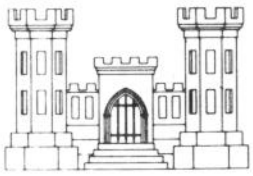
WHITE RIVER WATERSHED

BEAVER LAKE

WHITE RIVER, ARKANSAS

DESIGN MEMORANDUM NO. 13-4

UPDATED MASTER PLAN FOR DEVELOPMENT AND MANAGEMENT OF BEAVER LAKE



DEPARTMENT OF THE ARMY
LITTLE ROCK DISTRICT, CORPS OF ENGINEERS
LITTLE ROCK, ARKANSAS
JULY 1975

ARMY-LITTLE ROCK, ARK.

SWDPL-R (SWLED-PV 11 Aug 75) 3d Ind
SUBJECT: Beaver Lake, White River, Arkansas, Design Memorandum No. 13-4, Updated Master Plan for Development and Management of Beaver Lake

DA, Southwestern Division, Corps of Engineers, Main Tower Building, 1200 Main Street, Dallas, Texas 75202

23 FEB 1976

TO: District Engineer, Little Rock

Subject Master Plan is approved subject to comments in the previous indorsements.

FOR THE DIVISION ENGINEER:

Barry G. Rought

1 Incl
nc

BARRY G. ROUGHT
Chief, Planning Division

CF:
HQDA (DAEN--CWO-R) (dupe) wo/incl

DAEN-CWO-R (11 Aug 75) 2nd Ind
SUBJECT: Beaver Lake, White River, Arkansas, Design Memorandum No. 13-4, Updated Master Plan for Development and Management of Beaver Lake

DA, Office of the Chief of Engineers, Washington, D.C. 20314 12 Feb 76

TO: Division Engineer, Southwestern
ATTN: SWDPL-R

1. The submitted Master Plan is approved subject to Division comments and the following:

a. The continued development of small expensive tailwater camping areas should be discouraged.

b. Scientific nomenclature should be used in association with common names when reference is made to flora and fauna to relieve any confusion associated with colloquialism.

c. The introduction of placing long term easement locations on Master Plan plates is commendable and this office would encourage the practice be extended to future master plan submittals. This practice will prove beneficial in reviewing future real estate actions.

FOR THE CHIEF OF ENGINEERS:

2 Incl
1 wd
2 nc

GEORGE BRAZIER
Chief, Construction-Operations Division
Directorate of Civil Works

SWDPL-R (SWLED-PV 11 Aug 75) 3d Ind
SUBJECT: Beaver Lake, White River, Arkansas, Design Memorandum No. 13-4, Updated Master Plan for Development and Management of Beaver Lake

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23 FEB 1976

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HQDA (DAEN--CWO-R) (dupe) wo/incl

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FOR THE CHIEF OF ENGINEERS:

2 Incl
1 wd
2 nc

GEORGE BRAZIER
Chief, Construction-Operations Division
Directorate of Civil Works

23 OCT 1975

SWDPL-R (SWLED-PV 11 Aug 75) 1st Ind
SUBJECT: Beaver Lake, White River, Arkansas, Design Memorandum No. 13-4, Updated Master Plan for Development and Management of Beaver Lake

DA, Southwestern Division, Corps of Engineers, Main Tower Building, 1200 Main Street, Dallas, TX 75202 22 OCT 1975

TO: HQDA (DAEN-CWO-R)
WASH DC 20314

1. Forwarded, recommending approval of the land use portion of the subject master plan, subject to the following comments:

a. Section VII. Discussion of the dual allocation "Operation: Wildlife Management Areas Recreation - Intensive Use" (see Plate 6) should be included in this section. In this regard, Bear Creek Island should be discussed under the dual allocation.

b. Para 7-01b, next to last sentence. The current policy is stated in EC 11-2-119. This should be corrected.

c. Para 7-01d. Rather than quote the ER definition of the natural area allocation, the area should be described, particularly the unique resource to be protected.

d. Para 7-01f.

(1) First sentence of this subparagraph should be deleted. It is recommended that the last sentence of this paragraph read "The erection of certain other structures on flowage easement lands may be permitted subject to the written approval of the District Engineer."

(2) The discussion of Lake Shore Management Plan appears to be out of context under the heading of "Easement Lands." This should be discussed in a management section, added for same.

e. Plate 6, Legend. The "Operations: Wildlife Management Areas" designation should be orange. This should be corrected.

2. Those portions of the plan pertaining to development and management of the project resources are approved, subject to the inclosed

SWDPL-R (SWLED-PV 11 Aug 75) 1st Ind 22 OCT 1975
SUBJECT: Beaver Lake, White River, Arkansas, Design Memorandum No. 13-4, Updated Master Plan for Development and Management of Beaver Lake

comments which should be considered and incorporated in the plan as appropriate prior to implementing the development or action involved.

