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2005 INFRASTRUCTURE SYSTEMS CONFERENCE

LONDON LOCKS AND DAM MAJOR REHABILITATION PROJECT

by
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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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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

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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

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- 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

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- 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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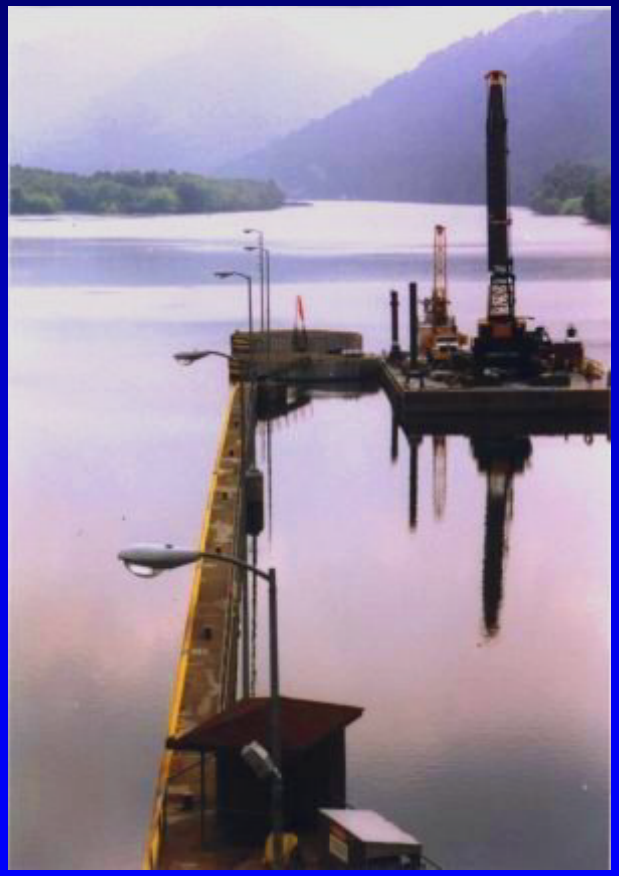

