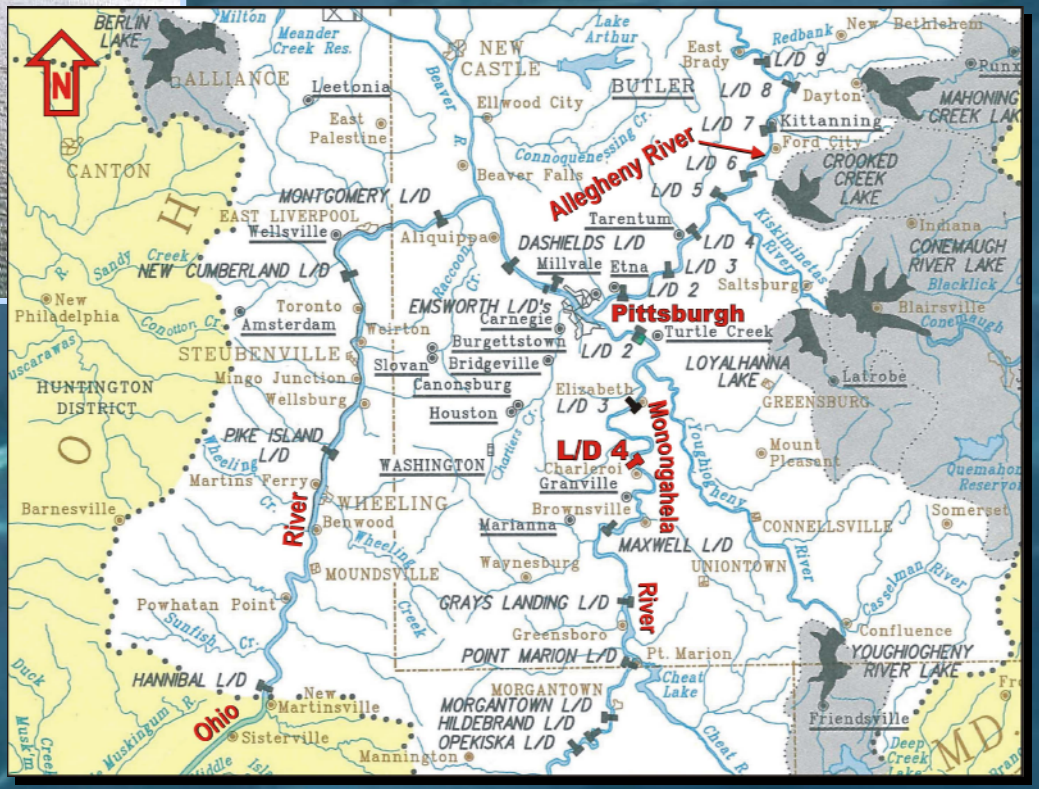
TRI-SERVICE
INFRASTRUCTURE SYSTEMS
CONFERENCE - 2005

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

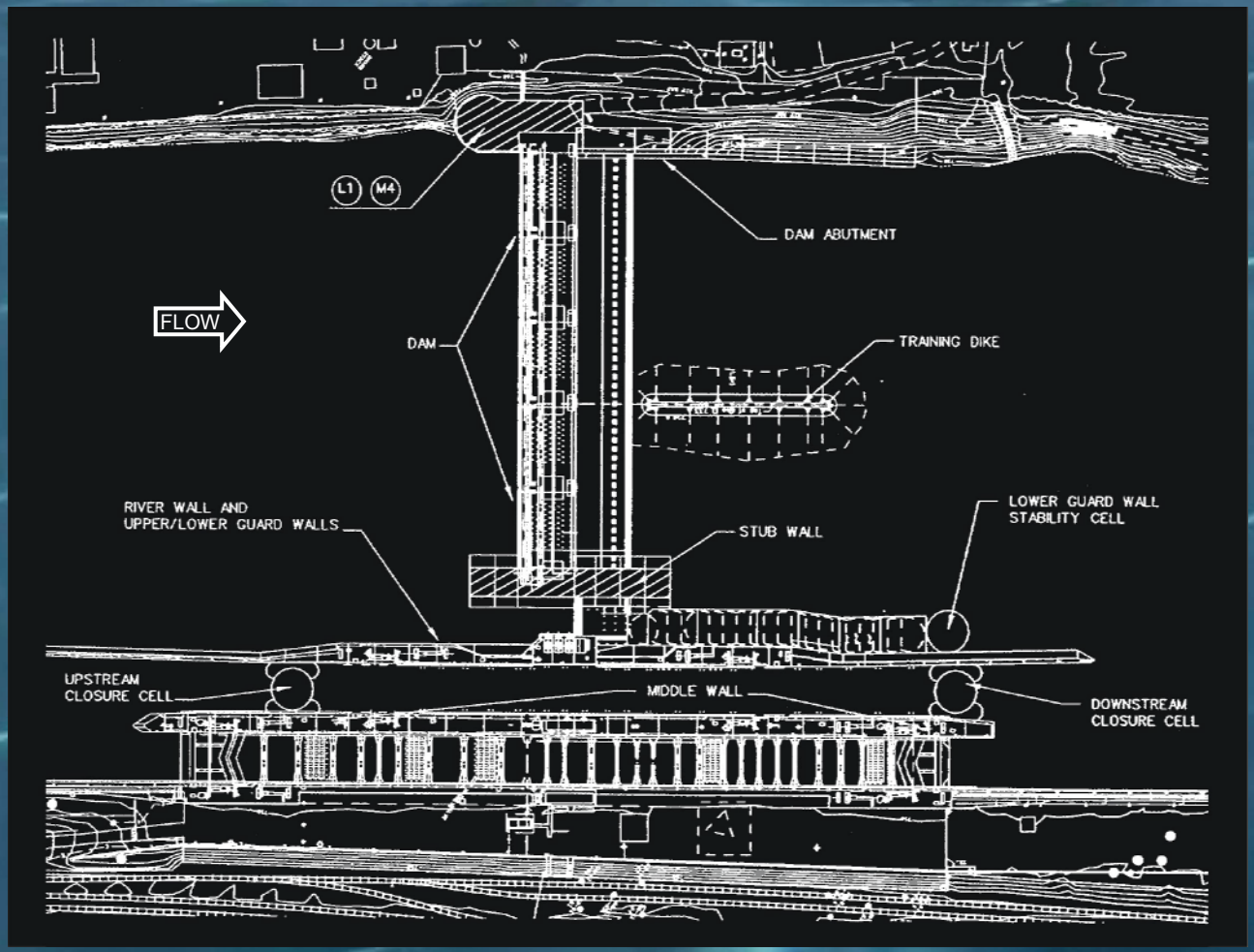


