Upper Mississippi River Nine-Foot Channel Project,
Lock and Dam No. 26R
Alton vicinity, Illinois
Madison County, Illinois
St. Charles County, Missouri

HAER No. IL-32

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
U. S. Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

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HISTORIC AMERICAN ENGINEERING RECORD

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Location: The site is situated on the Mississippi River two miles below the present Lock and Dam No. 26, which is located at Alton, Illinois. The replacement installation is approximately twenty miles upstream from St. Louis, Missouri, and 200 miles Above the mouth of the Ohio River.

Date of Construction: 1979 to present

Architect/Engineer: U. S. Army Corps of Engineers, Black & Veatch

Builders: Lock: S. J. Groves & Sons Company, Minneapolis, Minnesota
Guy F. Atkinson Company, South San Francisco, California
Dillingham Corporation, Pleasanton, California

Dam: S. J. Groves & Sons Company, Minneapolis, Minnesota
Guy F. Atkinson Company, South San Francisco, California
Bail Construction Company

Present Owner: U. S. Government (St. Louis District, U.S. Army Corps of Engineers)

Present Use: River navigation and control

Significance: The Upper Mississippi River Nine-Foot Channel Project represents one of the largest and most ambitious river improvement projects ever constructed in the United States. The project's origins date to the 1920s and the efforts of Upper Midwest commercial interests to improve their access to markets. During the early years of the Great Depression, the project became transformed into a massive public works program intended to relieve local and regional unemployment.

The locks and dams that comprise the project constitute seminal developments in the technological history of American river navigation projects. The project pioneered the use of non-navigable movable dams in the United States. Designers and engineers from the U.S. Army Corps of Engineers committed themselves to a foreign technology, by their decision to incorporate roller gates into the majority of the project's dams and, more importantly, developed new and improved versions of the simpler and more reliable Tainter gate at such a rapid rate that, by the nd of the 1930s, roller gates had become a passe' technology.

The successful completion of the Nine-Foot Channel Project transformed the Upper Mississippi River into an intra-continental canal, providing a fully navigable interior river system throughout the Midwest. The project significantly altered the environment of the Upper Mississippi, but it also served as an impetus for the improvement of drinking water and sewage disposal systems in towns and cities located along the river. Additionally, the project provided new recreational opportunities to the general public.

Lock and Dam No. 26R constitute the first replacements of an original element of the Nine-Foot Channel Project. The new installation will replace Lock and Dam No. 26, located two miles upstream. The original installation is unable to adequately accommodate the present volume of river traffic and suffers from severe structural deficiencies.

Lock and Dam No. 26R represent the present state of the art in river navigation control works. The basic components of the installation are comparable to those utilized in the 1930s. The most striking difference between the older installations and Lock and Dam No. 26R is the immense size of the new structures. The significance of the new installation is not limited to its size. Throughout the design and construction process, the Corps of Engineers and the various contractors have engaged in an extensive program of computer-assisted design, testing, and evaluation. These sophisticated studies represent perhaps the most significant difference between the older structures and Lock and Dam No. 26(R).

Historian: Patrick W. O. Bannon, July 1989

PART I. HISTORICAL INFORMATION

A. Physical History

1. Dates of Erection: 1979-present

2. Architect-Engineer: U. S. Army Corps of Engineers, Black & Veatch

3. Original and Subsequent Owners: U. S. Government

4. Builders, Contractors, Suppliers

   a. General Contractor -- lock construction: Joint venture of S. J. Groves & Sons Company, Minneapolis, Minnesota; Guy F. Atkinson Company, South San Francisco, California; and Dillingham Corporation, Pleasanton, California (construction of cofferdam for lock, main lock, and one-half of a dam gate bay on either side of lock).

   b. Subcontractors -- lock construction: Moretrench American Corporation, Rockaway, New Jersey (cofferdam dewatering); Acrow Corporation of America, Carlstadt, New Jersey (access bridge truss panel spans), Morgen Manufacturing Company, Yankton, South Dakota (concrete conveyor).

   c. General Contractor -- dam construction: Joint venture of S. J. Groves & Sons, Minneapolis, Minnesota; Guy F. Atkinson Company, South San Francisco, California; and Ball Construction Company (Phase One pile driving and concrete work), Black & Veatch (Phase Three design and construction -- auxiliary lock and completion of dam).

d. Subcontractors -- dam construction: Joint venture of J. S. Alberici Construction Company, Inc., St. Louis, Missouri, and Luhr Brothers, Inc. of Columbia, Illinois (Phase One cofferdam), Moretrench American Corporation, Rockaway, New Jersey (Phase One cofferdam dewatering), Reliance Trucking Company, Phoenix, Arizona (heavy lift cantilever crane for placement of lower guide wall).

