marine Skidway Cradle



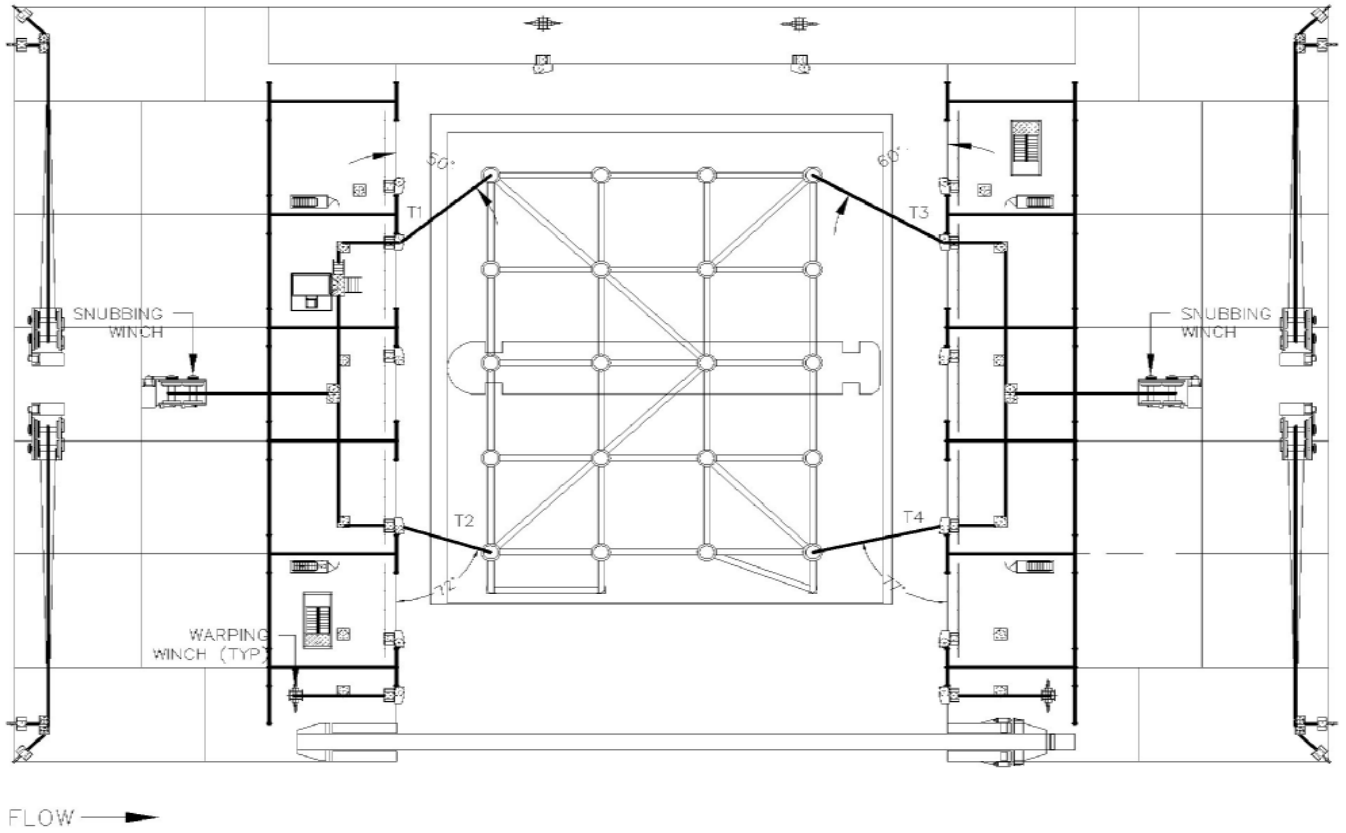
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Cradle for Marine Skidway



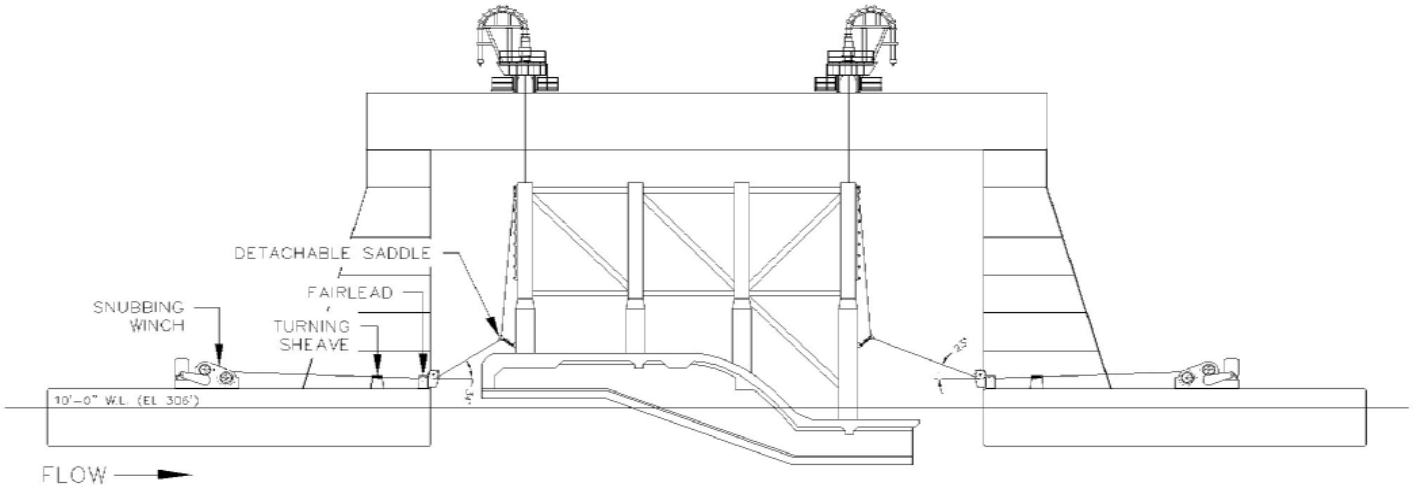
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Plan View of Catamaran Crane Barge & Snubbing System



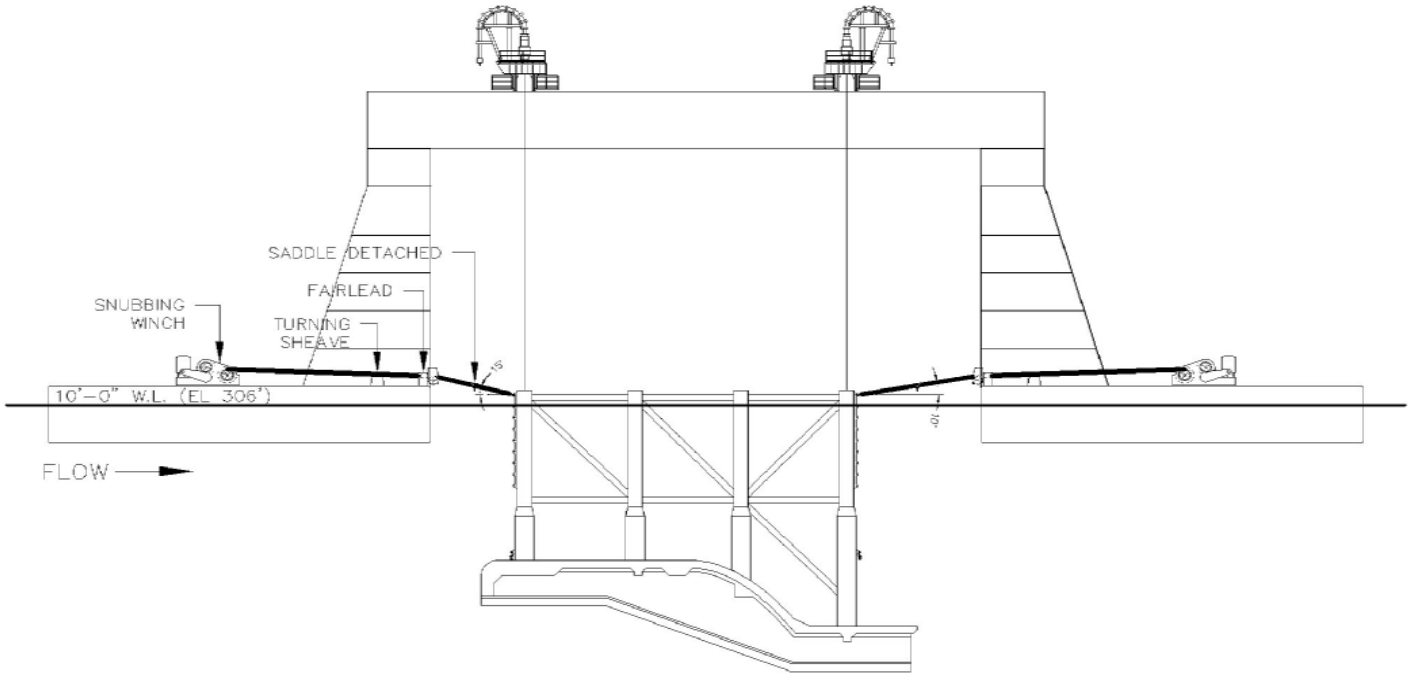
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Profile View of 5,000 tons Catamaran Crane Barge & Snubbing System



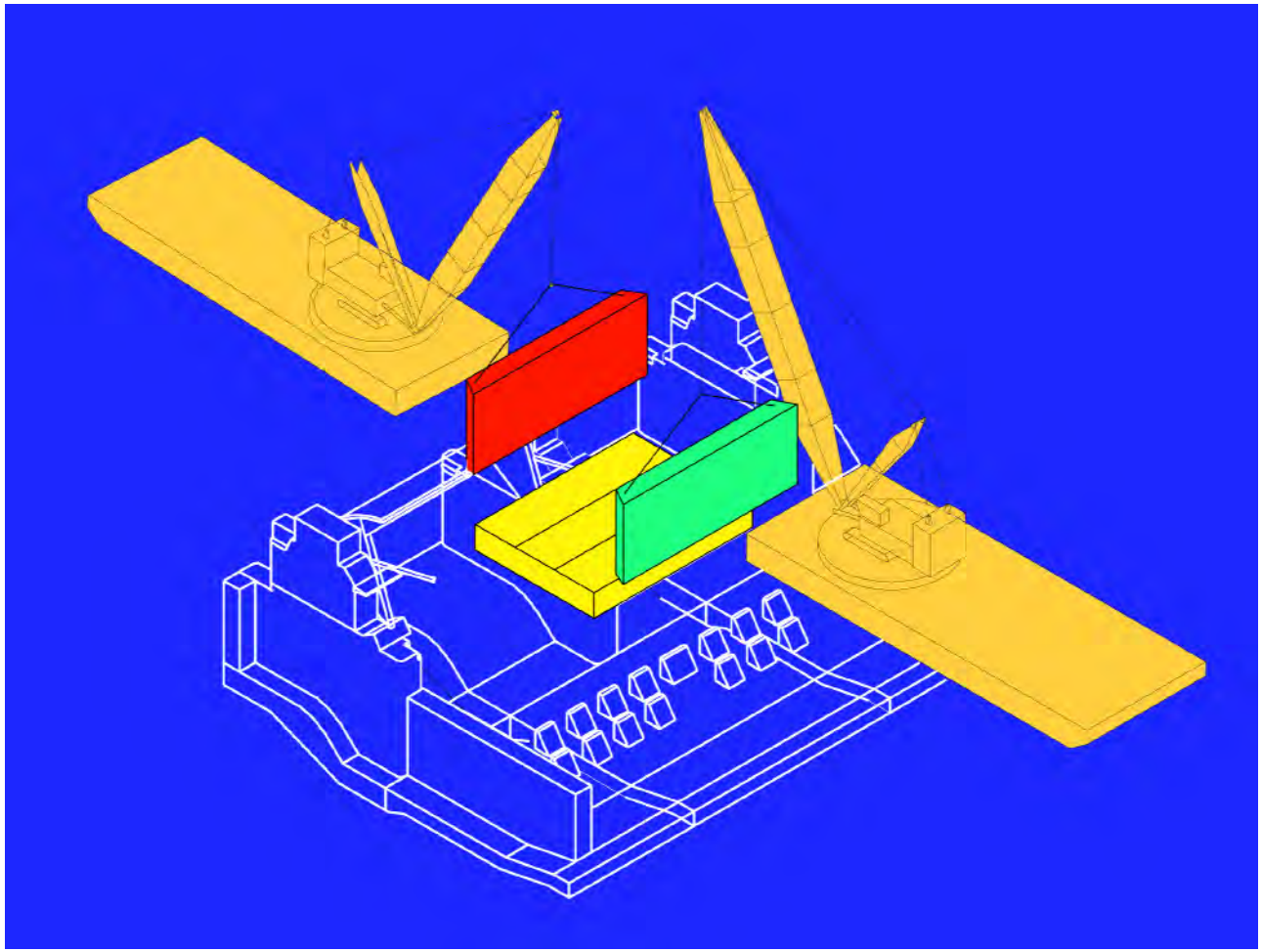
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5,000 TONS Catamaran
Lowering Tainter Gate Sill Shell



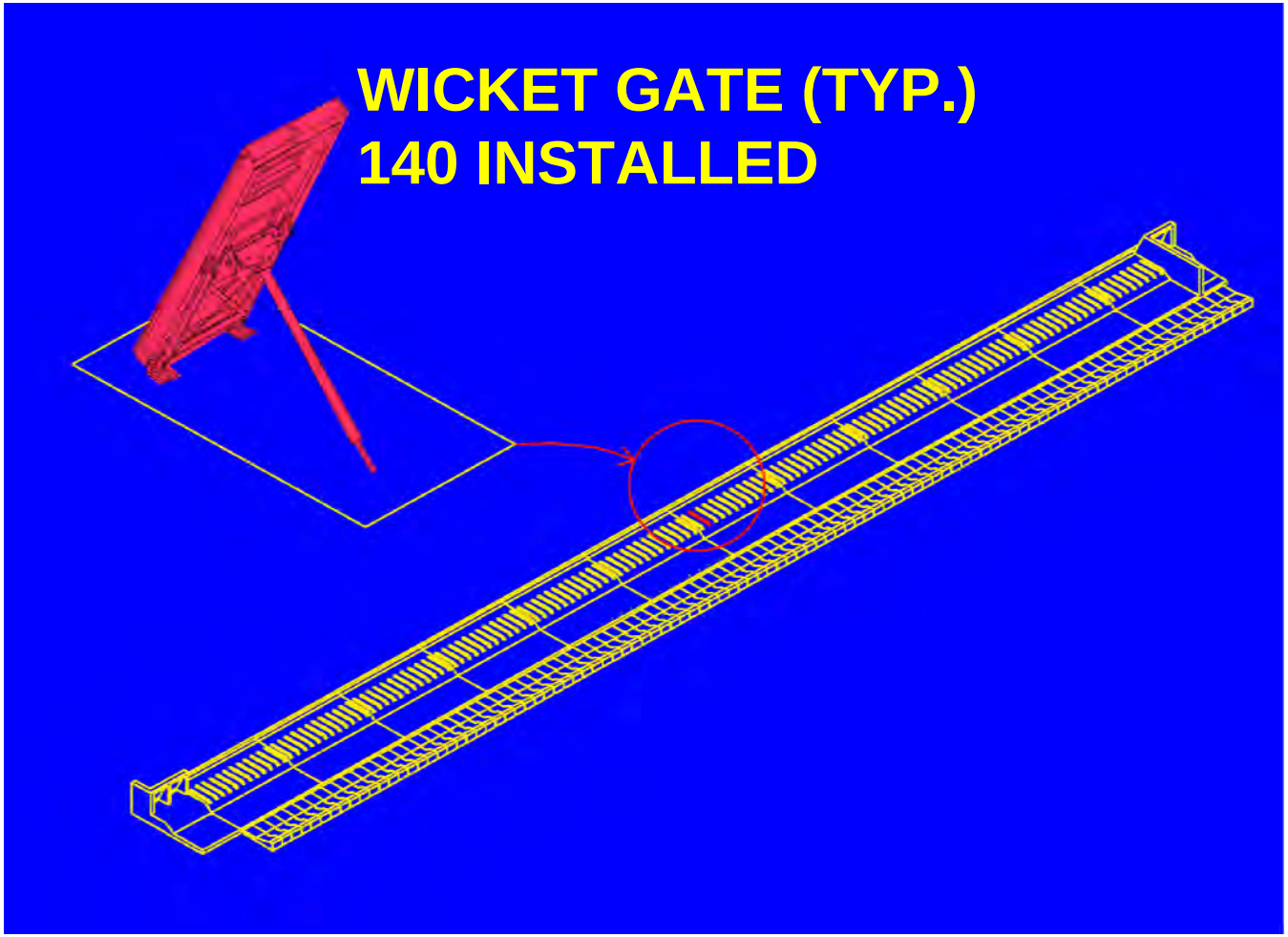
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Erection of Pre-Fabricated Tainter Gate



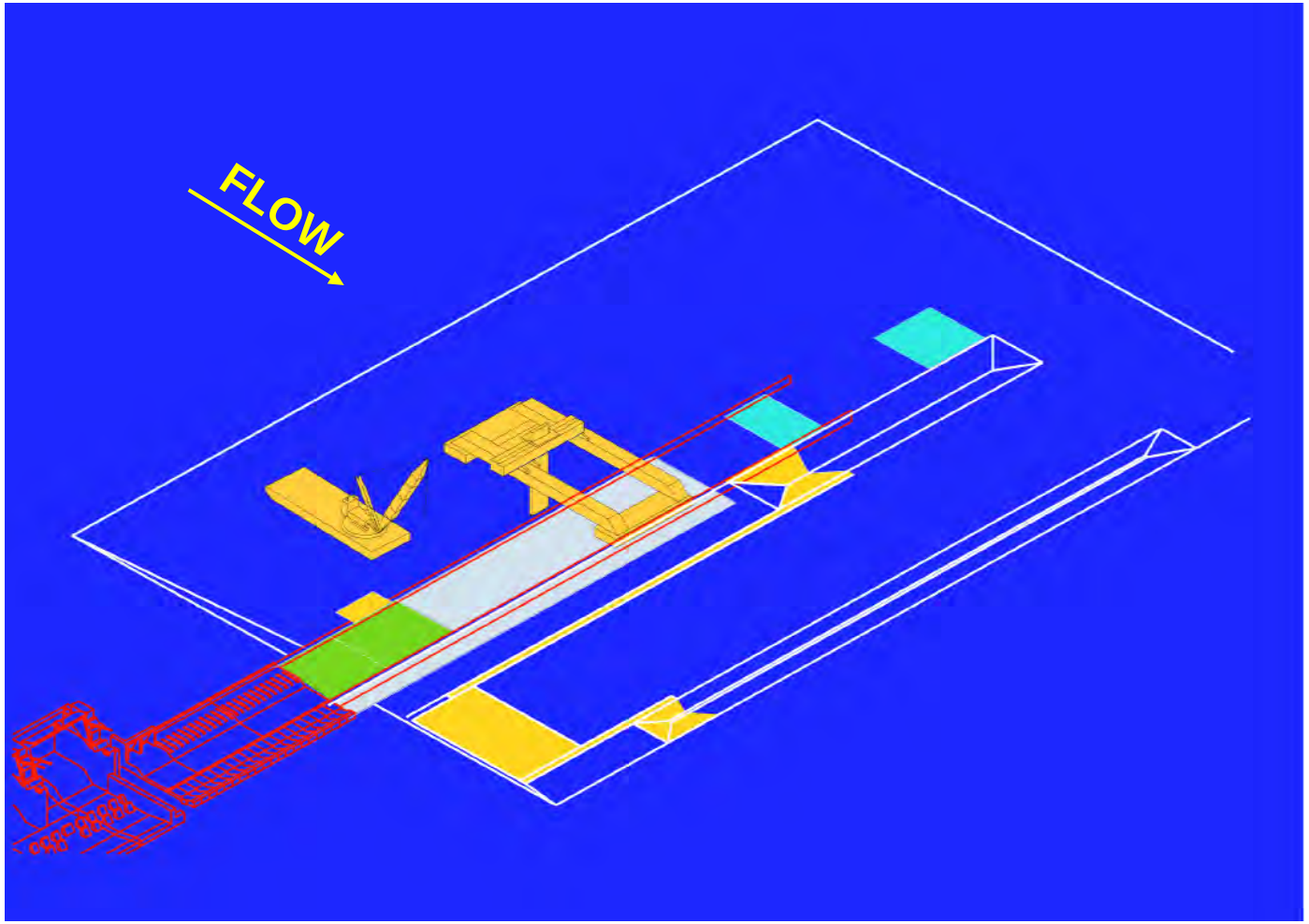
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Navigable Pass Section of Olmsted Dam



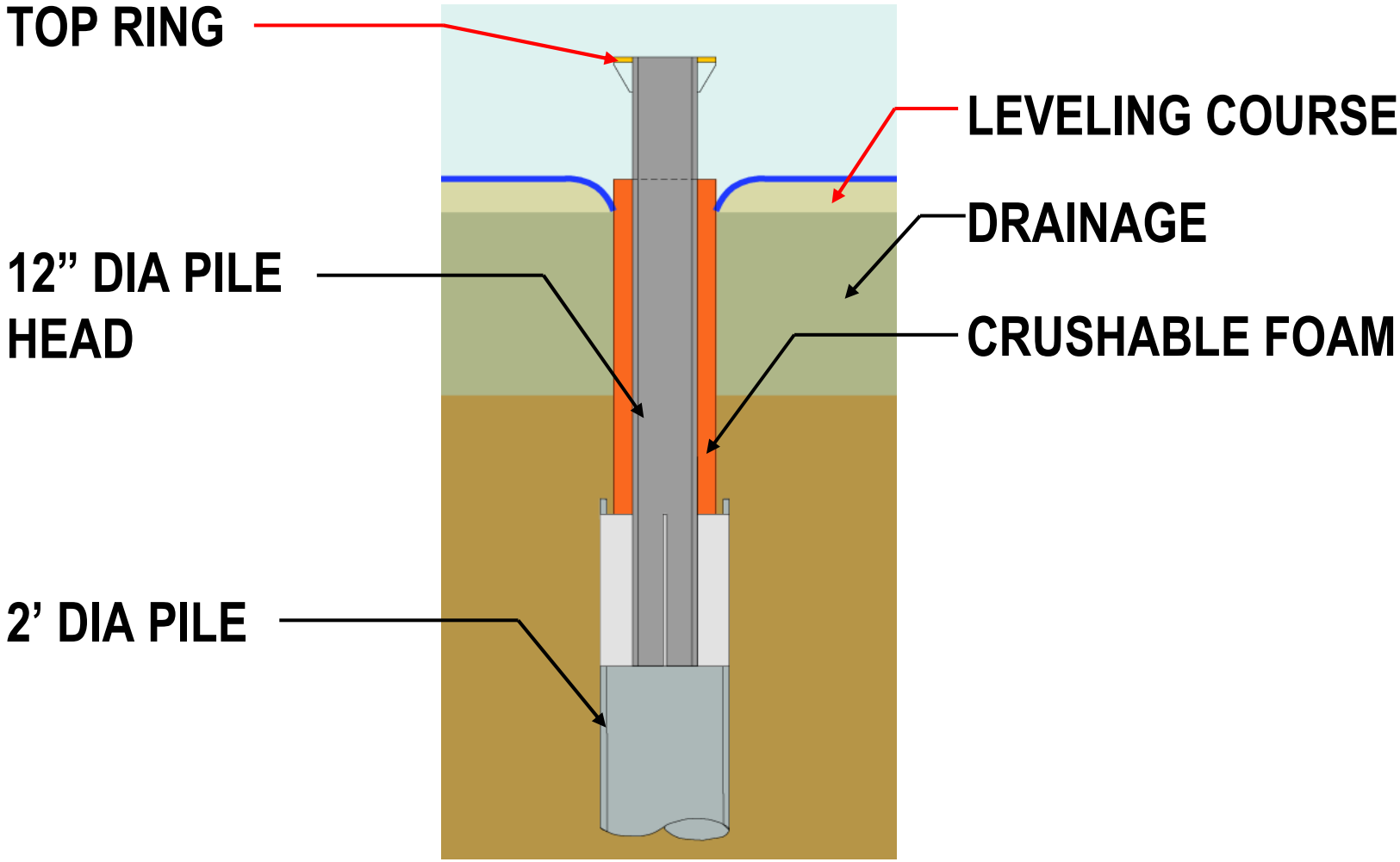
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Sequence of Construction for Navigable Pass



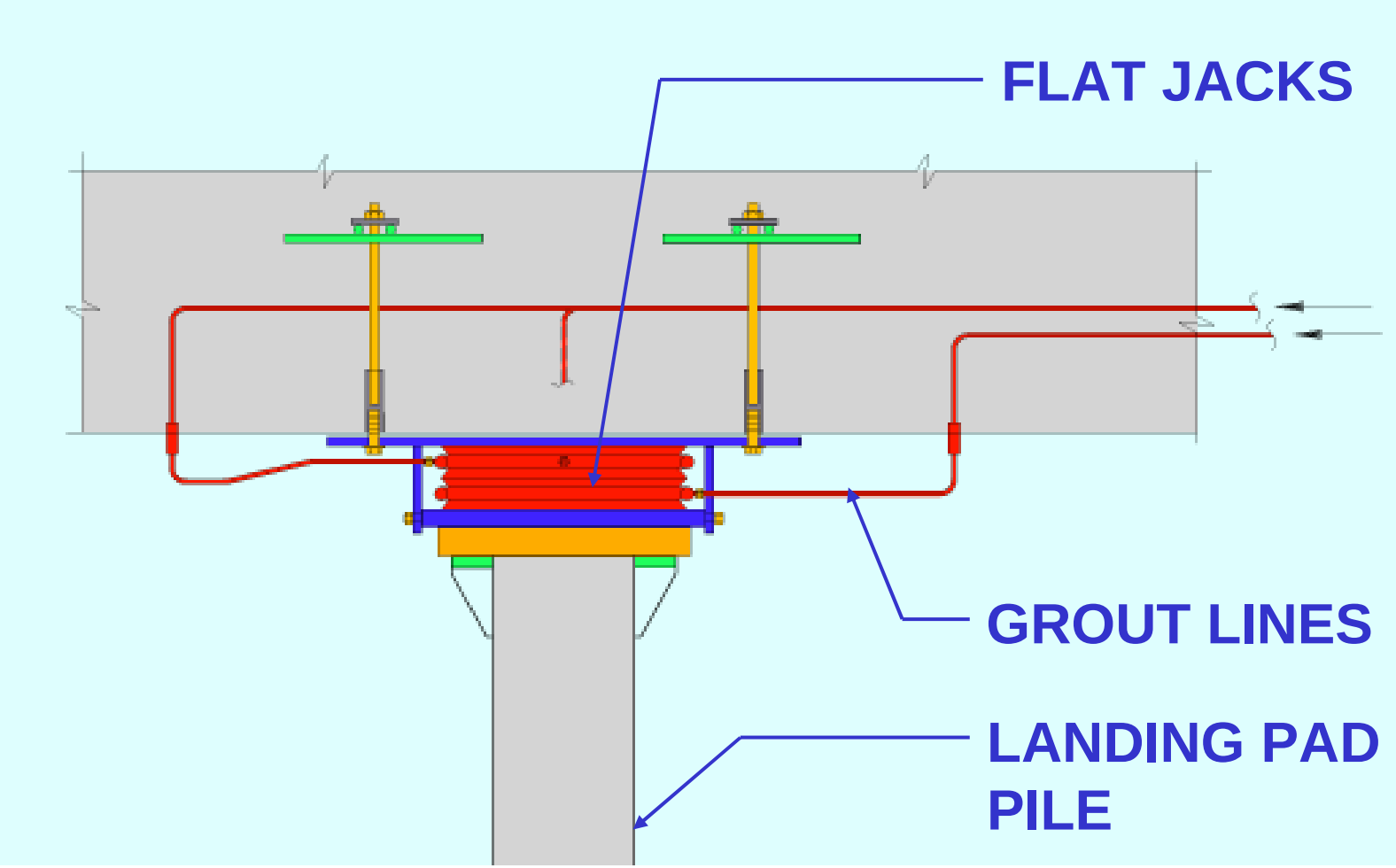
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Typical "Controlled Moment" Pile Connection



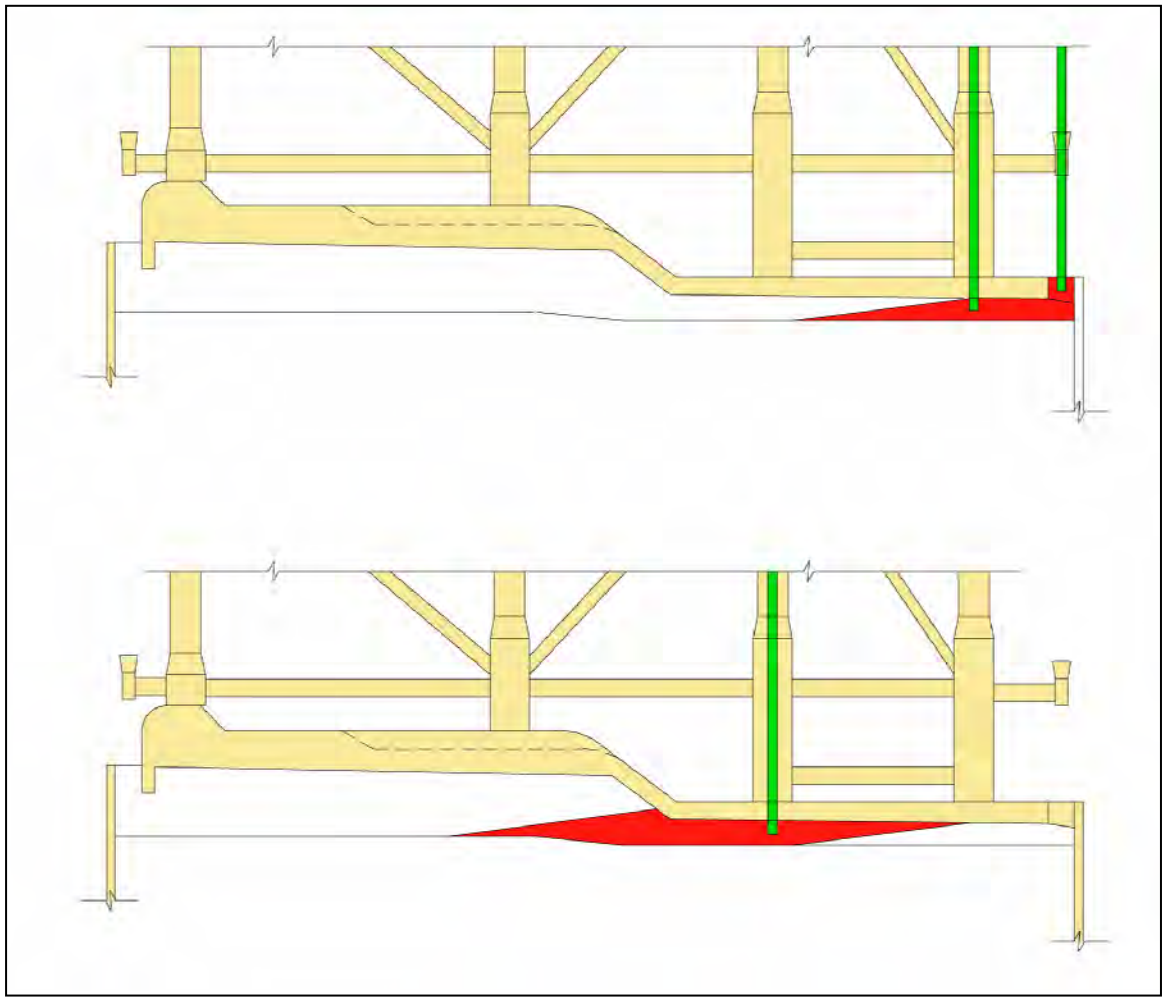
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Louisville District

Typical Landing Pile with Flat-Jacks



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of Engineers
Louisville District

Sequence for tremie Concrete Placement for Navigable Pass



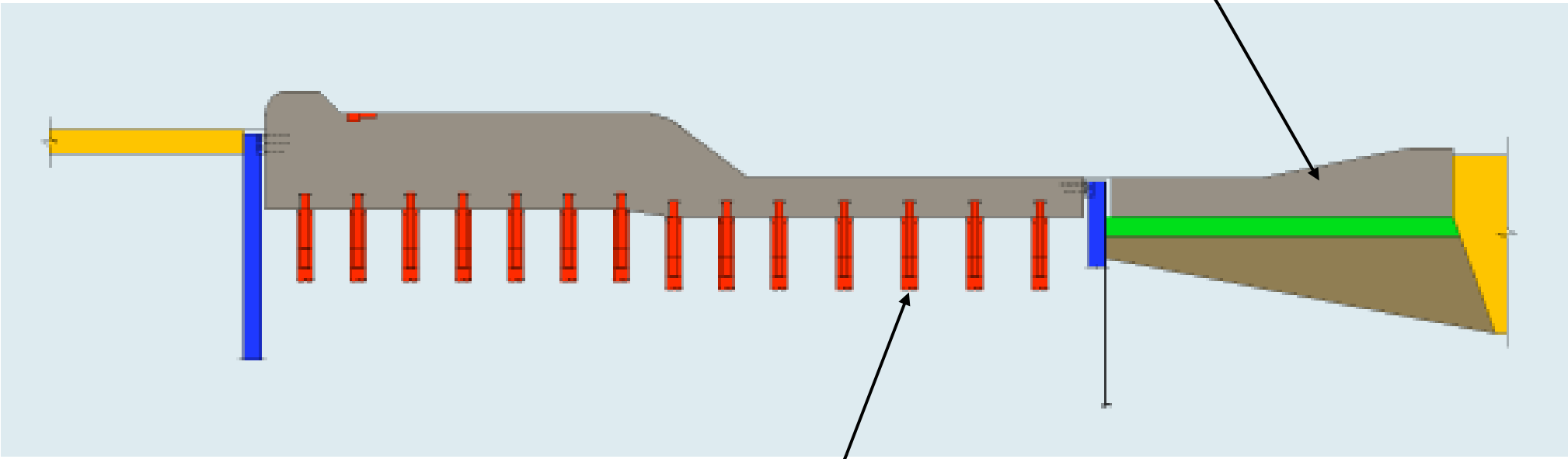
STAGE 1 POUR

STAGE 2 POUR

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Typical Elevation of Navigable Pass

PAVING BLOCK



CONTROLLED FIXITY PILES

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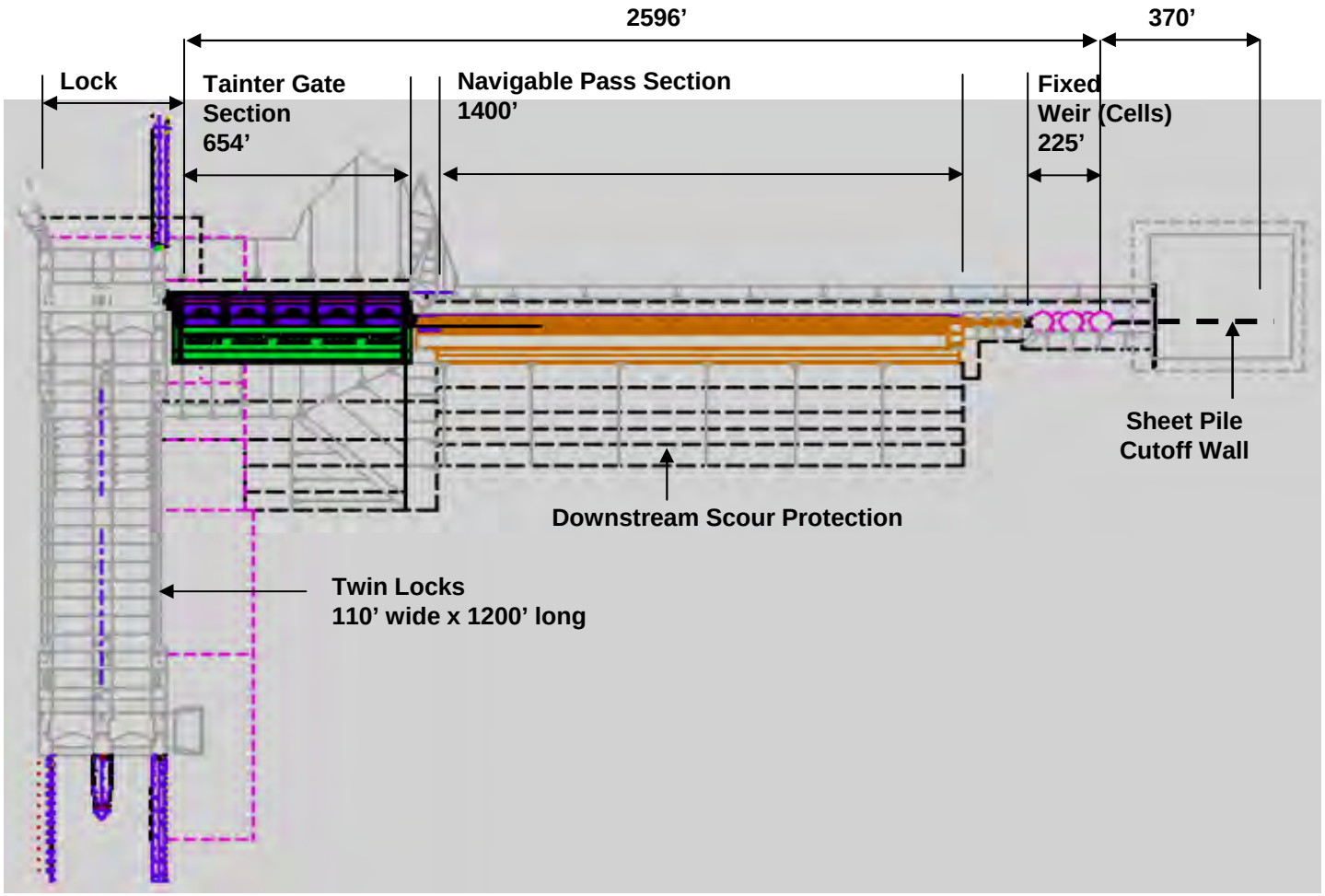
2005 Infrastructure Systems Conference

Design Changes to Tainter Gate Shells
for
Super Gantry Method of Construction
at
The Olmsted Dam Project
Jacobs / Gerwick - A Joint Venture
in Partnership With
The Louisville District, COE

Presented By: Ken Burg
Project Manager

US Army Corps of Engineers
Louisville District

Major Project Components

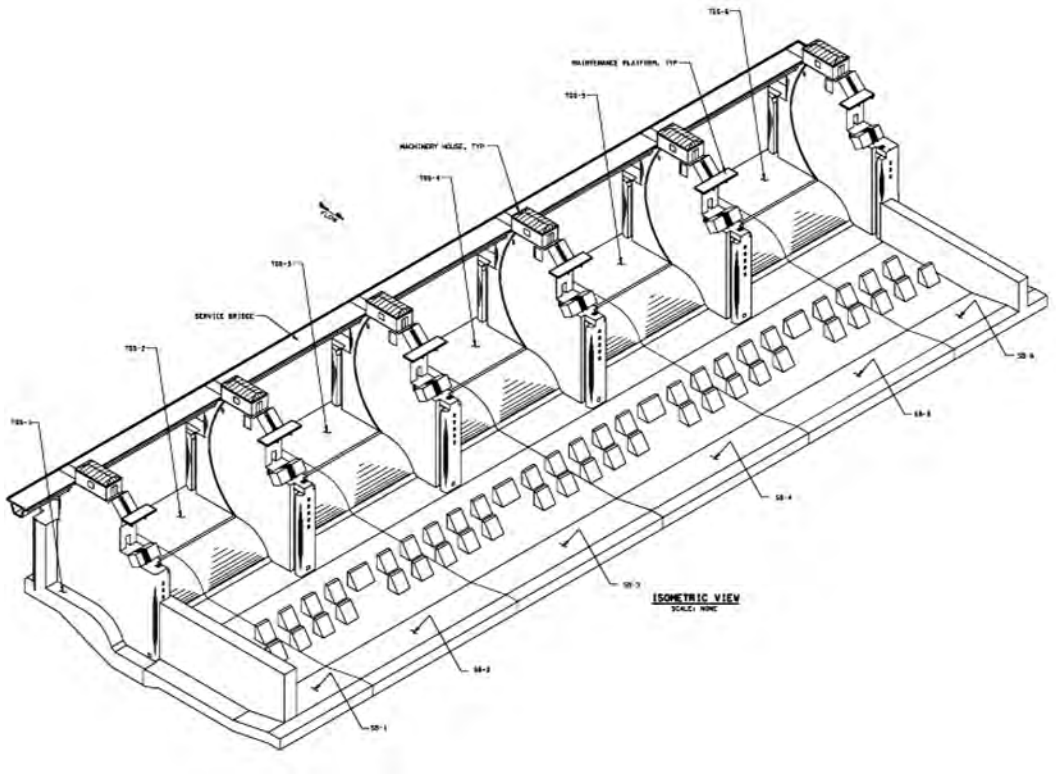


Illinois

Kentucky

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Tainter Gate Section



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Precast Shell Statistics

- ***Sill Shells***
  - 125’ x 102’ x 30’, 3683 tons dry, 2151 tons wet
- ***Stilling Basin Shells***
  - 125’ x 116’ x 18’, 3647 tons dry, 2130 tons wet
- ***Lower Pier Shells***
  - 102’ x 69’ x 14’, 2112 tons dry
- ***Upper Pier Shells***
  - 57’ x 30’ x 14’, 601 tons dry; will be cast in place with this method

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Original Method of Construction

- Prepare in-the-river foundation, complete with piles and tremie reinforcing mat
- Cast shells on shore, self weight fully supported
- Move shells into water, self weight fully supported
- Pick up and transport shells submerged
- Set shells in place on prepared foundation and fill with tremie concrete

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Super Gantry Method of Construction

- *Prepare in-the-river foundation and drive piles*
- *Cast shells on shore, self weight fully supported*
- *Attach lift frame to shells and remove secondary shoring*
- *Lift shells in-the-dry and mate with tremie reinforcing on skidway*
- *Move shells into river and transport partially submerged*
- *Set shell and tremie reinforcing over piles and fill shells with tremie concrete*

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Changes in Design Requirements

- *In-the-dry lift increases load to shells and lift frames by a minimum of 70%*
- *Transport is partially submerged; center of gravity of lift changes during setdown; loads to catamaran barge increase*
- *Connections between shell / lift frame and between lift frame / catamaran are much larger*
- *Shell geometry and reinforcing revised for increased loading*

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Revisions to Shells for Super Gantry - 1

- *Increase dimensions of selected stiffening elements to accept additional reinforcing / maintain existing reinforcing*
- *Increase size / decrease spacing of selected reinforcing*
- *Revise intersection of typical stiffening element for larger connection to lift frame*
- *Increase "gap" between shells for increased clearance at set down*
- *Revise continuity reinforcing to include portions of tremie reinforcing*
- *Revise tremie reinforcing to clear casting supports*

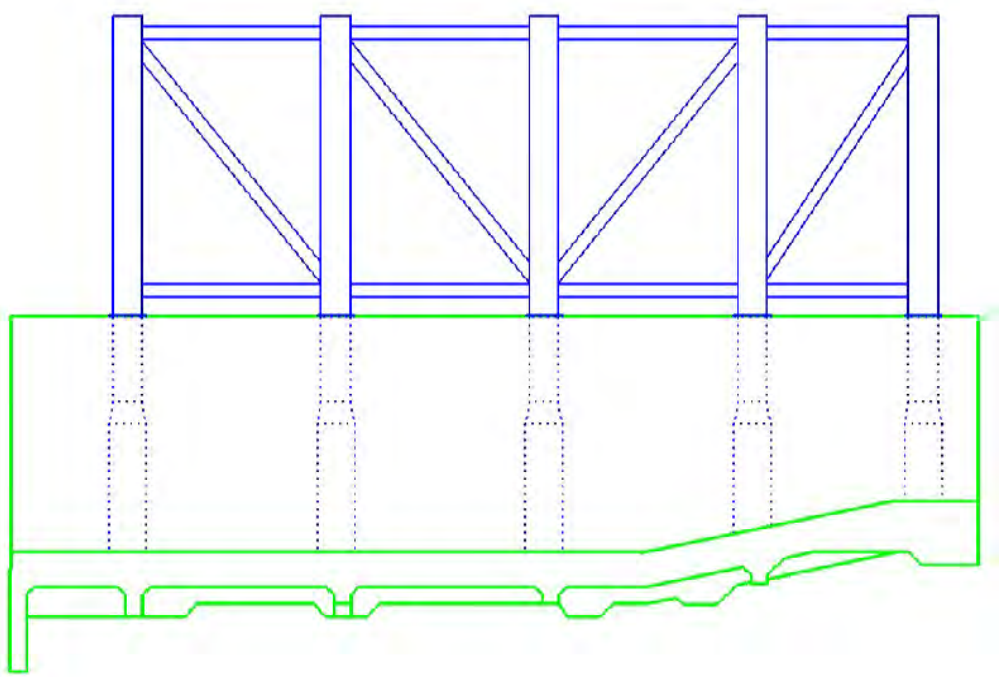
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Revisions to Shells for Super Gantry - 2

- Revise (shorten) training walls on SBS-6 shell to clear larger catamaran
- Revise connection between Sill Shell and Lower Pier Shell for reinforcing assembly in-the-dry after mating and dewatering
- Revise underdrain details and location to clear splice location between shell continuity bars and tremie reinforcing mat

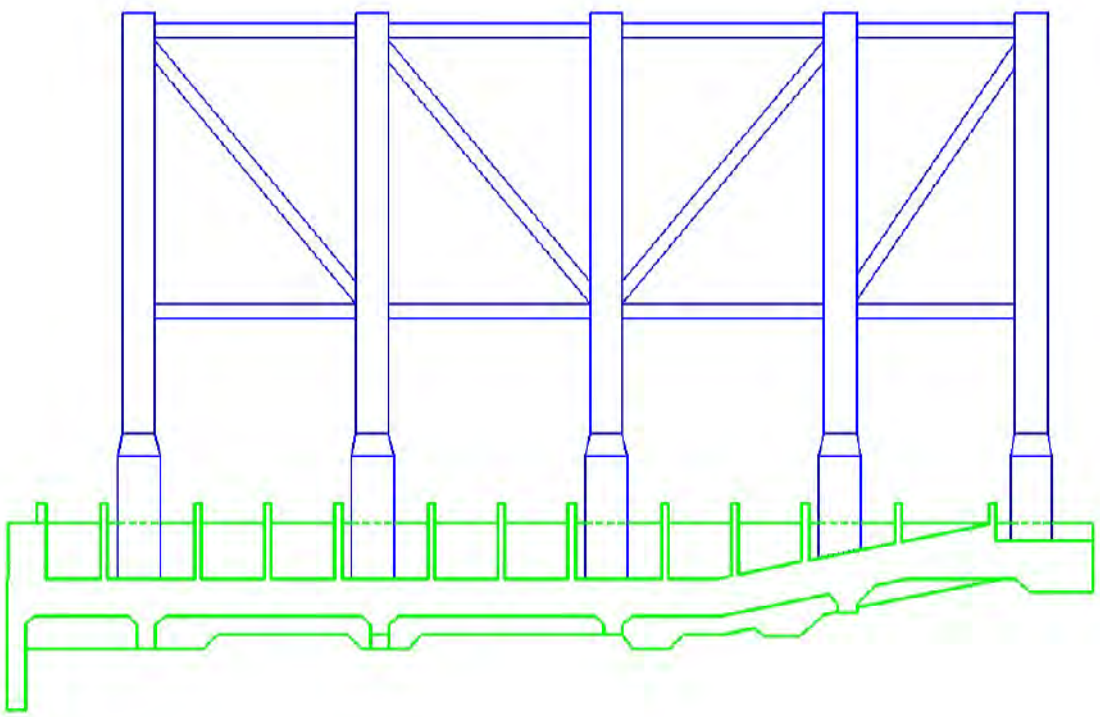
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Revise Training Wall on SBS Shell



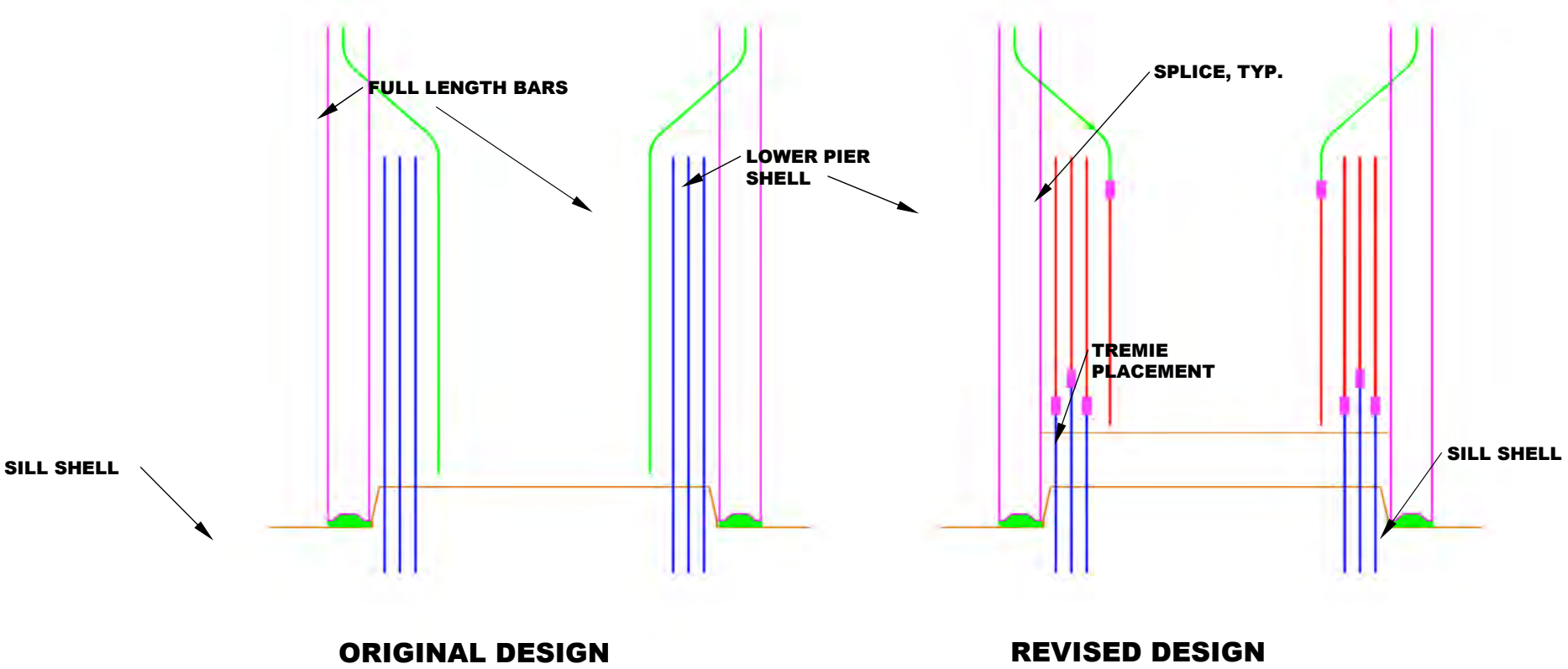
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Revise Training Walls on SBS Shell



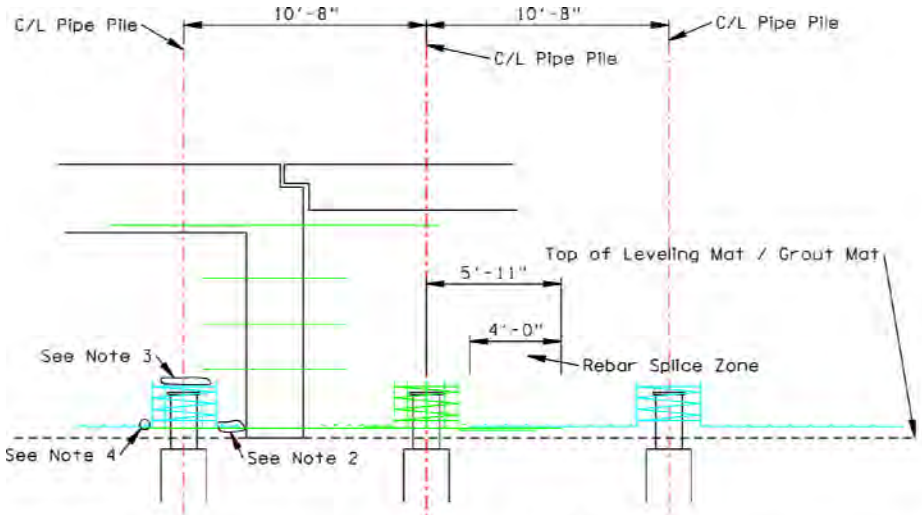
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Revised Sill to Lower Pier Connection



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Revisions to Shells for Super Gantry



SS to SS INTERFACE

REBAR CODE

1. Green rebar is shell continuity reinforcing
2. Blue rebar is tremie rebar mat reinforcing

Notes:

1. Typical at SS-1 to SS-2, SS-3 to SS-4 and SS-5 to SS-6
2. At Contractor's option, install with shell continuity bars or tie to shear reinforcing and postion after mating shell and rebar mat.
3. Using spliced bars from S-72, rotate bars back and position after shell is mated to rebar mat.
4. At Contractor's option, install with continuity bars or pullback and position after shell mating with rebar mat.

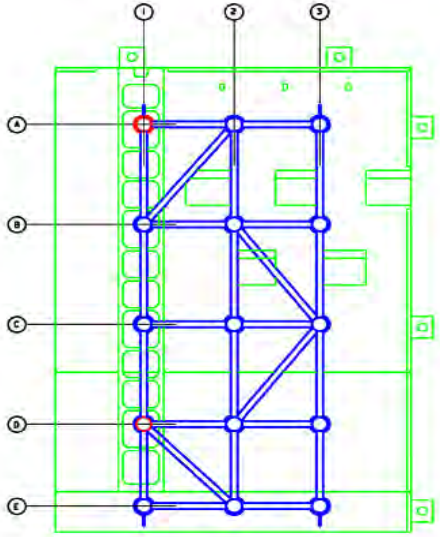
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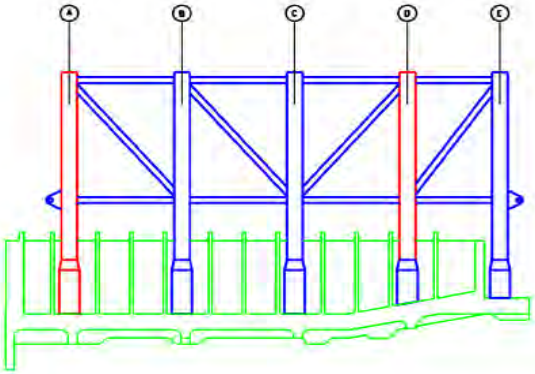
Revisions to Lift Frames for Super Gantry

- *Configure Lift Frames for SBS-1 for reuse with SBS-6 with minimum rework*
- *Revise connection between shell / frame to meet Contractor preferences for location and orientation*
- *Add man door to bottom of leg for personnel access to assemble shell/frame connection; reinforce leg*
- *Add full area access platforms to top of lift frame to meet Contractor work plan*
- *Revise wall thickness and material strength for selected leg members to match demands from increased loadings*

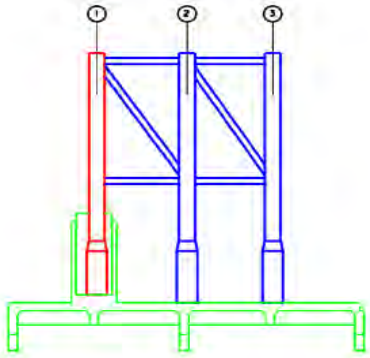
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Revisions to Lift Frames for Super Gantry



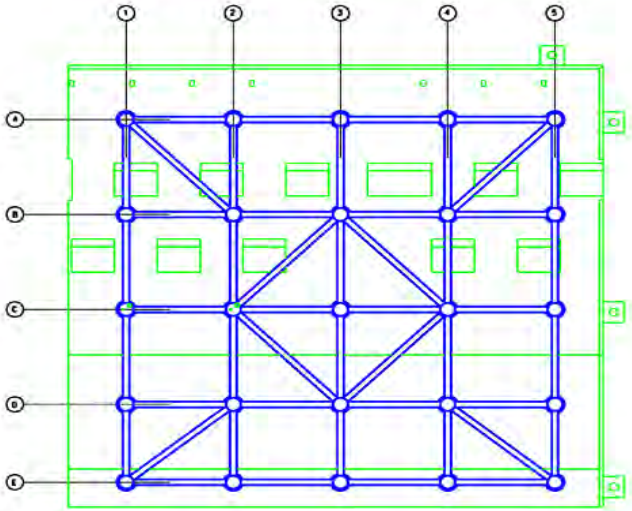


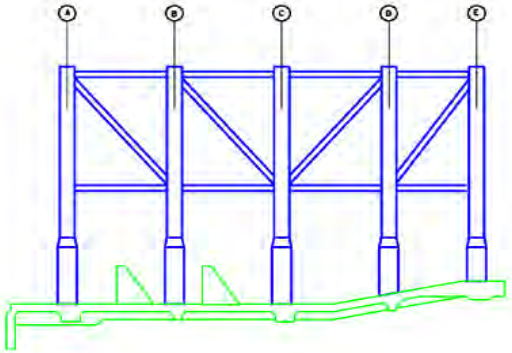
Shell SBS-1

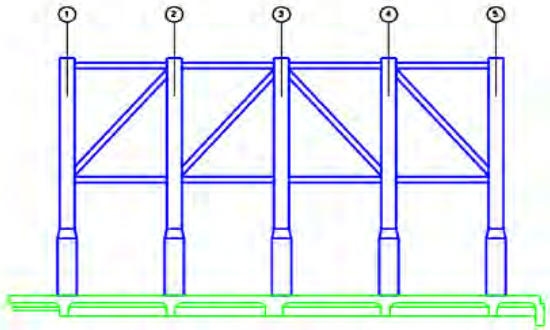


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Revisions to Lift Frames for Super Gantry



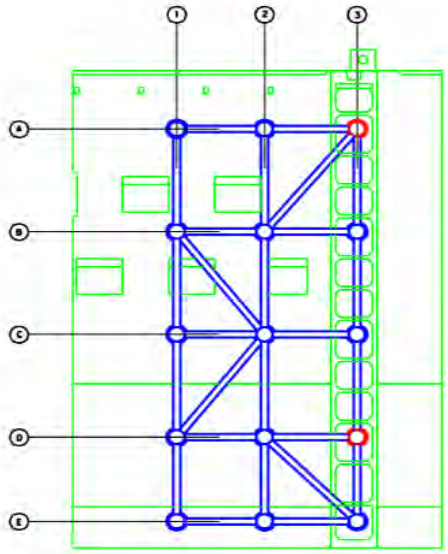


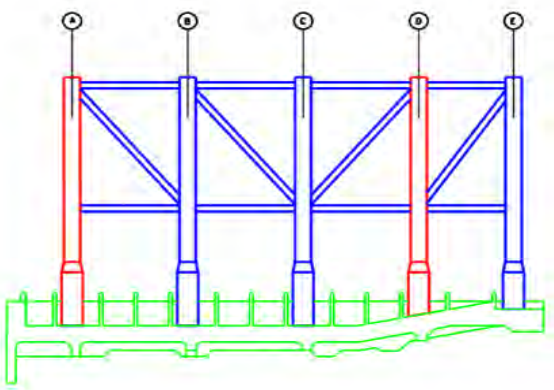


Shells SBS-2 thru SBS-5

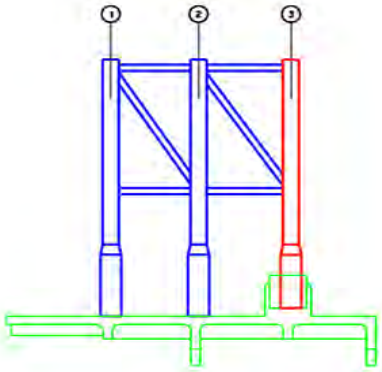
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Revisions to Lift Frames for Super Gantry



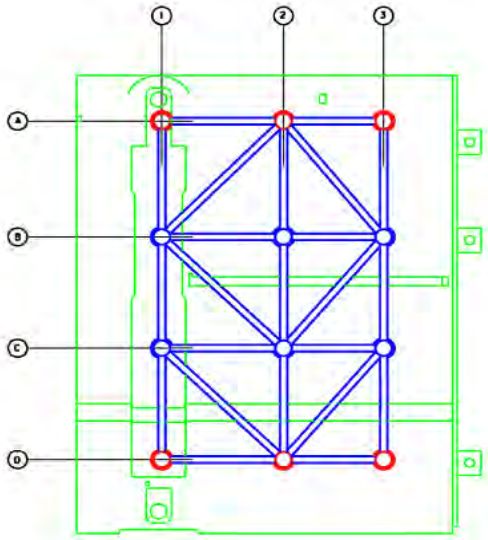


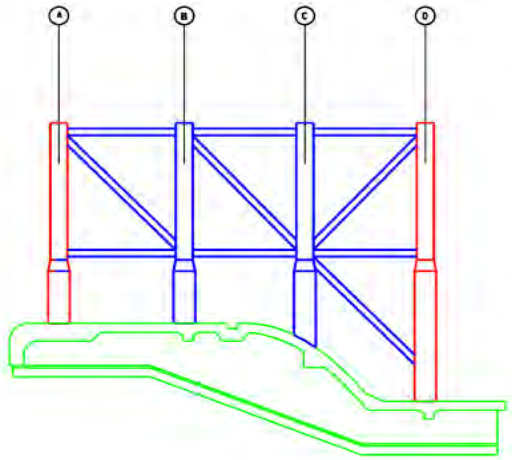
Shell SBS-6

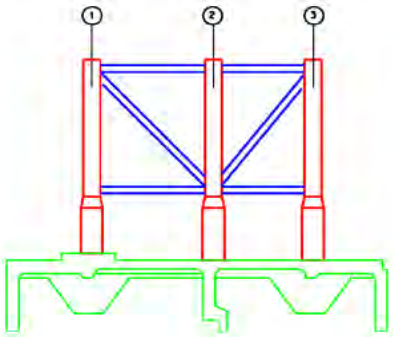


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Revisions to Lift Frames for Super Gantry



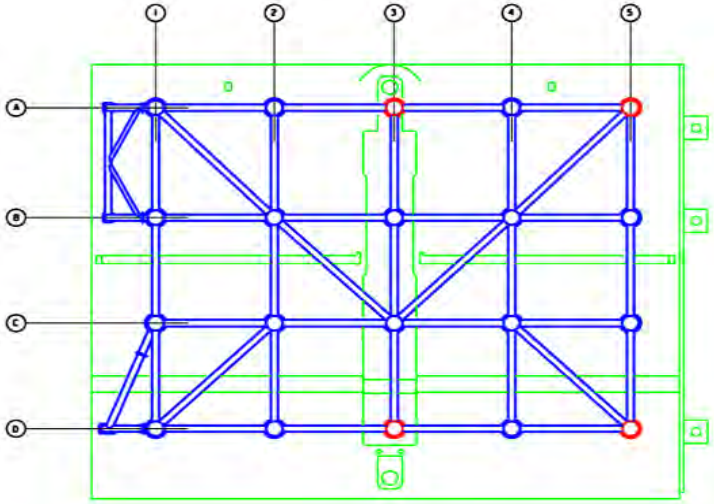


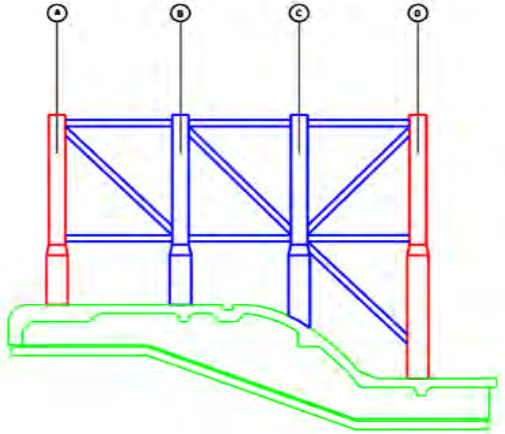


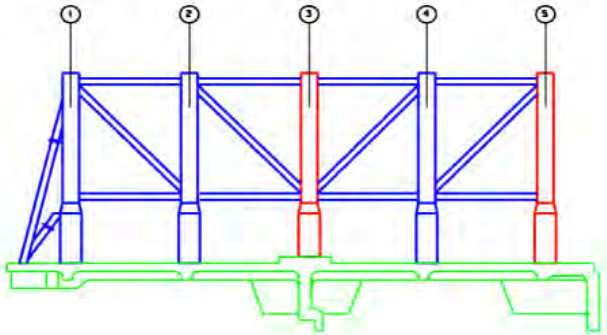
Shell SS-1

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Revisions to Lift Frames for Super Gantry



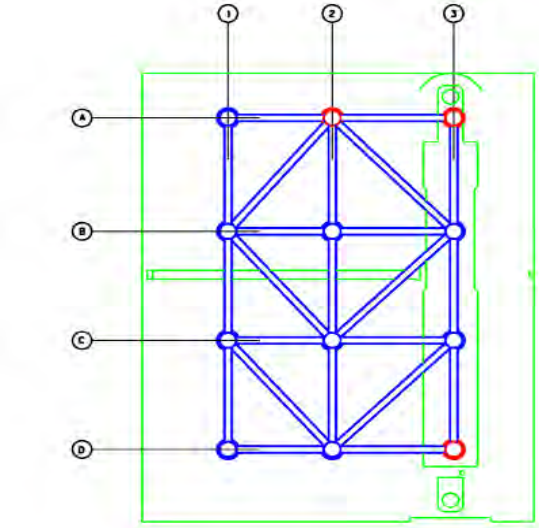


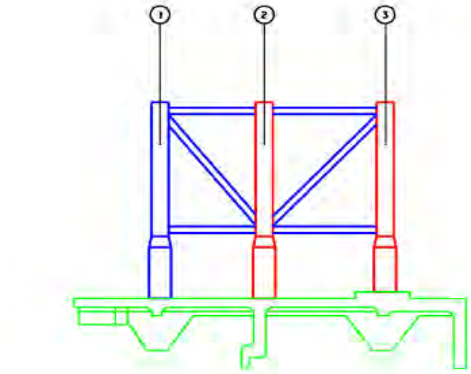


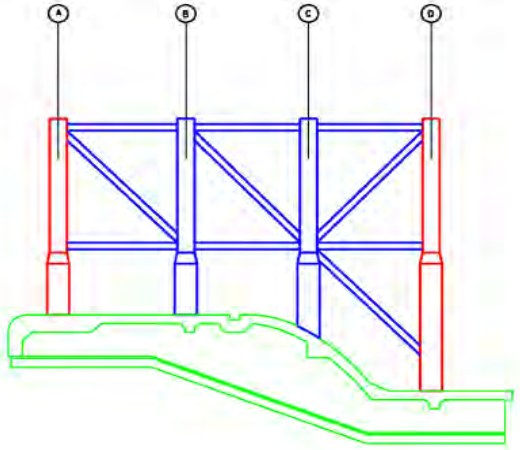
Shells SS-2 thru SS-5

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Revisions to Lift Frames for Super Gantry







Shell SS-6

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Summary

- *The Super Gantry Method of Construction required re-analyses of the shells and lift frames for loadings approximately 70% greater than the original design*
- *Modifications to the shells and lift frames have been included almost entirely within the geometric envelope of the original design*
- *The sequence of work has been modified drastically compared to the visible modifications to the shells and lift frames*
- *The Super Gantry Method of Construction provided the Contractor with the benefits of reduced operation time in the river with more mating operations completed on shore in-the-dry*

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Byron McClellan,

USACE-Louisville District

502-315-6240

Byron.K.McClellan@LRL02.usace.army.mil

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Greenup L&D Miter Gate Repair and Instrumentation

Joseph Padula, Ph.D.	ERDC
Bruce Barker	ERDC
Doug Kish	Huntington District

Greenup L&D Miter Gate



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Greenup L&D Miter Gate

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Background

- Greenup L&D is on the Ohio River five miles below Greenup, KY
- Main lock 110 ft wide by 1200 ft long, Aux lock 110 ft wide by 600 ft long
- Greenup locks is the 8th busiest of the Corps' locks
  - Commercial tonnage has averaged 70 million tons over the last five years
  - Approximately 7200 lockages per year
- Locks were placed in service in 1959
- Other features
  - Nine Tainter gates,
  - 70,000 kW hydroelectric plant
  - Highway bridge

Greenup L&D Miter Gate

Background

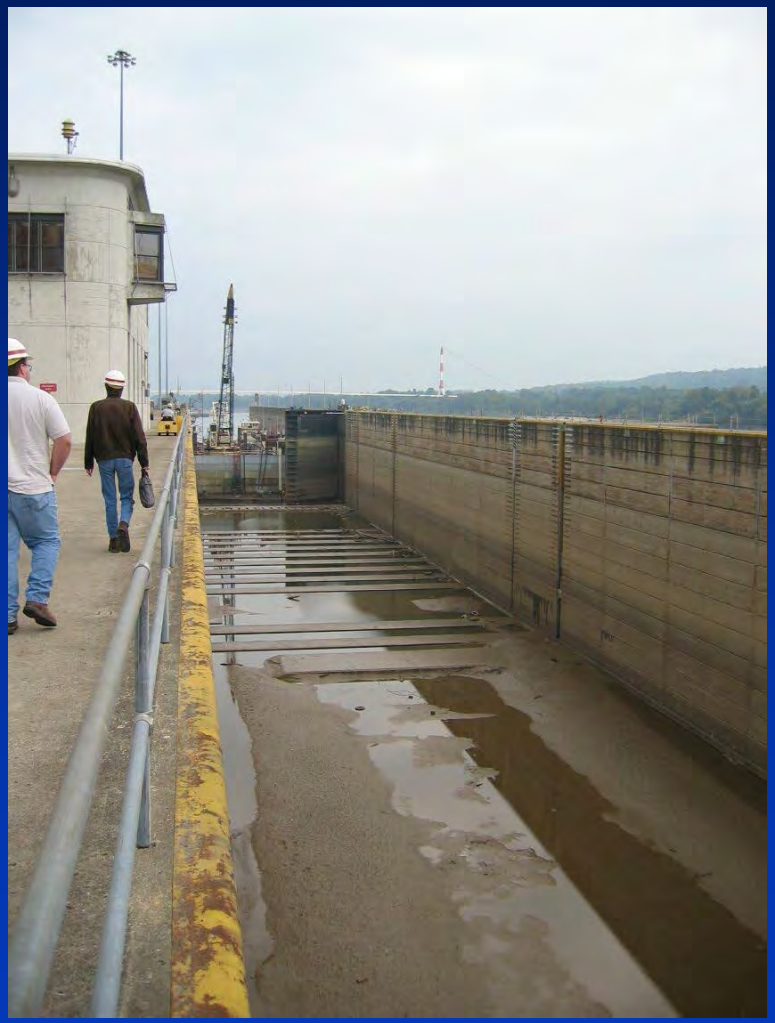
- Main and auxiliary locks have upstream and downstream miter gates and emergency lift gates
- Miter gates are horizontally framed, 15 girders
- Chamber height is 67 feet
- Normal lift is 30 feet

Greenup L&D Miter Gate

Background

- In September 2003, the main lock chamber was dewatered for scheduled maintenance
- The outage was scheduled to last three weeks

Greenup L&D Miter Gate





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Greenup L&D Miter Gate



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Greenup L&D Miter Gate

Miter Gate Damage

- **Cracking at reinforcement gussets**
- Cracking around pintle casting
- Out-of-plane deformation of thrust diaphragm
- Out-of-plane deformation of Girder 15 web

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Greenup L&D Miter Gate



Greenup L&D Miter Gate



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Greenup L&D Miter Gate



Greenup L&D Miter Gate

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Greenup L&D Miter Gate



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Greenup L&D Miter Gate



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Greenup L&D Miter Gate



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Greenup L&D Miter Gate

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Greenup L&D Miter Gate



Greenup L&D Miter Gate



Greenup L&D Miter Gate





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Greenup L&D Miter Gate

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- **Out of plane deformation of Girder 15 web**

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Greenup L&D Miter Gate



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Greenup L&D Miter Gate



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Greenup L&D Miter Gate

Miter Gate Repairs

- Remove triangular gussets and replace with radiused gussets
- Remove and replace cracked flanges
- Heat straighten out-of-plane distortion of thrust diaphragm and girder web
- Add stiffeners to thrust diaphragm and girder web
- Reset quoin block
- Work was driven by the need to return lock to service as soon as possible!