FOR THE DIVISION ENGINEER:

BARRY G. ROUGHT
Chief, Planning Division

2 Incl
4 cy incl 1 wd
Added 1 incl
2. Comments

CF:
SWLED-PV

Comments on Master Plan for Beaver Lake,
White River, Arkansas, DM No. 13-4,
Inclosure 2 to SWDPL-R 1st Ind

1. Para 1-04. Since the referenced managment plans were based on the previous master plan, they should be reviewed for conformance with the updated master plan and revised as necessary.

2. Para 1-05. Due to the emphasis on environment protection, public health and aesthetics, it is recommended that the list be expanded to include EO 11752, Prevention, Control and Abatement of Environmental Pollution at Federal Facilities.

3. Para 1-05c and 15-13. The last part of the last sentence should be deleted since EC 11-2-119, (paragraph 5) states that recovery of OM&R by user fees is not current administration policy for expenditure of Code 710 funds.

4. Para 1-05d and 9-04. Past legislative history on user fees does not indicate a firm conviction for any specific user fee program. It is recommended that this paragraph be revised to state that user fee collections will be consistent with current legislation and Corps policy.

5. Para 2-03b. The relevance of the James River pollution problem attributed to Springfield, Missouri, and the low D.O. of Table Rock Lake discharge to Beaver Lake is questionable. It would appear that some water quality parameters with numerical concentrations to support the discussions in paragraphs 4-05e and 5-07 would be more helpful.

6. Section IV, General. The discussion of soils associations should be expanded to present important management characteristics peculiar to each association.

7. Para 4-05c. A map and descriptive legend should be furnished to delineate the broad vegetative types on the project area.

8. Para 4-06, 7-01b, 9-05 and Table 15-23. It is noted that development of Bear Creek Island will require cost-sharing under the current policy. It should also be noted that some facilities proposed in the park cannot be cost-shared, requiring development at full non-Federal expense.

9. Para 6-02c. Close coordination with the Northwest Arkansas Regional Planning Commission should be maintained. Studies of the Beaver Lake area published by this organization can be a valuable tool in the development and management of the lake.

10. Section VIII. Criteria to be used in design of roads, parking and boat launching ramps should be indicated.

11. Para 9-02. It is recommended that this paragraph be combined with Section XIII.

12. Para 10-05. Project office personnel do not have direct management and supervision in obtaining compliance with terms of leases, concessions, and permits. This should be clarified.

13. Section X. It is recommended that a paragraph be added addressing the training of water and wastewater treatment plant operators and applicators/supervisors of insecticides in order to comply with the requirements of EO 11752, ER 1130-2-334, ER 1130-2-407, SWDR 1130-2-9, PL 92-500 (Sect 313) and Federal Insecticide, Fungicide and Rodenticide Act (PL 92-516).

14. Section XI. The section should be revised to present a concept plan for the development and management of the forest resource. More specifically, the following is needed:

a. Broad management needs should be presented, by land allocation unit or vegetative type.

b. Planned silvicultural treatments to satisfy the needs should be briefly described.

15. Para 13-01.

a. The Department of the Interior should be deleted since no lands on Beaver Lake have been made available to that agency.

b. A concept plan based on the Arkansas Game and Fish Commission plans for wildlife management as well as measures to be carried out by the Corps should be added. This concept plan should include the purpose for which lands are to be managed, such as public hunting, etc; a brief description of wildlife habitat types available (with reference made to the vegetative cover map to be added); the principal species to be managed; and a brief description of management procedures to be employed. The Fish and Wildlife Management Plan (Appendix D) is a detailed plan for accomplishing the goals established in the conceptual plan.

DEPARTMENT OF THE ARMY
LITTLE ROCK DISTRICT, CORPS OF ENGINEERS
POST OFFICE BOX 867
LITTLE ROCK, ARKANSAS 72203

REPLY TO
ATTENTION OF

SWLED-PV

11 August 1975

SUBJECT: Beaver Lake, White River, Arkansas, Design Memorandum No. 13-4, Updated Master Plan for Development and Management of Beaver Lake

Division Engineer, Southwestern

Design Memorandum No. 13-4, which was prepared by Cromwell, Neyland, Truemper, Millett, & Gatchell, Inc., a Little Rock firm, under Contract No. DACW03-74-C-0122, is submitted for your approval.

