



“Colossus”

The next time you're in Las Vegas, take a detour to the Hoover Dam. You'll notice the similarity in the appearance of the Dam's architectural features with the design of the LA Times Building on 1st St. in downtown Los Angeles. Understandable since the architect for the Dam was Gordon B. Kaufmann who was also Harry Chandler's architect for the LA Times headquarters building. This is just one of the insights into the history of the Dam's construction we learn in Michael Hiltzik's book, "Colossus, Hoover Dam and the Making of the American Century". The book's bigger story is the historical and political events leading up to the Dam's construction and the effects the Dam has had on the region. Indeed, without the Dam, the American Southwest, and especially Southern California we know today, would be very different. The irrigation water the dam delivers to the Imperial Valley and, more importantly the electricity and drinking water it provides, spurred the growth and development of the entire region. But it's also true that the decreasing amount of water in Lake Mead behind the Dam, has also placed limits on our growth due to historically low rainfall and snow runoff experienced in recent years in the Colorado River watershed.

When President Franklin Roosevelt dedicated the Dam in September 1935, he characterized it as a tangible symbol of the New Deal even though construction planning was well underway in the administration of Herbert Hoover. The history of the Dam goes back even further, to the 1850s when California developers first had dreams of controlling flooding from the Colorado River and using its water for irrigation in the Imperial Valley. The disastrous winter flooding in 1905 that destroyed Imperial Valley agriculture, created the Salton Sea, and took 18 months to stop, (by repairing dikes along the river at a cost of \$3 Million to the Southern Pacific Railroad), put the whole issue of control of the river on the national stage. In 1907 President Theodore Roosevelt proposed legislation to construct flood control dams on the Colorado River and to construct the All American Canal, from the River to the Imperial Valley. Twenty three years later the construction of the Hoover Dam began. It would be the largest American public works project since the construction of the Panama Canal.

The Dam is enormous in every way: 726 ft. high, (two times higher than any previous dam), 660 ft. thick at its base, it contains 3.5 million cu. yds. of concrete in its combination of gravity and arch designs, and, at its peak in 1934 employed over 5,200 men working around the clock, seven days a week. The project cost \$98 Million. As it turned out, the pouring of concrete for the dam was the most straight forward part of the project. There was so much work necessary before that could begin. Construction of roads and a railway to the site, construction of an electric power line from Victorville, CA, and construction of Boulder City for 4,000 workers and their families had to be completed. The construction of the four diversion tunnels and the cofferdams, to keep the dam site dry, took nearly two years to complete. The diversion tunnels were enormous: each was 56' diameter and 4,000 ft. long, drilled and blasted through the rock along both sides of Boulder Canyon. Work in the tunnels was very dangerous, taking the lives

of 33 men in one 14 month period. Jobsite safety was of secondary importance to the progress of the work.

Frank, "Hurry Up" Crowe was the project manager for the construction contractor, Six Companies, a consortium whose bid was the lowest of the three bids received. (Bechtel is the only construction company of the six member companies that still exists.) Crowe had completed 14 dams for the Bureau of Reclamation prior to the Hoover Dam. His experience in the construction of diversion tunnels and his innovative overhead cable system, spanning the canyon for transport of material and men to the dam site, were two of the reasons why the project was completed nearly a year ahead of schedule.

The Bureau of Reclamation conducted research on various concrete mixes, making over 15,000 test samples with 96 different mix designs using aggregates varying in size up to 9" diameter. The 30,000 concrete pours, each with a specific mix design, were planned to minimize heat buildup. The pours were made in interlocking blocks 50' x 50' x 5' high, staggered, and interlaced with a system of piping in which 45 degree water was circulated to keep the curing concrete from overheating and cracking.

One aspect of the Dam's construction that could have been better understood was its foundation geology. After 10 months of round the clock excavation, down to bedrock at 104 ft. below the river bed, a series of 400 holes were bored into the rock for grout injection. These were planned to form a continuous concrete curtain below the Dam to prevent water from seeping beneath the Dam and causing uplift. Unfortunately, only a fraction of the holes were grouted successfully. As a result, following completion of the Dam, seepage into the Dam's service galleries accompanied by a startling amount of uplift was recorded on the strain gages cast into the Dam's structure. This necessitated the drilling of nearly 800 additional holes, some to a depth of over 300', to complete the grout curtain. This process wasn't completed until 1947, taking nearly 9 years, twice as long as it took to build then Dam.

"Colossus" was published by the Free Press in 2010. It has 496 pages including an extensive bibliography and notes section. The innovative and incredibly difficult construction process is presented in portions of five of the books 20 chapters. There are only three construction drawings included among several pages of photographs. Nevertheless, the book is an excellent and unique way to view the history of Southern California, and the Hoover Dam.

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