INCA

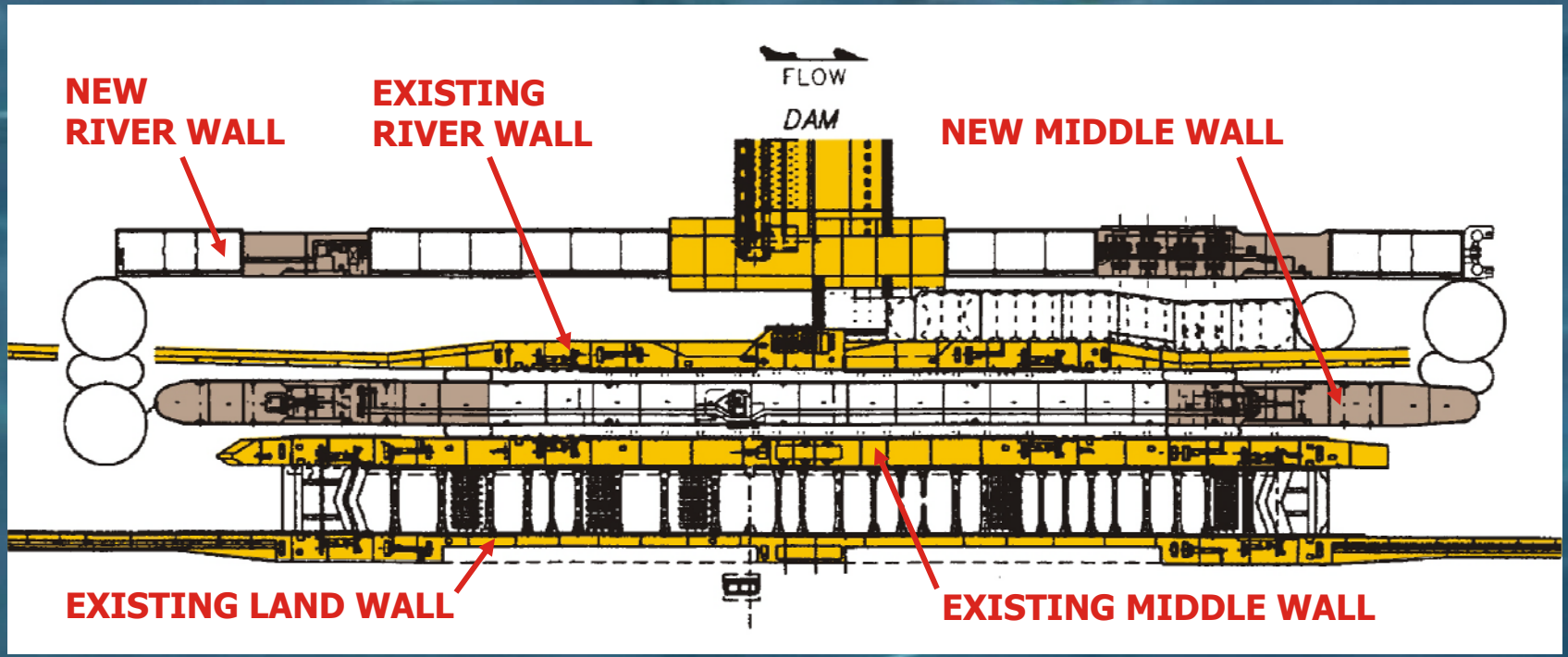
PITTSBURGH DISTRICT

EXISTING LOCK 4

PLAN VIEW - EXISTING LOCK 4

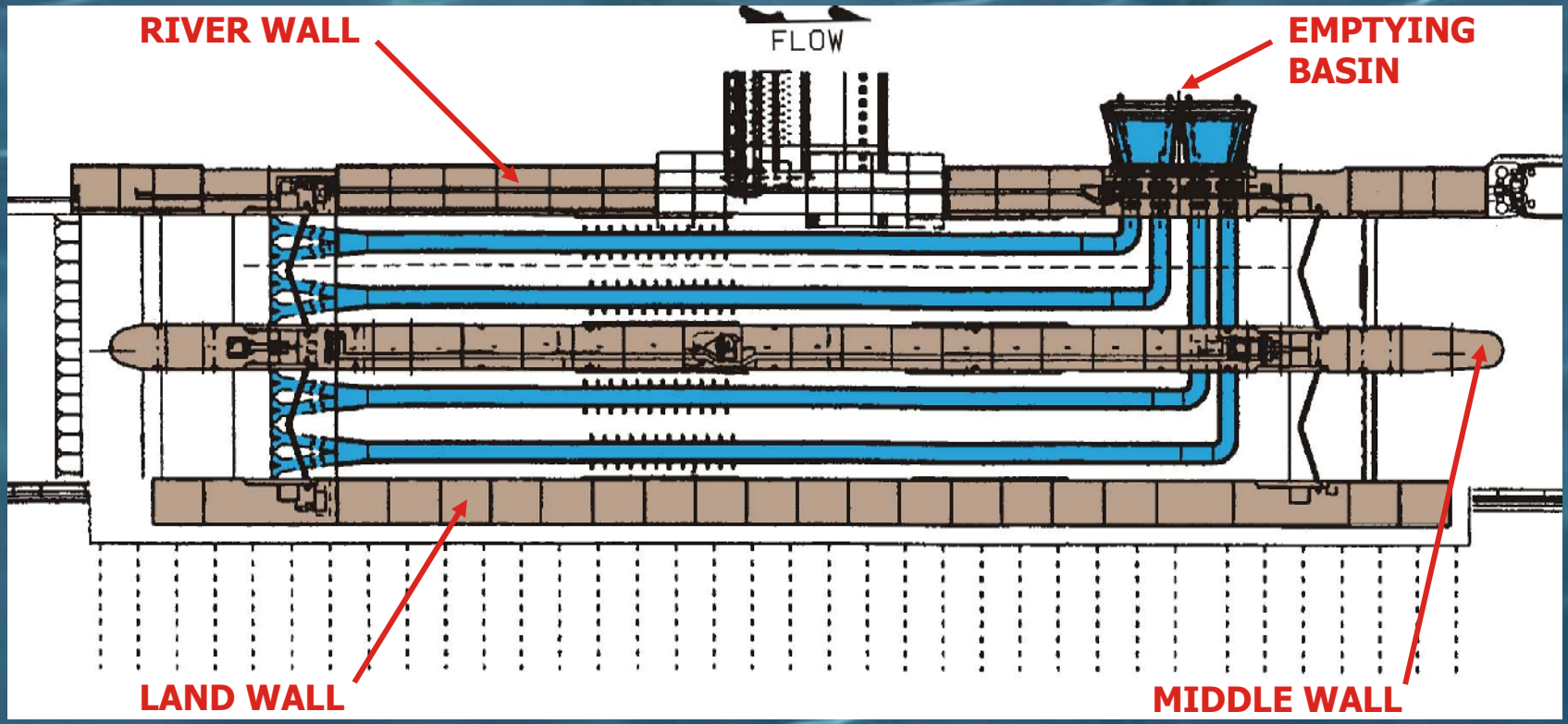