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Greenup L&D Miter Gate



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Greenup L&D Miter Gate



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Greenup L&D Miter Gate

Cause of Miter Gate Damage?

- A suspected cause of pintle cracking and out-of-plane distortion of girder web and thrust diaphragm was lack of bearing of quoin block at the bottom portion of the gate

Greenup L&D Miter Gate





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Greenup L&D Miter Gate

Miter Gate Damage Instrumentation

- An instrumentation plan was developed to monitor behavior of girders and diaphragm around the pintle
- Short term objective was to verify behavior of bottom girders
- Long term objective was to monitor girders and diaphragm for changes in behavior over time as a result of shifting or misalignment of the gate, cracking or other damage

Gate Instrumentation



Gages Installed:

20 - Full-bridge strain gage sensors on Gate

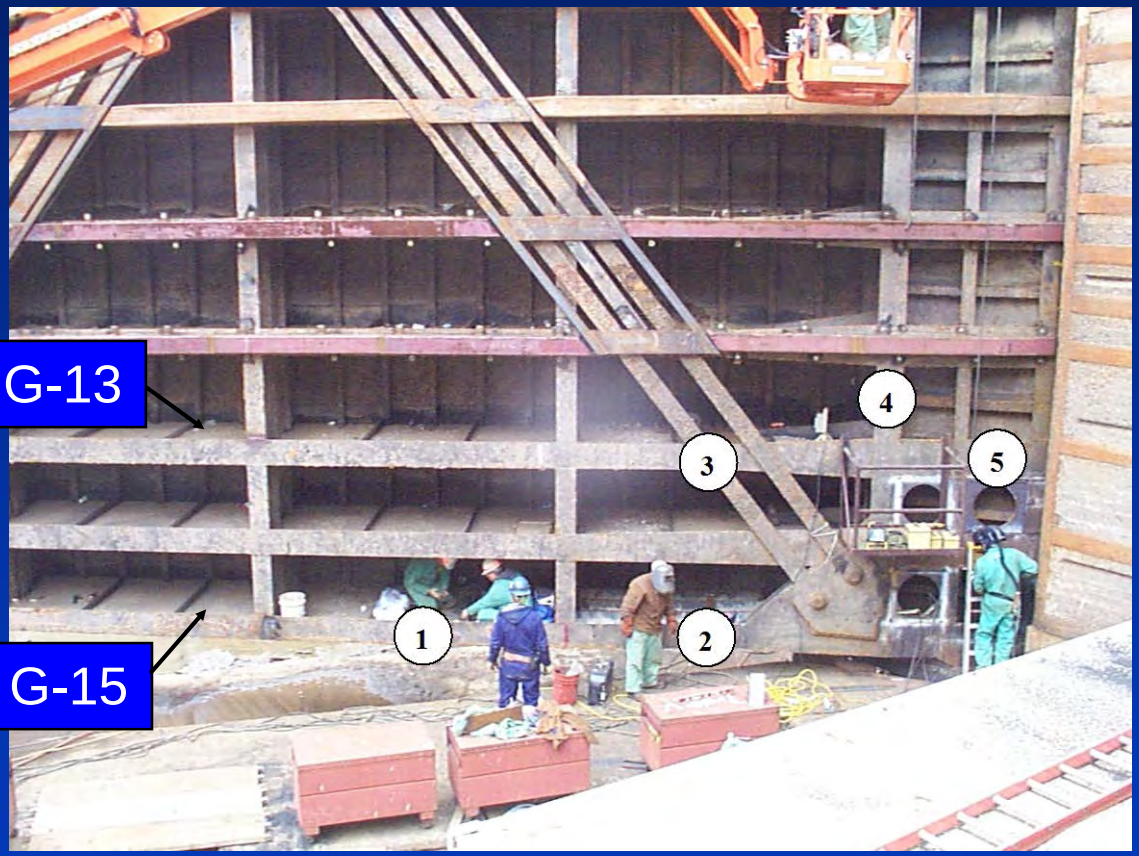
2 – Strain gages on the Strut Arms

2 - Pressure Cells (lower pool and chamber)

1 – wire potentiometer (on gate opening mechanism)

Gate Instrumentation

Strain Gage Locations

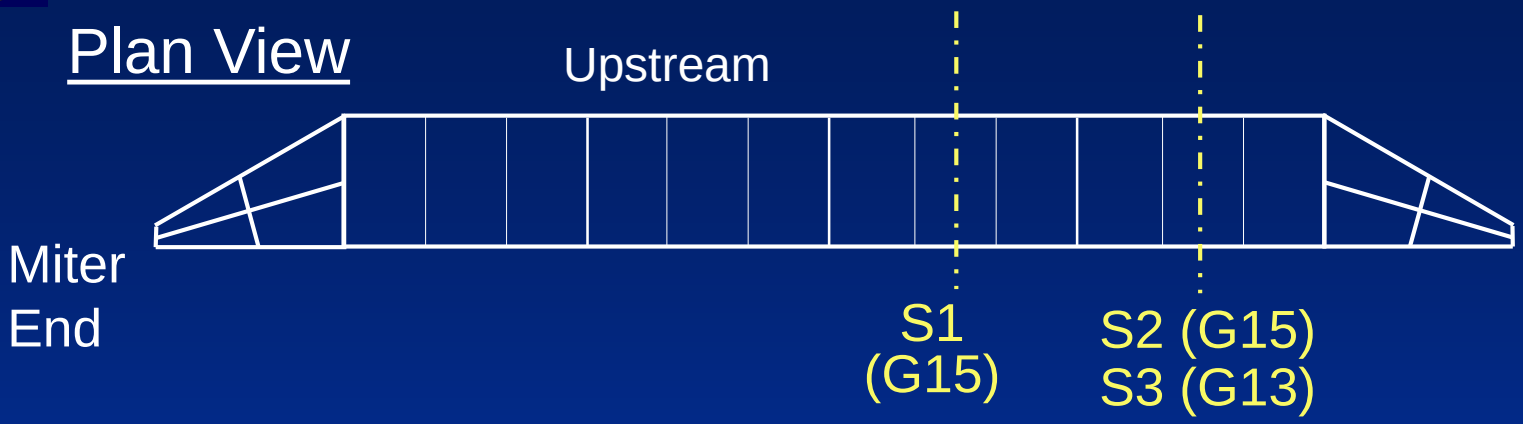


Gage Sets 1, 2, 3, and 5 were installed on horizontal flange of the G13, and G15 Girders

Gage Set 4 was installed on the vertical girder flange

Strain Gage Locations

Plan View



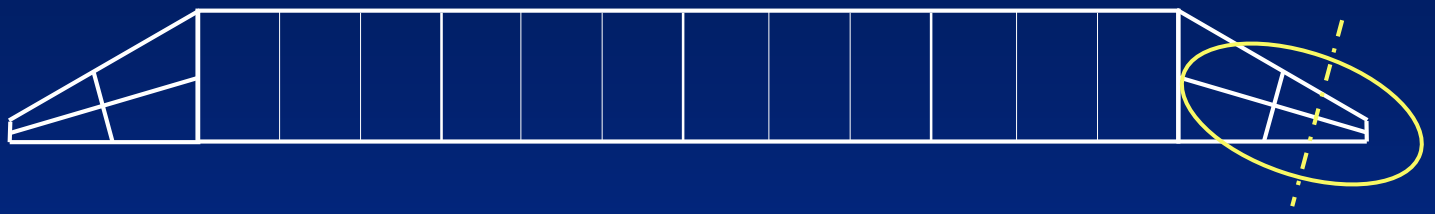
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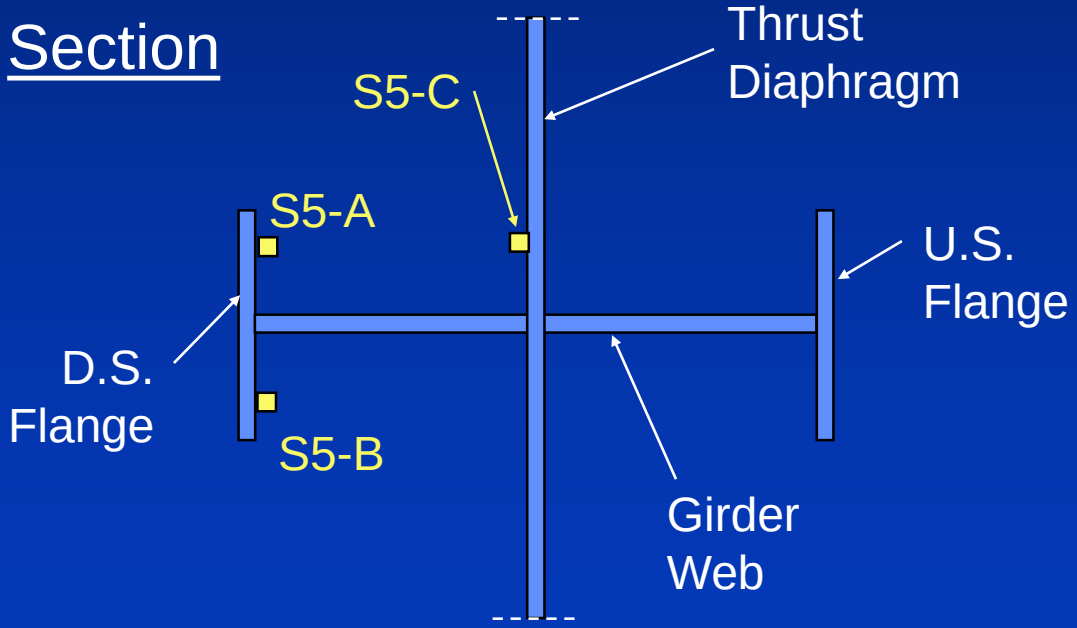
Strain Gage Locations

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Plan View



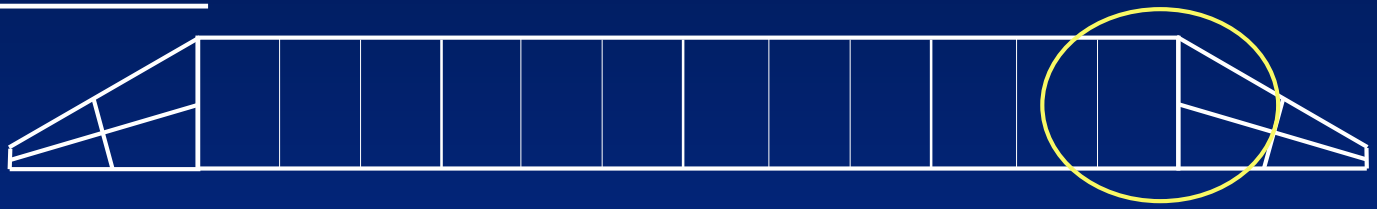
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Strain Gage Locations

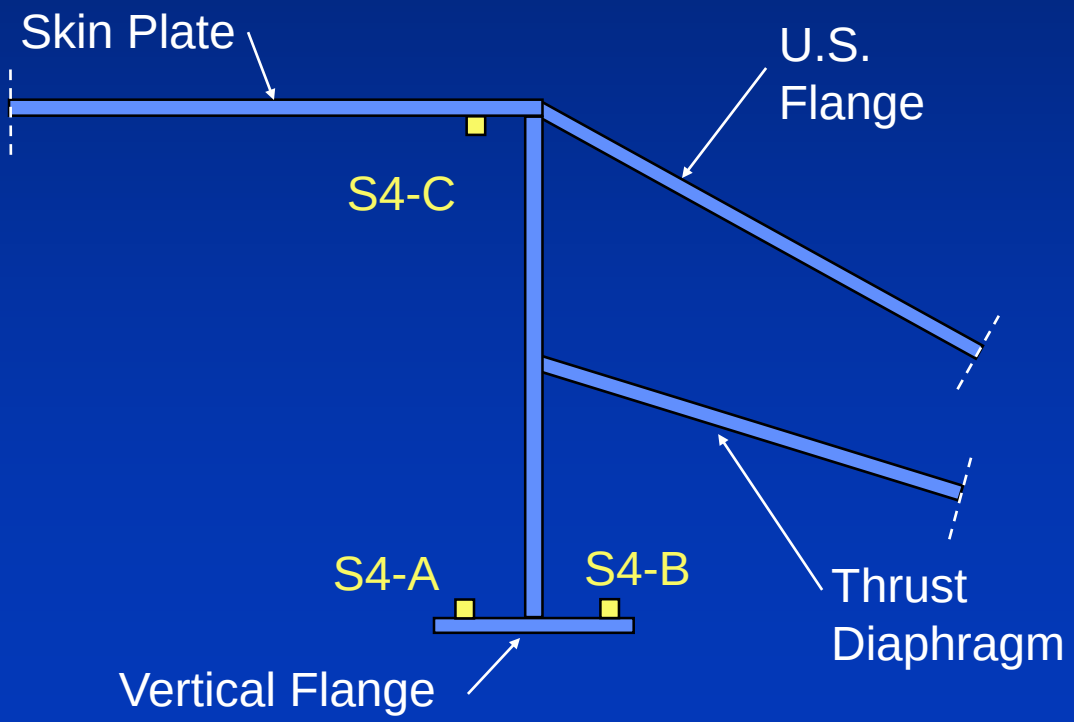
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Plan View



Miter End

Detail



Strain Gage Installation

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HiTech Products
Strain Sensor

ERDC technician Tommy Carr welding down a strain gage

Cable Protection





Cable protection was done with flex tubing and a 1-1/2” conduit run from the top of the gate to the bottom

Gate Position Measurement



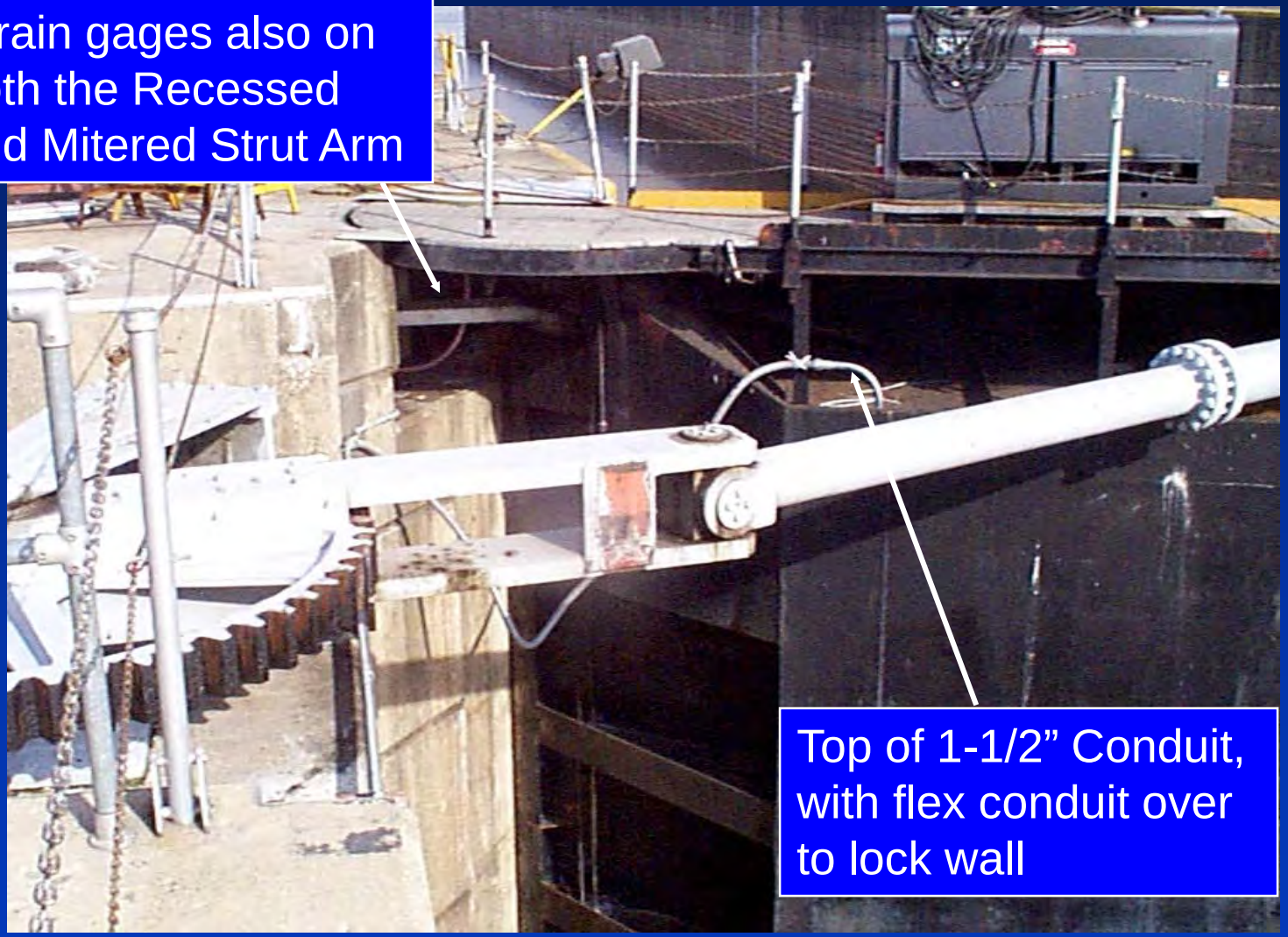
Celesco String Potentiometer

Gate position was monitored using a string potentiometer attached to the hydraulic ram



Gage Installation

Strain gages also on both the Recessed and Mitered Strut Arm



Top of 1-1/2” Conduit, with flex conduit over to lock wall

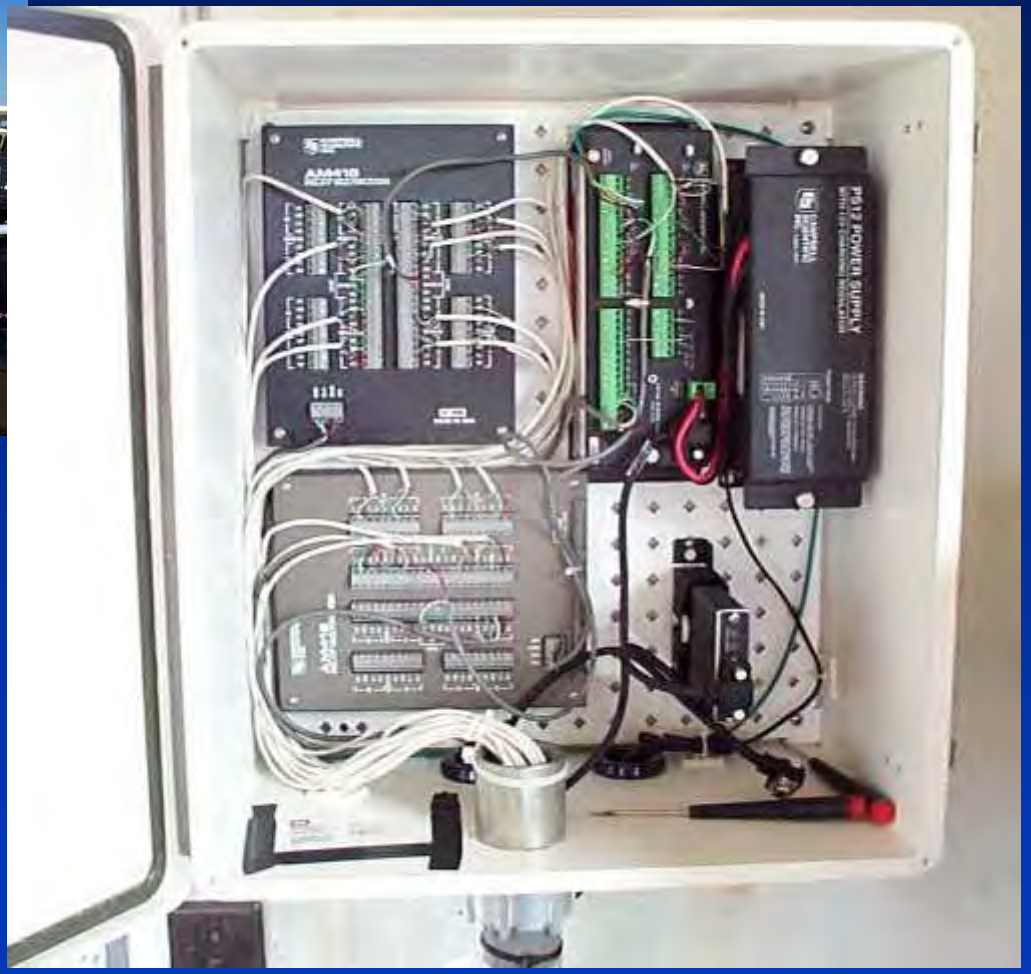
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Data Logger

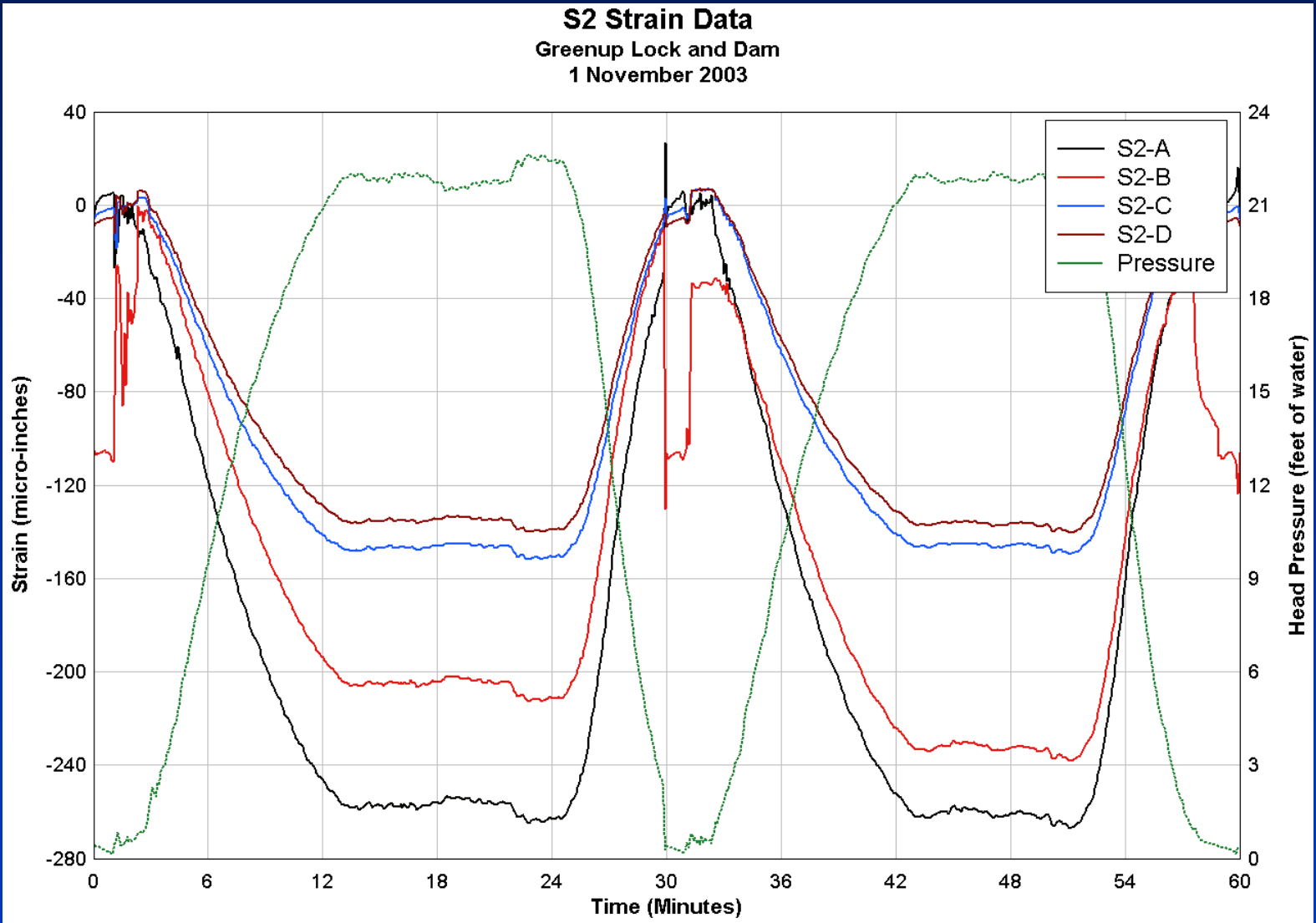




Campbell Scientific CR10X Data logger Installed in gate control building

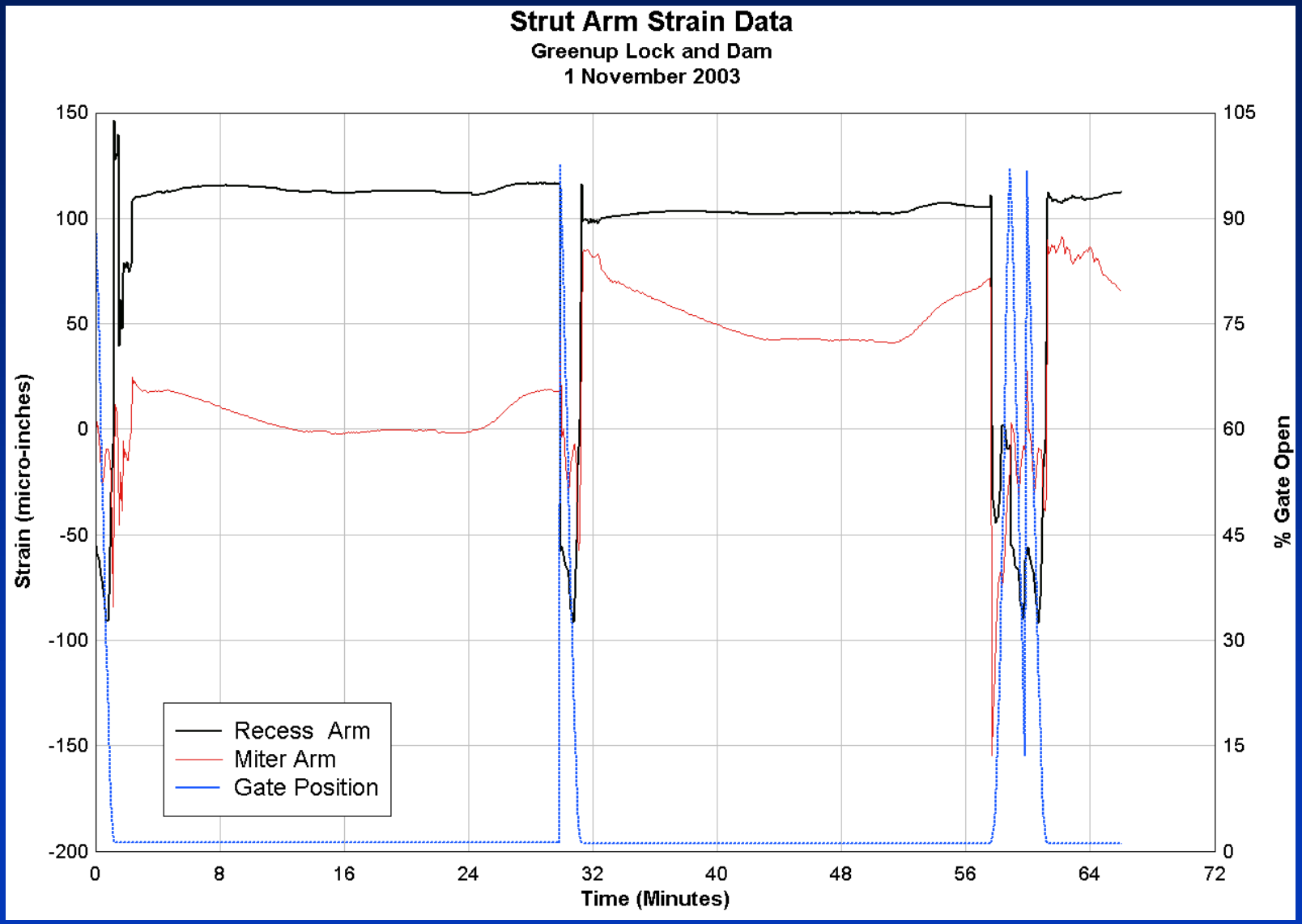


Strain Data – S2 Gages



US Army Engineer Research & Development Center

Strain Data – Strut Arms



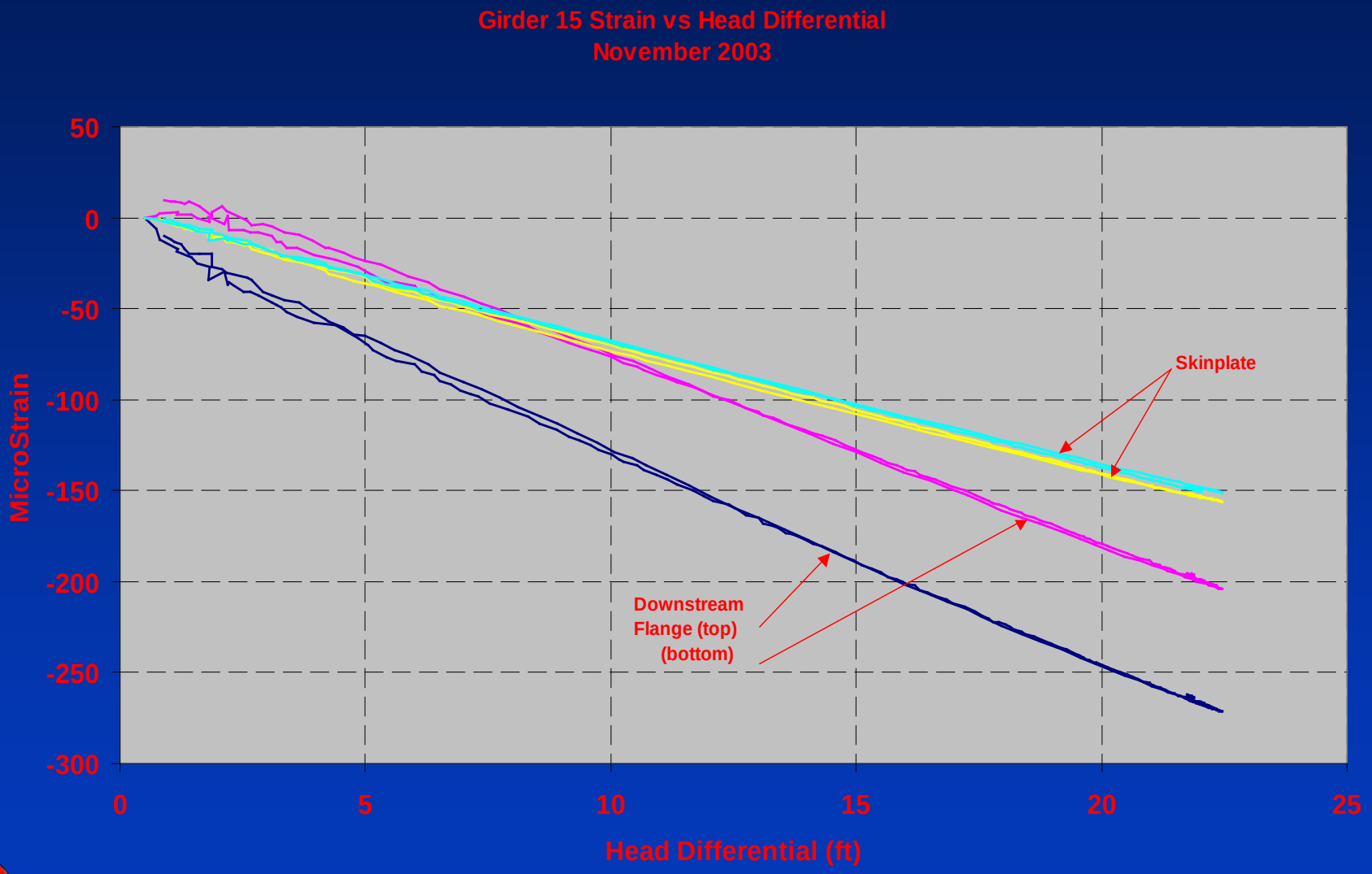
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Greenup L&D Miter Gate



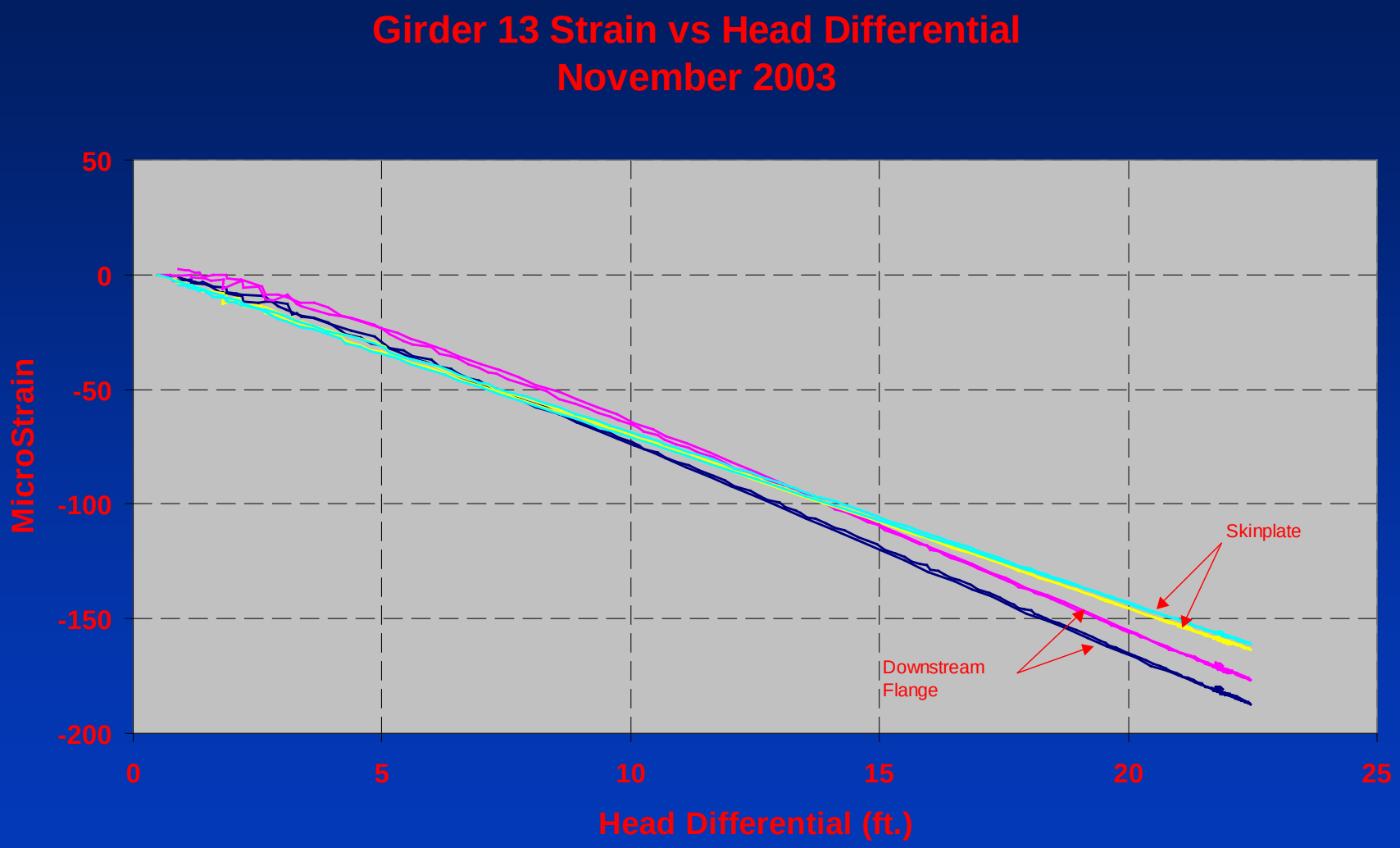
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Greenup L&D Miter Gate

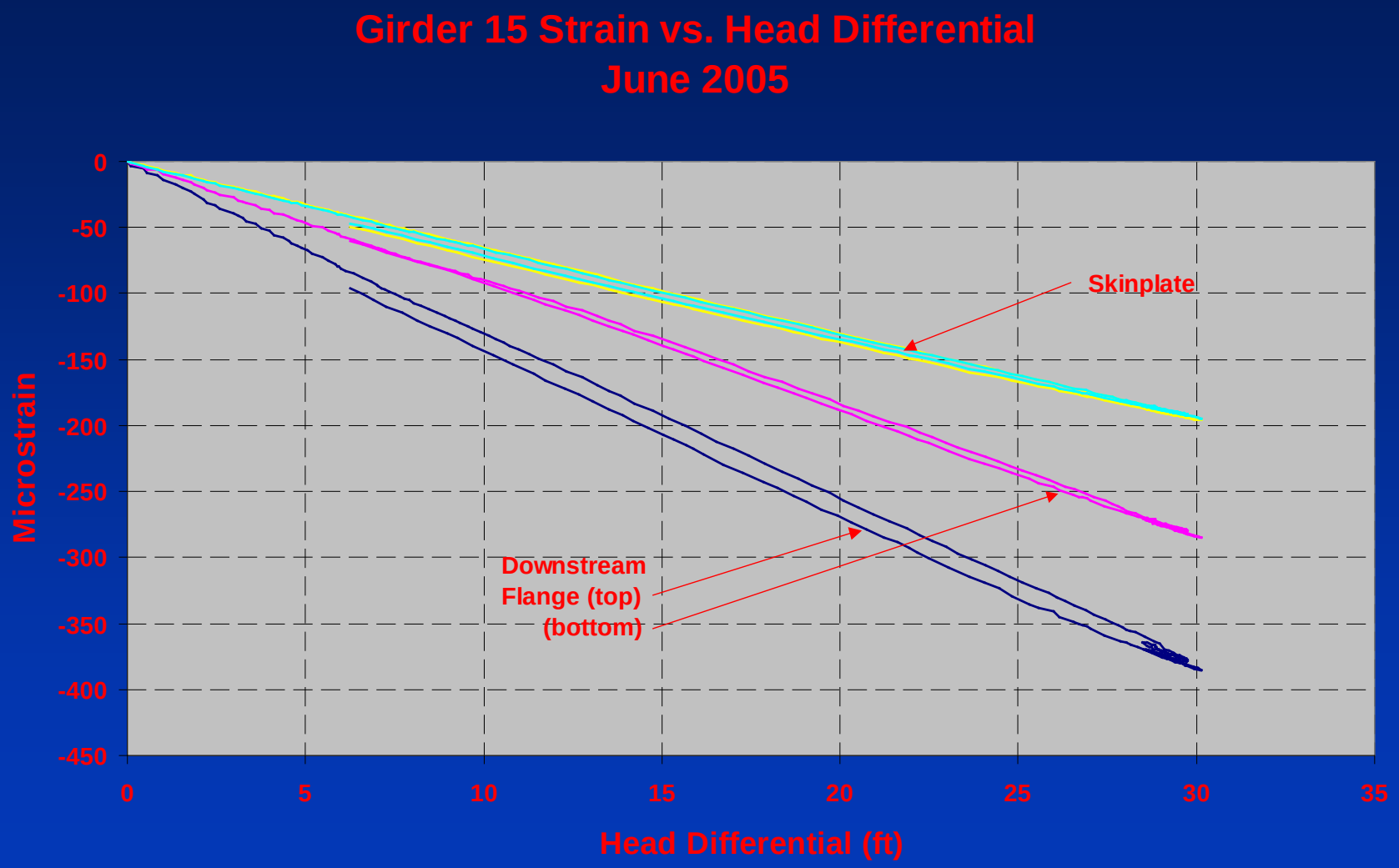


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Greenup L&D Miter Gate



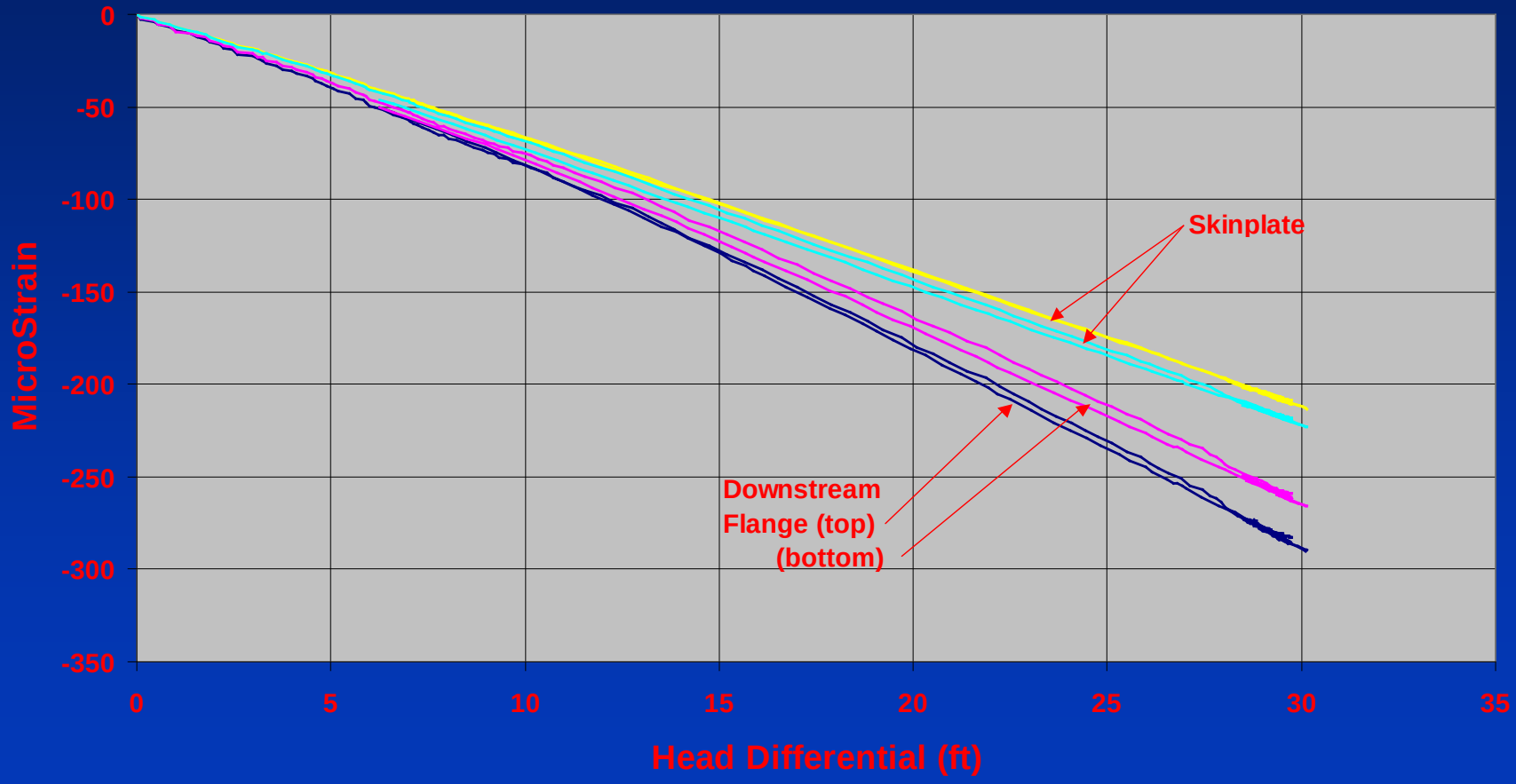
Greenup L&D Miter Gate



Greenup L&D Miter Gate

US Army Engineer Research & Development Center

Girder 13 Strain vs. Head Differential
June 2005



Greenup L&D Miter Gate

Instrumentation – Lessons Learned

Conclusions

- Installing instrumentation around emergency gate repairs is difficult
- A durable and lasting strain monitoring system with automatic data logging and remote access was successfully implemented
- Instrumentation was installed with no impact to repair schedule and at minimal cost
- Preliminary results to date indicate behavior as expected

Greenup L&D Miter Gate

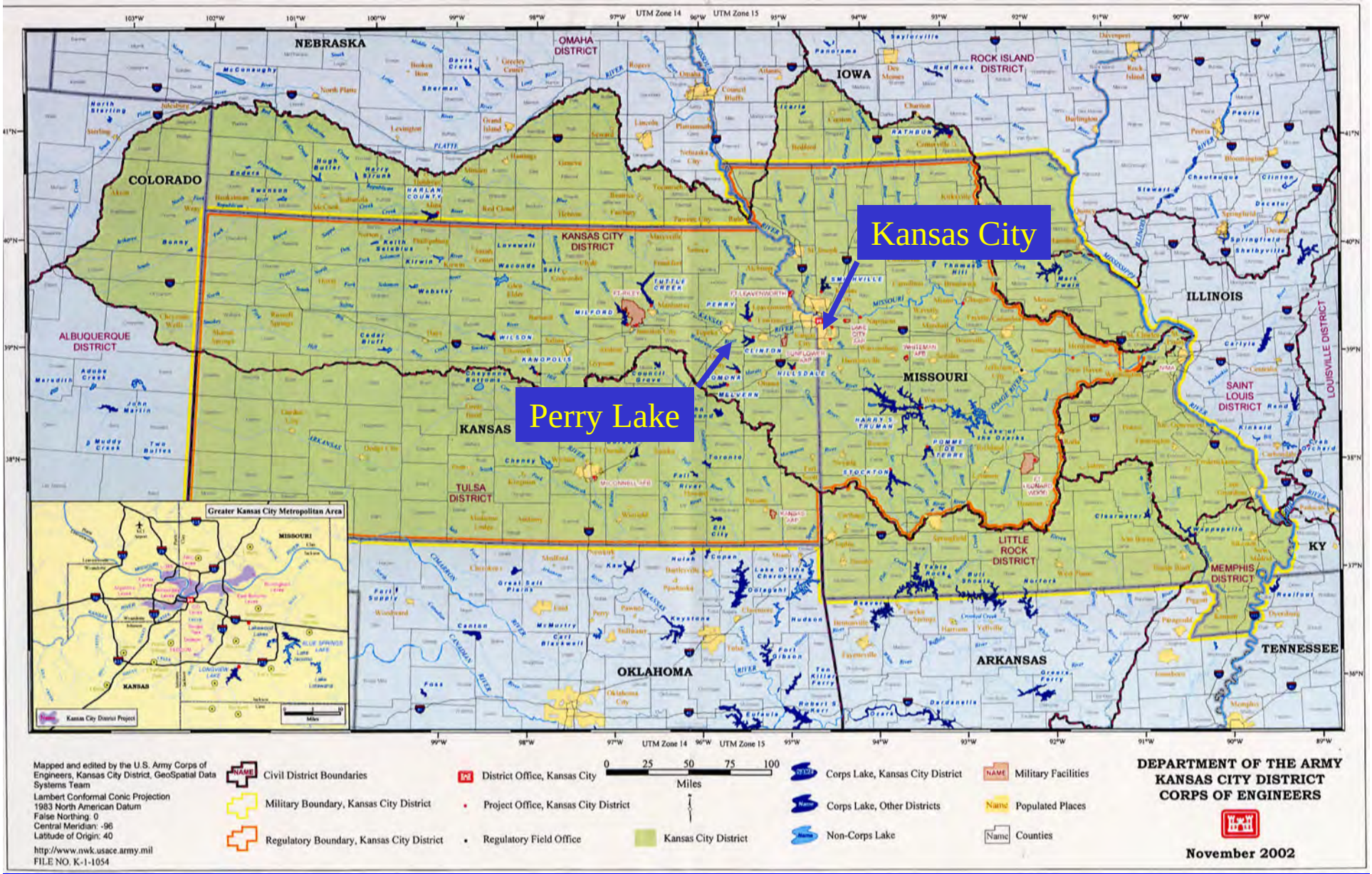
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Questions?

Kansas City District



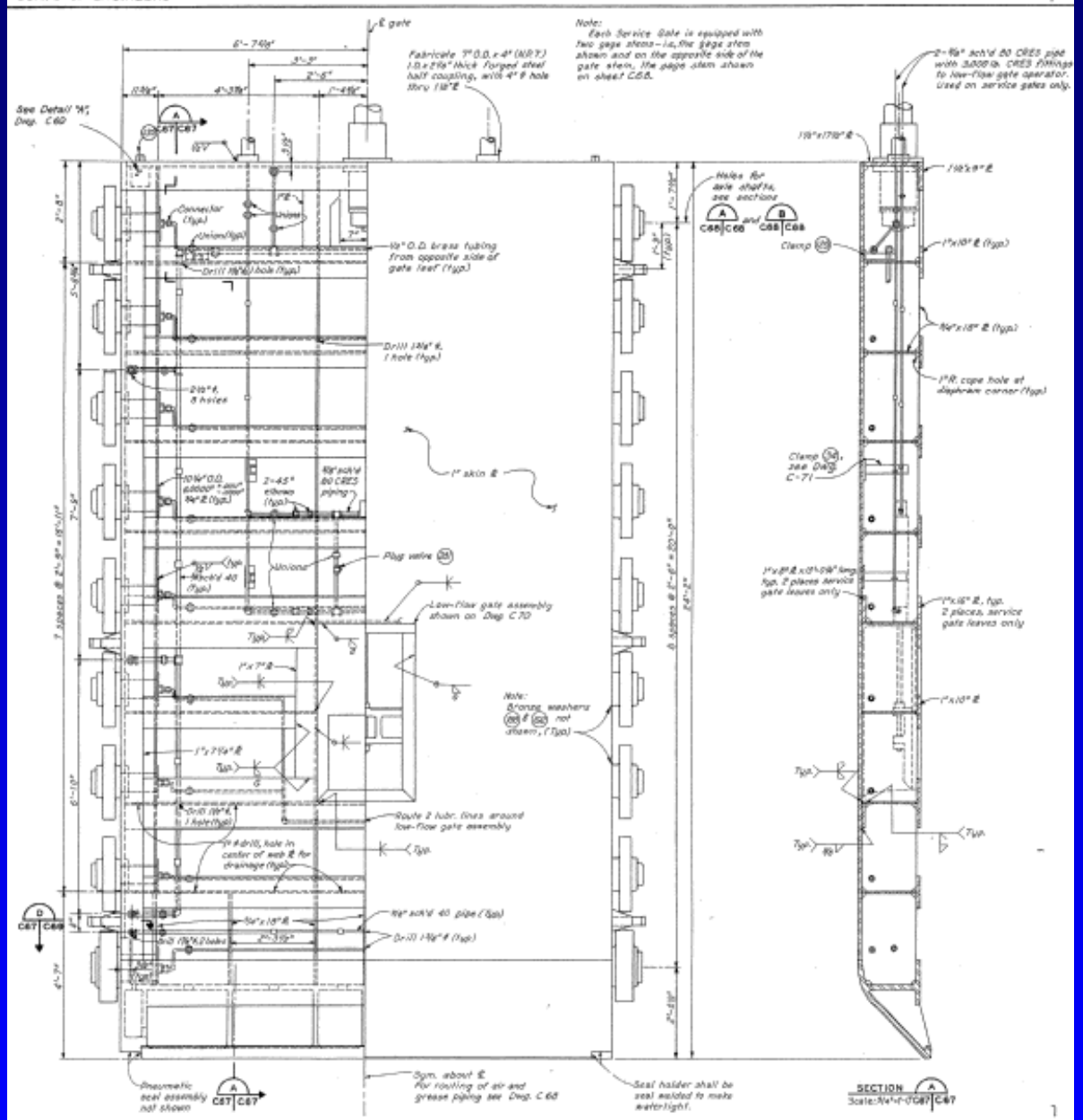
PERRY LAKE PROJECT GATE REPAIR
3 August 2005
MARVIN PARKS, E.I.T


Kansas City
Perry Lake
NEBRASKA
COLORADO
KANSAS
OKLAHOMA
IOWA
MISSOURI
ILLINOIS
ARKANSAS
KY
TENNESSEE
OMAHA DISTRICT
ROCK ISLAND DISTRICT
KANSAS CITY DISTRICT
ALBUQUERQUE DISTRICT
TULSA DISTRICT
SAINT LOUIS DISTRICT
LOUISVILLE DISTRICT
LITTLE ROCK DISTRICT
MEMPHIS DISTRICT
Greater Kansas City Metropolitan Area
UTM Zone 14
UTM Zone 15
Mapped and edited by the U.S. Army Corps of Engineers, Kansas City District, GeoSpatial Data Systems Team
Lambert Conformal Conic Projection
1983 North American Datum
False Northing: 0
Central Meridian: -96
Latitude of Origin: 40
http://www.nwk.usace.army.mil
FILE NO. K-1-1054
Civil District Boundaries
Military Boundary, Kansas City District
Regulatory Boundary, Kansas City District
District Office, Kansas City
Project Office, Kansas City District
Regulatory Field Office
0 25 50 75 100
Miles
Kansas City District
Corps Lake, Kansas City District
Corps Lake, Other Districts
Non-Corps Lake
Military Facilities
Populated Places
Counties
DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT
CORPS OF ENGINEERS
November 2002





CORPS OF ENGINEERS



DOWNSTREAM ELEVATION

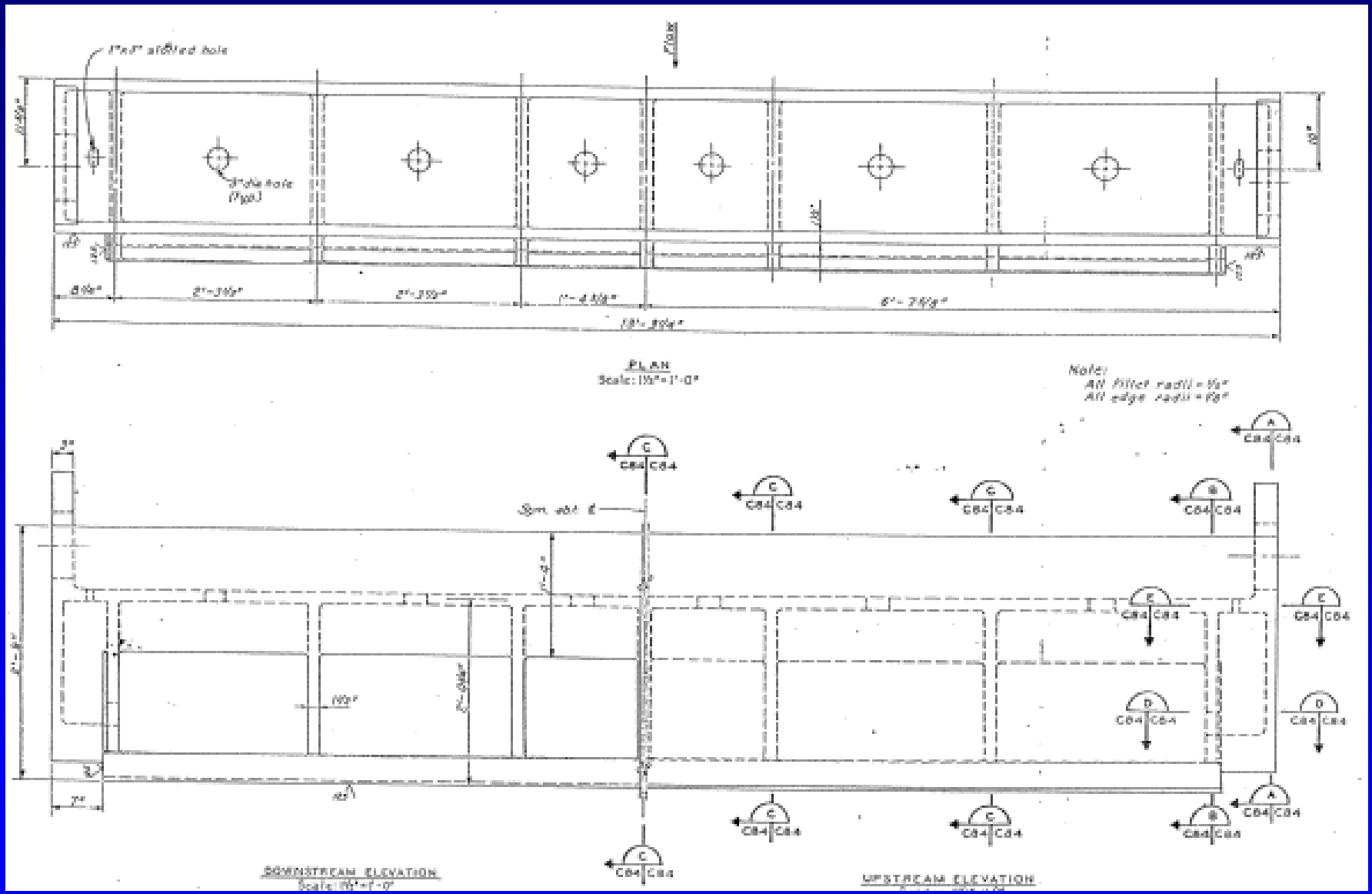
UPSTREAM ELEVATION *

SERVICE GATE LEAF (26)

MAKE 2

Scale: ¾" = 1'-0"

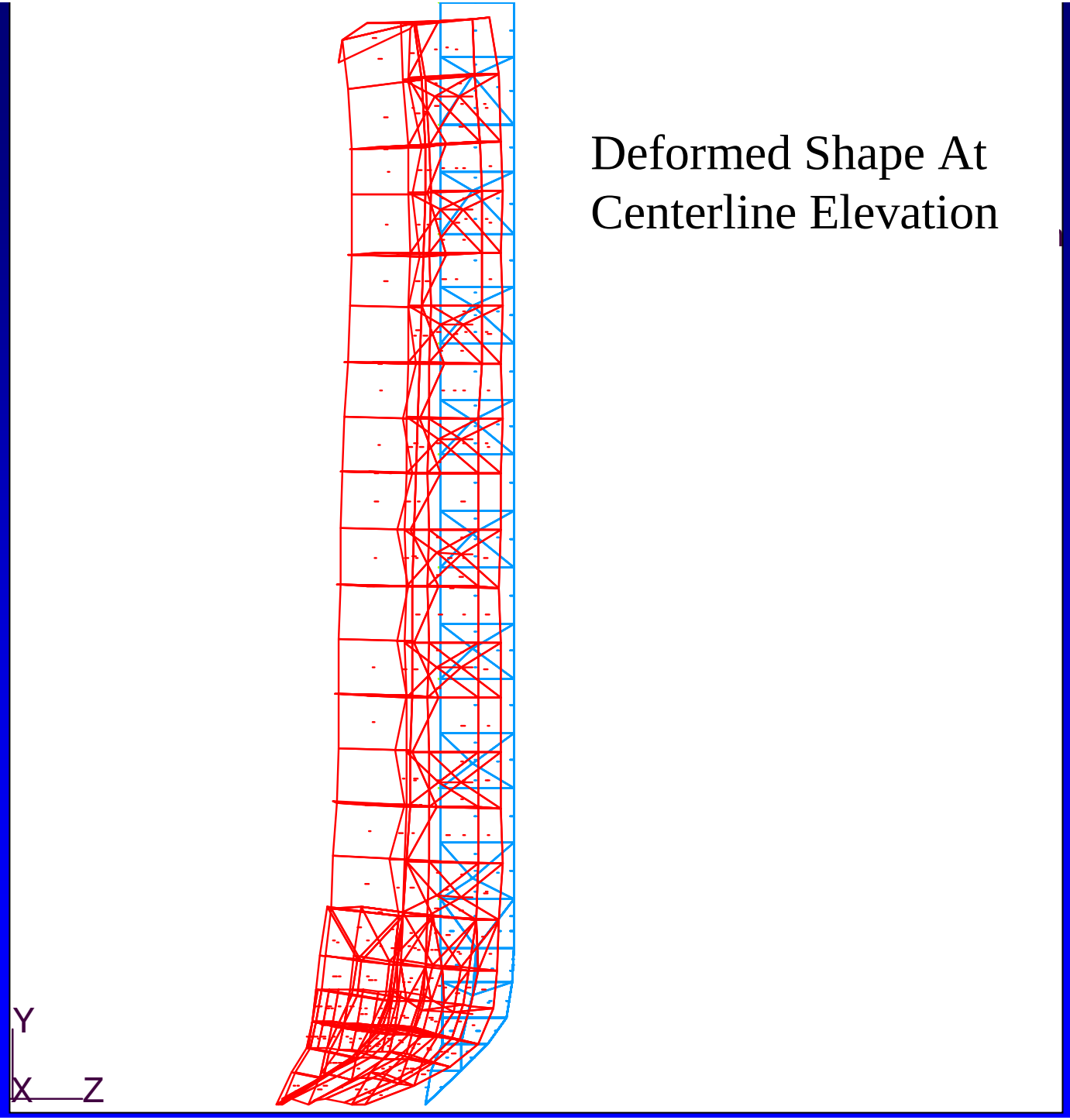
*Service gate leaf for No.2 passage is shown. Service gate leaf for No.1 passage shall have the low-flow gate piping routed thru the opposite gage stem, compr. air and grease piping shall then be routed thru gage stem shown. (Make 1 as shown. Make 1 with routing of piping symmetrically opposite.)


