

II - DESCRIPTION OF PROJECT

2-01 Location

Carbon Canyon Dam is located near the northern edge of Orange County, California. The dam is approximately 4 miles east of the city of Brea and approximately 12 miles north of the city of Santa Ana (pl. 1-1). The drainage area above the dam is 19.3 square miles and is encompassed entirely within the Puente and Chino Hills (pl.2-1). Carbon Canyon Creek flows in a generally southwesterly direction onto the coastal Orange County Plain, joins Coyote Creek, and then flows into the San Gabriel River.

2-02 Purpose

Carbon Canyon Dam's primary purpose is for flood control in the Carbon Canyon Creek drainage basin. In conjunction with Brea and Fullerton Dams, Carbon Canyon Dam is vital for the flood protection of portions of the coastal plains in Orange County, including the cities of Brea, Fullerton, Placentia, and Anaheim. The storage allocation for debris and flood control purposes at Carbon Canyon Dam is shown on plate 2-2.

Currently, no facilities for the generation of hydroelectric power at Carbon Canyon Dam exist, nor are any contemplated. Furthermore, no navigation of any sort is allowed should the reservoir become full.

2-03 Physical Components

a. Embankment. The dam is a compacted impervious earth-fill structure. It is 2610 feet long at the crest, with a crest width of 20 feet. The maximum height above streambed is 99 feet. The crest of the dam extends from north to south for about 750 feet, then continues in a southeasterly direction for about 1860 feet. The upstream slope protection consists of a 6-inch filter blanket overlain by a layer of dumped stone 1.5 feet thick. The part of the downstream toe of the dam that extends across the valley floor has toe protection consisting of a 6-inch filter blanket overlain by a stone facing approximately 2 feet thick. Both upstream and downstream faces have a slope of 1 vertical on 3.25 horizontal. A 200-foot wide berm runs parallel to the axis of the dam on the upstream side, having side slopes of 1 vertical on 3 horizontal.

The general plan, typical sections, and real estate limits are shown on plate 2-3. Photographs of the embankment are shown in figure 2-1.

b. Spillway. The spillway is a detached, concrete, broad crested weir structure, trapezoidal in cross-section. Looking in the downstream direction, it is located on the left side of the canyon, with a crest elevation of 475 feet, NGVD. The discharge capacity of the spillway at the PMF surcharge elevation of 491.9 feet is 31,200 ft³/s. The spillway structure consists of an approach channel, a reinforced-concrete control section, a reinforced-concrete chute, and flip bucket. The spillway approach channel is an unlined trapezoidal channel about 535 feet long. It has a bottom width of 100 feet and side slopes of 1 vertical on 1.5 horizontal. Grouted stone gutters are

installed on the top of the side slopes to take care of side drainage. The control section, which connects the approach channel to the spillway chute and flip bucket, consists of a concrete lined trapezoidal channel 50 feet long. The bottom width varies from 100 feet wide at station 14+50 to 125 feet wide at station 15+00. The side slopes vary from 1 vertical on 1.5 horizontal at station 14+50 to 1 vertical on 2.25 horizontal at station 15+00. Grouted stone gutters at the top of side slopes, which take care of side drainage, terminate in the upper reach of the spillway chute. The spillway chute is a concrete-lined trapezoidal channel with a base width of 125 feet, a length of 500 feet (including flip bucket), and side slopes of 1 vertical on 2.25 horizontal. The downward slope of the invert from the spillway crest at station 15+00 to station 17+00 is 0.115, and from station 17+00 to the flip bucket at station 19+65.66 is 0.14. The flip bucket is an energy dissipator located at the base of the drop structure. Spillway seepage control measures consist of a concrete cutoff wall extending about 7 feet below the invert of the spillway approach channel and a concrete cutoff wall extending about 1.5 feet below the slab at the downstream end of the spillway channel. A steel sheet piling wall and a 10-foot deep apron of derrick stone protect the downstream end of the spillway against undermining. Details, dimensions, and other information related to the spillway are shown on plate 2-4. Figure 2-2 shows photographs of the spillway.