PRECONSTRUCTION - U/S GUARD WALL

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- **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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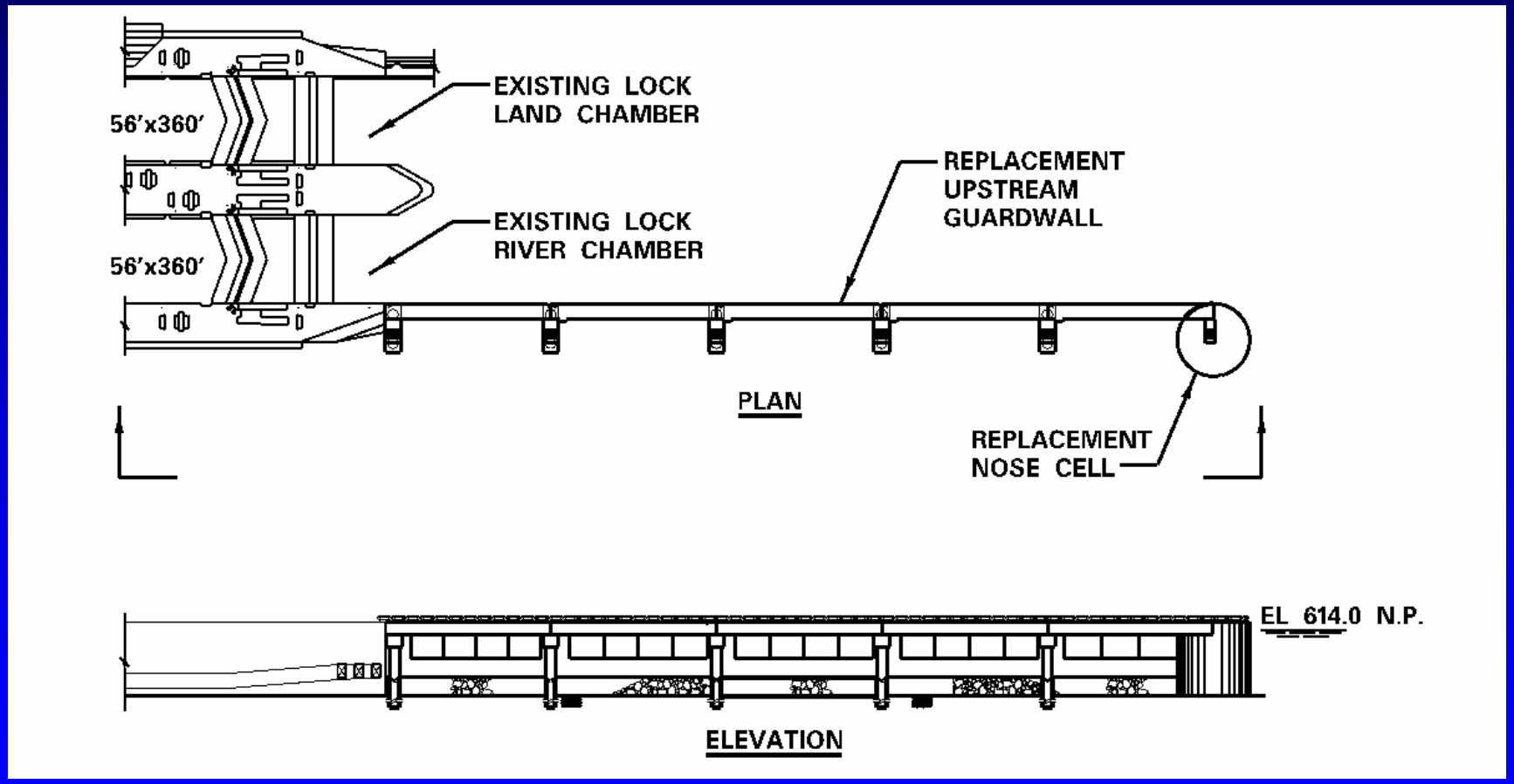