1"x3" slotted hole
3" dia hole (Typ.)
PLAN
Scale: 1½"=1'-0"
Note:
All fillet radii = ½"
All edge radii = ⅛"
DOWNSTREAM ELEVATION
Scale: 1½"=1'-0"
UPSTREAM ELEVATION





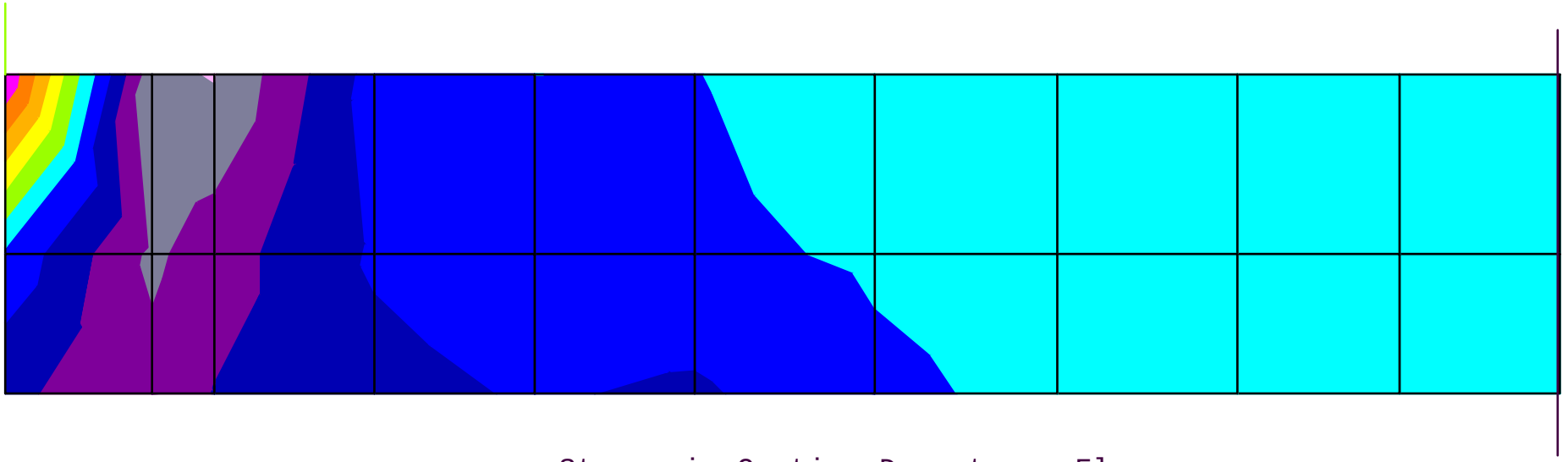




Deformed Shape At
Centerline Elevation

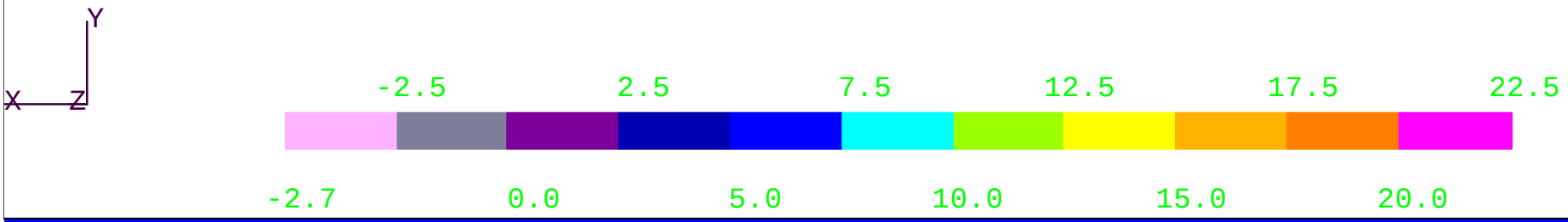
Downstream Elevation

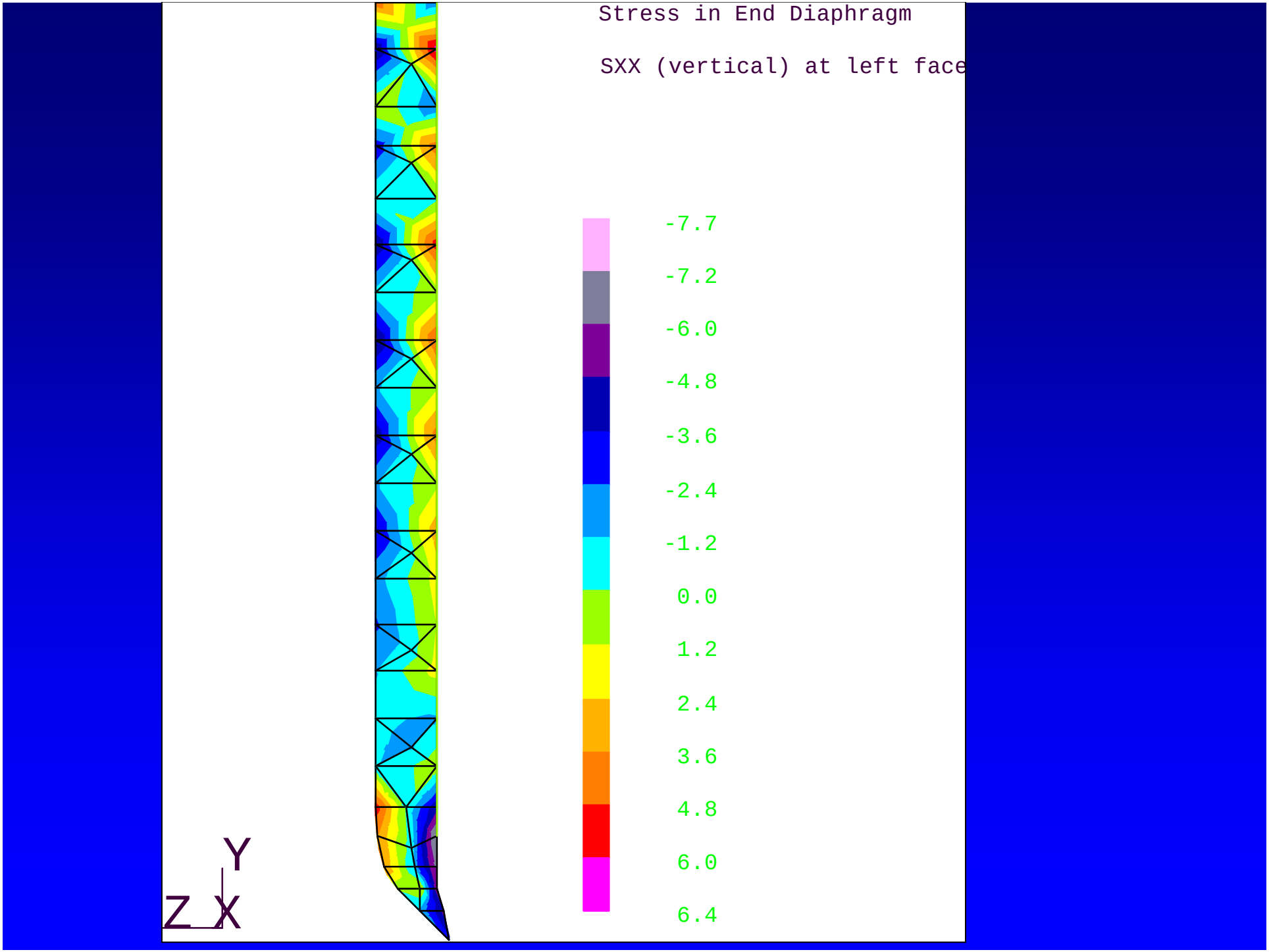
centerline

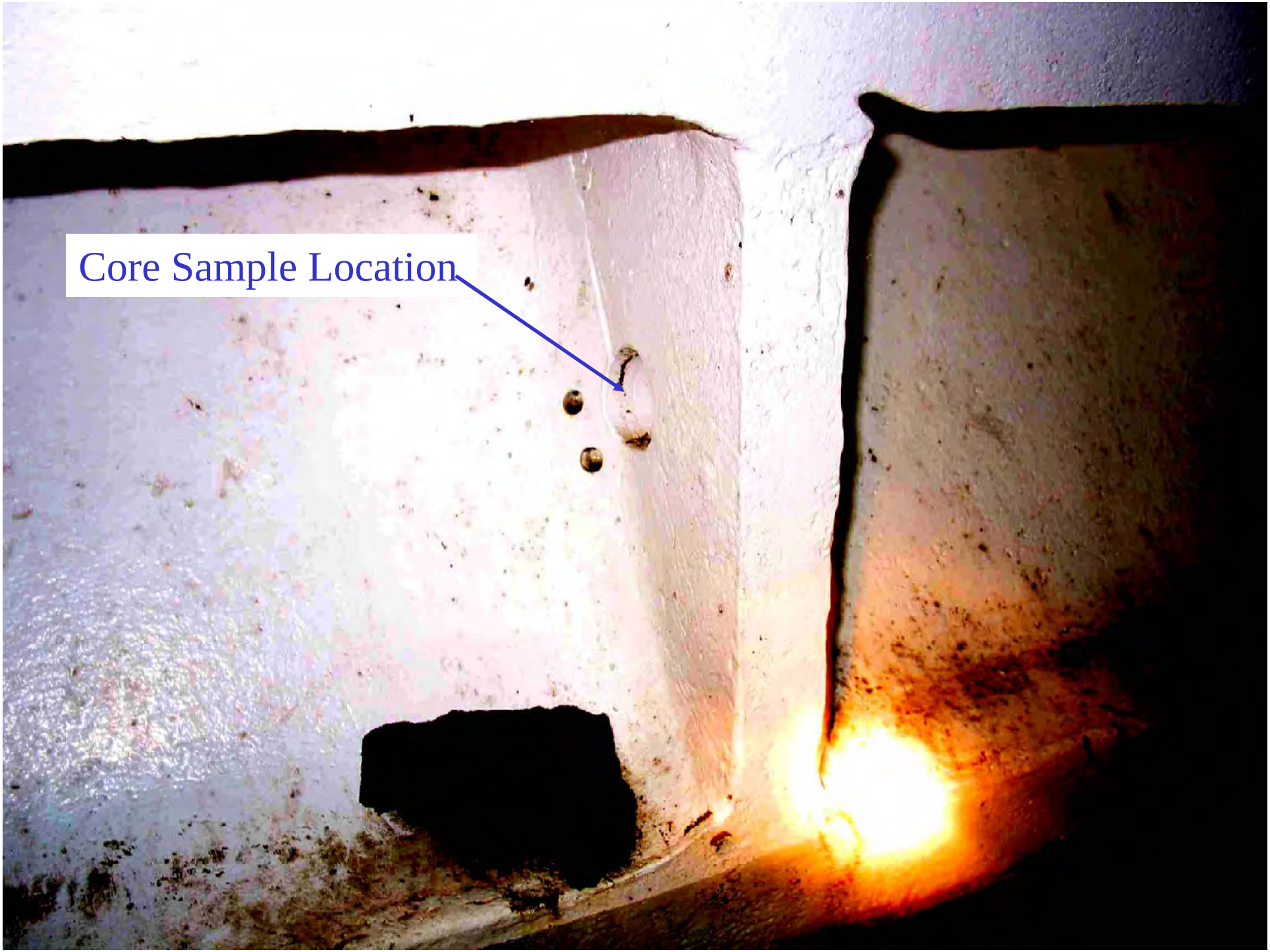


Stress in Casting Downstream Flange

SXX (horizontal) at upstream face

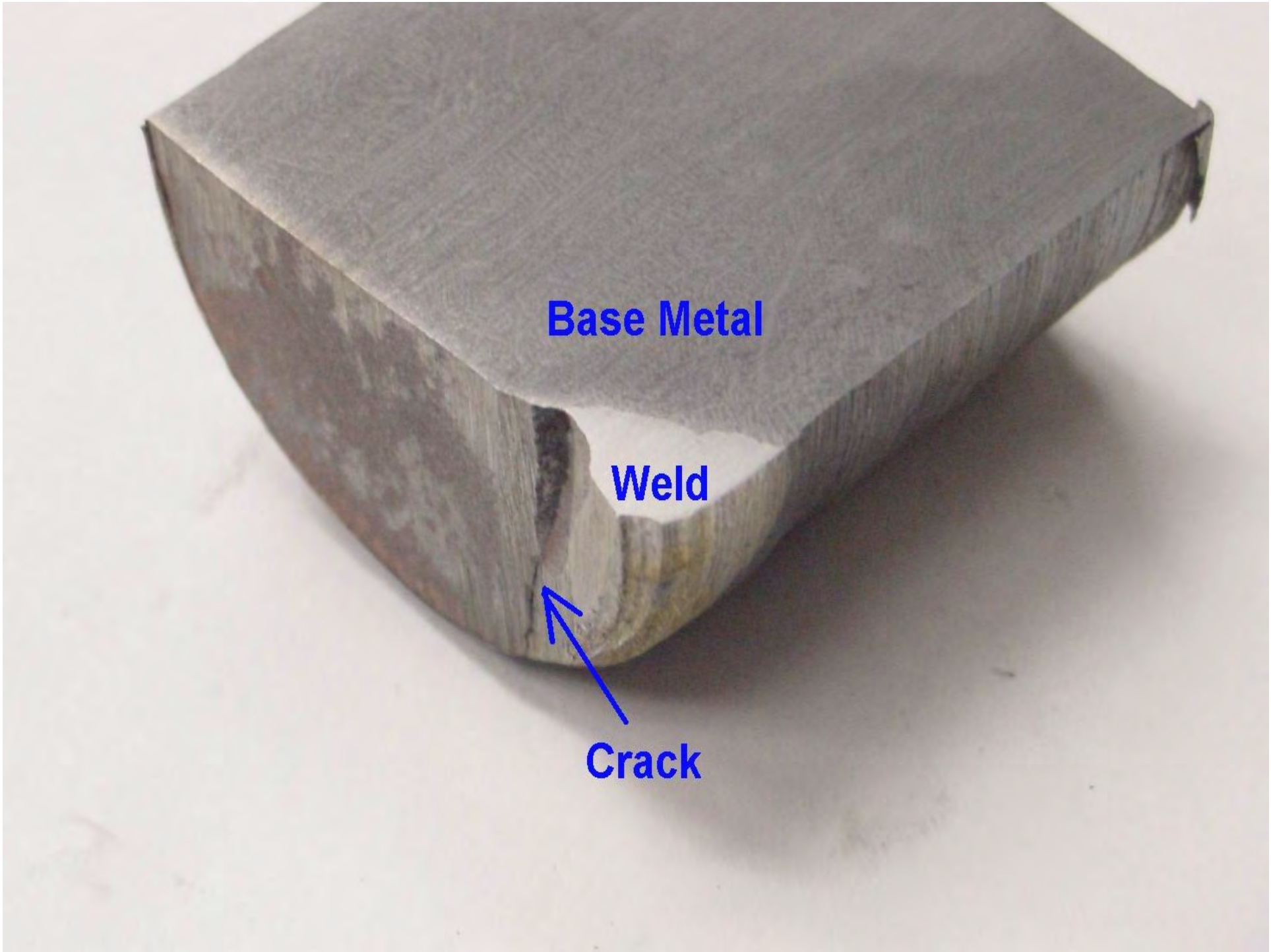


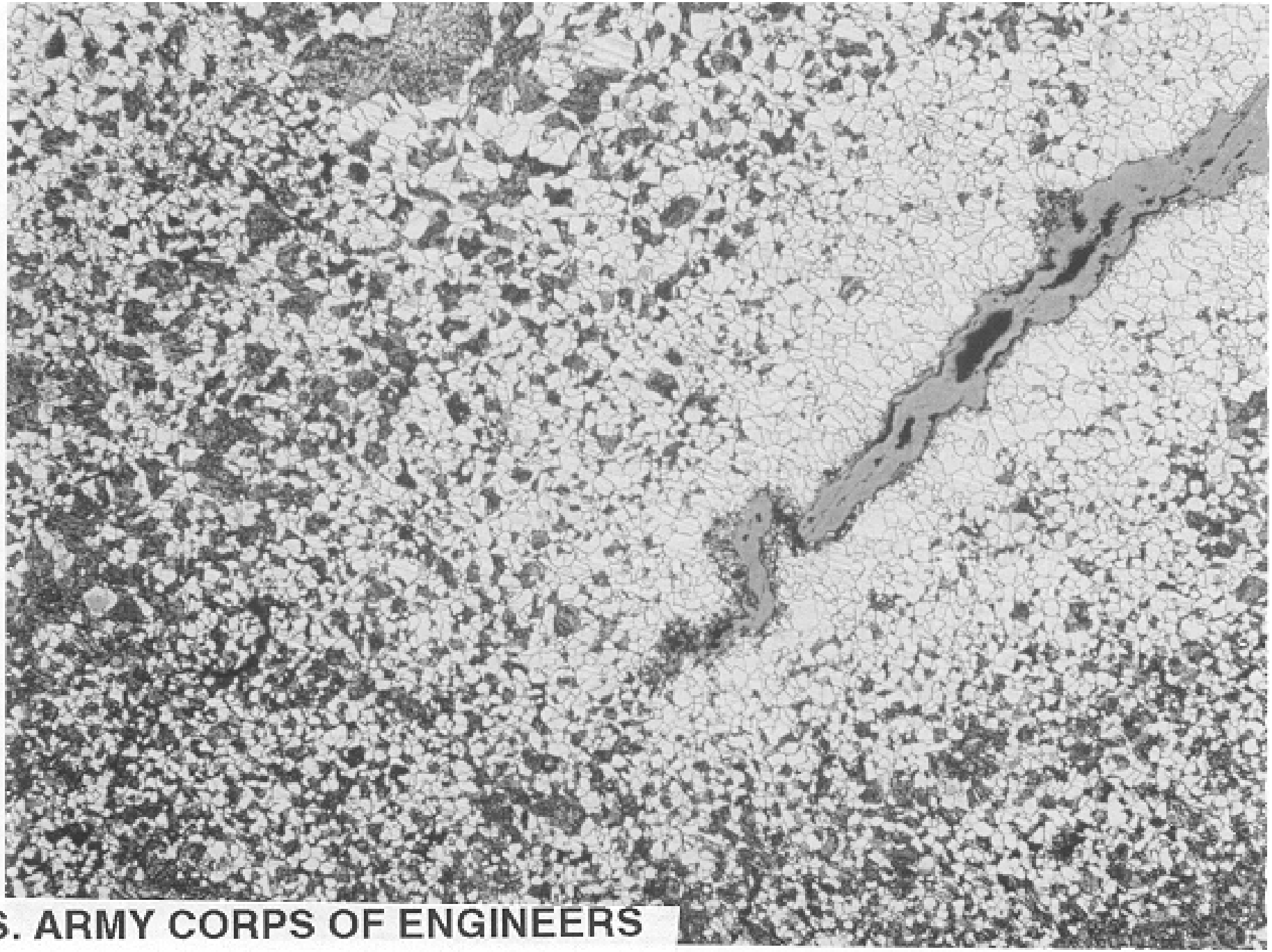

Stress in End Diaphragm
SXX (vertical) at left face
-7.7
-7.2
-6.0
-4.8
-3.6
-2.4
-1.2
0.0
1.2
2.4
3.6
4.8
6.0
6.4
Y
Z
X


Core Sample Location



Core Sample, Service Gate No. 1


Base Metal
Weld
Crack



U.S. ARMY CORPS OF ENGINEERS

Lab No. 01M0789, **Fig 4, 50X**

ANALYTE	PLUG
Total Carbon	.34
Silicon	.43
Sulfur	.042
Manganese	.88
Phosphorus	.035
Nickel	.74
Chromium	.88
Molybdenum	.39
Copper	.13
Vanadium	ND
Aluminum	.033

Service Gate No. 1
Casting Core Sample
Chemical Analysis

Repair Alternatives

- Weld repair the existing cracks and return gate to service
- Replace cast gate leaf with another cast steel gate leaf
- Remove (cut) the cast gate leaf and replace with a fabricated steel section

Repair Alternative Chosen

- Remove (cut) the cast gate leaf and replace with a fabricated steel section

Justification

- Long-term cost relative to weld repair
- Cast steel difficult to repair and risky
- Casting a new gate leaf ~ $80k
- NDT and maintenance issues with cast steel








1330 lbs





Fabrication

- A572 GR 50 material
- ASTM A 770 requirement for end diaphragms
- Charpy V-Notch requirement for end diaphragms, skin plate and structural tee
- AISC Group 3 structural tee

Welding

- Most important aspect of the work
- Weld Procedure Qualifications
- Stress Relieving
- Preheat and Interpass Temperature
- NDT / CWI

Take-Away Points

- Coal-tar epoxy paint-may protect, but it definitely hides flaws
- Know what you are working with
- Insist on AISC certification fabricators
- Follow AISC provisions on heavy shapes when applicable. Stay away from Group 4 and 5 shapes if possible.

Take-Away Points, con’t

- Use AWS D1.5 FCP on HSS, especially for new construction
- “UT” or to not “UT”
- Insist on AISC certified fabricators
- NDT is not a panacea

Comments / Questions

Contact Info

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US Army Corps of Engineers
Kansas City District

Marvin.L.Parks@usace.army.mil

816-983-3253



Presentation to the

2005 Tri-Service Infrastructure Systems Conference

Thomas J. Quigley, Brian K. Kleber and Thomas R. Ruf

U.S. Army Corps of Engineers
St. Louis District

August 3, 2005

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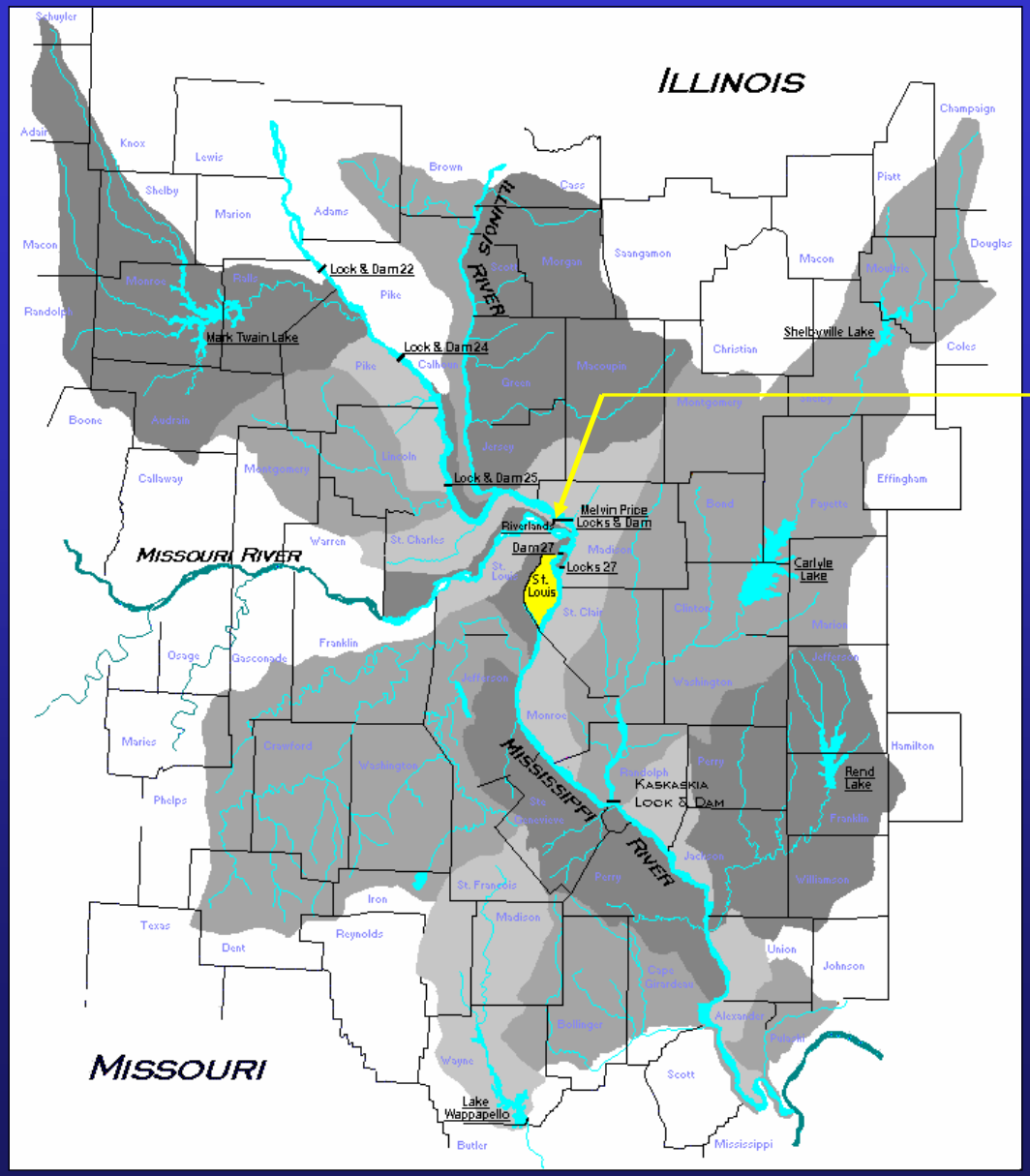
Mel Price – Auxiliary Lock Downstream Miter Gate Repair



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Mel Price Locks and Dam

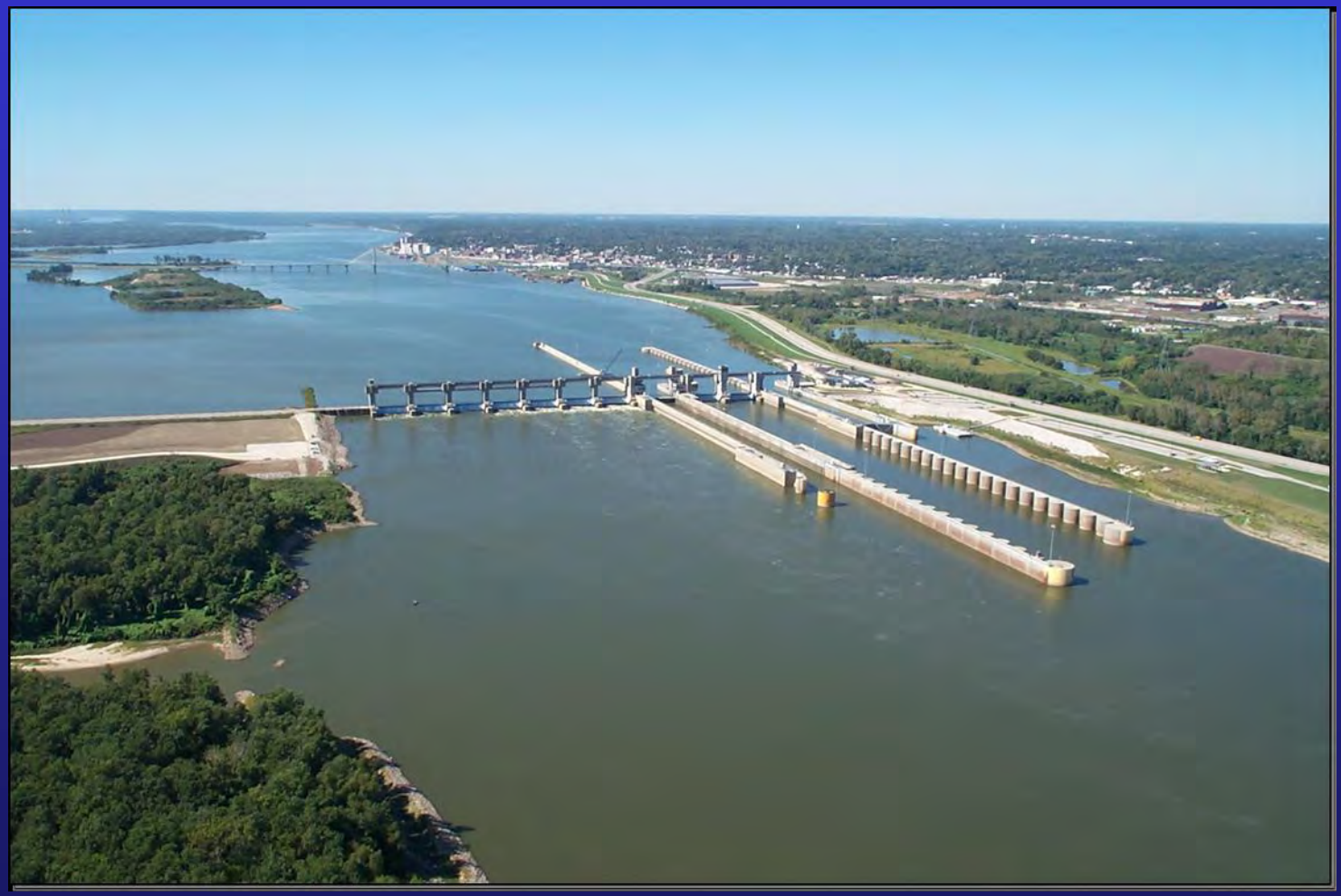


Project Location

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Mel Price Locks and Dam



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Mel Price Accident
3 October 2004

What Happened?

Why Did It Happen?

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Mel Price Accident

What Happened?

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Miter Gate Functioning Normally



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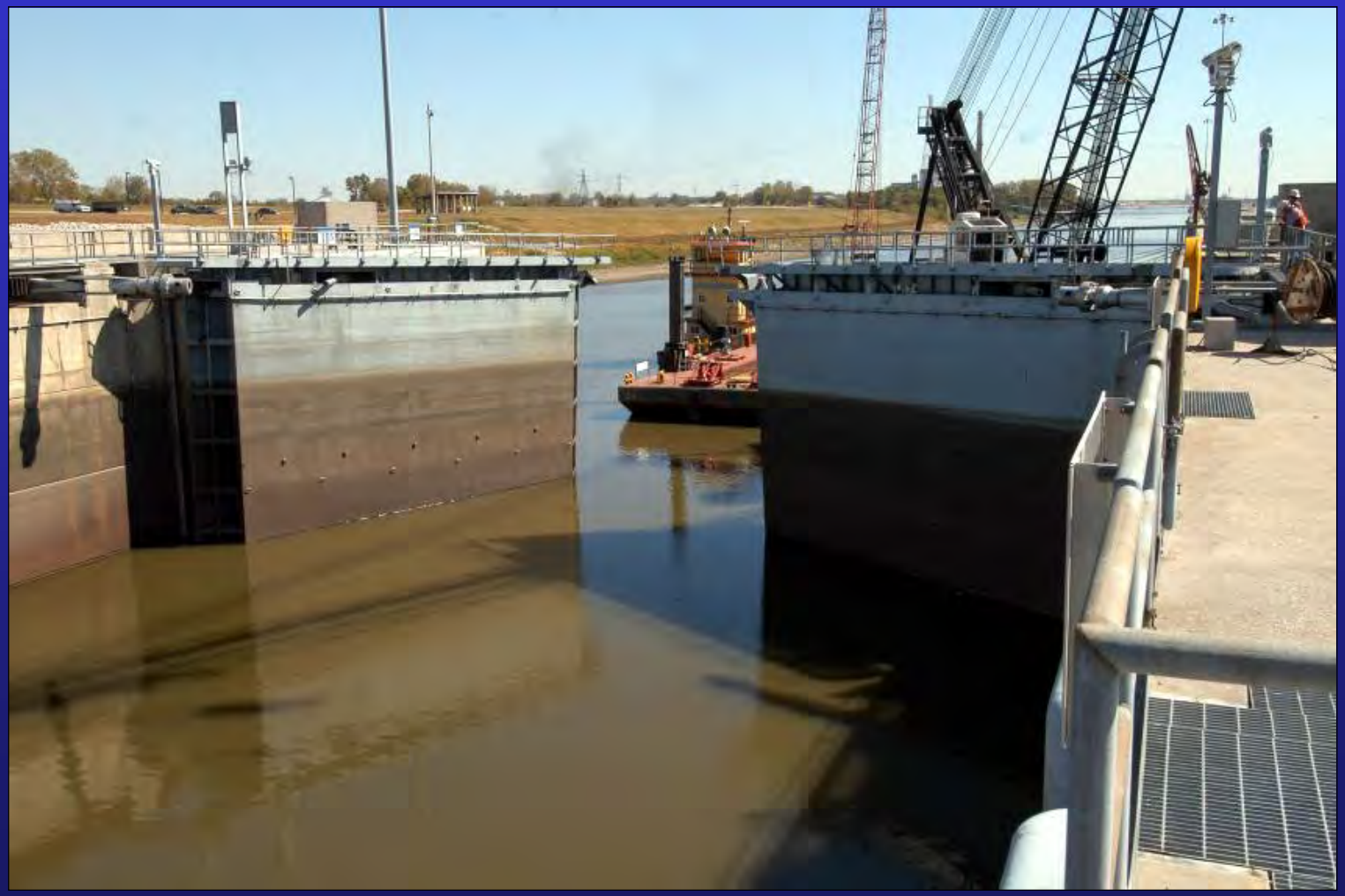
Gate Leafs Forced Downstream From Normal Mitered Position



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Gate Leafs Forced Downstream From Normal Mitered Position



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Mel Price Accident

Damage Summary

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Damage to Gate Anchorages



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Damage to Gate Anchorages



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Damage to Gate Anchorages



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Failed Operating Struts

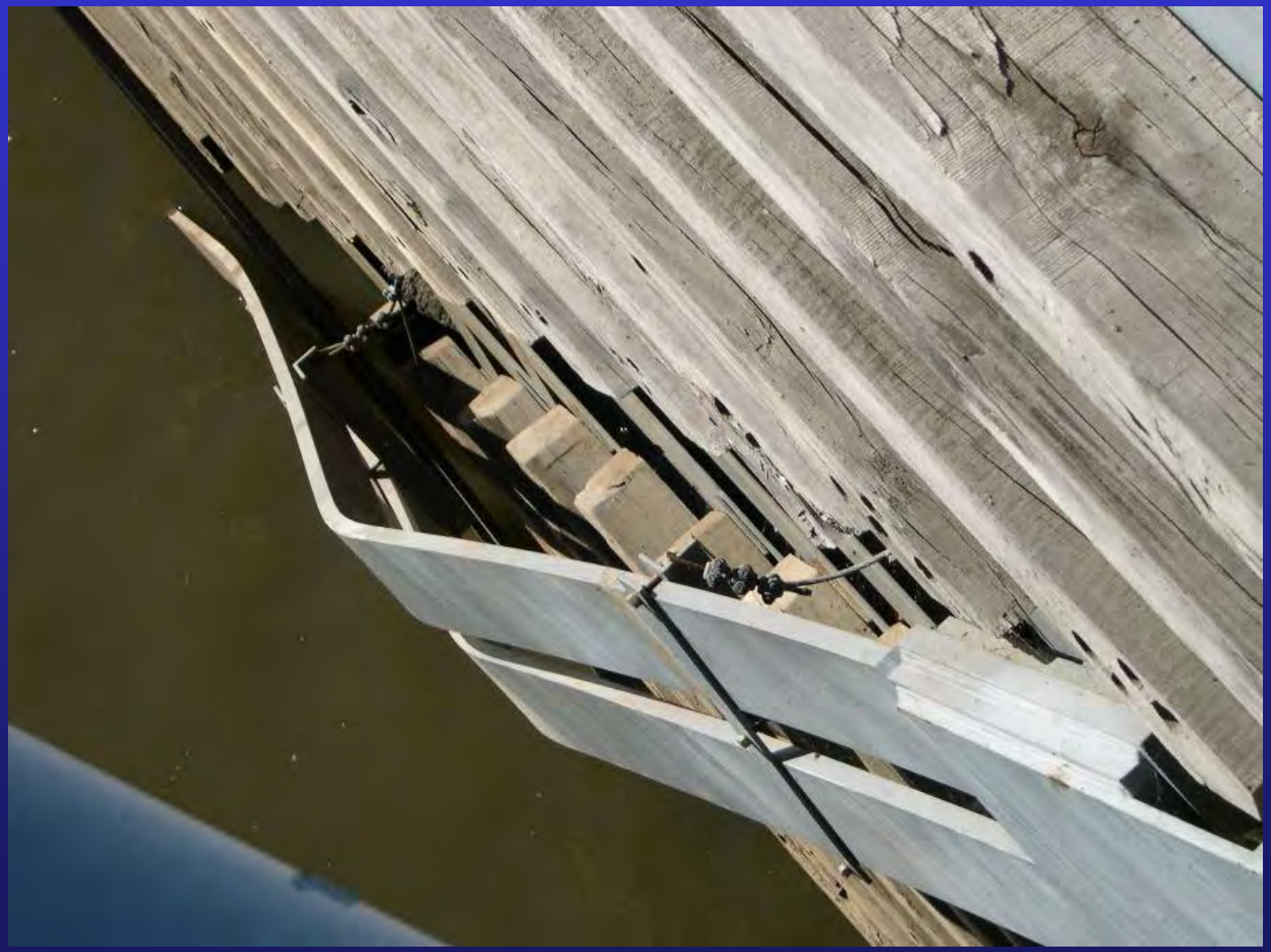




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Diagonal Failure



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Damage to Miter End of Leafs









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Pintle Socket Sheared Off





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Bent & Cracked Pintle Socket



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Pintle Ball Retainer Sheared Off



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Bottom Seal Damaged



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Mel Price Accident

Why Did It Happen?

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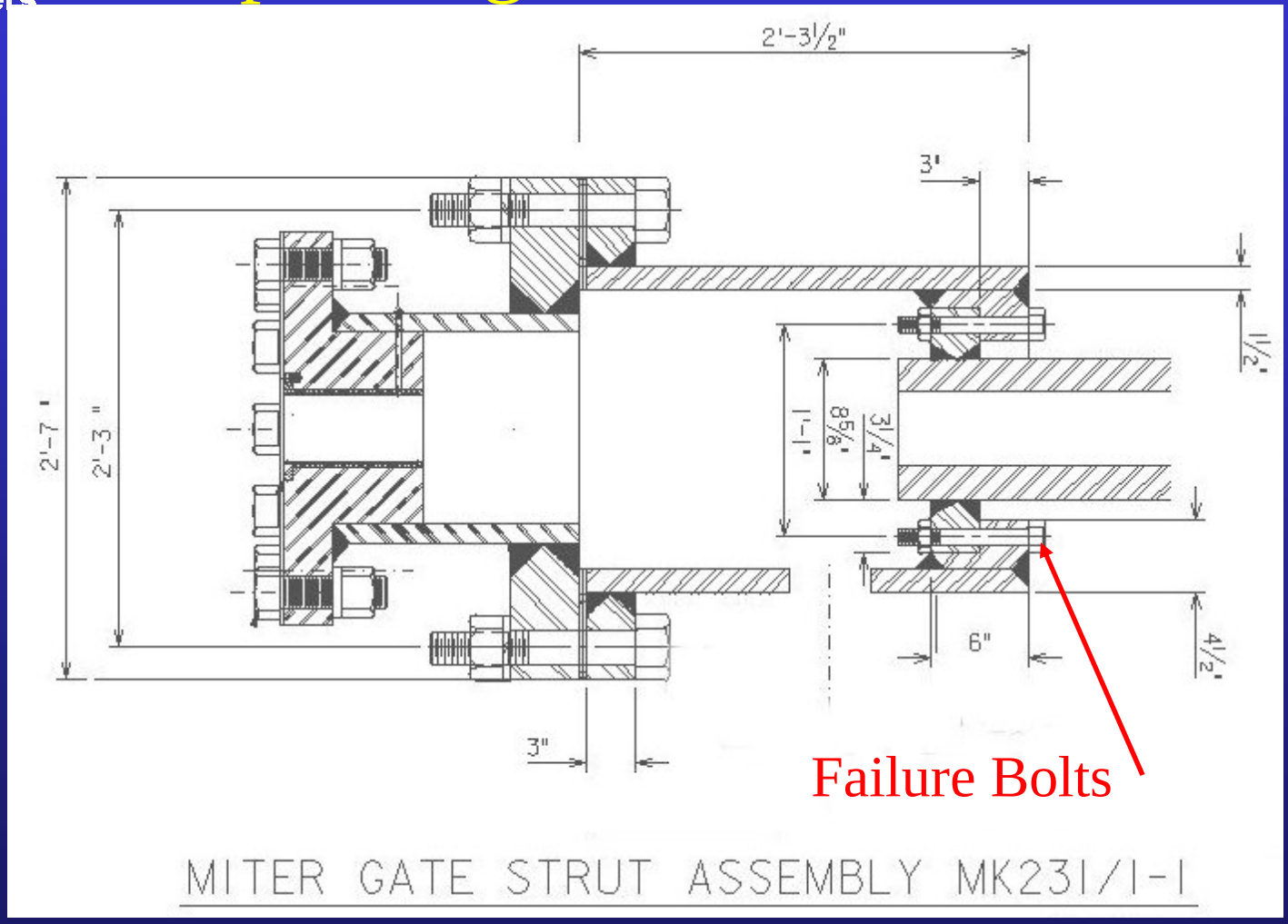
Gate Operating Arm



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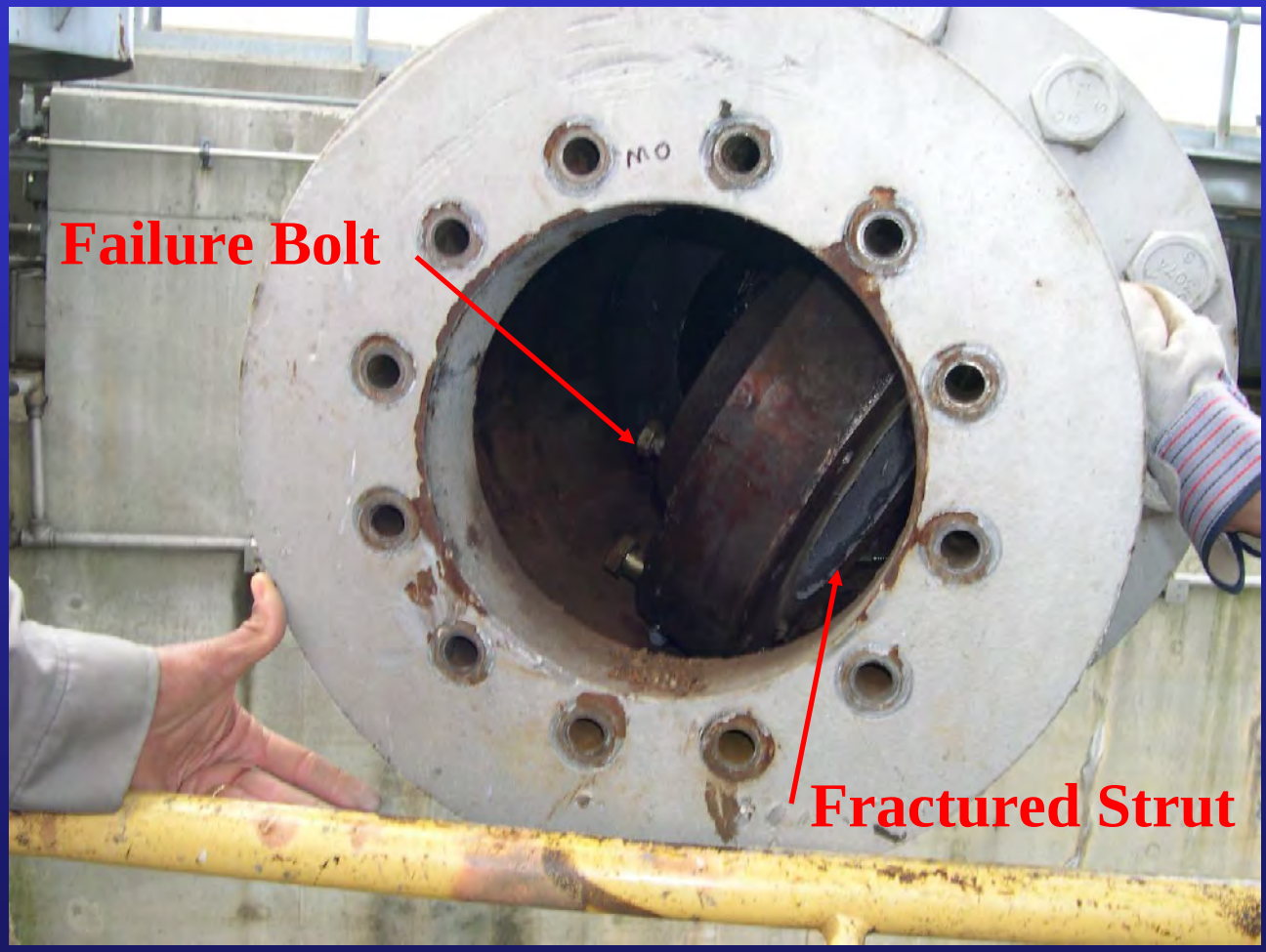
Operating Arm Failure Tube



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Failure Tube



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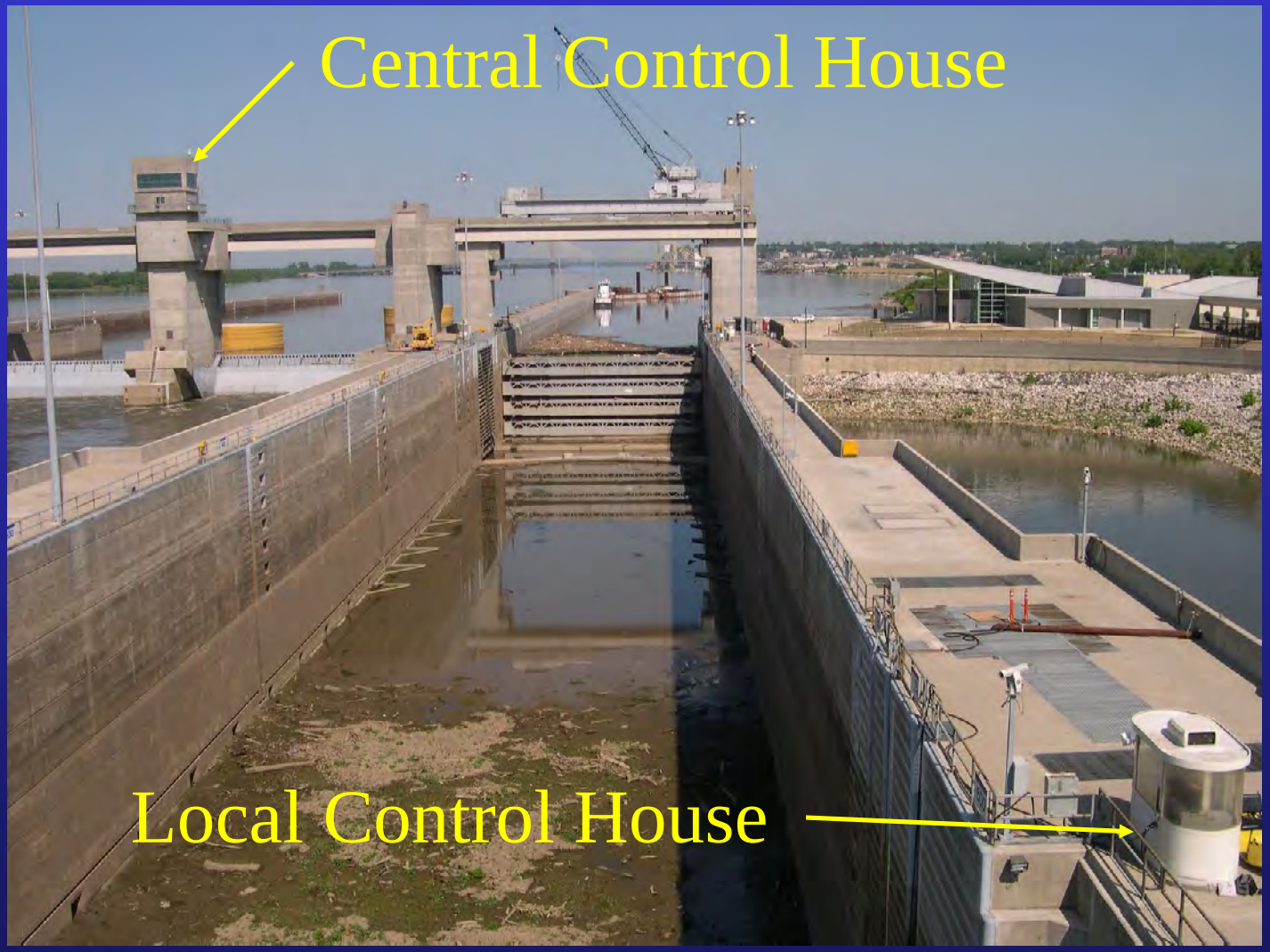
Normal Miter Block Position



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Gate Control Stations



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Magnetic Proximity Switch on Gate



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Switches on Machinery Rack



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Modification of PLC Logic



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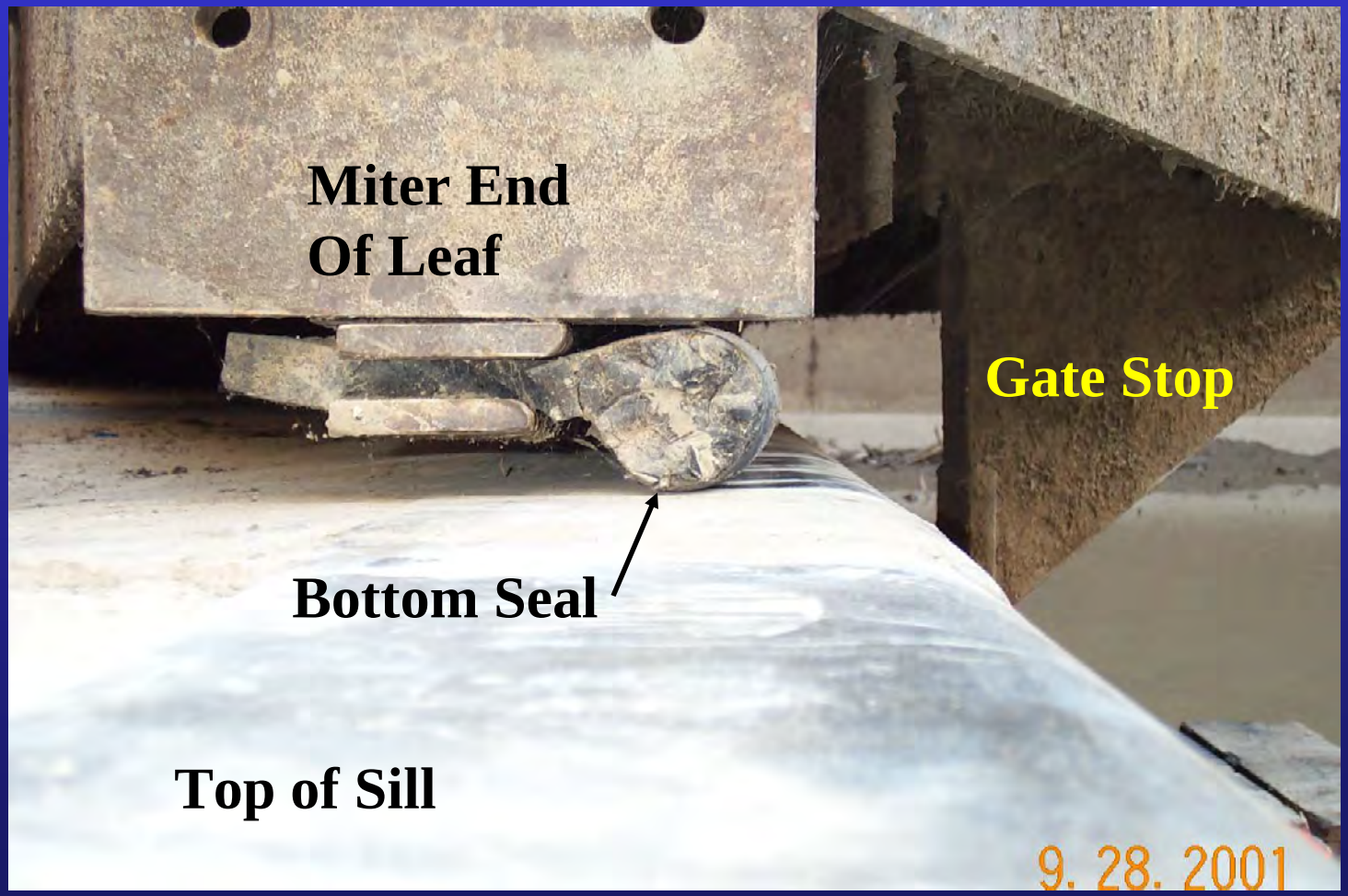
Miter Gate Sill



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Miter Gate Sill



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Investigation Report Findings



- Increased hydraulic system relief pressures and fracture of the strut failure tube failure bolts.
- Leaves not mitered.
- PLC programming incorrectly indicated that the downstream gate was mitered (closed).
- No operator verification of miter or intervention.
- Filling of lock chamber with the downstream gate leaves not in miter.
- Appreciable unbalanced head on the unmitered downstream gate leaves
- Catastrophic failure – miter gate leaves move past miter

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Actions Taken By MVS Based on Report Recommendations

1. Standard Operator Procedures and Training
2. Programming Ladder Logic Control
3. Additional Miter Gate Switch
4. Policy on Changes and Inter-Office Coordination
5. Relief Valve Gages and Mechanical Linkages

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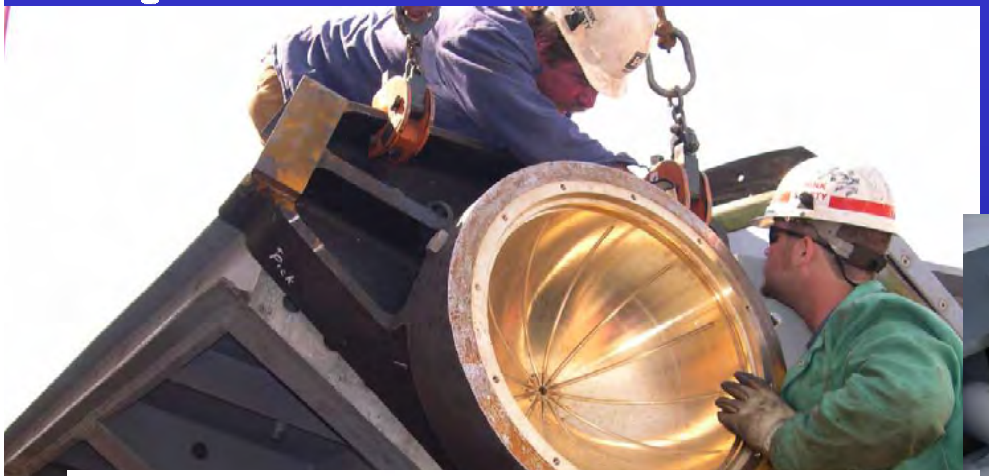
All-Discipline Team



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Concentrate On Critical Activities







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Variety of Contract Instruments







- Best Value
- AE IDIQ
- MIPR
- Purchase Order
- Lump Sum Contract
- Credit Card

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Team Visits

Engineers conferring with Contractor

Diagonal Stressing Team





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What We Did Right



- All-Discipline Team
- Communicate, Communicate, Communicate
- Concentrated On Critical Activities
- Hired Contract Employee To Schedule Service Base And Contractor Work
- Contingency Planning
- Used Any and All Contract Options
- Team Project Visits To See Progress
- Kept Exec Office Involved
- Risk reduction measures to keep the main lock operating.

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Gate Repairs



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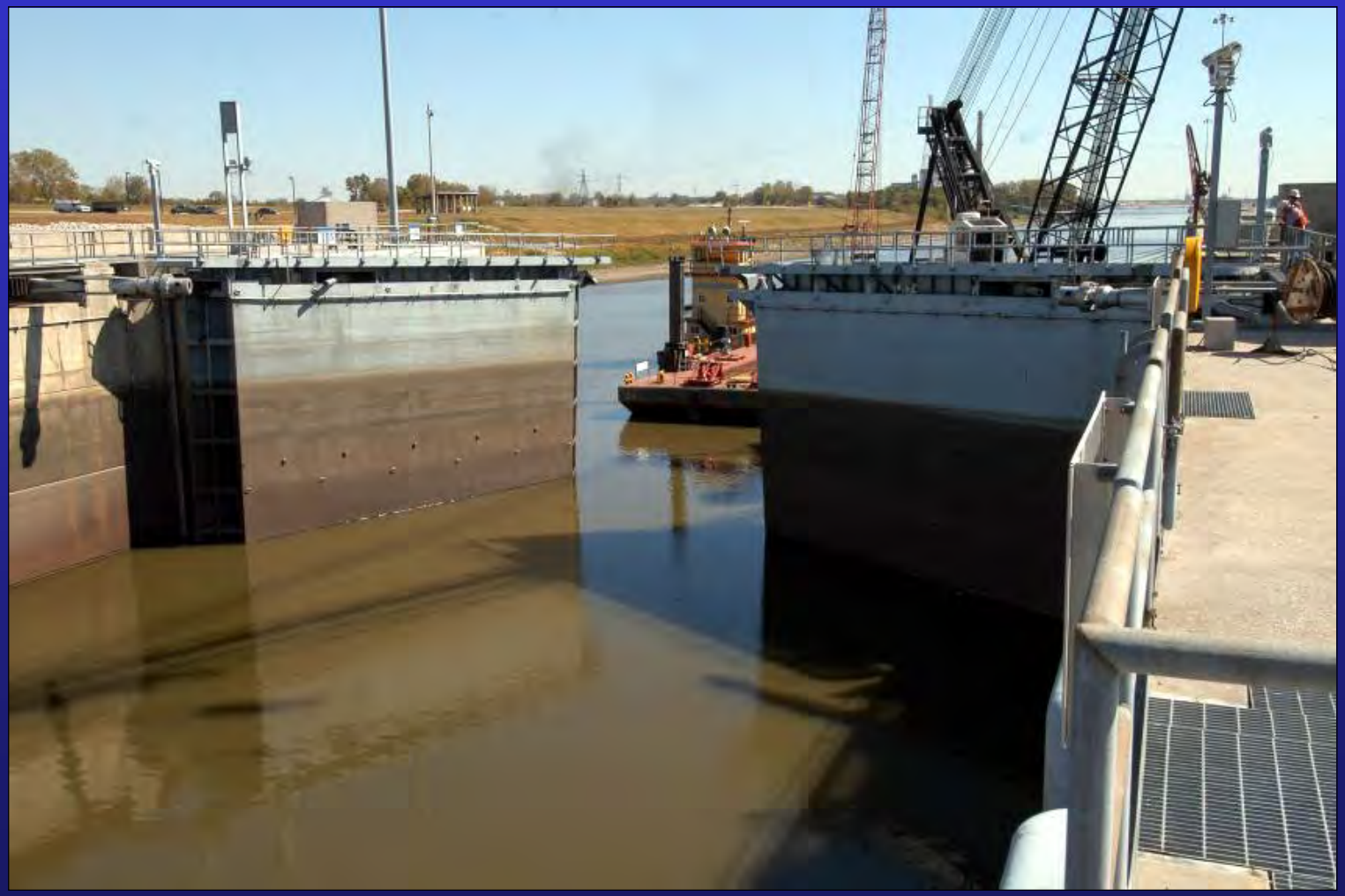
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Gate Repairs

Pulling Gate

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Position of Leafs After Accident



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Cutting Gate Anchors



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Removing Illinois Leaf



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Placing Illinois Leaf on Spare Gate Barge



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Guy Cables Installed



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Guy Cables Installed



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Both Leafs Secured on Spare Gate Barge



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Damage Inspection





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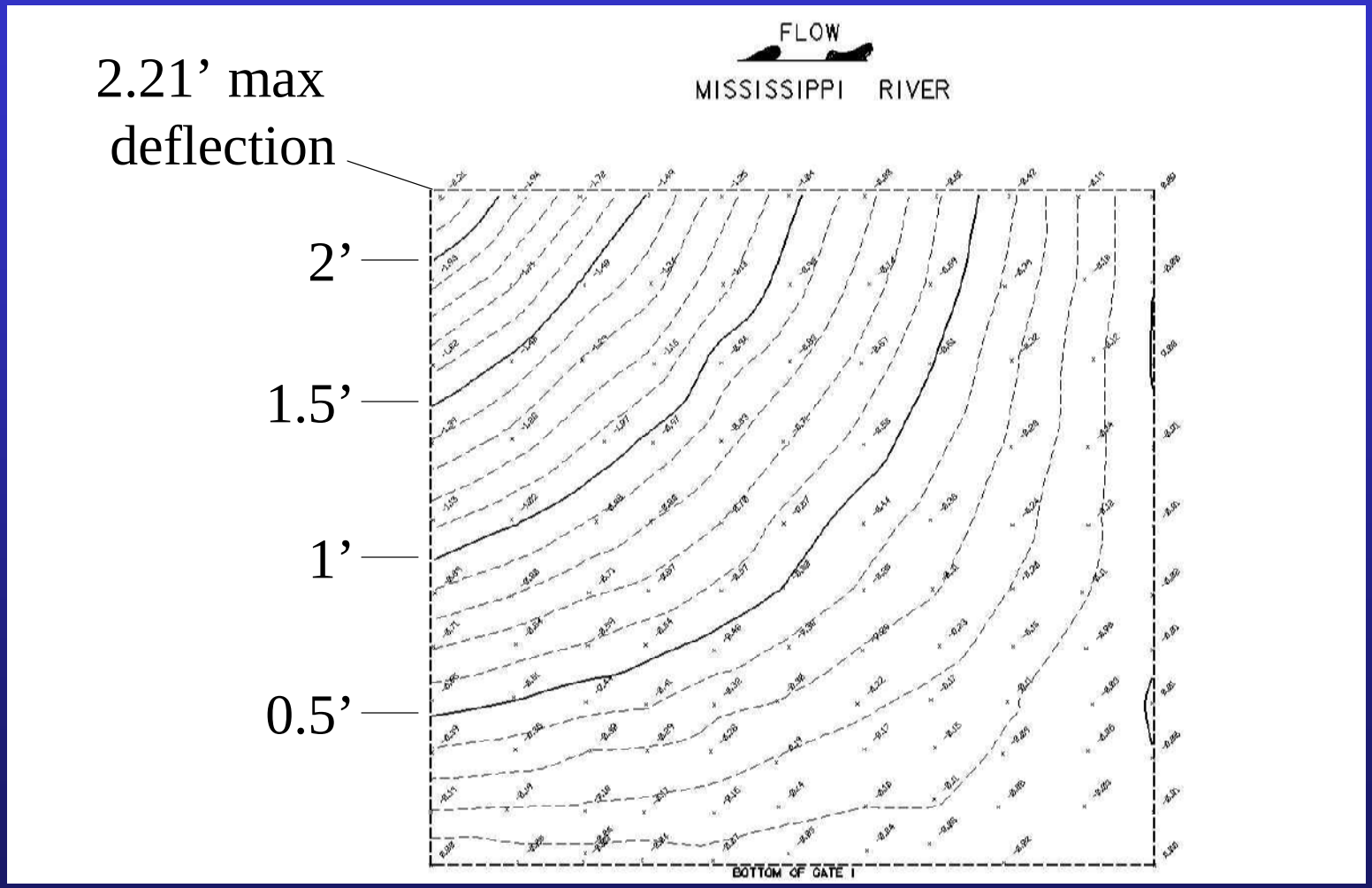
Surveying Damaged Gate



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Survey Results – Illinois Leaf



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What Do We Do Now?



