

BAGNELL DAM AND OSAGE POWER PLANT  
EAST RETAINING SECTION  
Spanning Osage River on Business Route 54  
Lake Ozark  
Miller County  
Missouri

HAER No. MO-117-A

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
Midwest Regional Office  
601 Riverfront Drive  
Omaha, Nebraska 68102-4226

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Location: Spanning Osage River on Business Route 54  
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<u>UTM References:</u>	East End:		West End:		
	Zone	Easting	Northing	Easting	Northing
	15	533099	4228509	533095	4228452

Quad: Bagnell Quadrangle, Missouri – 7.5 Minute Series, 1983

Construction: 1929-31

Designer: Stone and Webster Engineers

Present Owner: AmerenUE, Lake Ozark, Missouri

Present Occupant: AmerenUE, Lake Ozark, Missouri

Present Use: Dam and Power Plant

Significance: This property is listed on the National Register of Historic Places for significance related to social history and engineering. The construction of the dam and power plant in 1930-31 began the production of hydroelectric power in mid-Missouri and created the Lake of the Ozarks, a regional tourist attraction that dramatically changed social and economic aspects of central Missouri.

Project Information: Bagnell Dam was recorded in 2009 by R. Gail White, White and Borgognoni Architects, Carbondale, Illinois, and by Benjamin Halpern, Halpern Photography, Champaign, Illinois. As a result of relicensing requirements, the historic structures will be altered for required technological upgrades and enhanced safety.

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I. Physical Description of Bagnell Dam East Retaining Section:

A. East Retaining Section:

The East Retaining section of the dam is a 331' long, non-overflow gravity type structure. It is constructed of poured concrete and has a vertical upstream face and slopes of 8 horizontal to 12 vertical on the downstream faces, except for the lower 30' of the maximum section where the slope is changed to 10-1/2 horizontal to 12 vertical.

The dam was built on Gasconade dolomite, which overlies a comparatively shallow layer of Gunter sandstone, under which is a deep layer of Proctor dolomite. A key trench was constructed at the heel of the dam except at the abutments where the rock was removed to permit keying the entire section into the hillsides.

With its cover of about 50' of gravel and silt over the major portion of the river valley, earth, rather than concrete, retaining sections would have been more economical in terms of material savings. It was determined however, that use of concrete to build the retaining sections would save approximately one year in time of construction as well as provide other advantages.<sup>1</sup>

The structure is in good condition, but will be altered for required technological upgrades and enhanced safety.

B. Warehouse and Shop:

A warehouse for bulk materials storage and a shop for equipment repairs are located below the East Retaining Section at elevation 600' MSL. When constructed, they were integrated into the structure of the East Retaining Section. The date of construction of the warehouse and shop is unknown, but post-dates the original construction of the dam and powerhouse.

The south face of the East Retaining Section forms the north, or back, wall of the warehouse and shop. The horizontal curvature of the East Retaining Section is expressed on the interior of the warehouse and shop. The north, south, and east exterior walls of the warehouse and shop are constructed of cast-in-place concrete with a smooth finish. The concrete cornice is plain with only a concrete cap.

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<sup>1</sup>G.R. Strandburg, "The Osage Hydro-Electric Project," *Civil Engineering* Vol. 1, No. 4, January 1931, 246.

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The shop is located at the east end of the structure. Two overhead doors in the east façade provide vehicular access to the shop. A wall running north-to-south divides the shop and warehouse. A single passage door located in the south half of the wall that divides the warehouse from the shop allows communication between the shop and warehouse.

The warehouse occupies the western approximately three-fourths of this section of the structure, and is used for bulk storage of materials and tools. A mezzanine constructed of cast-in-place concrete and supported on square concrete columns runs along the north side of the warehouse. Guardrails constructed of steel pipes extend around the perimeter of the mezzanine. The interiors of the warehouse and shop feature smooth-finish concrete floors, concrete walls, and exposed concrete structure at the ceilings. A break room is located in the southeast corner of the warehouse. The break room does not appear to be original to the warehouse. The floor is painted concrete. Walls are pre-finished gypsum panel and ceilings are 12" square acoustical tile.

A receiving dock is located between the west end of the warehouse and the east end of the administrative offices. The south side of the dock is open. The concrete roof structure of the warehouse extends across the dock providing weather protection for this area. There are railroad tracks in the concrete floor of this area to accommodate rail car access. An elevated walkway extends across two-thirds of the front (south) façade of the warehouse and shop.

Doors into the warehouse are two-panel wood design. The windows of the warehouse and shop are aluminum replacement sashes. The Warehouse and Shop are in good condition. No changes are proposed for these areas.

## II. History of the Bagnell Dam East Retaining Section:

Union Electric began construction of the Osage hydro-electric development on August 6, 1929. Clearing of timber for the reservoir began at that time, although a few men had already begun work to prepare housing and administration offices.<sup>2</sup> The layout for the cofferdam for the spillway and west abutment areas located on the flood plain of the Osage River on the west side

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<sup>2</sup>Carole Tellman Pilkington, "The Story of Bagnell Dam," *Lake Area Chamber of Commerce*, 1989, 8-9.

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of the valley was begun on September 30, 1929.<sup>3</sup> The spillway cofferdam was unwatered on March 1, 1930.<sup>4</sup>

The construction sequence was to cofferdam the spillway and west abutment areas, and then to complete the excavation for that part of the work. Although earth excavation was started before the spillway cofferdam was completed and unwatered, the major portion of the work, except for the diversion channel, was done in the dry. The west abutment and spillway were then completely concreted except for notches and sluiceways, the bottoms of which were located at the normal river level to provide for later river diversion. The excavation for the diversion channel was carried on simultaneously with the work on the west abutment and spillway portions of the dam. The river was diverted through the temporary notches and sluiceways in the spillway when the concrete in these parts of the structure was completed to a sufficient height. The main power station cofferdam, which extended across the original channel of the river, was then closed and unwatered, after which the erection of the permanent power station structure began.