1 Incl (7 cys)
as

for CHARLES E. EDGAR III
Colonel, Corps of Engineers
District Engineer

PREFACE

Beaver Lake was formed to provide flood control, hydroelectric power and water supply. The formation of a lake of this size created other uses, namely, outdoor recreation. To accommodate this activity the Corps of Engineers has established areas for parks where facilities have been built for fishing, boating, camping, picnicking, hiking, swimming, and sightseeing. Visitation to this lake is expected to increase by approximately 200% by the year 2000. For growth of this magnitude, proper planning must be accomplished to provide facilities without damage to the natural resources of the area. This Updated Master Plan was written using guidelines specifically aimed at preventing environmental abuse while at the same time providing optimum use of the area available. It is felt that proper development can be provided using this plan.

SUMMARY

This Updated Master Plan anticipates the increased demand for recreational facilities on Beaver Lake and plans for the orderly expansion of parks located on the lake. Park site plans have been evaluated as to current and future needs and have been expanded or changed in anticipation of these needs. Included in the expansion and/or changes are increased facilities for fishing, swimming, camping, picnicking, hiking, group and multi-family activities and physically limited and interpretive programs.

Control of camper and day-use activities is necessary for fee-area use. This control will be provided by furnishing entrance complexes where separation of activities may be accomplished.

To enable physically limited and senior citizens to enjoy various outdoor activities, this master plan proposes the installation of new facilities. These facilities include fishing ramps, picnic sites, and a nature trail.

Modern facilities for the parks are being expanded and include increased numbers of electrical outlets, construction of pressurized water systems and sanitary facilities.

These are just a few of the many areas which have been considered during the preparation of this plan. Consideration has also been given to reforestation, revegetation, control of vehicles in camp and picnic areas, furnishing tent pads, construction of an interpretive center, land use, play areas for children and trails for hiking.

WHITE RIVER WATERSHED
ARKANSAS

WHITE RIVER
BEAVER DAM AND LAKE
DESIGN MEMORANDUM NO. 13-4
UPDATED MASTER PLAN FOR
DEVELOPMENT AND MANAGEMENT
OF BEAVER LAKE

PREVIOUSLY ISSUED AND CURRENTLY SCHEDULED DESIGN MEMORANDUMS

Memo No.	Subject	Date submitted or scheduled	Date approved
1	Site selection	3 Sep 57	18 June 58
	Hydrology and Hydraulic Analysis		
2-1	Part I - Spillway Design Flood	21 Jan 57	25 Nov 57
2-2	Part II	14 Feb 58	19 Sep 58
	Supplement	30 Oct 59	14 Jan 60
3	Hydroelectric Power	10 Jun 60	2 Nov 60
4	Concrete Materials	21 Aug 59	25 Sep 59
5	Geology and Soils (Revised)	28 Apr 60	6 Jun 60
6	General (Revised)	21 Jan 60	22 Apr 60
	Real Estate:		
7-1	Dam Site, Work Area, Access Road	29 May 58	15 Sep 58
7-2A	Reservoir (Mi.609-659)	25 Aug 59	16 Nov 59
7-2B	Reservoir (Mi. 659-689)	9 Sep 60	9 Nov 60
8-1	Access Road	17 Sep 58	5 Jan 59
8-2	Office and Service Facilities	30 Jul 58	19 Feb 59
9	Main Dam, Concrete Portion	29 Jan 60	5 May 60
10	Power Plant	Indefinite	
	Relocations:		
11-1A	State Highway 68	29 Jun 60	5 Jul 60
11-1B	State Highway 12	13 Apr 61	10 Jul 61
	Supplement No. 1 (Van Hollow)	14 Aug 61	12 Sep 61(SWD)
	Supplement No. 2 (White River)	18 Aug 61	13 Sep 61(SWD)
	Supplement No. 3	1 Sep 61	29 Sep 61(SWD)
11-1C	State Highway 94	24 May 61	28 Aug 61
11-2A	Benton County Roads	21 Jun 60	21 Sep 60
11-2B	Washington County Roads	31 May 61	11 Aug 61
	Supplemental Data	29 Sep 61	1 Nov 61(SWD)
	Utilities		
11-3A	SW Electric Power Comapny	30 Dec 59	5 Jul 60
11-3B	SW Bell Telephone Company	9 Mar 60	9 Jun 60
11-3C	Carroll Electric Cooperative Corp	7 Jul 60	19 Sep 60
	Supplement	16 Aug 62	21 Aug 62
11-3D	Ozark Rural Electric Coop.Corp.	8 Jul 60	7 Sep 60

WHITE RIVER WATERSHED (CONT.)

