

Chapter VII

THE CONSTRUCTION AND OPERATION OF HOOVER DAM

A. Construction of the Dam

The history of the construction of Hoover Dam is outside the scope of this volume. A list of references appears in appendix 702.¹

The Black Canyon site was selected by A. P. Davis, Director of the Reclamation Bureau, and approved by a group of advisers to the Secretary: F. C. Emerson, W. F. Durand, J. G. Scrugham, and James R. Garfield. Extensive geological investigations, technical design studies, hydraulic research, and concrete investigations preceded the writing of specifications. Two boards of eminent engineers advised the Secretary and Commissioner: The Hoover Dam Consulting Board, comprising Louis C. Hill, David L. Henry, William F. Durand, F. L. Ransome, and Andrew J. Wiley, and the Colorado River Board (appendixes 301-303), comprising Maj. Gen. William L. Sibert, Charles P. Berkey, Daniel W. Mead, Warren J. Mead, and Robert Ridgway.²

Construction of the project was formally initiated July 3, 1930, by President Hoover's signature of the Second Deficiency Act for the fiscal year 1930,³ and issuance by Secretary Wilbur of an order on July 7, 1930 (appendix 701), to Commissioner Mead to commence construction. Work under the first contract began September 17, 1930, when Secretary Wilbur drove a silver spike, inaugurating construction of the Union Pacific branch railroad from Las Vegas to Boulder City.⁴

The planning and construction of the dam were under the general direction of Chief Engineer R. F. Walter. The dam itself was designed under the direction of John L. Savage, and the power plant

¹ A comprehensive account of the various construction phases may be found in Wilbur and Mead, "The Construction of Hoover Dam" (1933), containing the full text of the plans and specifications; Nelson, "The Boulder Canyon Project," Smithsonian Institution report for 1935; Nielson, "Boulder Dam" (extract from "Dams and Control Works, U. S. Bureau of Reclamation," 1938).

² Wilbur and Mead, "The Construction of Hoover Dam" (1933), pp. 1-5.

³ Act of July 3, 1930 (46 Stat. 860).

⁴ See ch. VII (B), *infra*.

under the direction of L. N. McClellan. Walker R. Young was construction engineer in charge for the Bureau of Reclamation. His immediate staff was headed by Ralph Lowry, assistant construction engineer, and John C. Page, office engineer, later Commissioner of Reclamation.

The plans and specifications for the dam and appurtenant works were advertised in December 1930. Bids were opened March 4, 1931. The low bidder was Six Companies, Inc., of San Francisco, Calif., a company composed of six western contracting firms: Utah Construction Co., Pacific Bridge Co., Kaiser Paving Co., Ltd., McDonald & Kahn Co., Morrison-Knudsen Co., and J. F. Shea Co. The contract was awarded April 20, 1931. The contract allowed 2,565 days, from March 11, 1931, to April 11, 1938, for completion. The great work was accomplished under the direct supervision of Frank Crowe, the contractor's engineer in charge. The dam and power plant structures covered by this contract were completed and accepted by the Secretary of the Interior on March 1, 1936, or over 2 years ahead of schedule. A summary of the construction schedule achieved on this project appears in the margin.⁵

The dam is 726.4 feet high, 1,282 feet long at the crest, 660 feet thick at the base, and 45 feet thick at the crest. It contains 3,250,000 cubic yards of concrete. Water is released from the reservoir through four intake towers feeding four 30-foot diameter steel pen stocks, which in turn lead into the turbines and to outlet headers through branch pen stocks.