Because of the depth and permeable nature of the layer of gravel in the valley bottom a cofferdam with watertight cutoff down to rock was built on the west portion of the dam site and in the river channel. Single lines of steel sheetpiling were driven across the floodplain, while a self-supporting cellular type construction cofferdam was used in the river channel. During the first step of the construction program when the flood plain on the west side of the river was closed by the spillway and west abutment cofferdam, a sluiceway capable of flooding the entire excavated area within twenty-four hours was installed in the river end of the cofferdam. This precaution was taken to prevent erosion of the slopes of the earth prism supporting the steel sheeting if the cofferdam were overtopped. As soon as the critical flood period of the year was passed in May 1930, work was started on the power station cofferdam, restricting the river channel to a clear width of 200'. As soon as the concrete in the west abutment and spillway section had been completed to Elevation 585' MSL, the ordinary high stage of the river, the spillway cofferdam was removed, the diversion channel opened and the river returned through the slots and sluiceways in the spillway section of the dam.<sup>5</sup>

Erection of the Power House steel structure began on December 10, 1930. Less than one year later, on August 6, 1931, the generator tests started, and on September 3, 1931, the water

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<sup>3</sup>Pilkington, 15.

<sup>4</sup>Cally Lence and Gail White, "Bagnell Dam and Osage Power Plant," National Register of Historic Places Nomination, U.S. Department of the Interior, National Park Service, Washington, D.C., listed August 27, 2008, 16.

<sup>5</sup>A.W. Clark, "Construction Features of Osage Hydro-Electric Development," In *Engineering News-Record*, March 26, 1931, 525-526.

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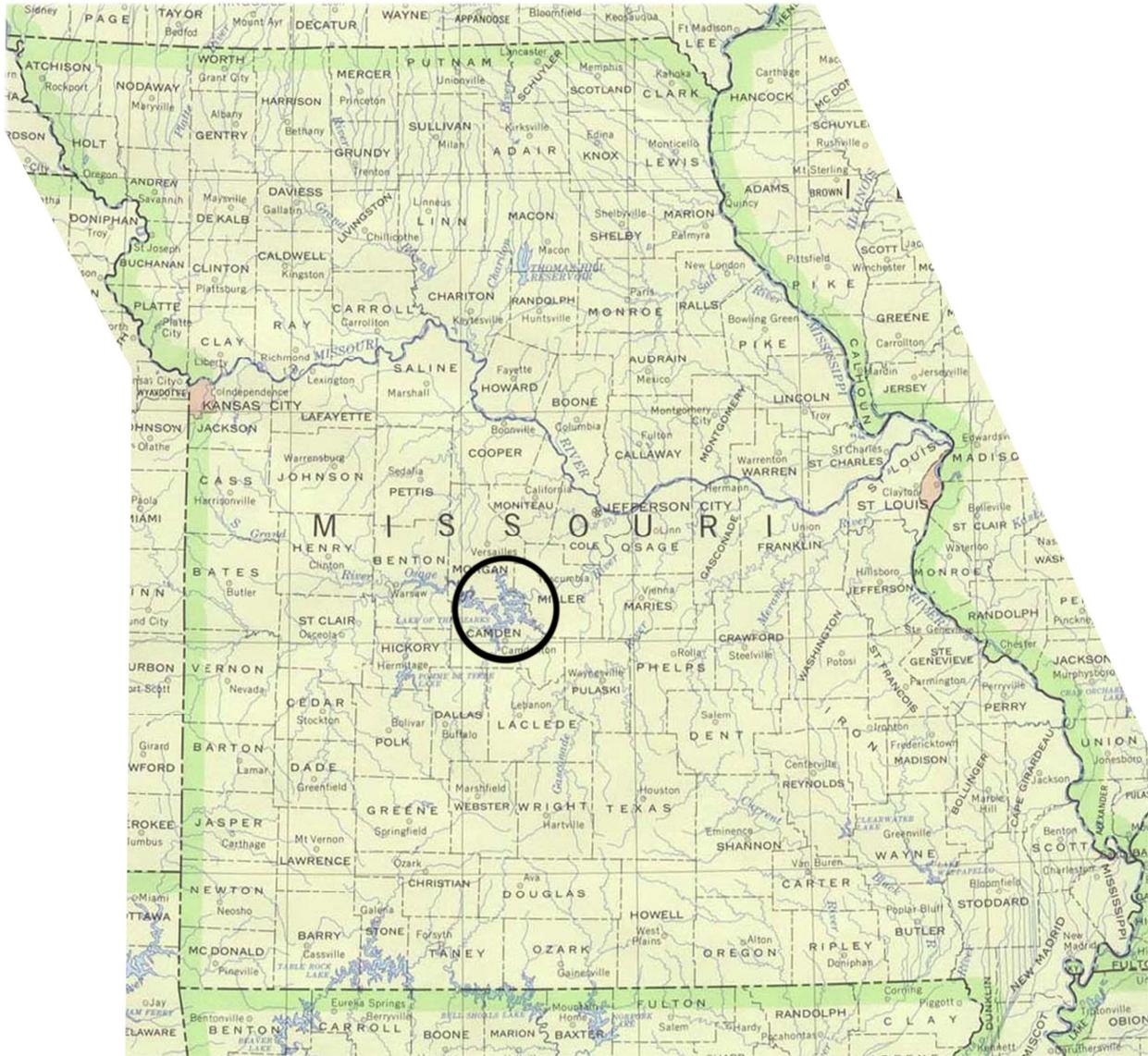
wheel tests started. By October 16, 1931, the first commercial operation of the Osage Power Plant began.<sup>6</sup> At this time, the Osage Plant was connected to the St. Louis system, the expansion of which allowed Union Electric to sell power to St. Louis and Rivermines customers at less cost. Soon thereafter, electrification came to the lake area. The first distribution pole was set on the south side of the Osage River. The first power line extended from the spillway structure to an H-frame structure on the south bank. The line was energized on December 24, 1931, and served twenty-four customers.<sup>7</sup>

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<sup>6</sup>Pilkington, 15.