Memo No.	Subject	Date submitted or scheduled	Date approved
13-1	Preliminary Master plan - Part of the Master Plan (revised)	4 Jan 61	24 Mar 61
	Revision	16 Nov 61	13 Dec 61
13-2	Master Plan	19 Mar 63	13 Dec 63
	Revision	29 Jun 64	24 Jul 64
	Supplement No. 1	29 Jan 68	24 Feb 69
13-3	Updated Master Plan	Jun 69	16 Oct 69
	Appendixes:		
	A - Project Resource Management Plan	21 Sep 72	1 Apr 74
	B - Forest Management Plan	7 Dec 73	21 Jun 74
	C - Fire Protection Plan	Oct 75	
	D - Fish and Wildlife Management Plan	20 Oct 72	Approved
	E - Project Safety Plan	20 Oct 72	23 Mar 73
13-4	Updated Master Plan	Jul 75	
14	Reservoir Clearing	6 Dec 60	6 Mar 61
	Supplement No. 1	28 Sep 61	28 Dec 61
15	Sediment Ranges	9 Jun 61	29 Jun 61
16	Instrumentation	30 Jun 60	8 Aug 60
18	Operational Facilities	14 Dec 64	17 Feb 65
19	Right Abutment Road	6 Oct 64	25 Mar 65

WHITE RIVER WATERSHED
ARKANSAS

DESIGN MEMORANDUM NO. 13-4

UPDATED MASTER PLAN FOR
DEVELOPMENT AND MANAGEMENT OF

BEAVER LAKE

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BEAVER LAKE
WHITE RIVER
ARKANSAS

UPDATED MASTER PLAN FOR DEVELOPMENT AND MANAGEMENT OF BEAVER LAKE

SECTION I

INTRODUCTION

1-01. Project authorization and related legislation. Construction of Beaver Lake for multiple purposes of flood control, generation of hydroelectric power, and other beneficial uses was authorized by the Flood Control Act approved 3 September 1954. The inclusion of storage in the lake for municipal and industrial water supply was authorized by the Water Supply Act of 1958.

1-02. Project purposes. Beaver is one of four multiple-purpose projects constructed in the upper White River Basin for the control of floods and the generation of hydroelectric power.

1-03. Purpose of master plan. This master plan establishes policies, objectives and programs for the preservation, enhancement, development, maintenance, and administration and management of all project resources and provides for the necessary facilities to enhance opportunities for public enjoyment.

1-04. Prior pertinent design memorandums. The preliminary master plan for Beaver Lake was approved 24 March 1961 and the Master Plan was approved 13 December 1963. Design memorandum number 13-3, the Updated Master Plan, was approved 16 October 1969. The Project Resource Management Plan, the Forest Management Plan, the Fish and Wildlife Management Plan and the Project Safety Plan were prepared as appendices to the Design Memorandum 13-3. Upon approval of this updated plan these appendices will become part of this plan.

1-05. Application of public laws.

a. Flood Control Act of 1944 (Public Law 78-534). The Department of the Army is authorized to provide for recreational use of the projects under its control by Section 4 of the Flood Control Act approved 22 December 1944, as amended by Section 4 of the Flood Control Act approved 24 July 1946, as amended by Section 209 of the Flood Control Act approved 3 September 1954, and as amended by Section 207 of the Flood Control Act of 1962, as amended by Section 2 of the Land and Water Conservation Fund Act of 1965, and as further amended by Section 210 of the Rivers and Harbors Flood Control Act of 1968.

b. Fish and Wildlife Coordination Act of 1958 (Public Law 85-624). Section 3 of this Act provided for the use of Corps of Engineers Civil Works projects for the conservation, maintenance, and management of fish and wildlife resources. The land and water areas under the jurisdiction

of the Department of the Army may be made available to State wildlife agencies by license agreement or by cooperative agreement with the Secretary of the Interior under the terms of a general plan approved jointly by the Secretary of the Army, the Secretary of the Interior, and the head of the State wildlife agency.

c. Implementation of Public Law 89-72. Recreational development since FY 74 requires implementation of the policy established by the Secretary of the Army in coordination with the Office of Management and Budget as outlined in EC 1130-2-138 dated 31 May 1974, Recreational Development at Completed Projects. The policy requires that a non-Federal body must agree to furnish not less than 50 percent of the cost of incremental development and further agree to operate, maintain, and provide replacement of the park development; or that a system of user charges be put in place to recover all operation, maintenance, and replacement costs.

d. Public Law 93-303, Fee Collection System. On 7 June 1974, Public Law 93-303 was enacted. This law provides for the collection of fees at family camping and group camping areas having various classes of facilities as follows:

Class A. Waterborne restrooms; potable water; showers (warm water); sanitary disposal station; camp sites with table, fireplace (rock ring or grill); refuse containers; paved roads; designated tent or trailer spaces; visitor protection control; personal fee collection (honor system will not be used).

