

HORSESHOE DAM MODIFICATIONS

Background

Horseshoe Dam, on the Verde River, 58 miles northeast of Phoenix, is an earthfill structure, 202 feet high, with a reservoir capacity of 131,500 acre-feet. Horseshoe Dam was built from 1944-1946 by the Phelps-Dodge Corp. for the Salt River Valley Water Users' Association under a water exchange agreement. Spillway gates were added to the dam in 1949 by the city of Phoenix to increase the domestic water supply. In 1952 the dam was raised 4 feet to elevation 2044.



SAFETY OF DAMS

Reclamation's Dam Safety Program was officially implemented in 1978 with passage of the Reclamation Safety of Dams Act, Public Law 95-578.

Dams must be operated and maintained in a safe manner, ensured through inspections for safety deficiencies, analyses utilizing current technologies and designs, and corrective actions, if needed, based on current engineering practices. In addition, future evaluations should include assessments of benefits foregone with the loss of a dam. For example, a failed dam can no longer provide needed fish and wildlife benefits.

Studies conducted on Horseshoe dam under the 1978 Bureau of Reclamation Safety of Dams Act showed that the dam was considered unsafe by modern engineering standards. Modifications to the dam were necessary because engineers had determined that the probable maximum flood was far greater than originally determined and would result in an uncontrolled release of reservoir waters by breaching the dam. Additionally, it was determined that the dam could not withstand a maximum credible earthquake occurring nearby.

In the event of a dam failure, Bartlett Dam located downstream would also be in danger of failing. The resulting flood could inundate a large area, causing catastrophic consequences to people and property downstream.

Although the likelihood of either event occurring was extremely low, federally-owned dams are required to meet safety standards to withstand probable maximum flood flows and maximum credible earthquakes.

The modifications, which were completed in 1993, resolved dam safety problems on Horseshoe Dam and increased the dam's water release capability.

The modifications included:

- Construction of a fuse plug auxiliary spillway
- A 148,000 cubic yard stability beam at the downstream toe of the dam for earthquake stability
- Crest of dam raised 8 feet with an additional 4-foot parapet to prevent overtopping from wave action.
- Relocation of the dam tender's residence and construction of an operations building, three engine-generator buildings, a chlorination building and a helipad.

The modification construction contract was awarded to Stimpel Wiebelhaus Associates of Redding, California. The building construction contract was awarded to Miller and Associates, Inc., of Rillito, Arizona. The total cost of the project was approximately \$13 million, funded through congressionally appropriated funds allocated to the Bureau of Reclamation's Safety of Dams program.

Horseshoe Dam is operated and maintained by the Salt River Project. The U.S. Forest Service administers recreational facilities at Horseshoe Lake which is located within the Tonto National Forest. Recreational opportunities include fishing, waterfowl hunting, camping, sailboating, limited power boating and other outdoor activities. The Maricopa County Highway Department is responsible for the dam's access roads.

For more information:
Bureau of Reclamation
Phoenix Area Office
6150 West Thunderbird Road, Glendale AZ 85306
623-773-6200

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Dimensions	
Structural Height	202.0 ft
Hydraulic Height (Normal Operating Depth at Dam)	157.0 ft
Top Parapet (Elevation)	2055.0 ft
Spillway Crest Elevation	2000.0 ft
Crest Elevation	2052.0 ft
Crest Length	1652.0 ft (with spillways 1994 ft)
Crest Width	16.0 ft
Base Width	619 ft
Volume of Dam Construction Materials	1,595,780 cu-yds
Streambed at Dam Axis	1894.9 ft
Top of Active Conservation Pool (Elevation)	2026.0 ft
Top of Dead Storage Pool (Elevation)	1915.0 ft (Tunnel intake elevation)
Hydraulics & Hydrology	
Total Water Storage at Elevation	131,500 af at 2026.0 ft
Maximum Water Surface Elevation	2051.9 ft
Normal Water Surface Elevation	2026 ft
Spillway Type	Gate concrete ogee crest
Service Spillway Capacity at Elevation	318,000 cfs at 2051.5 ft
Auxiliary Spillway	Yes
Auxiliary Spillway Capacity at Elevation	240,000 cfs at 2051.5 ft
Uncontrolled Spillway Capacity at Elevation	558,000 cfs at 2051.5 ft
Outlet Works Capacity at Elevation	2200.0 cfs at 2026.0 ft
Drainage Area	5630 sq mi
Hydrometeorological Report (HMR)	HMR 49