

# Hoover Dam

- I. One of the largest in the world
  - A. Located on the Arizona- Nevada border
  - B. One of the seven wonders of the world
  - C. Holds back Lake Mead on the Colorado river in the Black Canyon
- II. Has a unique history
  - A. Built during the depression during 1931- 1935 two years ahead of schedule taking less than 5 years
  - B. 16,000 people worked on the dam at a wage of \$.50 per hour- over 3,000 in each shift
  - C. The first job was for high-scalers to remove loose rock in the canyon wall
    1. Required swinging out into open space with only a thin rope holding you
    2. Only a few brave men desperate for money would take the job
    3. One high-scaler, Arnold Parks, swung himself into midair to catch a man who had fallen from the canyon's rim
  - D. Next job was build 2 cofferdams down river to prevent flooding while working on the dam
  - E. To lessen the flow of the river around the dam, tunnels were drilled into the side of the canyon walls (two in each) to divert the flow around the sides- their combined length was over three miles
  - F. It was May 1931. The men now bored holes for explosives into the rock
  - G. Temperatures reached 140F in the workings
  - H. the men filled the holes with explosives and a ton of explosives was used for every 14' of tunnel- more than 1.5 million yd<sup>3</sup> of rock was taken out
  - I. The men lined the pipes with concrete then
  - J. For two years, water flowed freely through the diversion pipes, but in 1934 Cofferdams were built at tunnels 2 and 3 those closest to the river, then they were closed forever with concrete plugs. when winter arrived they closed down #4 too, and #1 was fitted with a valve
  - K. Feb 1, 1935- a 1000 ton steel gate was lowered over tunnel 4 and water began to back up behind the dam, creating Lake Mead
  - L. Workers now began pouring concrete around strong metal bars called rebar
  - M. to let the concrete set, they left grooves in between concrete squares for air to pass through. when it was set, they poured additional concrete into these grooves.
  - N. If the heat produced by the curing concrete was to have been concentrated into an oven, it could bake 500,000 loaves of bread per day for three years!
  - O. Then the dam was finished

- III. Looks overwhelmingly large
  - A. 726.2 ft. tall
  - B. More than 5 miles of tunnels
  - C. Two wings to the hydroelectric power plant which is on the south side of the dam- each 650 ft. long and 8 stories high
  - D. 9 generators on the Arizona side and 8 on the Nevada each 70 ft. tall, but only 30 ft. show
  - E. 6 large openings called valve houses are on the south side of the dam to be used as a bypass system, but haven't needed to be used in several years because of the 17 turbines
  - F. Lake Mead is the largest man-made lake in the United States
- IV. Electricity is created when the water flows through the dam
  - A. Water flows into one of the generators from a penstock turning the turbine, which turns the shaft
  - B. The Rotor, a huge electromagnet, which is turned by the shaft is turned through the stator, a coil of wire, causing electric current to flow into the stator creating 230,000 volts and 133,000 kilowatts and the whole power plant creating 2.08 million kilowatts
- V. Hoover dam is one of the most outstanding in the world
  - A. It has a unique history
  - B. Creates lots of power
  - C. Controls the flooding of the Colorado River
  - D. Amazing edifice

Bibliography

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# Hoover Dam

by Nathan Shepard

Hoover Dam is one of the largest dams in the world. Located on the Arizona-Nevada boarder, it holds back Lake Mead on the Colorado River in Black Canyon. Lake Mead is the biggest man-made lake in the United States. Because of the dam's history, vastness, and matchless design, it is one of the seven wonders of the world.