PLAN VIEW – EXISTING & NEW LOCK WALLS WITH COFFERBOX MONOLITHS INDICATED

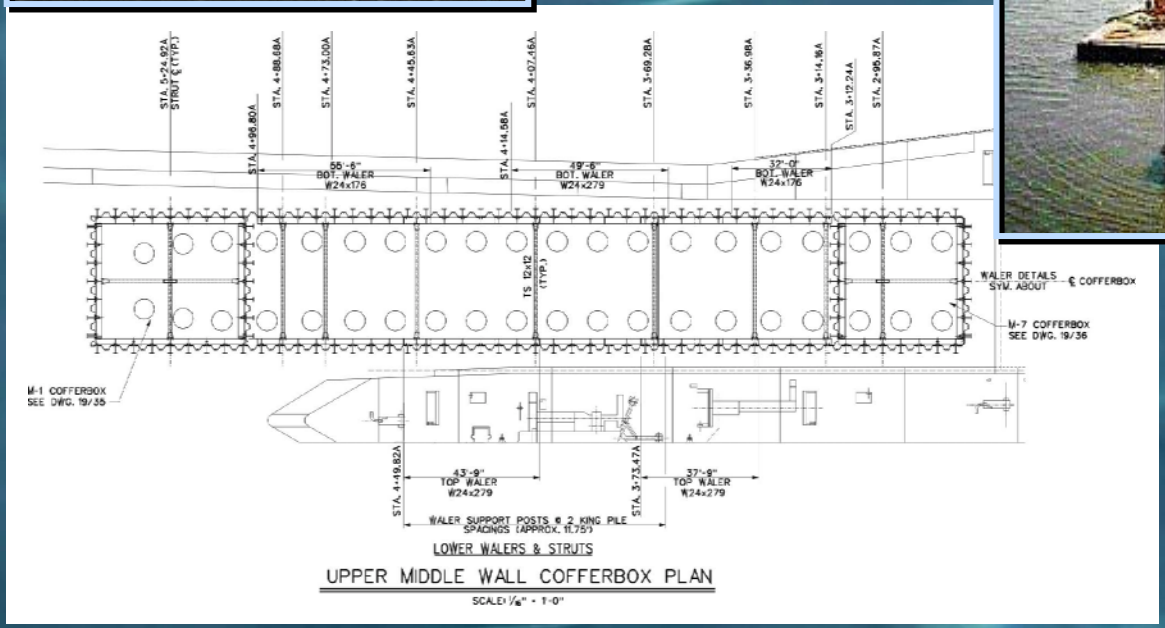


INCA
PITTSBURGH
DISTRICT

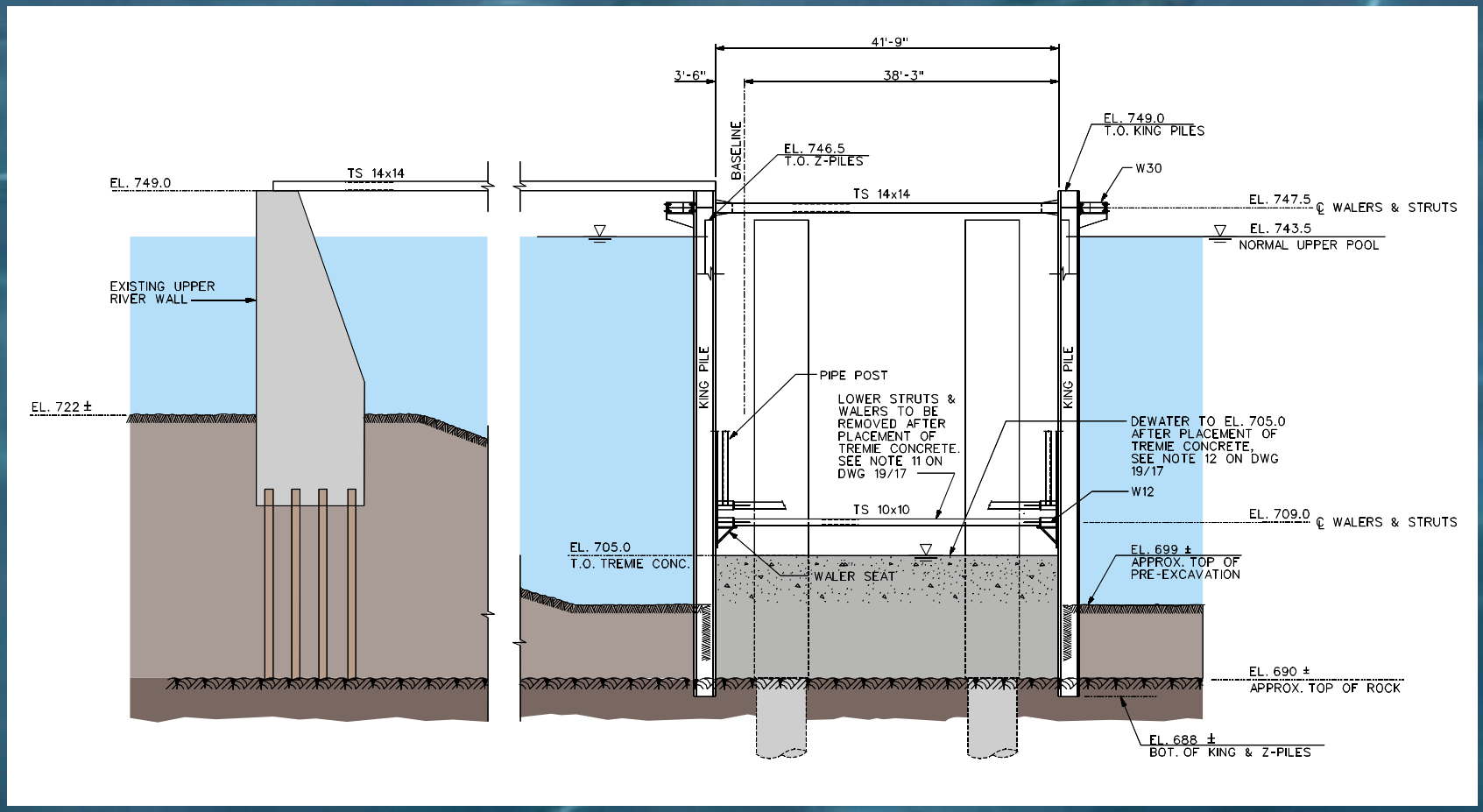