5. Original Plans and Construction: U.S. Army Corps of Engineers

6. Alterations and Additions:

Lock and Dam No. 26R is presently under construction.

B. Historical Context

Lock and Dam No. 26R represents the first replacement of an original element of the Upper Mississippi River Nine-Foot Channel Project. Congress authorized the replacement of Lock and Dam No. 26 in 1974, but work did not begin on the new installation until 1979. Legal challenges by the Sierra Club, Izaak Walton League, and the Western Railroads Association contributed significantly to the delay in the start of construction.

The inability of the existing Lock and Dam No. 26 to handle the high volume of river traffic, which totalled 48.7 million tons of goods during 1970, and the rapidly deteriorating physical condition of the fifty-year-old structure provided the impetus for the replacement project The first major phase of construction began in 1979 and entailed construction of the first stage cofferdam, which projected 1,000 feet into the river from the Missouri shore, and construction of the first stage of the dam, which encompassed the first six and one-half gate bays of the main dam structure. The cofferdam is comprised of forty-five sand-filled steel sheet pile cells, each 64 feet in diameter. Construction within the cofferdam began in October 1981, with the first placement of concrete taking place in November 1982. Work on this stage of the project was completed in late 1984.

The second stage of the project entails construction of a second cofferdam and completion of the main lock and one-half of a dam gate bay on either side of the lock chamber. Work on this stage of the project began in August 1984. The second cofferdam was completed in March 1986 and concrete placement began in June 1986. This phase of the project is presently nearing completion.

The third stage of the project, which has yet to be initiated, will take place within a third cofferdam. The work will entail completion of the dam and possibly construction of an auxiliary lock. This work is projected to be complete by 1992.

The main lock is a U-shaped megastructure supported on steel H-piles. The lock chamber measures 110 feet in width and 1,200 feet in length. The base slab is 20 feet thick, tapering to 15 feet in the middle. The lock walls rise nearly 61 feet from the floor. They are 40 feet thick at the ends. the loek walls are 1,599 feet long. The upper guide wall is 1,499 feet long, while the lower guidewall measures 884 feet in length. The lock is flooded and emptied by means of longitudinal culverts located in the base of the lock walls. The flow of water in the culverts will be controlled by Tainter valves. The lower lock gate will consist of a pair of 57.5-foot-tall miter gates. The upper gates will consist of three-leaf lift gates capable of being raised to a height of 38 feet. The maximum lift will be 24 feet.

The 1,160-foot-long movable dam is supported by steel H-piles driven to bedrock. It consists of nine open-frame Tainter gates, each measuring 110 feet in width and 42 feet in height. Seven gates are located between the lock and the Missouri shore, while two gates are located between the lock and the closure structure, consisting of filled steel sheet pile cells, that connects the movable dam to the Illinois shore. The auxiliary lock, if built, will replace this closure structure.

The proposed auxiliary lock, which would be located against the Illinois shore, will measure 110 feet in width and 600 feet in length. The design of this structure is incomplete, but it would presumably resemble the main lock in terms of basic structural design and operating systems.

PART II. **TECHNOLOGICAL INFORMATION -- LOCK**

A. General Statement:

1. Architectural character: U-shaped megastructure supported on steel H-piles. Strictly utilitarian in appearance and architectural character. Drawings V-601, V-602, X-3.

2. Condition of fabric: Good.

B. Description of General Layout and Principal Elements:

1. Overall dimensions: Main Lock -- 110 feet by 1,200 feet. Auxiliary lock -- 110 feet by 600 feet. Drawing V-601.

2. Foundations: Vertical and battered steel H-piles driven to bedrock.

3. Walls: Monolithic reinforced concrete with steel wall armor. Drawing V-601, V-602.

4. Structural system: Monolithic reinforced concrete.

5. Upper and lower guide walls: Precast concrete beams on concrete and steel caissons. Drawing M-L 26(R) 26/40.1.

C. Mechanical Equipment:

1. Tainter valves: Four electrically-operated, steel Tainter valves connected to motors by metal struts, located in upper and lower ends of lock walls. Drawings V1-201, M-L 26(R) 22/1, 7 20/1A, M-L 27 25/1, M-L 27 26/1.