DRILLED SHAFT ALTERNATIVE

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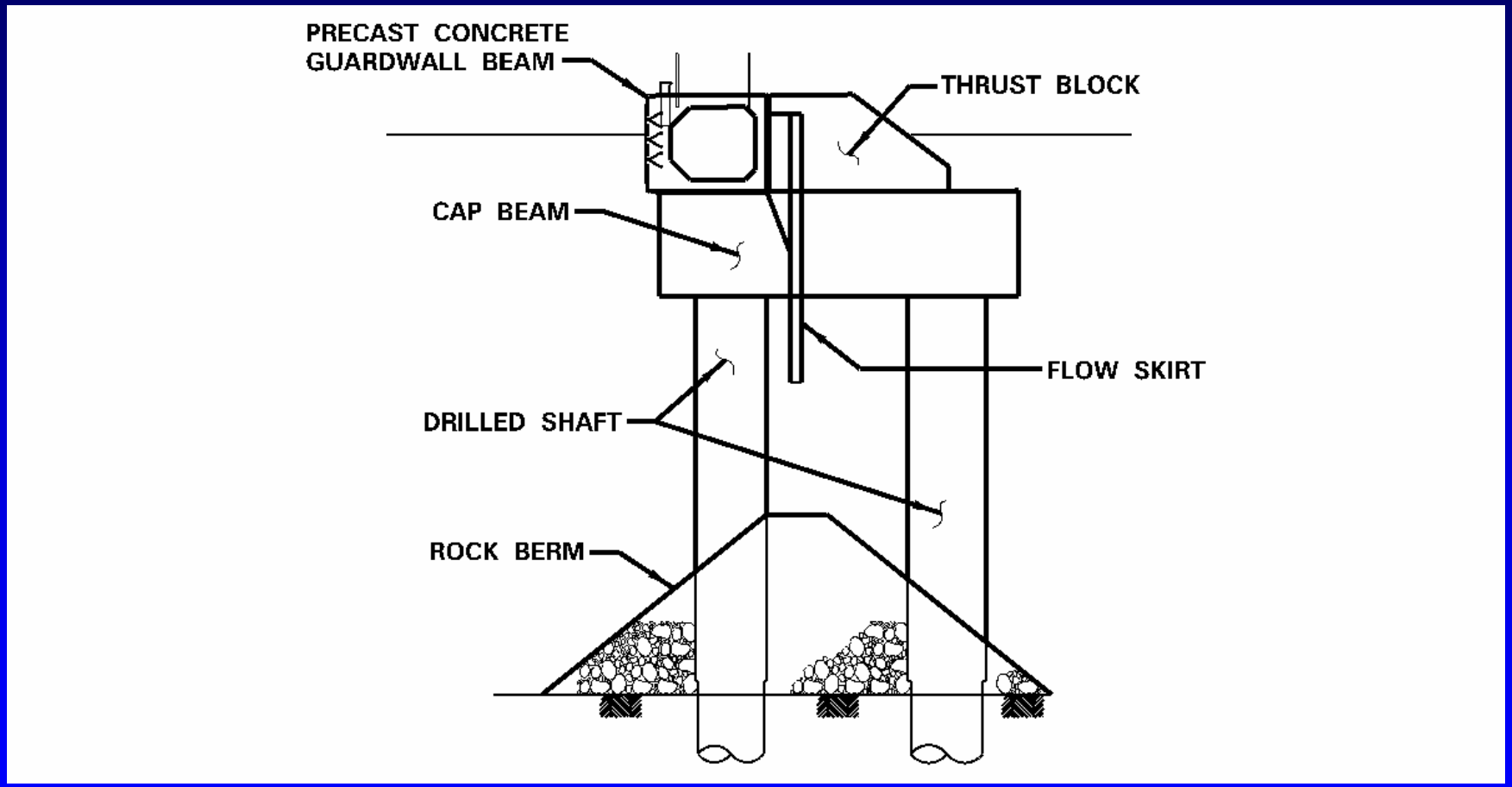

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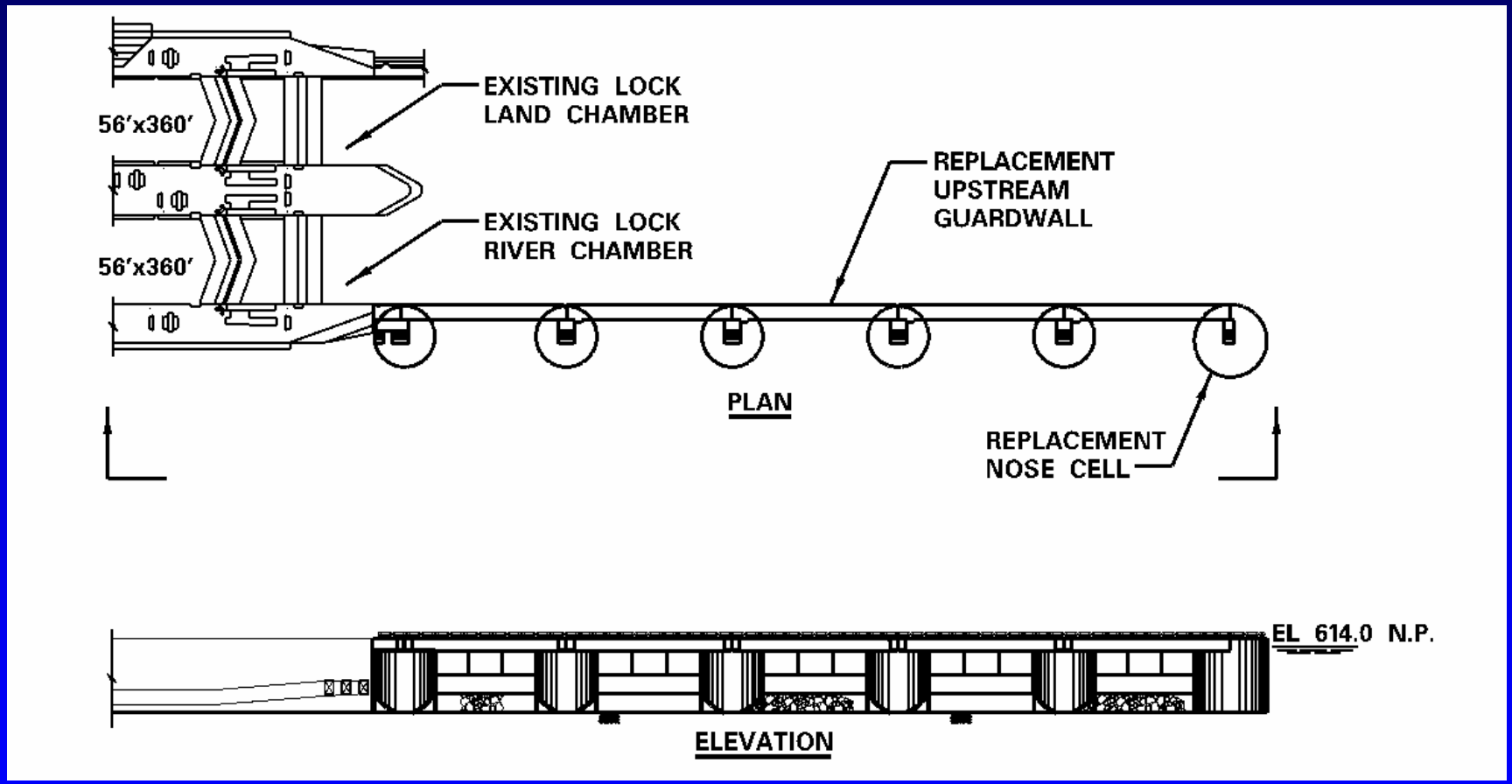