PLAN VIEW – NEW CHARLEROI LOCK



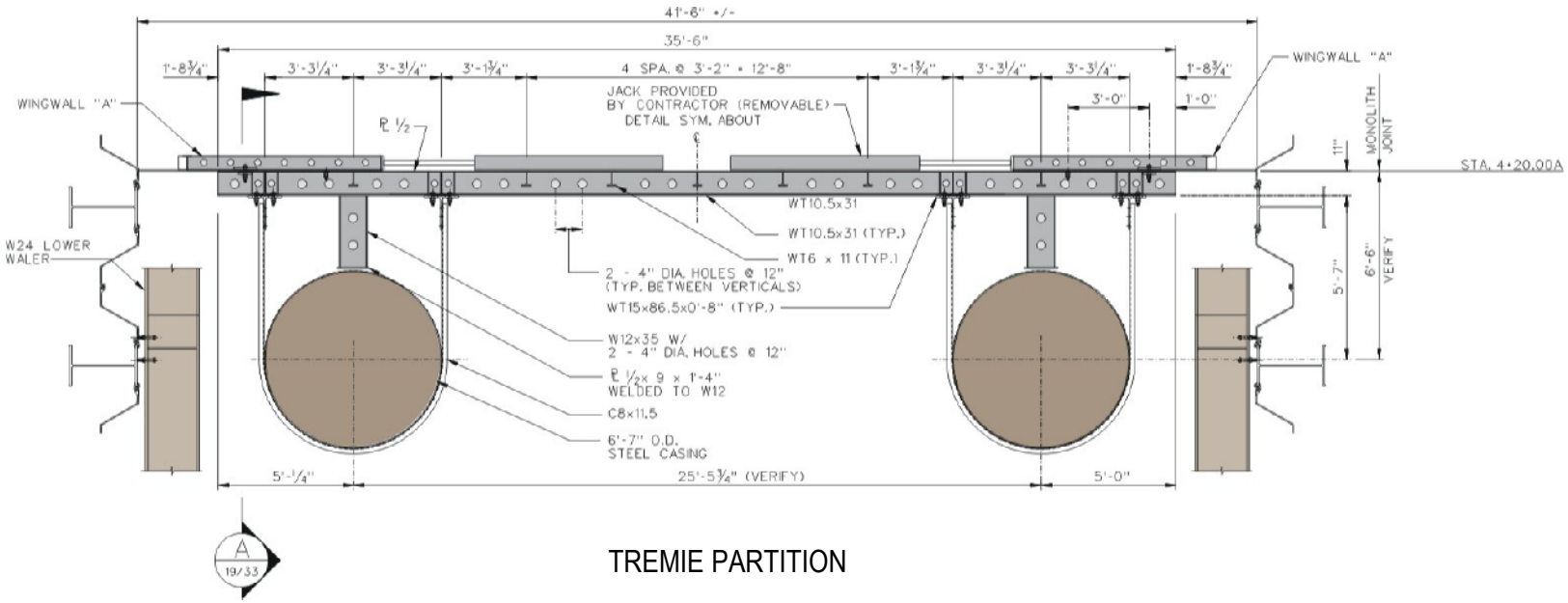
TYPICAL COFFERBOX



CROSS SECTION - RIVER WALL COFFERBOX



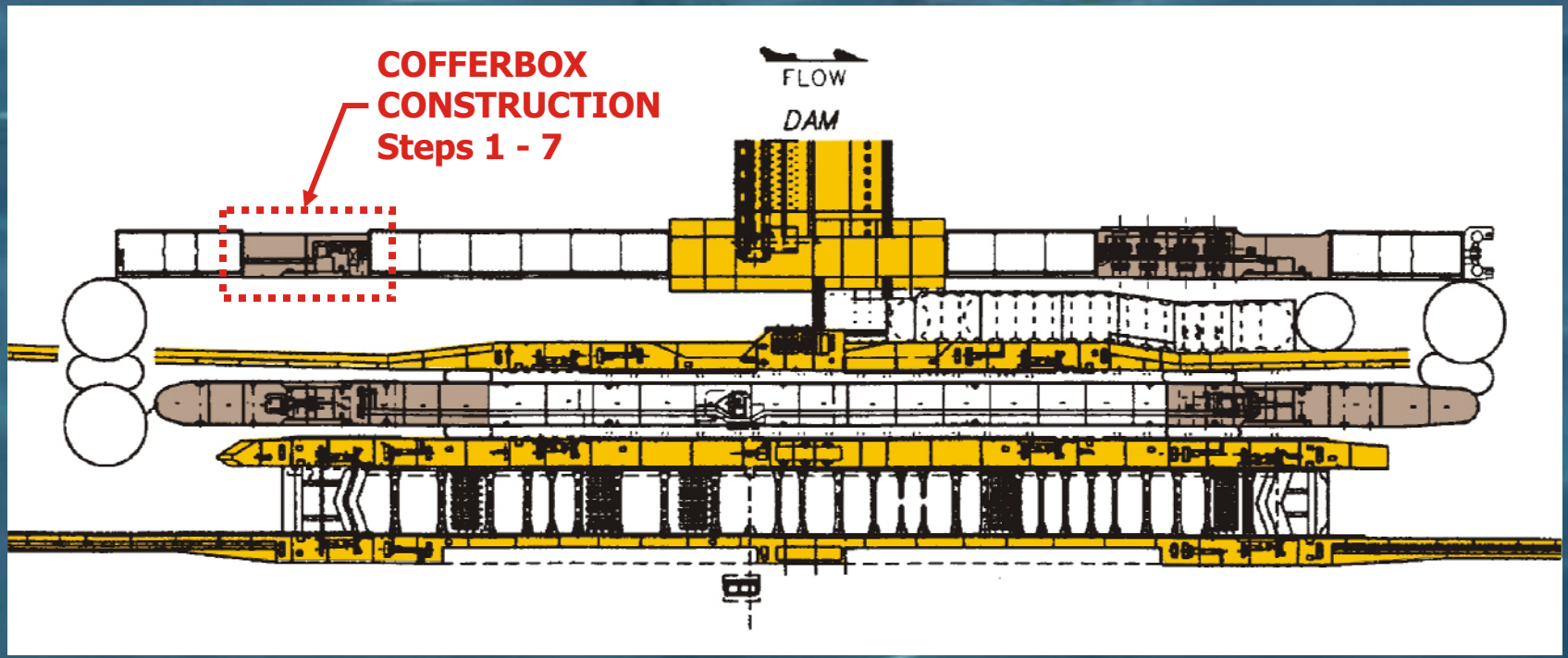
