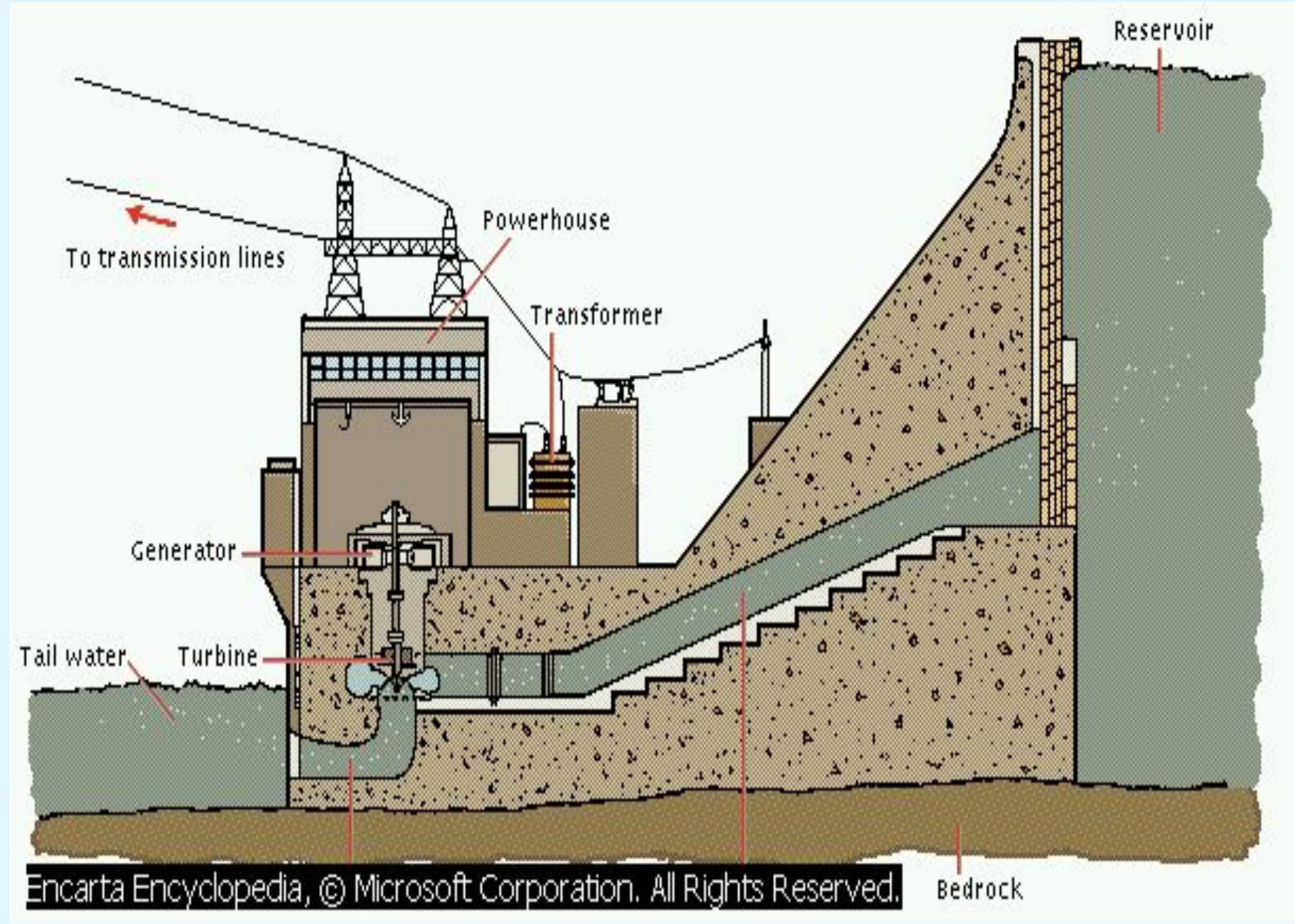
Hydro Electric Power Plant

INTRODUCTION

- In hydroelectric power station potential and kinetic energy of stored water is converted into electric energy .
- For hydro power station factors like rainfall,steam flow available head and storage facilities are studied.
- 25% of electricity generation capacity in world is provided by hydel power plant.
- In the countries like Norvey 99% electricity is produced by hydelpowerplant.

