

U.S. Department  
of the Interior

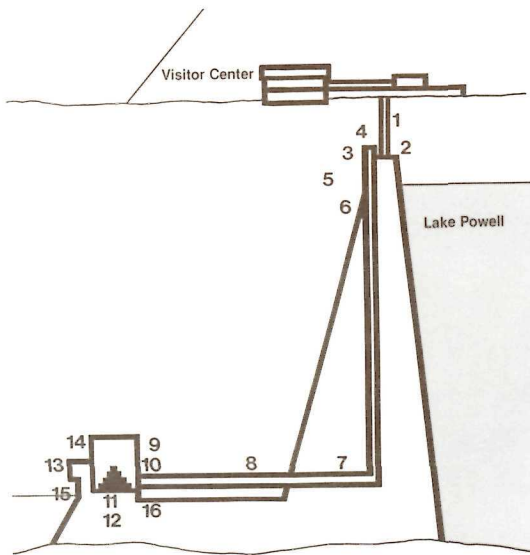
Bureau of  
Reclamation

# Glen Canyon Dam and Powerplant

Self-Guided Tour



## Cross Section of Glen Canyon Dam Showing Tour Stations



### Convenient markers appear on the tour route.

On this self-guided tour you will ride on three different elevators, walk through a tunnel, and cross a bridge. Total walking distance, round trip, is only about  $\frac{1}{3}$  mile ( $\frac{1}{2}$  kilometer).

You may proceed at your own pace, but an average visit takes around 30 minutes. The areas you will visit are safe, but please observe the “No Admittance” and “Restricted Area” signs. These are for your protection. Benches are provided for those who wish to rest along the way.

### Wheelchair Users

With assistance, the tour route is suitable for wheelchair users. There are two short ramps, a long incline, and seven doorways to negotiate, both going and returning. After leaving the Visitor Center there are no wheelchair-accessible restrooms on the tour route.

## **1 Elevator From Visitor Center to Crest of Dam Access Tunnel**

The tour begins on this elevator which will convey you 110 feet (34 meters) down to the level of the crest of the dam.

## **2 Tunnel to Crest of the Dam**

Upon leaving the Visitor Center elevator you will enter a short tunnel, which you will walk through to the crest of the dam.

## **3 The Crest of the Dam**

The crest length of Glen Canyon Dam is 1,560 feet (476 meters). In comparison, the width of the roadway and sidewalks totals 35 feet (11 meters). Embedded in the concrete are rails for the 165-ton (149.7-metric-ton) gantry crane, the high steel structure on top of the dam. The gantry crane is used to install stop logs and remove penstock gates for maintenance. The penstock is a 15-foot (5-meter) diameter steel tube, 500 feet (152 meters) long, which carries water from the lake to the turbine.

## **4 Penstock Gate Chamber**

The small building on the upstream side contains machinery to operate gates on the penstock intakes. The top of the structure can be removed to permit the gantry crane to raise the heavy penstock gates for inspection and maintenance.

You may be interested in noting lake elevations which are posted at various intervals down the edge of the wall.

On both sides of the canyon, you can see channels cut into the canyon walls, creating a “bypass” or spillway intake for the water. These channels can be used when elevation of the lake exceeds 3,648 feet (1112 meters) above sea level.

## **5 Geology of Glen Canyon**

The portion of Glen Canyon you can observe downstream from the dam is typical Navajo sandstone, a thick formation that extends downward about 500 feet (152 meters) below the riverbed. Navajo sandstone is principally solidified sand dunes perhaps 150 million years old. In this section of the canyon the walls are sheer and high, while the cliffs along most of Lake Powell have been eroded into many picturesque formations.

This site was chosen for the dam because the canyon is narrow, the rocks are stable with no nearby faults, and the cost of building the dam was much less here than elsewhere. In the bed of Wahweap Creek, 6 miles (9.7 kilometers) from the dam, was located an ample supply of hard rock aggregate that was mixed with cement and water to make concrete for the dam.

## **6 Elevator Into Dam**

The west side elevator (right side looking downstream) will descend 528 feet (161 meters). The trip will take just over 1 minute. Push the button marked: “Tour.”

## **7 Gallery From Elevator to Powerplant**

Upon exit from the elevator, you will enter one of the dam’s many galleries. The 50°F (10°C) temperature remains constant year-round.

Galleries are necessary in concrete dams for inspection purposes. In this gallery, over 100 feet (30.5 meters) of concrete lie between you and Lake Powell.

## Follow the Signs to the Powerplant

### 8 Bridge From Dam to Powerplant

86,000 square feet (7989 square meters) of grassed area lies between the dam and powerplant, almost 2 full acres (.79 hectares). The big manholes are used to periodically inspect expansion joints in the penstocks which are 20 feet (6 meters) below the surface. A water trough at the base of the dam returns drainage water to the river.

### 9 Visitor Gallery

The Visitor Gallery has a photo montage depicting 10 years of construction of Glen Canyon Dam and Powerplant.

The polished concrete cylinder to your right is a core taken from the dam. It displays the unusual hardrock aggregate from Wahweap Creek bed.

The graphic cut-away exhibit shows the embedment of the penstocks inside the dam. The flow of water through these penstocks turns the turbines which drive the shafts connected to the generators. Glen Canyon Powerplant produces electricity for small cities and rural areas in the Pacific Southwest and Rocky Mountain regions.

