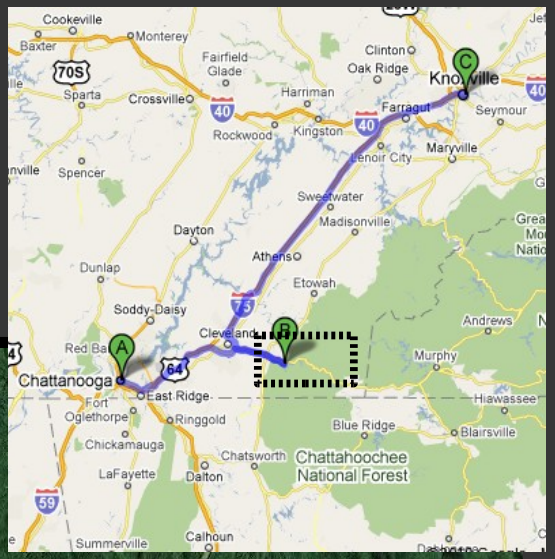
OCOEE NO. 2&3 DAM

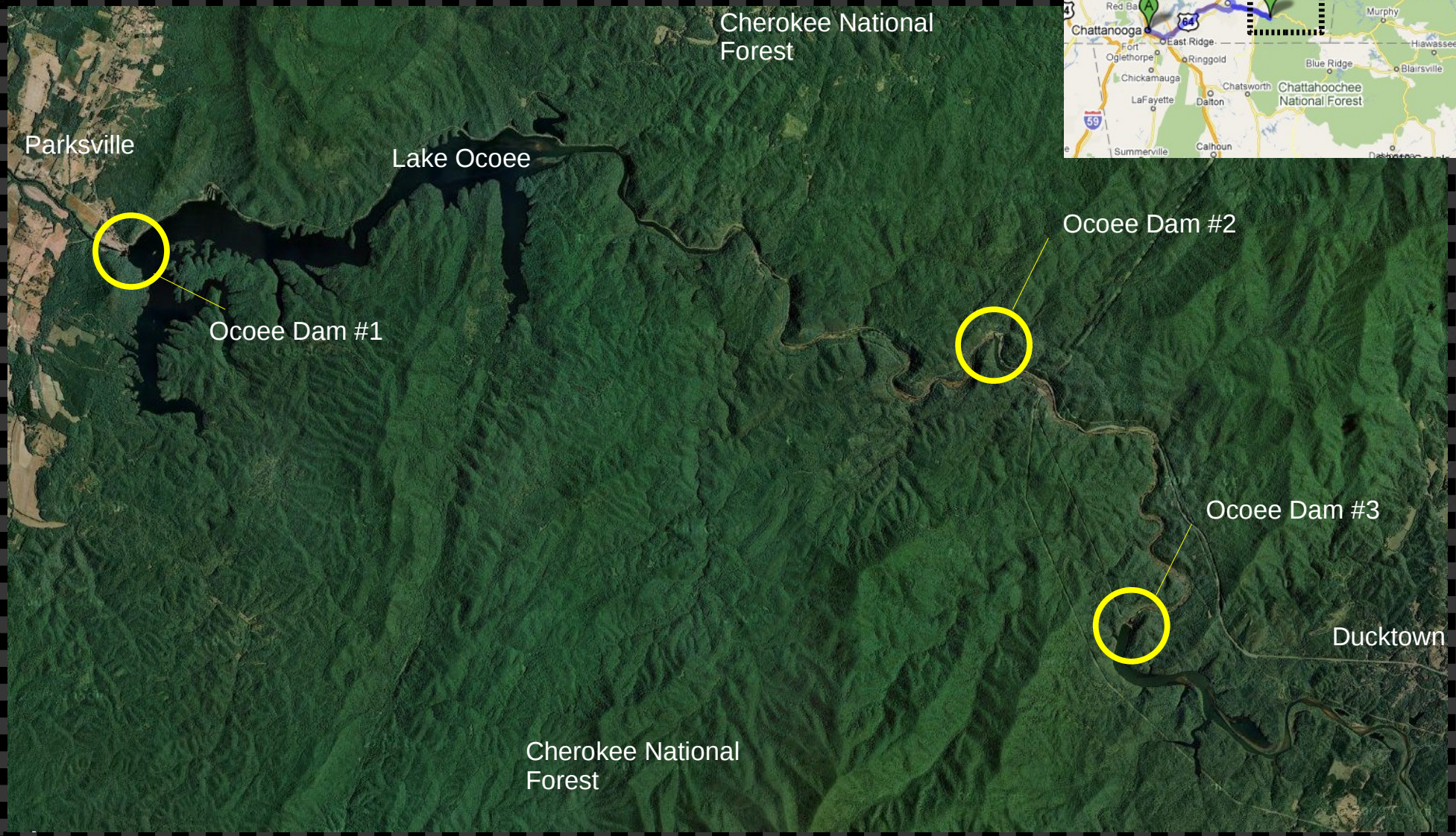
LAR 544 LANDSCAPE ARCHITECTURE DESIGN II

Maudy Budipradigdo

Ocoee Dams

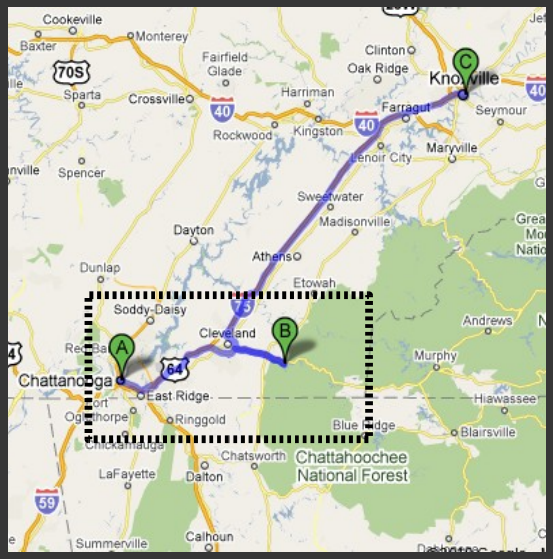
The dams are surrounded by the Cherokee National Forest, and the only major road access is provided via the Ocoee Scenic Byway, a section of U.S. Route 64





Ocoee Dam No.2

History



- Late 19th, early20th – Demand from growth industry in Chattanooga for electric power
- 1910 - Eastern Tennessee Power Company (ETPC) was formed to exploit the Ocoee's hydro-power potential
- 1911 - Ocoee Dam No. 1
- 1913 - Ocoee Dam No. 2; 1942 - Ocoee Dam no.3
- 1922 - ETPC merged with several other entities to form the Tennessee Electric Power Company (TEPCO)
- 1939 - U.S. Supreme Court decision forced the company to sell its assets to the Tennessee Valley Authority

  - The $78 million TVA paid for TEPCO included $2.59 million for Ocoee dam #2
- 1940 - TVA made several improvement which increased the dam's generating capacity by 15 %