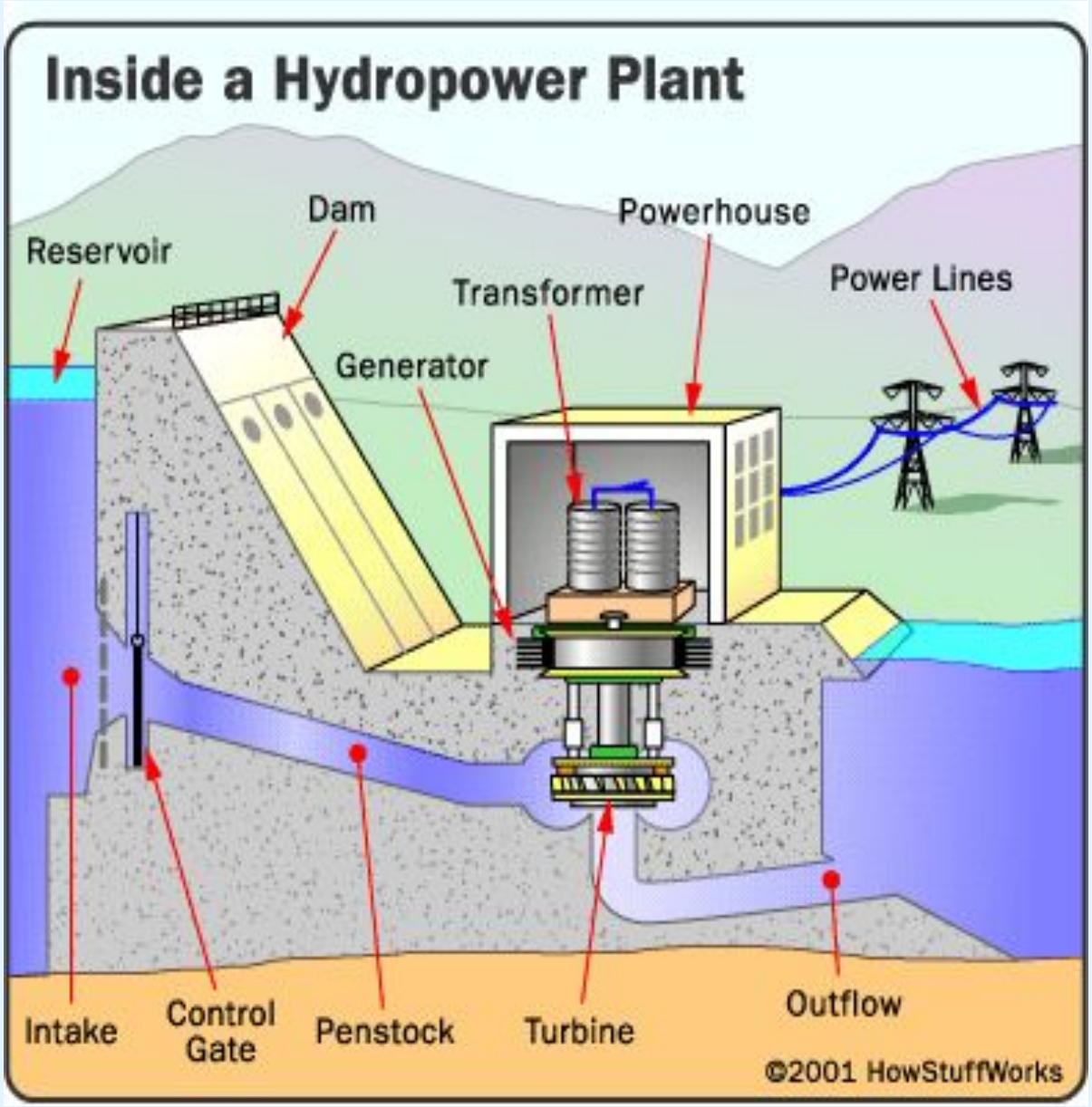
- 4% of the total hydel energy potential in world is in India.
- In India 25.32% of total electricity generation capacity is produced by hydel power plant.
- As per rocords of March-2000 23,816 MW electricity was generated by hydel power plant.
- It is increasing day by day because of the institutes like National Hydro Power Corporation Limited(NHPCL).



PURPOSES OF MULTIPURPOSE HYDROPROJECT

- For irrigation of agricultural land.
- For navigation.
- For fisheries and tourism.
- For flood control.
- For civil water supply.
- For generation of electricity.

BASIC ELEMENTS OF HYDEL POWER PLANT



- Reservoir
- Dam
- Trace rack
- For bay
- Surge tank
- Penstock
- Spillway
- Turbine
- Powerhouse

CLASSIFICATION OF HYDEL POWER PLANT

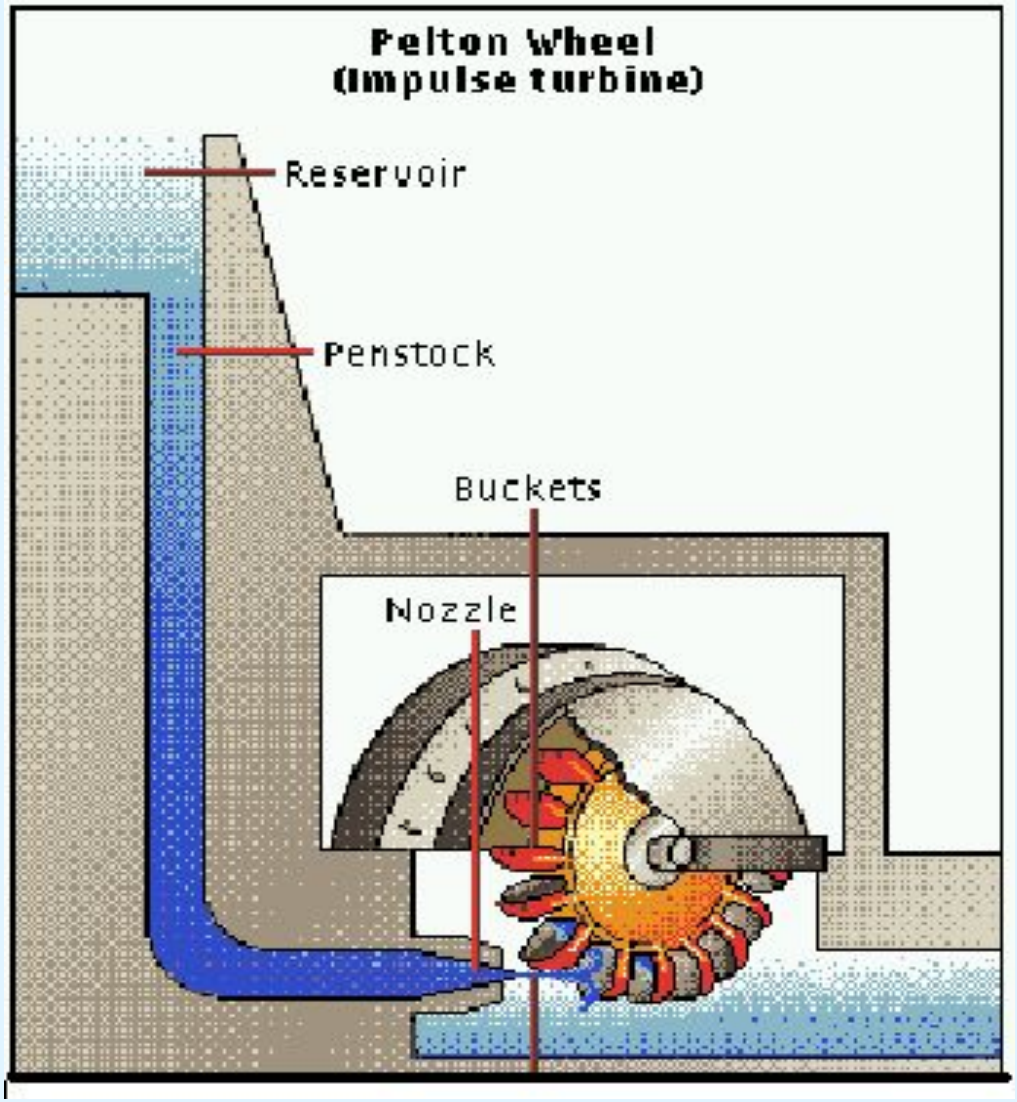
- According to availability of water:-
  a) Run of river plant without pondage
  b) Run-off river plant with pondage
  c) Storage plant
  d) Pump storage plant
- According to head :-
  a) Low head plant
  b) Medium head plant
  c) High head plant
- According to load :-
  a) Base load plant
  b) Peak load plant