⁵ The program of construction at Hoover Dam was as follows:

Feature	Date started	Date completed
Diversion tunnels.....	June 1931.....	March 1933.
Upstream cofferdam.....	September 1932.....	Do.
Downstream cofferdam and rock barrier.....	November 1932.....	Do.
Removal of the same.....		May 1935.
Excavation for dam.....	October 1932.....	June 1933.
Intake towers.....	February 1932.....	March 1935.
Spillways.....	do.....	Do.
37-foot penstock tunnels.....	February 1933.....	May 1934.
Installation of 30-foot-diameter outlet pipes in upper tunnels:		
Arizona.....	January 1935.....	September 1935.
Nevada.....	October 1934.....	August 1935.
Installation of 30-foot-diameter outlet pipes in lower tunnels:		
Arizona.....	January 1935.....	June 1936.
Nevada.....	February 1935.....	July 1936.
18-foot penstock tunnels.....	December 1932.....	August 1934.
Installation of 13-foot-diameter penstock pipes in branch tunnels.....	December 1934.....	January 1936.
Canyon wall outlet works.....	November 1932.....	August 1935.
Tunnel plug outlet works.....	July 1935.....	April 1936.
Stoney gates at downstream portal of inner diversion tunnels.....		
Tunnel plugs in inner diversion tunnels.....	March 1934.....	November 1935.
Tunnel plugs in outer diversion tunnels.....	December 1934.....	March 1935.
Concrete in dam.....	June 1933.....	May 1935.
Power plant.....	December 1932.....	
Initial generating units ready for operation.....		September 1936.

Two spillways, one on each side of the canyon, are designed to pass 400,000 second-feet. Each spillway channel is 670 feet long, 75 to 128 feet deep, and 40 feet wide at the bottom.

The generating equipment is installed in a U-shaped power-plant building 1,650 feet in length. The two main wings are each 650 feet long, about 120 feet wide, and 230 feet above the lowest foundation elevation.

The power plant is designed for fifteen 115,000 horsepower generators, two 55,000 h. p. units, and two station service sets, making a total ultimate installation of 1,835,000 horsepower.⁶

B. The Name of Hoover Dam

(1) *Dedication by Secretary Wilbur.*—On September 17, 1930, on initiating construction, Secretary Wilbur issued the following order:

THE SECRETARY OF THE INTERIOR.
Washington, D. C., September 17, 1930.

DR. ELWOOD MEAD,
Commissioner of Reclamation,
Washington, D. C.

MY DEAR DOCTOR MEAD: This is to notify you that the dam which is to be built in the Colorado River at Black Canyon is to be called the Hoover Dam.

Sincerely yours,

RAY LYMAN WILBUR.

(2) *Confirmation by Congress.*—When the Interior Department appropriation bill for the fiscal year ending June 30, 1932, came to the floor of the House in December 1930, Congressman Taylor, then ranking Democratic member of the Interior Department Subcommittee on Appropriations and later chairman of the full Appropriations Committee, who had introduced a bill⁷ to name the structure Hoover Dam, called the attention of the House to the fact that the committee had designated the dam as Hoover Dam in the appropriation bill, saying:⁸

This is the first time that name has ever appeared in any bill or official act of Congress. This Interior Department Appropriations Committee thought that following the precedents of the naming of the Roosevelt Dam during President Roosevelt's administration, and the Wilson Dam during President Wilson's administration, and the Coolidge Dam during his administration, that President Hoover was very justly entitled to the same distinction, so we unanimously and very gladly wrote into this action those words making the naming of that great dam the Hoover Dam by the action of Congress that will be a monument to him for centuries after every other act of his administration, and of this Congress

⁶ U. S. Bureau of Reclamation, "Dams and Control Works" (2d edition), Boulder Dam.

⁷ H. J. Res. 81, 71st Cong., 1st sess., introduced May 27, 1929.

⁸ Congressional Record December 12, 1930, p. 646.

will have passed into utter oblivion * * * so that the dam is now officially named by both the Secretary of the Interior and by Congress.

Mr. Taylor's views were approved by the House, the Senate concurred and the bill became law confirming the name of Hoover Dam.⁹ In the next four succeeding appropriation acts the dam was designated as "Hoover Dam." These were the acts approved April 22, 1932,¹⁰ July 1, 1932,¹¹ July 21, 1932,¹² and February 17, 1933.¹³

(3) *Subsequent action.*—After Mr. Hoover left office, the Interior Department, although failing to take any formal action,¹⁴ avoided the use of the name "Hoover Dam," and publicized the names "Boulder Canyon Dam" or "Boulder Dam."