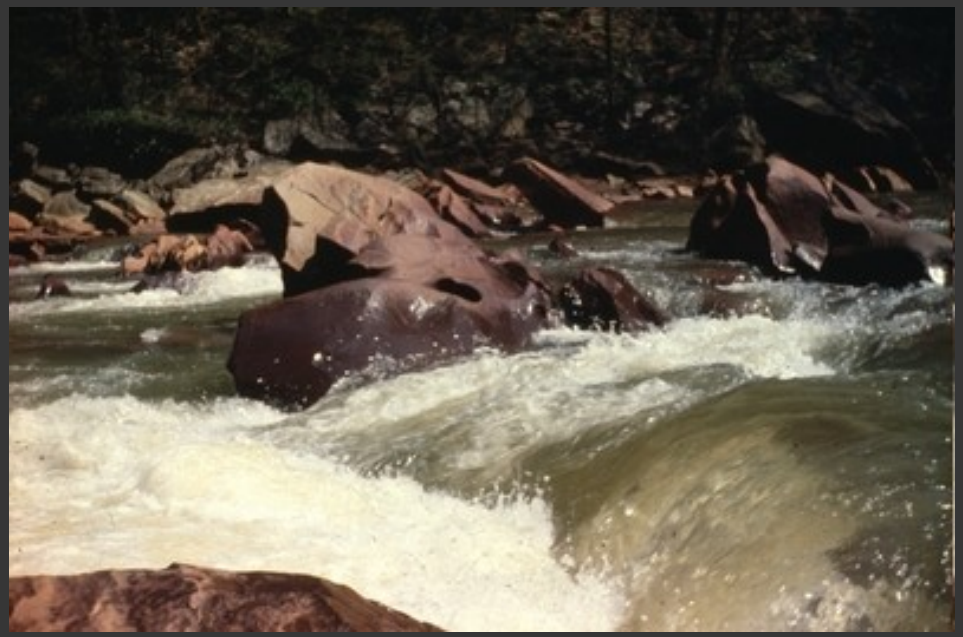
Ocoee Dam No.2

History

- May, 1940 - TVA had generator No. two rewound to take advantage of the more powerful wheel.
- On April 14, 1949 - the governor failed, causing the generator to run away. It finally left the shaft, exploded through the downstream powerhouse wall and caused a number of injuries, on very serious. It was replaced January 25, 1951.
- 1976 - The flume had deteriorated, TVA decided to shut it down
- 1983 - TVA renovated the flume with treated wood, and placed it back in operation
- - A propane-powered tram was built above the flume

Ocoee River

- Fast-flowing stream that originates deep in Georgia.
- Below the site of one of the dams, Ocoee No. 2, the river ran as whitewater down its twisting bed, losing most of its potential energy as it splashed over the rocks.



Design

Wooden “Crib” Diversion Dam

- 10-foot by 10-foot timbers, and filled the crib with stone
- 30 feet (9.1 m) high and 450 feet (140 m) long diversion dam
- 30 feet high dam by itself it didn’t offer much electricity-generating potential.

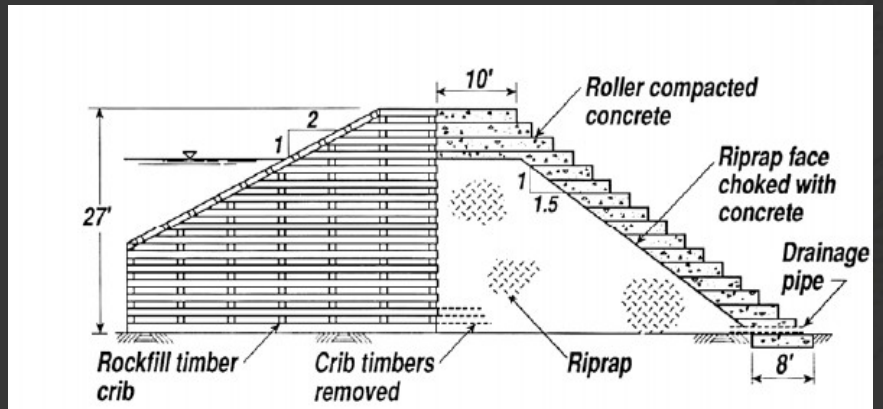
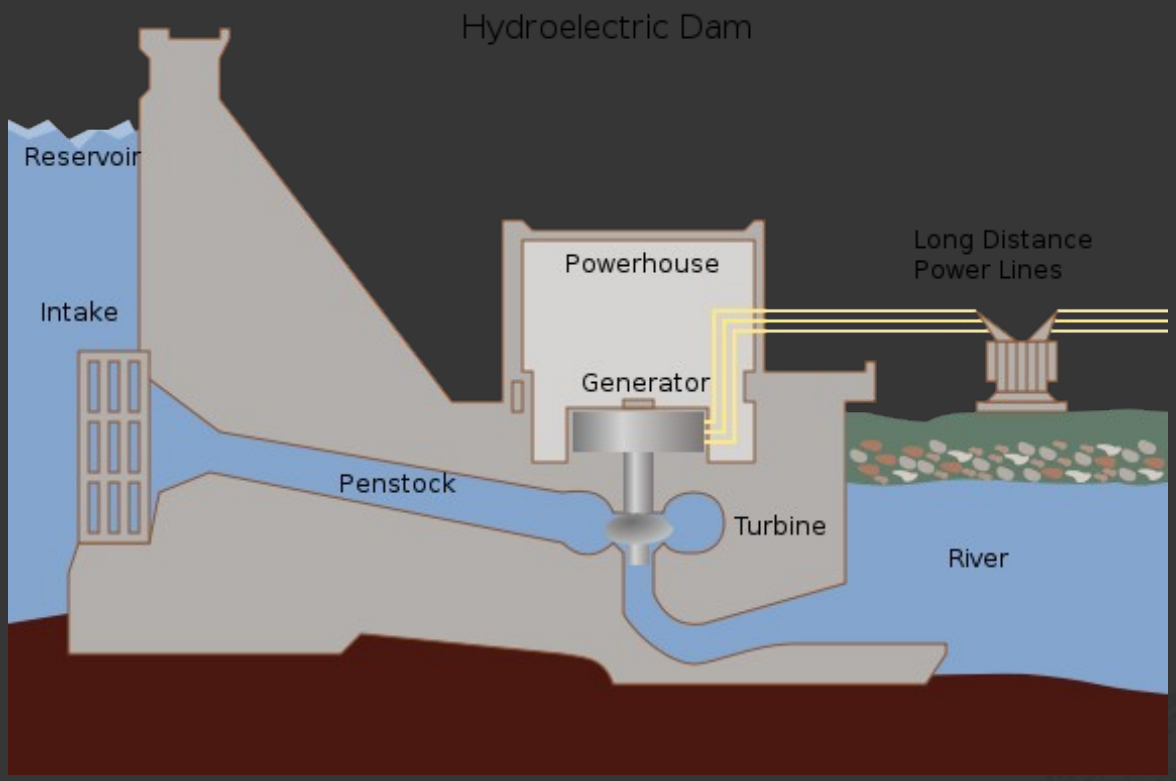


Figure 1. Typical cross section of Ocoee Dam No. 2.