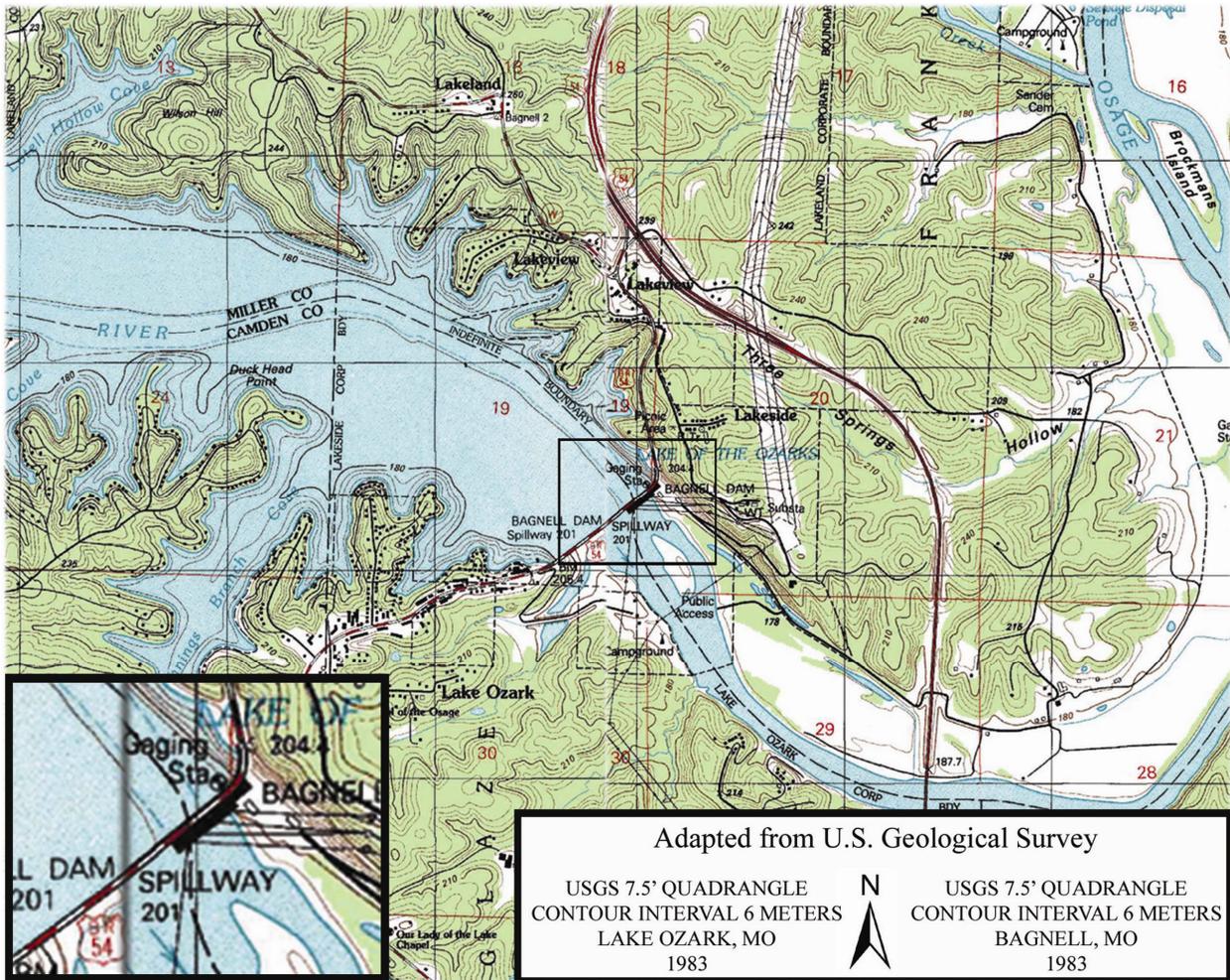
<sup>7</sup>Lorraine Burke, *50<sup>th</sup> Anniversary Bagnell Dam 1931-1981*, Lake of the Ozarks Area Council of the Arts, 1981, 36.

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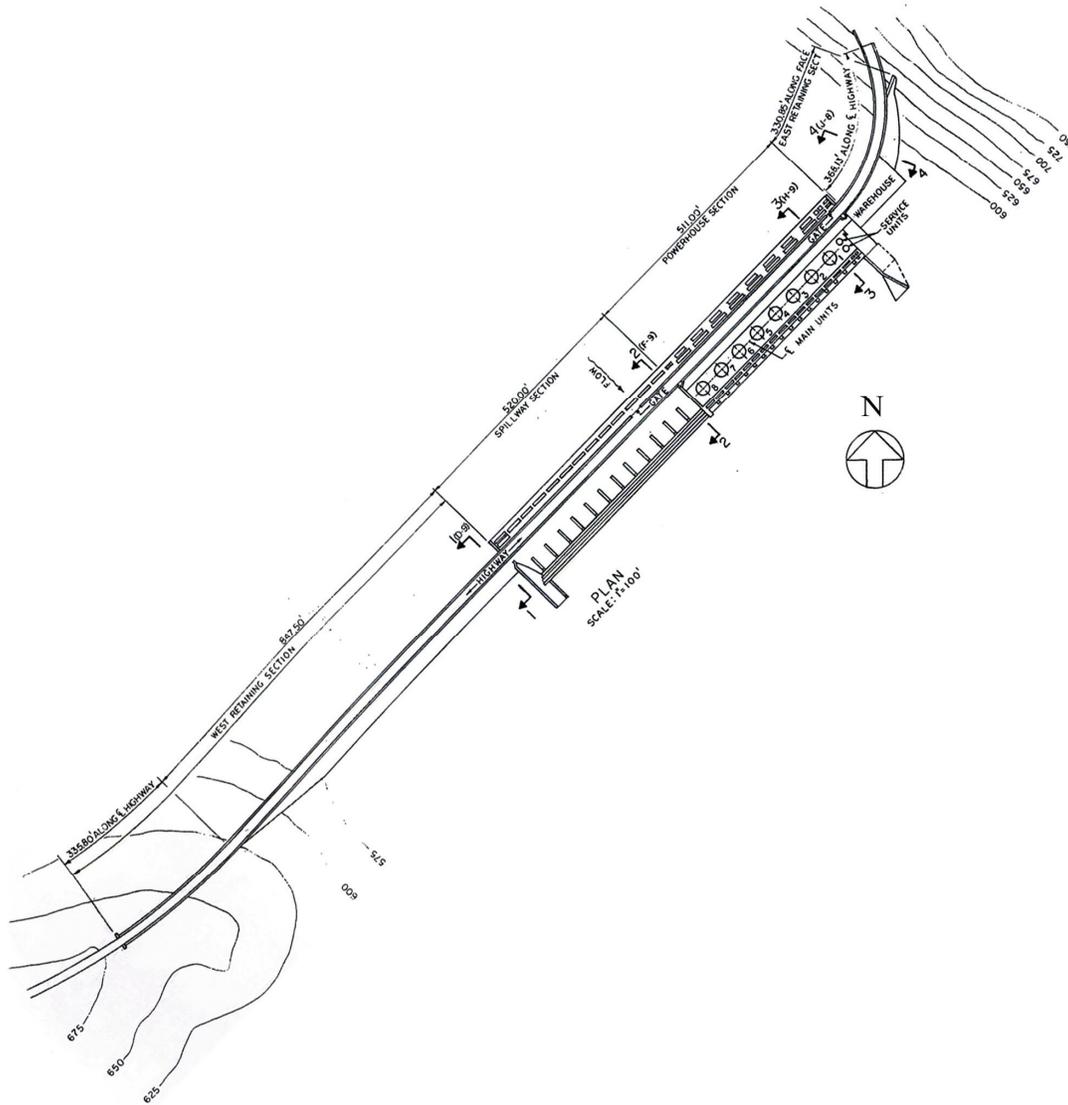
Map of Location within the State of Missouri  
Bagnell Dam and Osage Power Plant  
Adapted from [http://www.lib.utexas.edu/maps/United\\_states/missouri\\_90.jpg](http://www.lib.utexas.edu/maps/United_states/missouri_90.jpg)