(4) *Legislation restoring the name of Hoover Dam.*—Early in the Eightieth Congress, a number of bills were introduced to restore the name of Hoover Dam.¹⁵

On March 4, 1947, Chairman Welch, for the House committee on Public Lands, reported ¹⁶ House Resolution 140, by Mr. Anderson of California, with the following statement:

Herbert Hoover, while Secretary of Commerce, in 1922 presided as the representative of the Federal Government over two score meetings of the representatives of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming for the formulation of the Colorado River compact. He had a major part in bringing the States into agreement. This compact, signed November 24, 1922, made construction of the dam possible by allocating the waters of the river system, between the upper and lower Colorado River Basins, settling a 25-year-old controversy. The Boulder Canyon Project Act, enacted December 21, 1923, when Mr. Hoover was President-elect, ratified the compact and authorized construction of a dam in Black Canyon or Boulder Canyon, leaving to the Secretary of the Interior the choice of sites. It also laid upon him and the Secretary of the Interior extraordinary responsibilities.

As President, Herbert Hoover took an active part in settling the engineering problems and location of the dam in Black Canyon; was required by the Project Act to obtain power and water contracts adequate to assure some \$200,000,000 of revenues before construction was begun; settled the difficult and controversial questions involved in the allocation of the power, and made the revenue contracts which Congress required; and proclaimed the Boulder Canyon Project Act to be in effect on June 25, 1929. This act ratified the Colorado River compact, which Mr. Hoover had signed 7 years before, and subjected all operations of the

⁹ Act of February 14, 1931 (46 Stat. 1115, 1146).

¹⁰ Act of April 22, 1932 (47 Stat. 118).

¹¹ Act of July 1, 1932 (47 Stat. 535).

¹² Act of July 21, 1932 (47 Stat. 717).

¹³ Act of February 17, 1933 (47 Stat. 845).

¹⁴ See letter of Secretary of Interior Harold L. Ickes to Hon. Allen T. Treadway, Congressional Record, Senate, April 21, 1947, p. 3835.

¹⁵ H. J. Res. 59 (80th Cong.), by Mr. Anderson; H. J. Res. 117, by Mr. Foote; S. J. Res. 45, by Mr. Hawkes; S. 673, by Mr. Baldwin. See also the speech of Congressman Phillips of California, Congressional Record, August 2, 1946.

¹⁶ H. Rept. No. 87 (80th Cong., 1st sess.).

Boulder Canyon project to that compact. He subsequently reported to Congress, through Secretary Wilbur, compliance with its mandate that this project be built on a self-liquidating basis; Congress made the necessary appropriations (in acts which five times named the dam in his honor); the construction contracts were signed under his administration, and when he left office construction had been pushed to a point where it was more than a year ahead of schedule.

After Mr. Hoover left office, the Interior Department, for reasons that need not be referred to in detail here, avoided the use of the name "Hoover Dam" where possible, and used the names "Boulder Canyon Dam" or "Boulder Dam."

After hearing testimony relative to the need for clarifying the present situation with regard to the name of this dam, it is apparent to this committee that affirmative legislative action by Congress is desirable.

It is particularly timely that this measure honoring Mr. Hoover should come to the floor of the House at a time when he is completing the second of his great humanitarian missions for President Truman in the relief of world-wide suffering.

The resolution passed the House on March 6, 1947, without a dissenting vote, after a series of speeches from both sides of the aisle in tribute to Mr. Hoover.¹⁷

On March 17, 1947, a companion resolution¹⁸ by Senator Hawkes of New Jersey was reported favorably.¹⁹ It was passed by the Senate on April 23, 1947.²⁰

The resolution restoring the name of Hoover Dam, signed by President Harry S. Truman April 30, 1947,²¹ reads:

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the name of Hoover Dam is hereby restored to the dam on the Colorado River in Black Canyon constructed under the authority of the Boulder Canyon Project Act, approved December 21, 1928 (45 Stat. 1057), and referred to as Hoover Dam in the Act approved February 14, 1931 (46 Stat. 1146); in the Act approved April 22, 1932 (47 Stat. 118); in the Act approved July 1, 1932 (47 Stat. 535); in the Act approved July 21, 1932 (47 Stat. 717); and in the Act approved February 17, 1933 (47 Stat. 845). Any law, regulation, document, or record of the United States in which such dam is designated or