SHEET PILE CELL ALTERNATIVE

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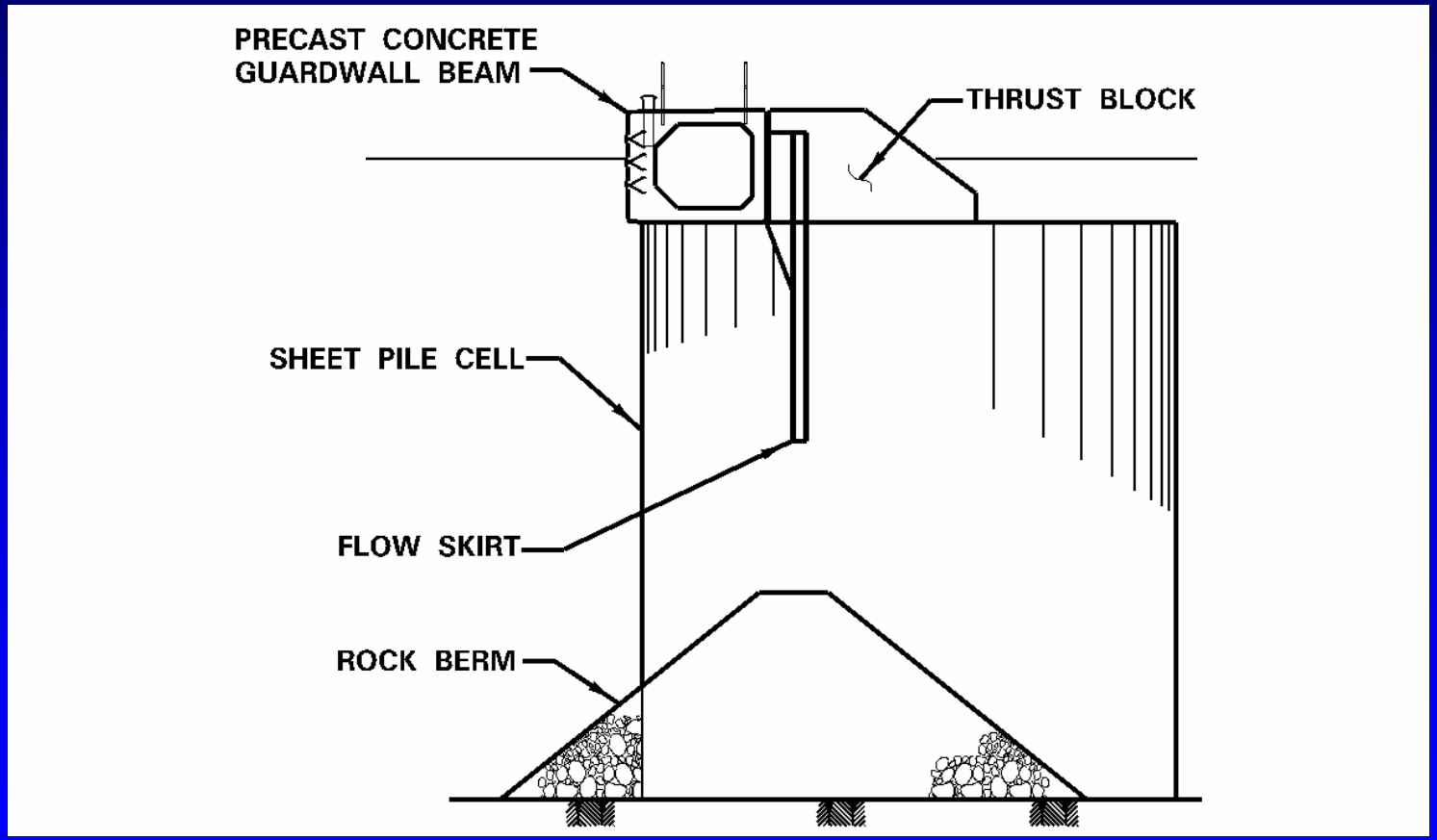