Class B. Vault restrooms; potable water; sanitary disposal station; camp sites with table, fireplace (rock ring or grill); refuse container; access and circulation roads; designated tent or trailer spaces; visitor protection control; personal fee collection.

Class C. Pit or vault restrooms; potable water; camp sites with table, fireplace (rock ring or grill); refuse containers; access and circulation roads; designated tent or trailer spaces; visitor protection control; personal fee collection.

Class D. Portable or pit restrooms; potable water; fireplace (rock ring or grill); refuse containers; access and circulation roads; designated tent or trailer spaces; visitor protection control; personal fee collection.

An additional charge of $0.50 per day may be made for use of electrical hookups in parks in Classes A, B, C, or D.

At each Corps lake, where camping is permitted, at least one primitive campground containing designated camp sites, sanitary facilities, and vehicular access will be provided where no fee will be charged. The primitive campground will contain sufficient camp sites to qualify as reasonably large.

1-06. Scope of report. Evaluation of the current master plan for Beaver Lake indicated that present facilities must be expanded or improved if requirements are to be met. This report considers many aspects of recreation on the lake and using available and projected visitation and use data provides for changes, where necessary, to fulfill these requirements.

SECTION II

PROJECT DESCRIPTION

2-01. Location. Beaver Dam is located at river mile 609.0 on the White River in Carroll County, Arkansas. The lake extends in a southwesterly direction approximately 45 miles into Benton, Washington, and Carroll Counties, Arkansas. The location of the lake and its relationship to major recreational attractions is shown on Plate 1.

2-02. Accessibility. Beaver lake is easily accessible as a well developed system of U.S., State and County roads encircles the area. These roads include U.S. Highway 62 on the north, and U.S. Highway 71 on the west. State Highways include 23 and 12 on the east and 68 and 45 on the south. State Highways 264, 187, 127, 303, and 94 provide access to recreational areas on the lake. The city of Fayetteville is served by commercial airlines and the cities of Eureka Springs, Rogers and Springdale have airport accommodations for private aircraft.

2-03. Project data.

a. General. Beaver Lake is located in the Ozark Mountain region of northwestern Arkansas. The lake area is irregular in shape with many deep coves and arms. The shoreline is generally steep with many overhanging bluffs and ledge outcrops. Principal timber growth consists of numerous species of oak. The project area comprises 38,040 acres of fee or public domain land and water, and 2,423 acres of flowage easement land.

b. Basin hydrologic and climatic summary. The White River Basin drains an area of 27,765 square miles. Of this drainage area 10,622 square miles are located in Missouri and 17,143 square miles in Arkansas.

The White River rises in the Boston Mountains in the western part of the basin and flows in a generally northerly direction to the Missouri-Arkansas state line (Mile 591.9), thence in a generally easterly direction for about 115 miles in southern Missouri and for about 30 miles along either side of the state line until it finally crosses into Arkansas at about mile 447.5. Downstream from that point, it flows in a generally southeasterly direction to the mouth of the Black River (mile 264.8) near Newport, Arkansas, and then in a southerly direction to join the Mississippi River at mile 599 above Head of Passes, Louisiana, and about 14 miles above the mouth of the Arkansas River. The principal tributaries flowing into the White River are the Buffalo, James, North Fork, Black, Little Red, and Cache Rivers, and Big Creek. The Beaver, Table Rock, Power Site, and Bull Shoals Dams form a series of lakes beginning near Fayetteville, Arkansas and extending 235 miles through northwest and north-central Arkansas and southwest Missouri.

The fall of the White River varies from 1.7 feet per mile in its middle reaches to 0.4 feet per mile near its mouth. Major Mississippi floods cause backwater effects which have reached approximately 165 miles upstream from the confluence of the White River with the Mississippi.

The average annual discharge of the White River of more than 20,900 cubic feet per second ranks this river high in streamflow compared to other rivers in the United States. Contributing to this streamflow is an average annual rainfall of approximately 45 inches and the flow issuing from numerous large springs in the Ozark Plateaus. Of the 69 springs in the United States with average flows of 100 c.f.s. or more, seven are located in this region. These springs contribute to the flow of the White River even during periods of drought.