Design

Flume

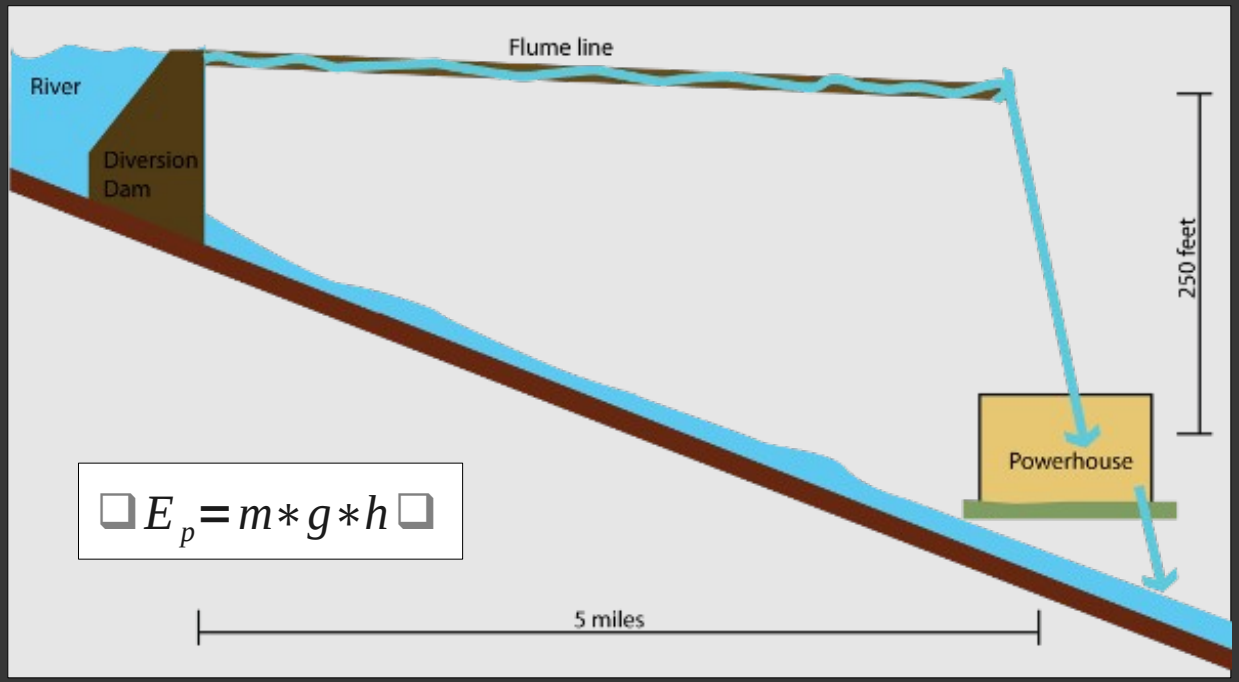
- To utilize the 'extra' 250 feet in elevation potential energy
- 5-mile flume was constructed on the cliffs above the river gorge, which allows just a 19-foot (5.8 m) drop in the water level from the diversion dam to the point at which it spills through the pipes into the powerhouse below