¹⁷ See remarks of Mr. Brown, Congressional Record (80th Cong., 1st sess.), March 6, 1947, p. 1788; Mr. Rankin, id., p. 1788; Mr. Knutsen, id., p. 1789; Mr. Herter, id., p. 1790; Mr. Barrett, id., p. 1791; Mr. Sabath, id., p. 1791; Mr. Kefauver, id., p. 1792; Mr. Dirksen, id., p. 1792; Mr. Halleck, id., p. 1792; Mr. Welch, id., p. 1794; Mr. Murdock, id., p. 1794; Mr. Rockwell, id., p. 1794; Mr. Vorys, id., p. 1795; Mr. Jenkins of Ohio, id., p. 1795; Mr. Russell, id., p. 1797; Mr. Elliott, id., p. 1797; Mr. Gross, id., p. 1797; Mr. Bender, id., p. 1797; Mr. Phillips of California, id., p. 1798; Mr. Johnson of California, id., p. 1791, 1798; Mr. Chenoweth, id., p. 1798; and Mr. Ramey, id., p. 1798. During the hearings of the House Committee on Public Lands, Congressman Anderson of California, Jensen of Iowa, and Phillips of California testified in support of the measure.

¹⁸ S. J. Res. 45 (80th Cong., 1st sess.).

¹⁹ S. Rept. No. 55 (80th Cong., 1st sess.), Senate Committee on Public Lands.

²⁰ See remarks of Senator Hawkes, Congressional Record (80th Cong., 1st sess.), April 21, 1947, p. 3829; Senator Smith, id., p. 3837; Senator Hawkes, April 23, 1947, p. 3956; Senator Eastland, id., p. 3956; Senator Flanders, id., p. 3957; Senator McClellan, id., p. 3957; Senator Saltonstall, id., p. 3957; Senator Chavez, id., p. 3961; Senator Morse, id., p. 3962; and Senator Knowland, id., p. 3963. Contra: Senator McCarran, id., p. 3837; Senator Taylor, id., p. 3957.

²¹ Act of April 30, 1947 (Public Law 43, 80th Cong., 1st sess.).

referred to under the name of Boulder Dam shall be held to refer to such dam under and by the name of Hoover Dam.

Approved April 30, 1947.

C. The Reservoir: Lake Mead

The Reservoir created by Hoover Dam, Lake Mead, is appropriately named for Dr. Elwood Mead, who was Commissioner of Reclamation during the definitive phases of its planning and construction. Dr. Mead was identified with the project in many other ways. As State engineer of Wyoming, on October 27, 1897, he wrote advocating storage on the Colorado.²² As a member of the All-American Canal Board, he was responsible for the official endorsement of that project. (See chs. I (F) and XI (A) and appendix 101.) He was chairman of the American section of the International Water Commission which conducted negotiations with Mexico. (See ch. XIV (B), *infra*.) As Commissioner of Reclamation, he supervised the planning of Hoover Dam,²³ the negotiation of the construction contracts on Hoover Dam, Imperial Dam, the All-American Canal, Parker Dam, and several of the related projects referred to in chapter XII, and the negotiation of many of the power and water contracts which appear in this volume.

Lake Mead extends upstream 115 miles from the dam, has a shore line of approximately 550 miles, and surface area of about 162,700 acres, or 254 square miles, and a storage capacity of 32,359,000 acre-feet.²⁴

Plans for operating the reservoir contemplate that the upper 9,500,000 acre-feet of storage capacity will be reserved for flood-control purposes, with incidental production of secondary energy; that 3,207,000 acre-feet, comprising the dead storage below access to the intake towers, will be used for silt retention, and that the remaining 19,672,000 acre-feet will be "live storage" available for regulating the reservoir for irrigation and domestic water supply, and for the production of firm power.