The White River drainage system contains about 22 miles of seriously polluted streams. The most serious problem was the excessive nutrient and high BOD load discharged to the James River as sewage effluent by the city of Springfield, Missouri (pop. 118,950), and other communities in the area. A total of 12 miles of stream were seriously polluted this way. The excessive nutrients carried by the James River probably contributed to the annual severe oxygen depletions in the hypolimnion of Table Rock Lake. Discharges of this hypolimnial water through Table Rock Dam resulted in dissolved oxygen levels as low as 2.0 mg/l in Lake Taneycomo. The Corps of Engineers is attempting to improve this situation by injection of liquid oxygen into the water.

The river carries only a small amount of sediment and is considered a clear water stream. The chemical quality of surface water is generally satisfactory except in certain areas where it is excessively hard, or contains high levels of nitrate, dissolved solids, iron or salt.

The White River Basin is located in the climatic zone classified as humid subtropic which includes most of the southeastern United States.[1] In this climatic region weather changes are frequent, particularly in early summer when monsoon wind systems carry warm, moist, unstable, maritime tropical air into the area.

In general, the climate in the basin is moderate with an average annual temperature of about 59. Late summer is the time of maximum heat and least rainfall. Temperatures ranging from 90^{o} to 100^{o} are common during this time of year. During the winter months, mid-day temperatures in the basin are relatively warm, around 55^{o} to 60^{o}.

[1]Koppen-Geiger System of Climate Classification. After R. Geiger and W. Pohl (1953)

TABLE 2-1

PERTINENT DATA OF THE DAM AND LAKE

Item	Design data
Dam:	
Length of dam, feet	2,575
Concrete section, feet	1,333
Earth embankment, feet	1,242
Maximum height of dam above streambed, feet	228
Concrete in dam, cubic yards	780,000
Earth in main embankment, cubic yards	1,700,000
Earth in auxiliary dams, cubic yards	126,000
Length of spillway, gross, feet	328
Spillway crest gates (7), size in feet	40X37
Outlet conduits (1),size in feet	5.67X10
Elevations, feet above mean sea level	
Top of dam	1,142
Spillway crest	1,093
Lake:	
Elevations, feet above mean sea level	
Top of flood-control pool	1,130
Top of conservation-water supply pool	1,120
Surface area of lake, acres	
At top of flood-control pool	31,700
At top of conservation-water supply pool	28,220
Storage capacities, acre feet	
Flood control	300,000
Conservation-water supply	1,652,000
Lake total	1,952,000
Shoreline lengths, miles	
At top of flood-control pool	483
At top of conservation-water supply pool	449
Power Development:	
Generating units, number	2
Rated capacity, each unit, kilowatts	56,000
Station installed capacity, kilowatts	112,000
Water Supply:	
Location of intake, miles above dam	47
Ultimate water supply, millions gallons per day	120

Some short periods of cold weather occur with temperatures ranging from 0° to 10°. On winter nights, temperatures from 40° to below freezing are common.

Average annual precipitation ranges from 42 inches in the north of the basin to 54 inches in the south, with a mean of about 48 inches occurring in the Beaver Lake area. The average annual snowfall for the Beaver Lake area is about 12 inches.

c. Project structures (operational). The Beaver Lake Dam is composed of both concrete and earthen structures. The concrete section of the dam is 1,333 feet in length and the earth portion 1,242 feet long. The dam stands 228 feet above the main channel of the White River. The spillway is 328 feet long and contains seven spillway crest gates each 40 x 37 feet in size. The top of the dam is at elevation 1,142 and the spillway crest at elevation 1,093. In the dam are two generating units each with a capacity of 56,000 kilowatts. Table 2-1 summarizes engineering data on the project.

2-04. Project operation. The project was constructed to provide for top of flood control pool at 1,130 m.s.1. The elevations of the top and bottom of the conservation and water supply drawdown pool are 1,120 and 1,077 feet m.s.1. respectively. Under normal conditions of rainfall and runoff the pool elevation is expected to fluctuate between elevations 1,120 and 1,077 m.s.1. During flood conditions the lake may rise into the flood control pool and under extreme flooding may exceed the top of the flood control pool at elevation 1,130 as much as 1 or 2 feet during surcharge operation. Under extended drought conditions comparable to those known to have occurred in the period of record, the lake may be drawn as low as the nominal bottom of the power and water supply drawdown at elevation 1,077 m.s.1. Under extreme conditions of extended low rainfall and runoff, the lake may be drawn as low as the maximum probable draw down at elevation 1,050 feet m.s.1. if necessary to meet long-range hydroelectric power commitments. Plates 11 and 11A show the experienced Beaver Lake stage hydrograph and duration curve for the period from February 1963 through December 1974. A summary of the natural flows at the dam site for the period January 1923 through December 1957 is shown on Table 2-2.