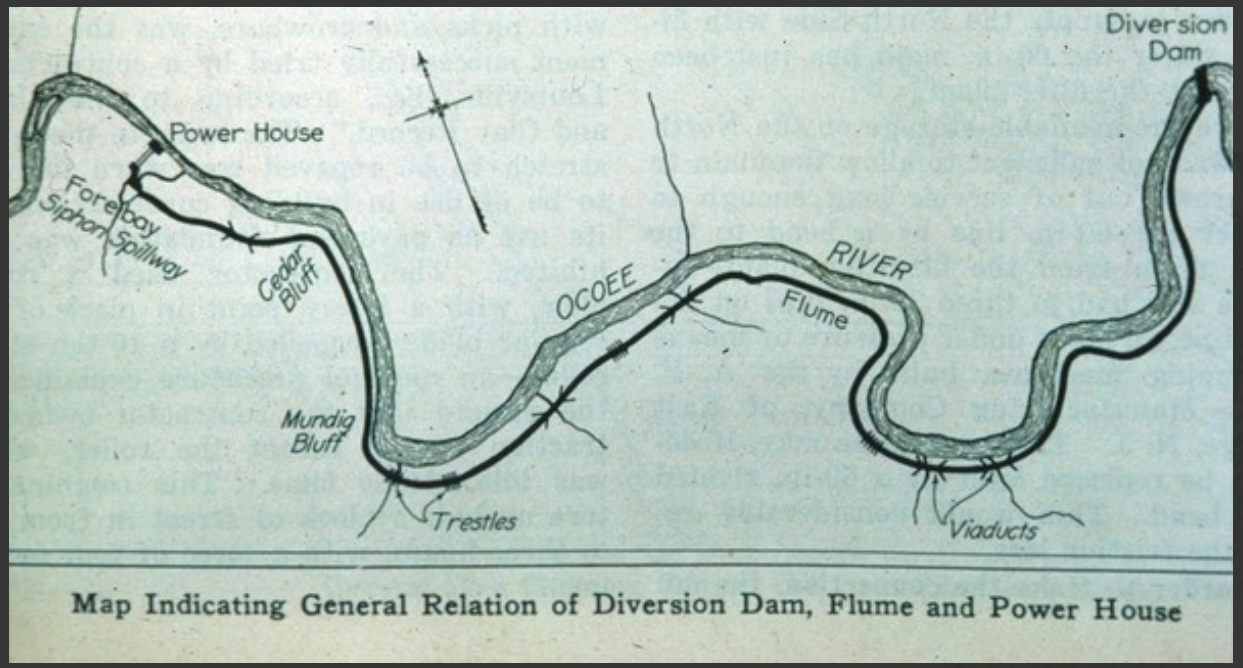


Typical hydroelectric dam

Design

Flume



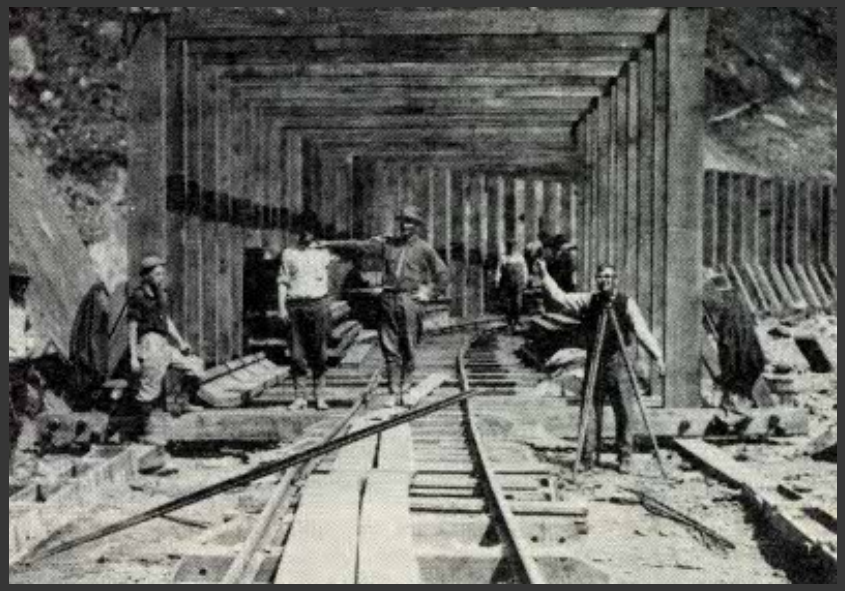


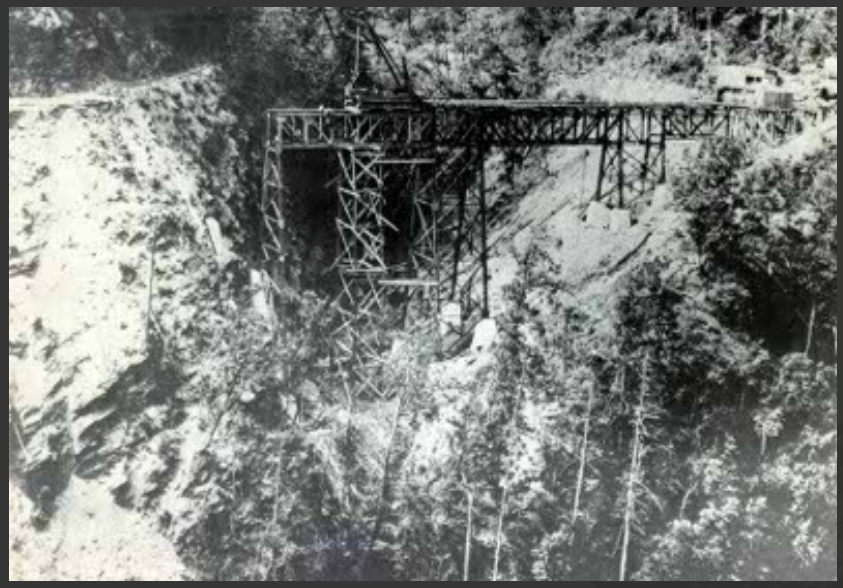
Map Indicating General Relation of Diversion Dam, Flume and Power House

Design

Flume

- Material: over eight million board feet of lumber yellow pine from the forests of Georgia, North Carolina and Tennessee
- Little heavy equipments were used to carve almost 5 miles side of a cliff side of a mountain, such as : mules, wheelbarrows, picks, shovels, and dynamites.
- Needs only nineteen months to finish!

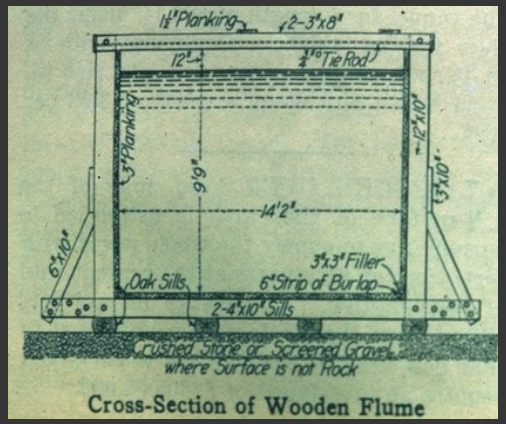




Design

Flume & Steel Trestle

- Size of flume: 14 feet wide and 11 feet deep
- The flume follows natural contours, winds its way along the cliffs overlooking the south side of the gorge, carved out the mountainside.



Cross-Section of Wooden Flume

Design

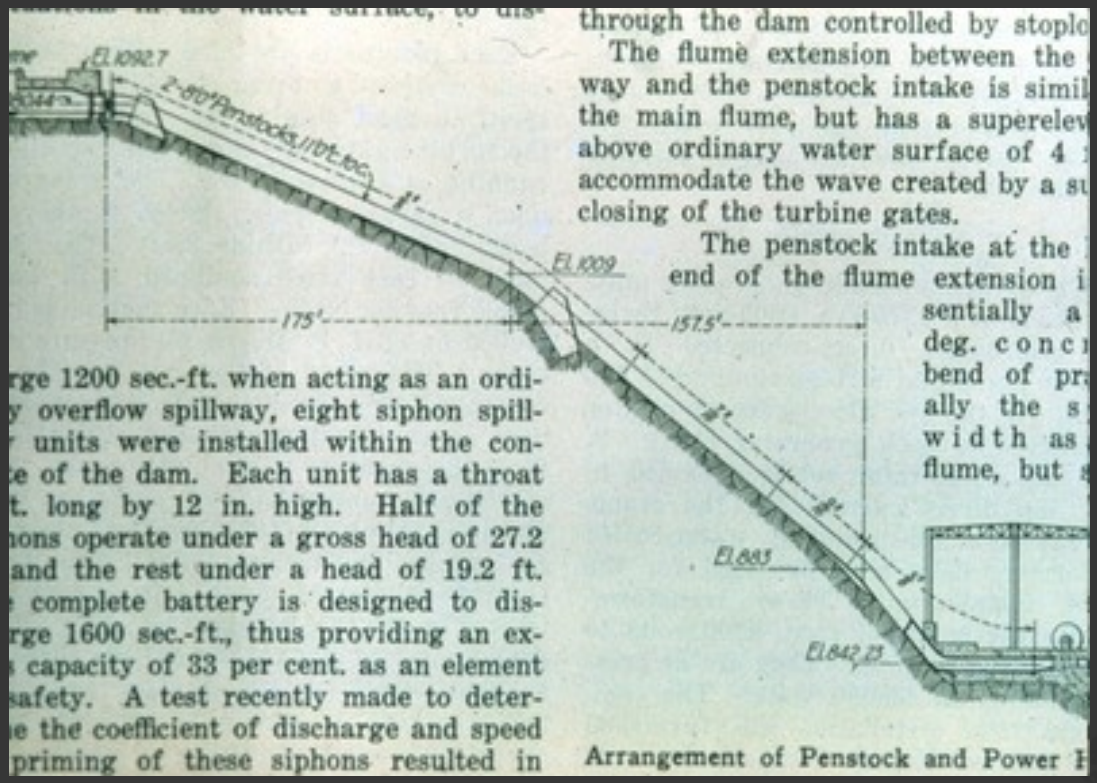
Flume & Steel Trestle

- 10”-wide walkboard and a propane-powered tram was built above the flume to allow authorities to inspect it.
- By 1930 all the trestles were converted to steel.