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Panel of Experts

- Retired construction and operations personnel from USACE (Similar Failure At Bankhead)
- Steel structures engineering experts from various universities
- Heat straightening expert
- Structural engineers from other USACE offices
- St. Louis District structural engineers, lock operations personnel and Rivers Project Office personnel

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Conclusions From Panel of Experts



- Gate could be repaired
- Repair would be quicker than replacement
- Heat straightening could be used
- Leafs should be layed down for repairs

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Gate Repairs

Laying Leafs Down

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Original Lifting Beam For Vertical Lifting Only



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Redesigned Lifting Beam



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Lifting Beam In "Green Monster" Test Rack



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Installing Lifting Beam



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Turning Feet for Gate Laydown





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Removing Guy Cables



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Shreve Moving Leaf For Lay Down



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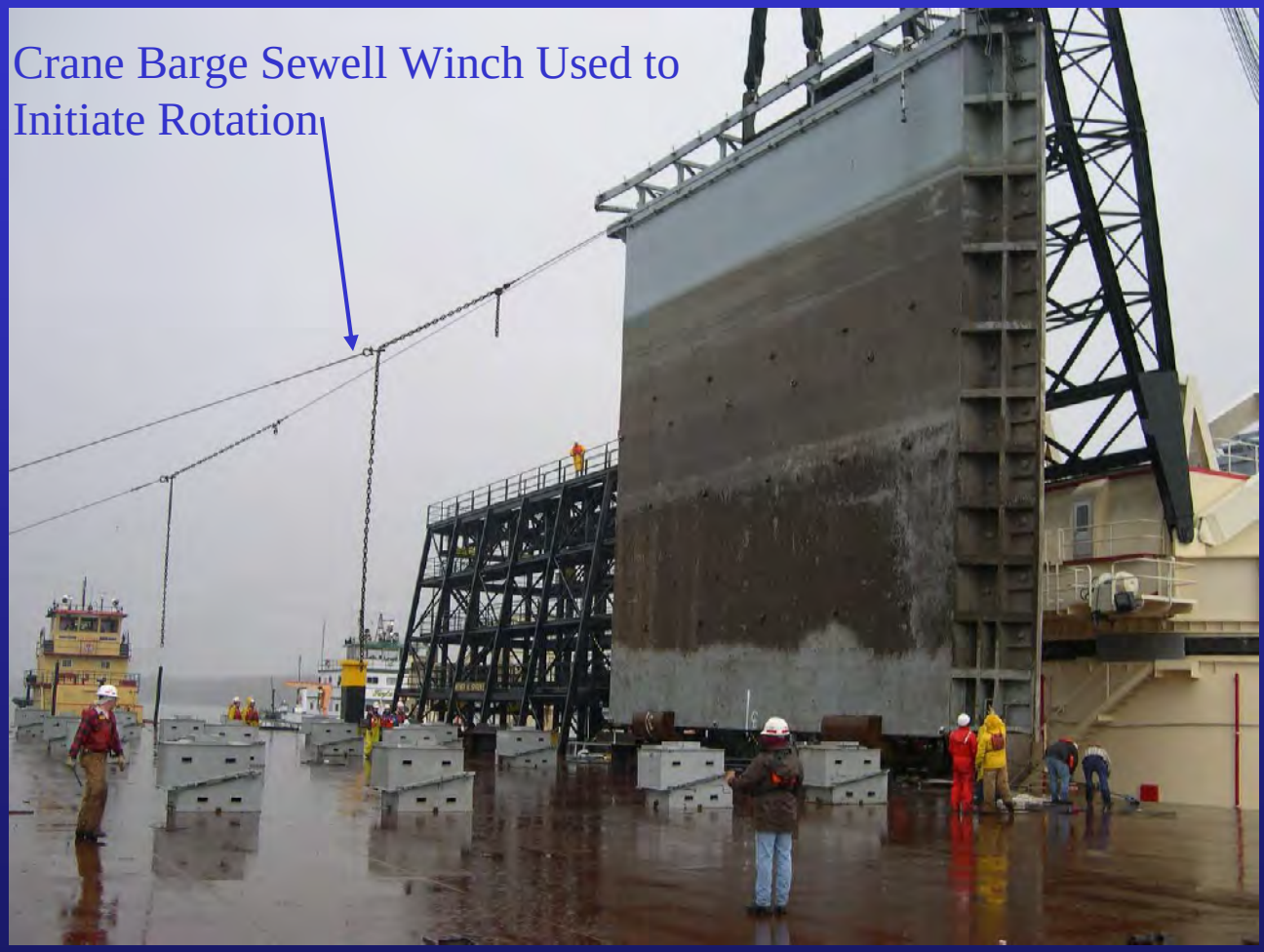
Aligning Turning Feet on Support Stands



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In Position for Laydown



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Rotation on Turning Feet



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Shreve Setting Leaf Horizontal







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Gate on Support Stands



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Gate Leafs in Horizontal Position



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Leaf Supported In Deflected Position



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Enclosure on Delong Barge at Service Base





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Gate Repairs

Heat Straightening

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Heat Straightening Crew



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Heat Straightening



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Spot Heats



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Heat Straightening Diagonals



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Diaphragms Before Heat Straightening





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Diaphragm After Heat Straightening



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Support Condition For Checking Straightness





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Gate Repairs

Structural Repairs

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Revised Strut Arms and New Pintle Sockets





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Machining Strut Arm at Service Base



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Fabrication Work at Service Base

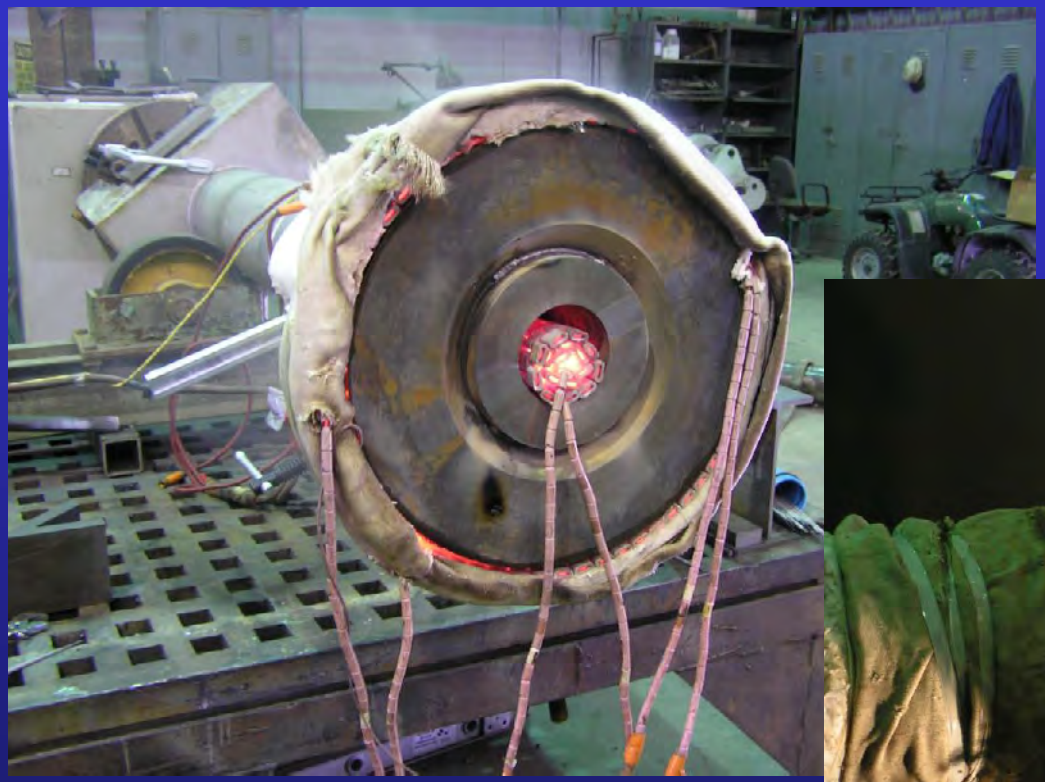




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Welding Strut Arm at Service Base





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Modified Bottom End of Diagonal





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Modified Bottom Diagonal Gussets





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Modified Bottom End of Diagonal



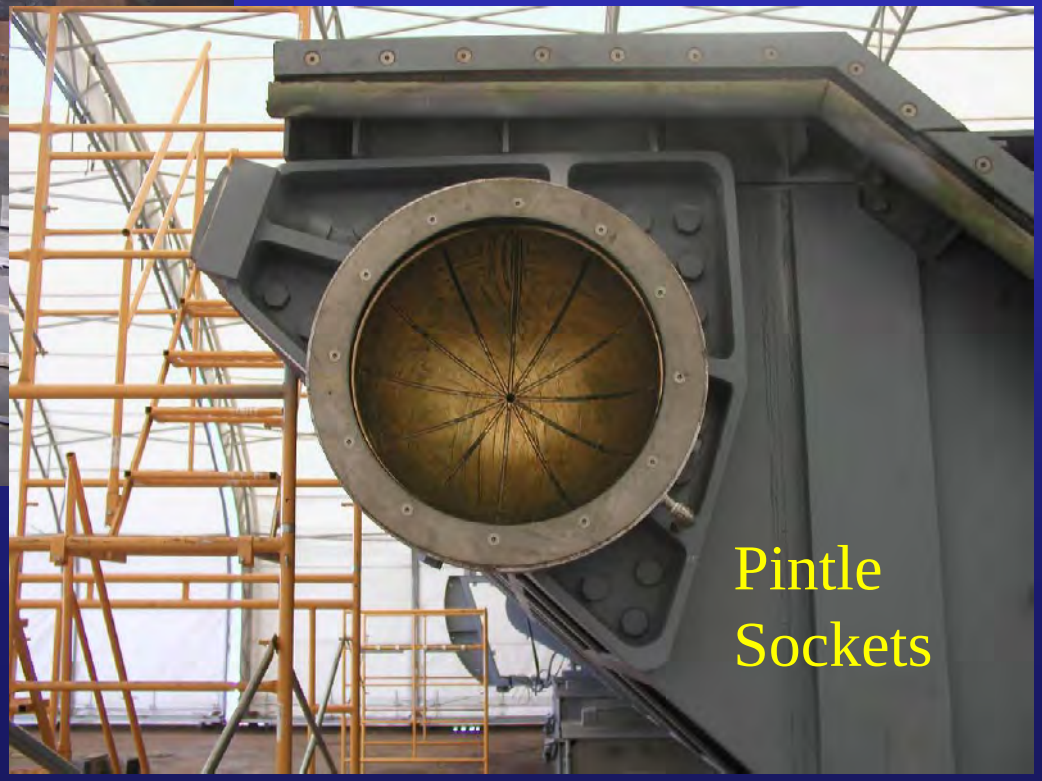


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Castings Supplied By Rock Island Arsenal



Anchor Bars And Gudgeon Barrels



Pintle Sockets

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Gate Stops on Miter Gate Sill



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Lifting Repaired Leafs Vertical

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Installing Lifting Device



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Shreve Lifting Leaf Vertical



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Shreve Lifting Leaf Vertical



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Placing Leaf In Toaster



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Leafs In Toaster for Transport to Lock



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Reinstalling Gate

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Repaired Illinois Leaf in Place



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Welding & Boring Gudgeon Pin Plates





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Welding & Boring Gudgeon Pin Plates







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Installing Missouri Leaf



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Repaired Gate Leafs in Place

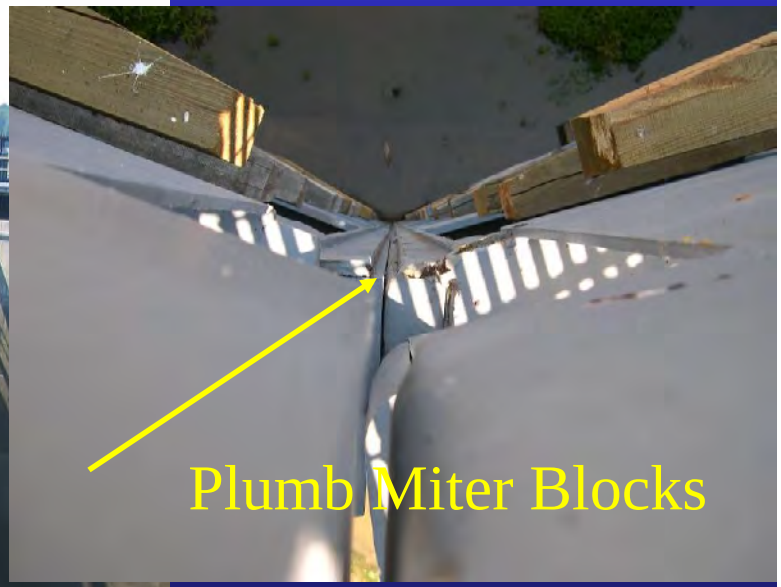


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Repaired Gate Leafs in Place





US Army Corps of Engineers®

July 2005 - Auxiliary Lock Back In Service



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of Engineers®



Thank You !!!

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WE BRING IT ALL TOGETHER



Chickamauga Lock and Dam
Lock Addition
Cofferdam Height Optimization Study

Leon A. Schieber, P.E. (KS)
Project Engineer/Structural Engineer

BLACK & VEATCH
building a world of difference™

ENERGY WATER INFORMATION GOVERNMENT

August 4, 2005

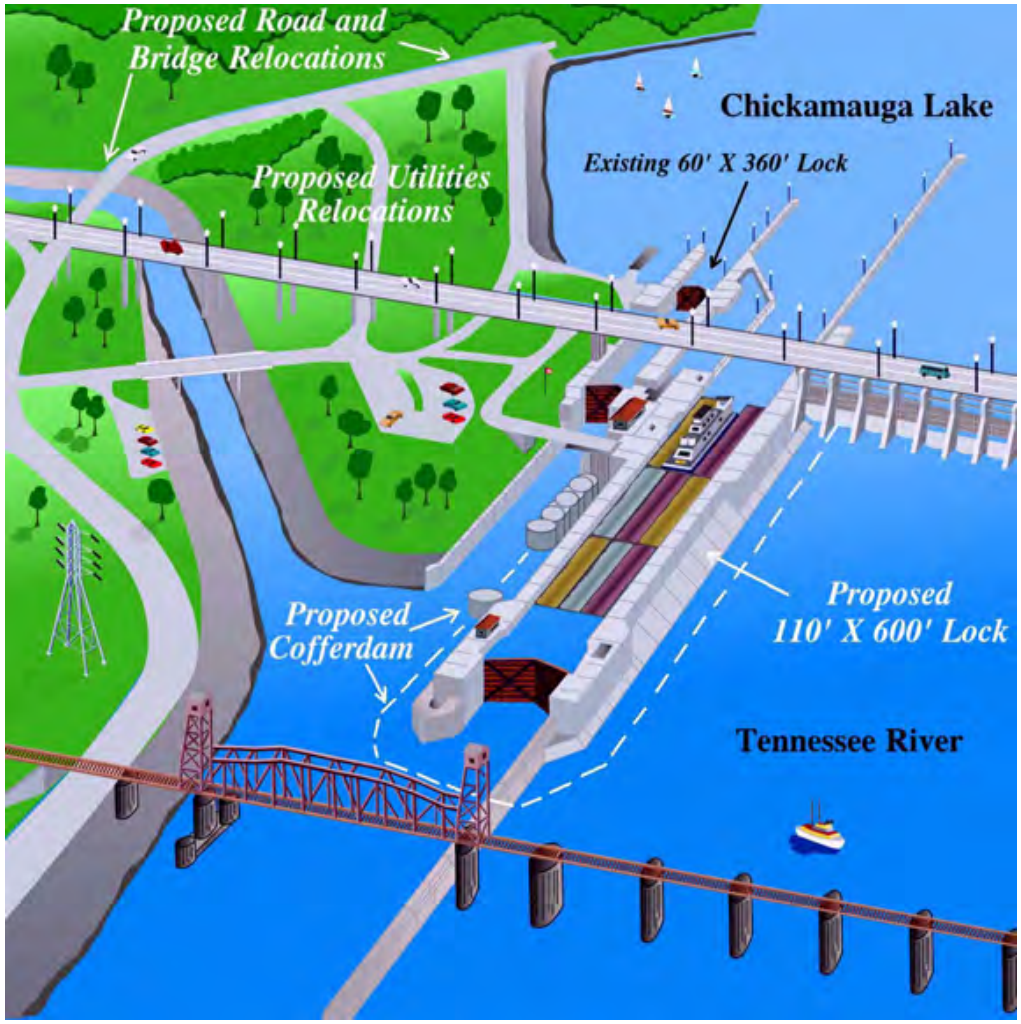
Cofferdam Height Optimization Study Agenda

- Background - Lock Replacement Study
- Cofferdam Risk and Uncertainty (R&U) Approach – EM1605 (hand method) vs. Monte Carlo Simulation
- R&U Inputs
- R&U Results

Background - Lock Replacement Study

Nashville District and Tennessee Valley Authority Performed Feasibility Study and Determined In-The-Dry Construction for Lock Replacement

Chickamauga Lock Replacement Background



- USACE Nashville District and the Tennessee Valley Authority Performed Lock Replacement Study
- Lock is to be Replaced Due to Existing Lock Stability Concerns
- Determined that in the Dry Construction is Most Desirable

Cofferdam Height

- TO WHAT HEIGHT SHOULD COFFERDAM BE CONSTRUCTED?
- WHAT METHOD SHOULD BE USED TO ANSWER THIS QUESTION?

Cofferdam Starting Parameters

Given Information Regarding Cofferdam Height Optimization	
Top of Cofferdam (feet)	Equivalent Return Period (years)
655.2	10
658.5	25
661.8	100

Three different construction periods for lock addition were considered: 5, 7, & 10 years.

Cofferdam Risk and Uncertainty (R&U) Approach – EM 1110-2-1605 (hand method) vs. Monte Carlo Simulation

EM 1605 (Hand Method) is Limited in Prediction of Risk Costs, While Monte Carlo Simulation Allows for More Versatility in Prediction of Risk Costs

Risk Cost Equation

- Cofferdam Height Optimization Equation Can be Simplified Into:

Risk Cost = RC = *P* * Flood Damage Costs

+ Construction Cost

- The Derivation or Determination of P is Where Monte Carlo Simulation Allows for Greater Advantage Over the EM 1605 (Hand Method)

EM 1110-2-1605 – Derivation of *P*

- Risk of Flooding is Defined as:

$$P = \frac{N! \cdot p^{i} \cdot (1 - p)^{N-i}}{i! \cdot (N - i)!}$$

Where:

- ✓ *N = Construction Period*
- ✓ *i = Number of Occurrences of Specific Flood Return Period*
- ✓ *P = Probability of Obtaining During Construction Period Exactly i Events of Specific Flood Return Interval Having a Probability of p Occurring in a Single Trial.*

- Problem is There is no Reasonable “Hand Method” for Determining “i”.

EM 1110-2-1605 – Simplification of *P*

- Solution - Use Statistics to Simplify Equation
- Solve Opposite Question – What is Probability No Floods Occur? i.e. i = 0

$$P = (1 - p)^N$$

Where:

- ✓ *P = probability of obtaining during construction period no flood events having a probability of p*

- Now 1 - P = Probability of Obtaining at Least One Event of Probability p During Construction Period.
- The result does not define how many events (i.e. Could be More Than 1)

Monte Carlo Simulation – Prediction of *P*

- Monte Carlo Simulation Allows for Prediction of “i”.
- “i” is Predicted by Treating Annual Frequency Curve as Independent Predictor of Flood Events for Each Year of Construction Period
- This is Accomplished by Fitting a Probability Distribution to Annual Frequency Curve

Monte Carlo Simulation – Prediction of *P*

- Thus the Monte Carlo Simulation Model can Provide One or More Tailwater Elevations Above the Cofferdam Height During a Construction Period
- Cost Equations were Then Adjusted to Allow for Flooding Costs that Result From More Than One Event to be Added to the Total Risk Cost (Construction + Flooding Costs).
- RC = Sum (Flood $Cost_i$ + Construction Cost)
  - ✓ Where i = number of floods

R&U Inputs

Identification of Uncertainty and Assignment of Probability Distributions

Monte Carlo Simulation – Prediction of *P*

- The inputs include:
  - ✓ cofferdam cell height (constant),
  - ✓ construction duration (entered as discrete values),
  - ✓ tailwater frequency curve (cumulative/beta general distributions),
  - ✓ tailwater duration curve (constant per specific flood event),
  - ✓ flooding costs (triangular distribution),
  - ✓ construction costs (triangular distribution).
- The output includes:
  - ✓ total risk cost (triangular distribution).

Annual Tailwater Frequency Curve Data From 1958 to 1999

Percent Chance Exceedance	(Return Interval in Years)	(Elevation in feet) Expected Probability
0.2	(500 - year)	665.75
1	(100 - year)	661.79
2	(50 - year)	659.96
5	(20 - year)	657.35
10	(10 - year)	655.16
20	(5 - year)	652.63
50	(2- year)	648.09

Corrected Flood Probabilities For EM 1605 (Hand Method)

Percent Chance Exceedance	*(Return Interval in Years)*	*(Elevation in feet) Expected Probability*	**Probability of at least one or more flood events during construction period**		
			5 yrs	**7 yrs**	**10 yrs**
0.2	(500 - year)	665.75	**1.0%**	**1.4%**	**2.0%**
1	(100 - year)	661.79	**4.9%**	**6.8%**	**9.6%**
2	(50 - year)	659.96	**9.6%**	**13.2%**	**18.3%**
5	(20 - year)	657.35	**22.6%**	**30.2%**	**40.1%**
10	(10 - year)	655.16	**41.0%**	**52.2%**	**65.1%**
20	(5 - year)	652.63	**67.2%**	**79.0%**	**89.3%**
50	(2- year)	648.09	**96.9%**	**99.2%**	**99.9%**

Cofferdam Construction Cost – Probability Distribution

T.O. COFFERDAM ELEVATION	Construction Cost	Construction Cost w/ Contingencies		
	BASE (w/o Contingency)	MIN %	AVG %	MAX%
655.2 (10 yr)	$24,072,499	$27,940,842	$29,763,812	$31,594,681
658.5 (25 yr)	$25,835,790	$29,953,783	$31,890,153	$33,835,602
661.8 (100 yr)	$27,261,317	$31,582,069	$33,612,552	$35,652,531

Cofferdam Construction Cost – Measurement of Uncertainty

Item No.	Description	% of Contingency		
		Min %	Avg %	Max %
1	Mob/Prepatory	2	3	5
2	Cofferdam Cells	15	20	25
3	Ramp Cells	15	20	25
4	Tie-Ins	30	45	60
5	Flooding Facility	20	30	40
6	Dewatering	30	35	40
7	Instrumentation	20	35	50
8	Miscellaneous	20	35	50
9	Cofferdam Removal	15	23	30

Cofferdam Construction Cost – Mitigation of Bias

Item No.	Description	% of Contingency			Team Member
		Min %	Avg %	Max %	
4	Tie-ins to Existing Facilities	2	3	4	G. Hicks
		20	25	30	L. Schieber
		30	40	50	J. Koontz
	Participated in discussion				M. Ledbetter
	Selected Values	**30**	**45**	**60**	

Cofferdam Flood Cost – Probability Distribution

	Total Fixed Flood Cost	Total Fixed Flood Costs w/ Contingencies		
T.O. COFFERDAM ELEVATION	BASE (w/o Contingency)	MIN %	AVG %	MAX%
655.2 (10 yr)	$4,533,977	$5,353,413	$5,794,580	$6,235,746
658.5 (25 yr)	$4,682,352	$5,677,143	$6,141,266	$6,605,389
661.8 (100 yr)	$4,865,427	$5,729,313	$6,195,062	$6,660,811

Cofferdam Flood Cost – Measurement of Uncertainty

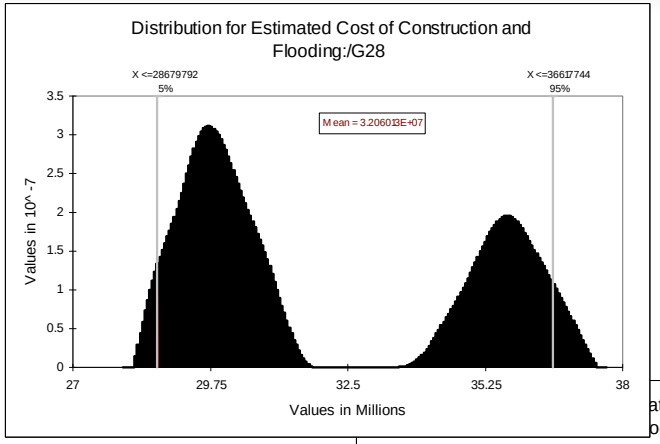
Item No.	Description	% of Contingency		
		Min %	Avg %	Max %
1	Pumping	10	15	20
2	Cleanup	20	35	50
3	Downtime	20	30	40
4	Damage	20	35	50

R&U Results

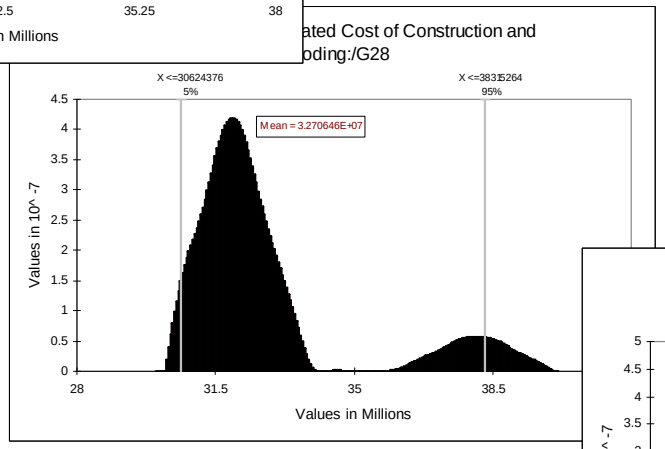
EM 1110-2-1605 Results Suggest The Optimum Cofferdam Height is the Lowest Elevation,

The Monte Carlo Simulation Results Suggest the Optimum Cofferdam Height is the Middle to Tallest Elevation Depending Upon Construction Duration

EM 1605 – Risk Cost Results

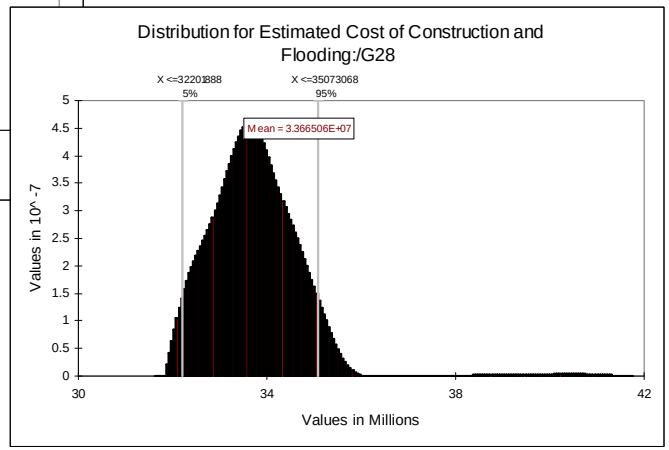


Cell Height 655.2

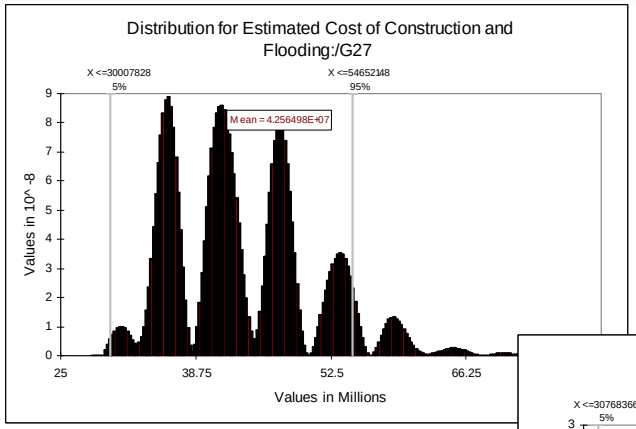


Cell Height 658.5

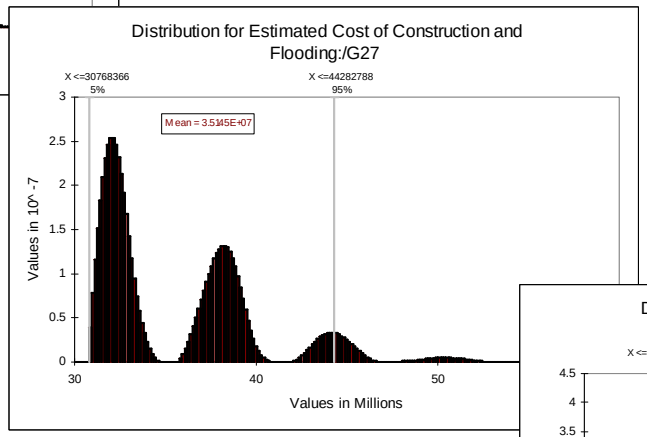
Cell Height 661.8



Monte Carlo Simulation – Risk Cost Results

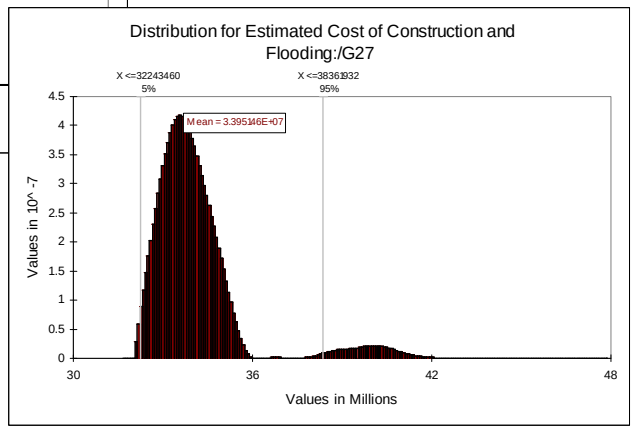


Cell Height 655.2



Cell Height 658.5

Cell Height 661.8

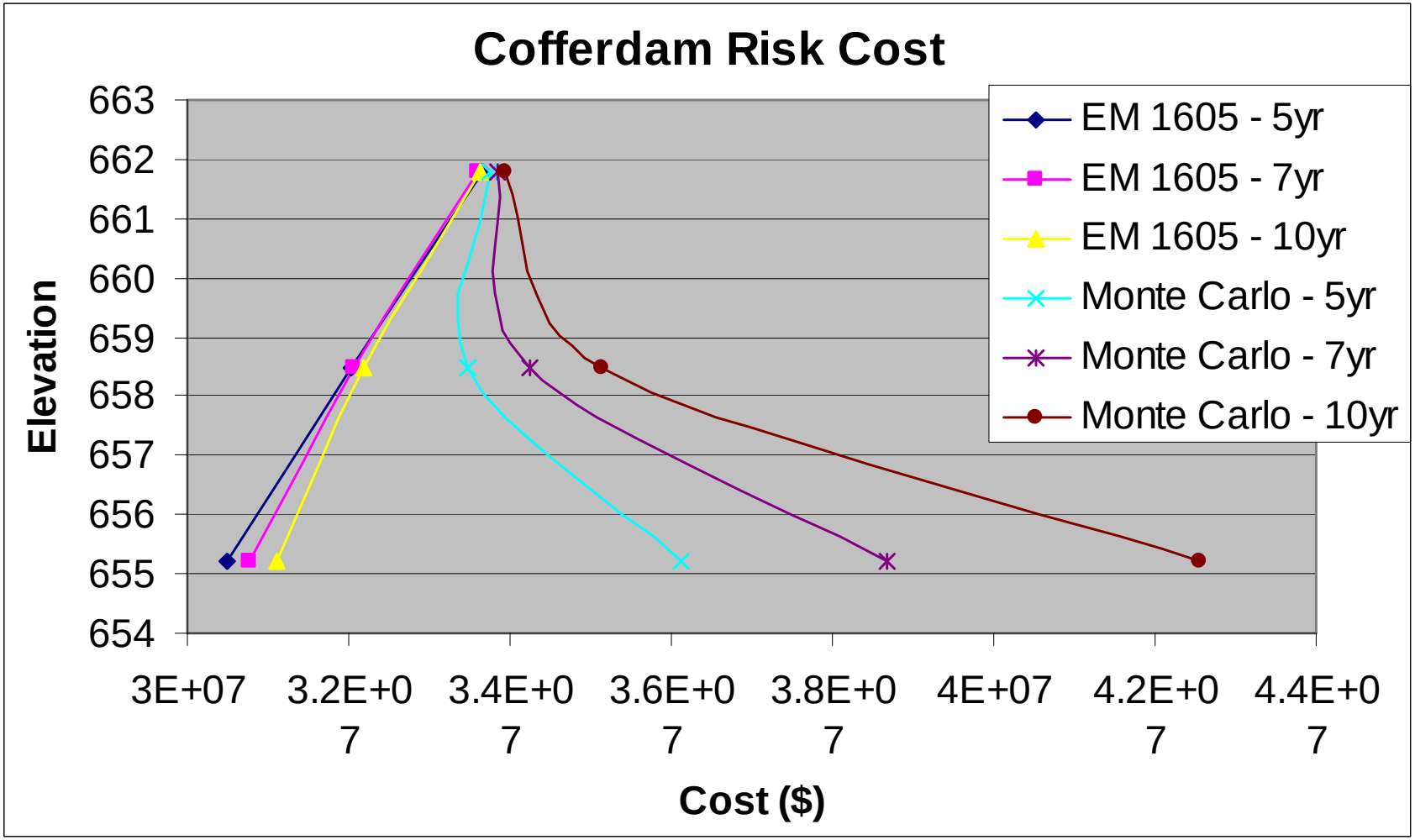


Comparison of Risk Cost

Cofferdam Height Optimization Results for EM 1605-10 Year Construction Period										
Top Elevation of Cofferdam (ft)	Equivalent Return Period (yr)	Total Flooding Cost, Mean ($)	90% Confidence Interval for Total Flooding Cost Mean ($)		Total Construction Cost, Mean ($)	90% Confidence Interval for Mean Total Construction Cost Mean ($)		**Total Risk Cost, Mean ($)**	**90% Confidence Interval for Mean of Total Risk Cost ($)**	
			5%	95%		5%	95%		**5%**	**95%**
655.2	10	1350796.74	0	4867541.5	29767114	28521360	31018496	**31117243**	**28680974**	**34852772**
658.5	25	292081.072	0	2475259.75	31884883	30577972	33197282	32185256	30618184	34375240
661.8	100	9451.18353	0	0	33608618	32234220	35005512	33625169	32227414	35026244

Cofferdam Height Optimization Results for Alternate Method-10 Year Construction Period										
Top Elevation of Cofferdam (ft)	Equivalent Return Period (yr)	Total Flooding Cost, Mean ($)	90% Confidence Interval for Mean of Total Flooding Cost ($)		Total Construction Cost, Mean ($)	90% Confidence Interval for Mean of Total Construction Cost Mean ($)		**Total Risk Cost, Mean ($)**	**90% Confidence Interval for Mean of Total Risk Cost ($)**	
			5%	95%		5%	95%		**5%**	**95%**
655.2	10	12798011.6	0	23954028	29766965	28519440	31012780	42564976	30007828	54652148
658.5	25	3246614.75	0	12351337	31898379	30560092	33215586	35144994	30768366	44282788
661.8	100	336133.295	0	5867248.5	33615328	32221876	35006436	**33951461**	**32243460**	**38361932**

Summary of Risk Cost



Questions ?

Used Monte Carlo Simulation as a Tool to Predict Risk Cost and Provide Information Regarding Risk Management. Compared this with EM 1110-2-1605 (Hand Method).

Contact Information

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Black & Veatch Special Projects Corp.

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Replacing Existing Lock 4:
Innovative Designs for Charleroi Lock

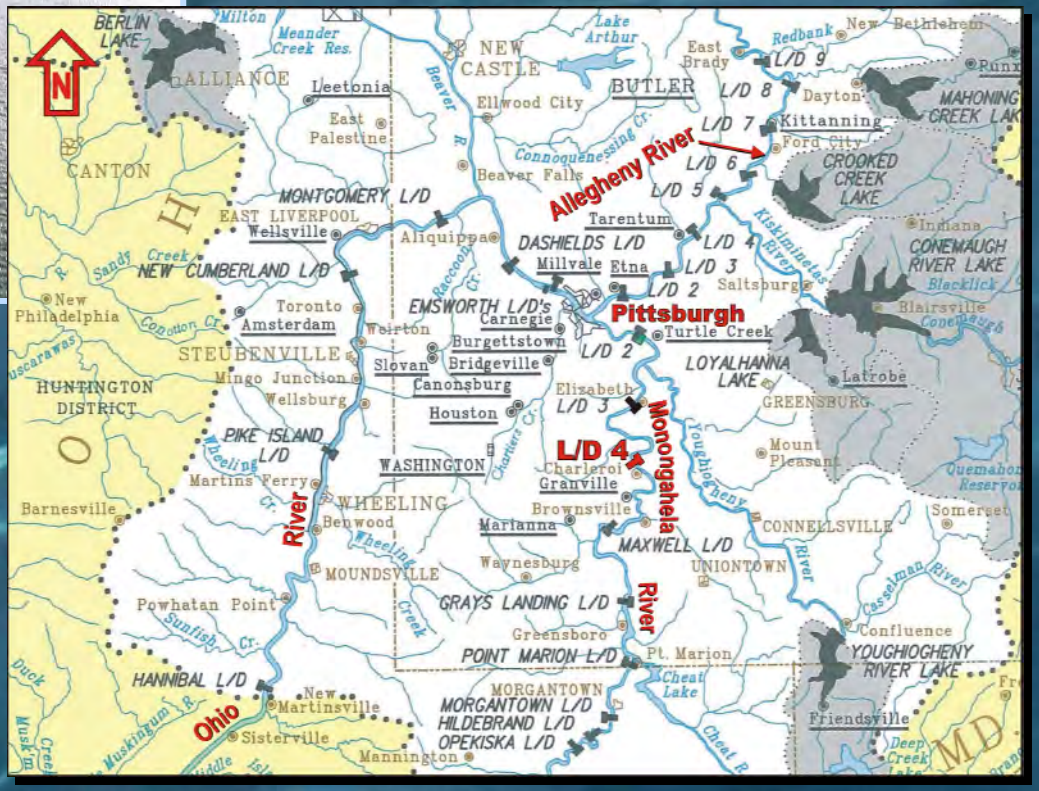
LISA R. PIERCE, P.E.
DAVE A. STENSBY, P.E.
Project Managers
INCA Engineers, Inc.

STEVE R. STOLTZ, P.E.
Project Engineer
Pittsburgh District, USACE

PROJECT LOCATION & EXISTING LOCK 4







INCA

PITTSBURGH DISTRICT

EXISTING LOCK 4



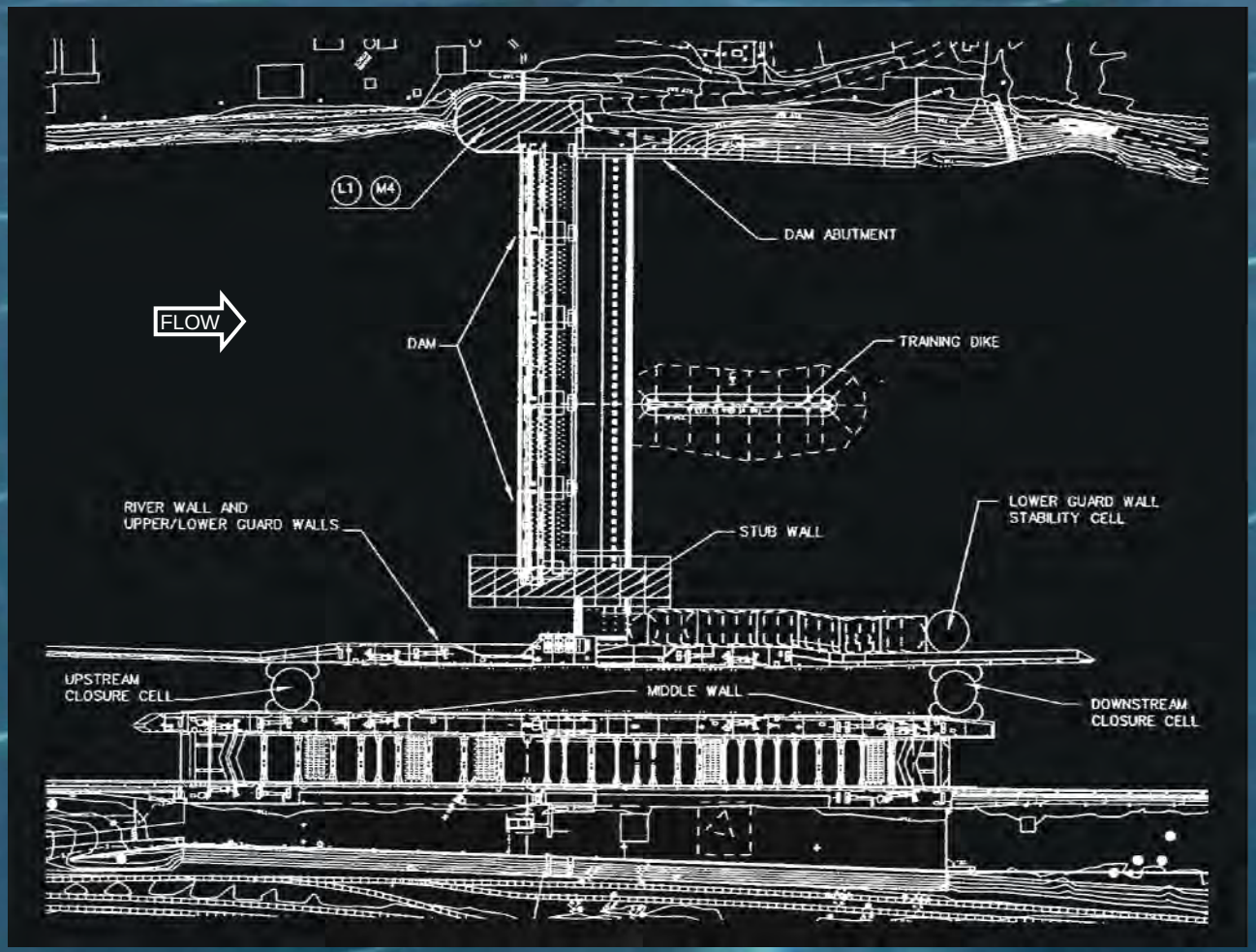






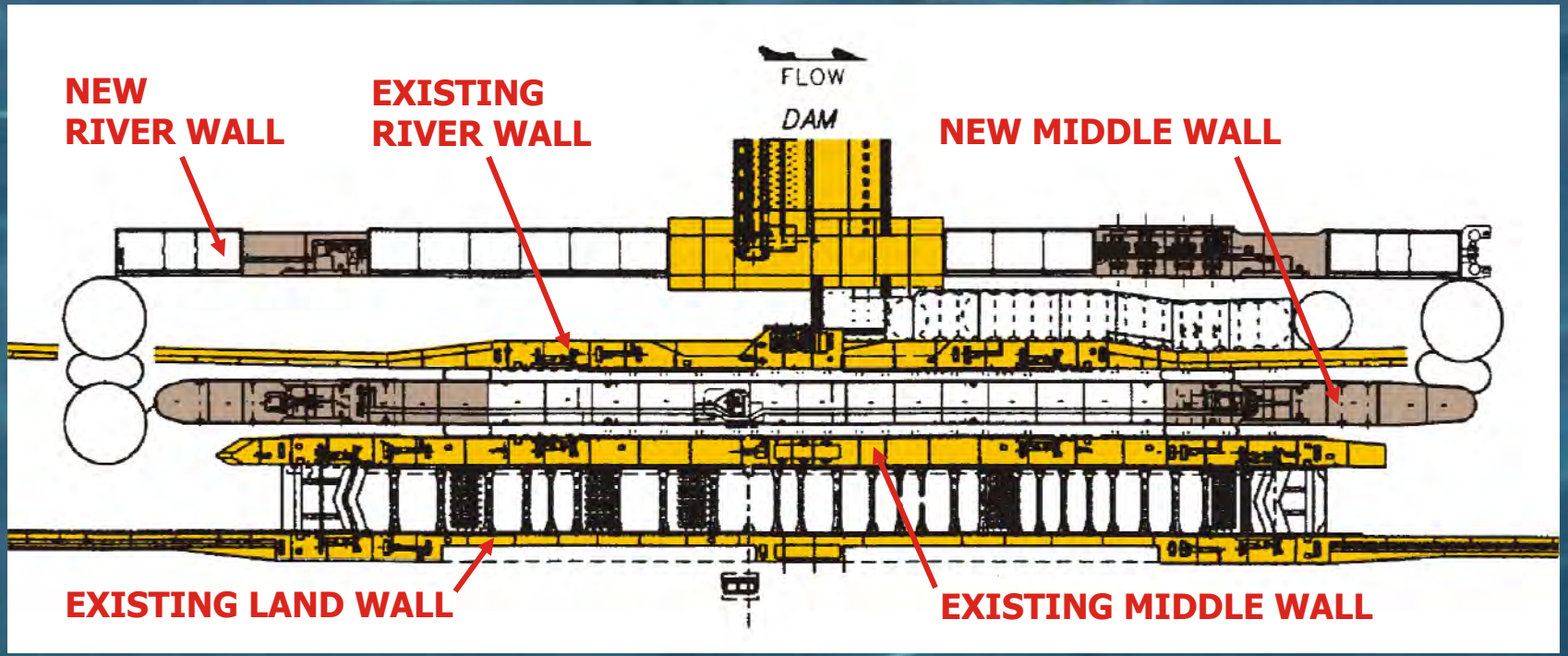
PLAN VIEW - EXISTING LOCK 4





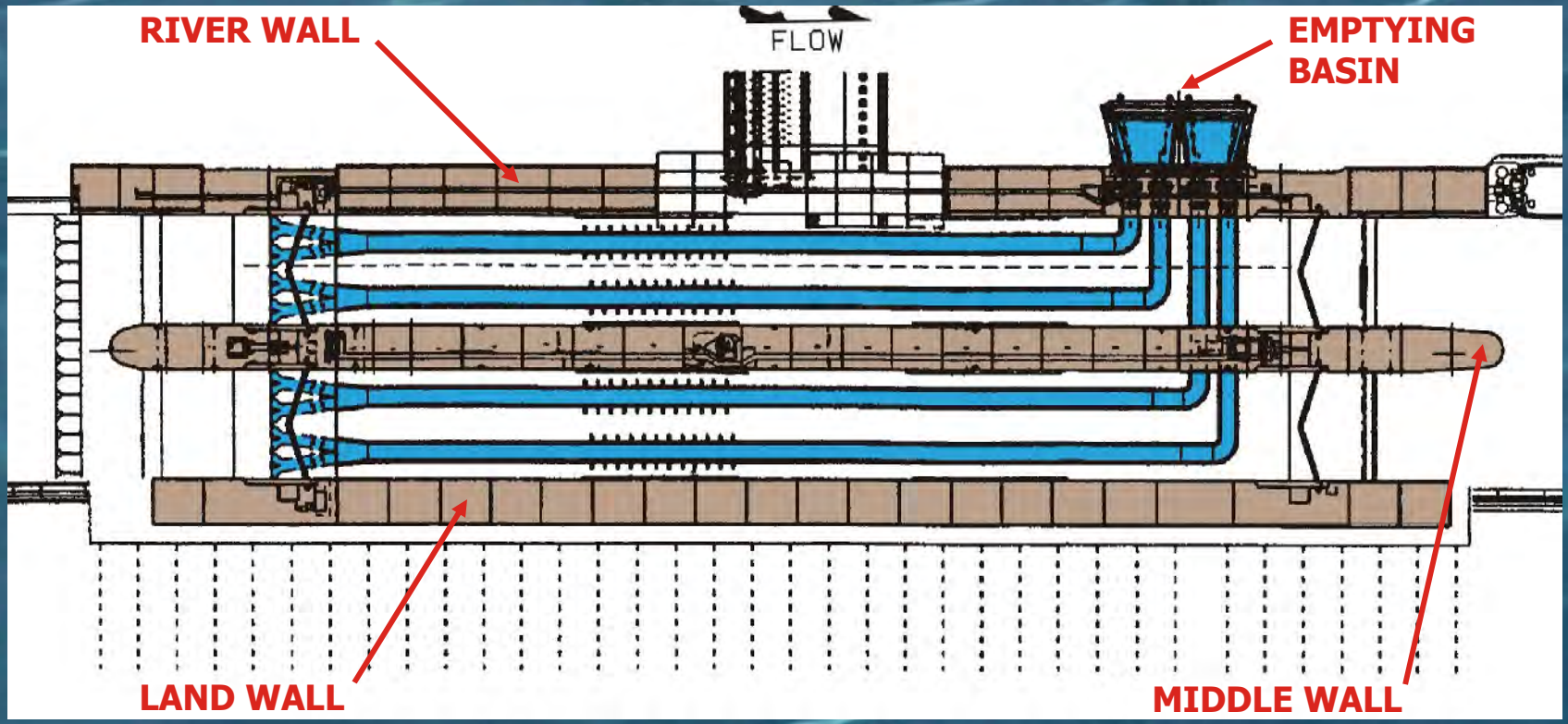
PLAN VIEW – EXISTING & NEW LOCK WALLS WITH COFFERBOX MONOLITHS INDICATED





PLAN VIEW – NEW CHARLEROI LOCK



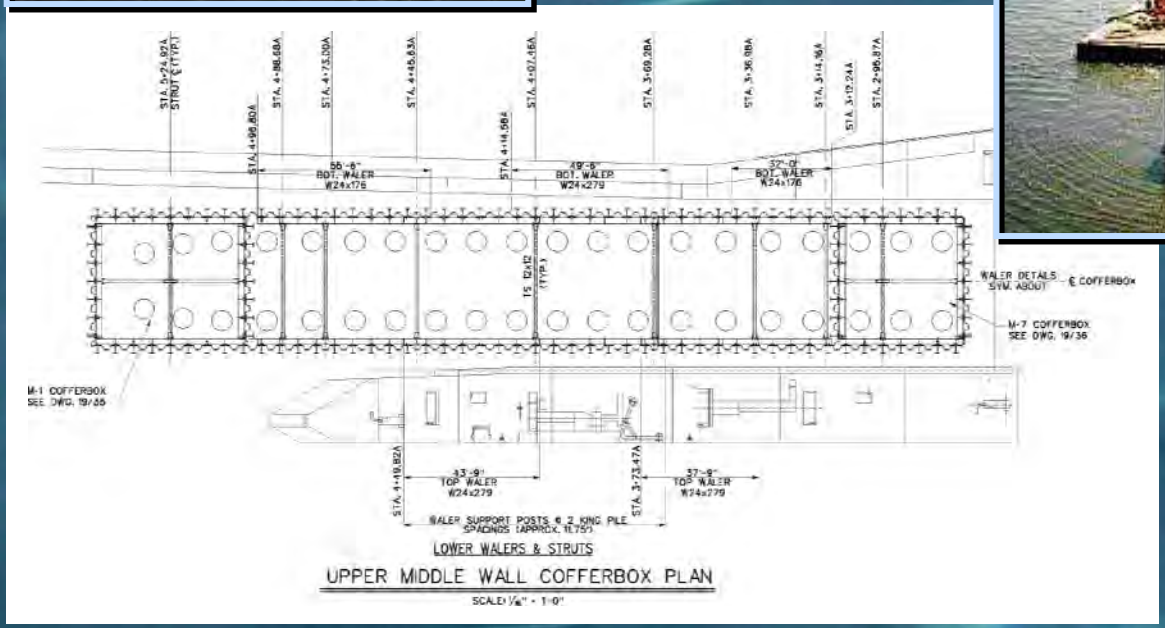


TYPICAL COFFERBOX



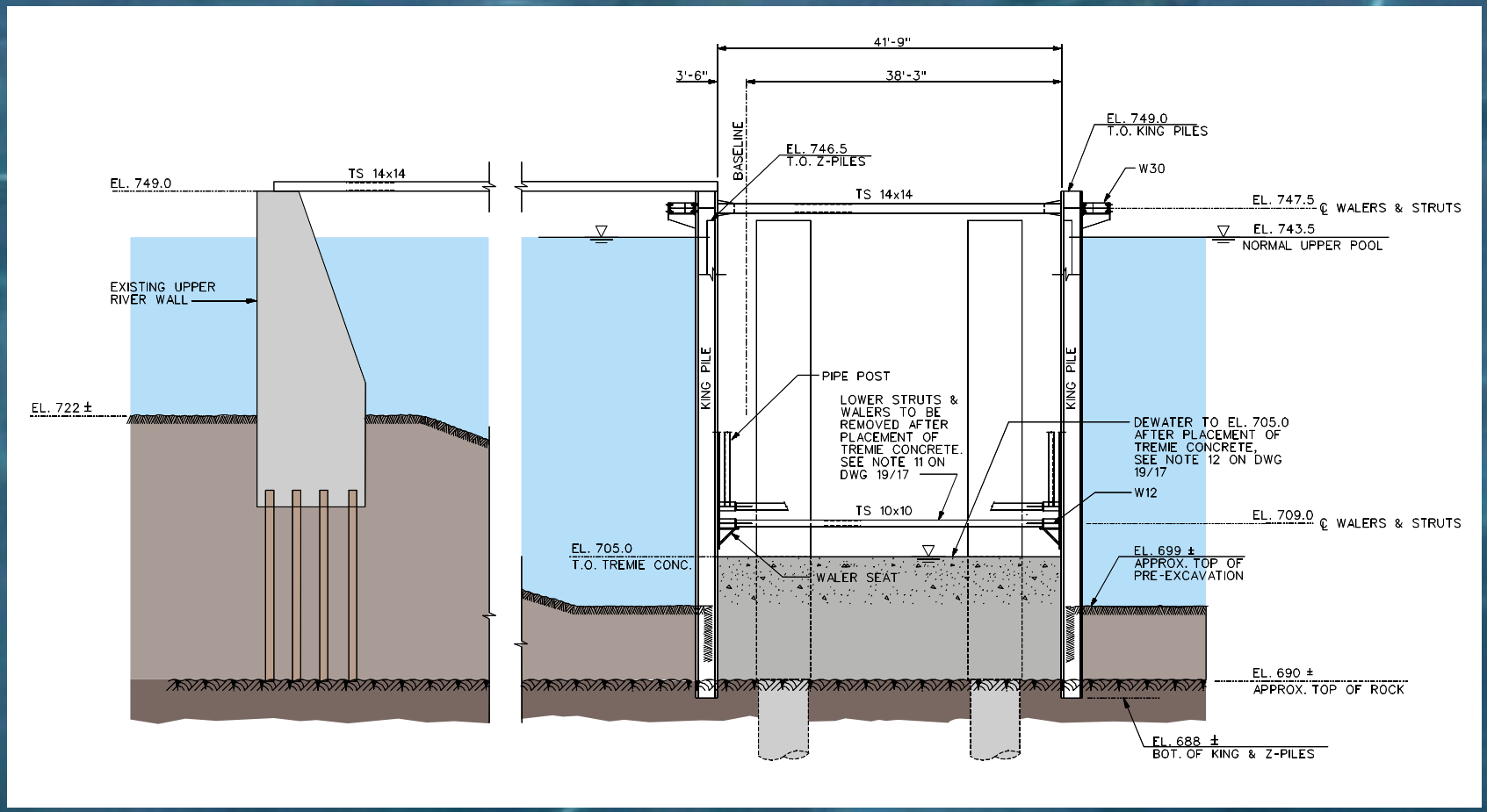






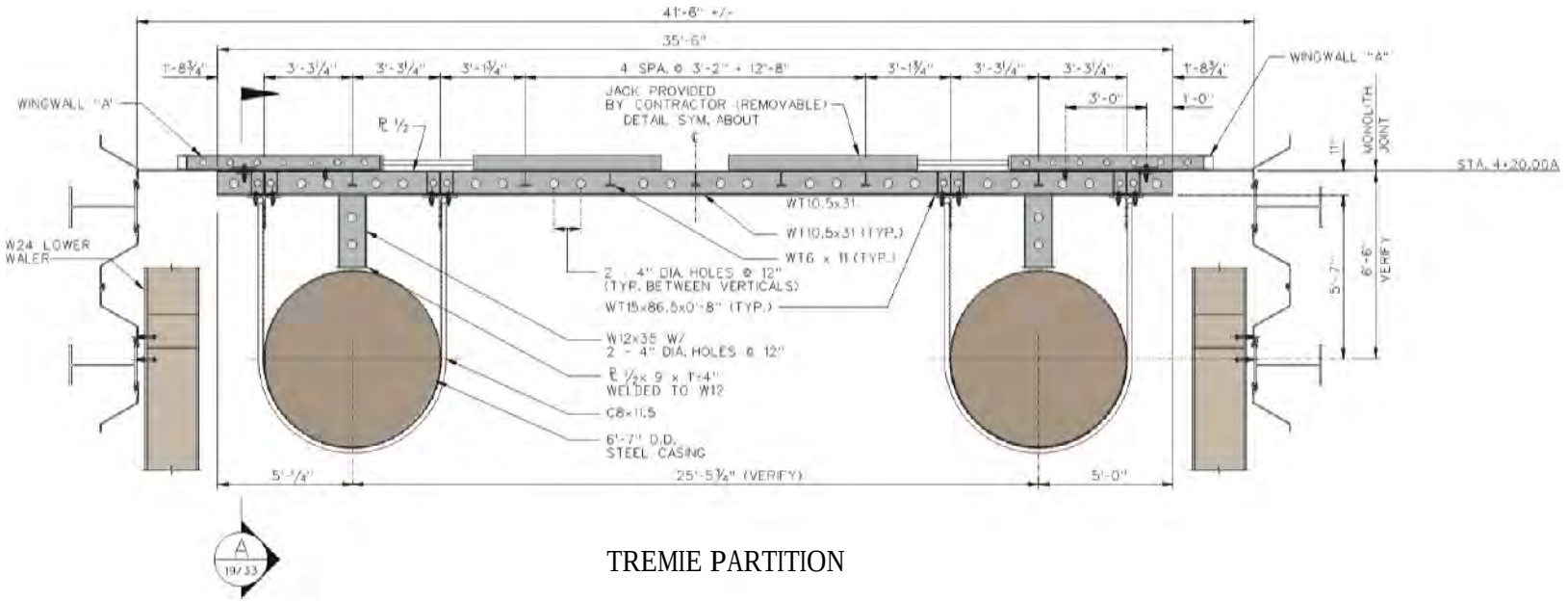
CROSS SECTION - RIVER WALL COFFERBOX





PLAN VIEW - TREMIE CONCRETE PARTITION





TREMIE PARTITION

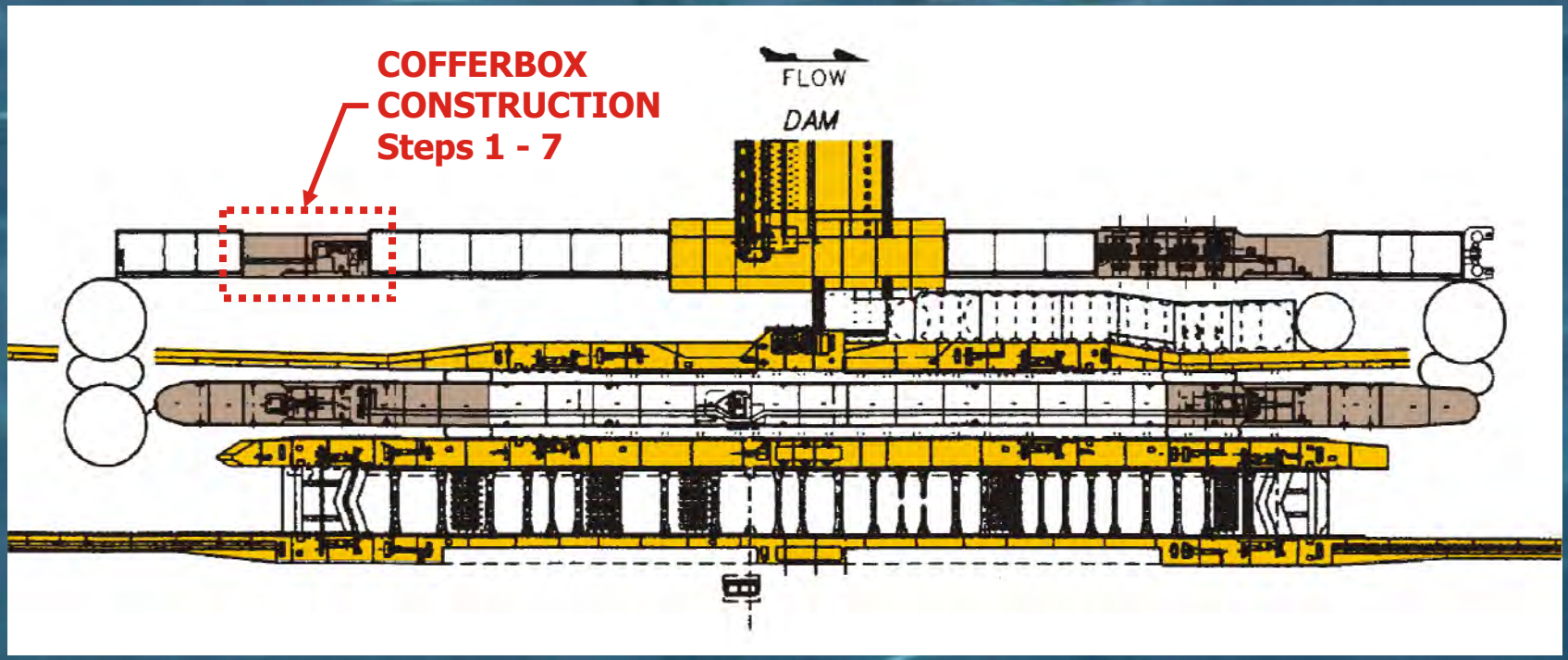
INCA

PITTSBURGH
DISTRICT

COFFERBOX CONSTRUCTION

Location of Typical Example (Steps 1 - 7)