Hoover Dam (sometimes called Boulder Dam- named after the nearby Boulder City) has a unique history. It was built during the depression from 1931- 1935. The workers had to endure temperatures of 140°F during the summer and freezing weather during the winter. Despite these obstacles and the dangers of the construction site, the workers finished it two years ahead of schedule. 16,000 men worked on the structure with 3,000 in each shift. The wage was 50 cents an hour. The first job in building the huge dam was difficult. Men called high-scalers would swing out on thin ropes along the side of the cliff to break away loose rock with heavy machinery. The purpose of this job was to prevent any unstable rocks from ruining the foundation of the dam. Only a few brave men who were desperate for money took on this task. One high-scaler, Oliver Cowan, was working on a particularly difficult chunk of rock one day when a man fell off the top of the canyon's rim. Without hesitation, Cowan swung himself out off the side of the canyon wall and caught the man swiftly but firmly. Although Cowan is now dead, he is still remembered in the story of Hoover Dam. After assuring that the rock was secure, the men had to re-route the river temporarily so that the they could lay down the concrete.

Accordingly, the plans included four diversion tunnels to be drilled, two in each canyon wall. In May 1931, the workers began to bore holes for explosives. The workers used a ton of explosives for every 14' of tunnel they made. After the tunnels were completed, the men lined them with concrete. A concrete mixing plant upriver began producing concrete in March 1932. For the first year all the concrete was used to line the diversion tunnels. After the men completed the diversion tunnels, they built two cofferdams in September 1932. The upper cofferdam was built between the construction site and the diversion tunnel intakes with the lower cofferdam between the construction site and the diversion tunnel outputs. Now the construction site was dry. In June 1933 the men began to pour concrete around strong metal bars called rebar. They also constructed intake towers just upstream from the dam. When finished, water would flow through these towers, into diversion pipes 2 or 3 and flow into the power plant through penstocks (Smaller pipes used to carry water from the diversion tunnels to each generator). In order to allow the concrete to set, the men left grooves in between each concrete block for air to pass through. Later, the grooves were filled with concrete. While the concrete was curing, it got very hot. In fact, if the heat put out by the curing concrete had been concentrated into an oven, it could've cooked 500,000 loaves of bread per day for three years! By the time the dam structure was complete, it had been two years since the diversion pipes had been made, and all that time the water flowed freely through them. However, in 1934, the men built cofferdams over tunnels 2 and 3, the pipes closest to the river, and later they were closed permanently with large concrete plugs. When winter arrived, the workers built a cofferdam over tunnel 4, and tunnel 1 was fitted with a valve so that the workers could control it. On February first, 1935, a 1000 ton steel gate was

lowered over tunnel 4. The cofferdams were removed, and water began to back up behind Hoover Dam. Now the workers finally had control over the Colorado river. Hoover Dam was finished.

Hoover Dam, upon first sight, is overwhelmingly large; it is 726 feet and 2 1/2 inches tall! With an elevator that takes over a minute to ride, and more than 5 miles of tunnels, it is one sight to see. There are two wings on the hydro-electric power-plant, one on each side of the river. Each is 650 feet long and 8 stories tall. On the Arizona side of the river there are 9 hydro-electric power generators, and there are 8 on the Nevada side. Each generator is 70 feet tall; however, only 30 feet can be seen above ground. There are also six large openings in the cliff wall connected to the diversion pipes downstream from the dam to be used in case there is too much water for the generators, but with 17 hydro-electric generators, the bypass system hasn't been used in several years.

When water coming down from Lake Mead flows through the dam, it is used to generate electricity. The water flows through diversion tubes 2 and 3, and then it flows through penstocks into generators that are inside the power plant just downstream of the dam. When the water hits each turbine it causes the axle of the turbine to spin inside the shaft. The axle turns the rotor, a huge electromagnet, through the stator, a tightly woven coil of wire. This action generates 230,000 volts of electricity and 133,000 kilowatts of power. The entire power plant produces 2.08 million kilowatts of power. This power goes to Los Vegas, Los Angeles, and many other cities.

Hoover Dam is one of the most outstanding dams in the world. The conditions under which it was built were terrible, but it is flawless. It creates essential power for

many cities. Most importantly, it controls the flooding of the Colorado River. Truly, Hoover Dam is the greatest dam in the world.