Design

Penstocks and Powerhouse

- Penstocks coming into the powerhouse to the turbines to make hydroelectric power
- The two units at the powerhouse downstream from the dam have a generating capacity of 135 million kilowatts annually.



through the dam controlled by stoplo
The flume extension between the
way and the penstock intake is simil
the main flume, but has a superelev
above ordinary water surface of 4
accommodate the wave created by a su
closing of the turbine gates.
The penstock intake at the
end of the flume extension i
sentially a
deg. conc
bend of pr
ally the s
width as
flume, but

rge 1200 sec.-ft. when acting as an ordi-
y overflow spillway, eight siphon spill-
units were installed within the con-
e of the dam. Each unit has a throat
t. long by 12 in. high. Half of the
ons operate under a gross head of 27.2
and the rest under a head of 19.2 ft.
complete battery is designed to dis-
rge 1600 sec.-ft., thus providing an ex-
capacity of 33 per cent. as an element
afety. A test recently made to deter-
e the coefficient of discharge and speed
priming of these siphons resulted in

Arrangement of Penstock and Power H

Power vs. Recreation

- September 1976 – the flume had deteriorated and closed for safety reason
- Preservationists, including some sentimental old engineers, saved this monument to early hydraulic engineering - **National Register of Historic Places**
- 1977 – the place became popular to public during May to September. Commercial raft rental being provided.
- 7,000 visits during 1977.
- Recreational potential needed to be considered once the project is restored
- Unfortunately Ocoee no.2 can't be used to support two functions at a time
- Solution: **water release schedule,** 116 recreation days

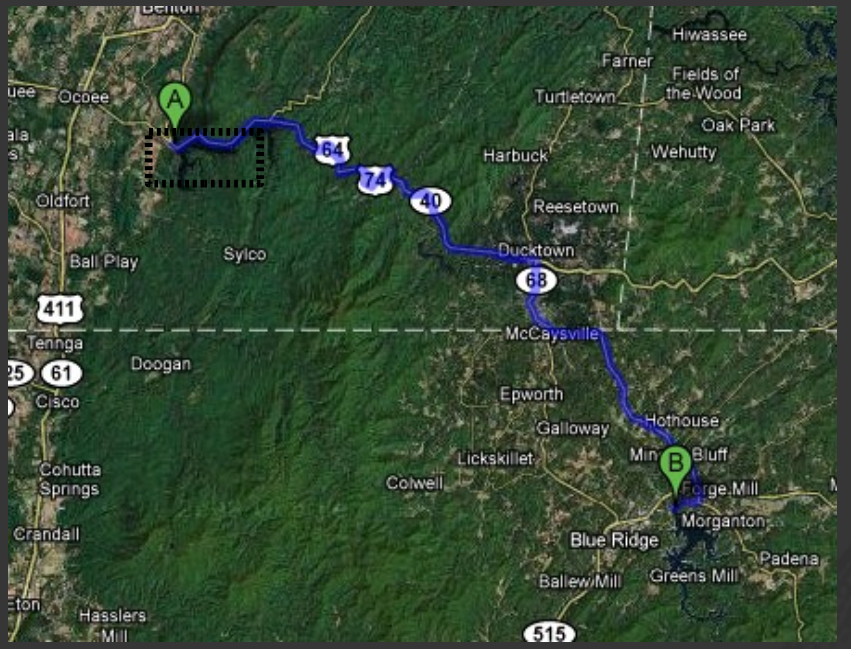
Recreation

- The dam releases help to maintain consistent rapids on the river during warmer months
- This 4.5 mile flume has a gradient of about 60' per mile and with streamflows of about 1,000 ft3/s to 1,400ft3/s, this stretch of the river provides excellent class IV whitewater recreation conditions
- Atlanta Olympic Games 1996 - The whitewater kayaking events were held on between Ocoee dam no. 2 and 3.
- Three type of recreation :
  - General floating use in multiperson rubber rafts
  - Individual open and decked boat or kayak use
  - Competitive events

Ocoee Dam No.3

History

- 1930s - TEPCO purchased the land and water rights for third dam (four including blue Ridge Dam on Toccoa river).
- 1939 - TEPCO sold its assets to TVA
- 1941 - World War II in Europe sparked a need for increased aluminum production at the ALCOA plant in Alcoa, Tennessee.
- August 15, 1942 – dam was completed
- Diversion tunnel was completed in November of the same year, but budget delays prevented the dam's generator from becoming operational until April 30, 1943.