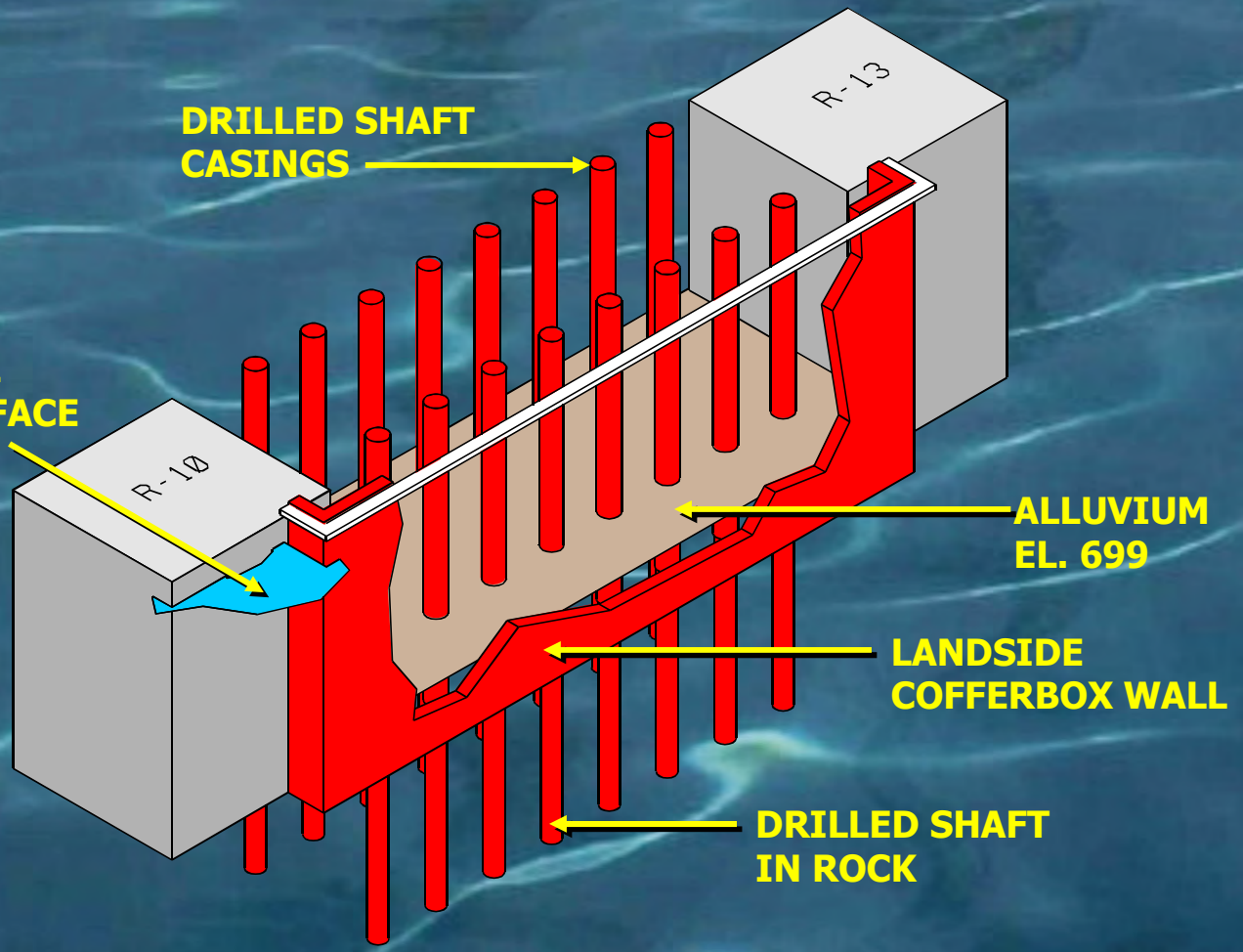




COFFERBOX CONSTRUCTION

Step 1

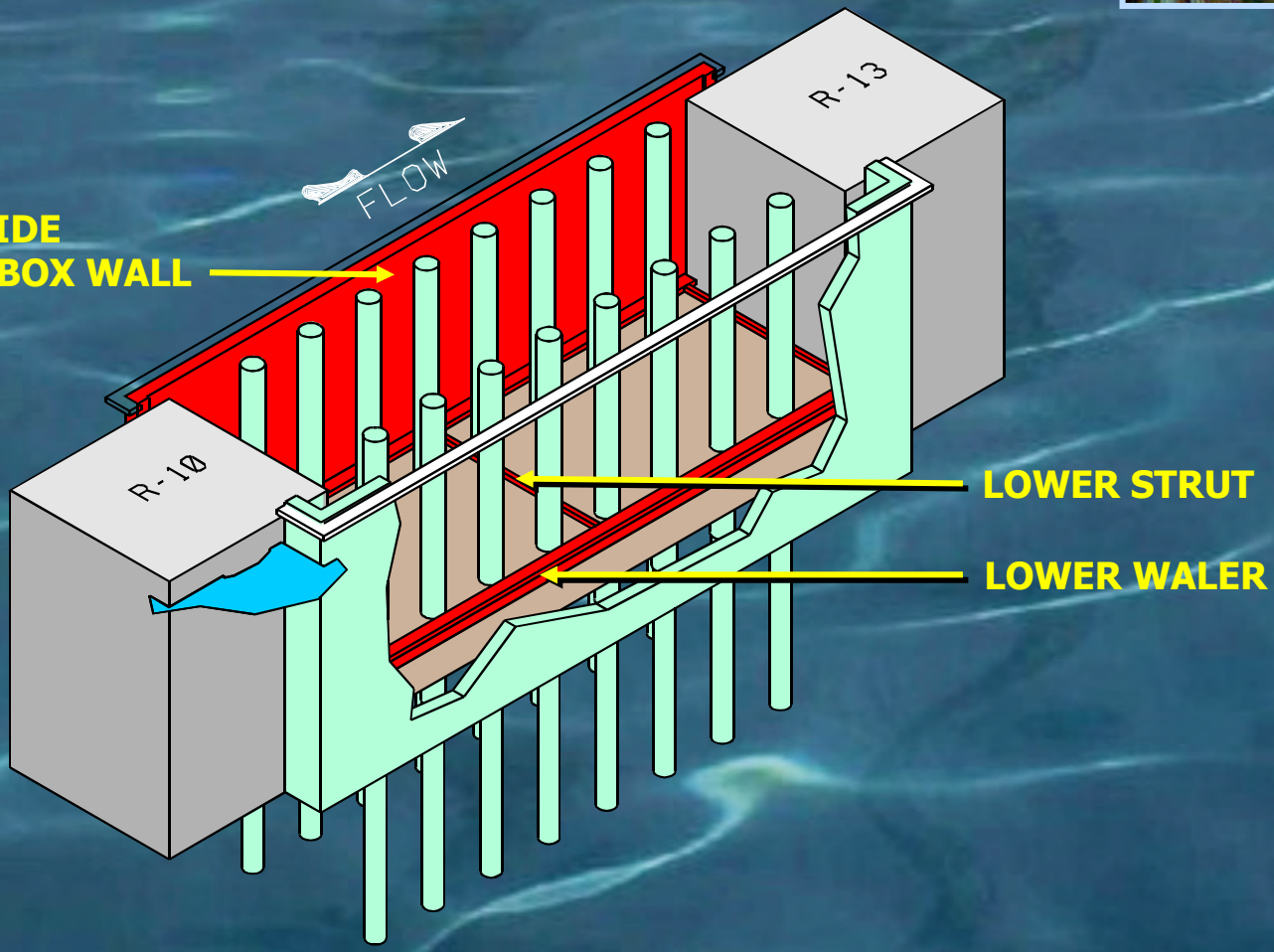




COFFERBOX CONSTRUCTION

Step 2

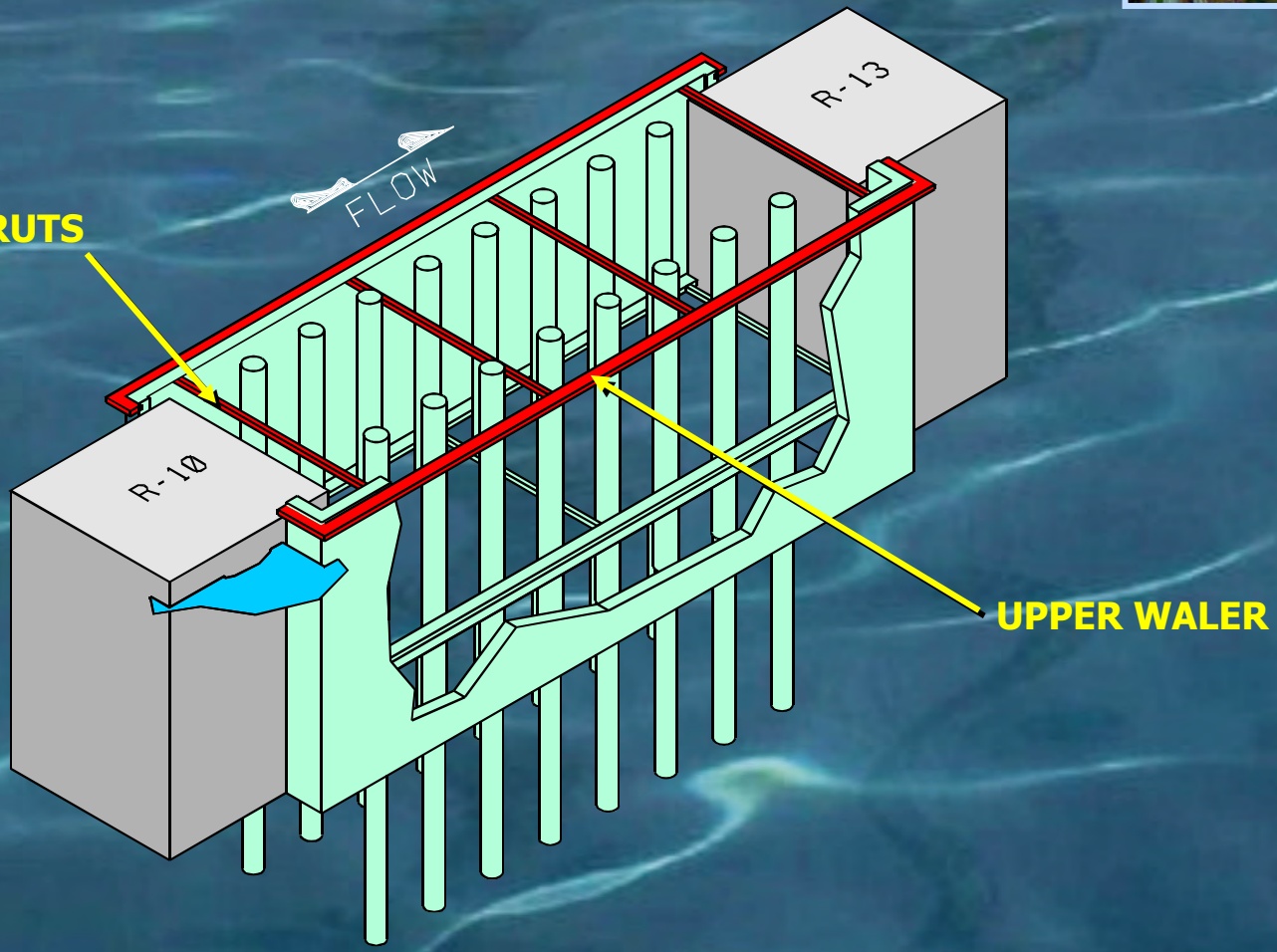




COFFERBOX CONSTRUCTION

Step 3

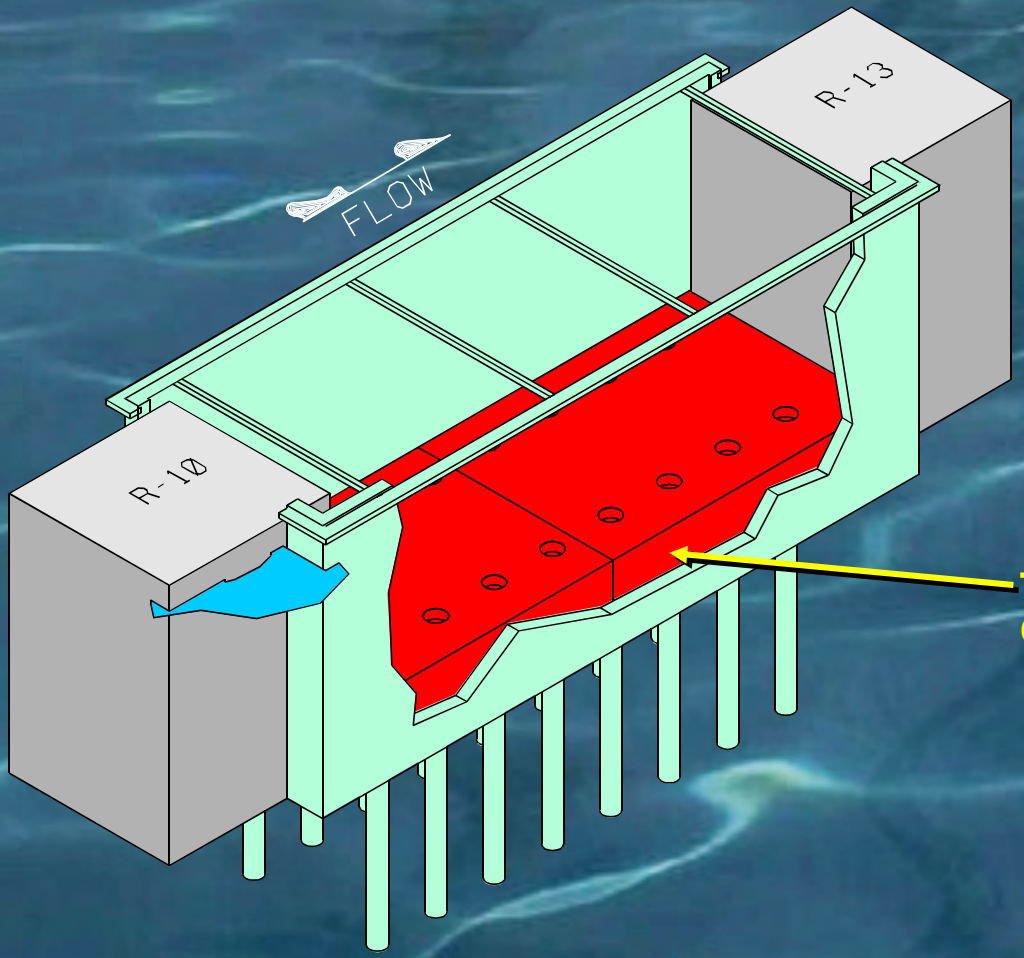




COFFERBOX CONSTRUCTION

Step 4

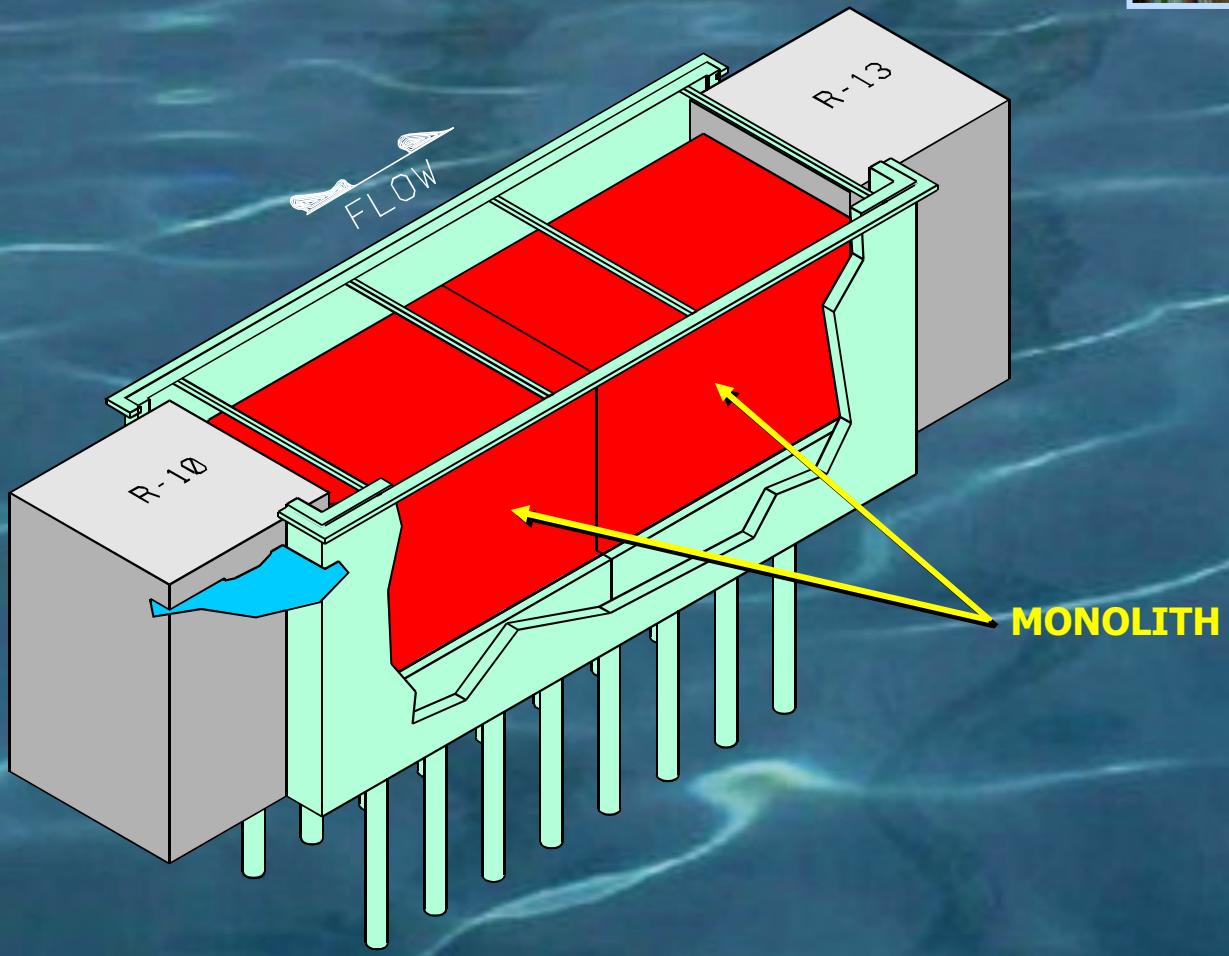




COFFERBOX CONSTRUCTION

Step 5

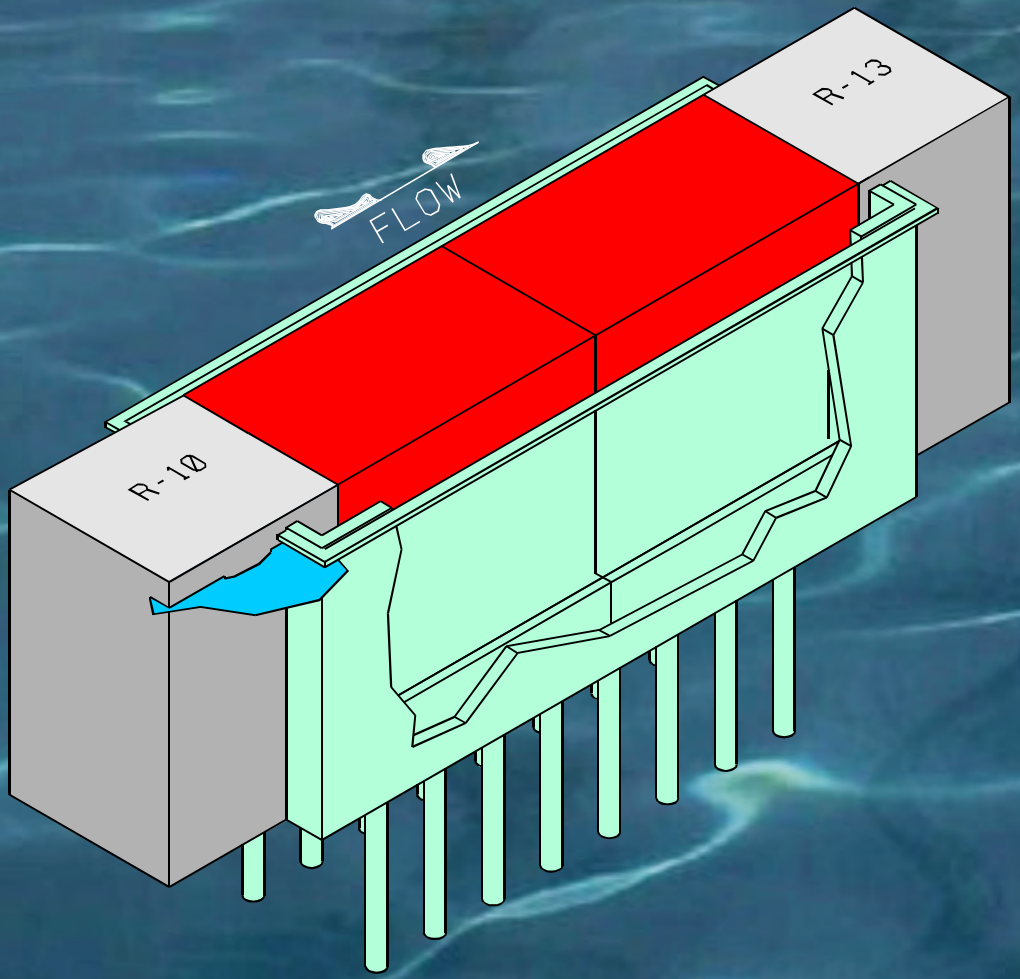




COFFERBOX CONSTRUCTION

Step 6

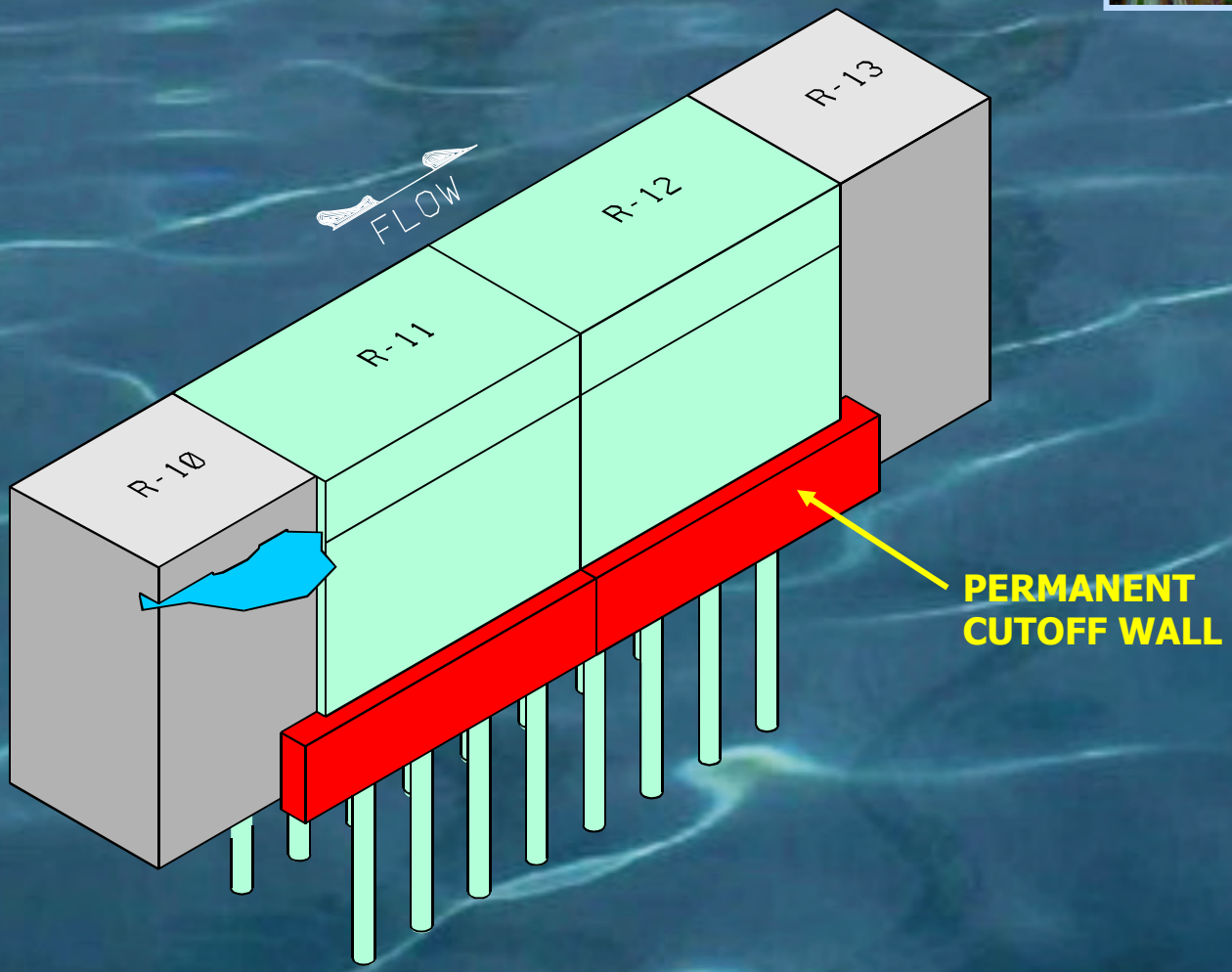




COFFERBOX CONSTRUCTION

Step 7





CONSTRUCTION COST



Charleroi Locks, Contract One
(River Wall)

Trumbell and Brayman Construction JV
$96.5 Million Construction Award

September 2004

CONTRACTOR INPUT



Excavation within Cofferboxes

- Shaft casing and strut obstructions
- Feasible (less congested than other completed projects)
- Prefer excavating after casings are installed
- Clamshell, air-lift, and dredge pump

CONTRACTOR INPUT



Formwork and Access Requirements

- Distance between inside face of cofferbox and finished face of monolith = 3′ – 6″ (contractors said a minimum of 2 to 3 feet needed)
- Additional space available for personnel in AZ pile recesses
- Walers do not encroach on this space (upper walers – exterior, lower walers – removed prior to forming)
- River wall access from river side
- Middle wall access – temporary work platform on top of cofferbox

CONCLUSION



☑ **Cofferboxes are well-suited for:**

- New sites
- Sites where new locks are offset from navigation traffic and existing locks

Otherwise, cofferboxes reduce navigation width available during construction.

☑ **Advantages of construction in local cofferboxes**

- Elimination of conventional global cellular cofferdams
  - Reduces total construction time and costs
  - Reduces navigation impacts
  - Reduces hydraulic impact on waterway
- Monolithic concrete construction







Thank You





TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE - 2005

INCA

PITTSBURGH DISTRICT

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US Army Corps
of Engineers
Huntington District

2005 INFRASTRUCTURE SYSTEMS CONFERENCE

LONDON LOCKS AND DAM MAJOR REHABILITATION PROJECT

by
David P. Sullivan, P.E.
CELRH-EC-DS

4 August 2005

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LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

Discussion Items:

- Project phases
- Replacement of upstream guard wall
- Extension of riverward lock chamber and associated work
- Lessons learned

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LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

Pertinent Data:

- Authorized by River and Harbor Act of 3 July 1930
- Located in central West Virginia at Kanawha River mile 82.8
- Gated dam with 5 roller gate bays, normal damming height of 24 feet
- Twin 56’ x 360’ lock chambers

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

Pertinent Data:

- Privately owned and operated hydroelectric generating plant on left abutment
- Placed in operation in September 1933 with construction complete May 1934
- Initial construction cost – 3,269,800

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT





LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- Due to funding stream, project was phased

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- Phase 1 – Fabrication and delivery of new upstream needle dam system
  - Structural steel needle beam.
  - Pre-cast concrete needle dam sill.
  - Interlocking sheet pile needle dam panels. Sheet piling (AZ36) was purchased by the government.

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STRUCTURAL STEEL NEEDLE BEAM

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PRECAST CONCRETE NEEDLE DAM SILL

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MAJOR REHABILITATION PROJECT





SHEET PILE NEEDLE DAM PANELS

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- Phase 2A – Electrical upgrades
  - Installation of new motor control center in operations building
  - Installation of CCTV system on both dam and lock
  - Installation of intercom system

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MAJOR REHABILITATION PROJECT





NEW MOTOR CONTROL CENTER

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- **Phase 2B – Fabrication and delivery of embedded /misc. metals**
  - Pintle and embedded quoin assemblies
  - Miter gate anchorages, linkage, gudgeon and anchor pins
  - Miter gate machinery bases
  - Floating mooring bitts

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- **Phase 2C – Upstream guardwall replacement and extension of riverward lock chamber**
  - Demolish existing upstream guard wall and construct new ported upstream guard wall
  - Relocate upstream miter gates 47 feet in riverward lock chamber

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LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- **Upstream guard wall replacement**

  Original upstream guardwall founded on timber cribbing with stone fill. Many barge impacts have occurred over the years leading to a maximum movement toward the river of approximately 2.5 feet. Wall has undergone dumped stone stabilization several times and was in failure mode.

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1930'S ERA CONSTRUCTION OF U/S GUARD WALL

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PRECONSTRUCTION - U/S GUARD WALL

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MAJOR REHABILITATION PROJECT

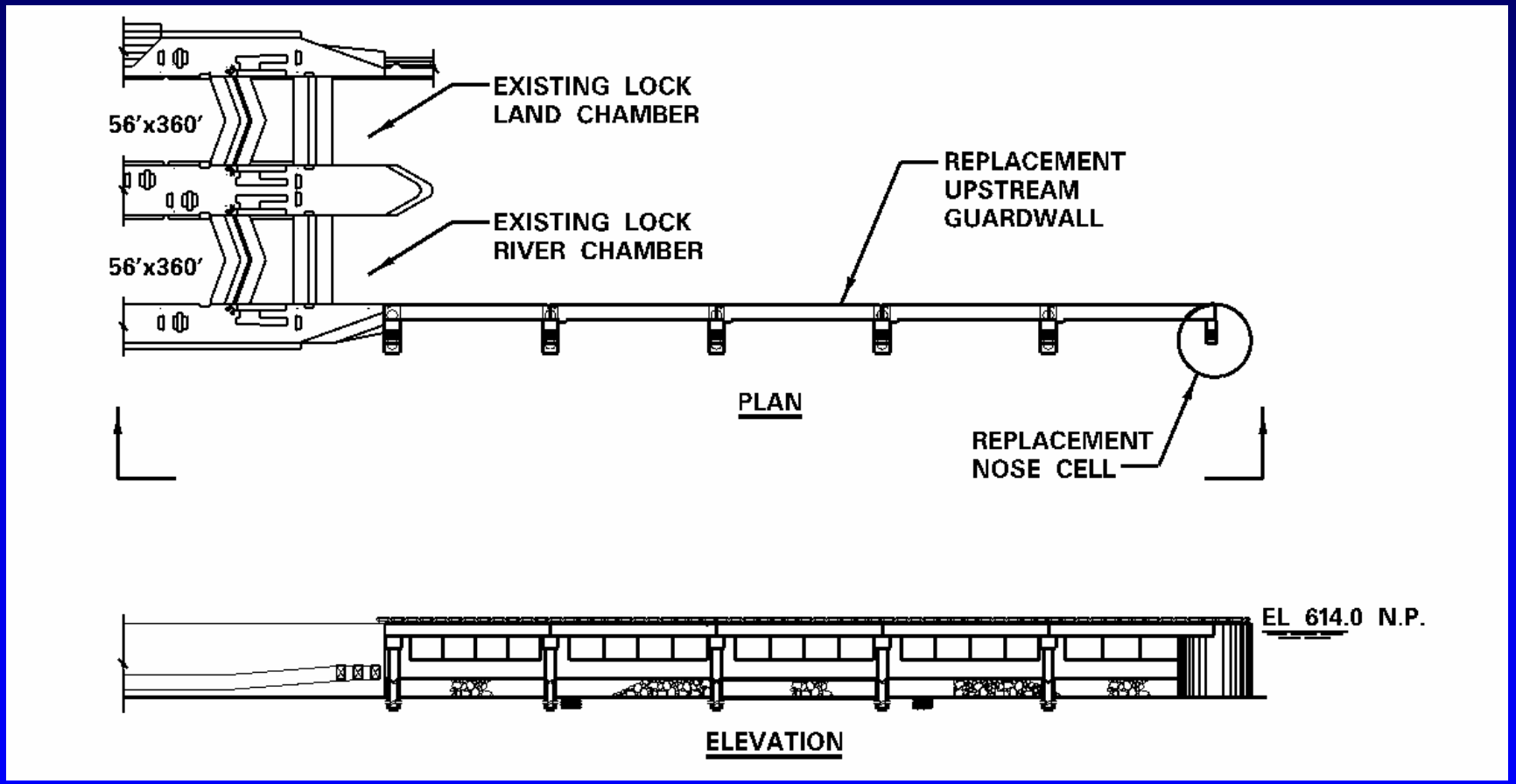
- **Upstream guard wall replacement**
  - 5 - precast/post-tensioned concrete beams - 10’ x 8’ x 105’
  - Option to support guard wall beams on either drilled shafts or concrete filled sheet pile cells. Cellular supported option was chosen by all bidders.

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT



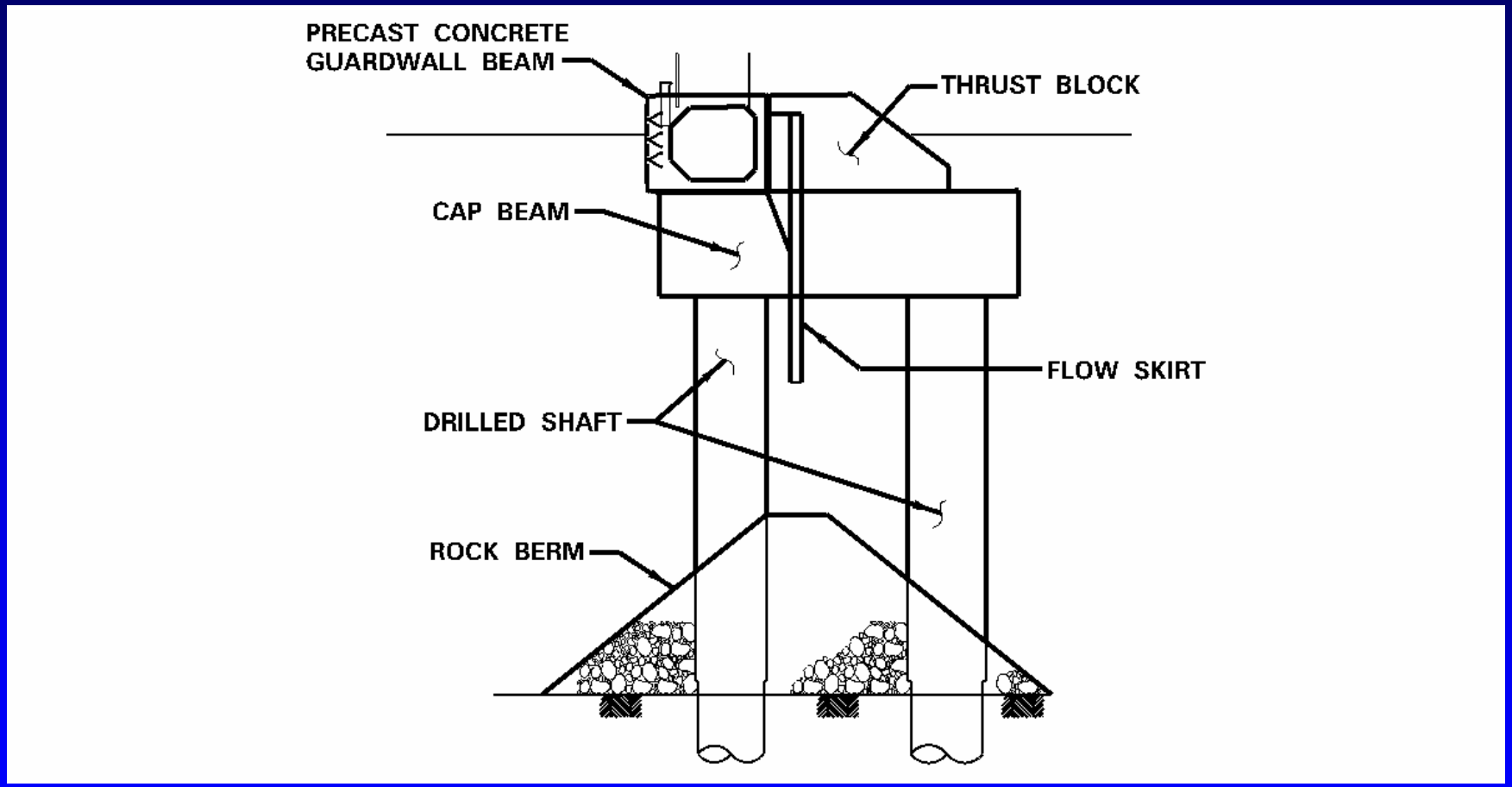
DRILLED SHAFT ALTERNATIVE

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT



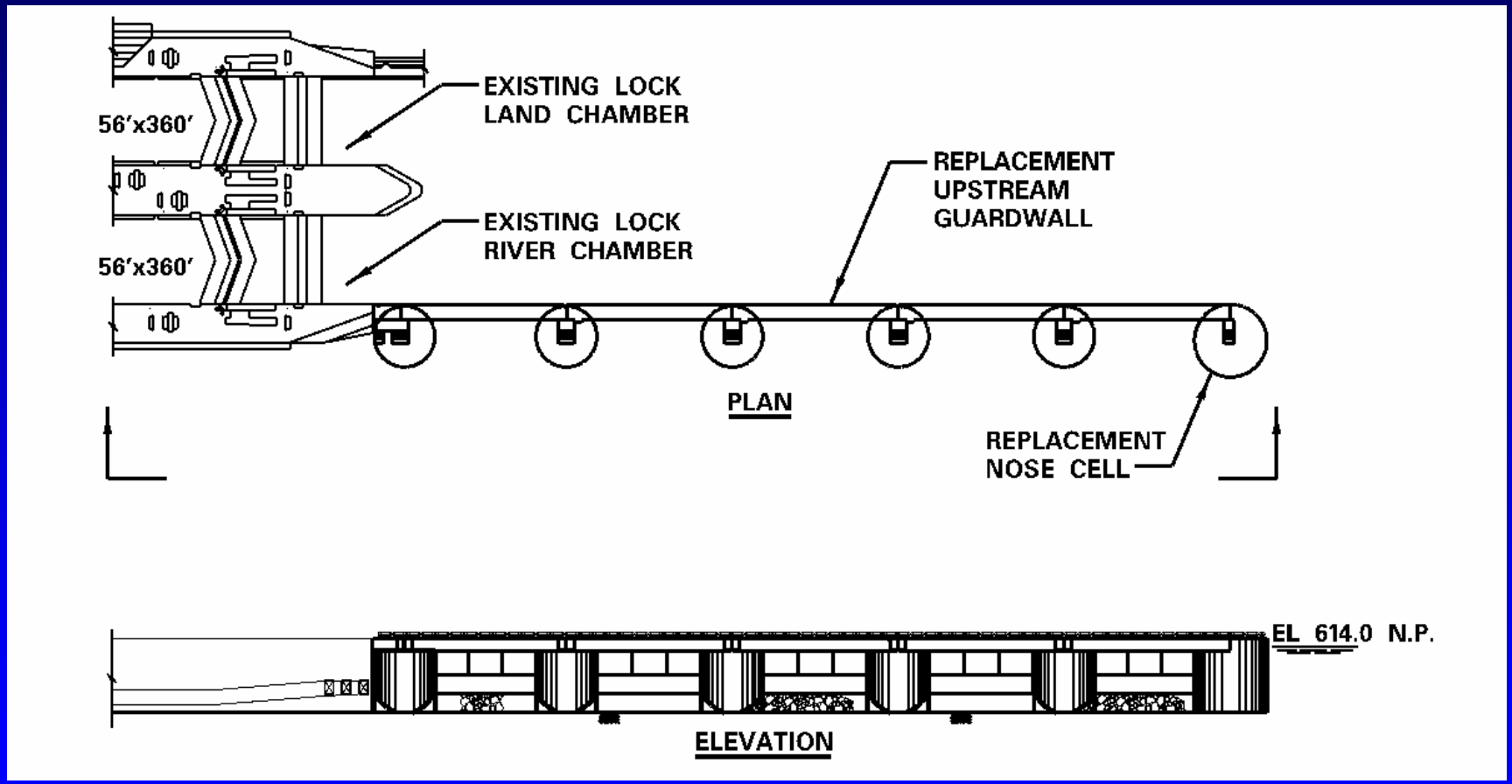
DRILLED SHAFT ALTERNATIVE

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT



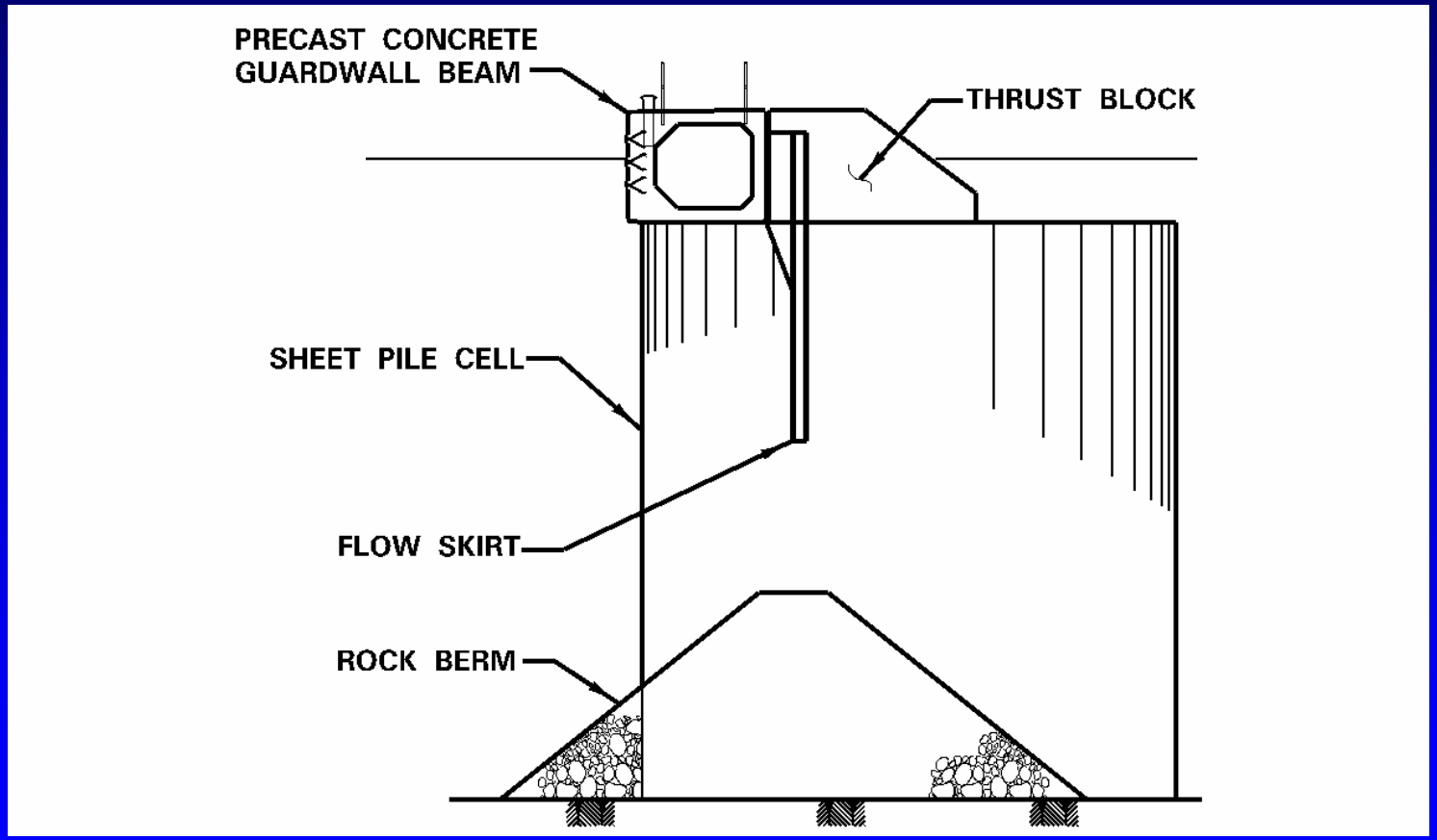
SHEET PILE CELL ALTERNATIVE

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT



SHEET PILE CELL ALTERNATIVE

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DEMOLITION OF UPSTREAM GUARD WALL

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DEMOLITION OF UPSTREAM GUARD WALL

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CELL PLACEMENT FOR UPSTREAM GUARD WALL

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FABRICATION OF GUARD WALL BEAMS

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FABRICATION OF GUARD WALL BEAMS

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FABRICATION OF GUARD WALL BEAMS

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POST TENSIONING OF GUARD WALL BEAMS

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INSTALLATION OF GUARD WALL BEAMS

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INSTALLATION OF GUARD WALL BEAMS

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INSTALLATION OF SKIRT PANELS

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MAJOR REHABILITATION PROJECT



RECONSTRUCTION OF UPSTREAM GUARD WALL

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- Extension of existing lock chamber

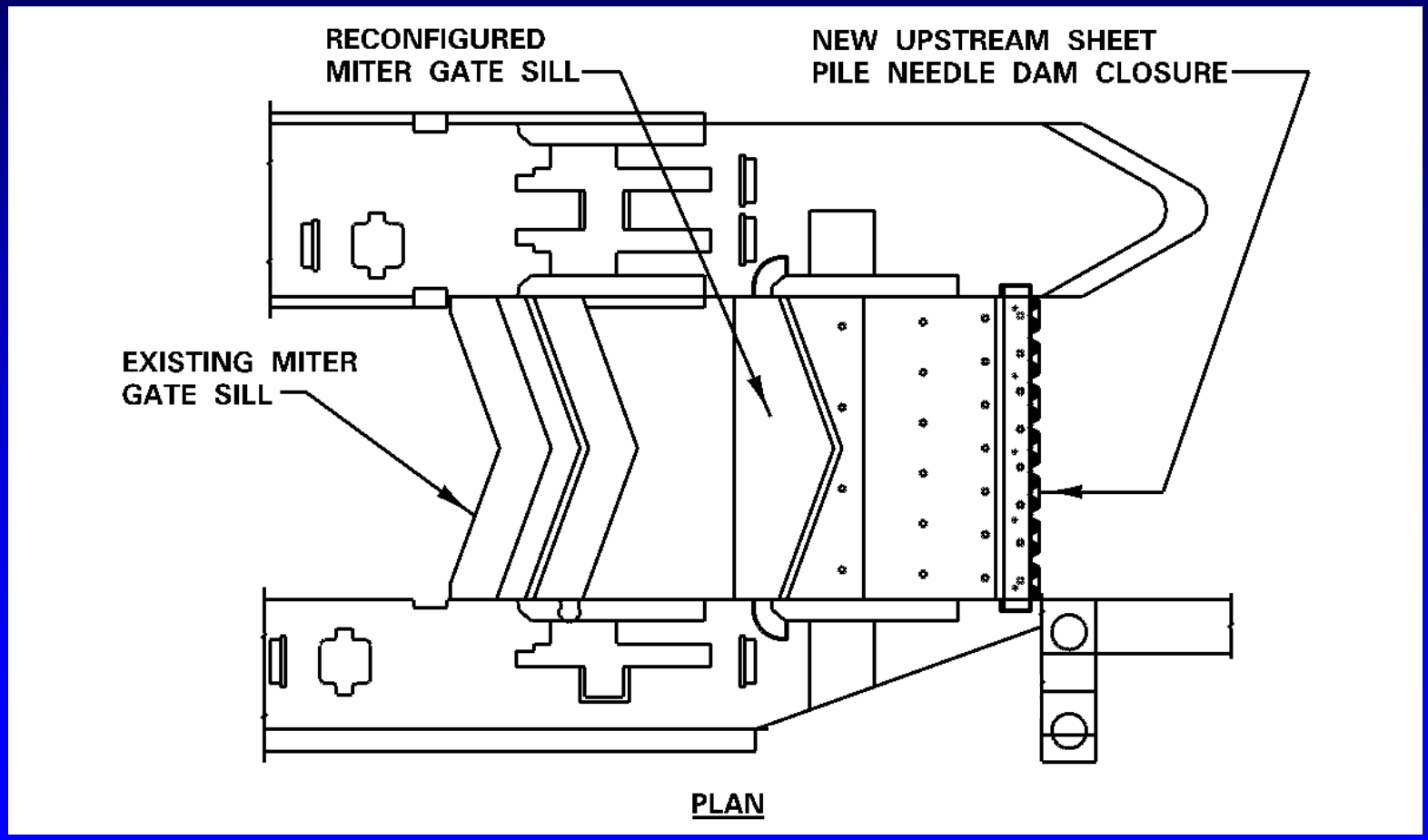
  Existing riverward lock chamber will be extended 47 feet by relocating the upstream miter gates. This will allow the typical tow configuration of 5 barges and a tugboat to lock through the chamber using three cuts instead of five.

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT



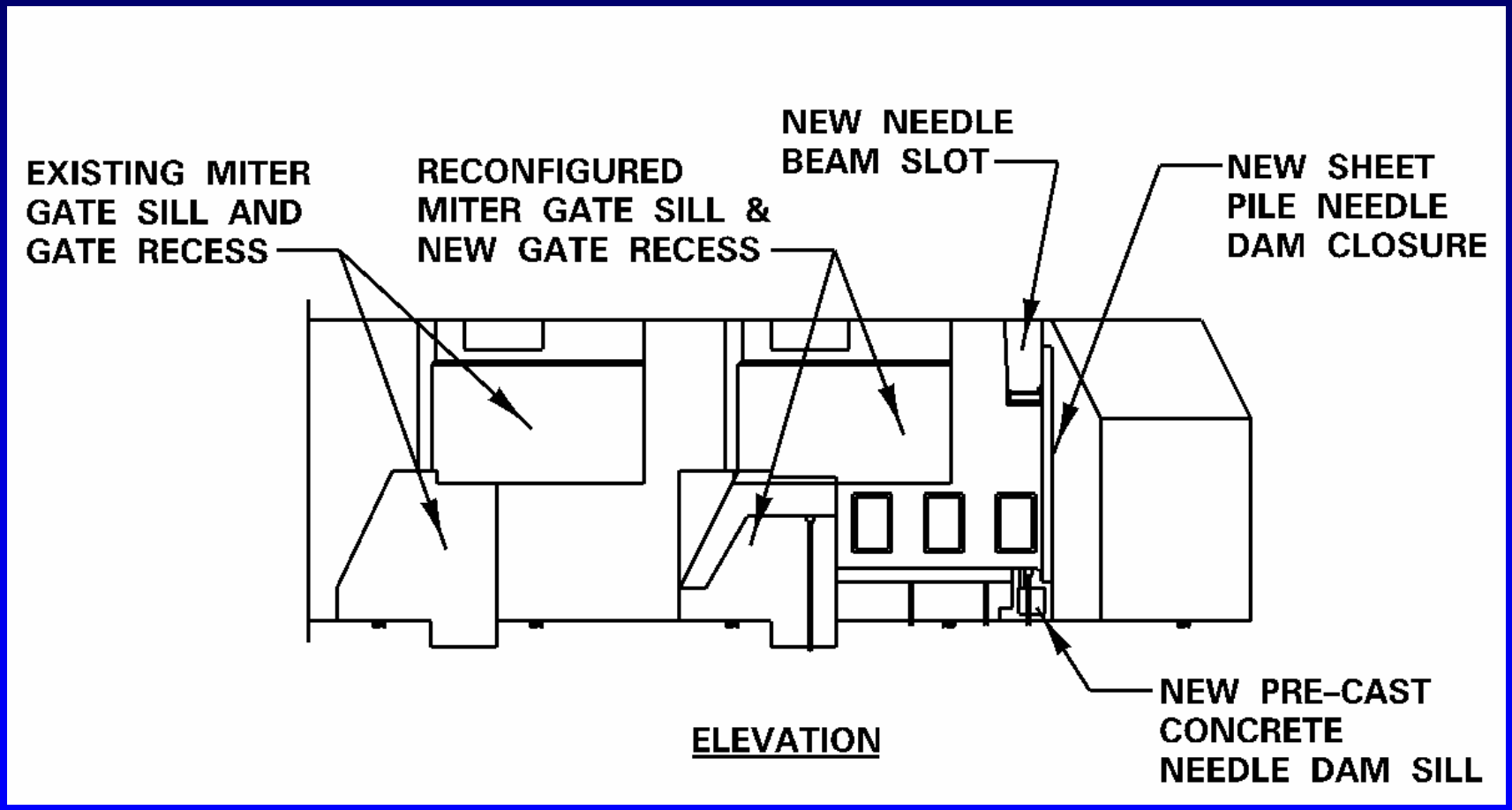
EXTENSION OF RIVERWARD LOCK CHAMBER

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MAJOR REHABILITATION PROJECT



EXTENSION OF RIVERWARD LOCK CHAMBER

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

- Extension of existing lock chamber
  - Installation of 24 multi strand rock anchors to stabilize upstream intake and miter gate monoliths
  - In-the-wet installation and anchoring of the new needle dam sill
  - Demolition of existing miter gate sill and reconfiguration of existing needle dam sill for miter gates
  - Excavated concrete for miter gate recesses and appurtenances

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LONDON LOCKS AND DAM

MAJOR REHABILITATION PROJECT





ANCHOR INSTALLATION

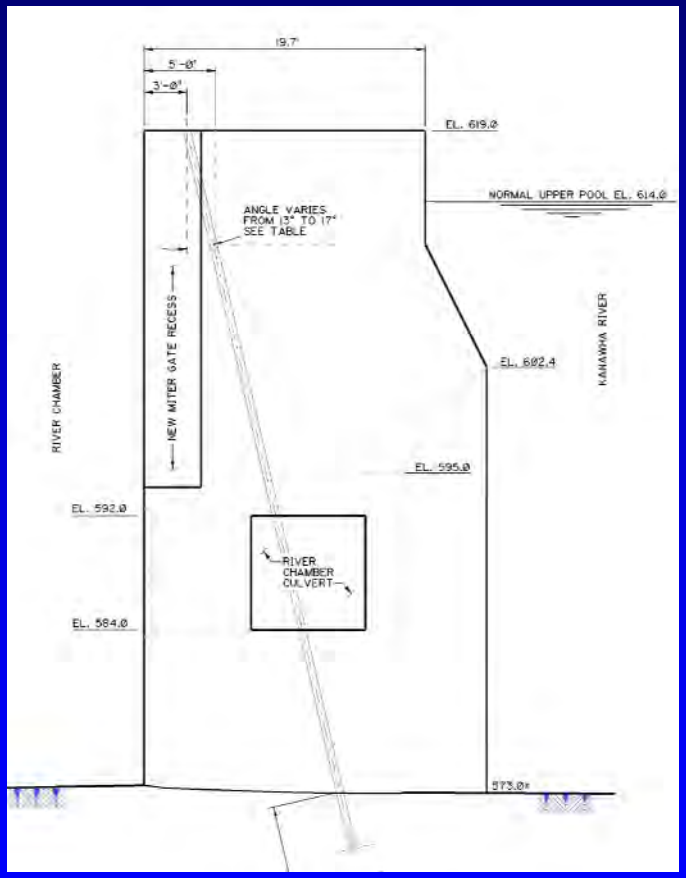
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ANCHOR INSTALLATION IN CULVERT

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TRANSPORTATION OF NEEDLE DAM SILL

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MODIFICATION OF NEEDLE DAM SILL

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MODIFICATION OF NEEDLE DAM SILL

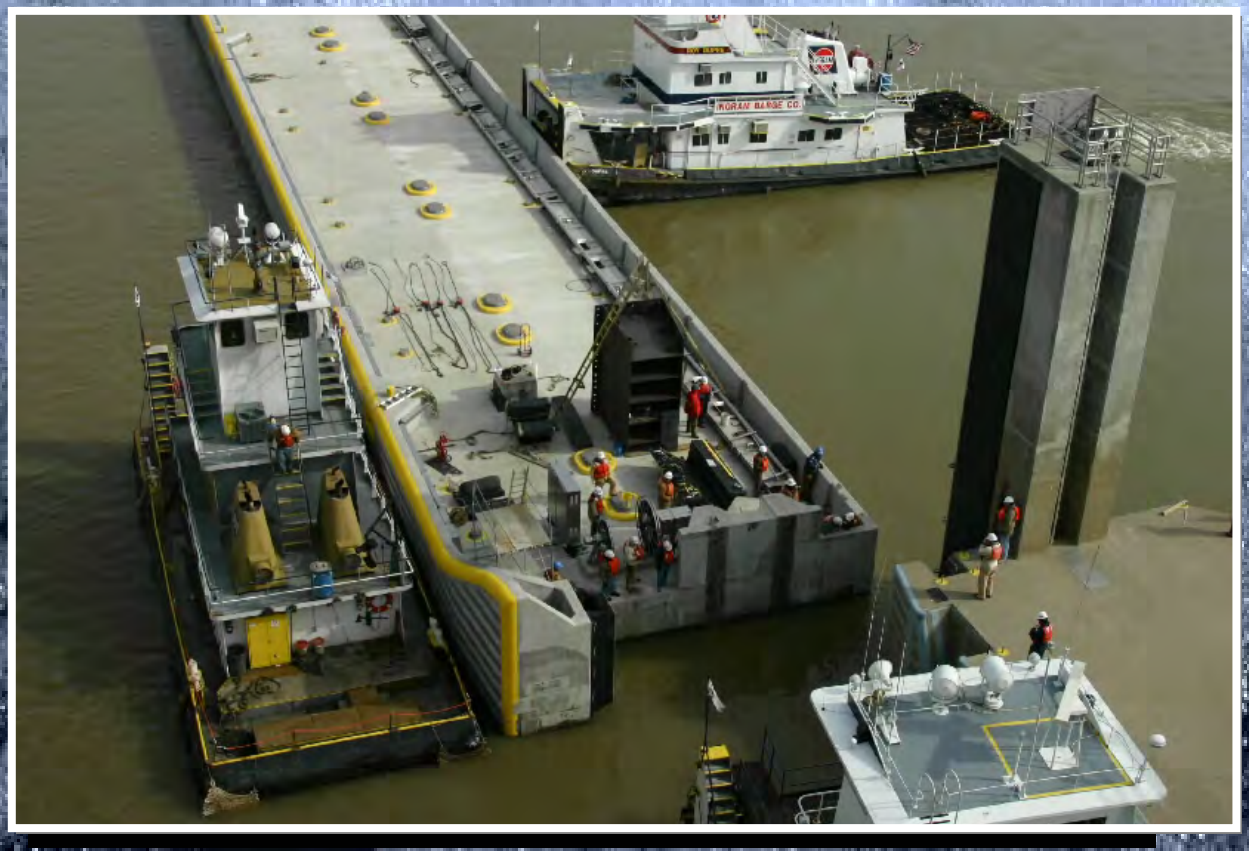
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2005 TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE

St. Louis, Missouri

Olmsted Floating Approach Walls



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Location Map



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Olmsted Site



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Olmsted Floating Approach Walls

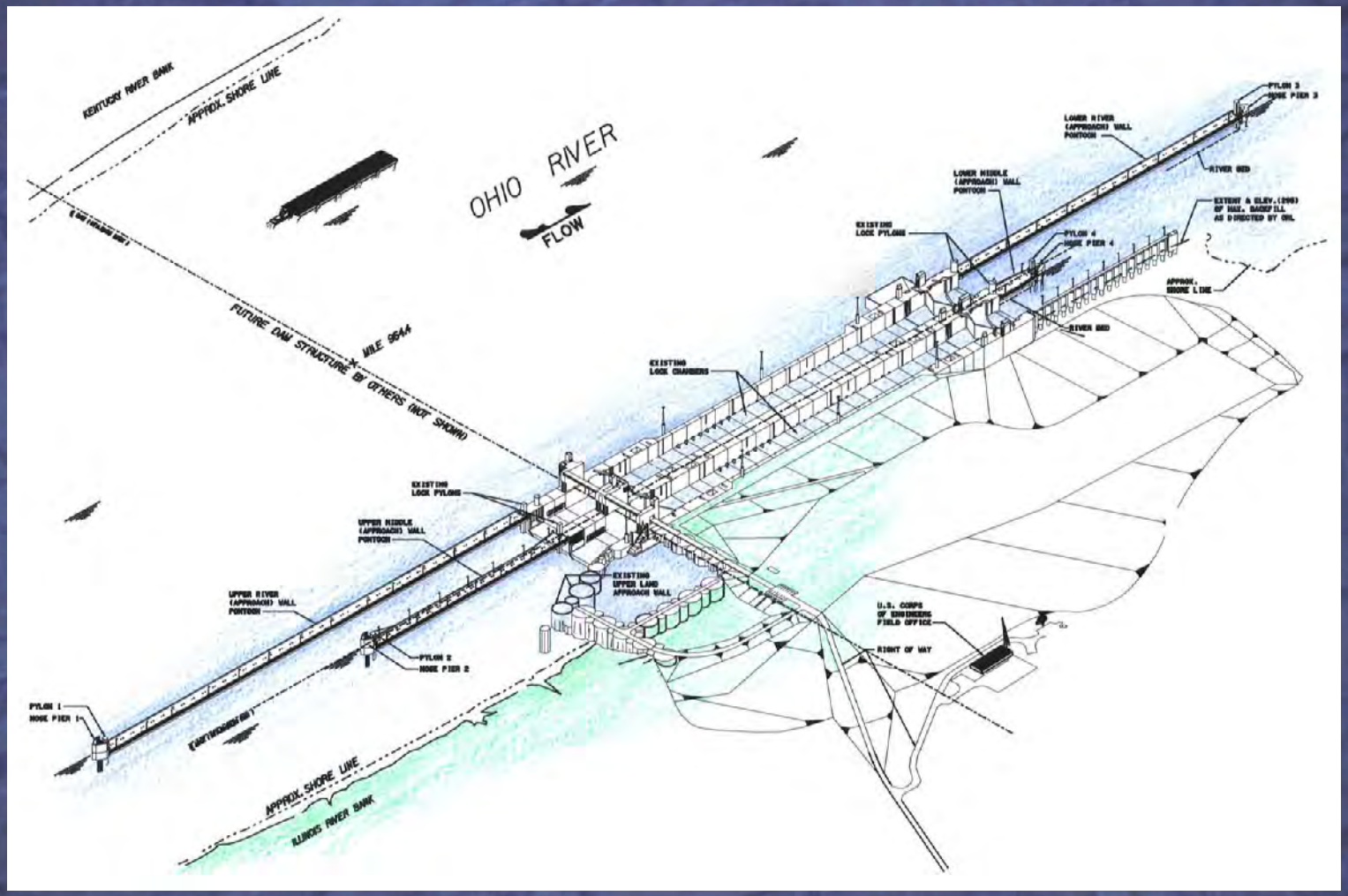
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Introduction

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Olmsted Locks & Approach Walls



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Olmsted Locks & Approach Walls - Today



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Olmsted Approach Walls – Design Criteria

- Maintain Open River Navigation During Construction
- Build Without Cofferdam
- Minimize Structural Mass to reduce Seismic Loads
- Water Velocities During Construction Up to 2.4 m/s (8fps)
- River Level May Change up to 18.3 m (60 ft) in one Season
- Resist Direct Barge Impact; Loads Up to 17,800 kN (4 million lbs)
- Resist Lateral Barge Impact; Loads to be Determined
- Minimize the Use of Divers During Construction of Divers

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Olmsted Floating Approach Walls

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Barge Impact

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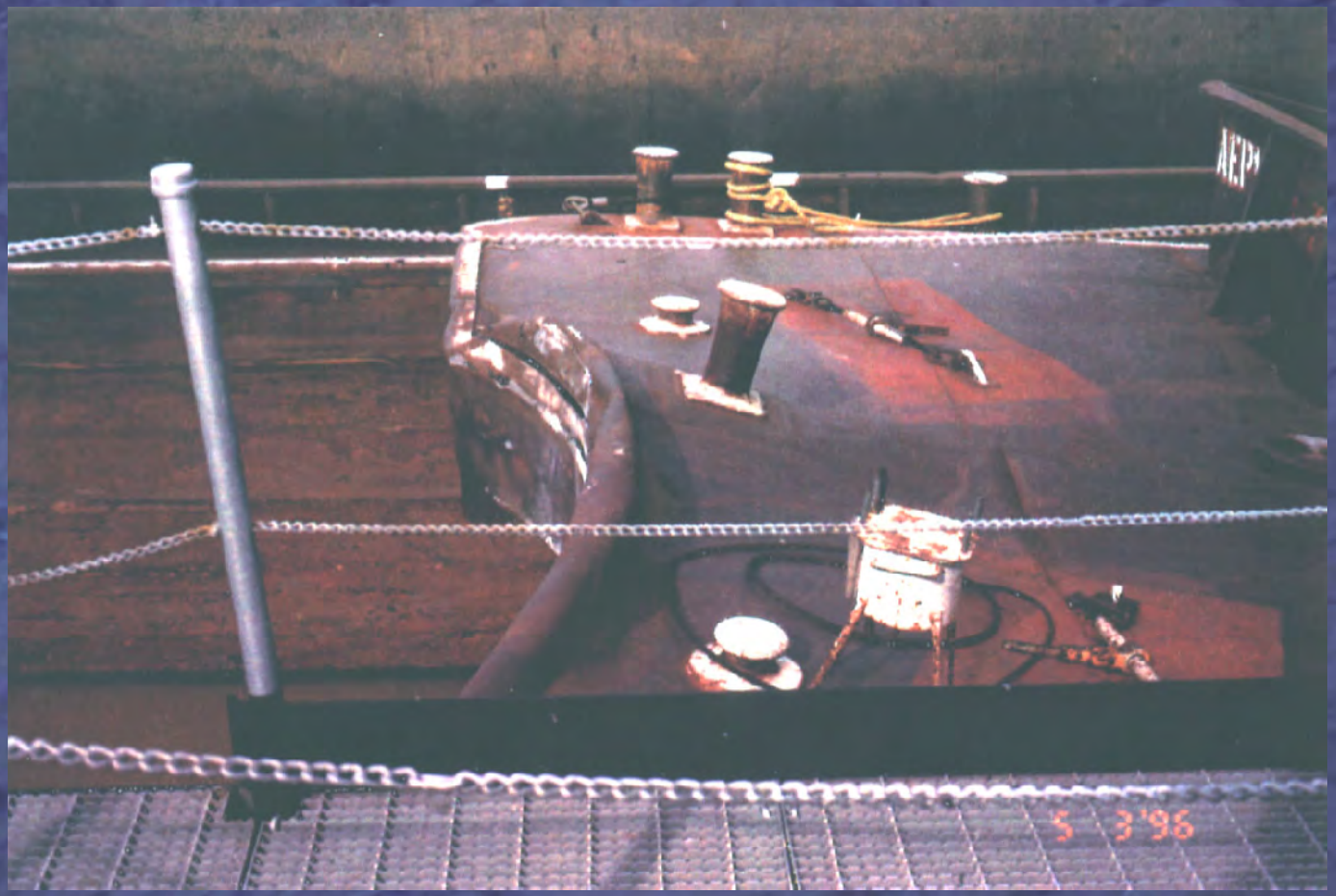
Typical Approach Walls Barge Impact



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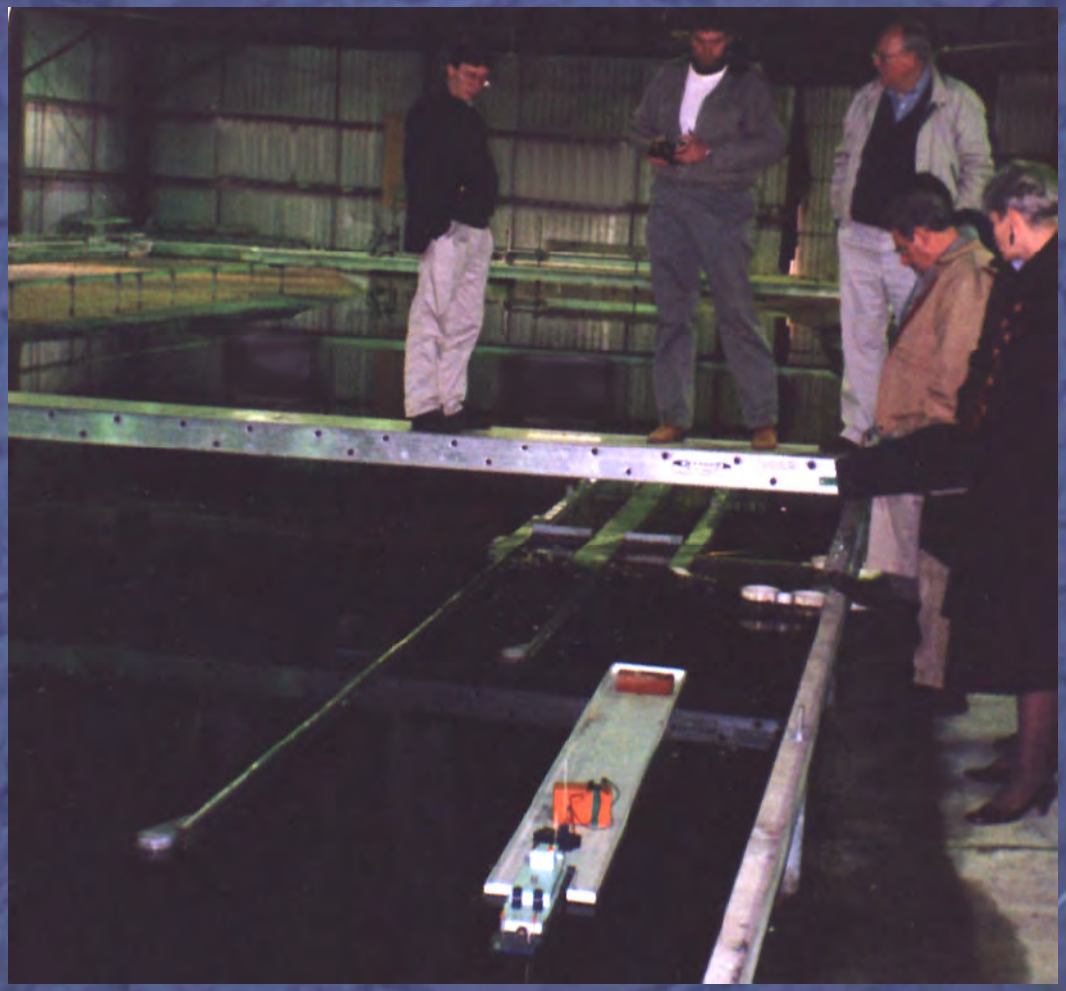
Raked Barge After Impacting a "Bullnose"



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WES Barge Impact Model Testing



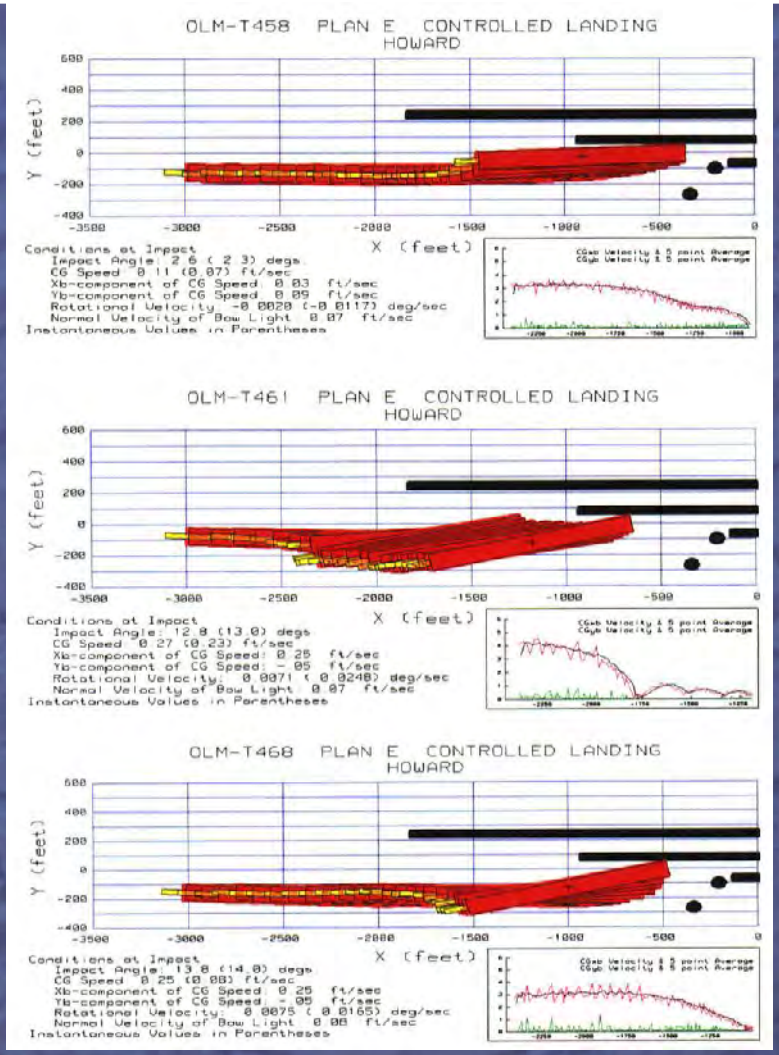
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WES Barge Impact Model Testing Results

Over 300 Model test impacts run by WES personnel



Model tests generated Impact Velocity and Angle of Impact

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Final Olmsted Approach Walls Design Barge Impact Loads (KIPS)

Design Condition	Lower Walls kip	Upper Middle Wall kip	Upper River Wall kip	Nose Pier kip
Usual	300	300	600	----
Unusual	450	600	900	----
Extreme	500	800	1,000	4,000

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Olmsted Floating Approach Walls

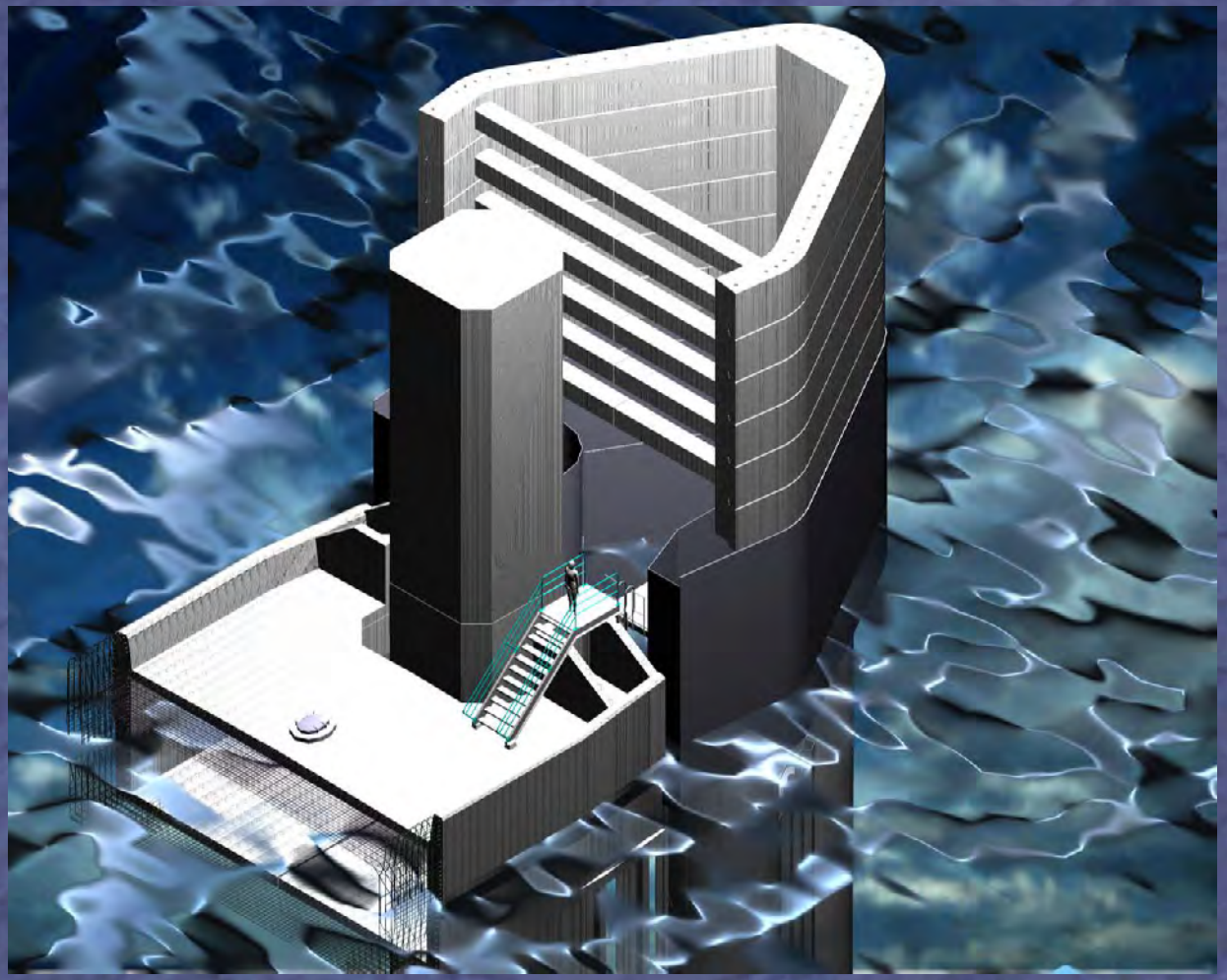
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Nose Pier & Pylon