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DEMOLITION OF UPSTREAM GUARD WALL

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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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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

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- 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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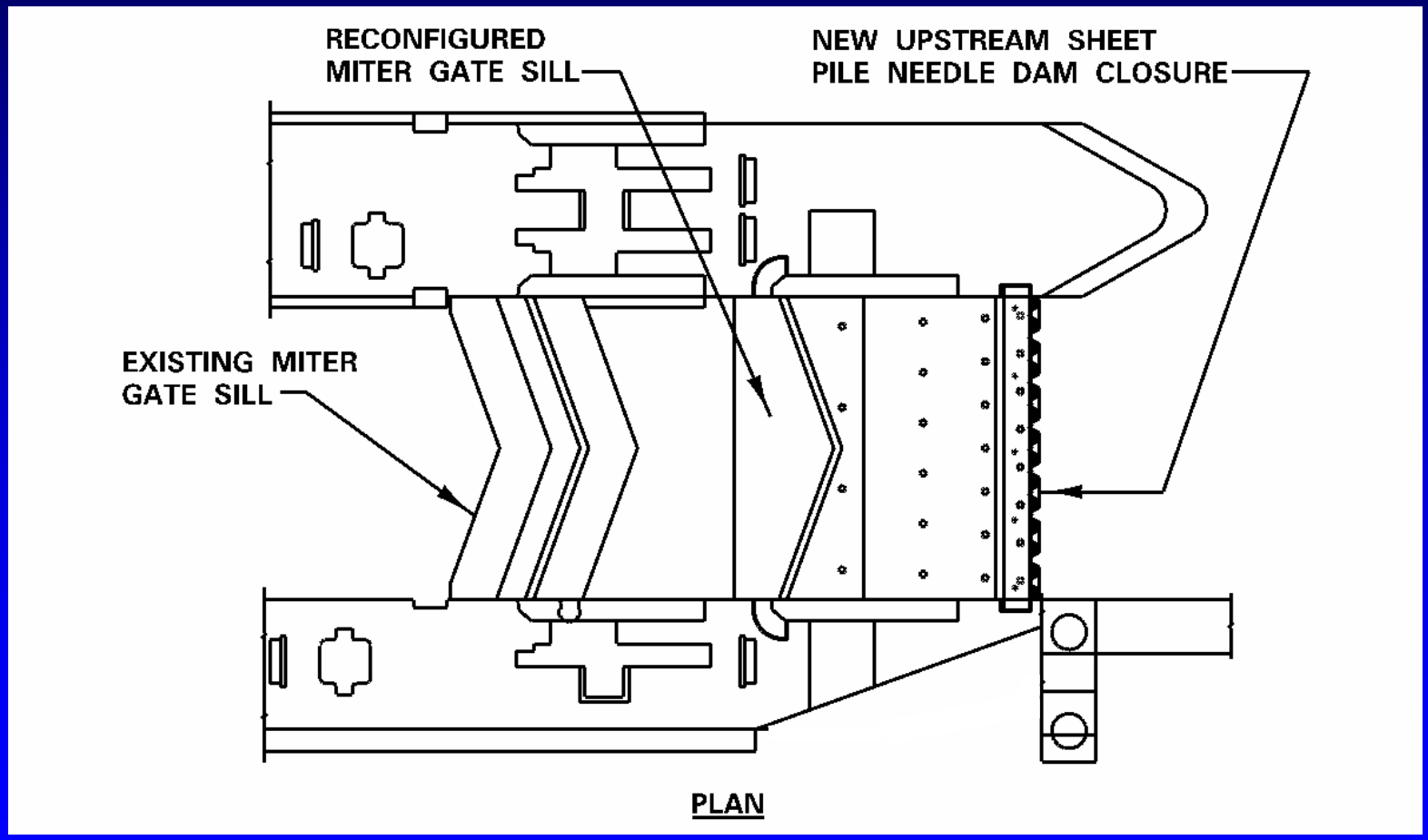