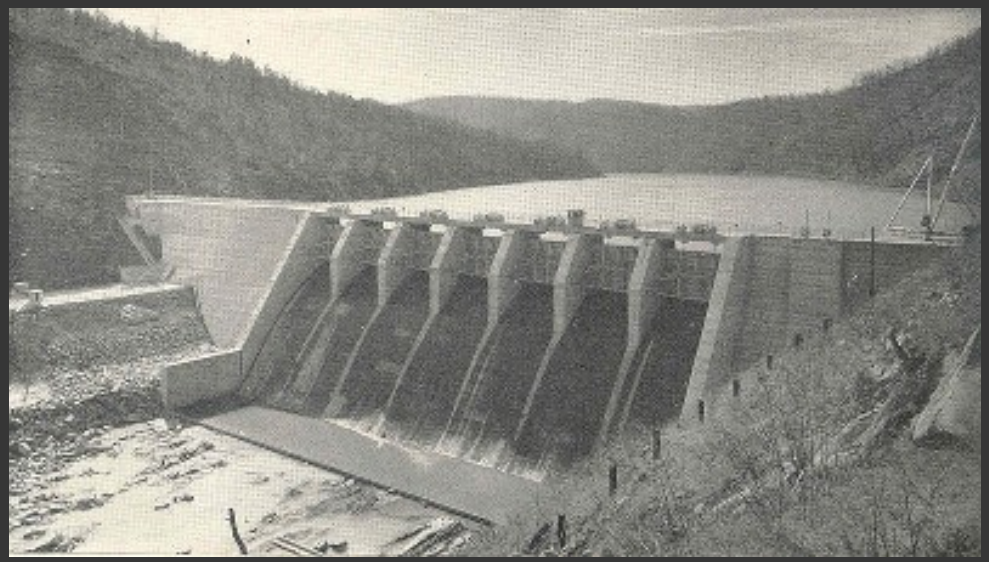
Design

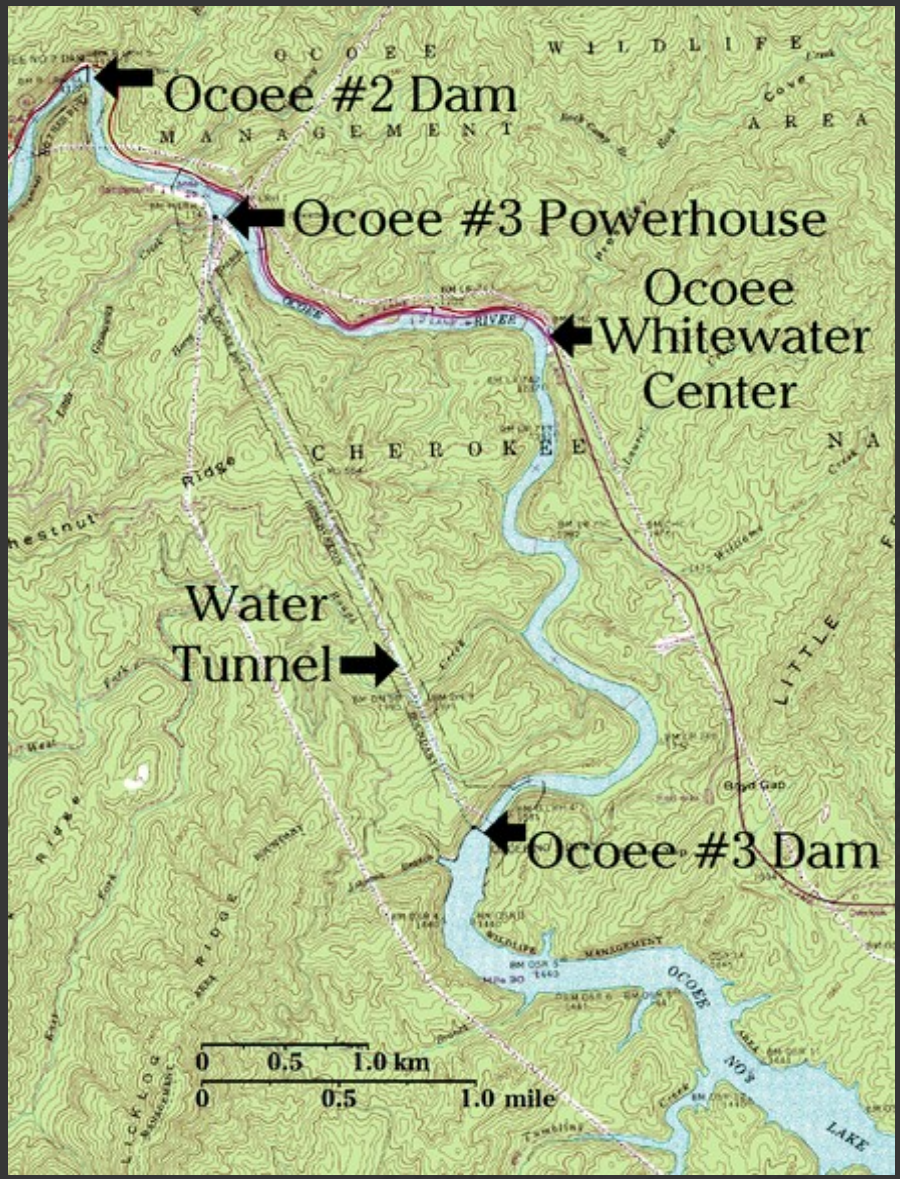
Dam

- The dam impounds the 360-acre (150 ha).
- Concrete gravity diversion-type dam 110 feet high and 612 feet long across the Ocoee River.

Tunnel

- 12-foot (3.7 m) by 12-foot (3.7 m) tunnel carved into the mountainside.

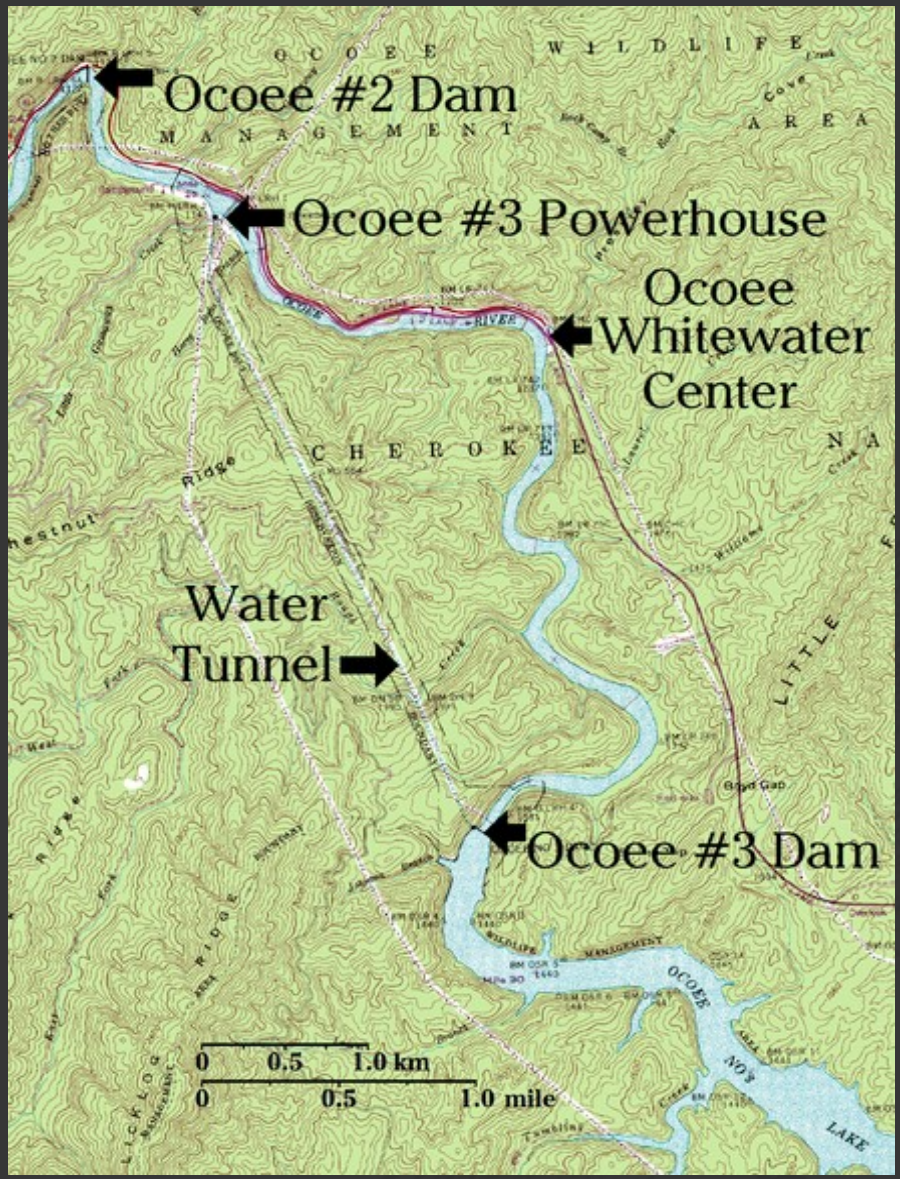




Design

Powerhouse

- 4.2 miles (6.8 km) downstream from the dam in order to obtain maximum utilization of the elevation loss along this stretch of the river.
- The water emerges from the tunnel at a point 2.5 miles (4.0 km) from the reservoir intake and drops 180 feet (55 m) through a steel penstock to the powerhouse's lone turbine.