PLAN VIEW - TREMIE CONCRETE PARTITION



TREMIE PARTITION

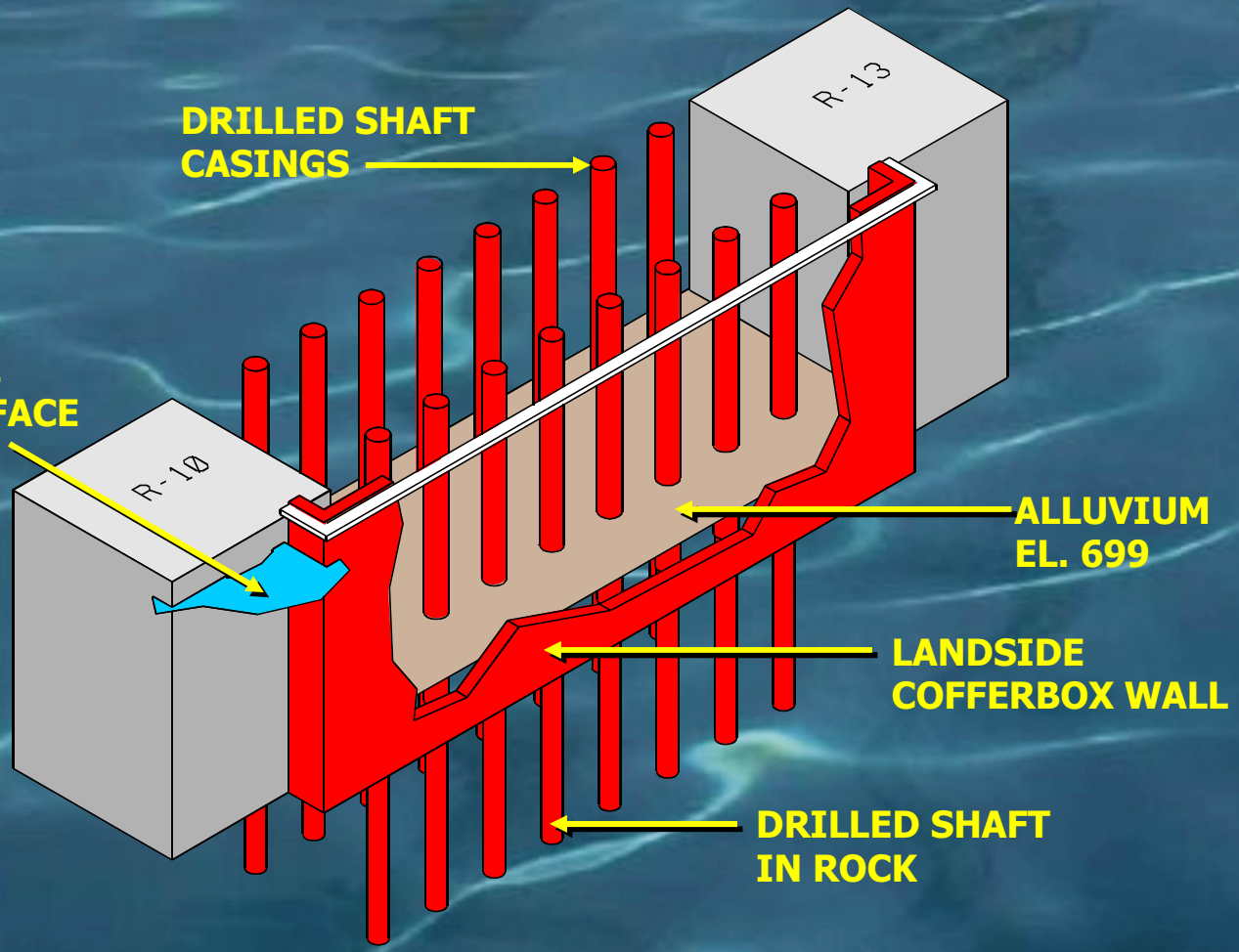
COFFERBOX CONSTRUCTION

Location of Typical Example (Steps 1 - 7)



