Replacing Existing Lock 4:
Innovative Designs for Charleroi Lock

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EXISTING LOCK 4
PLAN VIEW - EXISTING LOCK 4
PLAN VIEW – EXISTING & NEW LOCK WALLS
WITH COFFERBOX MONOLITHS INDICATED

- NEW RIVER WALL
- EXISTING RIVER WALL
- NEW MIDDLE WALL
- EXISTING LAND WALL
- EXISTING MIDDLE WALL
PLAN VIEW – NEW CHARLEROI LOCK

- River Wall
- Emptying Basin
- Land Wall
- Middle Wall
COFFERBOX CONSTRUCTION
Location of Typical Example (Steps 1 - 7)
COFFERBOX CONSTRUCTION

Step 1

- DRILLED SHAFT CASINGS
- UPPER POOL WATER SURFACE
- ALLUVIUM EL. 699
- LANDSIDE COFFERBOX WALL
- DRILLED SHAFT IN ROCK
COFFERBOX CONSTRUCTION

Step 2

RIVERSIDE COFFERBOX WALL

LOWER STRUT

LOWER WALER

FLOW
COFFERBOX CONSTRUCTION

Step 3

UPPER STRUTS

FLOW

UPPER WALER
COFFERBOX CONSTRUCTION

Step 4

TREMIE CONCRETE
COFFERBOX CONSTRUCTION

Step 5

MONOLITH
COFFERBOX CONSTRUCTION

Step 6
COFFERBOX CONSTRUCTION

Step 7

FLOW

PERMANENT CUTOFF WALL

R-10
R-11
R-12
R-13

TRI-SERVICE INFRASTRUCTURE SYSTEMS CONFERENCE - 2005

PITTSBURGH DISTRICT
CONSTRUCTION COST

Charleroi Locks, Contract One
( River Wall )

Trumbell and Brayman Construction JV
$96.5 Million Construction Award

September 2004
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
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
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