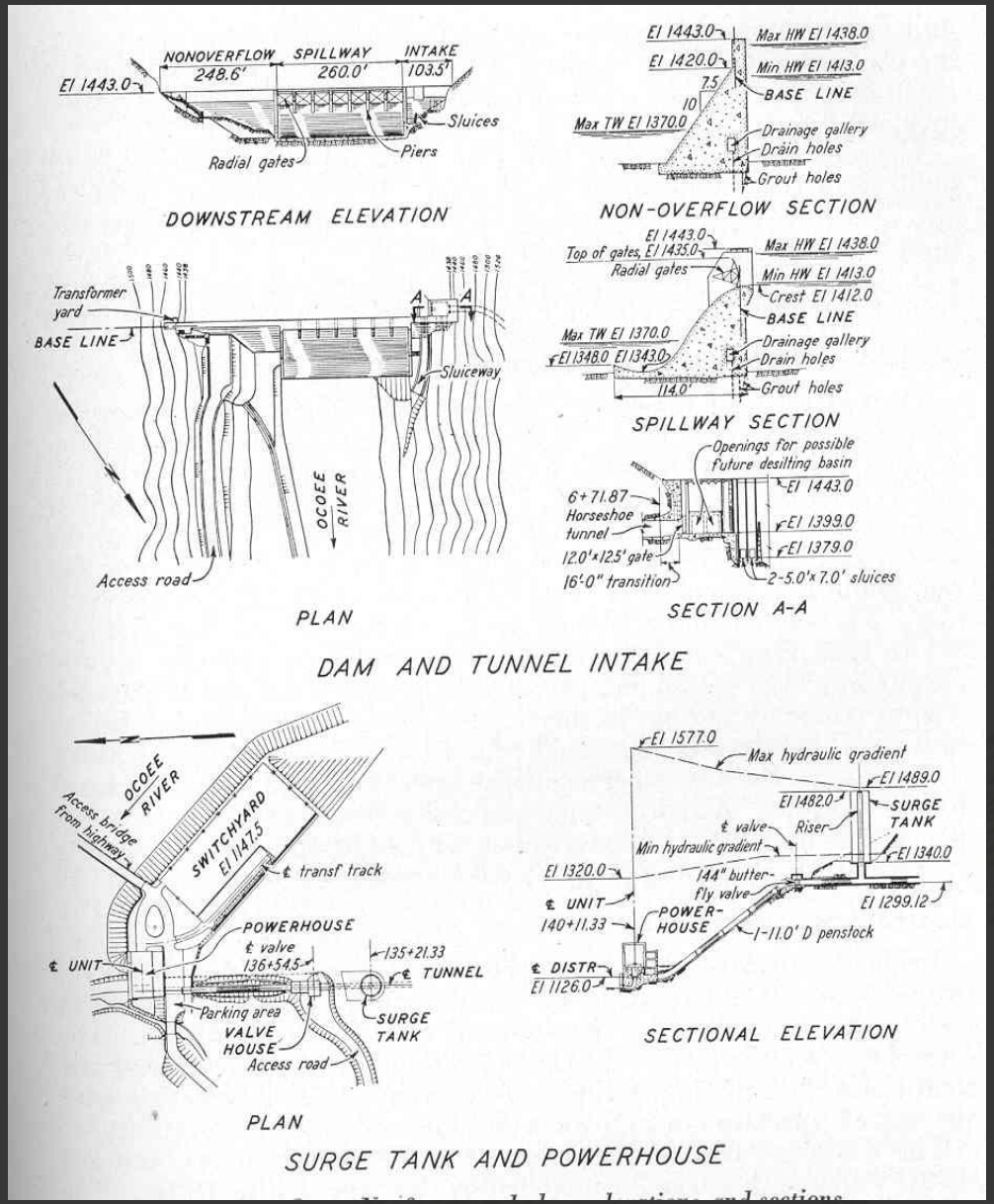


Capacity

- This dam has a generating capacity of 28,800 kilowatts.
- The dam's concrete overfall spillway has a discharge capacity of 95,000 cubic feet per second, 1,560 cubic feet of which is via the dam's two 5-foot by 7-foot sluice gates located near the bottom of the dam.

Recreation

- Multi-purpose dam, has water release schedule.
- Major recreational releases are typically scheduled for weekends during the Summer months



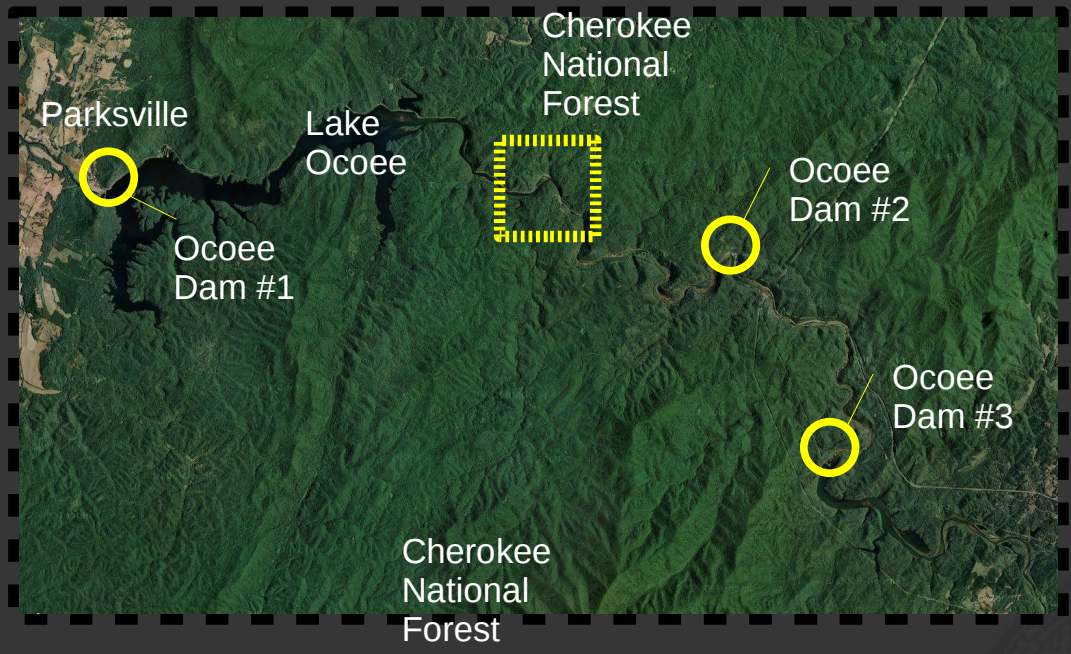
Recreation

- The Upper Ocoee riverbed had remained dry throughout most of the 20th century. The Ocoee Gorge is wider at this point, allowing ample room for spectators.
- This upper stretch was shallow and too wide to generate the desired intensity for whitewater slalom.
- With the Ocoee approximately 100 miles north of Atlanta, all three of these factors made the Upper Ocoee the ideal place to host the 1996 Summer Olympics Whitewater Slalom competition.
- Course designers rechanneled the riverbed to create an Olympic course one-third the width of the original riverbed.
- Sandstone boulders harvested from the area shaped the course banks and venue, some weighing up to seven tons each.