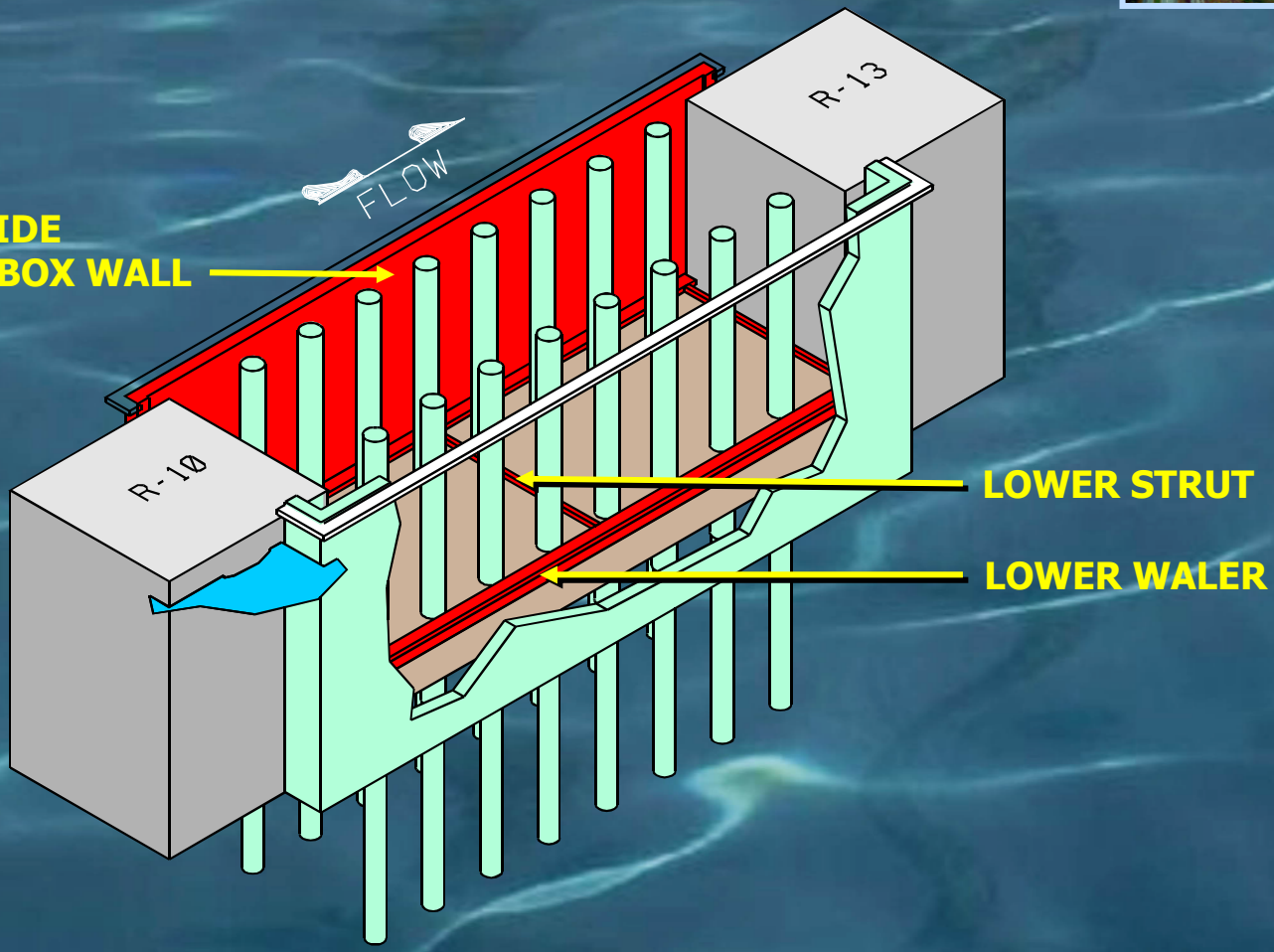
COFFERBOX CONSTRUCTION

Step 1



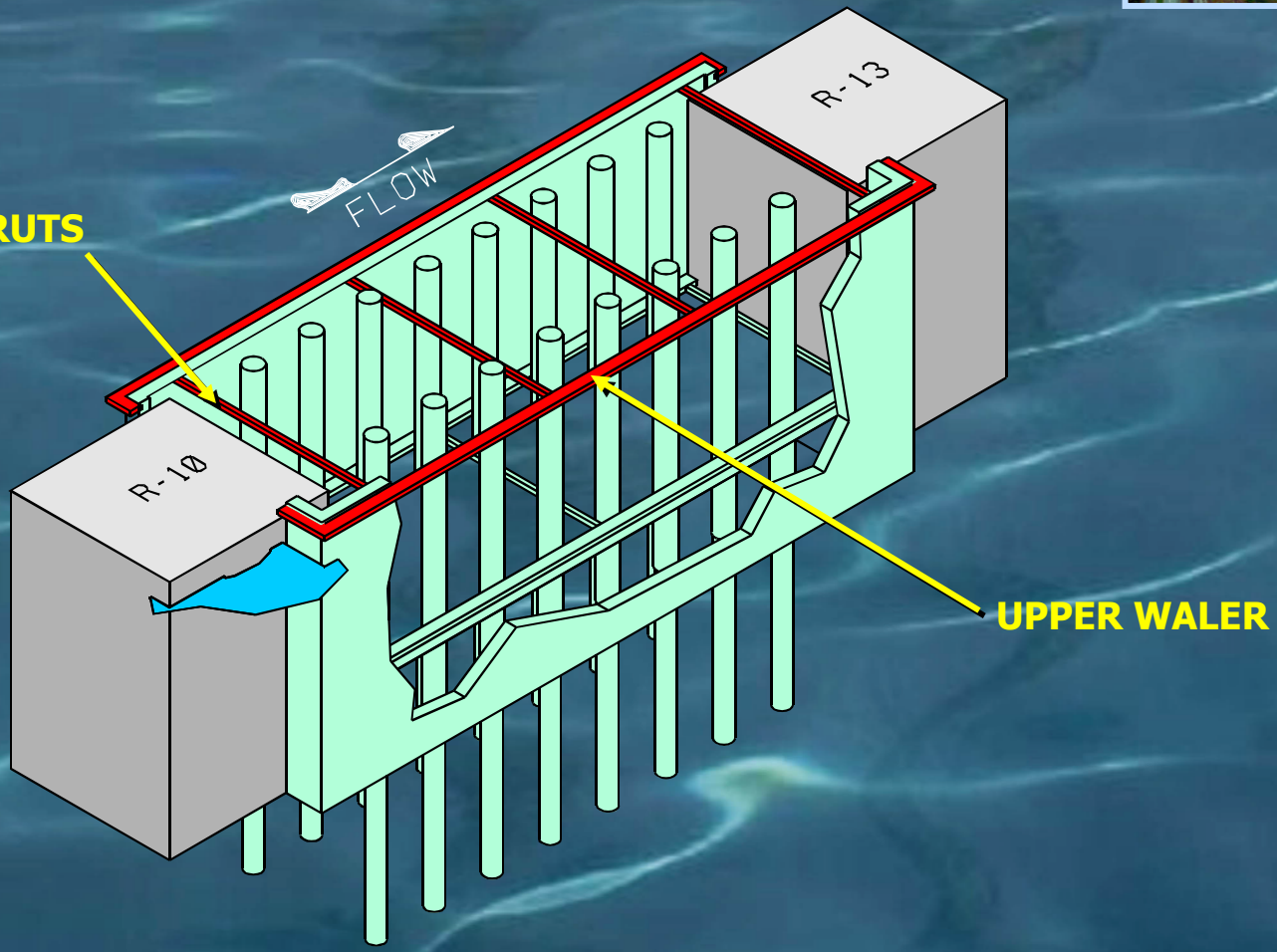
COFFERBOX CONSTRUCTION

Step 2



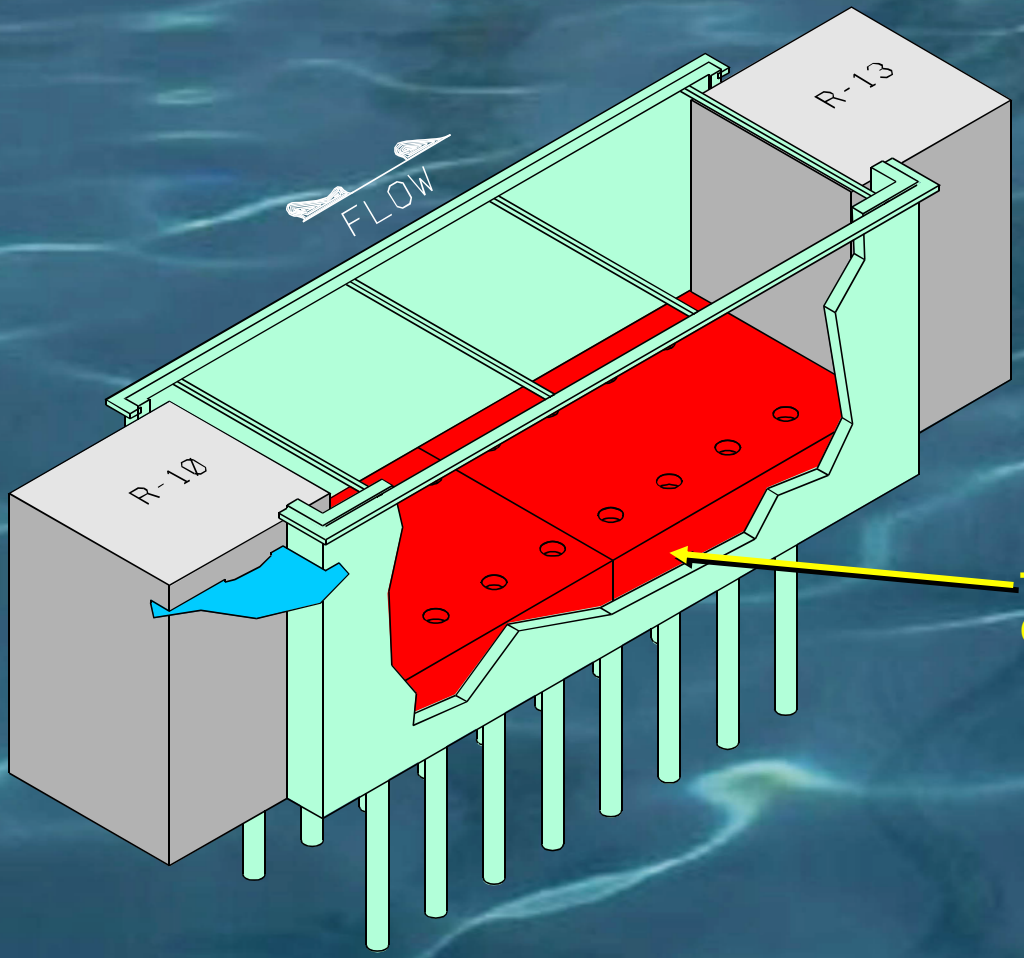
COFFERBOX CONSTRUCTION

Step 3



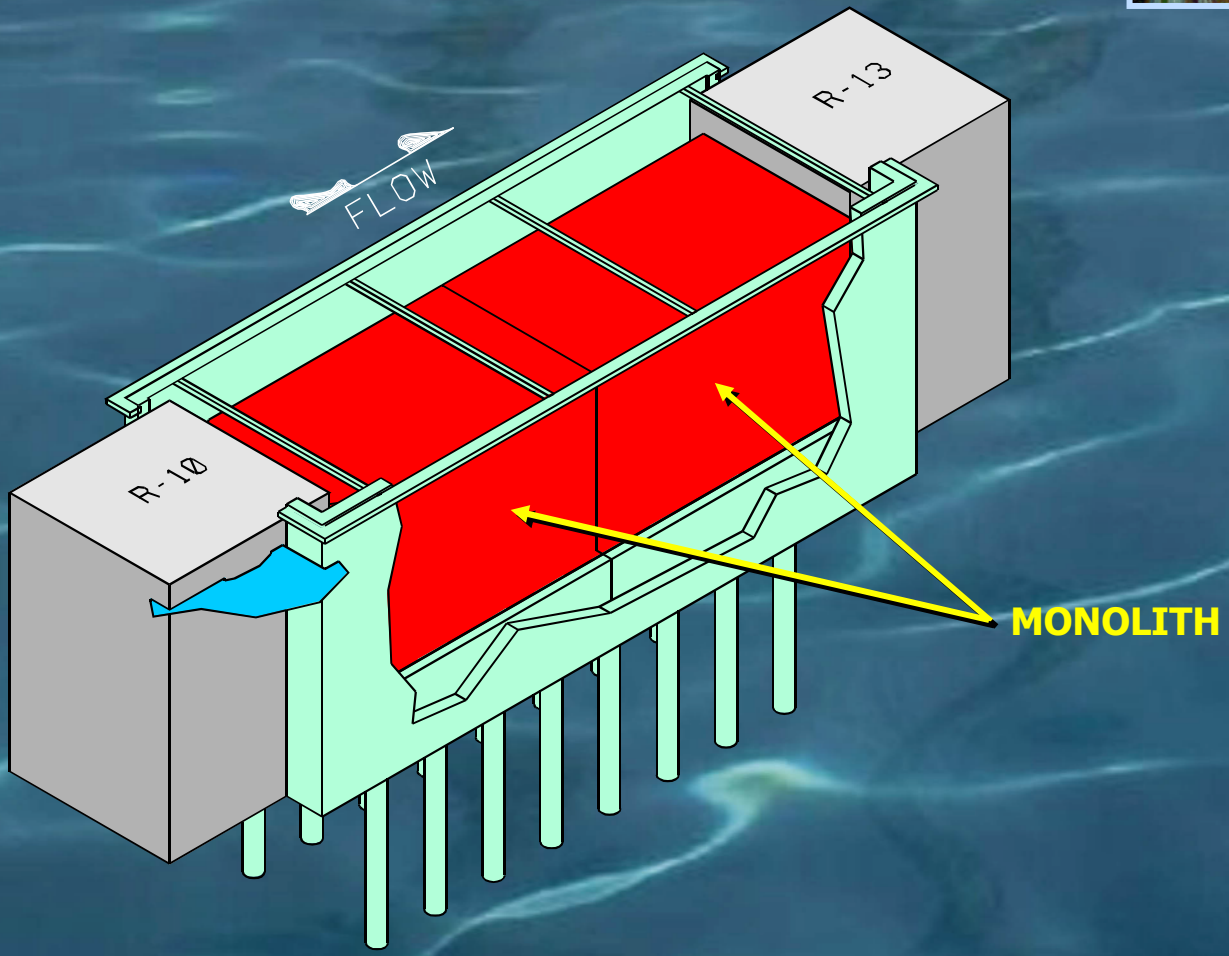