- According to plant capacity:-
  a) Microhydal plant (upto 5 MW)
  b) Medium capacity plant (5-100 MW)
  c) High capacity plant (100 MW)
  d) super plant (above 100 MW)
- According to place of power house:-
  a) Surface power house plant
  b) Under ground power house plant
- According to turbine specific speed:-
  a) High specific speed plant
  b) Medium specific speed plant
  c) Low specific speed plant

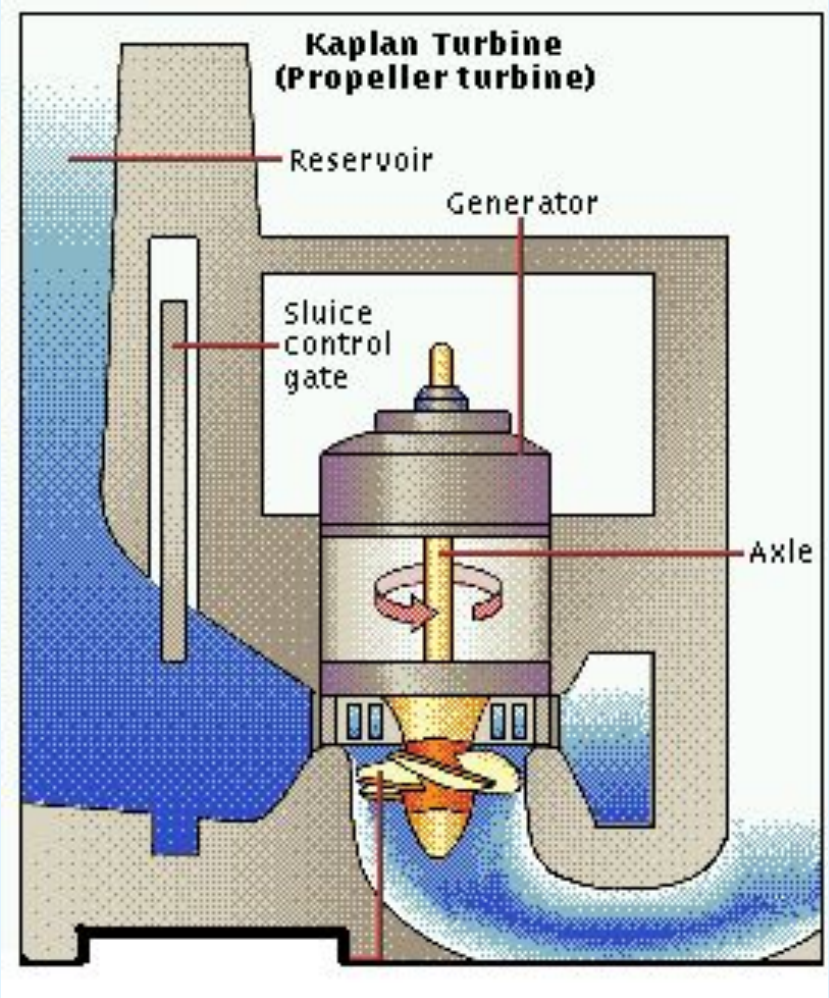
WATER TURBINES USED IN HYDEL POWER PLANT

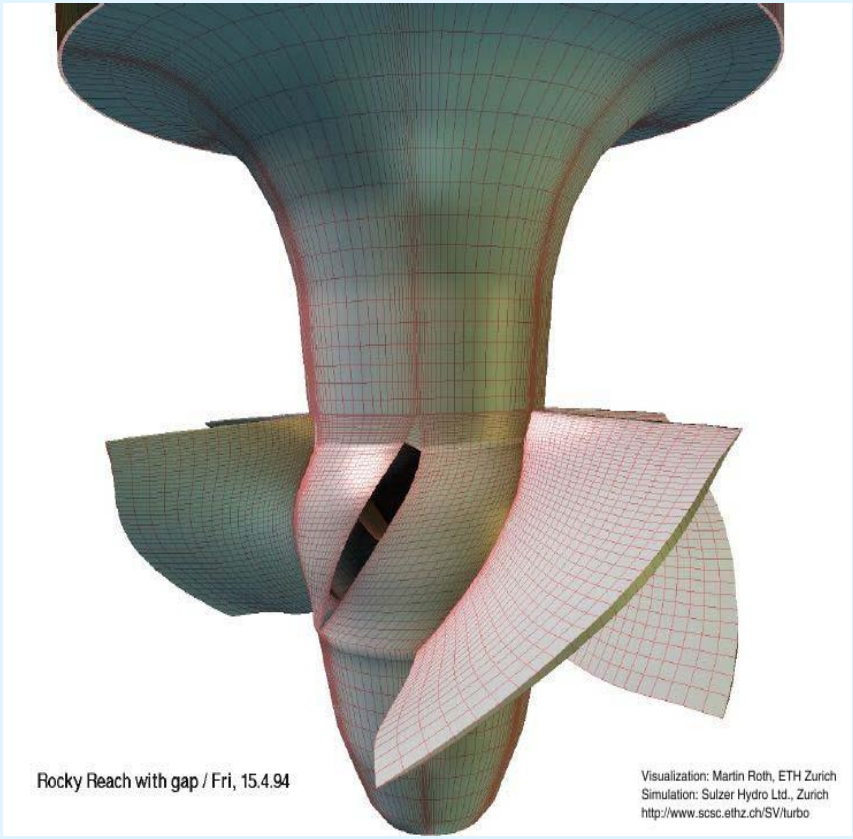
- PELTON TURBINE
- FRANCIS TURBINE
- KAPLAN TURBINE

PELTON WHEEL



KAPLAN TURBINE





ADVANTAGES OF HYDEL POWER PLANT

- This plant is free from pollution.
- Its operation and maintenance cost is less.
- It has no stand by losses.
- Unit cost of power is less.
- Hydraulic turbines can be started speedily.
- The plant has longer service life.
- No fuel is required.
- No change in efficiency with the age.