To your left is a digital counter which registers the dollars this powerplant is returning to the United States Treasury by the sale of electricity.

Looking through the glass into the big generator room, you will see overhead cranes with a capacity of 300 tons (272.2 metric tons). If you look below to the floor of the generator room, you will see the huge lifting beam assembly which connects the two cranes to lift the 479-ton (434.5-metric-ton) rotor and other parts during disassembly and assembly of the generators.

### 10 Power Generator Room

Glen Canyon Powerplant has eight generators, each costing \$1 million when installed from 1964 to 1966. The plant can be safely operated with a total plant output of 1,150,000 kilowatts. This is enough electricity for a city of approximately 1 million people.

The generators turn at 150 revolutions per minute, generating electricity at 13,800 volts. They are driven by Francis-type reaction turbines, which are connected to the generators by large, vertical steel shafts.

### Turbine Pit and Shaft—Governor Gallery

Take the powerplant tour elevator to the lower level of the plant to view the rotating shaft, turbine gate control, governor gallery, and other operating equipment.

### 11 Turbine Pit and Shaft

The steel shaft is 40 inches (101.6 centimeters) in diameter, weighs 79,500 pounds (36,061 kilograms), and turns at 150 revolutions per minute. It is connected to the generator above and the turbine wheel below. Water passing through the turbine wheel spins the shaft and the generator to which it is connected. About 1.3 million gallons (5,000 cubic meters) of water per minute are passing under your feet at this moment. The many metal arms at the bottom of the pit are hydraulically operated, and open and close the wicket gates to control water flow through the turbine. Load changes are initiated by a computer in the Power Dispatch Center in Montrose, Colorado, by sending impulses over microwave communication channels to equipment that operates the wicket gates.

## 12 Governor Gallery

From this point to the far end of the gallery, or hallway, it is 550 feet (168 meters). There are eight identical units, one for each turbine, spread out down the hallway. The governor units regulate the speed of the turbines.

Proceed to the elevators. Enter the tour elevator and push button marked: "Return."

## 13 Powerplant Transformer Deck

From this outside platform you can view the massive transformers that raise the energy from the generating voltage of 13,800 volts to 230,000 and 345,000 volts for transmission to distant markets. The higher voltage decreases transmission line losses.

Each pair of generators feeds power into a bank of three single-phase transformers. Each of the transformers weighs about 90 tons (82 metric tons) and includes a heavy metal core and windings surrounded by special insulating oil.

## 14 Rock Bolts

To your right, on the canyon wall, are many "rock bolts" which prevent rock slabs from falling. These bolts are 2 inches (5.2 centimeters) in diameter, extend from 45 to 75 feet (14 to 23 meters) in the canyon wall, and are cement grouted.

Mounted on the parapet wall is a sample "rock bolt" with the standard type anchor and the 14-inch-square (5-centimeter) steel plate which is 2 inches thick.

## 15 The Colorado River

Below the powerplant, the river resumes its journey, winding through the lower reaches of Glen Canyon to pass Lees Ferry, 15 miles (24 kilometers) below here and continuing through Marble Canyon and Grand Canyon for a distance of 270 miles (435 kilometers) to reach Hoover Dam where this same water is used again to generate more electricity.

Beyond Hoover dam is a series of Reclamation reservoirs which furnish irrigation water for Arizona and California.

As you look at the canyon from this point, you see it much the same as Major John Wesley Powell viewed it when he named Glen Canyon in 1869.

Glen Canyon Dam has improved water quality in the river by causing sediment to settle. In the channel below the dam, rainbow trout thrive in the clear, cold water. Look to the left canyon wall and you will see the service access tunnel. This tunnel is 21 feet high (6.3 meters) and 22 feet (6.6 meters) wide with a two-lane drive running a length of 2 miles (3.2 kilometers) from the canyon rim. The tunnel is used to bring heavy equipment into the powerplant.

Also on the left, you will observe the outlet valves connected to 8-foot (2.4-meter) penstocks designed to discharge water around the powerplant, should the necessity arise.

## **This Completes the Tour**

Please return to the Visitor Center by proceeding through the powerplant and back to the dam by following the yellow signs marked "Return." We sincerely hope that you have enjoyed your visit!

An impressive view of Glen Canyon Dam may be observed as you exit the Visitor Gallery at marked point "16."

The self-guided tour has been made available through the efforts of the Bureau of Reclamation, an agency of the U.S. Department of the Interior.

## **16 Glen Canyon Dam**

Glen Canyon Dam was constructed in 26 separate vertical blocks by placing successive 7.5-foot (2.3-meter) layers known as "lifts" on top of each other. You can still see the faint horizontal lines between each layer. The first concrete was placed in June 1960; the dam was topped out in September 1963.

In 1964 the American Society of Civil Engineers voted Glen Canyon Dam to be the outstanding engineering achievement of that year. A commemorative plaque is mounted on the wall to the left of the elevator entrance at the top of the dam.

Total cost of the Glen Canyon Project, including the dam, powerplant, access roads, bridge and facilities at Page, was about \$272 million. Most of this money is being repaid, with interest, to the Treasury of the United States by the sale of electricity, amortized over a period of years.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