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Map of Vicinity of Lake Ozark  
 Bagnell Dam and Osage Power Plant  
 Adapted from U.S. Geological Survey, Lake Ozark and Bagnell Quads,  
[http://store.usgs.gov/b2c\\_usgs/usgs/maplocator](http://store.usgs.gov/b2c_usgs/usgs/maplocator)

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Sketch Map  
Bagnell Dam and Osage Power Plant  
Adapted from Construction Drawing 7649-X-501752  
Original on file at AmerenUE, St. Louis, Missouri

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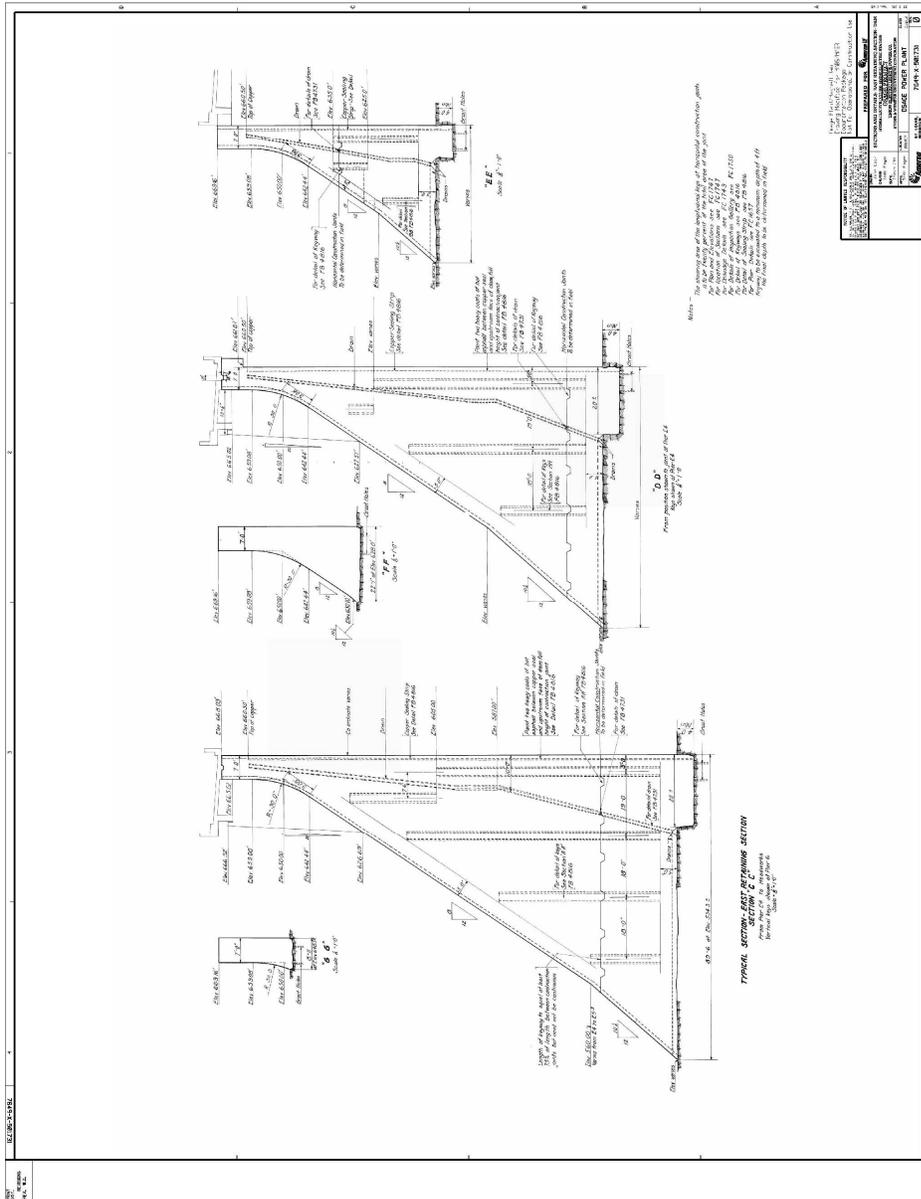


Reduced copy of historic aerial photographs, dated February 20, 1973  
Modified by AmerenUE for HAER documentation on January 6, 2010  
Original on file at AmerenUE, St. Louis, Missouri