Disadvantages of hydel power plant

- Initial cost of dam and plant is high.
- The availability of power from it is not much reliable.
- Loss of forest creates environmental problems.
- Due to evaporation , considerable water is lost.
- Time required for construction of hydroproject is more.

AUXILIARIES ATTACHED WITH HYDEL POWER PLANT.

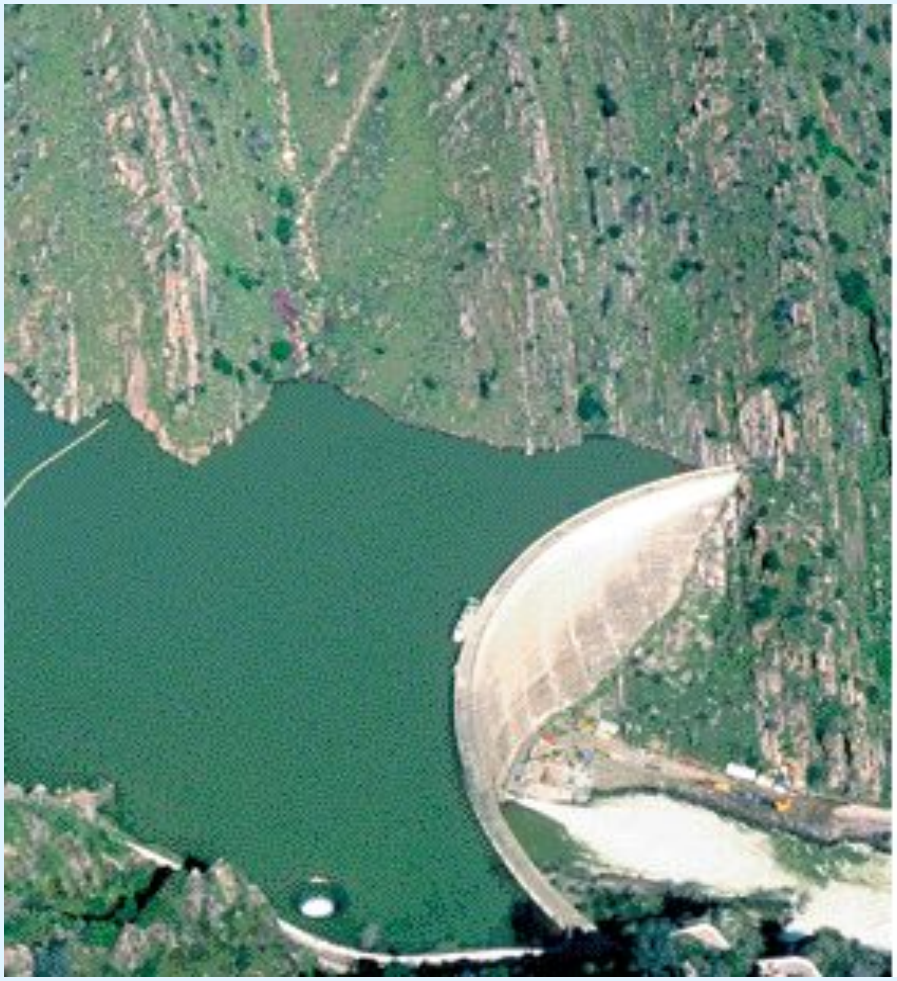
(A)Electrical instruments

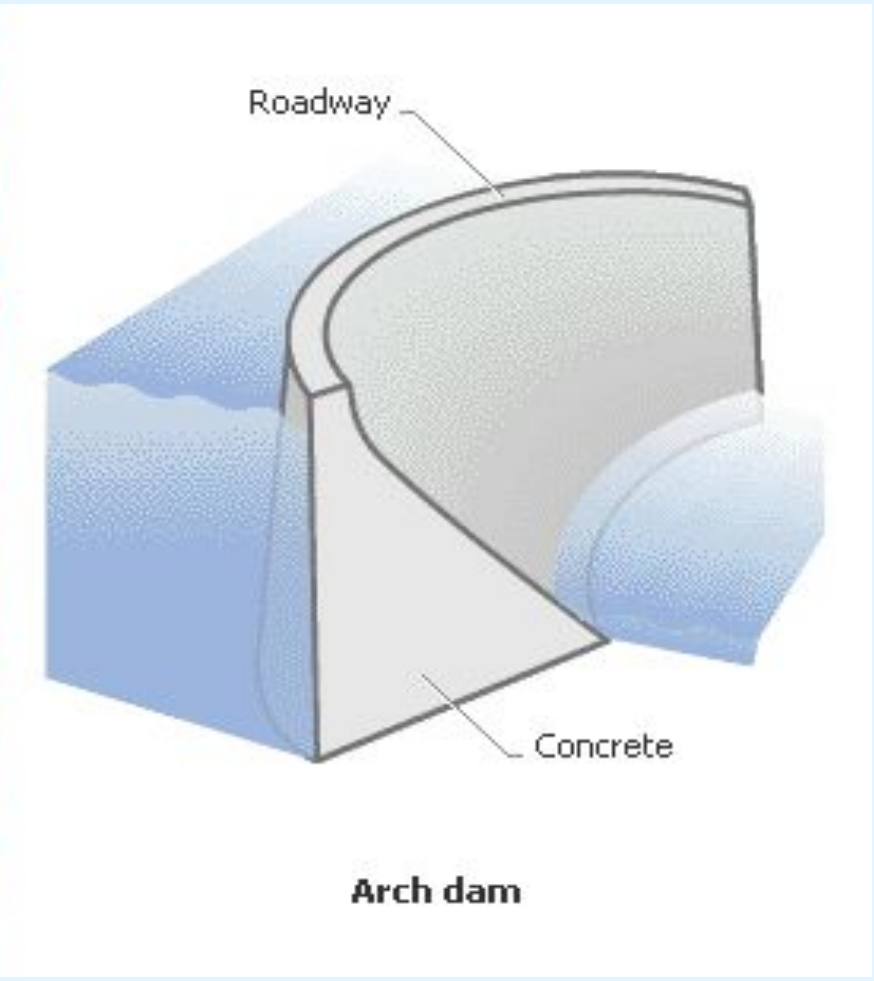
- Generator
- Exciter,transformers
- Switch gears
- Other instruments of control room

