2005 INFRASTRUCTURE SYSTEMS CONFERENCE

LONDON LOCKS AND DAM
MAJOR REHABILITATION PROJECT

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LONDON LOCKS AND DAM
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Discussion Items:

- Project phases
- Replacement of upstream guard wall
- Extension of riverward lock chamber and associated work
- Lessons learned
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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
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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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● Due to funding stream, project was phased
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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SHEET PILE NEEDLE DAM PANELS
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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NEW MOTOR CONTROL CENTER
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- 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
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• 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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- **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
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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DRILLED SHAFT ALTERNATIVE
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DRILLED SHAFT ALTERNATIVE
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EXISTING LOCK LAND CHAMBER

EXISTING LOCK RIVER CHAMBER

REPLACEMENT UPSTREAM GUARDWALL

REPLACEMENT NOSE CELL

EL 614.0 N.P.

SHEET PILE CELL ALTERNATIVE
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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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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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RECONSTRUCTION OF UPSTREAM GUARD WALL
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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EXTENSION OF RIVERWARD LOCK CHAMBER
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EXTENSION OF RIVERWARD LOCK CHAMBER
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- 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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ANCHOR INSTALLATION
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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