EXTENSION OF RIVERWARD LOCK CHAMBER

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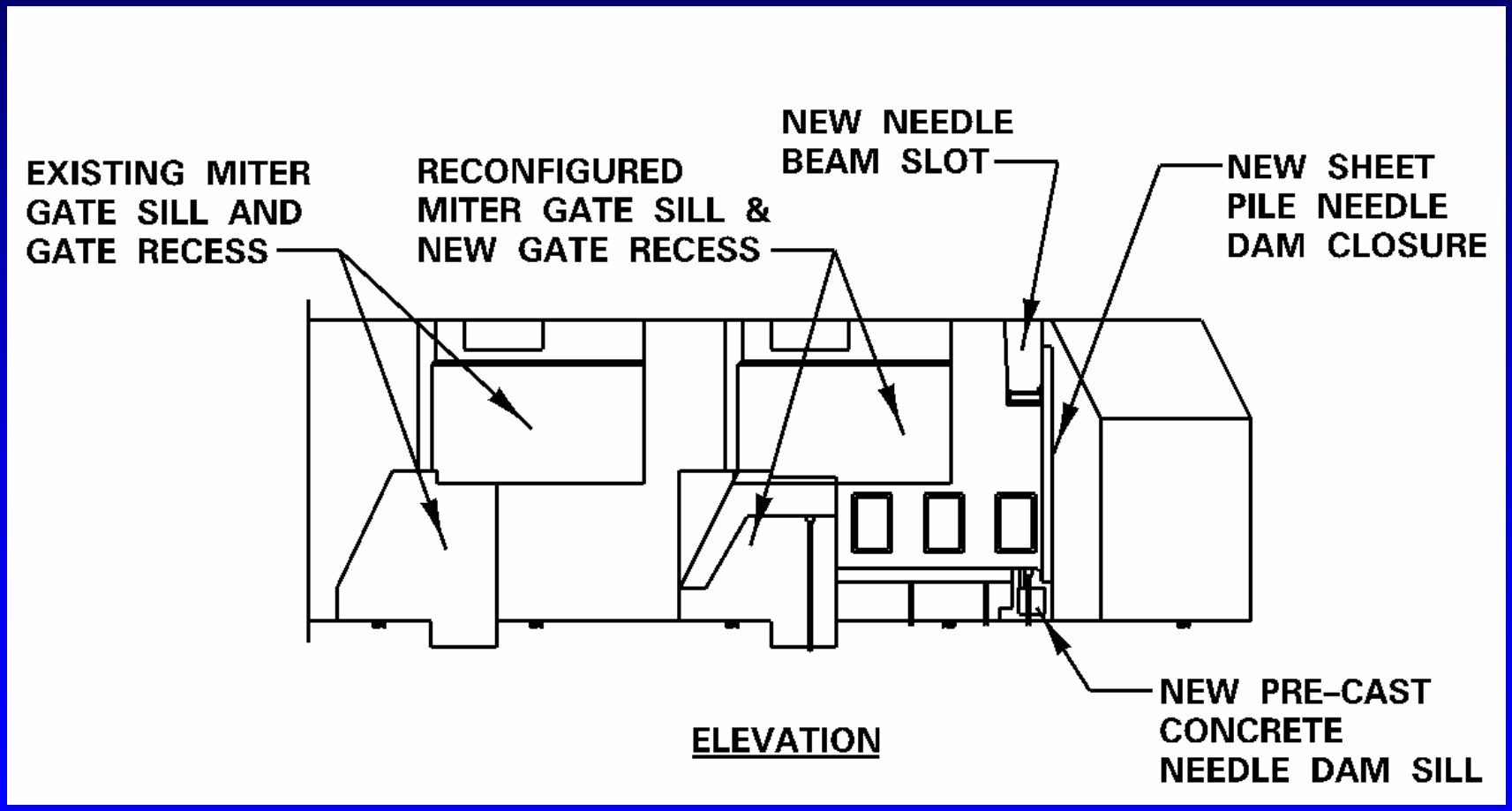