(B)Mechanical instruments

- Shaft coupling,journal bearings,thrust bearings
- Lubricating oil system
- Cooling system
- Brake system for generator-turbine shaft

Lets see few of the International Hydel Power Plant Dam…





Arch Dam

Monticello Dam impounds Putah Creek west of Sacramento, California. The solid concrete structure stands 93 m (304 ft) tall. The dam's arched upstream face transfers some of the pressure from its reservoir, Lake Berryessa, onto the walls of the canyon.

Kariba Arch Dam

The Kariba Dam lies along the border between Zambia and Zimbabwe. The facility controls flooding and supplies hydroelectric power to both countries. A public road traces the rim of the dam, between reservoir Lake Kariba and the drop to the Zambezi River. The distinct arch shape distributes pressure evenly on the overall structure of the dam.

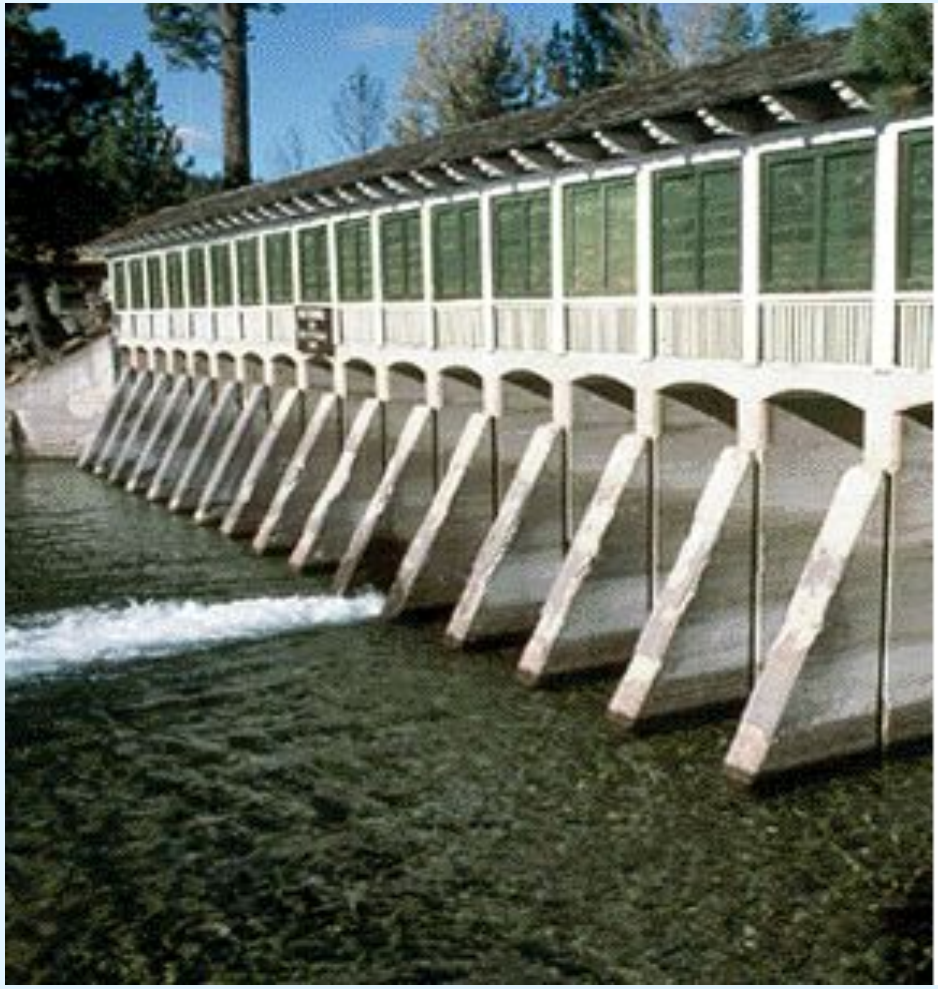
G and P Corrigan/Robert Harding Picture Library