Caney Creek Village

History

- 1918 - Tennessee Electric Power Company built the village for the use of employees of its Power Plant No. 2
- Named for the nearby stream on which cane grew.
- The most historically popular community in the area.

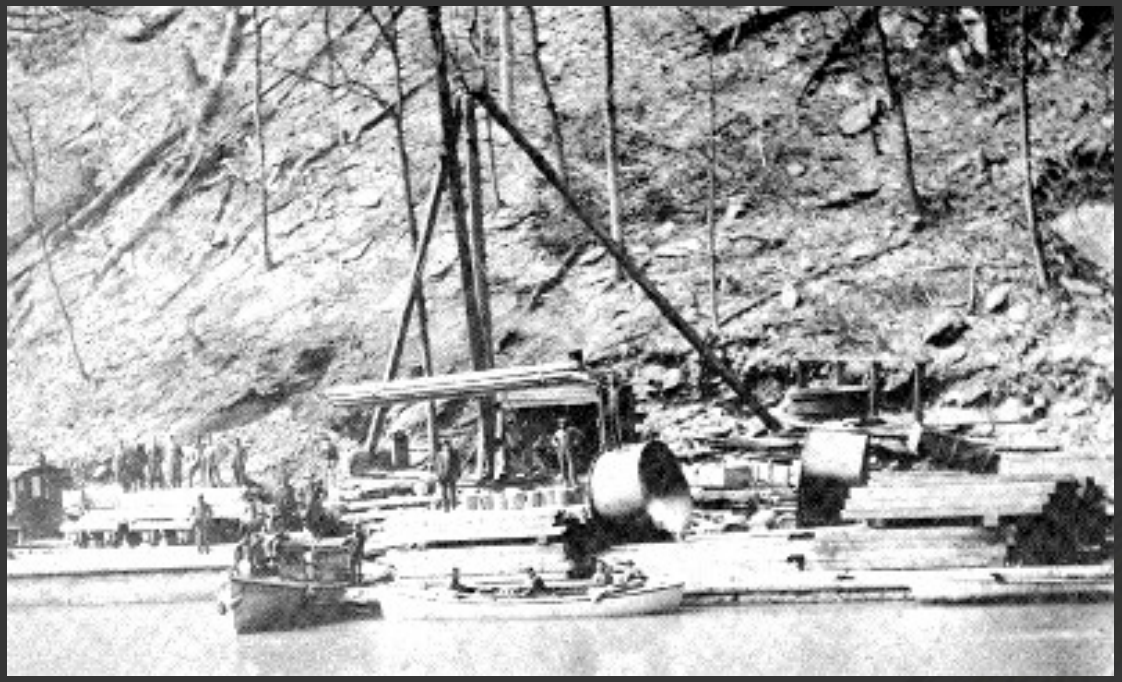


- The village had concrete sidewalks, electric street lights, city water, fire hydrants, telephones and a tennis court. The water was pure and clean. Houses had refigerators, electric cook stoves and bathrooms. Ice was brought in daily and the commissary was well stocked.
- It had a two-story hotel with at least 10 rooms. It was only rented to company officials or new residents who were waiting for the homes to be ready. All of the food supplies were stored at the hotel. Twenty-five children attended the one-room school. The older children were bused to the high school in Benton.
- Anything one had was shared by all.

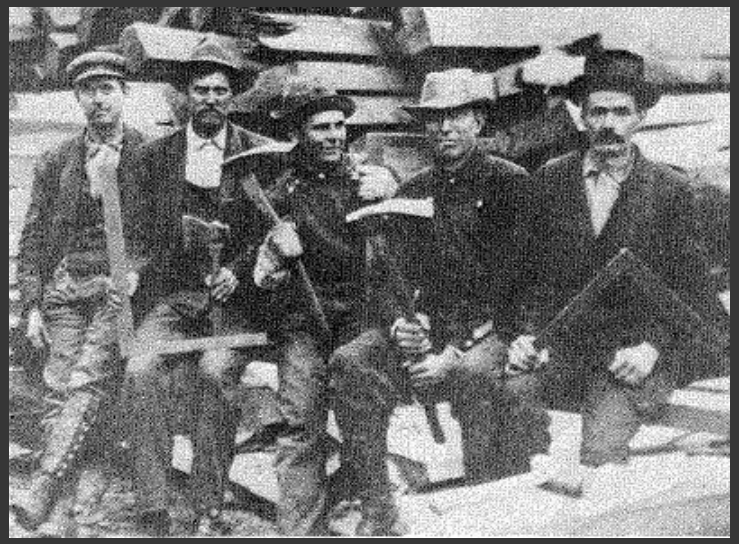
Caney Creek Village

Transportation

- Fifteen families lived at Caney Creek and their only way in and out of the village was to cross the Ocoee River, either by boat or by a 150' suspended bridge
- The village was once featured in Ripleys Believe It Or Not in the 1920s and 1930s for being the one village in the United States in which no automobile or horse-drawn vehicles had ever traveled through.
- To get to Caney Creek the residents would go by car to Parksville, transfer to boat for about ten miles, then on to the dinky train and home.



Caney Creek Village



Village at Ocoee No. 2.

The Village's Future

- In 1938-39 the Tennessee Valley Authority was to acquire the company that first provided electricity to Knoxville, Chattanooga, Cleveland, Tennessee.
- TVA policy: not to furnish its employees residences, according to statements of officials.
- Government claimed the village as “too socialistic”
- 1941 - This move saw the families forced to leave the village. Only a few rock walls and many memories remain.
- The TVA has also notified the occupants of the residences at Parksville, Ocoee No 1. plant, to vacate.
- Within the past 21 years there have been only two deaths by sickness."

Sources

- Samuel Rogers' personal collections
- http://www.tva.gov/sites/ocoee2.htm
- http://en.wikipedia.org/wiki/Flume
- http://www.tva.gov/heritage/littledam/index.htm
- http://en.wikipedia.org/wiki/Ocoee_Dam_No._3
- http://www.rootsweb.ancestry.com/~tnmcmin2/Ocoee.htm
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- http://www.panoramio.com
- http://genealogytrails.com/tenn/polk/Caney_Creek.html