D. Boulder City

On May 19, 1931, the United States, proceeding under an act of Nevada²⁵ ceding exclusive jurisdiction to the United States over lands

²² Letter to Capt. H. M. Chittenden (H. Doc. 141, 55th Cong., 2d sess., 1897).

²³ See "The Construction of Hoover Dam," Ray Lyman Wilbur and Elwood Mead (Government Printing Office, 1933).

²⁴ Hearings before subcommittee of the Committee on Appropriations, House of Representatives (76th Cong., 3d sess., pt. 1, p. 475). See also hearings on H. R. 10630, Interior Department appropriation bill for 1937 (74th Cong., 2d sess., pp. 1165-1166).

²⁵ Act of February 24, 1921 (secs. 2895-2898, Nevada Comp. Laws, 1929).

acquired by the United States for certain purposes, established the Boulder Canyon Project Federal Reservation (appendix 26, first edition). The validity of this reservation was subsequently challenged in litigation²⁶ to which the United States was not a party. Notwithstanding the adverse outcome of that litigation, the United States has continued to assert jurisdiction over this area, and has constructed a substantial town, Boulder City, which operates under a city manager and other employees appointed by the Secretary of the Interior.²⁷

Subsequently a number of other Federal activities were located in this area.²⁸ Some of the problems occasioned thereby are referred to in chapter VIII (D).

E. Transmission Lines

Transmission lines are not included in the Federal project, but were built by the power allottees. The major portion of the electric power generated at Hoover power plant is delivered to the coastal areas of southern California. Three 287,500-volt lines, the highest voltage lines in commercial service in the country at this writing, transmit Hoover power to the city of Los Angeles and the municipalities of Burbank, Glendale, and Pasadena. Operating at 230,000 volts, another pair of circuits service territory of the Southern California Edison Co. A third 230,000-volt circuit, which has a branch to Parker power plant and is owned by the Metropolitan Water District, extends south to the district's aqueduct to supply power for pumping water for the needs of the 3,425,000 people in the district's service area of California. From this circuit's western terminus at Hayfield pumping plant, the Southern California Edison Co. has a 230,000-volt line connecting the Metropolitan Water District circuit to the Edison Co.'s system at Highgrove. Two short 230,000-volt lines connect Hoover Dam to the Basic Magnesium project located between Boulder City and Las Vegas, Nev.; a 138,000-volt line transmits the California Electric Power Co.'s Hoover allocation to the Victorville and San Bernardino areas; and 69,000-volt circuits serve

²⁶ *Six Companies, Inc. v. F. C. DeVinney*, 2 F. Supp. 693 (D. C. Nev. 1933); *Six Companies, Inc. v. Stinson*, 2 F. Supp. 689 (D. C. Nev. 1933).

²⁷ The first city manager, 1930-31, was Louis C. Cramton; the second, 1931-41, Sims Ely.

²⁸ The Boulder Canyon Wild Life Refuge was established by Executive order of March 3, 1933. It became the Boulder Canyon National Wild Life Refuge by Proclamation No. 2416, July 25, 1940. The refuge was revoked by Public Land Order 501, July 22, 1948, appearing in the Federal Register, August 3, 1948, p. 4403. A memorandum of agreement between the National Park Service and the Bureau of Reclamation, establishing the Boulder Canyon Recreational Area (surrounding and including Lake Mead), was approved by the Secretary of the Interior, October 13, 1936.

Boulder City, the Colorado River Commission of Nevada's wholesale customers, such as the Southern Nevada Power Co. in Las Vegas and the mining districts at Pioche, and the Metropolitan Water District's resale customers at Needles, Calif., and Kingman, Ariz.

Further details relating to the Hoover Dam transmission system are shown in appendix 703.

F. Operation

Storage in Lake Mead was begun February 1, 1935. Generation of power was formally initiated at 12:22 p. m., September 11, 1936, but the energy delivered was sold under an interim contract; the 50-year period covered by the contracts entered into in 1930 commenced June 1, 1937. Power from Hoover Dam was first transmitted to Los Angeles on October 9, 1936.