TABLE 2-2

NATURAL FLOWS AT BEAVER DAM SITE

Item	Acre-feet	Average rate (c.f.s.)
Average annual 36 years	1,105,400	1,527
Maximum annual 1927	2,615,400	3,613
Minimum annual 1954	285,210	394
Maximum month April 1927	766,100	12,873
Minimum month September 1954	300	5

2-05. Visitation - existing and projected.

a. Visitation to present. Visitation records were first kept for the year 1964 and the number of visitors totaled 313,400. Visitation for 1973 totaled 3,277,000, an increase of over 900 percent for the 10 year period. Visitation for 1974 totaled 3,478,486. Peak months for use of the lake for outdoor activities are April through September with visitation during these months being nearly 75 percent of the total yearly visitation. See Tables 2-3 and 2-4 for visitation figures.

TABLE 2-3

1973 and 1974 PARK VISITATION

	1973	1974
Blue Springs	58,279	66,024
Dam Site	190,080	143,629
Hickory Creek	199,119	226,132
Horseshoe Bend	154,011	125,138
Indian Creek	20,947	21,921
Lost Bridge	117,142	105,750
Dam and Appurtenant Works	79,030	96,509
Prairie Creek	328,364	383,004
Rocky Branch	84,544	77,920
Starkey	46,410	37,064
Ventris	6,739	6,195
War Eagle	51,184	49,685
Total	1,335,849	1,338,971

TABLE 2-4

PERCENT ANNUAL ATTENDANCE DURING PEAK MONTHS OF USE [1]

Month	Percentage
April	9.5
May	11.3
June	13.8
July	14.9
August	12.8
September	10.8
Total	73.1

[1] Page A-53, U.S. Army Engineer Institute for Water Resources, Report 74-R1

b. Projected visitation.

1. Assumed Conditions. It is anticipated that visitation to Beaver Lake will continue to increase similar to the pattern as experienced in past years. In projecting project visitation growth several assumptions must be made. These assumptions are as follows:

(a) Approximately 70 percent of the average summer weekend day visitation will continue to be generated by the population residing within 100 miles of Beaver Lake. The energy shortage currently facing the nation and the resultant increase in the cost of gasoline and diesel fuel could have an impact on visitation. Even though 70 per cent of the average summer weekend day visitation will be generated by those residing within 100 miles of Beaver Lake, their vacation habits could be influenced by the energy shortage. In lieu of taking lengthy trips outside of the 100 mile zone of influence, they may very well spend their vacations at Beaver Lake resulting in a longer stay than in the past. Future visitation surveys will attempt to determine if this is the case.

(b) Increasing zonal income will produce proportionate increases in the number of activity days at Beaver Lake.

(c) Outdoor recreation has an economic value to the participant in that each dollar spent on an outdoor recreational activity is a dollar that cannot be spent for other commodities or services. Therefore, the per capita demand for outdoor recreation is closely related to per capita personal income.

(d) The competition from projects within and near Beaver Lake's zone of influence have impacted on visitation to Beaver Lake and these impacts will remain essentially as experienced.

(e) Inflation and the decreasing value of the dollar will not affect visitation.

2. Method of projection. Using the assumptions outlined above projections were made based on the observed relationship between personal income and recreation participation. With the rise in total personal income a proportionate rise in visitation occurs.

3. Procedure for visitation projection.

(a) The zone of influence for Beaver Lake was determined, the zone being an area within 100 miles of the Lake. From this area approximately 70 percent of the day use visitation occurs.

(b) Within this 100 mile zone of influence approximately 14 percent of the total population for the States of Arkansas, Oklahoma, Kansas and Missouri resides.*

* Source: Bureau of the Census, 1970 Population Census

(c) Projected populations for the four states was multiplied by this 14 percent figure for the years of 1980, 1990, 2000, 2010, and 2020.**

(d) The projected per capita personal income was calculated for these years using an increase of 3 percent per year.***

(e) Total zonal income was then calculated by multiplying per capita personal income by total zonal population. This was calculated for the years of 1980, 1990, 2000, 2010, and 2020.

(f) A factor was derived from these projections. This factor was then used with the 1973 base year visitation record to figure visitation for years mentioned in previous paragraphs. See Table 2-5 for projection factors and Table 5-3 for projected visitation.

4. Projected visitation and park use. This updated master plan is written to provide for the optimum use of Beaver Lake and not for use by the maximum number of people. With this in mind it is not feasible to provide for the number of people expected within a few years. Providing for this number would result in severe damage to the natural resources of the project. Provisions must be made to initiate a plan of control to limit visitors using camping and picnicking facilities. This plan incorporates a system of entrance complexes to control the number of campers permitted into an area. However, a system, such as a reservation system, could provide more control over a park and eliminate the possibility of campers not being provided a camp site after driving long distances.