COFFERBOX CONSTRUCTION

Step 4



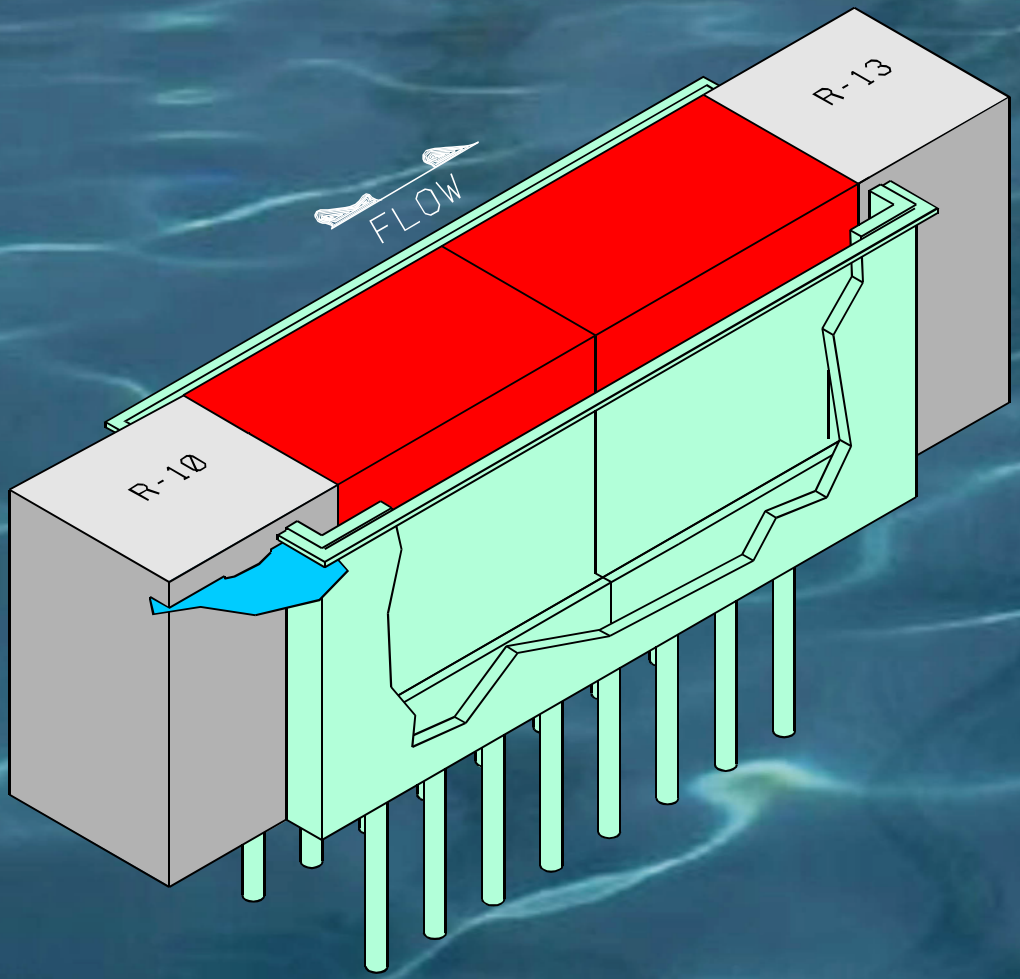
COFFERBOX CONSTRUCTION

Step 5



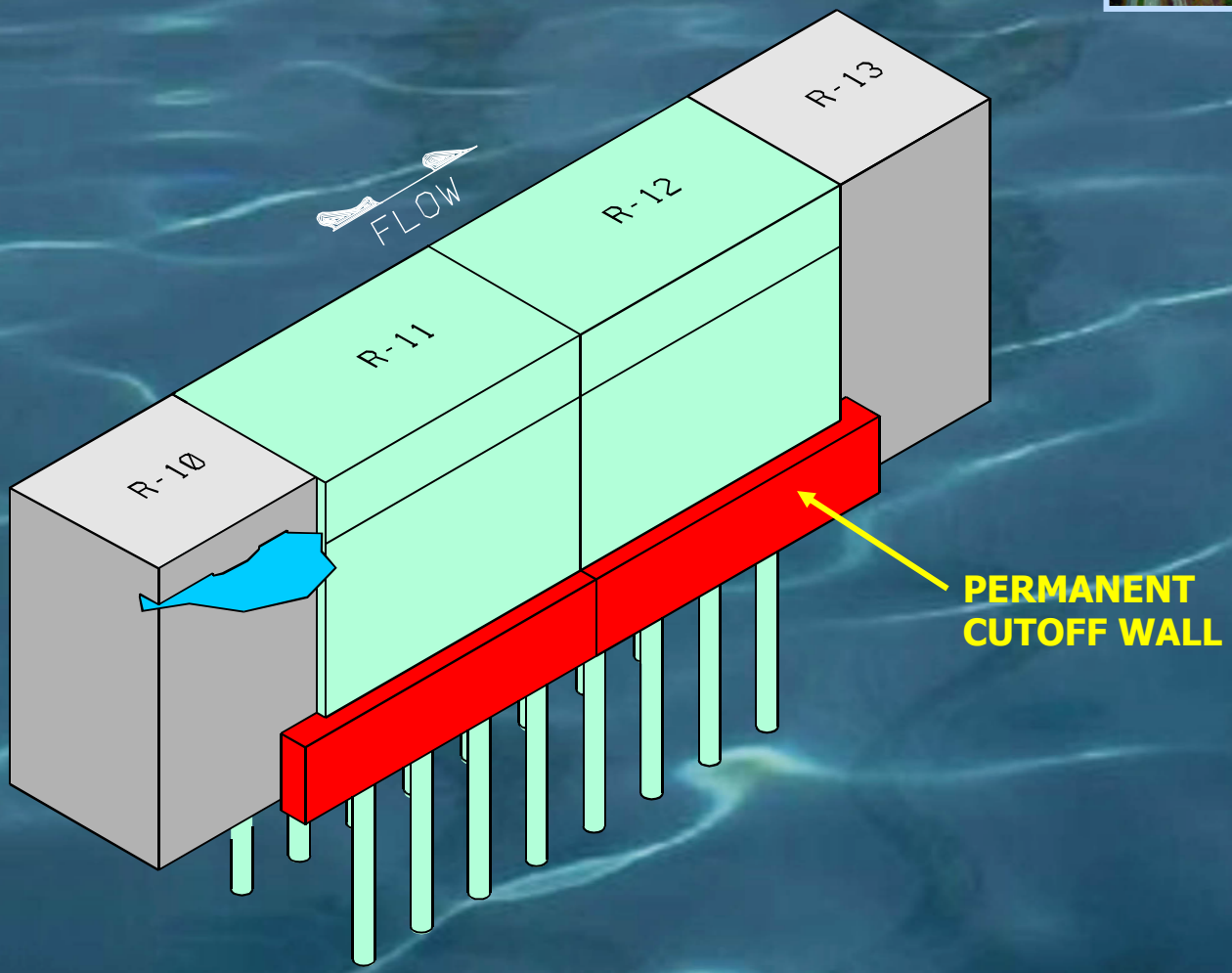
COFFERBOX CONSTRUCTION

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

LISA R. PIERCE, P.E.
DAVE A. STENSBY, P.E.
Project Managers
INCA Engineers, Inc.
L.Pierce@incainc.com
D. Stensby@incainc.com
(425) 635-1000

STEVE R. STOLTZ, P.E.
Project Engineer
Pittsburgh District, USACE
Stephen.R.Stoltz@LRP02.usace.army.mil
(412) 395-7297