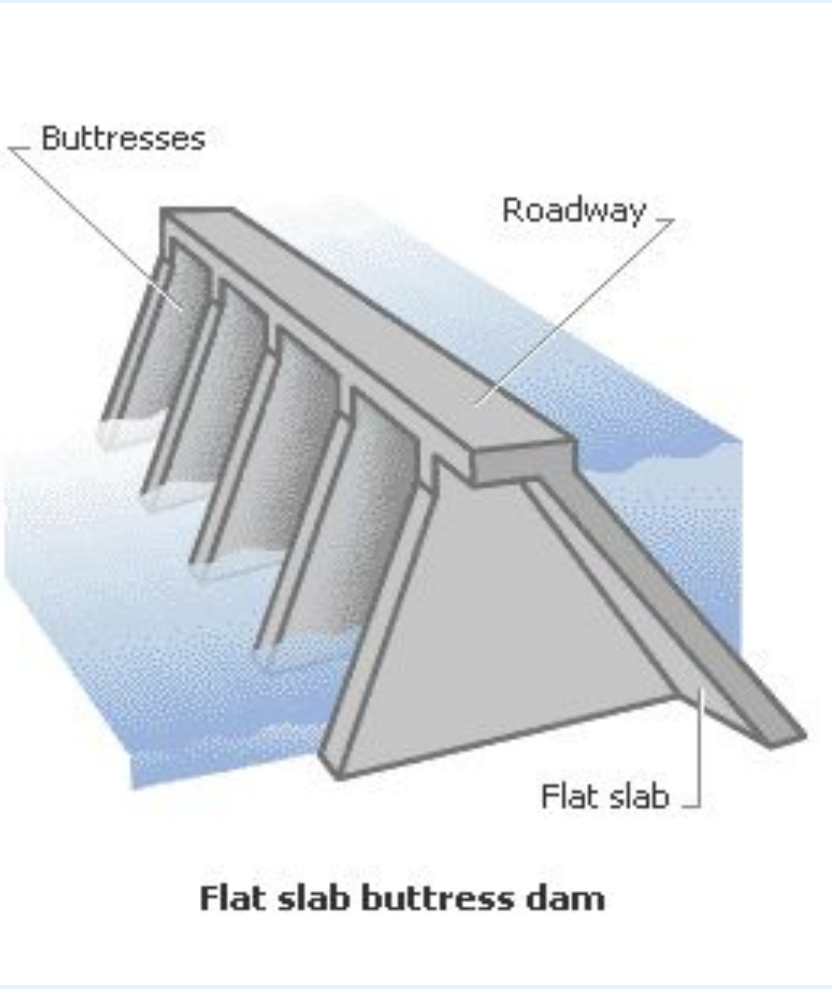
Hoover Dam

The Hoover Dam is an arch-gravity dam on the Colorado River. Its reservoir, Lake Mead, lies between the states of Arizona and Nevada. As an arch-gravity dam, it depends on its shape and its own weight for stability.

Lake Mead

Lake Mead, a vast artificial lake, straddles the border between Arizona and Nevada. The lake was formed by the construction of the Hoover Dam on the Colorado River. During wet periods, it stores excess water until it is needed. Lake Mead has also become a popular area for boating and other recreational activities.