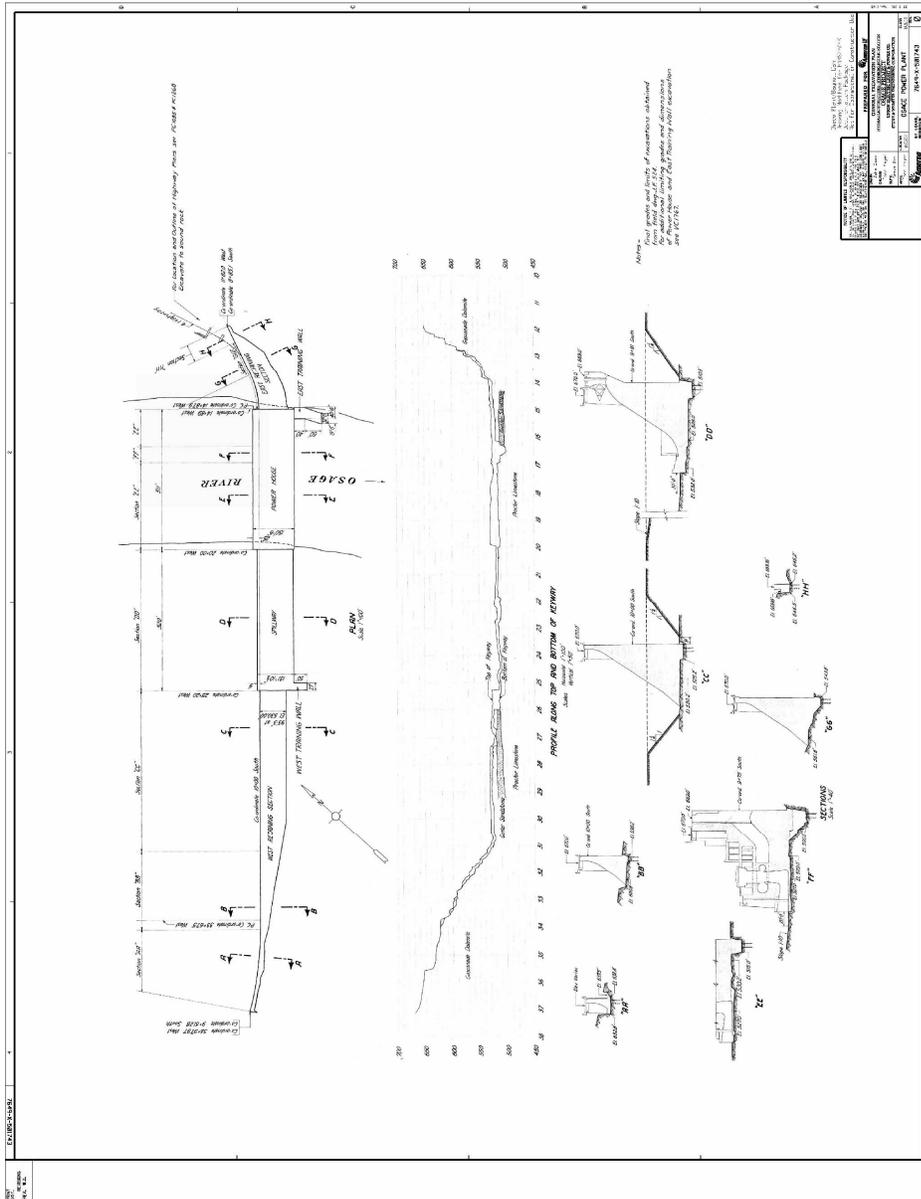


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Reduced copy of historic sections and details, dated June 13, 2010  
 Modified by AmerenUE for HAER documentation on January 6, 2010  
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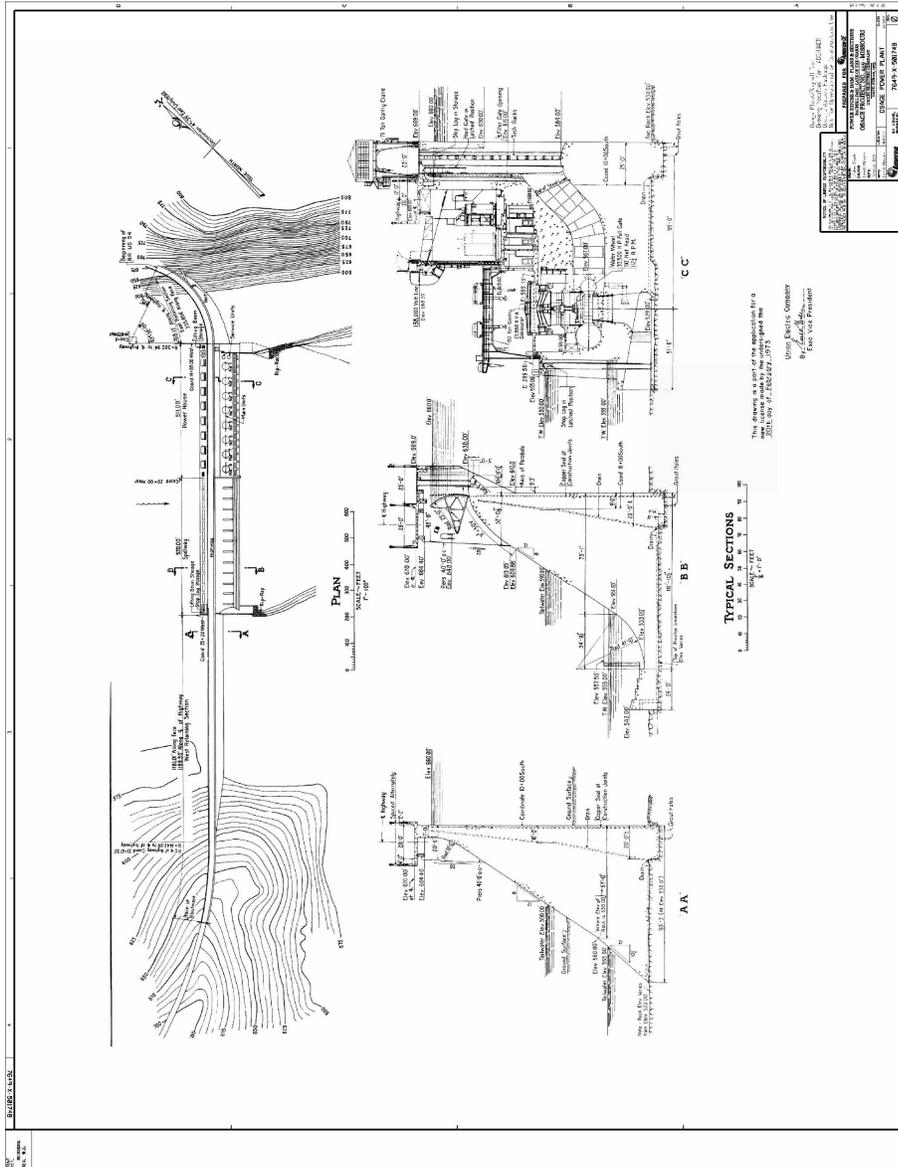
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Reduced copy of historic plan, dated December 19, 1930  
 Modified by AmerenUE for HAER documentation on January 6, 2010  
 Original on file at AmerenUE, St. Louis, Missouri