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Nose Piers & Pylons

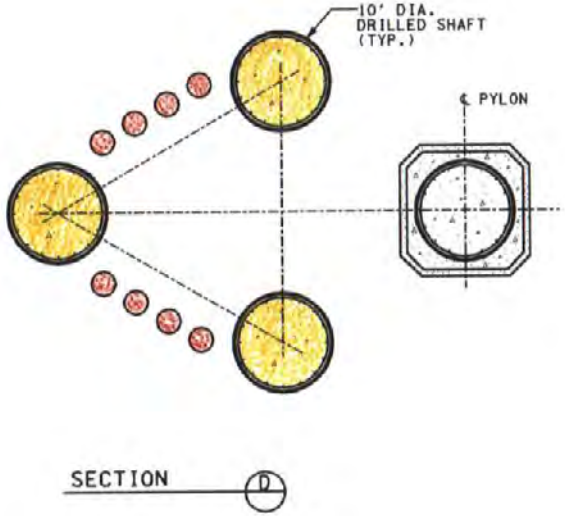


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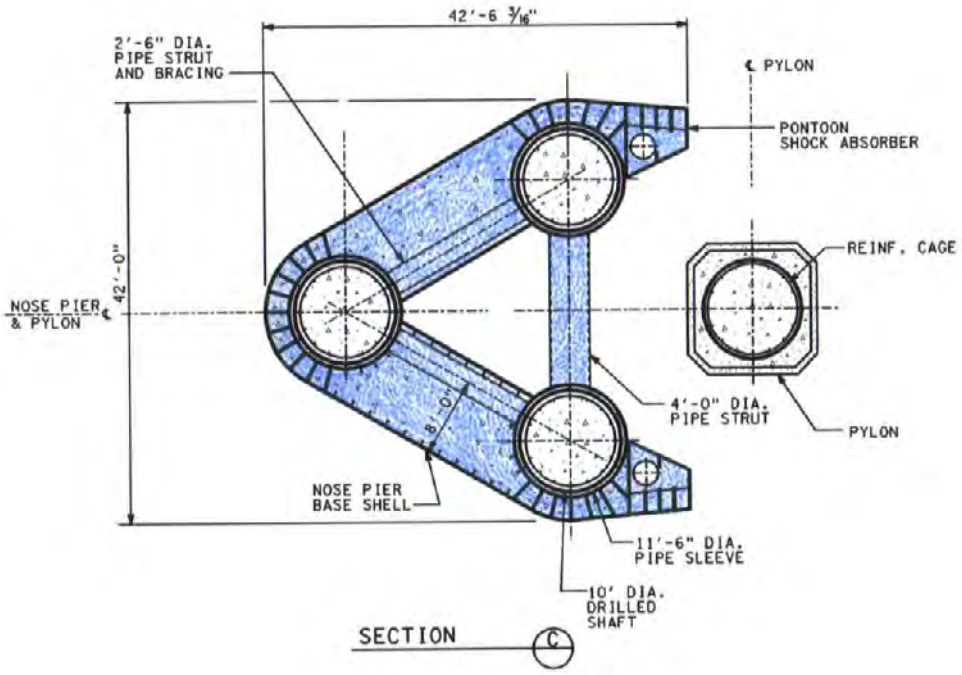
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Precast Shell Elements Placed over Shafts



ELEVATION 257-292.0

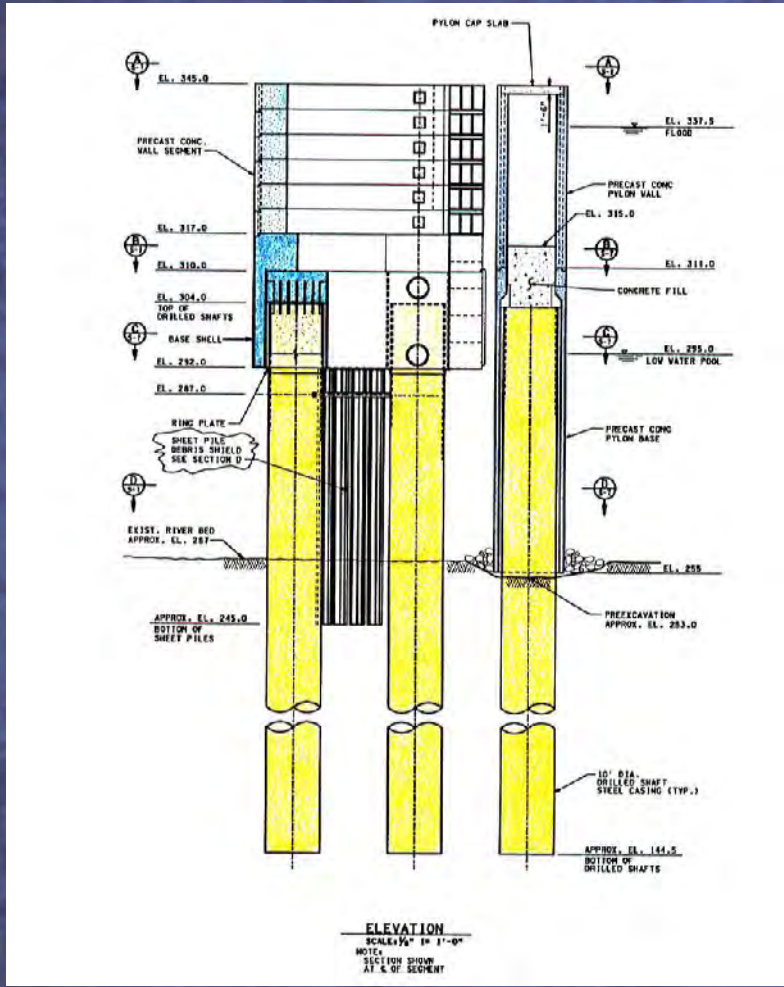


ELEVATION 292-310.0

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Founded on 10′ Diameter Drilled Shafts

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- Casings were fabricated in Idaho before steel prices spiked
- Casings are 44 m long, in one piece
- Casing thickness Varies from 2 – 3 cm

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10-Ft Diameter Casing & Custom Vibratory Hammer



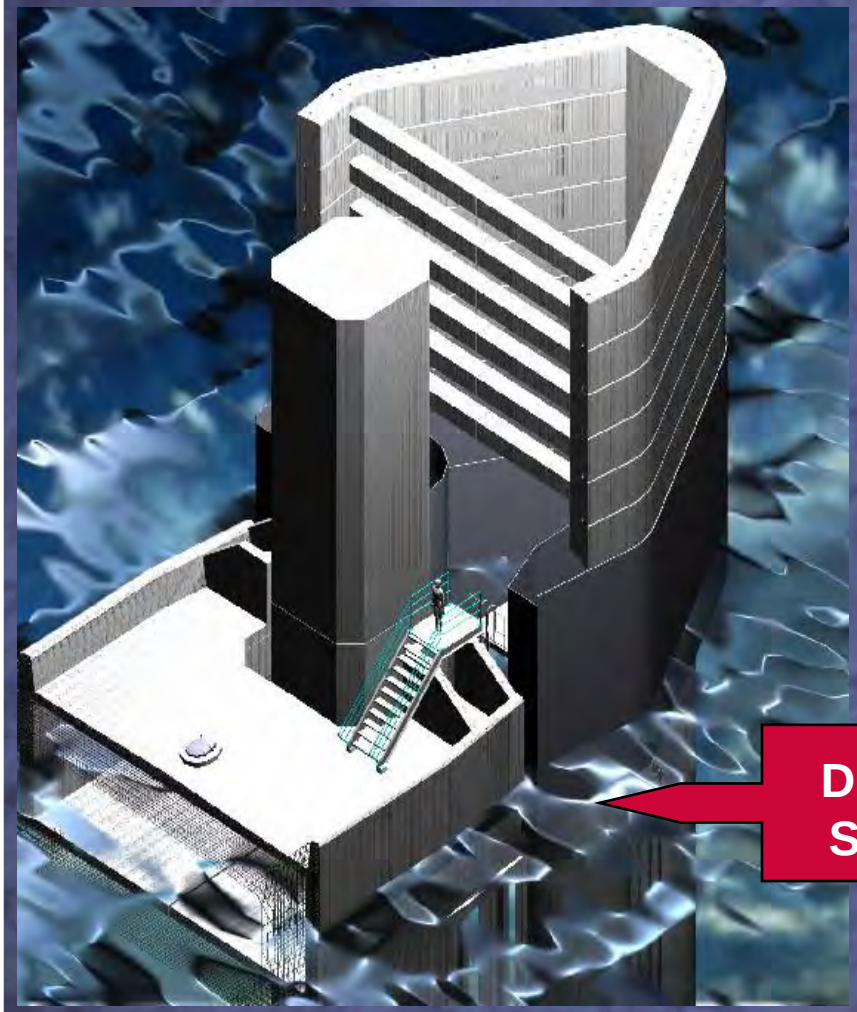


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Approach Wall Pylon & Nose Pier





DRILLED SHAFTS

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Positioning & Driving a Casing – Ringer Crane Mounted on Jumbo Barge



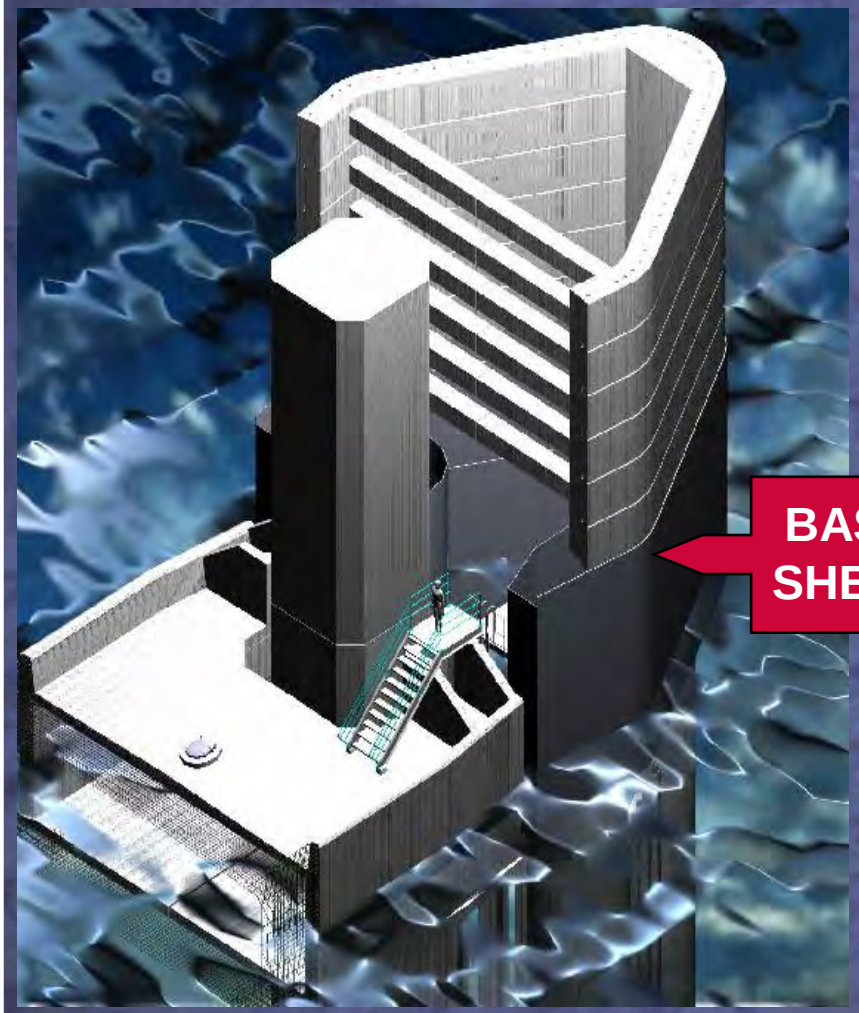




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Approach Wall Pylon & Nose Pier



BASE SHELL



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Setting Precast Concrete Top "Delta" Elements on Top of Nose Pier Base Shell

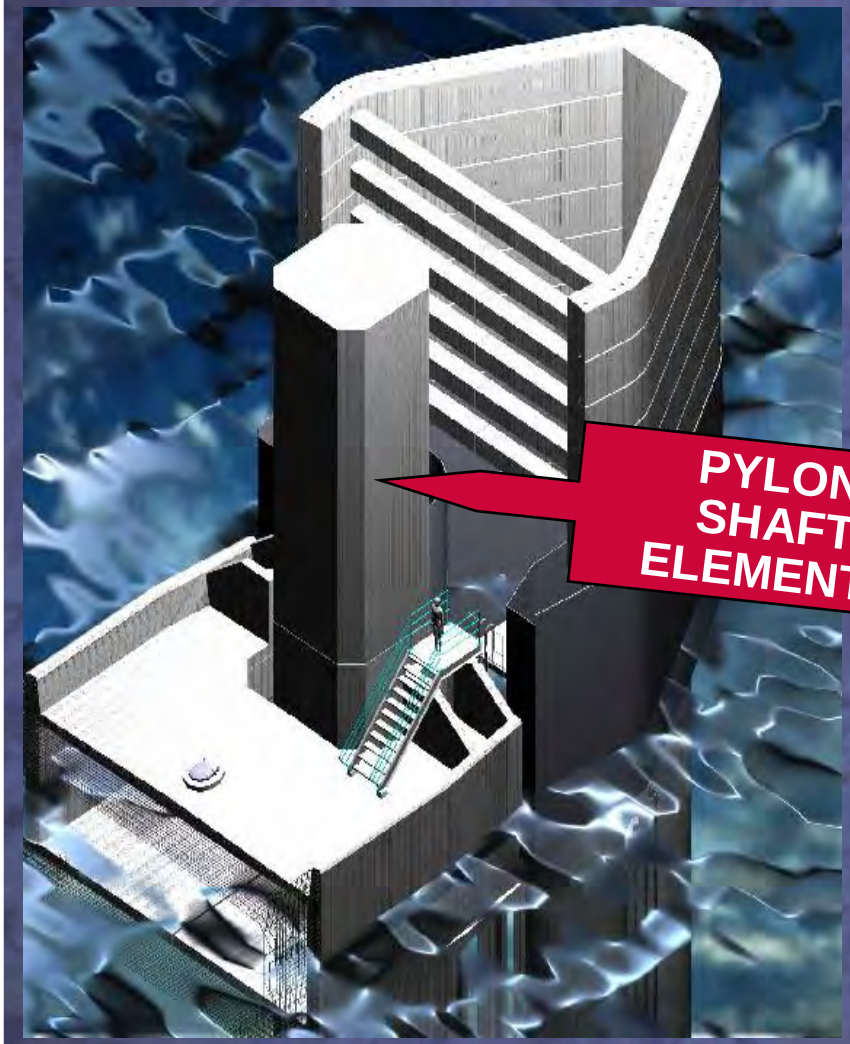


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Approach Wall Pylon & Nose Pier



PYLON SHAFT ELEMENTS



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Installing Precast Concrete Pylon Shell Elements over Drilled Shafts





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Painting for Visibility





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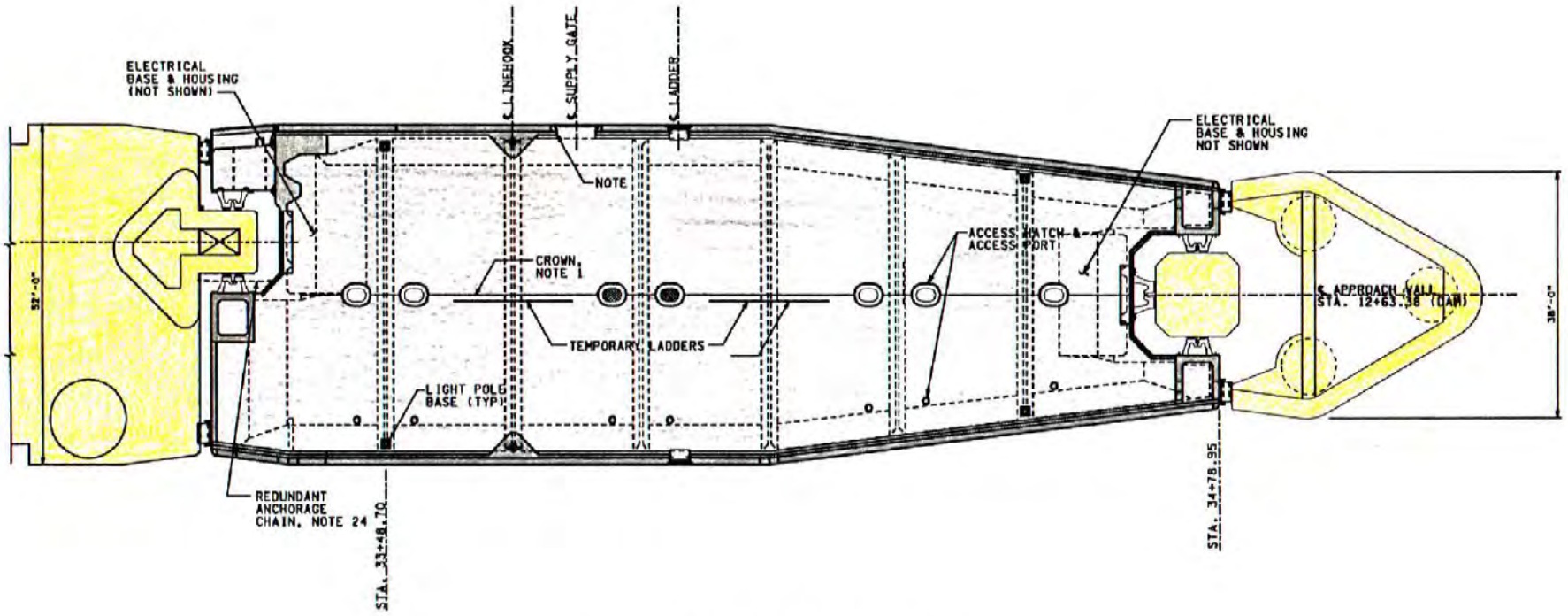
Olmsted Floating Approach Walls

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The Pontoons

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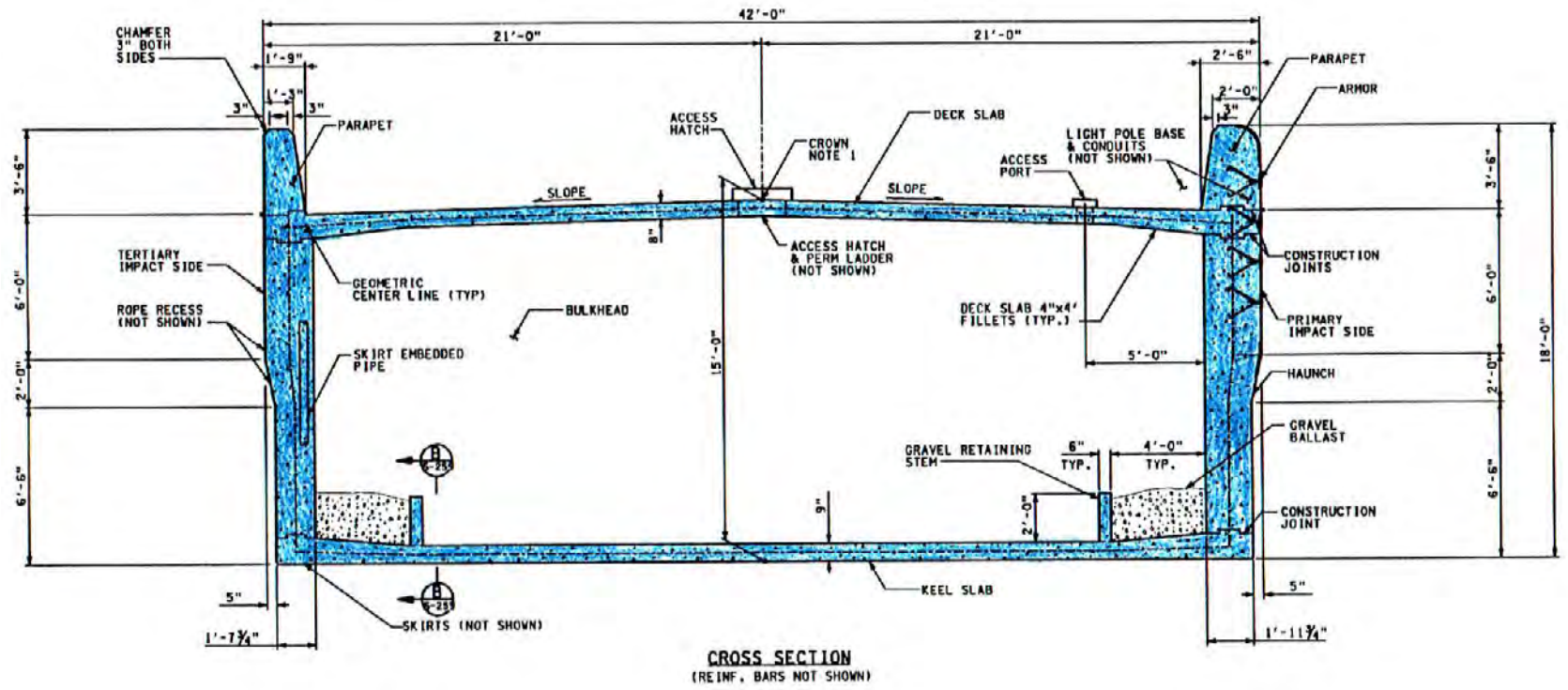


LOWER MIDDLE WALL PLAN
SCALE: 1" = 10'

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Typical Pontoon Cross Section



CROSS SECTION
(REINF. BARS NOT SHOWN)

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Graving Yard & Casting Basin



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Overview of Graving Yard Site March 1, 2001

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Overview of Graving Dock Site March 1, 2001



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Post tensioning with over 6.9 MPa (1000 psi)





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Olmsted Floating Approach Walls

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Floating Off the Casting Beds

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Casting Basin Flooding Begins

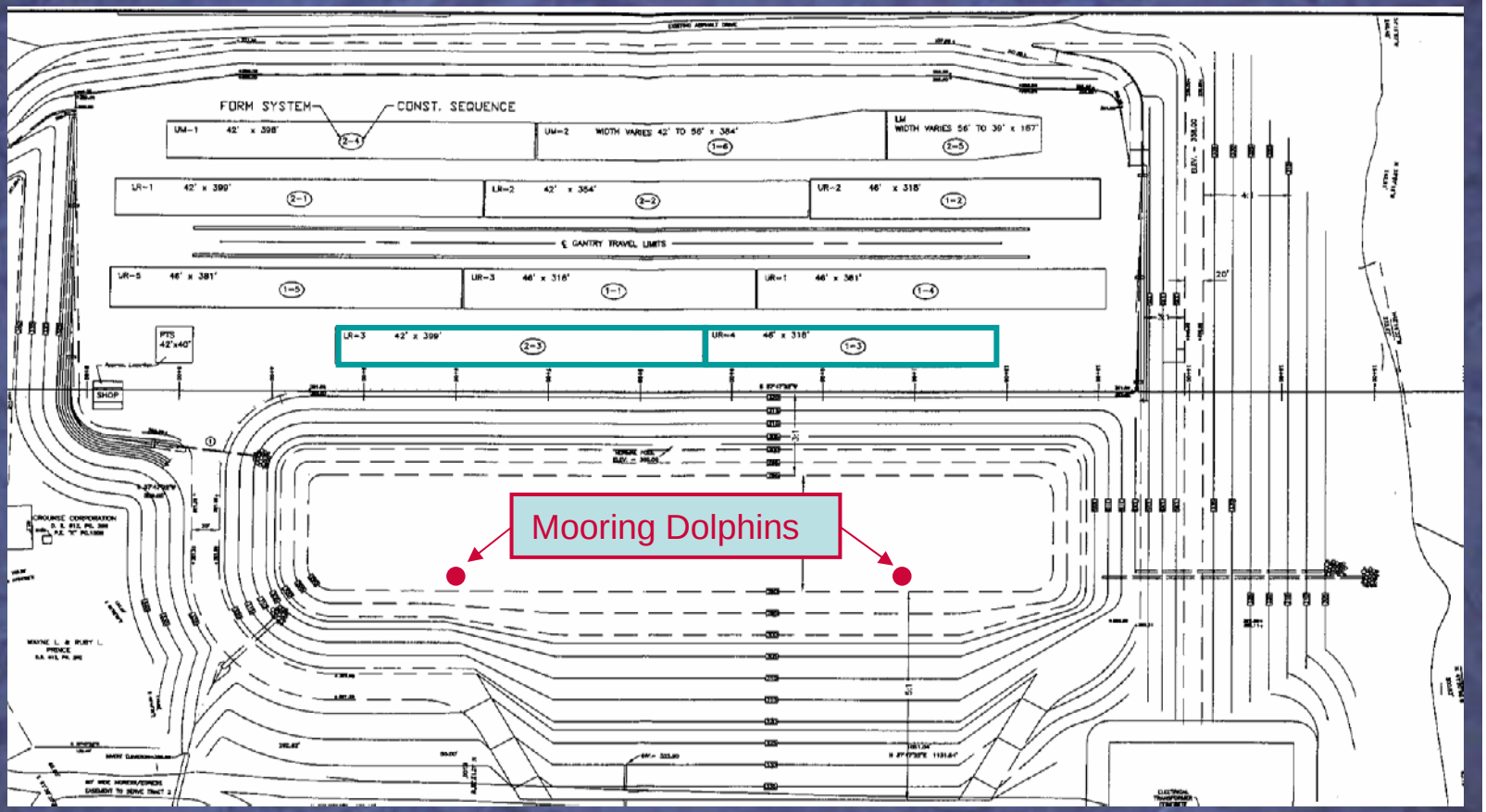


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Casting Yard Relationship to Float-out Storage Basin



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Basin is flooding – pontoons at lower casting elevations get wet first





First two rows are wet, water not yet to third row

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Basin Superflood Complete

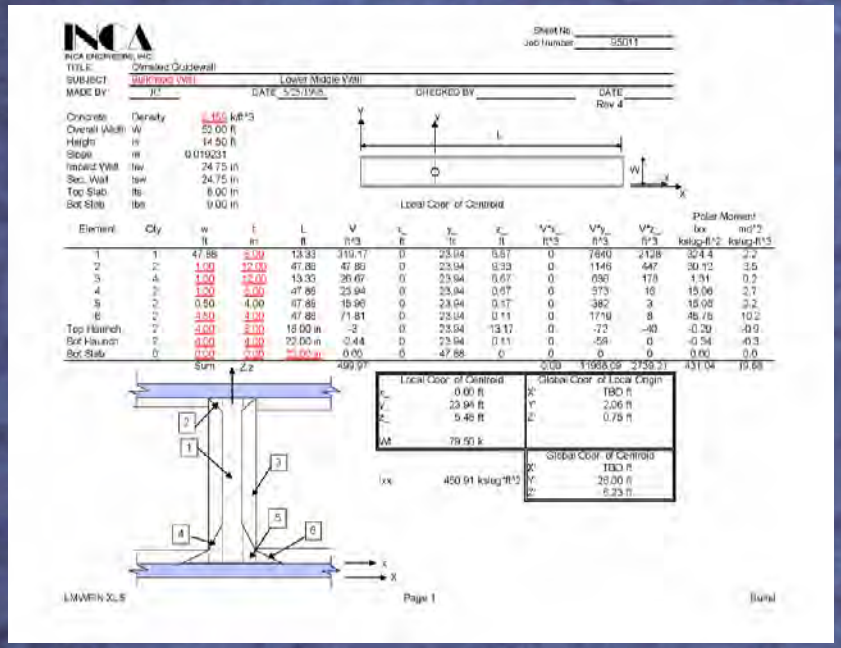


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Painstaking Bouyancy Calculations



INCA

Sheet No. _____
Job Number 95011

TITLE: Olmsted Guidewall
SUBJECT: Overhead Wall — Lower Middle Wall
MADE BY: RF — DATE 5/25/1995 — CHECKED BY _____ — DATE _____ — Rev 4

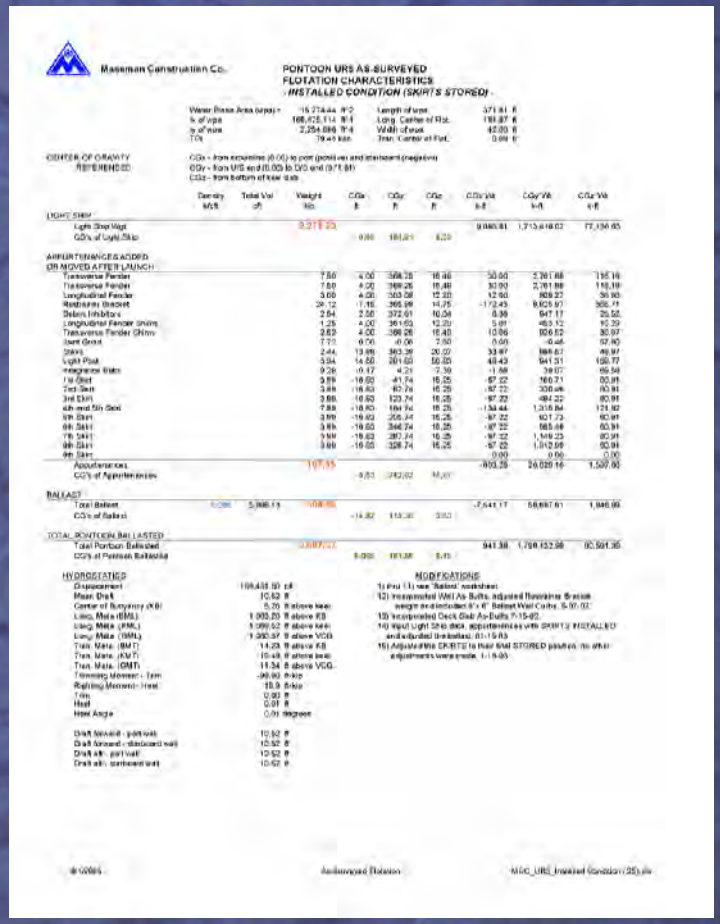
Concrete	Density	0.150 kcf*3
Overall Width	W	55.00 ft
Height	H	14.50 ft
Slope	m	0.019231
Inboard Wall	tiw	24.75 in
Sec. Wall	tsw	24.75 in
Top Slab	tts	6.00 in
Bot Slab	tbs	9.00 in

Local Coor. of Centroid

Element	Qty	w ft	w in	L ft	V ft^3	x_c ft	y_c ft	z_c ft	V*x_c ft^5	V*y_c ft^3	V*z_c ft^3	Polar Moment Ixx kslug-ft^2	Polar Moment Izz kslug-ft^3
1	1	47.88	6.00	13.33	319.17	0	23.04	6.67	0	7640	2128	324.4	2.2
2	2	1.00	12.00	47.88	47.88	0	23.94	9.33	0	1146	447	30.12	3.5
3	4	1.00	12.00	13.33	26.67	0	23.94	6.67	0	638	178	1.31	0.2
4	2	1.50	9.00	47.88	23.94	0	23.94	0.67	0	573	16	15.06	2.1
5	2	0.50	4.00	47.88	15.96	0	23.94	0.17	0	382	3	15.06	2.2
6	2	3.50	4.00	47.88	71.81	0	23.04	0.11	0	1719	8	45.76	10.2
Top Haunch	2	4.00	2.00	18.00 in	-3	0	23.04	13.17	0	-72	-40	-0.29	-0.9
Bot Haunch	2	4.00	4.00	22.00 in	-0.44	0	23.94	0.11	0	-58	0	-0.54	-0.3
Bot Slab	0	0.00	0.00	55.00 in	0.00	0	47.88	0	0	0	0	0.00	0.0
		Sum	Zz		499.91				0.00	11988.09	2759.21	431.04	19.68

Local Coor. of Centroid		Global Coor. of Local Origin	
x_c	0.00 ft	X	TBD ft
y_c	23.94 ft	Y	2.06 ft
z_c	5.48 ft	Z	0.79 ft
M	79.50 k		
Ixx	450.91 kslug*ft^3	Global Coor. of Centroid	
		X	TBD ft
		Y	26.00 ft
		Z	6.23 ft

LMWRN.XLS — Page 1 — Burial



Massman Construction Co.

PONTOON URS AS-SURVEYED
FLOTATION CHARACTERISTICS
- INSTALLED CONDITION (SKIRTS STORED) -

Water Plane Area (wpa) =	15,274.44 ft^2	Length of wpa	371.81 ft	
x_f of wpa	166,425.114 ft^4	Long. Center of Flot.	193.87 ft	
y_f of wpa	2,264,896 ft^4	Width of wpa	42.00 ft	
TPI	79.45 ton	Trav. Center of Flot.	0.00 ft	

CENTER OF GRAVITY REFERENCED
CGx - from centerline (0.00) aft (+) or fwd (-)
CGy - from URS aft (55.00) to CG and (0/1.5ft)
CGz - from bottom of keel slab

	Density kcf	Total Vol cf	Weight lbs	CGx ft	CGy ft	CGz ft	CGx*W k-ft	CGy*W k-ft	CGz*W k-ft
LIGHT SHIP									
Light Ship Wgt			3,211.23				9,980.91	1,713,418.02	77,156.65
CG's of Light Ship				0.00	180.01	6.29			
APPURTENANCES ADDED OR MOVED AFTER LAUNCH									
Transverse Fender				7.50	4.00	368.25	16.46	30.00	2,761.88	135.19
Transverse Fender				7.50	4.00	368.25	16.46	30.00	2,761.88	135.19
Longitudinal Fender				3.00	4.00	353.58	12.00	12.00	4,243.27	36.90
Restraint Bracket				24.12	7.15	365.99	14.75	-172.43	5,400.97	305.11
Debris Inhibitors				2.54	2.50	372.61	16.04	6.36	947.17	25.55
Longitudinal Fender Shims				1.25	4.00	361.63	12.29	5.01	453.10	12.29
Transverse Fender Shims				2.63	4.00	368.25	16.46	10.86	906.52	30.97
Inert Grout				7.73	6.00	-6.06	7.50	0.00	-0.46	57.90
Stairs				2.44	13.96	363.39	26.00	34.07	884.67	49.97
Light Post				3.84	14.50	361.63	50.00	48.43	941.51	150.77
Fragrance Rails				9.26	-0.17	4.21	7.39	-1.58	39.07	68.54
1st Skirt				9.89	-16.63	-41.74	16.25	-97.22	166.71	60.91
2nd Skirt				9.89	-16.63	-80.74	16.25	-97.22	308.46	60.91
3rd Skirt				9.89	-16.63	-123.74	16.25	-97.22	484.22	60.91
4th and 5th Skirt				7.89	-16.63	-164.74	16.25	-134.44	1,318.84	121.82
5th Skirt				3.89	-16.63	-205.74	16.25	-97.22	821.72	60.91
6th Skirt				3.89	-16.63	-246.74	16.25	-97.22	985.48	60.91
7th Skirt				3.89	-16.63	-287.74	16.25	-97.22	1,149.23	60.91
8th Skirt				3.89	-16.63	-328.74	16.25	-97.22	1,312.98	60.91
9th Skirt								0.00	0.00	0.00
Appurtenances			107.55					-993.29	26,029.16	1,597.60
CG's of Appurtenances				-9.83	-242.02	14.87				
BALLAST										
Total Ballast	0.064	5,966.13	358.00					-7,541.17	58,667.61	1,946.69
CG's of Ballast				-14.82	113.30	3.63				
TOTAL PONTOON BALLASTED										
Total Pontoon Ballasted			3,887.67					941.38	1,759,152.98	80,591.35
CG's of Pontoon Ballasted				0.00	181.58	5.71				

HYDROSTATICS

Displacement	199,488.90 cft
Mean Draft	10.52 ft
Center of Buoyancy (KB)	5.26 ft above keel
Long. Meta (BML)	1,955.20 ft above KB
Long. Meta (PML)	1,959.52 ft above keel
Long. Meta (SML)	1,950.97 ft above VCG
Trav. Meta. (BMT)	14.23 ft above KB
Trav. Meta. (PMT)	18.48 ft above keel
Trav. Meta. (SMT)	11.94 ft above VCG
Trimming Moment - Tpm	-99.90 ft-kip
Righting Moment - Heel	18.9 ft-kip
Trim	0.00 ft
Heel	0.01 ft
Heel Angle	0.01 degrees
Draft forward - port keel	10.52 ft
Draft forward - starboard keel	10.52 ft
Draft aft - port keel	10.52 ft
Draft aft - starboard keel	10.52 ft

MODIFICATIONS

1) Pro (1) see 'Ballast' worksheet.
12) Incorporated Wet As Built, adjusted flotation & assign an inclusion 6" x 6" Ballast Wet Cells, 5-97-02
13) Incorporated Deck Slab As-Built 7-15-97.
14) Input Light Ship data, appurtenances with SKIRTS INSTALLED and adjusted ballasts, 01-15-03.
15) Adjusted the SKIRTS to their Mid STORED position, no other adjustments were made, 1-15-03.

#10084 — Ballasted Flotation — MCC_URS_Inverted Condition (25).xls

2005 TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Pontoons all Afloat and Have Been Moored to Dolphins



LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Completed Pontoons Ready to Transport to Olmsted Site



Note Breached Dike

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Transporting a Completed Pontoon from Casting Yard to Olmsted Site



LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Completed Pontoon Arriving at Olmsted



LOUISVILLE DISTRICT

Olmsted Floating Approach Walls

INCA ENGINEERS INC.

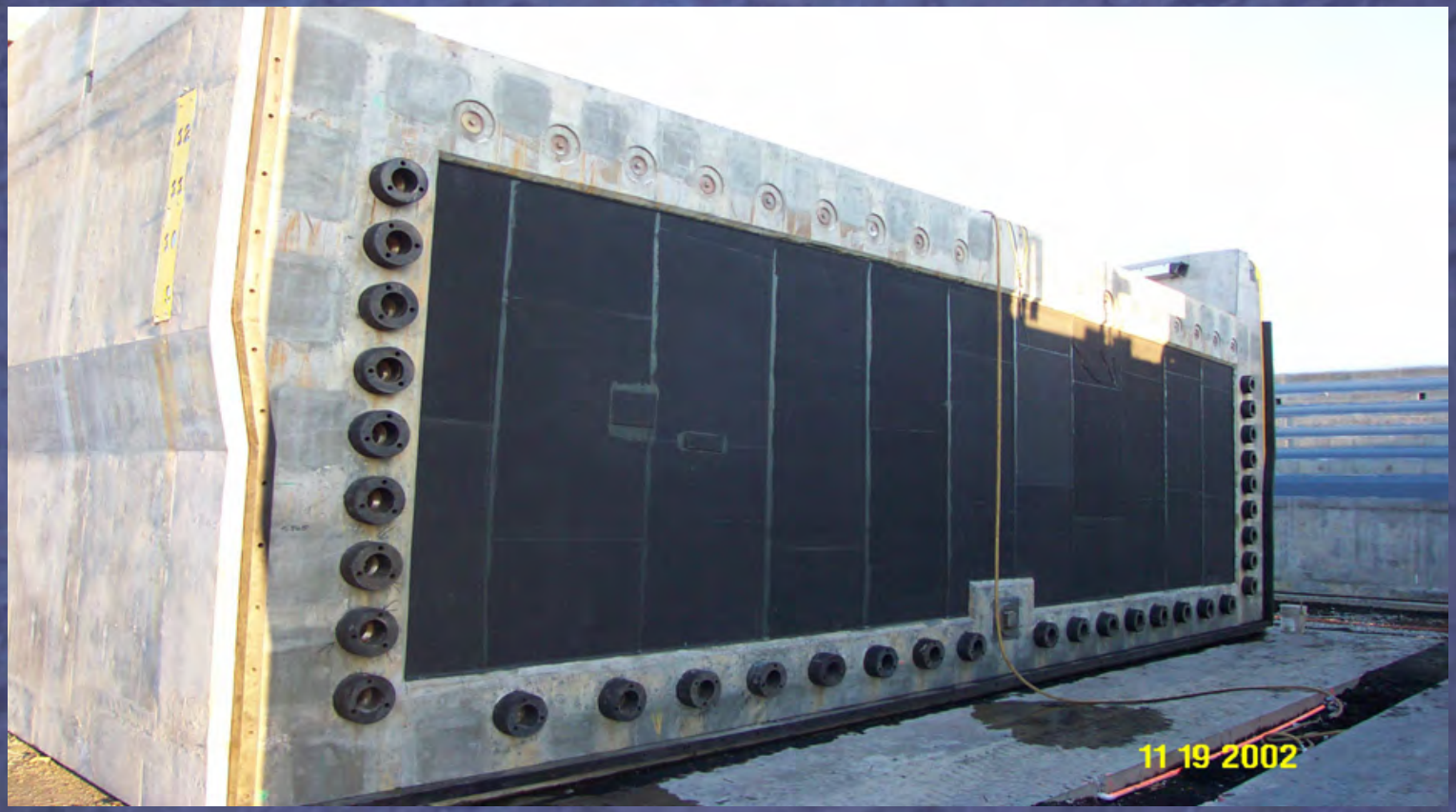
Integration and Installation at The Olmsted Site

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Integrating Pontoons at Olmsted

Integration Bolt Holes with Rubber “Donuts” surrounding each hole



LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Integrating Pontoons at Olmsted





2005 TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE

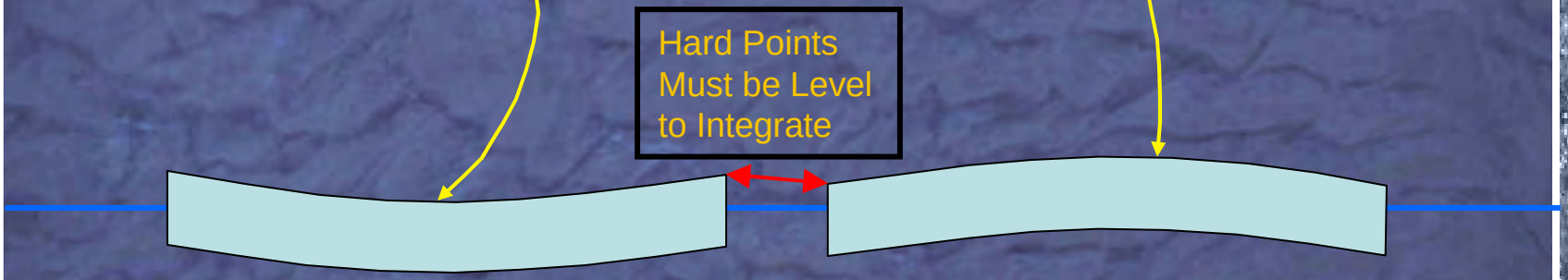
LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Aligning Pontoons for Integration

Pontoon in shadow; water temperature warmer than air or pontoon

Pontoon in the sun; water temperature cooler than air or pontoon



Temperature Extremes

- Air -14 to +108 deg F
- Water +37 to +87 deg F

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Checking Horizontal Alignment on Primary Impact face at Olmsted



LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Dewatering box in case future repairs are necessary below the water line





LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Integration Seals at Perimeter of Pontoon and around each Bolt Hole



LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Integrating Pontoons at Olmsted







LOUISVILLE DISTRICT

INCA ENGINEERS INC.

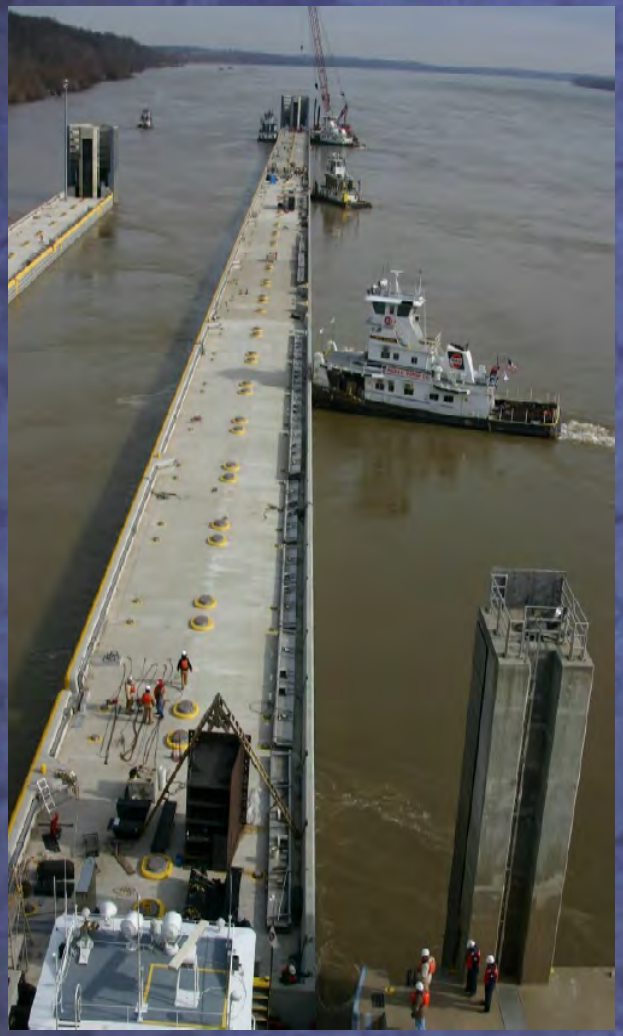
Installing an Integrated Floating Wall



This was a 90 Minute Operation!

LOUISVILLE DISTRICT

INCA ENGINEERS INC.



Final Installation of 508 m (1667 ft) Long Upper River Wall in February 2004

Duration of Installation: 1½ hours

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

High Mast Lighting was installed after pontoons were integrated and installed in final positions





LOUISVILLE DISTRICT

INCA ENGINEERS INC.

River in Flood January 2005
Pontoons Ride the Floods



2005 TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Construction Cost

Award Amount

$98,981,000

Final Amount

$106,360,000

7.45% Growth

LOUISVILLE DISTRICT

INCA ENGINEERS INC.

Olmsted Approach Walls Team

INCA Engineers
Glosten Associates
Geomatrix
Elcon Associates
John Priedeman
Washington DOT

USACE
Louisville District
Headquarters
Portland District
Nashville District
ERDC (WES)

Massman Construction Co.

SUBCONTRACTORS:
Bar-Tie Reinforcing Inc.
Gerald Chambers & Sons, Inc.
Luhr Bros., Inc.
Plateau Electrical Constructors, Inc.
Thomas Industrial Coatings

SUPPLIERS:
Alfab, Inc.
AmeriSteel
Eaton Metal Products Co.
Egyptian Concrete Co.
Federal Materials Concrete
Steven M. Hain Co.
Hydraulic Power Systems, Inc.
Ingram Barge Co.
James Marine Inc.
Steward Machine Co.
VSL/Vstructural

LOUISVILLE
DISTRICT

INCA
ENGINEERS INC.

THANK YOU!



2005 TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE

US Army Corps of Engineers
Louisville District

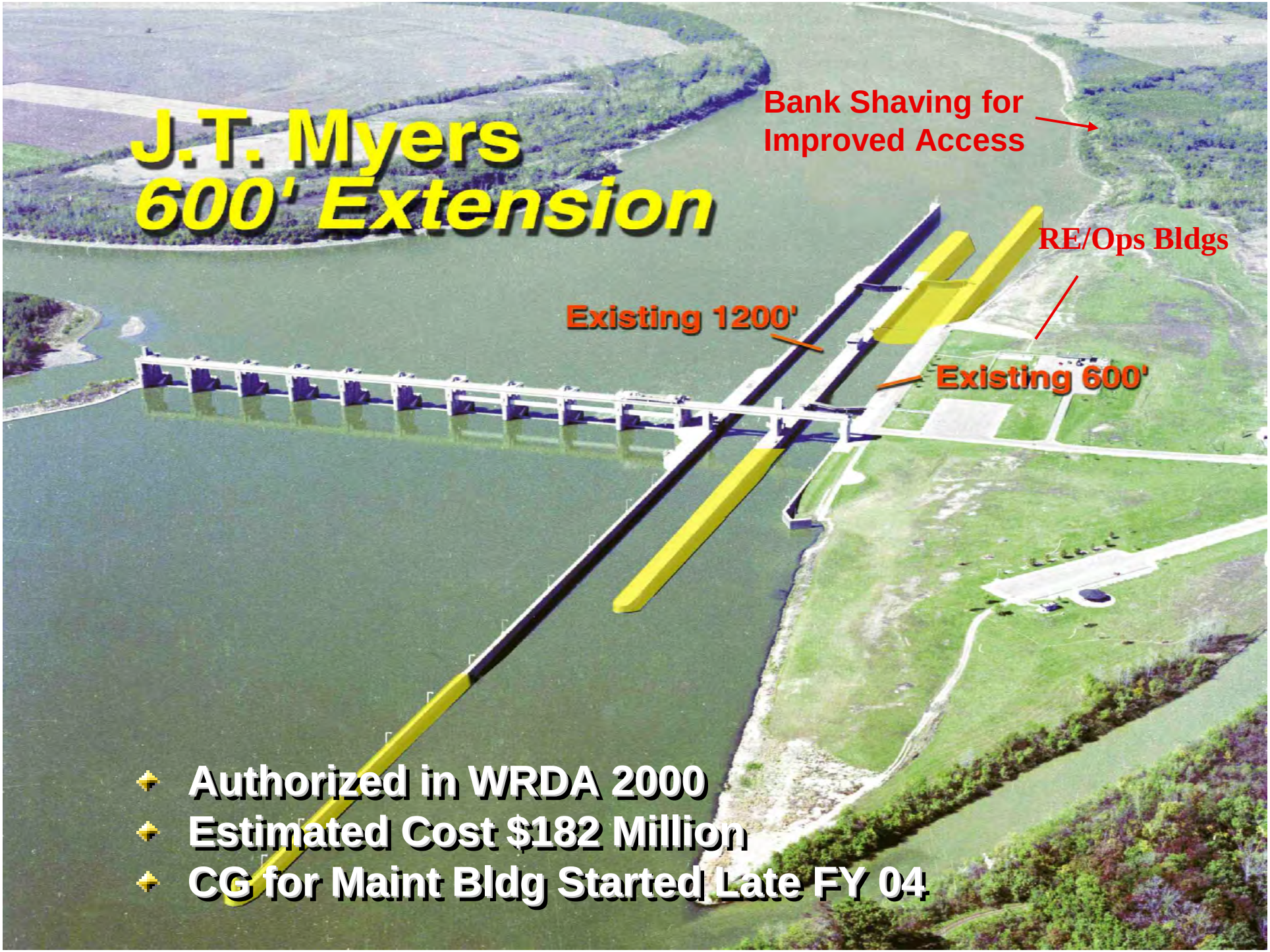
J.T. Myers Lock Improvements Project

Infrastructure Conference

St. Louis

August 1-4, 2005

By: David Schaaf, P.E
& Greg Werncke, P.E.


J.T. Myers
600' Extension
Bank Shaving for
Improved Access
RE/Ops Bldgs
Existing 1200'
Existing 600'
Authorized in WRDA 2000
Estimated Cost $182 Million
CG for Maint Bldg Started Late FY 04

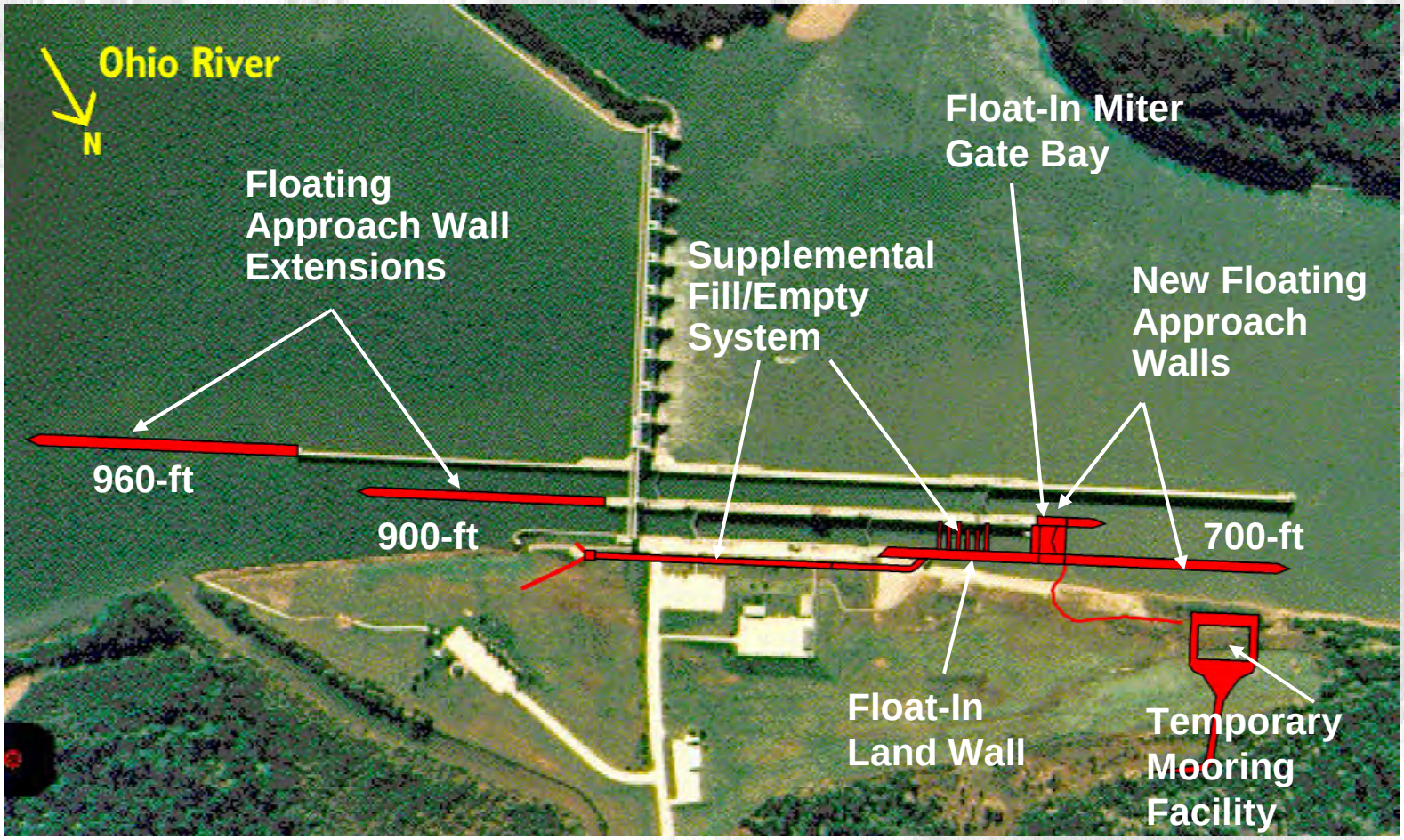
J.T. Myers Locks Improvements Project

Major Project Features As Authorized

- ***Extend Auxiliary Chamber to Nominal 1200-ft Length***
- ***Supplemental Wrap Around Filling/Emptying System for Extended Auxiliary Chamber***
- ***Approach Wall Modifications***
  - Floating extensions to upstream walls
  - New lower middle and land floating walls
- ***Shave Downstream Bank for Improved Access***
- ***New Miter Gates for Extended Chamber, Existing Lower Auxiliary Gates Rehabilitated and Serve as Project Spares and MG Storage Pier***
- ***Aquatic Mitigation Features***

J.T. Myers Locks Improvements Project

Major Lock Features of Authorized Project



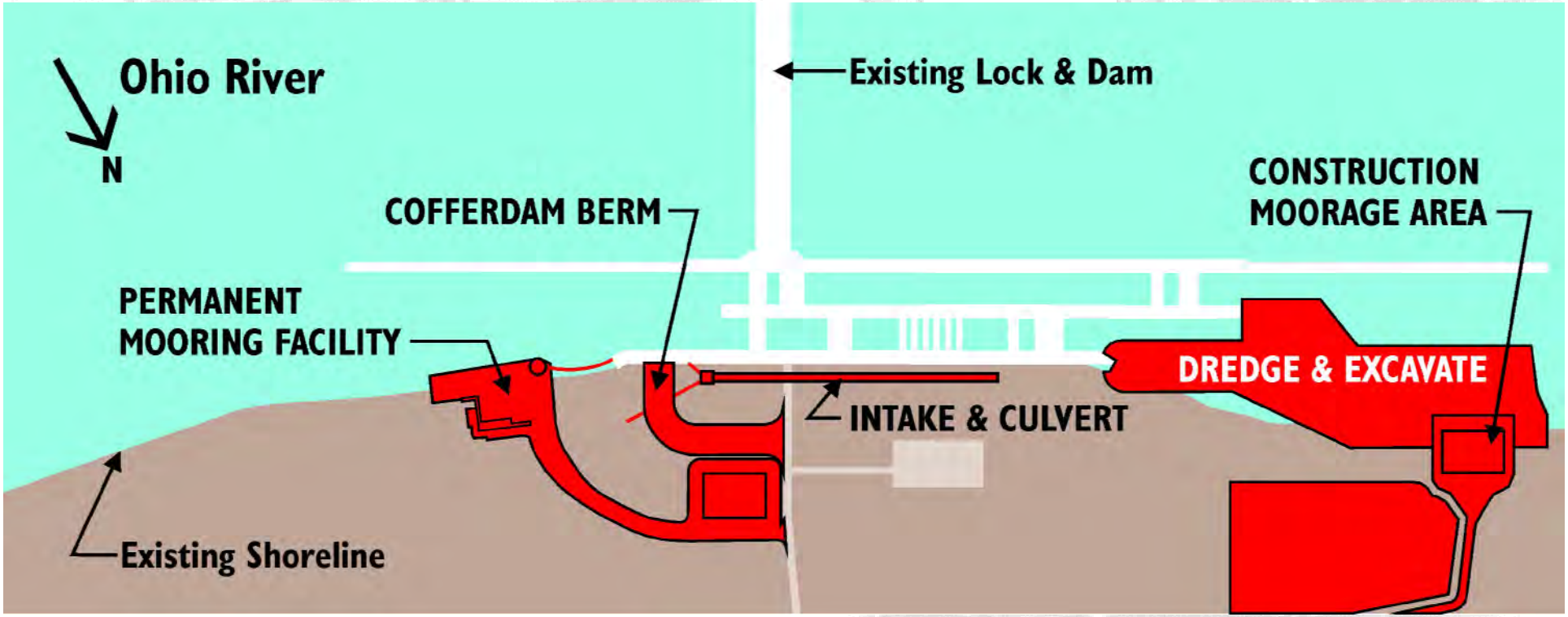
J.T. Myers Locks Improvements Project
August 2005

J.T. Myers Locks Improvements Project

Innovations Associated with Authorized Project

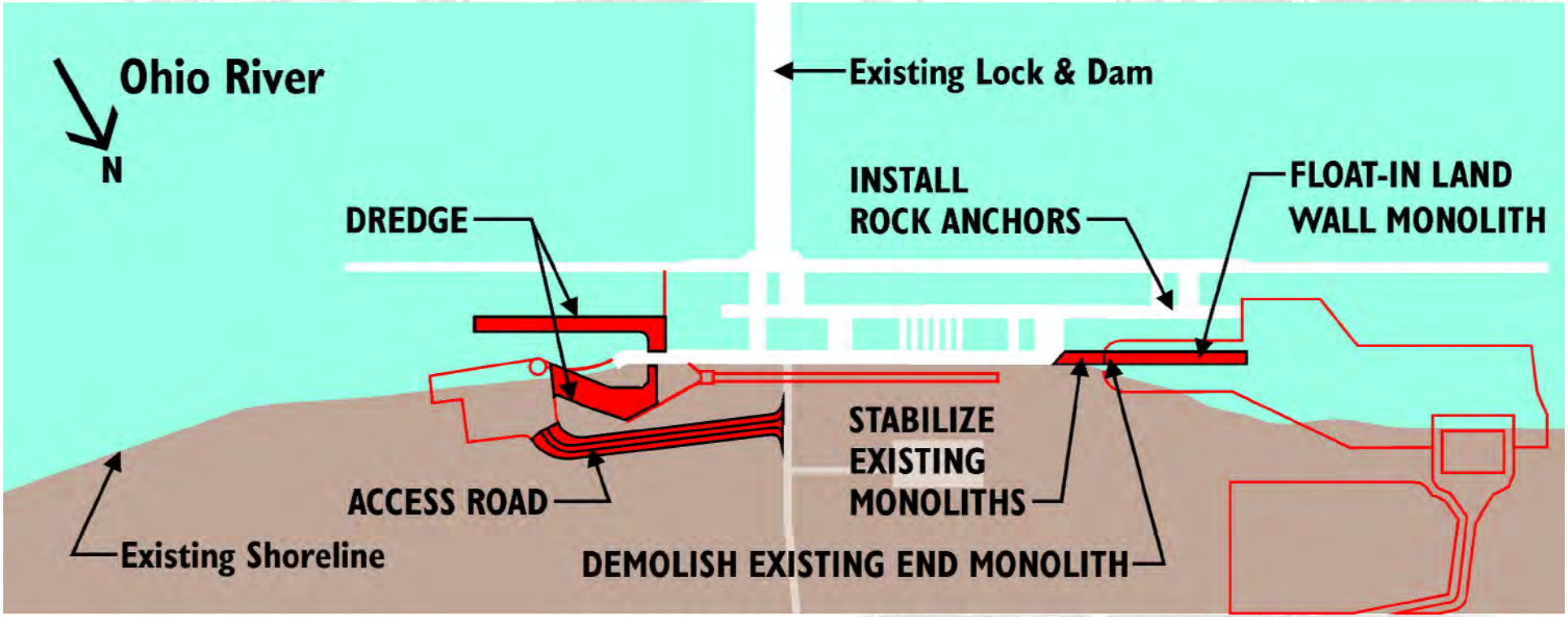
- ***Auxiliary lock extension provides opportunity to improve project capacity while minimizing construction costs and schedules***
- ***Lock extension designed for float-in/lift-in technology***
  - Eliminates need for cofferdam
  - Reduces interference with main chamber traffic
  - Opportunity to open auxiliary traffic in an emergency
- ***Approach wall extensions utilize floating walls***
  - Allows for most construction off-site and out of way of river traffic
  - Reduces cost compared to fixed wall alternatives

Construction Sequence
Stage - 1



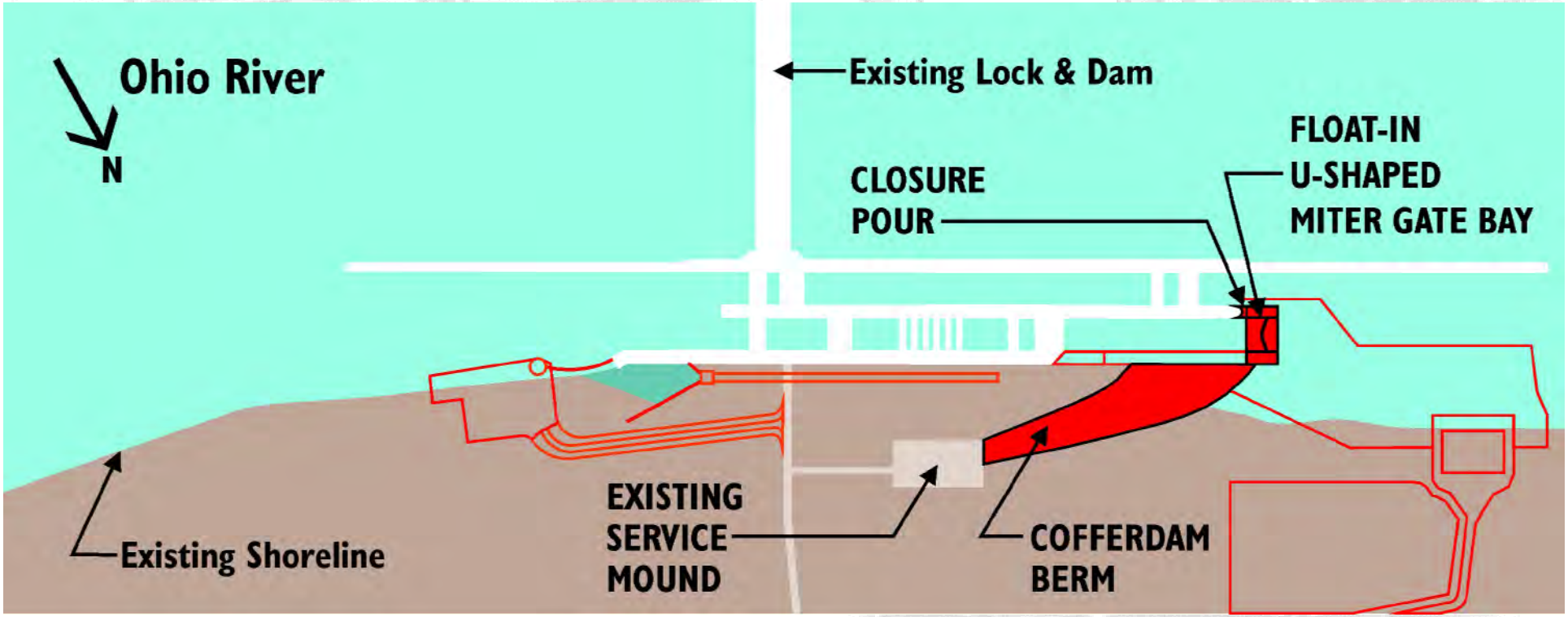
J.T. Myers Locks Improvements Project
August 2005

Construction Sequence
Stage - 2



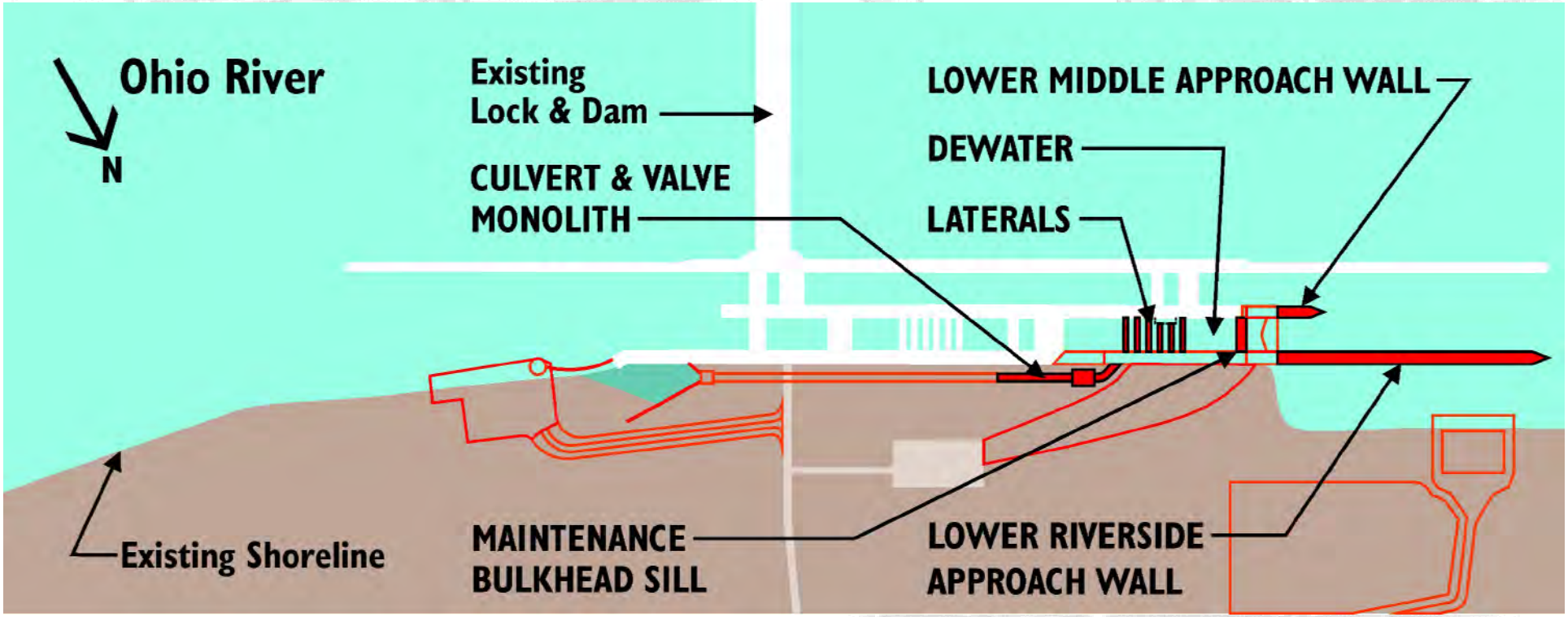
J.T. Myers Locks Improvements Project
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Construction Sequence
Stage - 3