EXTENSION OF RIVERWARD LOCK CHAMBER

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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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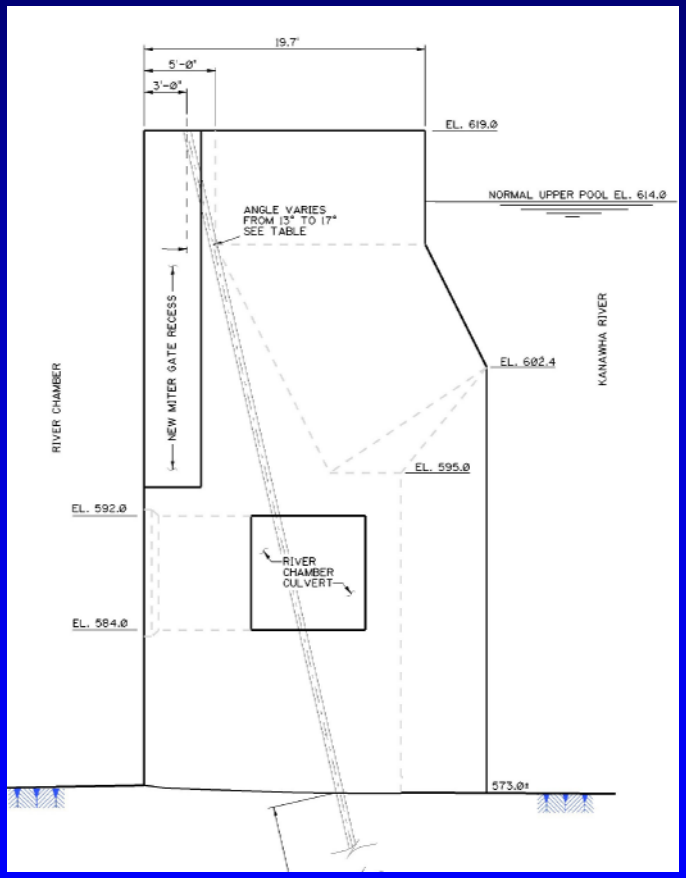

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TRANSPORTATION OF NEEDLE DAM SILL

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MODIFICATION OF NEEDLE DAM SILL

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MODIFICATION OF NEEDLE DAM SILL