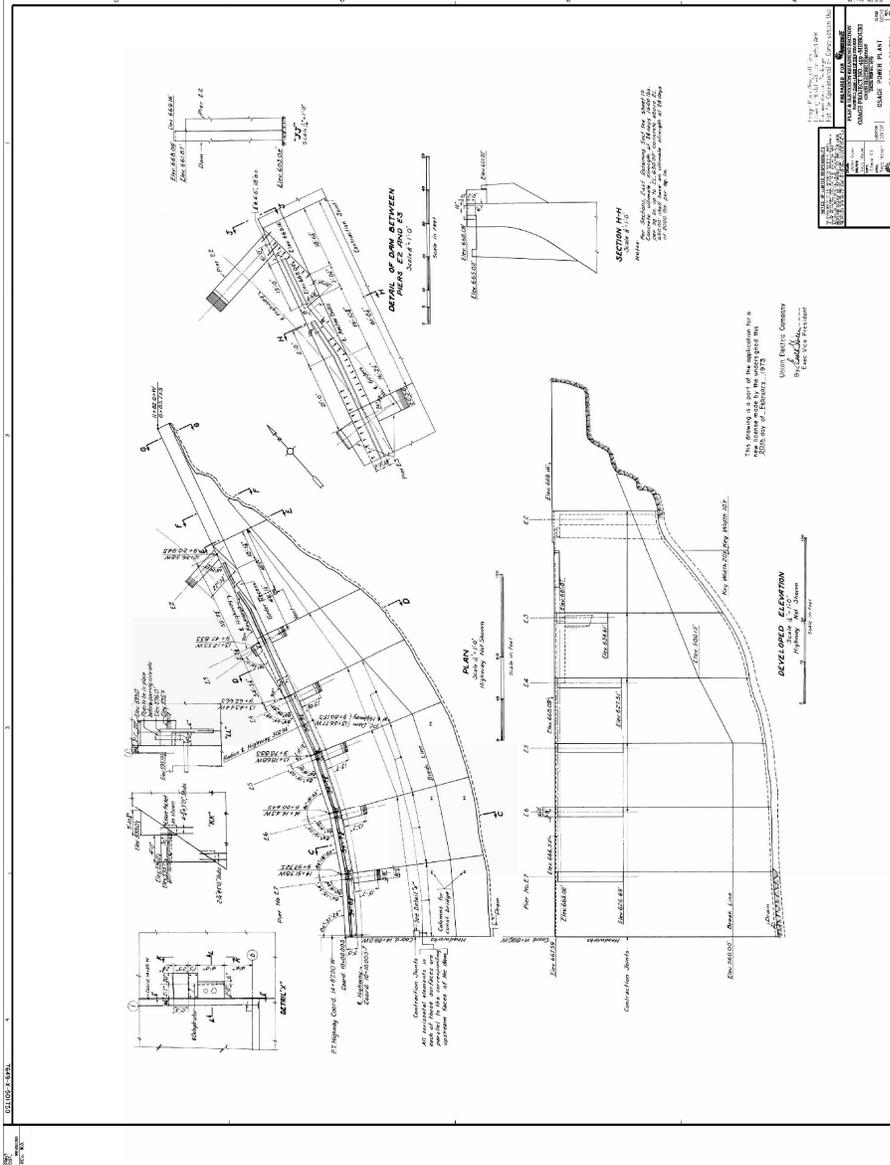


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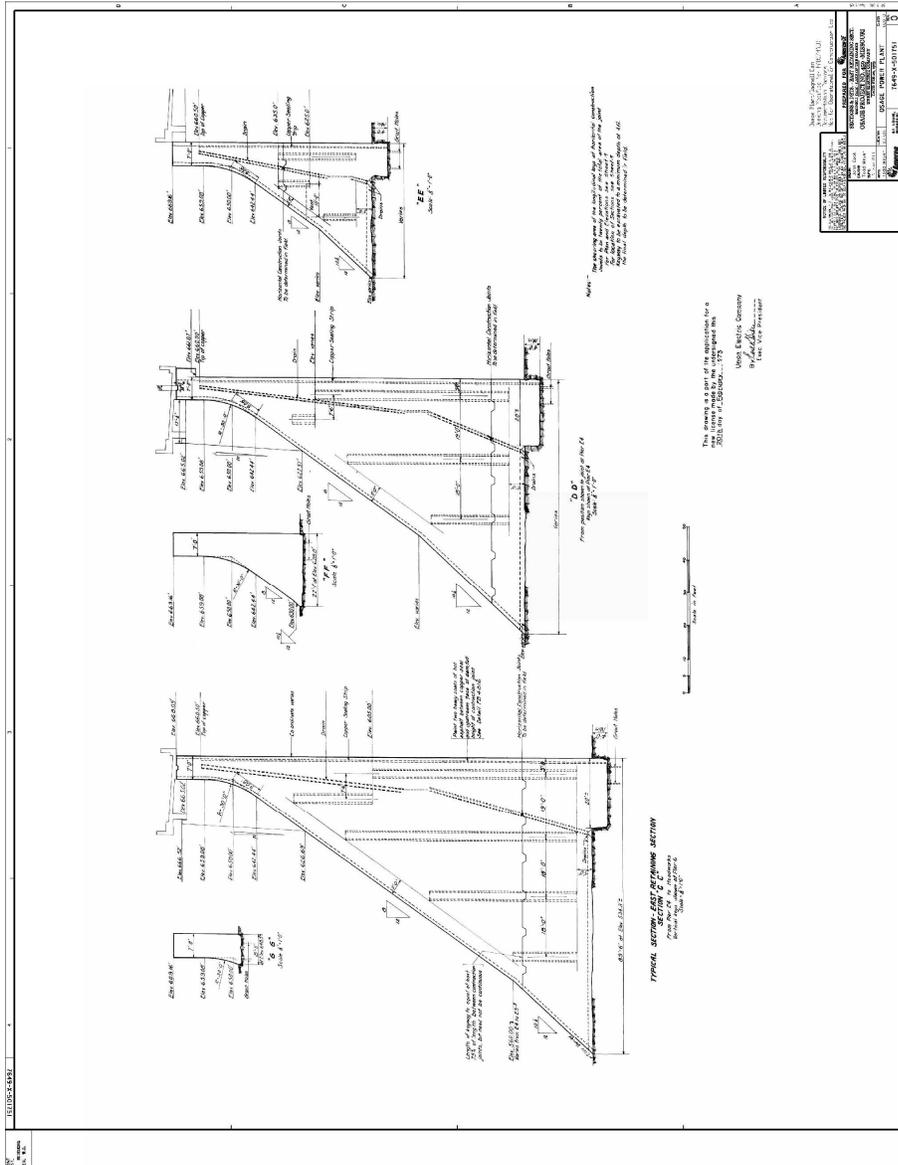
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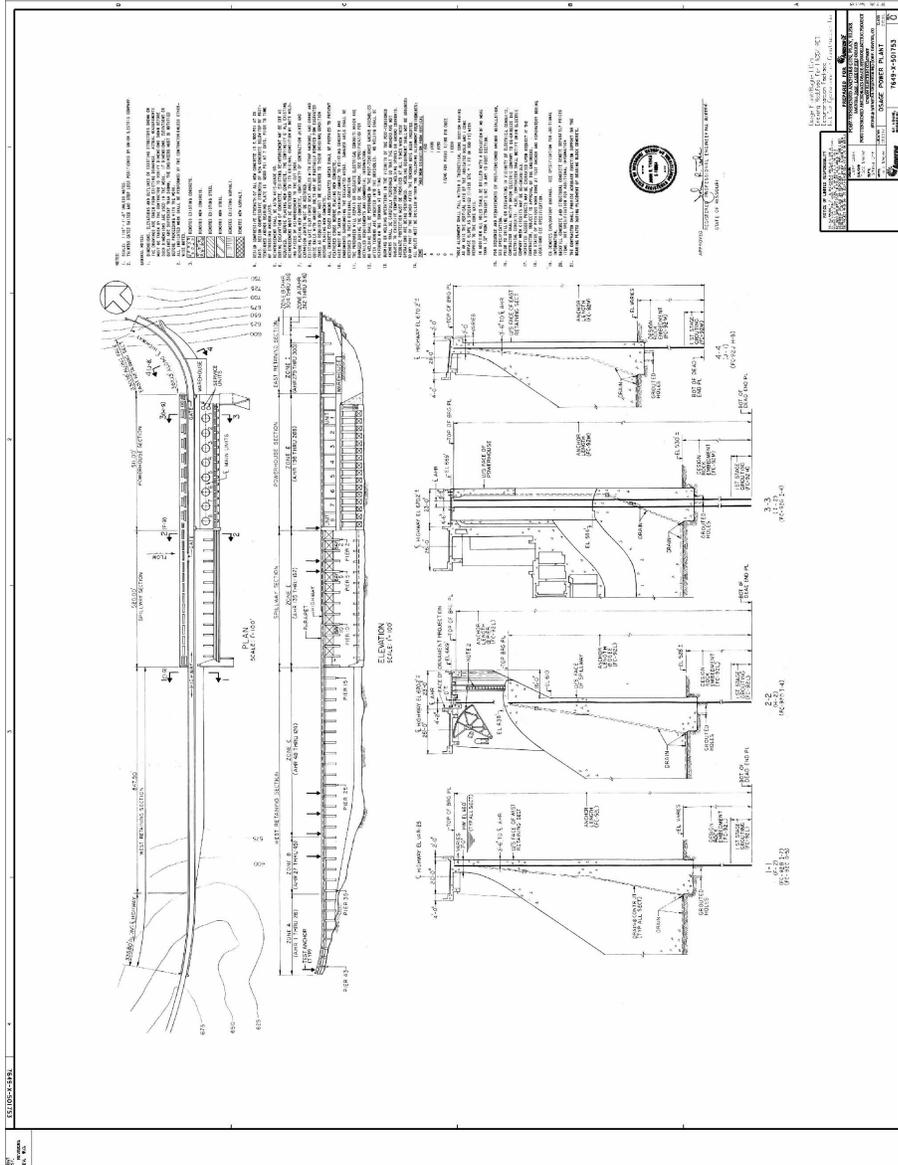
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 Modified by AmerenUE for HAER documentation on January 6, 2010  
 Original on file at AmerenUE, St. Louis, Missouri