3. Lock Gates:

Miter gates: lower gates consist of two-leaf Miter gates balanced on stainless steel pintels. Gates are electrically operated by means of steel sector gears and struts. Motor assemblies housed in machinery rooms buried within lock walls adjacent to each gate leaf. Oak timber fenders on gate faces. These gates are 57 feet 6 inches tall. Drawings M-L 26(R) 21/1.1, M-L 26(R) 22/1.

Lift gates -- Upper gates consist of three-leaf vertical lift gates. Each leaf is approximately 13 feet tall, providing a total gate height of approximately 39 feet. The leafs are raised and lowered by means of electrically-operated chain hoists and ride up and down within the lock wall gate recesses on reaction roller. A hinged nappe atop the downstream leaf provides additional height for the gate during periods of ice or high water. Motor assemblies and counterweights are housed in machinery rooms buried within the lock walls adjacent to each leaf. Drawings M-L 26(R) 21/28.1, M-L 26(R) 21/29.1, M-L 26(R) 30/2.1, M-L 26(R) 30/3.1.

4. Lighting: Various free-standing single- and double-head lighting standards.

5. Plumbing: Lock chambers are watered by means of longitudinal culverts located in base of the lock walls. Culverts are square in section, measuring 18 feet by 18 feet. Tainter valves (described above) control the flow of water in the culverts. Drawings VI-201, M-L 26(R) 22/1.

6. Lock bulkheads: Temporary blocking units of structural steel girder construction used to block upper lock openings during emergencies or for repairs.

PART III. **TECHNOLOGICAL INFORMATION -- MOVABLE DAM**

A. General Statement:

1. Architectural character: Type 3b movable dam. Tainter gate piers are monumental in scale and utilitarian in appearance. Drawings X-3, M-L 26(R) 40/1.1, M-L 26(R) 40/3.1, M-L 26R 45/1.1, M-L 26(R) 45/51.

2. Condition of fabric: Good

B. Description of Exterior:

1. Overall dimensions: First stage of dam, approximately 830 feet in length, presently complete. An additional approximately 350 feet, consisting of two gate bays and a closure section, is not yet built. Drawing M-L 26(R) 40/3.1.

2. Foundations: Vertical and battered steel H-piles driven to bedrock.

3. Control house walls/Tainter gate piers: Monolithic reinforced concrete construction. Drawings M-L 26(R) 40/1.1, M-L 26(R) 40/3.1.

4. Structural system: Monolithic reinforced concrete construction encompassing piers, gate sills, and dam apron. Drawings M-L 26(R) 40/1.1, M-L 26(R) 40/3.1.

5. Control house openings: Proposed to include two doorways, and continuous insulated glass windows at the controller level. Drawings X-3, M-L 26(R) 92/1, M-L 26(R) 92/2, M-L 26(R) 92/3.

6. Concrete house roof: Sloped roof behind parapet wall.

7. Tainter gate pier house openings: One doorway in north facade of each Tainter gate pier house. Drawing M-L 26(R) 40/1.1.

8. Tainter gate pier house roofs: Sloped roof behind parapet wall.

9. Service bridge: Precast concrete girder.

C. Description of General Layout and Principal Elements:

1. Access plans: Access to dam is provided by an elevator contained in Pier No. 11. A stair tower is also located within this pier. Drawing M-L 26(R) 40/3.1.

2. Stairways: Structural steel/poured concrete.

3. Flooring: Steel/reinforced concrete.

4. Wall and ceiling finish: Reinforced concrete.

5. Hardware: Steel and aluminum

D. Mechanical Equipment:

1. Movable gates -- Tainter type: Nine open-frame, non-submersible units, six presently erected, each measuring 110 feet wide and 42 feet tall. Individual electrically-operated cable hoists housed in pier-top operating houses. Drawings M-L 26(R) 40/3.1, M-L 26(R) 45/1.1, M-L 26(R) 45/51, M-L 26(R) 45/58, M-L 26(R) 46/2.