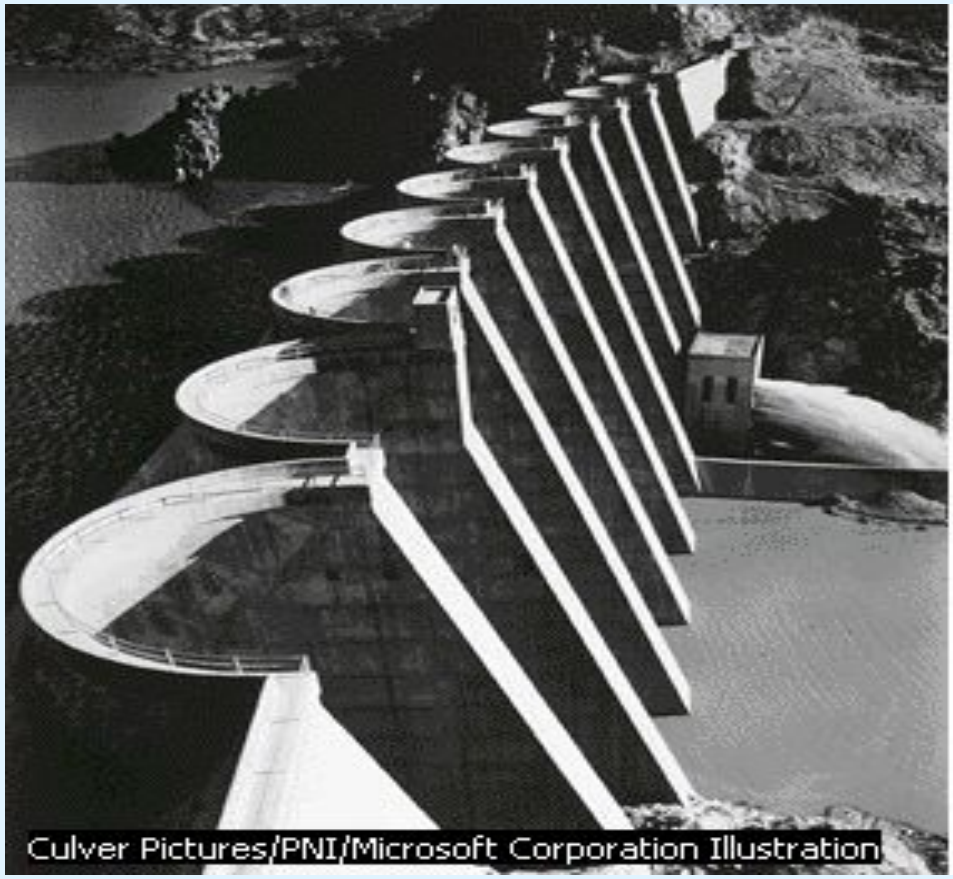


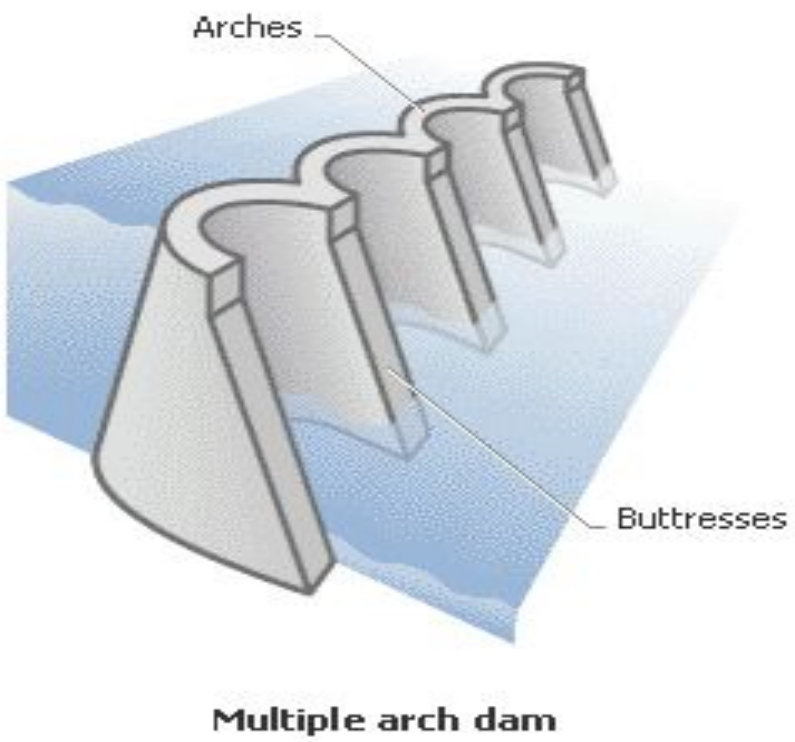


Flat slab buttress dam

Flat Slab Buttress Dam

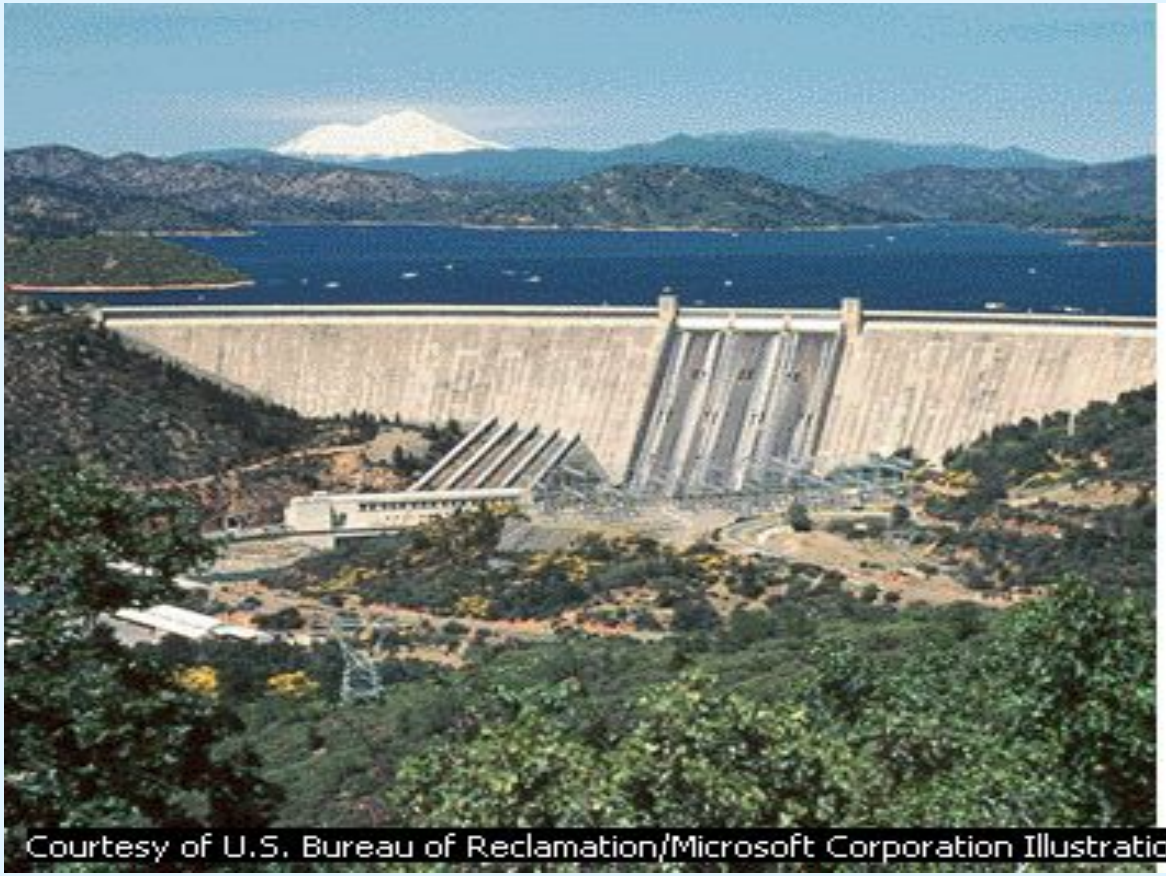
Lake Tahoe Dam impounds the Truckee River in northern California. Like all flat slab buttress dams, it has a flat slab upstream face supported by a series of buttresses on the downstream side. Lake Tahoe Dam measures 5.5 m (18 ft) tall and 33 m (109 ft) long. It was completed in 1913 to raise the water level in Lake Tahoe, a natural lake, to provide additional water for crop irrigation.