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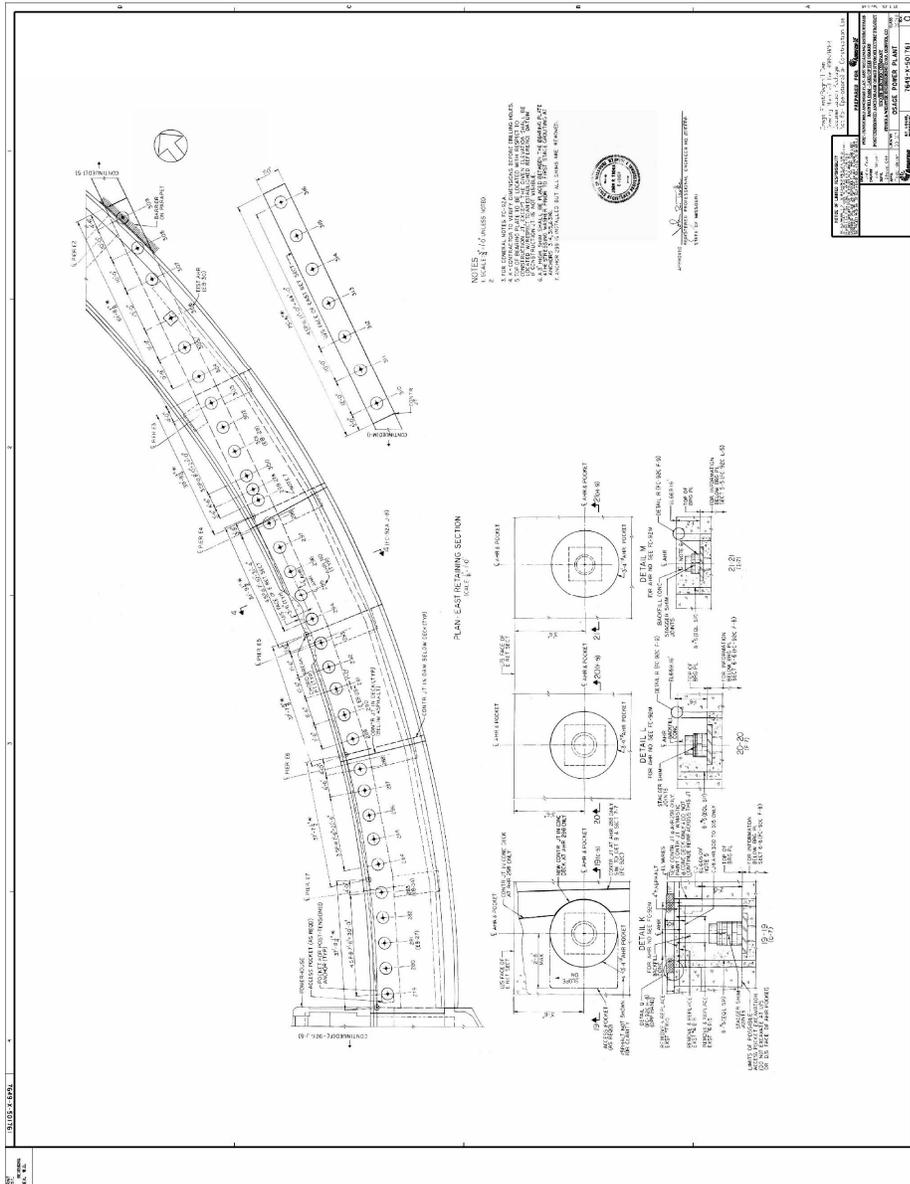
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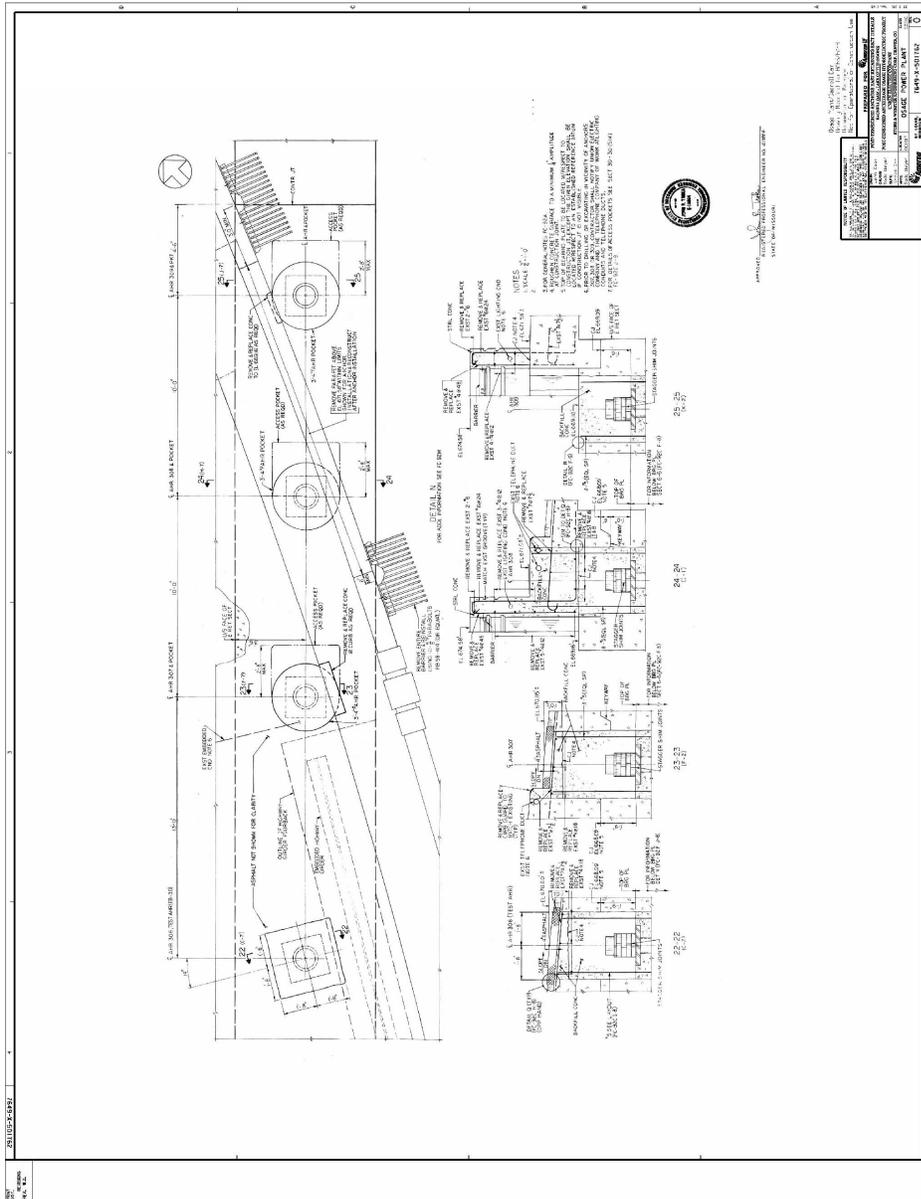
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 Modified by AmerenUE for HAER documentation on January 6, 2010  
 Original on file at AmerenUE, St. Louis, Missouri

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Reduced copy of historic plan, section and details, dated March 17, 1982  
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 Original on file at AmerenUE, St. Louis, Missouri

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Reduced copy of historic details, dated March 17, 1982  
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UNION ELECTRIC LIGHT AND POWER CO.-HYDROELECTRIC STATION-OSAGE DEVELOPMENT  
J.O. 5461 #447, 1-2-31.  
STONE & WEBSTER ENGINEERING CORPORATION, Builders  
General View from East Hillside N 2285

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