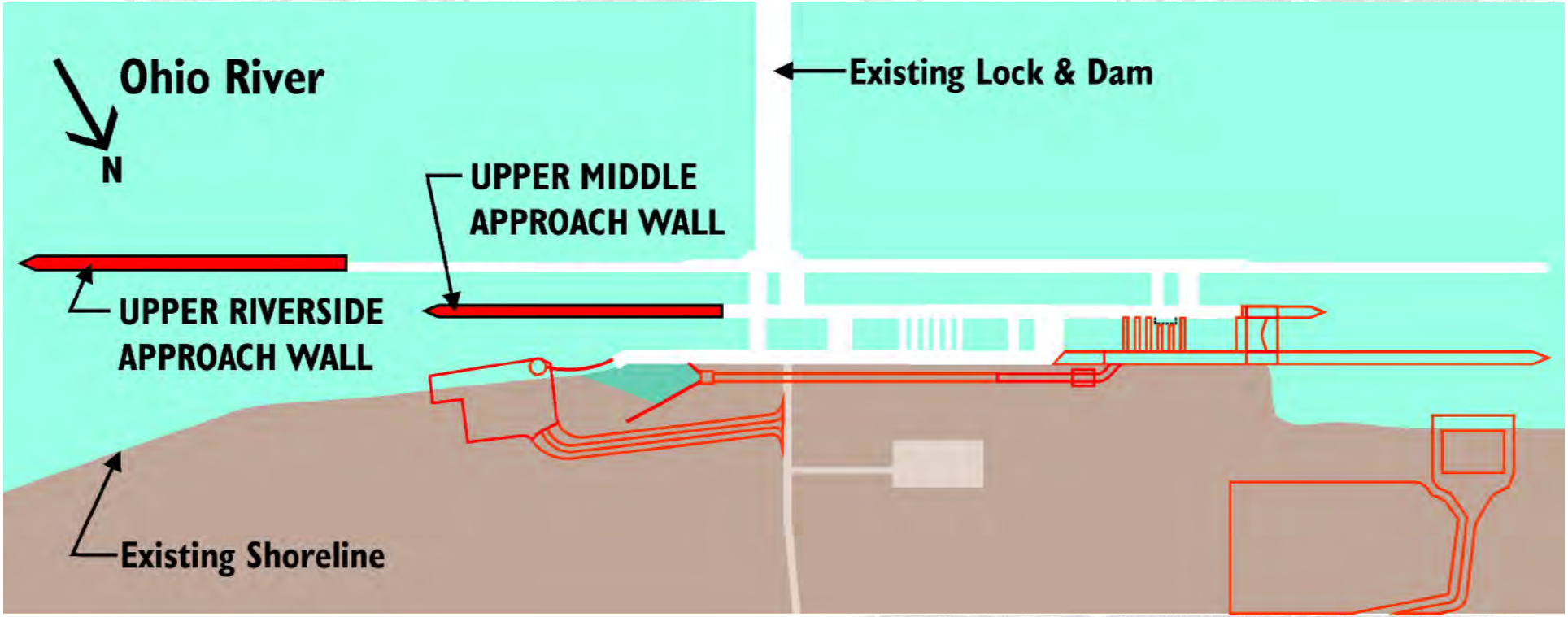
J.T. Myers Locks Improvements Project
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Construction Sequence
Stage - 4



J.T. Myers Locks Improvements Project
August 2005

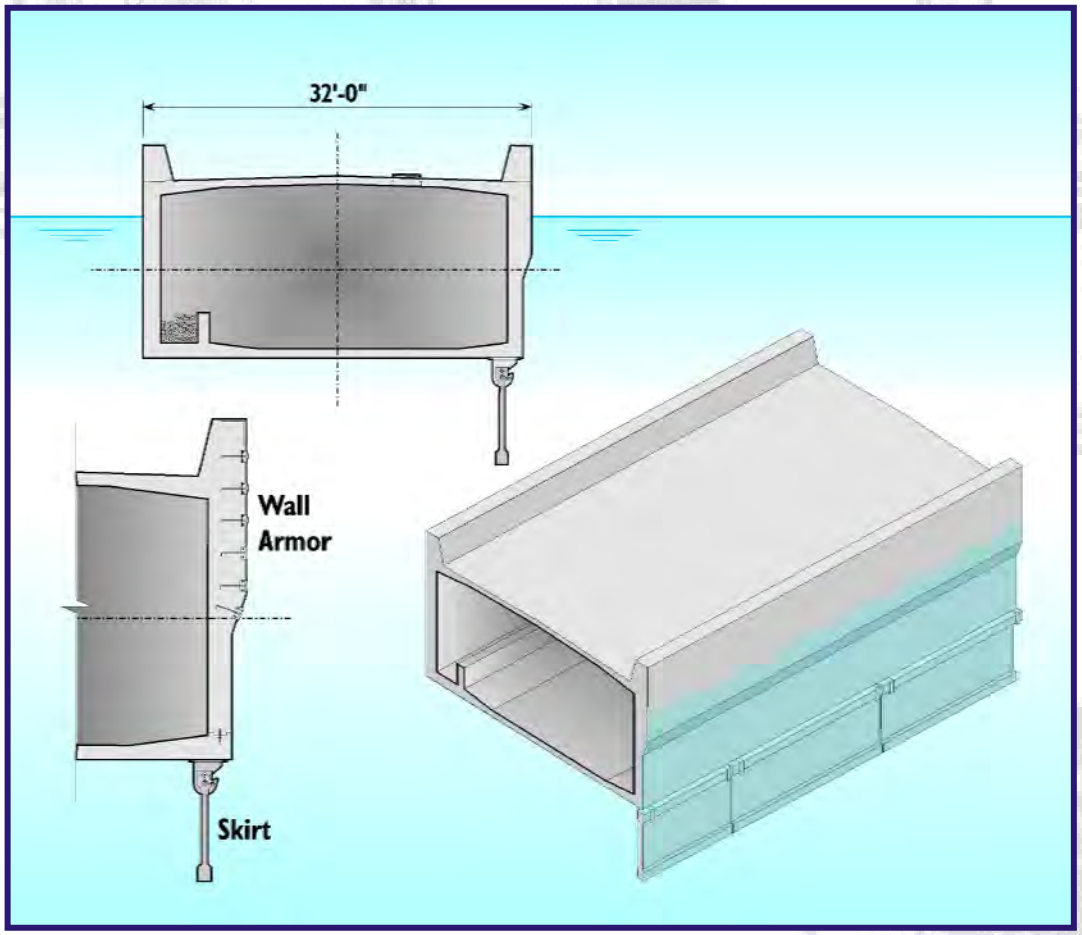
Construction Sequence
Stage - 5



J.T. Myers Locks Improvements Project
August 2005

J.T. Myers Locks Improvements Project

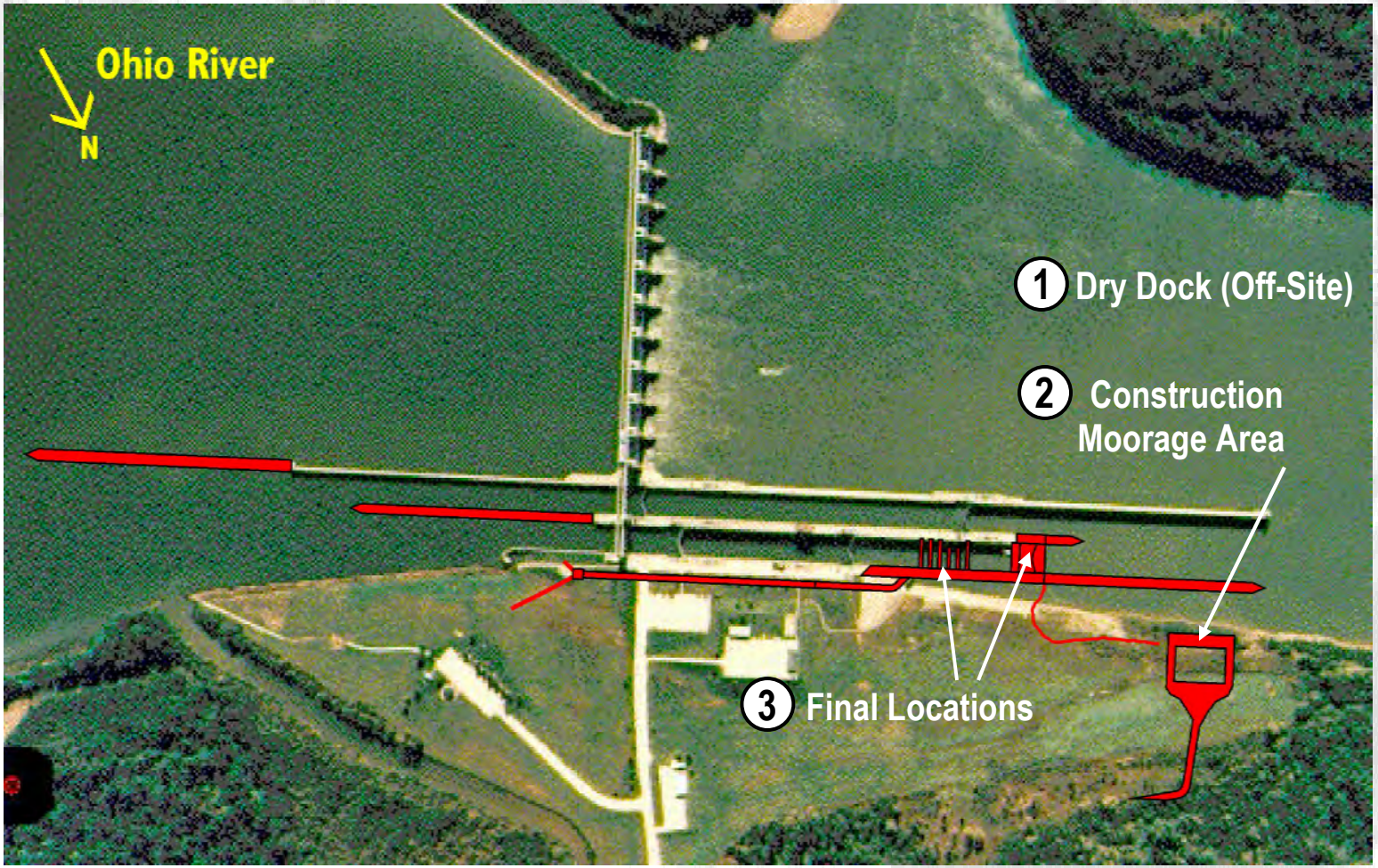
Currently Based Upon Olmsted Design





J.T. Myers Locks Improvements Project

Construction Sequence for Authorized Project



John T. Myers Locks Improvements Project

Recent Changes to Authorized Project

J.T. Myers Locks Improvements Project

Changes from Authorized Project

- *Authorized Project Was Fairly Conservative with Respect to Supplemental F/E Systems and Approach Wall Extensions*
- *Investigate More Economical Ways to Extend Auxiliary Lock Chambers for Other Sites (ORMSS)*
- *Improved Designs During PED*
- *Use of Physical Hydraulic Models Originally Funded Through ORMSS then Turned Over to J.T. Myers Project*

J.T. Myers Locks Improvements Project

Opportunities for Additional Savings

- ***Authorized Project Rough Cost Breakdown***
  - 1/3 Land Wall Extension and Miter Gate Bay
  - 1/3 Wrap Around Supplemental Culvert
  - 1/3 Floating Approach Walls and Extensions
- ***Use of Physical Hydraulic Models at WES***
  - Investigate alternative F/E systems (1:25 Scale)
  - Investigate approach conditions for various configurations of approach walls (1:100 Scale)
  - Investigate need for bank shaving on both approaches (1:100 Scale)
- ***Lock Panel Evaluation by Team of Experts***
  - Float-in Gate Bay vs, Conventional Construction
  - Float-In Monolith vs. Convention Cast In Place

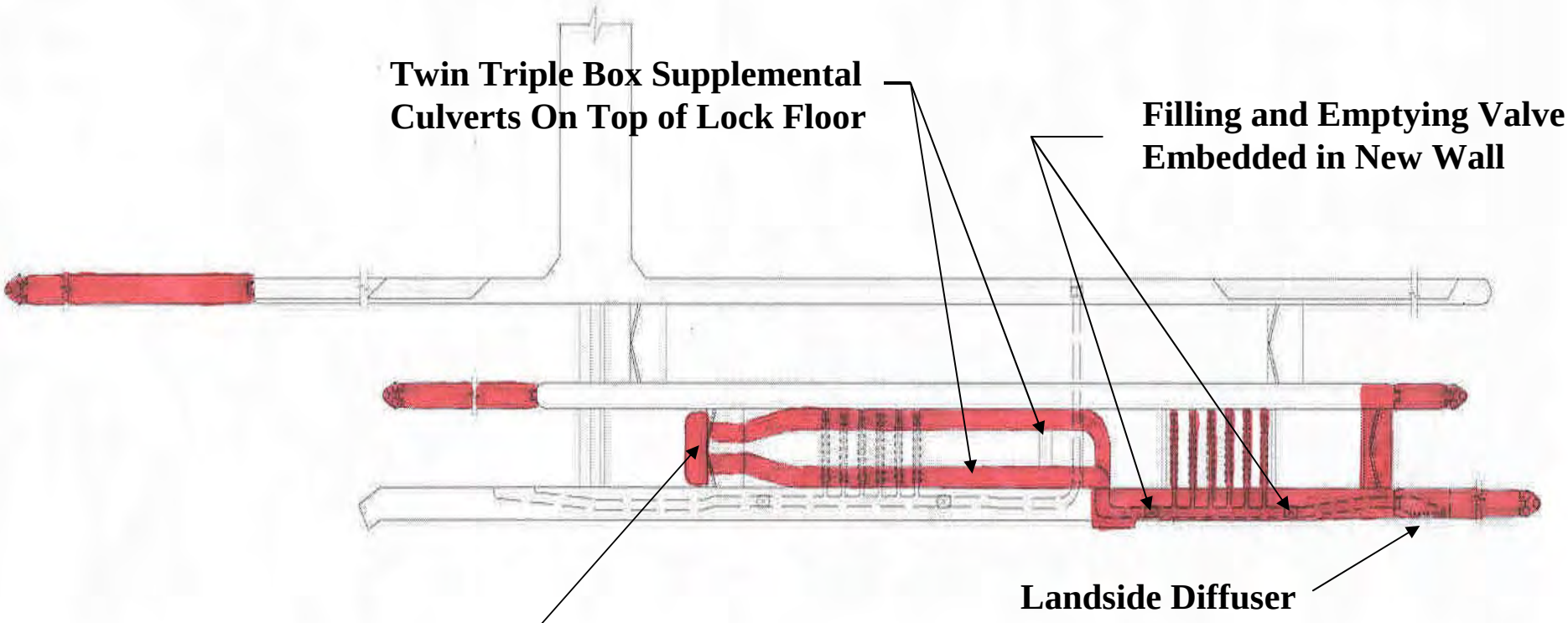
J.T. Myers Locks Improvements Project

Features of Alternative F/E System

- ***Provide supplemental system for lower end***
- ***Investigated multiple configurations***
  - Utilize only the existing system (potentially unsafe)
  - Extend existing system to lower end (very slow)
- ***Filling provided by twin "slender" triple box culverts through existing upper miter gates sill and over top of existing upstream lateral field***
- ***No butterfly valves (reverse tainters in new wall)***
- ***New downstream lateral field for distribution***
- ***Landside diffuser below floating lower guide wall***

J.T. Myers Locks Improvements Project

Features of Alternative F/E System



New Project Features Shown in RED

J.T. Myers Locks Improvements Project

1:25 Filling and Emptying Hydraulic Model

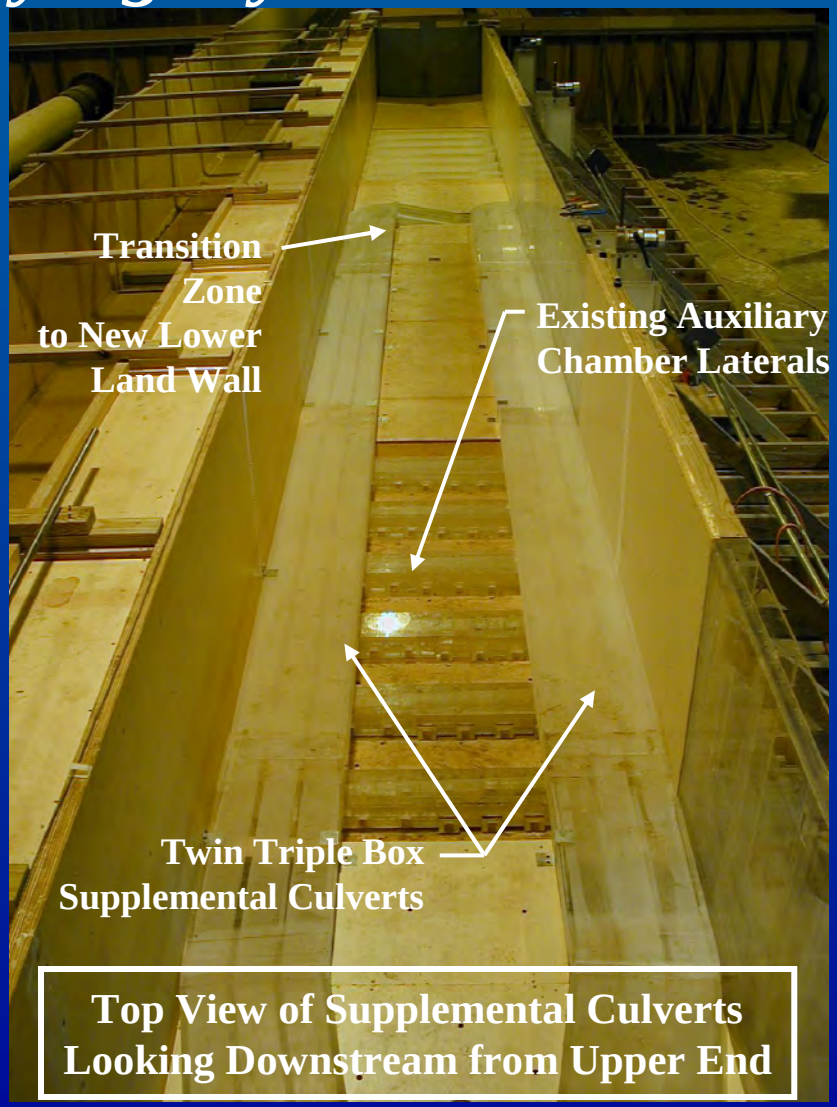
- ***Physical 1:25 scale model test new F/E system***
- ***Model originally started to investigate more economic F/E systems***
- ***Model under went three series of modifications for testing in the 1:25 F/E model***
  - Extension tested using existing system only (unsafe/slow operation)
  - Type 1 design the individual culverts each measured 4’-6” high x 8’0” wide with 11’-6” minimum clearance (good performance but high hydraulic losses)
  - Type 2 modification dropped culvert top to 12-6” minimum clearance and increased opening to 5’-6” high. This provided very good performance with reduced hydraulic losses)

J.T. Myers Locks Improvements Project

1:25 Filling and Emptying Hydraulic Model



Extended Auxiliary Chamber
Looking U/S From Lower End



Top View of Supplemental Culverts
Looking Downstream from Upper End

J.T. Myers Locks Improvements Project

1:25 Filling and Emptying Hydraulic Model





Thru-the-Sill Intake

Now 70’ U/S of MG Sill

J.T. Myers Locks Improvements Project

Information Gathered From 1:25 F/E Model

- ***Chamber filling and emptying times***
  - Fills in approximately 11 minutes. Empties in 8 minutes.
- ***Hawser forces in the extended lock chamber***
  - All hawser forces below 5 tons for above times
- ***Barge clearance and tow squatting issues at minimum pool elevations that leave 12.5' of clearance (13.5' over 90% of the time)***
- ***Tow processing speeds in and out of lock chamber during minimum pool levels***
- ***Barge performance and hawser forces in lower approach with landside diffuser***

J.T. Myers Locks Improvements Project

New 1:25 Outlet Diffuser & Lower Approach Model

- *J.T. Myers 1:25 F/E model was turned over to the Huntington District for modeling on Greenup*
- *Unresolved issues associated with lower approach and the outlet diffuser performance*
- *New 1:25 outlet diffuser and lower approach model for J.T. Myers constructed to address unresolved issues*
- *New model utilized flume previously occupied for Braddock Dam*
- *Model will assist both LRL (J.T. Myers) and LRH (Greenup) with design of outlet diffusers*

J.T. Myers Locks Improvements Project

New 1:25 Outlet Diffuser & Lower Approach Model



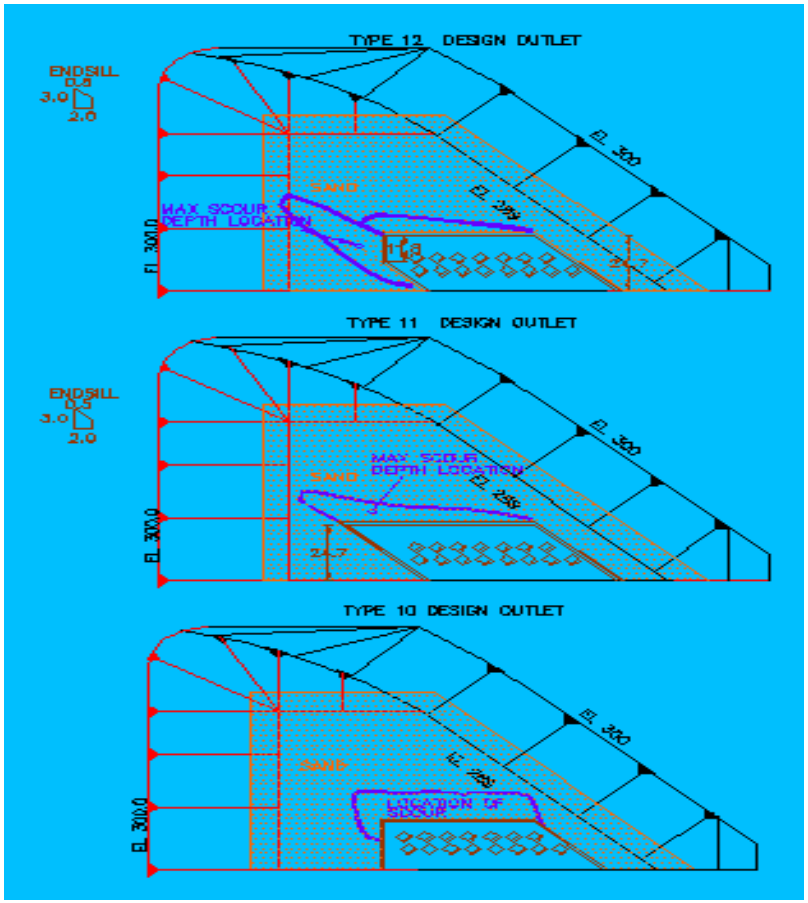


Diffuser Design from Authorized Project

J.T. Myers Locks Improvements Project
August 2005

1:25 Outlet Diffuser Model Changes



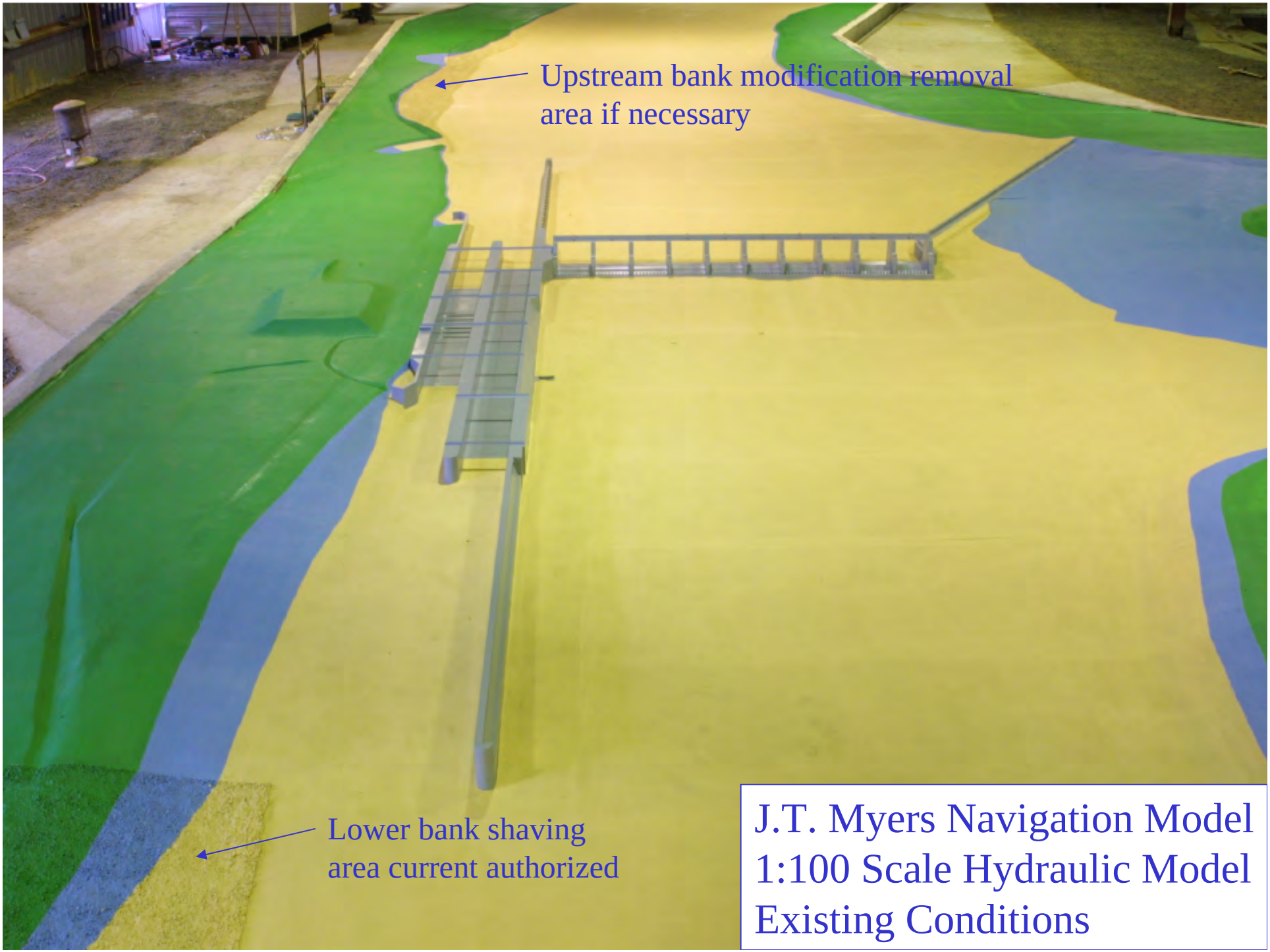


- Diffuser with baffle block system to break jet
- Realignment of port outlet to redirect and distribute flow
- Riprap around diffuser area for scour protection
- Reshape bank line around diffuser area
- Comparison between floating and fixed walls in lower approach

J.T. Myers Locks Improvements Project

Navigation Model – Existing Conditions

- *Physical 1:100 scale model to test approach conditions associated with new configuration*
- *Model limits are approximately 2-1/2 miles upstream and 2 miles downstream of the dam*
- *Effects of fixed weir and Wabash Island included in the island by splitting flow down main channel*
- *Utilizing cameras and digital mapping to calibrate tow tracks, speeds, etc...*



J.T. Myers Navigation Model 1:100 Scale Hydraulic Model Existing Conditions

J.T. Myers Locks Improvements Project

Navigation Model – Existing Conditions

- ***Initial tests were done to calibrate the model to the existing conditions in terms of flows, approach conditions, and tow movements***

- ***Industry brought down to ensure model was calibrated to existing conditions***

- ***Five flow conditions calibrated in model***
  - 32,700 cfs (11 feet dam opening) – 17’ pool differential
  - 160,000 cfs (80 feet dam opening) – 9’ pool differential
  - 295,000 cfs (200 feet dam opening) – 2.5’ pool differential
  - 360,000 cfs (dam all open) headwater at top fixed weir
  - 636,000 cfs (dam all open) headwater near top of walls

J.T. Myers Locks Improvements Project

Navigation Model – Improvement Features

- ***Multiple variations in approach wall lengths tested for all approach walls and extensions***
  - 100-ft segments tested to determine optimal configuration for approach conditions
  - Industry consulted on final configuration for wall lengths
- ***Bank shaving requirements investigated on both the upstream and downstream approaches***
  - Originally planned for only lower approach
  - Model tests revealed need along upper bank line with reduced amounts on lower end

1:100 Navigation Model Testing



J.T. Myers Locks Improvements Project

Navigation Model – Improvement Features

- ***Approach Wall Lengths Were Shortened***
  - Upper river wall went from 960 feet to 500 feet
  - Upper middle wall went from 900 feet to 800 feet
  - Lower land wall went from 700 feet to 400 feet
  - Lower middle wall remained unchanged

- ***Bank shaving requirements lessened considerably from authorized project since very little required on lower end***

J.T. Myers Locks Improvements Project

Summary of Changes

- **New through-the-sill supplemental filling and emptying system supplying water to extended chamber**
- **New outlet diffuser configuration**
- **Evaluation of fixed approach walls on lower end**
- **Approach wall lengths shortened considerably**
- **Bank line reshaping in upper approach but only minimal work required in lower approach. Net change is considerably less removal of material**

J.T. Myers Locks Improvements Project

Solid Works 3D Modelling

- *3D Model allows designers to visualize final structure*
- *Can create physical construction sequence model*
- *Can use model to cut section/details into MicroStation*
- *Model can be imported for Finite Element analysis*

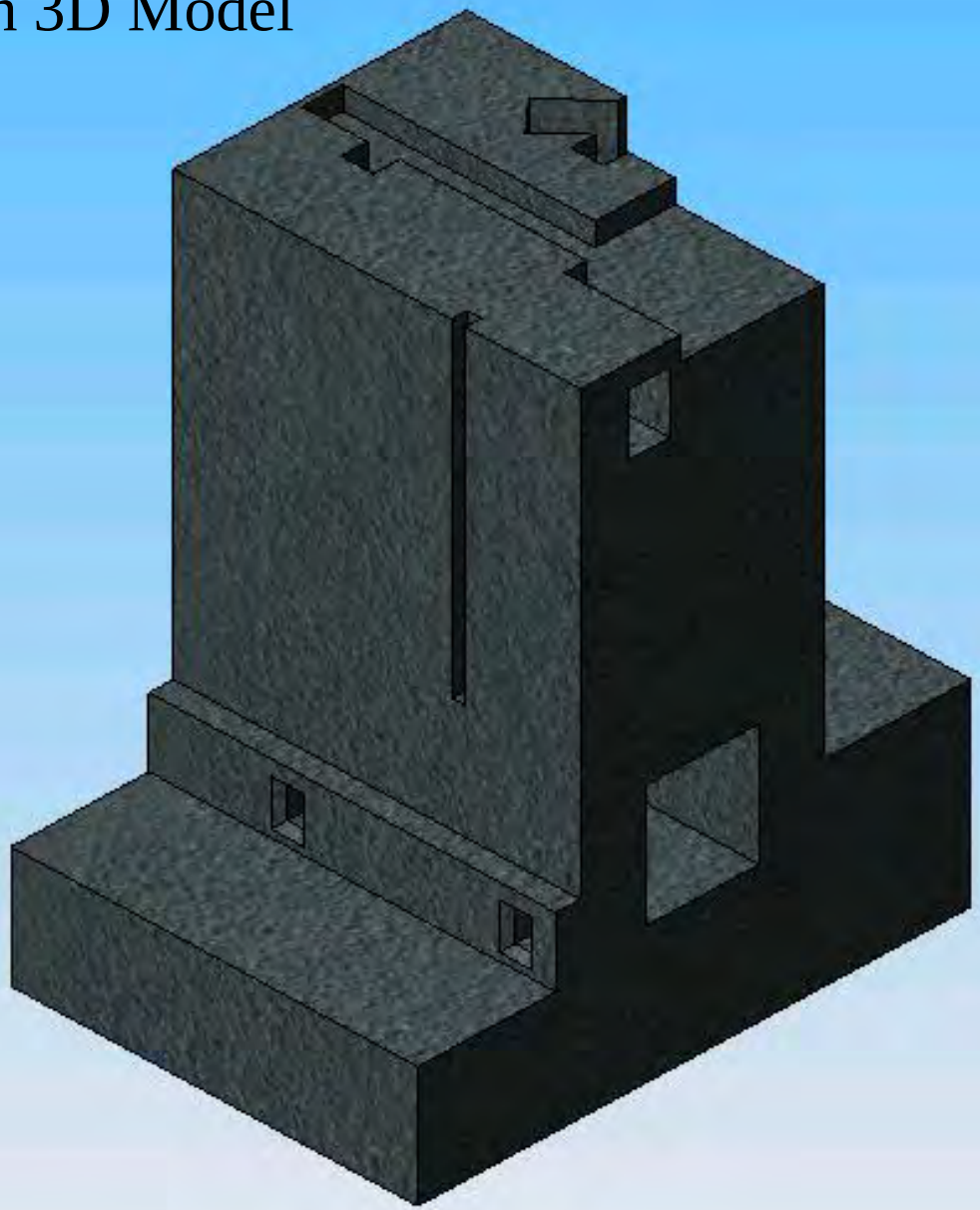
Myers Plan View

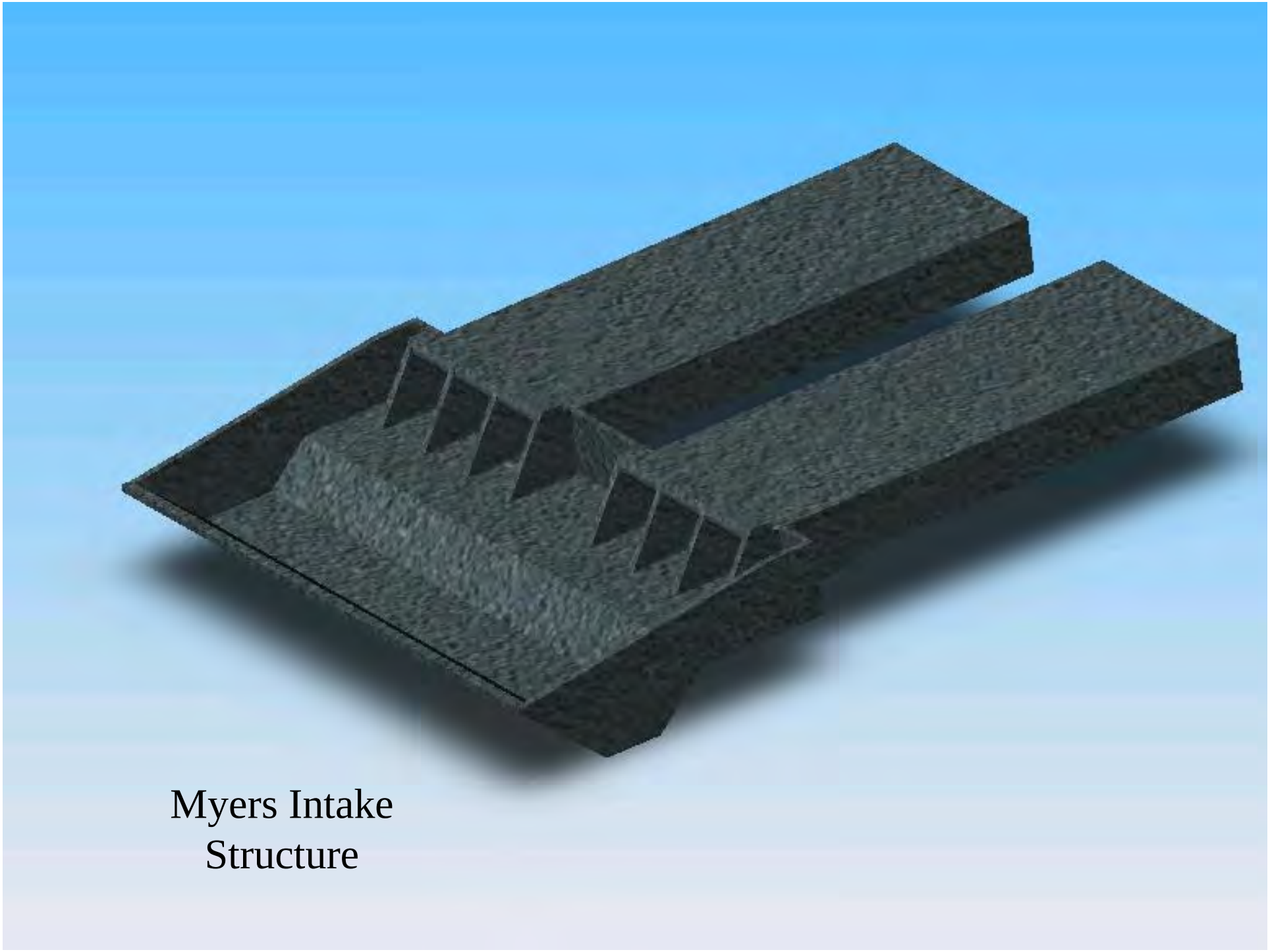




Myers Existing 600’ Chamber

Myers Monolith 3D Model





Myers Intake Structure

Myers Intake and Culverts



US Army Corps of Engineers
Louisville District

J.T. Myers Lock Improvements Project

Questions?

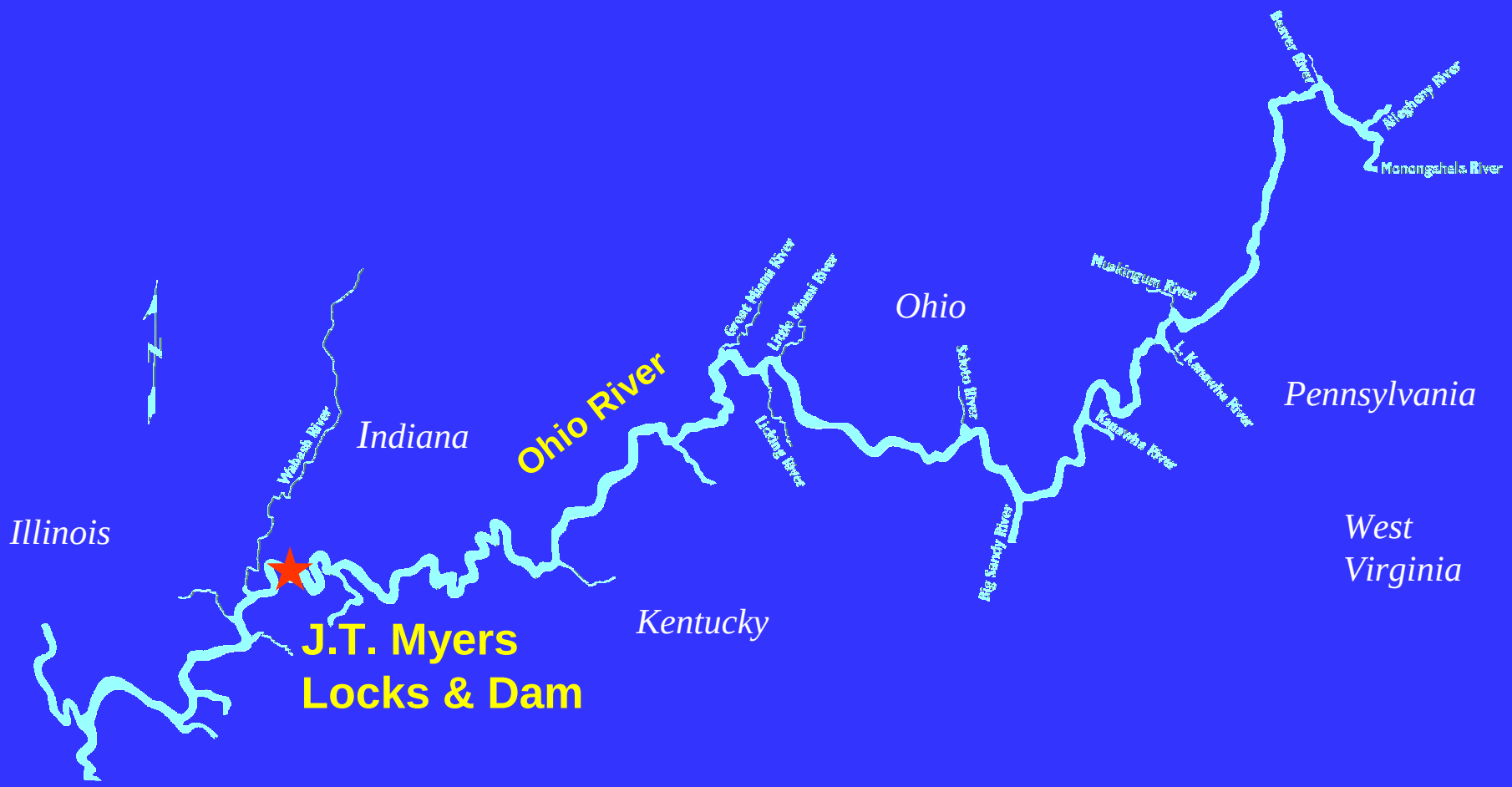
J.T. Myers Dam Major Rehab

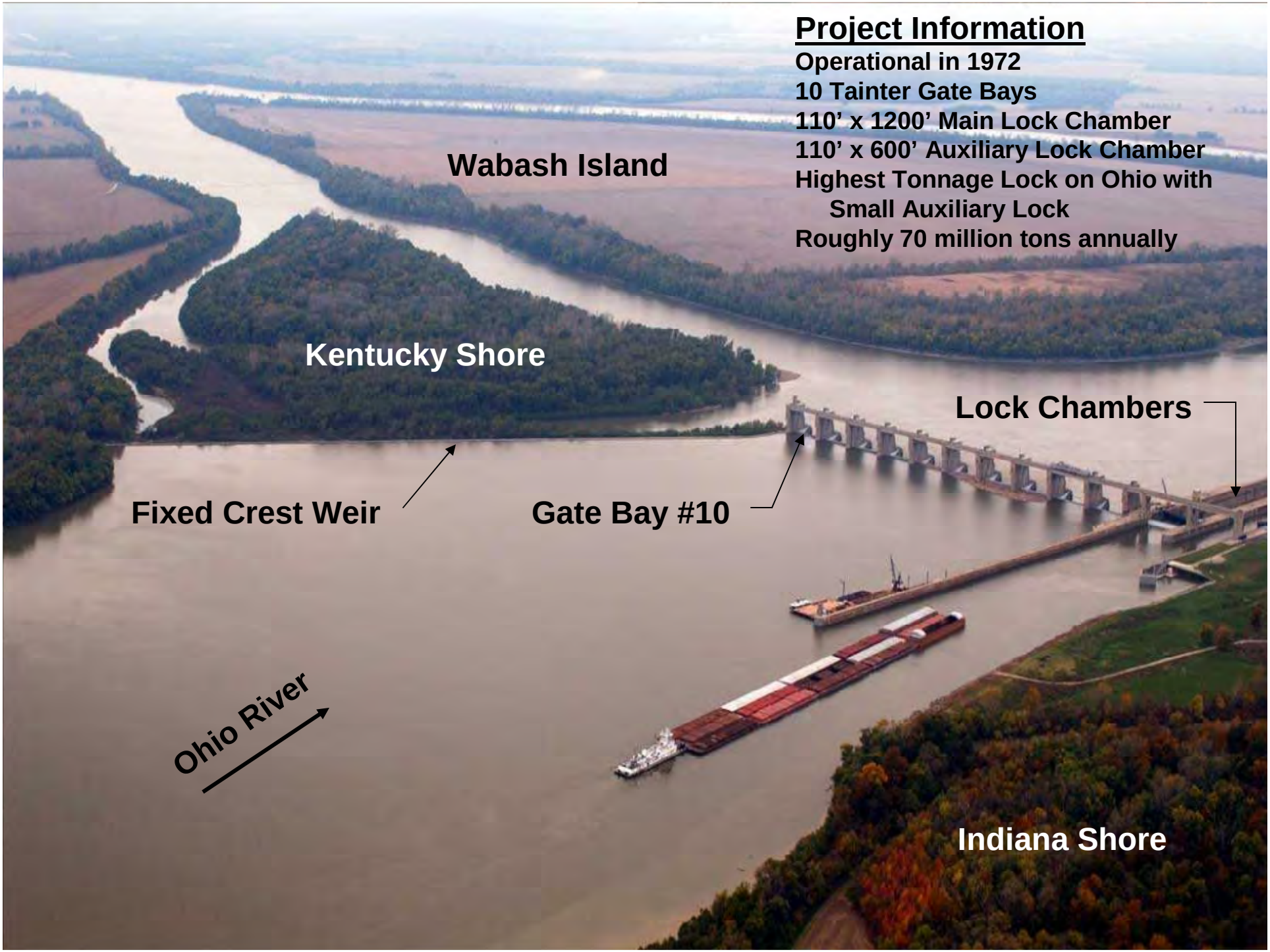
David Schaaf, P.E.
LRD Regional Technical Specialist, Louisville

Greg Werncke, P.E.
Senior Structural Engineer, Louisville

Randy James, Anatech Corporation

J.T. Myers Project Location




Project Information
Operational in 1972
10 Tainter Gate Bays
110’ x 1200’ Main Lock Chamber
110’ x 600’ Auxiliary Lock Chamber
Highest Tonnage Lock on Ohio with
Small Auxiliary Lock
Roughly 70 million tons annually
Wabash Island
Kentucky Shore
Lock Chambers
Fixed Crest Weir
Gate Bay #10
Ohio River
Indiana Shore

John T. Myers Dam Rehab

Major Areas of Concern for J.T. Myers Dam

- ✓ Erosion of dam gate stilling basin slab below dewatering bulkheads
  - Potential for undermining of dam
  - Downstream of bulkhead slots where repairs can be made
  - Damage to end sill structure potential to scour below dam
- ✓ Stability of dam pier structures due to seismic loads and erosion
  - More detailed information regarding ground motions at site
  - More detailed mapping of faulting at site
  - More stringent criteria regarding uplift on structure
- ✓ Other items (mechanical & electrical upgrades) will be evaluated since there are significant concerns regarding long-term condition
- ✓ Evaluation of bulkhead crane girder seats

Erosion of Ohio River Stilling Basin Slabs

Widespread Problem Throughout Louisville District Ohio River Projects with J.T. Myers, Markland, Cannelton, and Newburgh Having the Most Significant Damage

Access to Make Repairs with Current Equipment Very Difficult and Unsafe. Need for Specialized Equipment and Funds.

Repairs Can Only Be Made During Low Water Periods

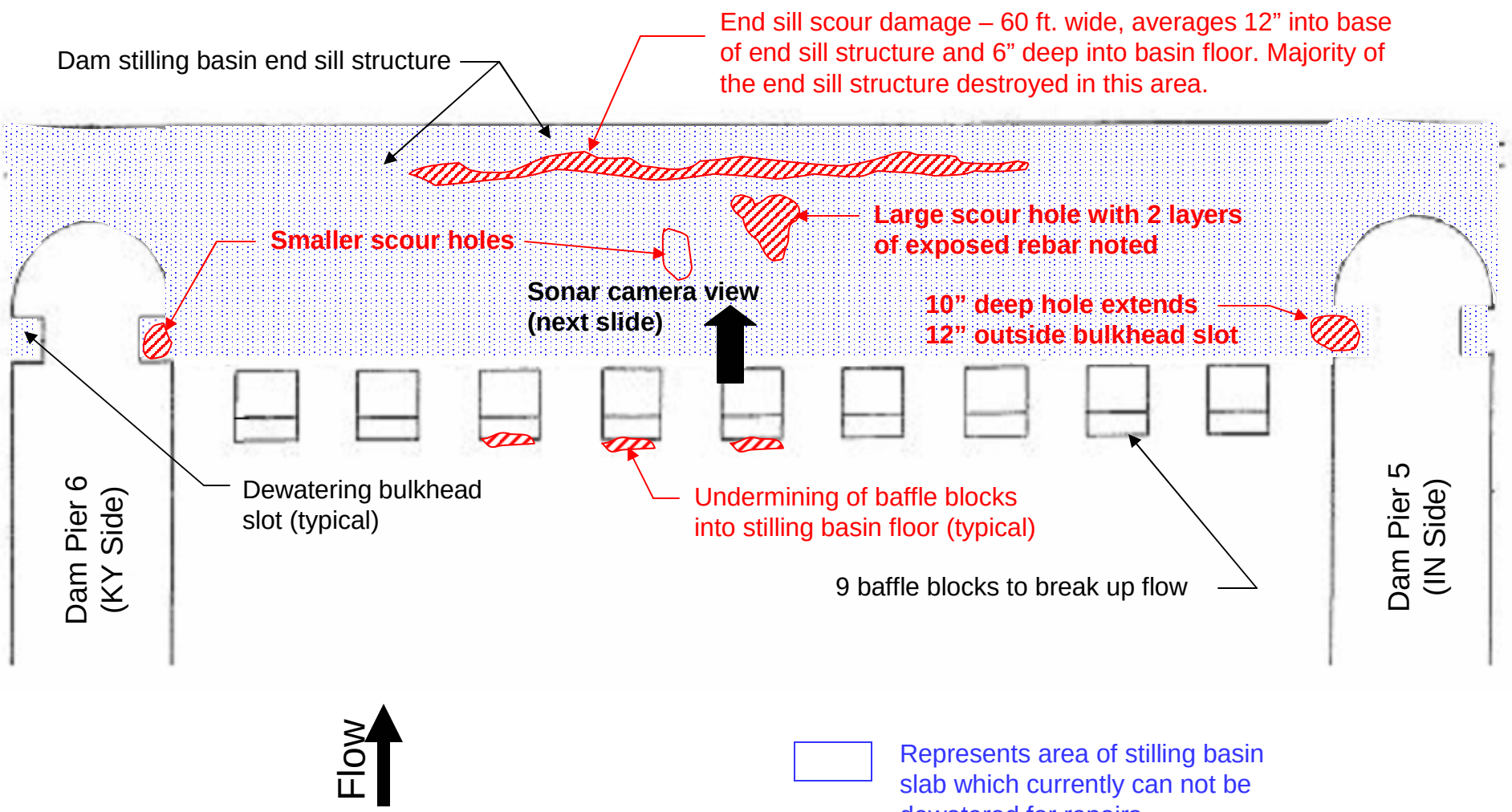
Some Small Repairs Made at Markland Site with a Dewatering Box

J.T. Myers Site First of Anticipated Follow-on Rehab Studies at Other Sites with Similar Problems

Potential for Catastrophic Outcomes without Future Repairs

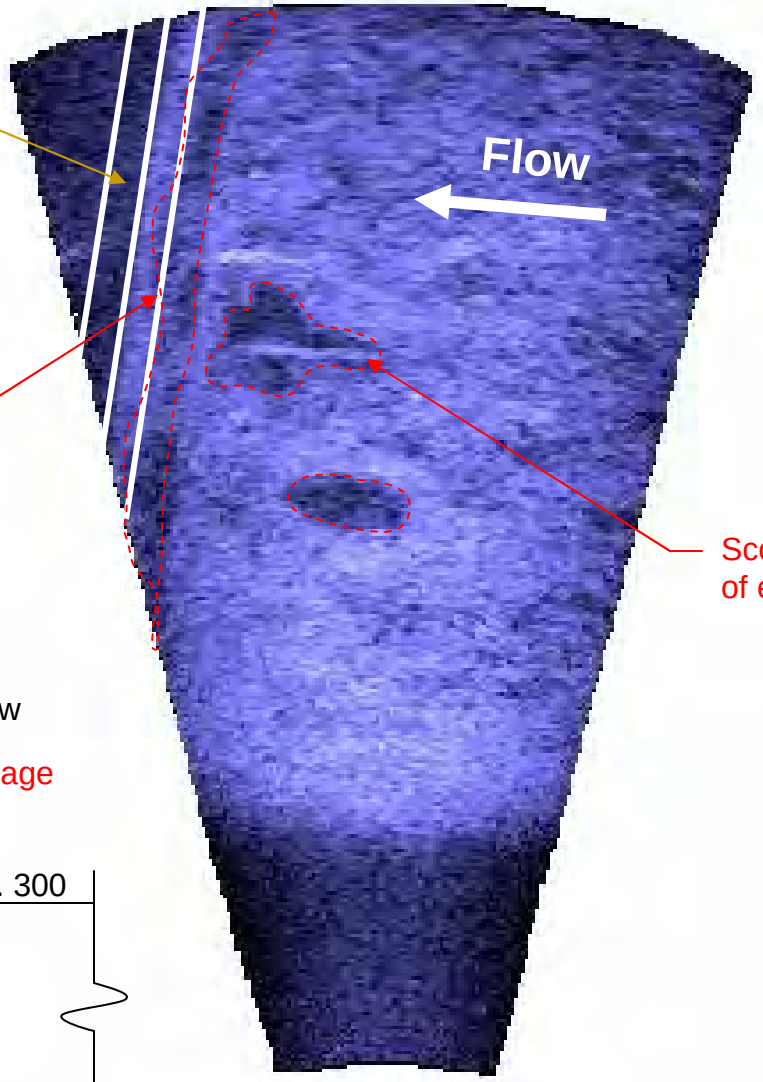
Erosion Damage at J.T. Myers

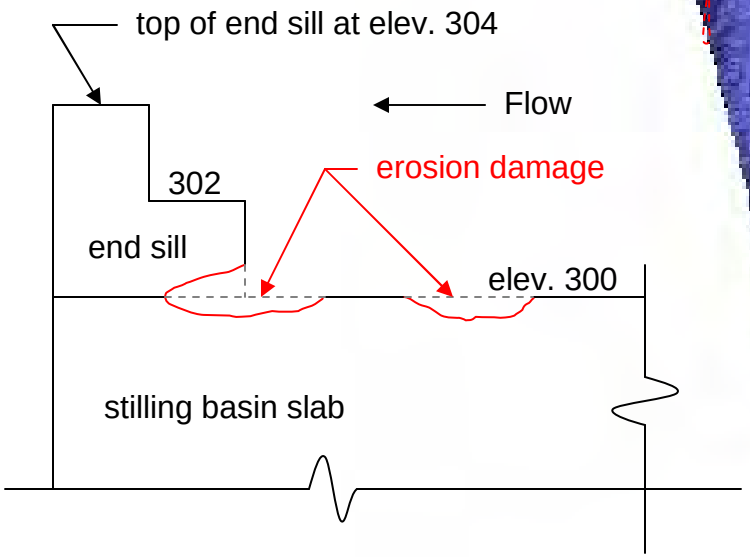
J.T. Myers Dam Gate Bay #6 Damage
Erosion of Stilling Basin / End Sill Structure

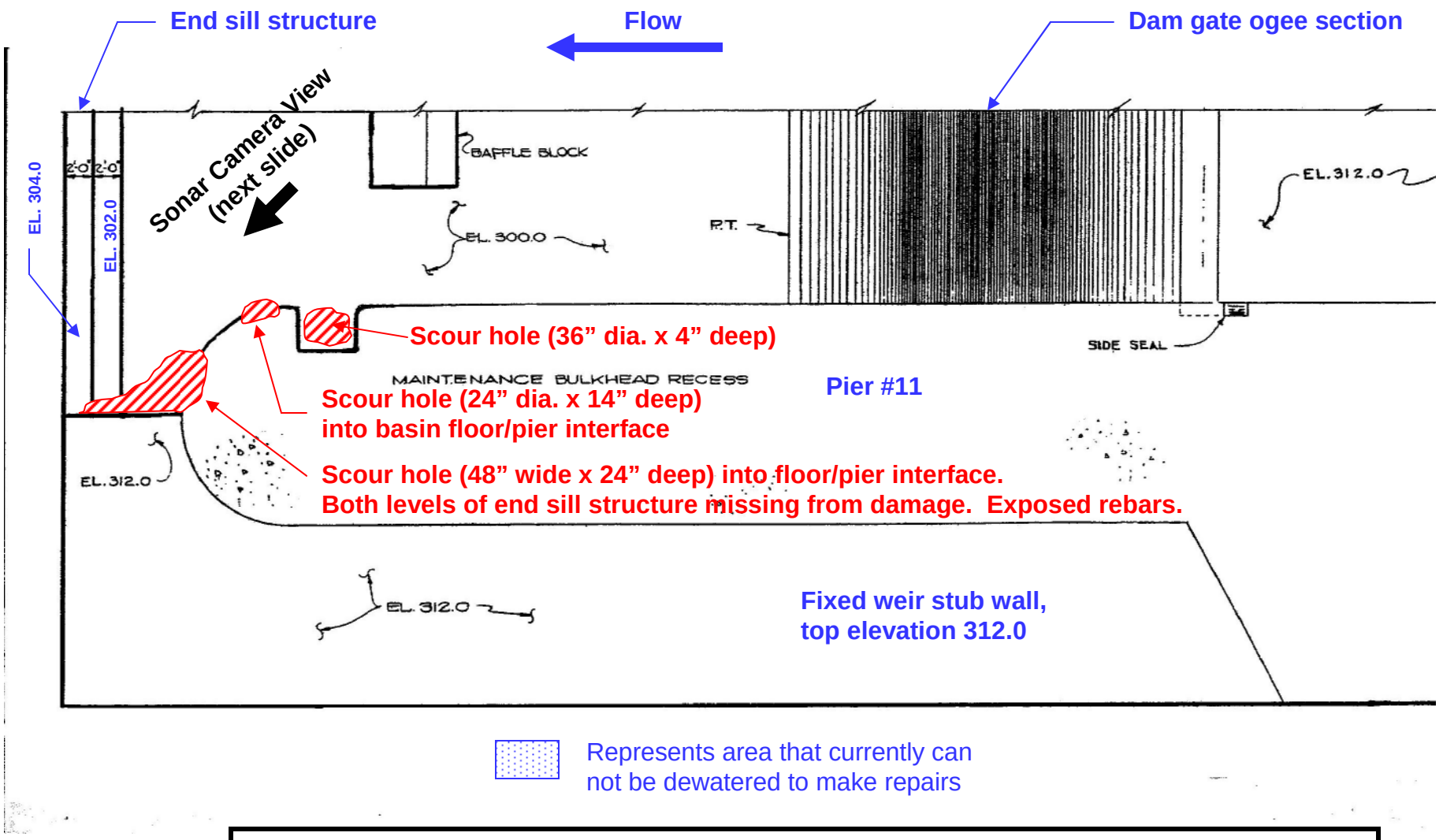


J.T. Myers Dam Gate Bay #6 Scour Image

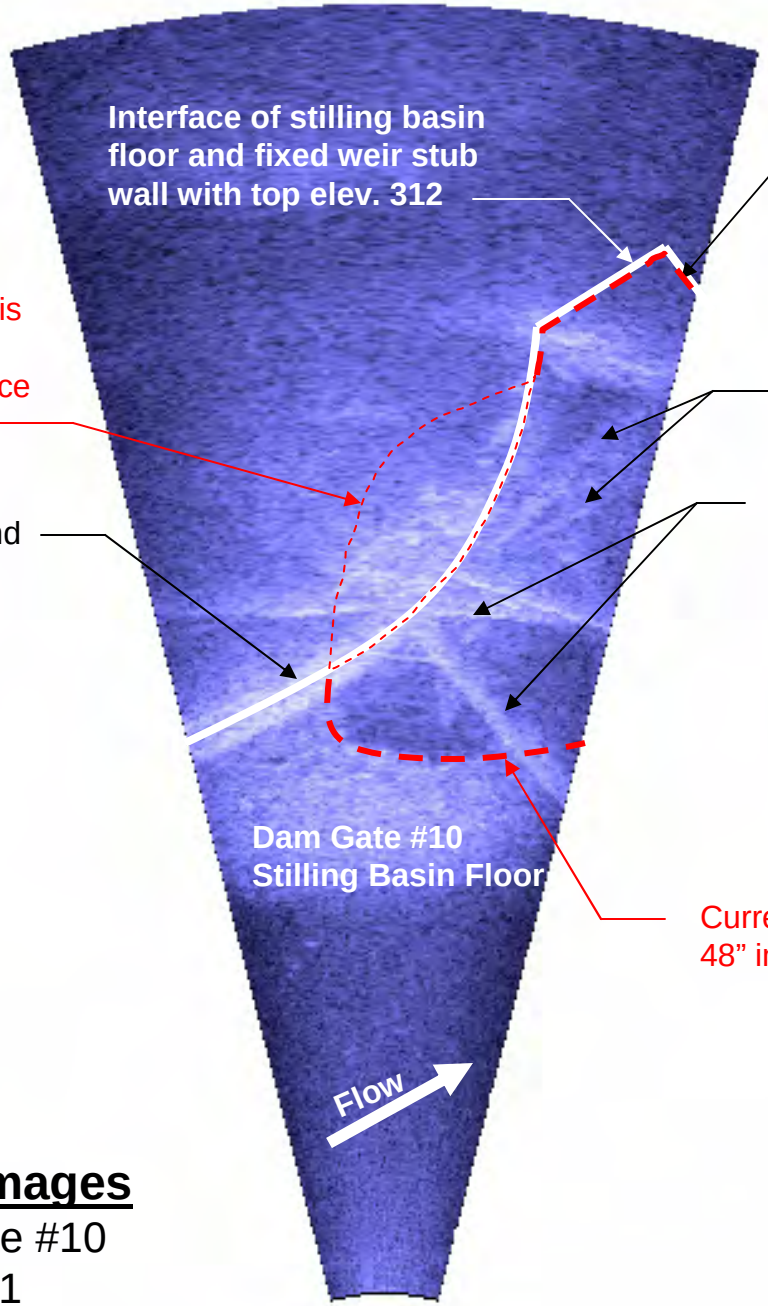
Erosion of Stilling Basin / End Sill Structure







J.T. Myers Dam Gate Stilling Basin Scour Damage
Plan View of Gate #10 Floor / Pier #11 Area



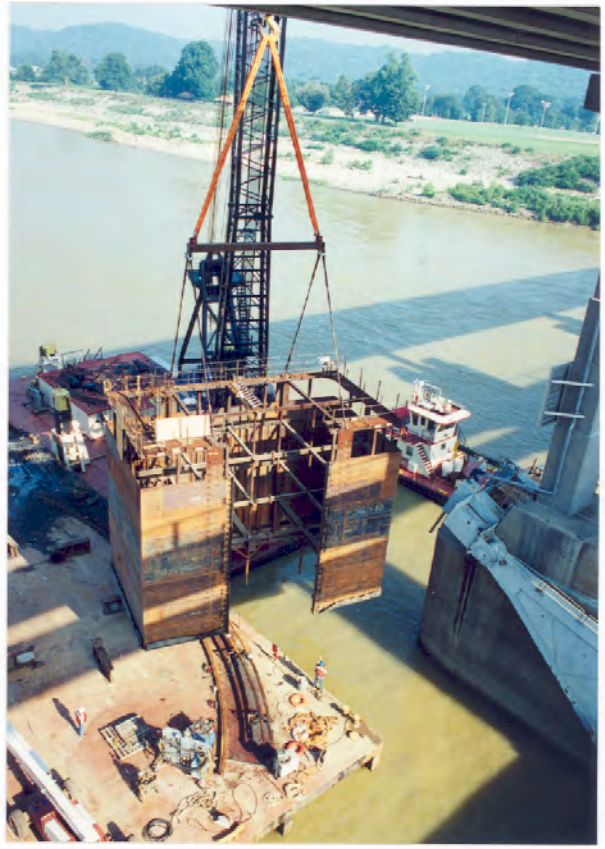
J.T. Myers Dam Scour Images

Erosion Damage of Dam Gate #10
Stilling Basin Floor at Pier #11

Scour Damage and Repairs at Markland Dam

**** Note: Markland Dam is a similar high-lift project on Ohio River very similar to J.T. Myers**

Scour Damage Repairs at Markland Dam





Temporary dewatering box built by LRS to make limited scour repairs around piers at the Markland Project.