3. Spur dike: An earthen spur dike parallel to the river along the Missouri shore will contain the pool and provide protection equivalent to that provided by the existing private levee.

E. Other Elements:

1. Overflow dike: A 2,000-foot-long earthen overflow dike connects the west dam abutment to the spur dike on the Missouri bank of the river. The crest of this dike will be 3 feet above the maximum regulated height of the pool.

2. Spur dike: An earthen spur dike parallel to the river along the Missouri shore will contain the pool and provide protection equivalent to that provided by the existing private levee.

3. Traveling crane: A traveling bulkhead crane, running on rails located atop the service bridge, will be used to place emergency and maintenance bulkheads in the gate bay openings. Drawing M-L 26(R) 40/3.1.

4. Tainter gate emergency bulkheads: Temporary blocking units of structural steel girder construction will be provided to block gate openings during emergencies or for maintenance. Drawing M-L 26(R) 40/3.1.

PART IV. TECHNOLOGICAL INFORMATION -- ESPLANADE AREA

A. Description of Esplanade -- General Layout:

1. Design character: Standardized park/service area component. Designed to accommodate various service-related functions. Major site alterations include construction of West Alton Public Access Area on Missouri shore.

2. Historic landscape design: Based on standardized designs.

B. Condition of Site and Structures: Unbuilt.

PART V. SOURCES OF INFORMATION

A. Original architectural drawings: Construction drawings, Mississippi River Lock & Dam No. 26R, half-size copies on file at St. Louis District Office.

B. Historic views: Construction photographs -- numerous color slides on file at the site. Additional prints on file at the St. Louis District Office.

C. Interviews: Personnel, Lock and Dam No. 26(R) and St. Louis District Office.

D. Bibliography:

1. Primary and unpublished sources: Assorted reports and reports held at the St. Louis District Office. See bibliography to HAER No. MO-50, Narrative History.

2. Secondary and published sources: See bibliography to HAER No. MO-50, Narrative History.

E. Likely sources not yet investigated: Documents and reports presently in use by designers and contractors.

F. Supplemental Material: Aerial Photographs, U.S. Army Corps of Engineers, St. Louis District.

LOCK AND DAM NOS. 24 THROUGH 27 -- INDIVIDUAL SIGNIFICANCE AND INVENTORIES

This report is part of the documentation that outlines the specific technological component of each lock and dam complex, with particular emphasis upon significant and unique enginecring elements. Additions and alterations to the various components comprising the individual complexes are also described in this documentation. The principal sources for information pertaining to these additions and alterations are the engineering drawings prepared for individual projects and the detailed repair and maintenance records held at each site. These sources do not comprehensively document the myriad changes, many of a decidedly superficial nature, made to each complex since its construction. Nevertheless, they constitute the only available record of these changes.

Dates for the construction of each complex are given from the onset of work to the completion of the complex and do not necessarily reflect the construction dates for any single element of the installation. Final construction reports survive for Lock and Dam No. 26, Lock No. 25, and Lock No. 24. These reports, held either at the individual sites or at the St. Louis District Office of the Corps of Engineers, concentrate almost exclusively on the actual construction process. The final construction reports include comprehensive lists of contractors and material suppliers, but contain only limited information pertaining to design, project administration, politics, and environmental issues.

Dimensions for the movable gate sections have been rounded, in accordance with common contemporary practice. for example, roller gates that measure 88 feet 10-1/2 inches in length are identified in construction drawings, completion reports, photographs, and this report, as 80-foot gates. Therefore, all gate measurements should be considered approximate rather than absolute.

Users of this documentation should note that, although many of the complexes appear identical, some architectural and engineering components vary significantly between complexes. This variation is most obvious in the disparity between the appearance of the three installations, Lock and Dam Nos. 24-26, constructed during the 1930s, with Lock and Dam Nos. 26R and 27, constructed after World War 11. However, there are subtle variations in the design of gate piers, gates, control stations, and other elements at each of the three 1930s installations. These variations largely reflect improvements in engineering practice that permitted the elimination of structurally unnecessary material. The open design of the Tainter gate piers at Dam No. 24, as contrasted with the more massive, monolithic design at the earlier Dam No. 26, provides perhaps the most obvious example of this type of variation. A fuller discussion of the architectural and engineering evolution of the St. Louis District installations is included within the narrative history portion of this documentation.