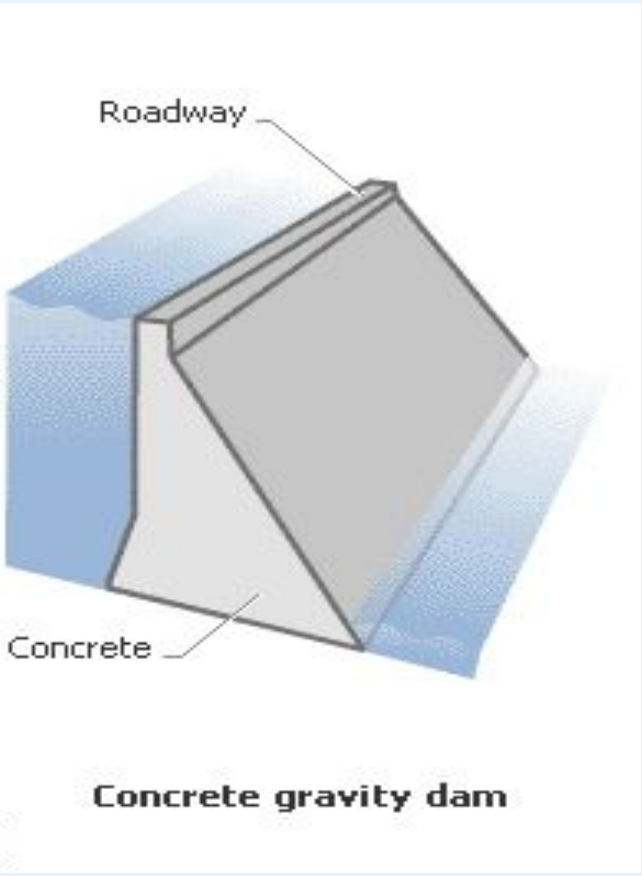




Multiple Arch Dam

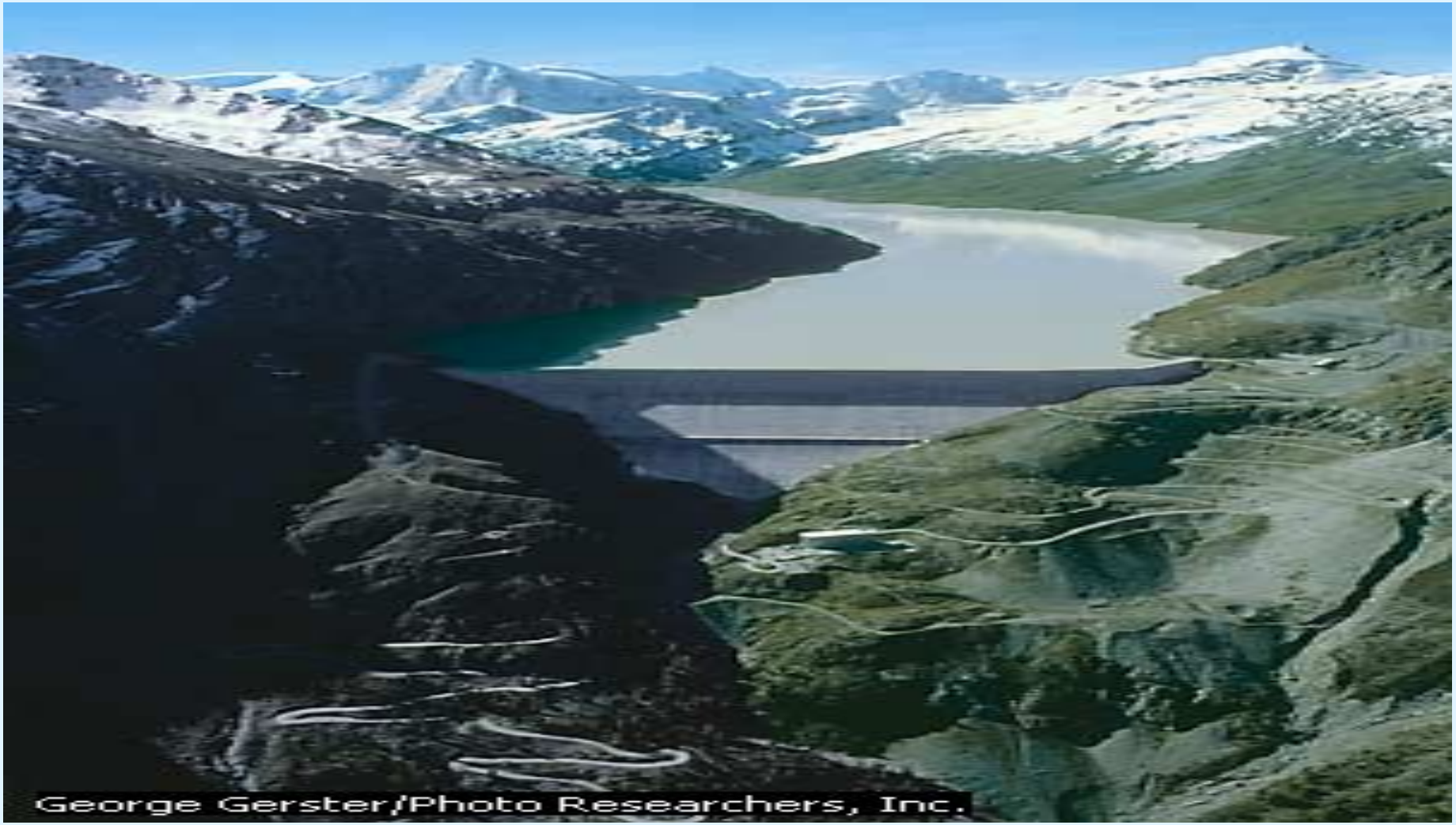
Bartlett Dam impounds the Verde River northeast of Phoenix, Arizona. Like all multiple arch dams, Bartlett Dam makes use of a series of arches supported by buttresses to withstand the pressure of the water in its reservoir, Bartlett Lake. Each of the dam's 10 concrete arches has a 7-m (24-ft) radius and measures 2 m (7 ft) at the base and just 0.6 m (2 ft) at the crest. The thick base provides additional strength at the bottom of the reservoir, where the water pressure is most intense.





Concrete Gravity Dam

Shasta Dam impounds the Sacramento River in northern California. Like all concrete gravity dams, Shasta Dam holds back the water in its reservoir, Shasta Lake, by the sheer force of its weight. Built of solid concrete, the massive structure rises 183 m (602 ft). It measures 165 m (542 ft) at the base and just 9 m (30 ft) at the crest. This shape, typical of concrete gravity dams, counteracts the force of the water pressing against the dam at the bottom of the reservoir, where the pressure is most intense.



Grand Dixence Dam

With a height of 285 m (935 ft), the Grand Dixence Dam in the Swiss Alps is one of the tallest dams in the world. Waterpower generates the majority of Switzerland's domestic electricity and is the nation's most important natural resource.

Raúl Leoni Hydroelectric Plant, Venezuela

Located on the Caroní River in Venezuela,the Raúl Leoni hydroelectric plant provides electricity for the entire country.

The plant was built on the site of a village called Guri and is named for a Venezuelanpresident who served from 1964 to 1968.