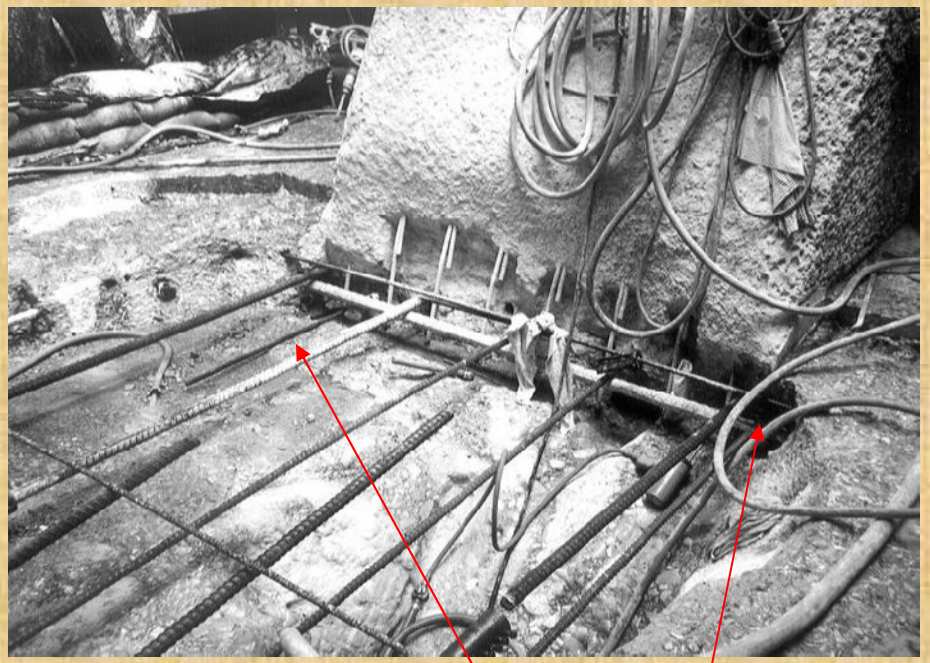
Only allows for limited area of damage to be repaired. Not applicable for many other sites and types of erosion damage

Must be site adapted which is too costly and would not cover necessary areas



Markland Scour Damage





Note depth of scour hole around pier

Note scour below baffle block & stilling
Basin floor interface, exposed rebar, limits of scour hole

Scour Damage Repairs at Markland



Note close-up of damage of exposed and worn rebar in scour hole prior to repairs



Limits of scour hole and repair of missing and damaged rebar throughout entire area around nose pier

J.T. Myers Dam Rehab

Failure Mechanisms and Potential Impacts

Critical Features in Need of Evaluation for Rehab Study

- ✓ Scouring of Dam Stilling Basin and Piers
- ✓ Stability of the Dam Piers due for Various Load Cases Combined with Scour, Foundation Faults, and Previous Cofferdam Failures
- ✓ Electrical and Mechanical Upgrades Required for Various Issues
- ✓ Bulkhead Crane Bridge Seats

Failure Mechanisms Associated with Various Features

- ✓ Dam Scour – inability to dewater for repairs, increased erosion rate through time, potential for undermining of dam with catastrophic failure
- ✓ Dam Stability – potential for deep-seated sliding failure of dam due for various load cases due to heavy faulting, pier failure due to reduced shear capacity at erosion areas, potential for catastrophic failure of dam
- ✓ Electrical & Mechanical Upgrades – inability to find replacement parts for repairs, uneven distribution of load on tainter gate cables, reduced capacity to operate dam properly, potential for increased O/M and inability to effectively control pools

J.T. Myers Dam Rehab

Impacts Associated with Failure Modes

- ✓ Duration of loss of pool depends upon level of failure and inflows at time of failure, but 30 to 60 days duration is considered reasonable to block flow and rebuild pool levels while permanent repairs are undertaken

- ✓ Loss of navigation benefits alone would exceed $100 million not to mention pool loss impacts to industries and cities with water intakes
  - Multiple power plants, industry, and municipal intakes in J.T. Myers pool
  - Major handling facilities for navigation traffic
  - Potential for other damages (bank erosion, highways, bridges)

- ✓ Repair costs would most likely exceed $50 million to build temporary cofferdam and make repairs to damaged gate bays

- ✓ Expected overall costs would run into the hundreds of millions, if not billions of dollars, depending upon the severity of the failure

- ✓ Navigation pool loss can occur within 3 days during low inflow periods

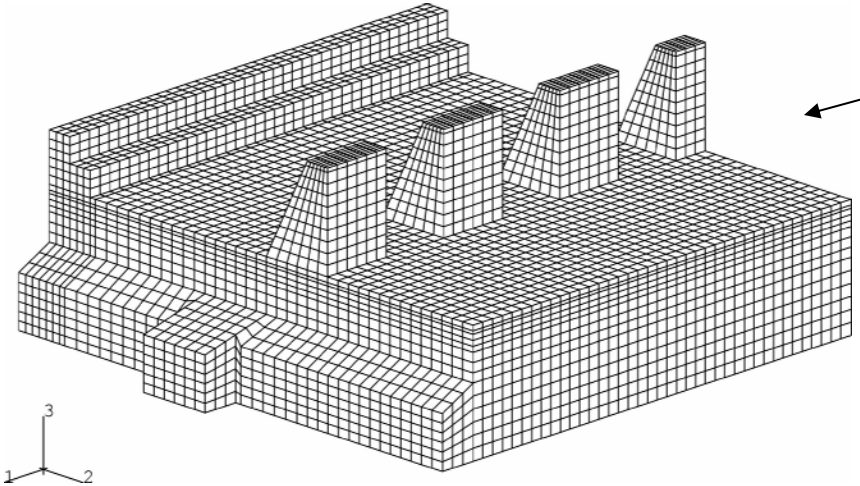
J.T. Myers Dam Rehab
Engineering Reliability Modeling

Development of Engineering Reliability Models

- ✓ Scouring of Dam Stilling – Analytical reliability model based upon detailed F.E. analysis of scouring action calibrated with test data and 1:100 navigation model from J.T. Myers Locks Improvements Project
- ✓ Stability of the Dam Piers – Analytical reliability model based upon wedge analysis and associated random variables for foundation strengths, passive resistance, lower pool fluctuations…
- ✓ Electrical and Mechanical Features – hazard rates to be developed by expert elicitation process
- ✓ Bulkhead Bridge Bearing Seats – analytical model with variations in concrete parameters, loads, deterioration rates, etc…

J.T. Myers Dam Rehab

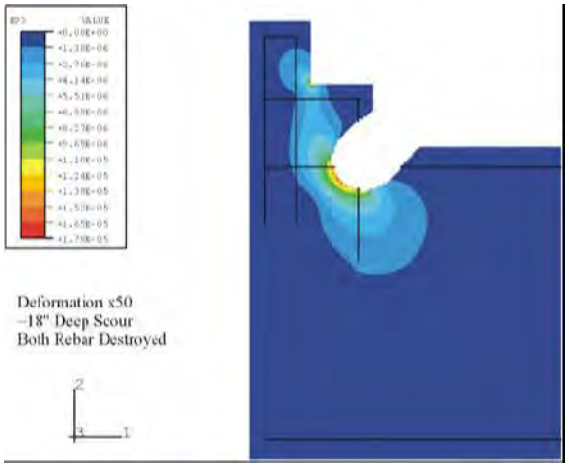
F.E. Analysis of Scouring Below Dam

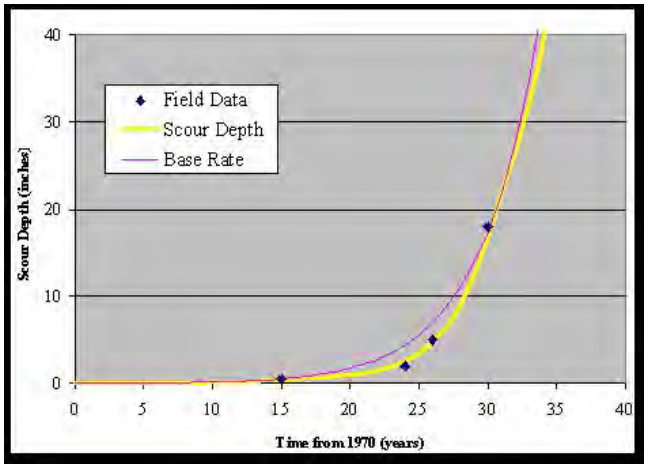


Global 3-D F.E. model of ½ stilling basin gate bay w/ baffle blocks and reinforcement features

FE model data output vs. field data and model tests

Refined local FE model evaluating concrete performance with continued scour





J.T. Myers Dam Rehab

Rehab Option to Improve Reliability

Anticipated Features of J.T. Myers Dam Rehabilitation

- ✓ Overall cost in the range of $25 to $35 million
- ✓ Specialized dewatering bulkhead and related equipment to make repairs to entire dam stilling basin - $12 to $15 million
- ✓ Anchoring of dam piers to improve stability - $8 to $10 million
- ✓ Mechanical and electrical upgrades as required - $3 to $8 million
- ✓ Repairs to bulkhead bridge bearing seats - $2 million +/-

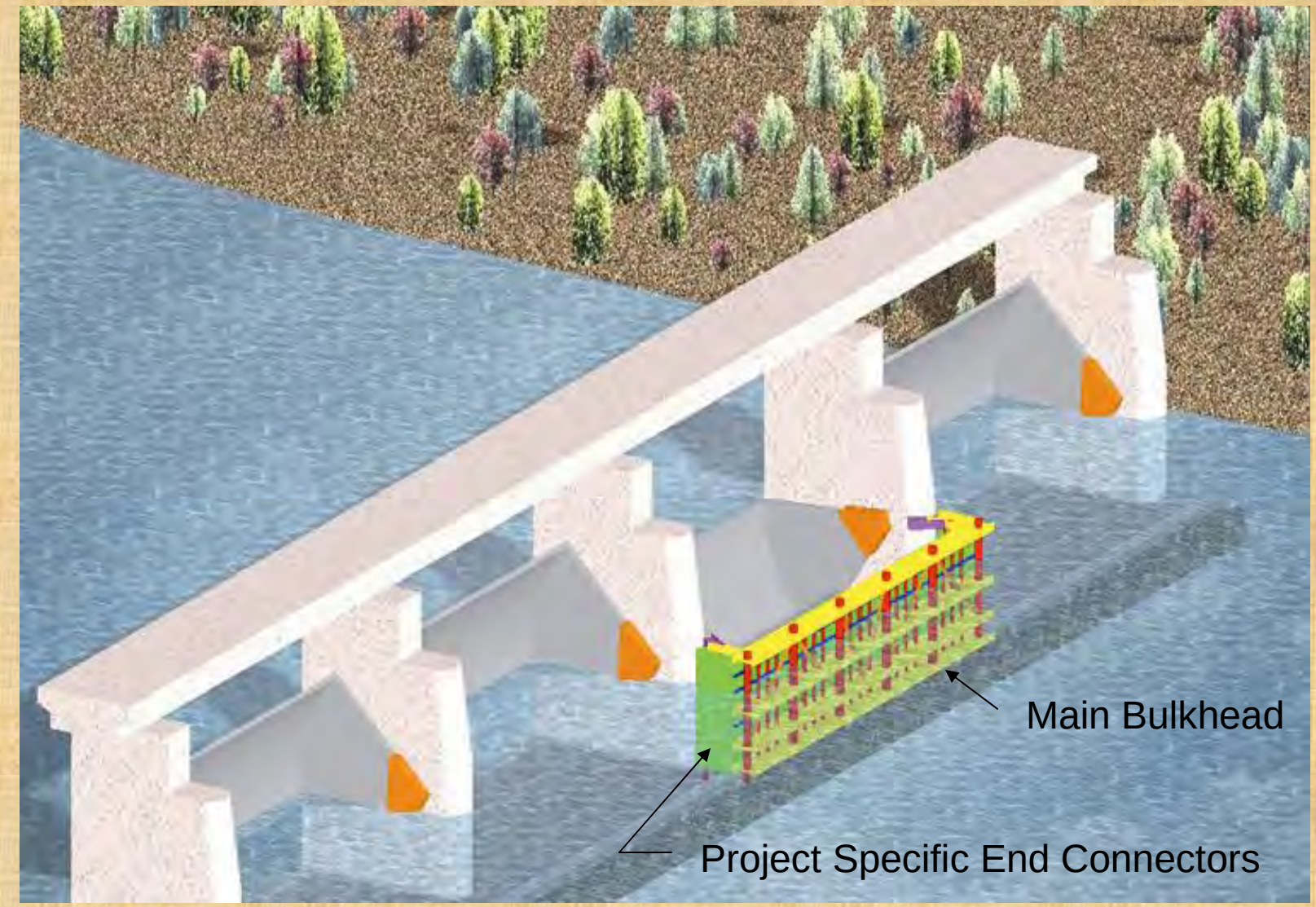
Specialized Dewatering Bulkhead

- ✓ Consists of main bulkhead with site-specific end connectors
- ✓ Main bulkhead would be a regional asset that could be used at multiple projects throughout LRD
- ✓ Allows repairs to be made to areas of the dam currently not accessible for maintenance repairs

Functional Criteria for the Bulkhead

- ✓ Allow for the Dewatering of an Entire Tainter Gate Dam Stilling Basin Bay
- ✓ Provides Unobstructed Access for Repair of Severe Scouring in the Stilling Basins
- ✓ Match Geometries of J.T. Myers, Markland, Cannelton and Newburgh Dams – Ohio River
- ✓ Be Adaptable for Use at Other Tainter Gate Dam Stilling Basin Bays

Dewatering Bulkhead Installed



J.T. Myers Dam Rehab

Current Status and Schedule

- ✓ **Study Cost of Roughly $800k Over 3 Years. Three Years Required Due to Limited Funding Stream from Available O/M $$$ (could have been done in 2 years)**
- ✓ **Supporting Engineering Analysis Completed, Currently Developing Reliability Models**
- ✓ **Supporting Economic and Hydrologic Analysis Underway, as well as Environmental Review**
- ✓ **Report Planned for Completion in Spring 2006 Pending Available Funds**

Thank You

Questions???

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Louisville District
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Huntington District

Kentucky Lock Addition Downstream Middle Wall Monolith Design

Scott A. Wheeler, P.E.
Huntington District

2005 Tri-Service Infrastructure Systems Conference

2-4 August 2005

Presentation Outline

- Project Overview
- Downstream Float-In Cofferdam
- Monolith Design
  - Seismic Criteria
  - Stability Analysis
  - Thermal Considerations
- Construction Issues

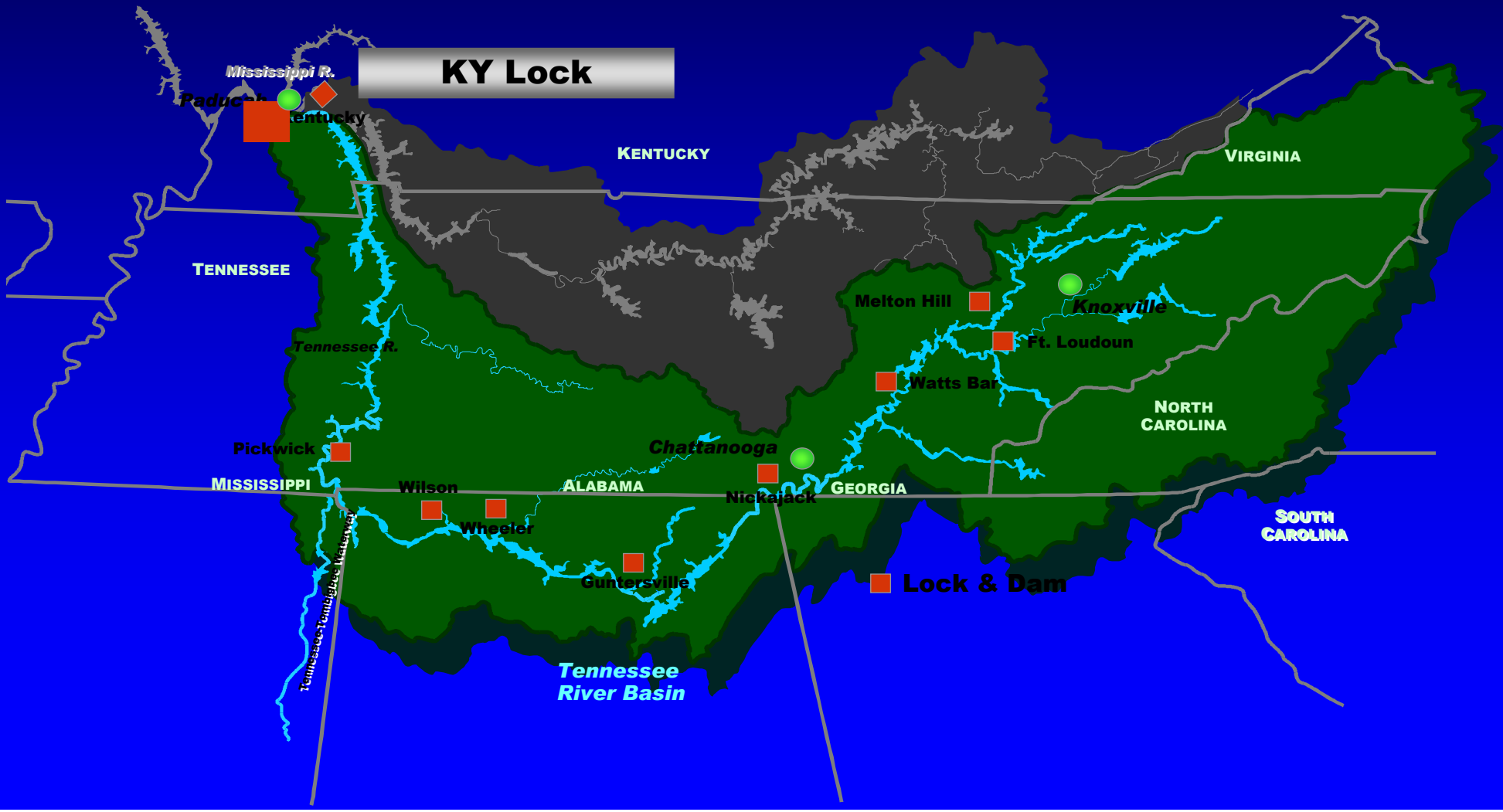
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Project Overview

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Huntington District

One Corps, One Regiment, One Team

Kentucky Lock Location



Project Components

- **New 110’x1200’ Lock Landward of Existing 110’x600’ Lock**
- **Relocations of KY Hwy 62, P&L Railway, TVA Powerhouse Access, and TVA Transmission Towers**

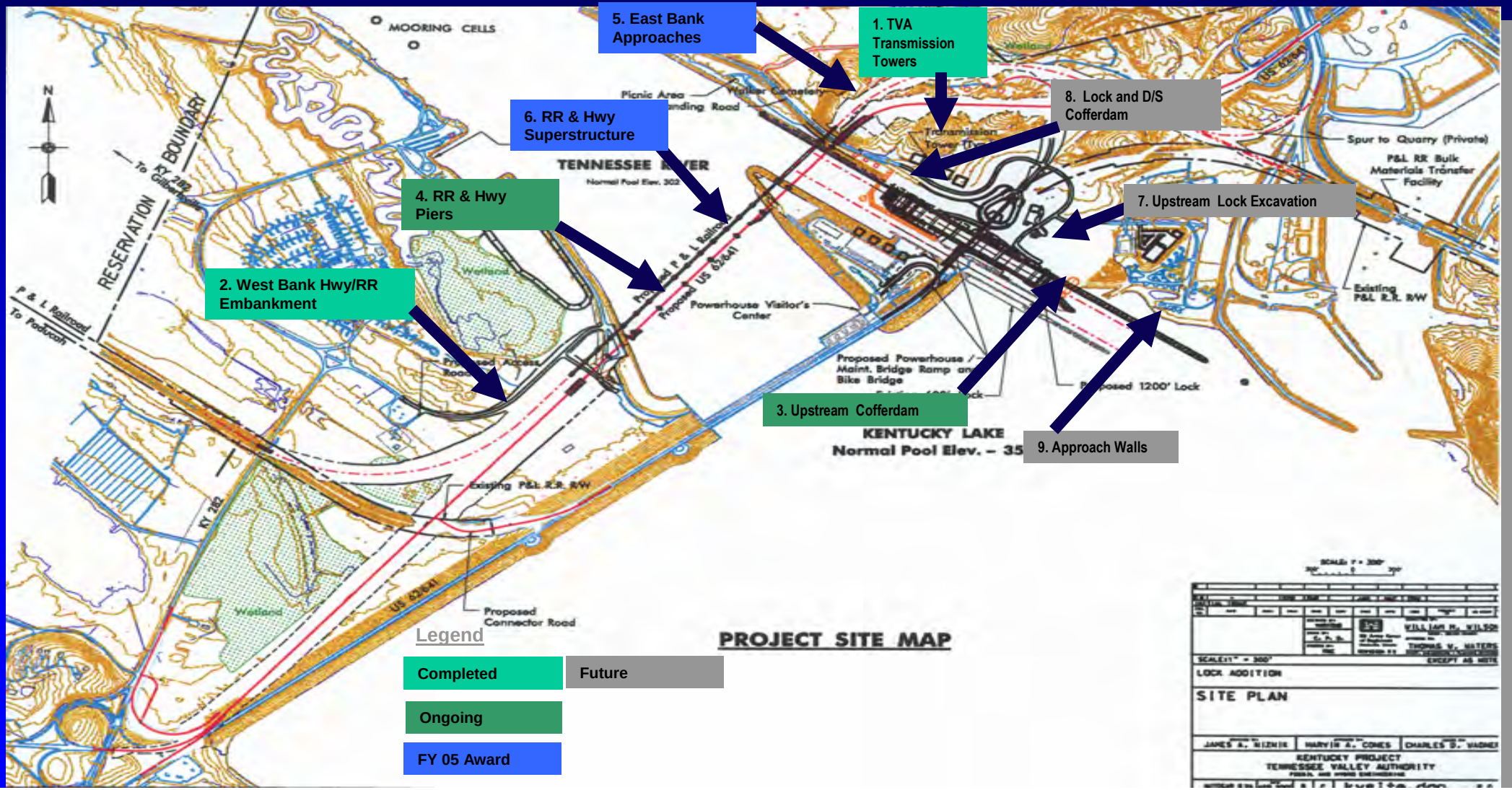
Project Schedule & Cost

- **Construction began FY98**
- **Lock and DS Cofferdam Construction from FY08 through FY18 or beyond based on current funding stream**
- **Total project costs are currently $639M**

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Construction Contracts



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Existing Project Site



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Huntington District

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Pool, Lock and Cofferdam Elevations

Pool Levels

• Headwater:	Minimum Normal	Elev. 354
	Maximum	Elev. 375
• Tailwater:	Minimum	Elev. 300
	Maximum Design	Elev. 344

Lock Elevations

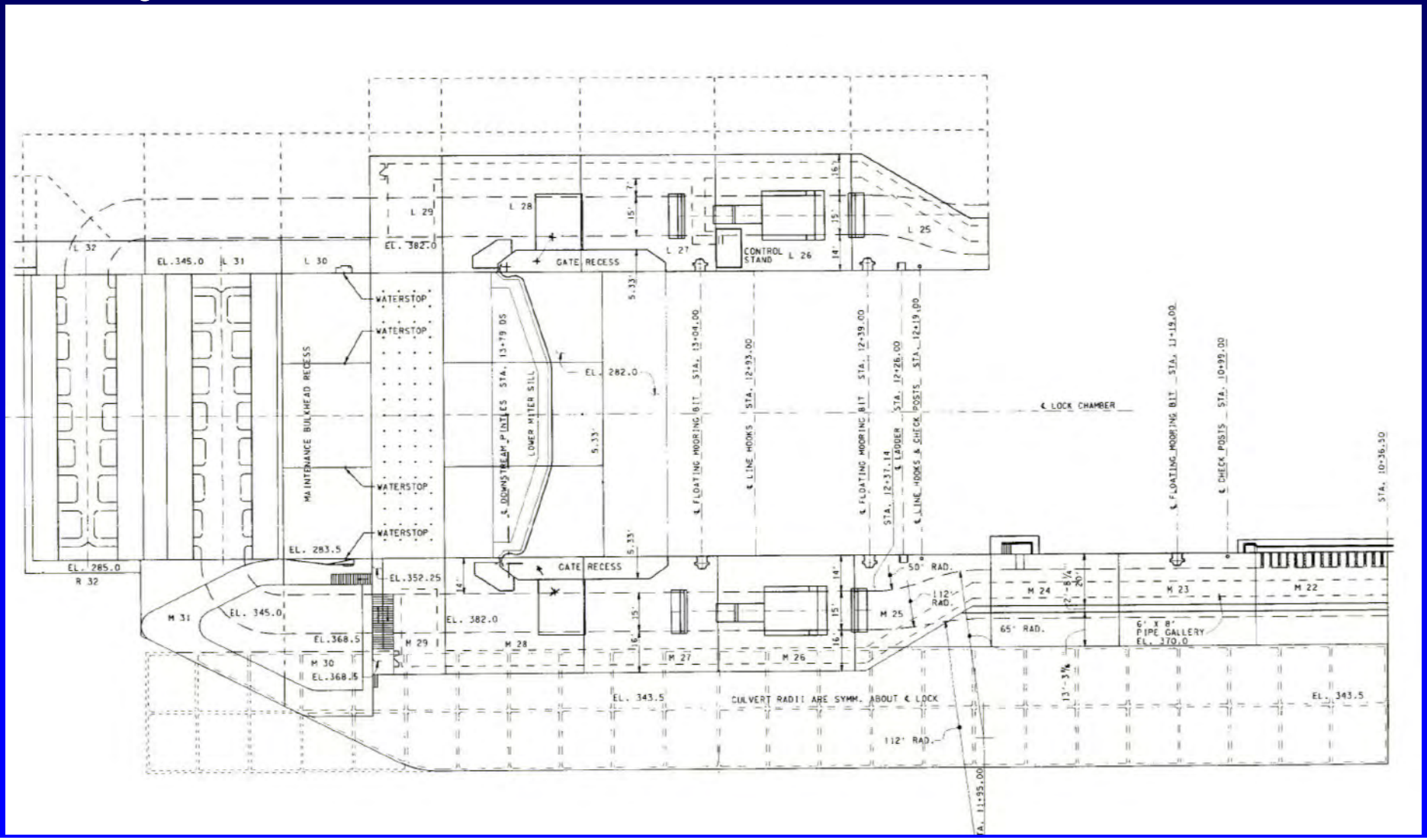
• Chamber:	Top of Wall	Elev. 382
	Lock Sills	Upper Elev. 335
		Lower Elev. 285
• Approach Walls:	Upper	Elev. Varies (Floating)
	Lower	Elev. 345

Cofferdams

• Upper Cofferdam:	Top of Protection	Elev. 375 (Top of Spillway Gates)
• Lower Cofferdam:	Top of Protection	Elev. 343.5 (25 Year Frequency)

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Huntington District

Downstream Monoliths



PDT Members

- TVA – Owner
- Nashville District – Lock O&M and Project Management
- Bergmann Associates, et. al. – Downstream Cofferdam Design
- Huntington District – Design of DS Monoliths and Sills
- Many others involved in the overall design of the project

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of Engineers
Huntington District

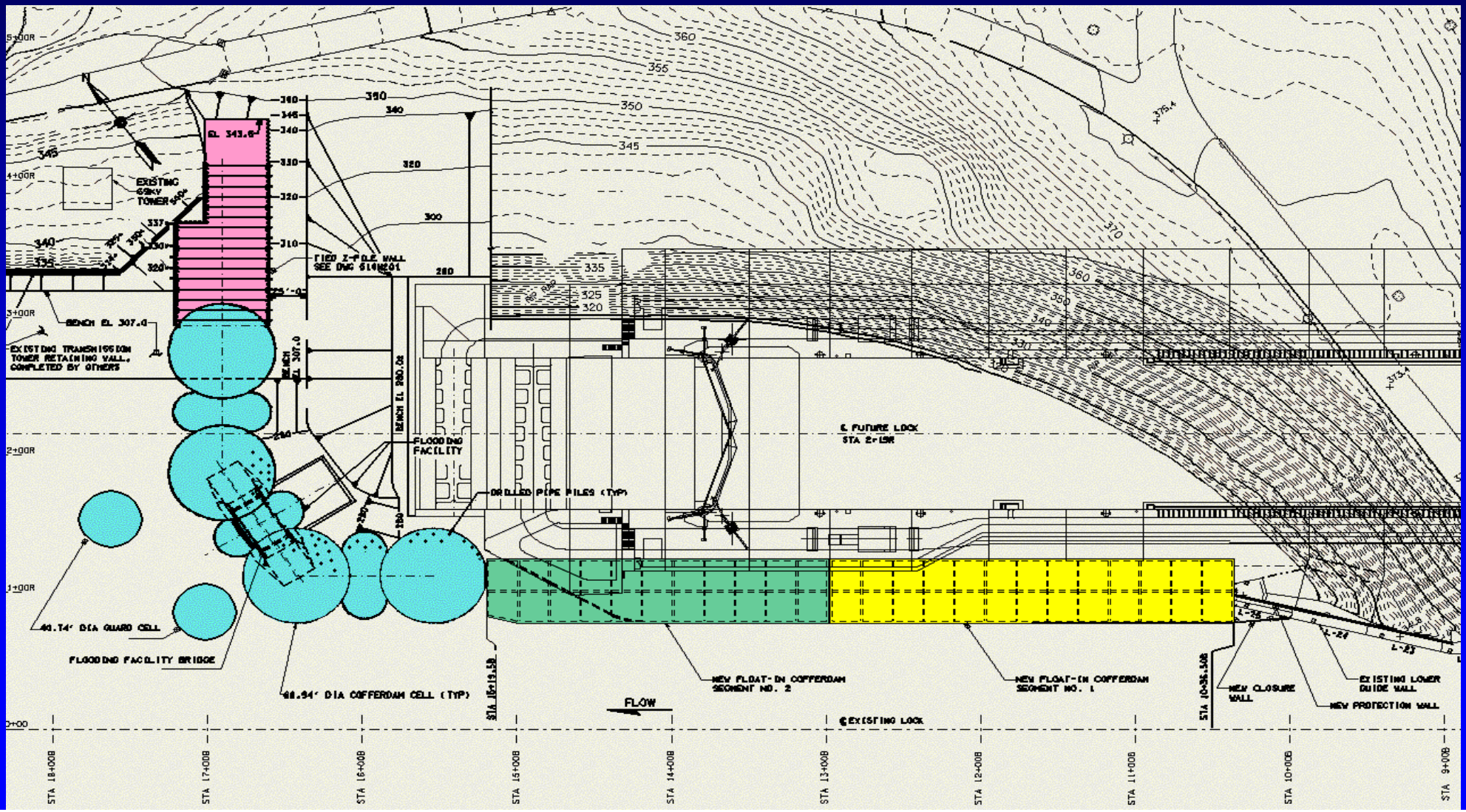
Downstream Cofferdam

Design

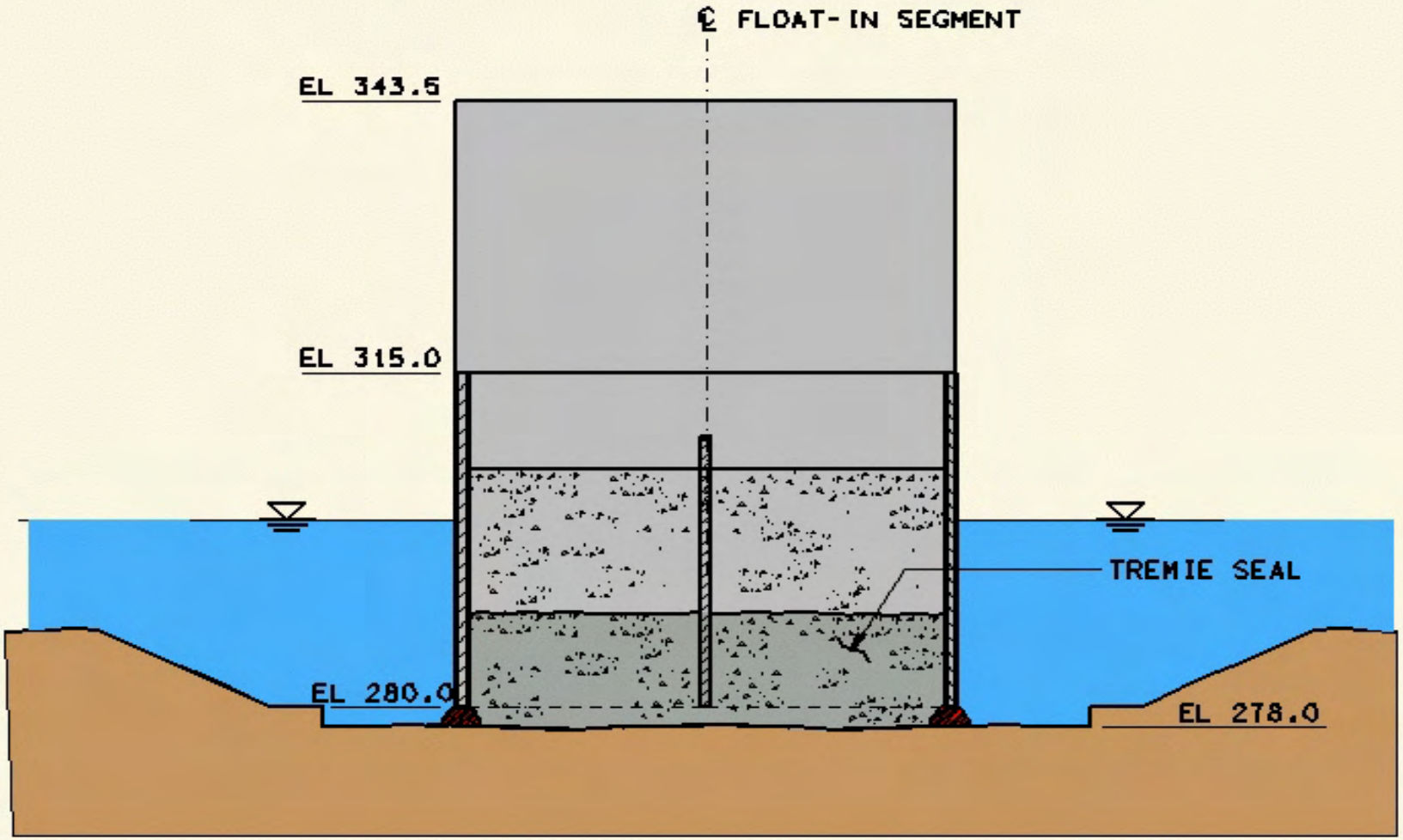
- Design of the Downstream Cofferdam was contracted to a joint venture of Bergmann Associates and Ben C. Gerwick with D'Appolonia Engineering
- Design completed in FY03
- Combination of precast concrete float-in with tremie and cast-in-place in-fill, conventional sheet pile cellular, and tied Z-pile structures

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DS Cofferdam Plan



Typical Cofferdam Section



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Monolith Design

- **Seismic Criteria**
- Stability Analysis
- Thermal Considerations

Seismic Criteria

- **Two sets of criteria for design**
  - TVA – “Federal Guidelines for Earthquake Analyses and Design of Dams” and USCOLD
  - USACE – Earthquake Design and Evaluation for Civil Works Projects, ER 1110-2-1806

Seismic Criteria

- **TVA Criteria**
  - Probabilistic Approach for MCE – 10,000 year event
  - MDE = MCE
  - OBE = ½ MDE
  - Only Reservoir Retaining Structures to be designed to the MDE

Seismic Criteria

- **USACE Criteria**
  - Deterministic Approach for MCE
  - MDE/OBE based on Hazard Potential Classification – High, Significant, or Low
  - High Hazard – MDE = MCE
  - Significant & Low – MDE < MCE

Seismic Criteria

Peak Horizontal Accelerations			
Agency	**Hazard**	**MDE**	**OBE**
TVA	Reservoir Ret.	0.25g	0.12g
USACE	High	0.25g	0.12g
	Significant	0.13g	0.05g
	Low	0.10g	0.05g

Seismic Criteria

- **Downstream Monolith Hazard**
  - TVA – Non-Reservoir Retaining Structure
    - Below Upstream Gates
    - Below Axis of Dam
  - USACE – Significant Hazard Classification
    - Little or no potential for direct loss of life
    - Loss of a major public facility

Seismic Criteria

- **Load Cases to Consider**
  - OBE
    - **TVA – 0.12g**
    - USACE – 0.05g
  - MDE
    - TVA – N/A
    - **USACE – 0.13g**
  - Since MDE ≈ OBE, only OBE was analyzed

Monolith Design

- Seismic Criteria
- **Stability Analysis**
- Thermal Considerations

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Stability Analysis

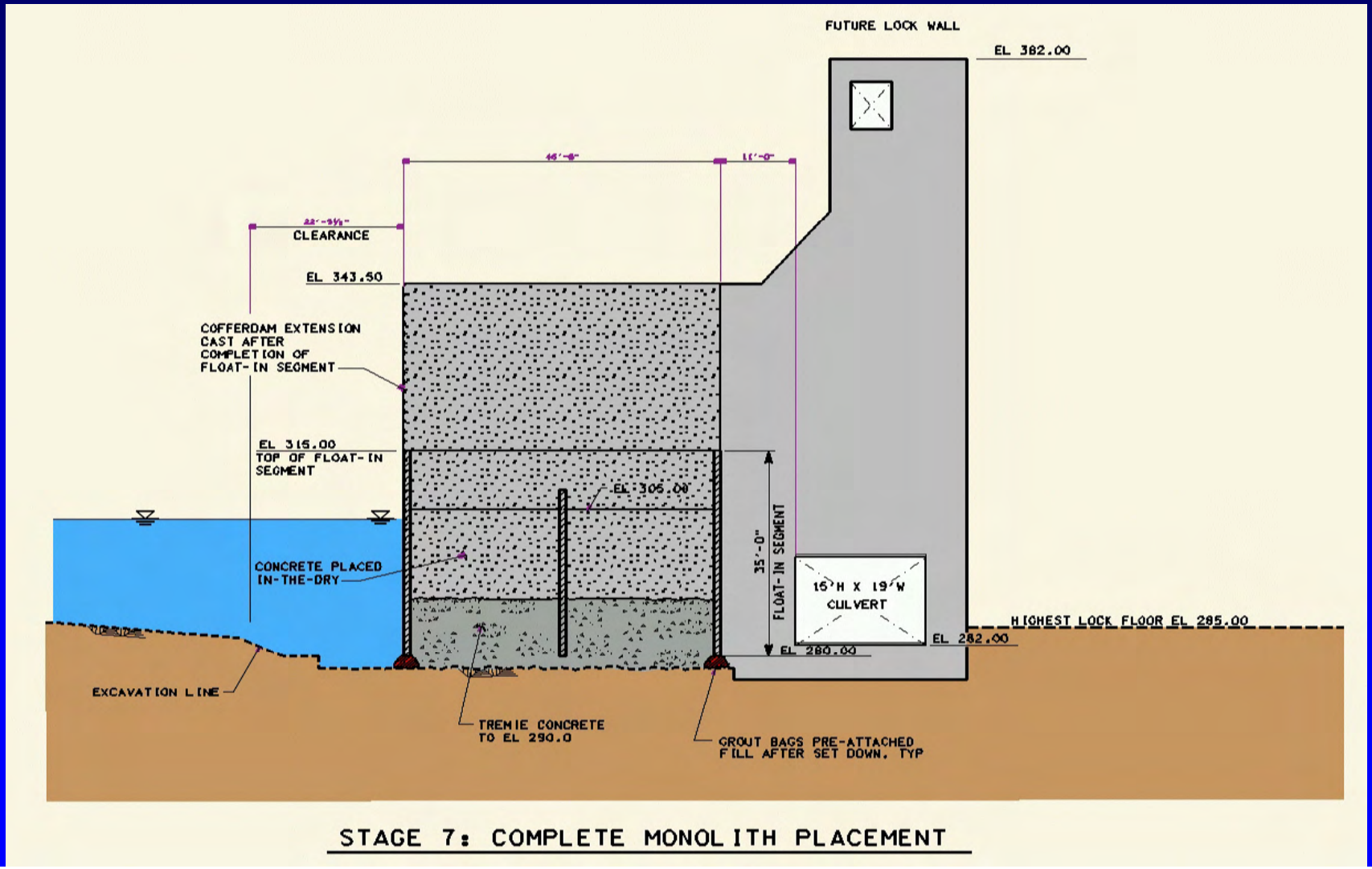
- 8 Load Cases Analyzed
- 3D Analysis on Miter Gate Monoliths
- 2D Analysis on Remaining Monoliths
- Monolith and Cofferdam treated as one structure
- Miter Gate Monolith and Monolith Immediately D/S analyzed as one Structure

Stability Analysis

- **Monolith/Cofferdam Combined Analysis**
  - Required for some load cases
  - Tied together with #7 bars at 18” spacing vertically and horizontally
  - Ties checked against seismic load case

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Stability Analysis

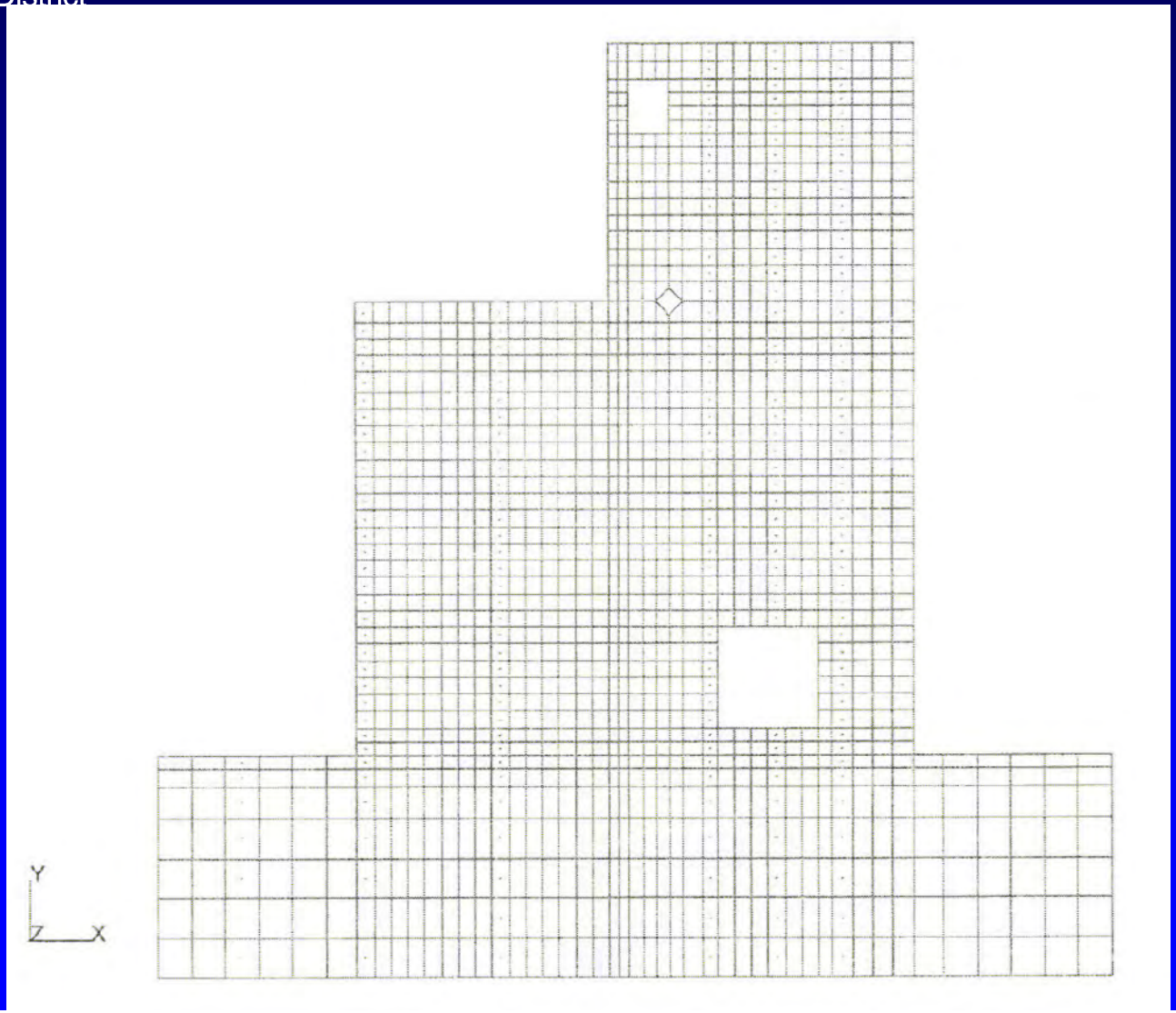


Stability Analysis

- **Seismic Analysis of Ties**
  - 1st Attempt – Non-Linear Time History Analysis using GTSTRUDL
  - Ties Modeled as Non-Linear Springs
  - Non-Linear Gap Elements at Concrete-Rock Interface
  - 1st Runs Took 15+ Days and Produced Useless Results
  - Next Attempt Exceeded the Computer's Addressable Memory Space

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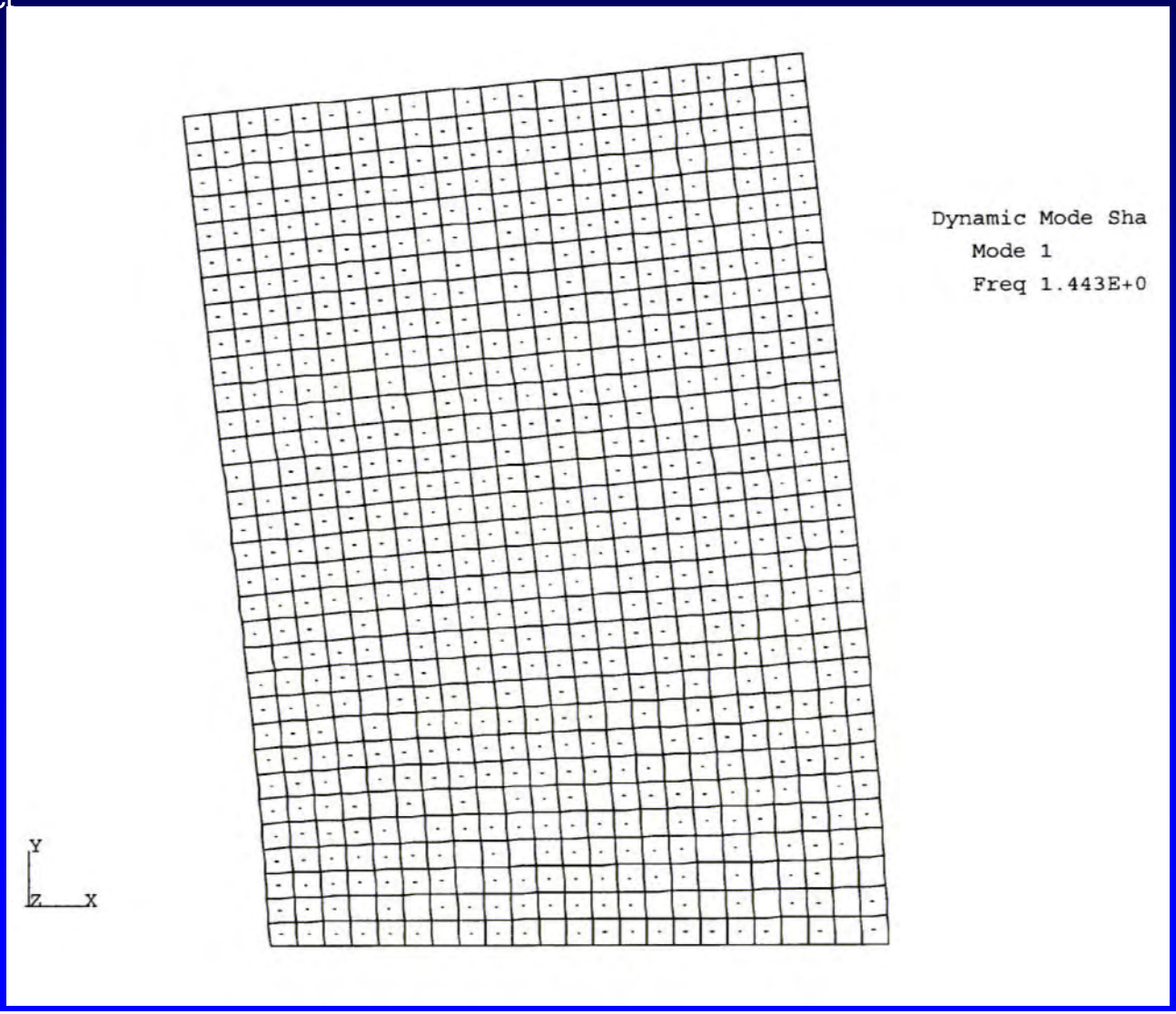
Stability Analysis



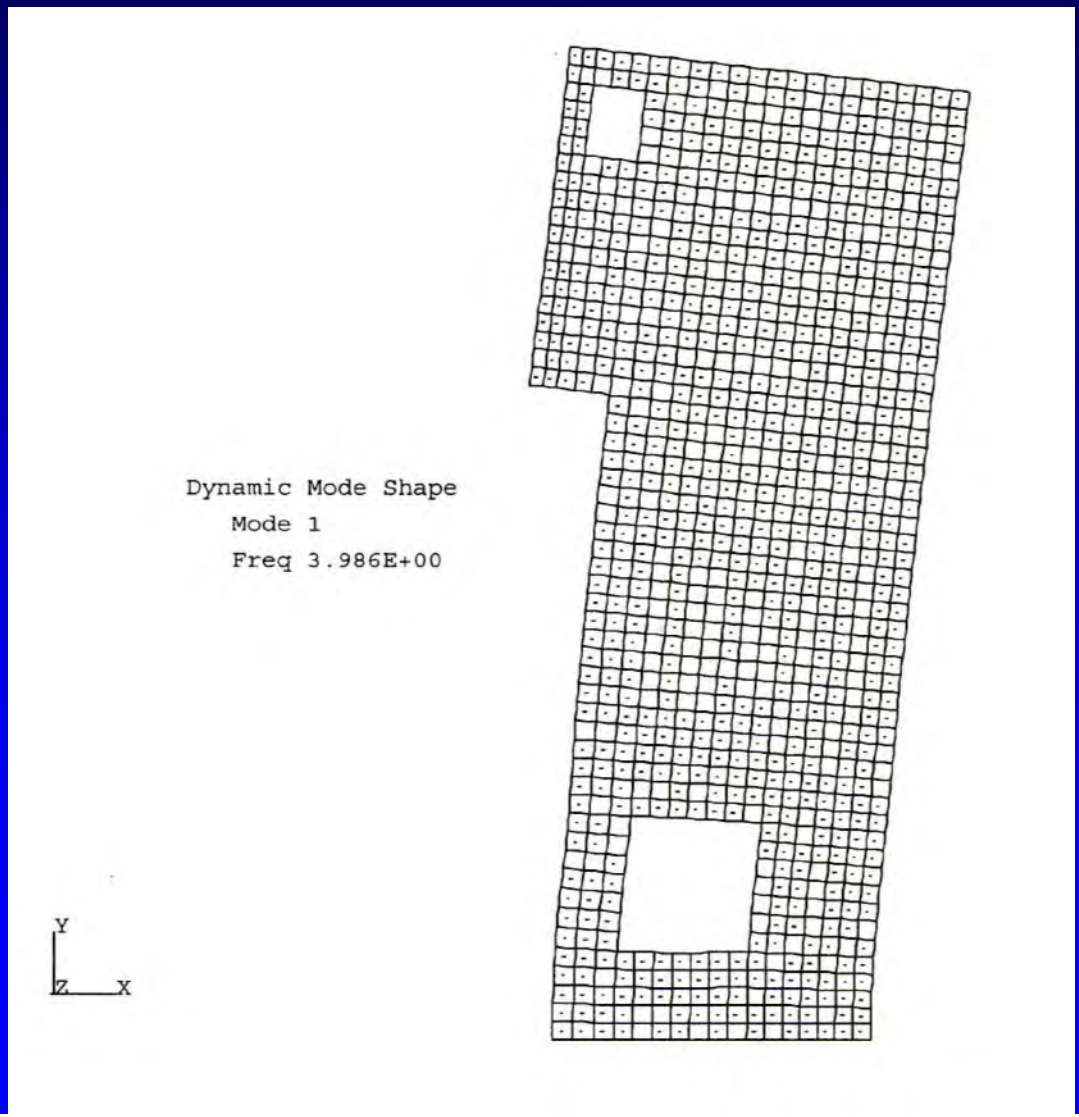
Stability Analysis

- **Seismic Analysis of Ties** (Cont'd)
  - Abandoned the Non-Linear Analysis
  - Response Spectrum Analysis of Individual Structures (Cofferdam and Monolith)
  - Modal Analysis using GTSTRUDL
  - Assumed Worst Case of Peak Response of Each Structure Occurring at Same Time and Completely Out of Phase
  - Results Gave a FS of About 3

Stability Analysis



Stability Analysis

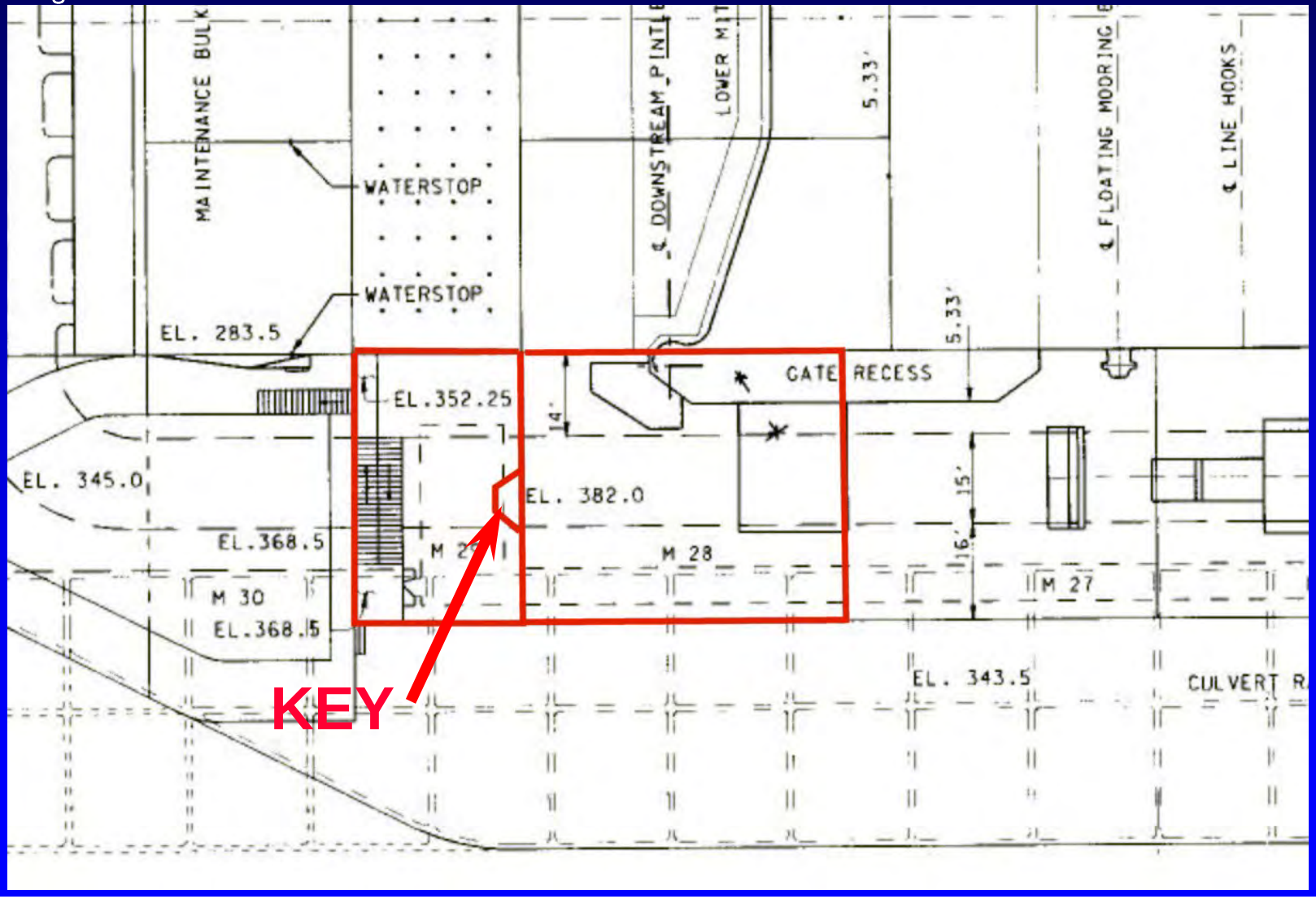


Stability Analysis

- **Miter Gate Monolith Design**
  - Does Not Meet Criteria for Some Load Cases When Analyzed Alone
  - Determined What Additional Force Required at D/S Joint to Meet Criteria
  - Designed a Shear Key to Carry this Force
  - Monolith Joint To Also Be Grouted

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Stability Analysis



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Monolith Design

- Seismic Criteria
- Stability Analysis
- **Thermal Considerations**

Thermal Considerations

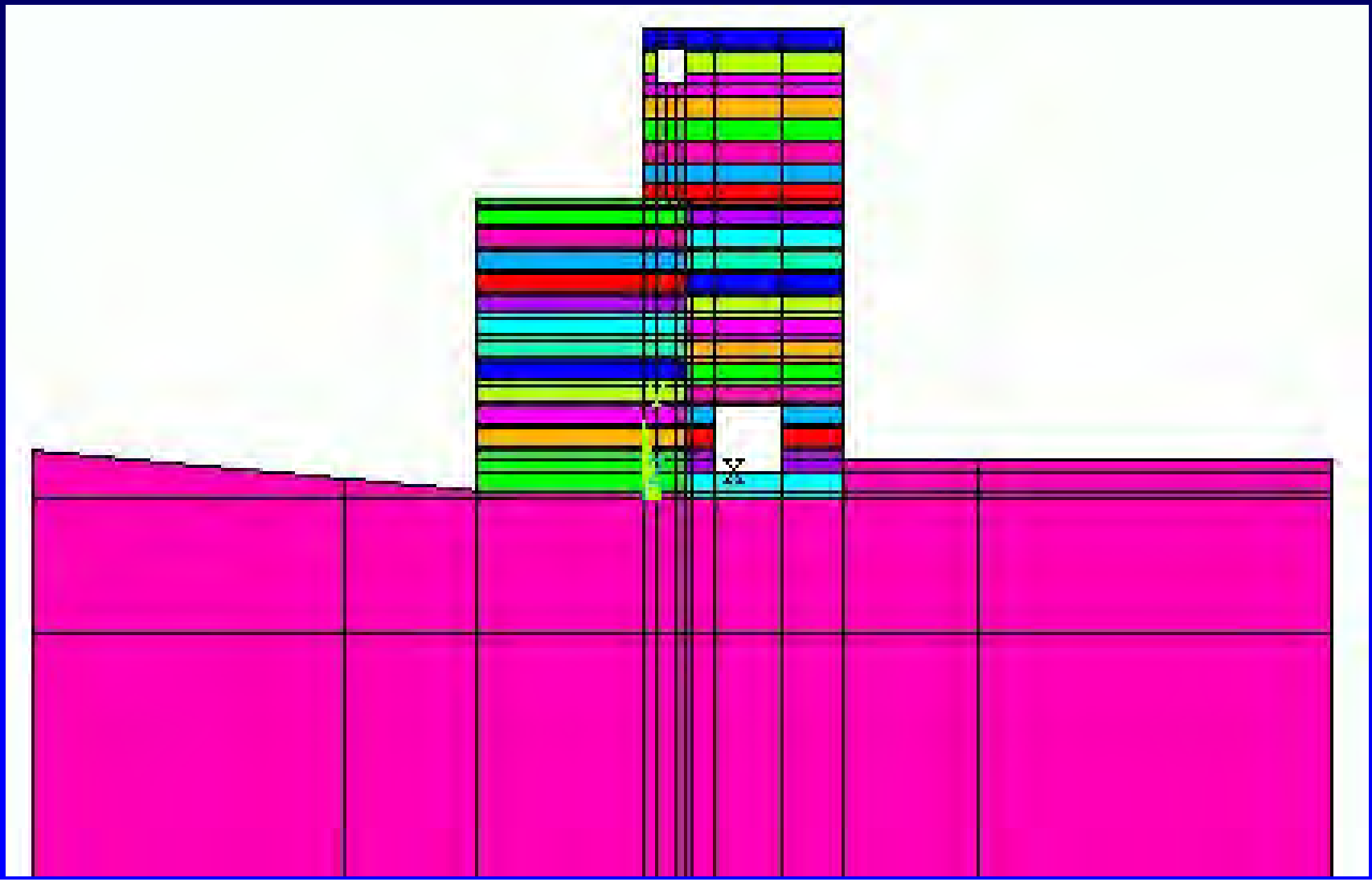
- **Two Options to Deal with Thermal Loads**
  - Separate the Structures with Bond Breaker and/or Insulation and Model Just the Lock Concrete
  - Model the Combined Structure Accounting for the Heat Transfer and Restraint Provided by the Cofferdam
- Second Option Required Based on Stability
- Thermal Analysis Performed by Black & Veatch

Thermal Considerations

- **Parametric Studies to Determine Lift Heights and Placement Restrictions**
- **Thermal Cracking Analysis**
  - First Step Was to Model the Construction Sequence of the Cofferdam
    - 10’ Tremie Placement
    - 5’ Lifts Every 7 Days
  - Lock Construction Then Began on Day 365
    - Approximately 5’ Lifts Every 5 Days

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Huntington District

Thermal Considerations

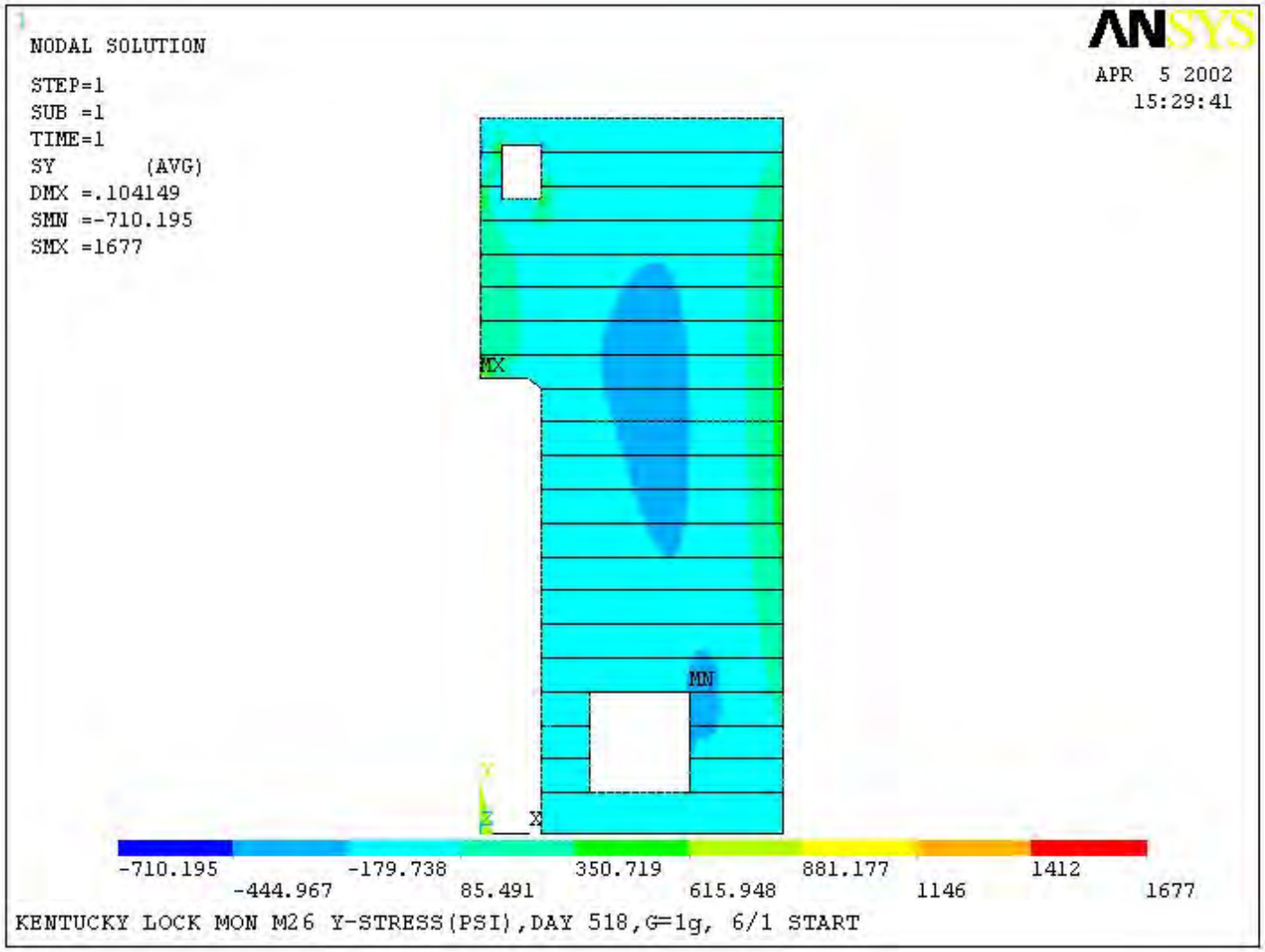


Thermal Considerations

- **Thermal Analysis Results**
  - Temperature and Shrinkage Steel Required
    - Around Culvert and Gallery
    - All Exposed Faces
    - Around the Chamfer at Top of Cofferdam
  - Didn’t Account for Longitudinal Restraint from Cofferdam
    - Provide T&S Steel at This Face, or
    - Create Joints in Cofferdam

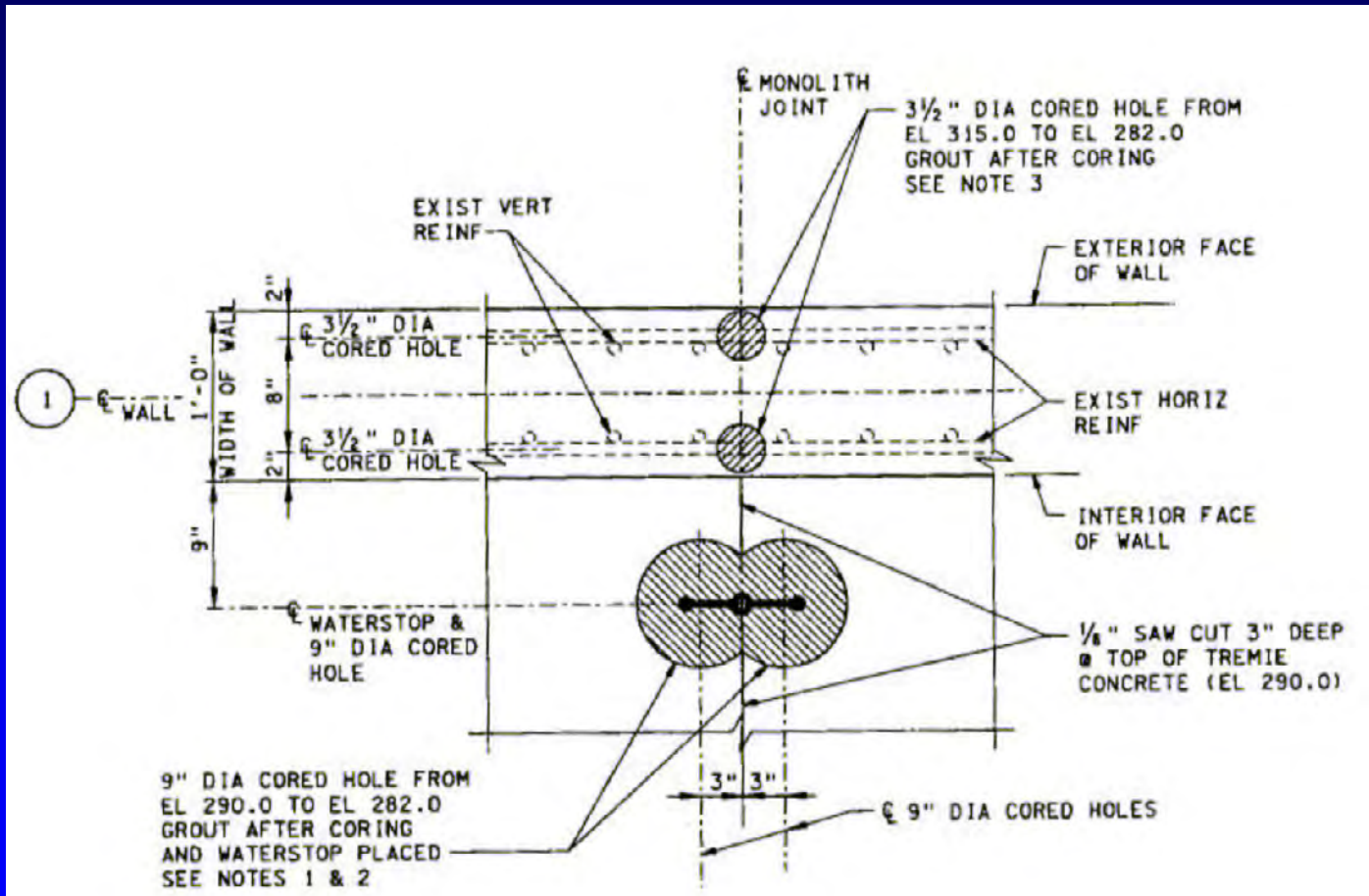
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Thermal Considerations



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Thermal Considerations



FROM EL 282.0 TO EL 315.0

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Construction Issues

Construction Issues

- **Primarily Related to Foundation**
  - Excavation Adjacent to Cofferdam – Founding Elevation of Lock 2’ to 17’ Below Cofferdam Foundation
  - Presence of Solution Channels – One Known Channel That May Extend to Below Upstream Corner of First Monolith

Construction Issues



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Construction Issues



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One Corps, One Regiment, One Team

KY Lock Addition – D/S Middle Wall Monolith Design

Questions?

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