c. Reservoir Outlet. The outlet works are entrenched in the right abutment when looking in a downstream direction, and consists of an approach channel, an intake tower, a transition, an outlet conduit, a control room, a floatwell, an access bridge, and a standby generator house. The outlet works are founded on soft bedrock, except for a short length of conduit at the downstream end, which is founded on alluvium. The approach channel consists of reinforced-concrete retaining walls 15 feet apart and about 80 feet long. Rack bars are provided just upstream from the gates to prevent sunken logs and other material from entering the intake structure. The bars have been modified by the addition of hinges which allow them to be lifted for maintenance purposes. The intake tower is a reinforced concrete structure, 18 feet by 20 feet inside and approximately 82 feet high. It provides access to the gate cylinders and hydraulic pipe lines. A reinforced-concrete transition structure, 77.3 feet long, lies between the two rectangular gated passages and the single rectangular outlet conduit. The rectangular outlet conduit is a reinforced concrete structure 471.7 feet long. It is 4.75 feet wide and 7 feet high. The conduit is constructed in sections 20 feet long with a slope of 0.004444. Rubber water stops are provided between the sections. The maximum capacity of the outlet conduit is 1270 ft³/s at a reservoir water surface elevation of 475 feet at the spillway crest with both gates open. Plate 2-5 shows pertinent information pertaining to the reservoir outlet works. Figure 2-3 is a photograph of the Carbon Canyon Dam outlet works.

d. Water Supply Facilities. Carbon Canyon Dam's operational objective is to maximize flood protection. This objective is to be accomplished by operating Carbon Canyon Dam to release all flood waters as rapidly and safely as possible. Miller Retarding Basin Complex and other flood retarding basins are located further downstream. The operation of Carbon Canyon Dam in conjunction with this water conservation is discussed in section 7-09.

2-04. Related Control Facilities

OCEMA maintains a series of flood retarding basins along the Carbon Creek Channel downstream of Carbon Canyon Dam (pl.2-6). These basins are used to retard flood flows in the urbanized area downstream of Carbon Canyon Dam. The Carbon Canyon Diversion Channel serves to relay water from the Miller Basin Complex to the Santa Ana River. Miller Stilling Basin, the most upstream of the facilities, is the location point from which flow from Carbon Canyon Channel is diverted into Carbon Canyon Diversion Channel or Carbon Creek Channel. During periods of low flow, water is directed into the Diversion Channel, which flows into the lower Santa Ana River Channel and its attendant groundwater recharge facilities. Higher flows which fill Miller Basin are directed into Carbon Creek Channel and flow west into the next series of retarding basins on their way to the San Gabriel River Channel.

2-05 Real Estate Acquisition

Carbon Canyon Dam and Reservoir project lands comprise 321.76 acres as shown on Plate 2-3.

2-06 Public Facilities

A variety of recreation facilities exist within Carbon Canyon Reservoir, although none of these is dependent on a permanently maintained pool. Development is limited to the reservoir area outside of the 33.8 acre debris pool. Permanent buildings, such as the administration and maintenance buildings are constructed at or above the future condition 50-year flood elevation (439.5 ft, NGVD). Within the basin the existing facilities include: 3 multipurpose sand fields (volleyball), 3 general purpose fields (baseball, soccer), 8 tennis courts, and a tot lot and children's play area. An equestrian, hiking, and biking trail system extends through the park. Three restrooms and 9 picnic areas are scattered throughout. A 0.75 mile long road provides access into the park area, with parking available in 6 separate areas. Table 2-1 indicates current facilities in the reservoir with their respective elevations.

Table 2-1

List of Recreational and Other Facilities, including elevations, in
Carbon canyon Regional Park

NAME OF FACILITY OR REFERENCE	ACRES	RANGE OF ELEVATIONS (FT., NGVD)
1. Parking Areas:		
#1	-	457.5 - 459.5
#2	-	454.2 - 460.79
#3	-	445.5 - 454.0
#4	-	447.5 - 450.0
#5	-	420.0 - 424.0
#6	-	418.9 - 419.97
2. Visitor Center/ Administration Bldg	-	462.5
3. Tennis Courts	1.32	
4. Playlots	0.70	449.7 - 453.26
5. Lake	3.24	434.0 - 438.0
6. Group Picnic Area	-	431.0
7. Volleyball Courts	-	434.0
8. Bicycle/Hiking Trail	-	426.0
9. Equestrian/Hiking Trail	-	454.5 - 495.0
10. Picnic Ramadas:		
#1	-	448.5
#2	-	435.0
#3	-	438.5
#4	-	453.0
#5	-	453.0
#6	-	432.5
#7	-	432.5
#8	-	421.5
#9	-	435.0
11. Rest Rooms:		
#1	-	452.5
#2	-	453.0
#3	-	460.5
12. Maintenance Building		457.4
13. Oil Pumping Station*	-	440.0
14. Storage Shed	-	-
15. Multi-Purpose Field	6.5	420.0 - 428.0
16. Redwood Grove	10.0	-

* Flood Proofed.