** Source: 1972 OBERS Projections, U.S. Water Resources Council Volume 5

*** Source: Multiple-Agency White River Basin Comprehensive Study White River Basin, Arkansas and Missouri, Volume II; Appendix B.

TABLE 2-5

POPULATION-INCOME PROJECTIONS FOR THE 100 MILE ZONE OF INFLUENCE-BEAVER LAKE

YEAR	Estimated Population* 1,000(s)	Per Capita** Personal Income	Total Income ($1,000's)	Projection Factor
1970	1590	$ 2620	$ 4,165,800	
1973	1650	2860	4,719,000	1.00
1980	1790	3520	6,300,800	1.34
1990	2007	4725	9,483,075	2.01
2000	2242	6350	14,236,700	3.02
2010	2520	8540	21,520,800	4.56
2020	2840	11470	32,574,800	6.90

Based on

* Source: 1972 OBERS Projections, U.S. Water Resources Council: Volume 5

** 1967 Dollars

SECTION III

PROJECT STATUS

3-01. Project development and operation chronology.

a. Dam and appurtenant works. Construction of Beaver Dam and appurtenant works was initiated in November 1960 and construction of the powerhouse and switchyard in April 1963. Commercial generation was begun in May 1965. The overall project was completed in June 1966 at an estimated cost of $46,200,000.

b. Recreational development. A Master Plan for development of recreational resources was prepared and approved 13 December 1963. The Master Plan was updated and approved 16 October 1969. Eleven parks have been developed by the Corps of Engineers with six parks reserved for future development. Section 4-06 summarizes the characteristics of the existing parks, the development of the parks and facilities provided for recreational activities in the parks.

3-02. Chronology of expenditures.

a. Construction general funds: A total of $2,232,000 of construction general funds was allocated to the Beaver Lake project for the initial development of recreational parks. The initial development was completed in FY 1967 and the first additional recreational funds (Code 711) were allocated in FY 1969.

b. Code 712 funds (Prairie Creek and Hickory Creek). In FY 1969 $ 371,000 was allocated for the development of these two parks, under a program for the rapid development of sites for which local interests had agreed to operate and maintain upon completion. In FY 1973 $14,945 was transferred to Bull Shoals Lake to complete land acquisition at Ozark Isle Park. Additional funds were never made available for completion of these partially developed parks and the Code 712 program was terminated at the end of FY 1974.

c. Total funds. Through FY 1975 $2,232,000 of Construction General, $387,572 of Code 711 and $356,055 in Code 712, or a total of $2,975,627 have been allocated for development of the parks on Beaver Lake.

c. Cost sharing.

(1) Administration policy as set forth in EC 1130-2-138, dated 31 May 1974, required that further development of existing or future recreational parks will require a non-federal body to agree to furnish at least 50 percent of the cost of the construction and assume all operation and maintenance cost after FY 1974 unless a system of user

fees can be established to recover all costs of operation and maintenance.

(2) A cost sharing contract with Carroll County, Arkansas for the development of Big Clifty Park is scheduled for FY 1976. Total cost of the proposed development is $218,000 and will consist of 2,900 feet of paved road, 2,230 sq.yds. of paved parking, 1 concrete launching ramp, 2 vault restrooms, 17 picnic units, and 1 group picnic shelter.

SECTION IV

RECREATIONAL AND ENVIRONMENTAL RESOURCES OF THE PROJECT AREA

4-01. Geological resources. Beaver Lake is in the Ozark Mountain region near the eastern margin of the Springfield Plateau which occupies primarily the western and southwestern flanks of the Ozark Plateau province. The Springfield Plateau in this region rises to an elevation of approximately 1400 feet. The White River has cut its channel to a depth of about 700 feet below the surface of the plateau and the plateau surface near White River has been deeply and intricately dissected by this stream and its tributaries. Three rock formations are present in the Beaver Lake area. These are, in descending order: the Boone formation of Mississippian age and the Cotter and Jefferson City formations of Ordovician age. The Boone formation caps the higher hills in the area. The strata throughout the region are nearly horizontal. The region dip is southwestward at the rate of only a few feet per mile. Some minor flexures are present, they are broad and gentle and only a small amount of fracturing resulted.

One predominant geological feature of the lake area is a low, persistant, limestone bluff, which occurs just above the Ordovician-Mississippian contact. This bluff is about 50 feet higher than the top of the flood control pool near the dam. Going upstream the bluff descends gradually in elevation until it is below the top of the pool in the area east of Rogers.

All of the soils of the region except those in the flood plain and terrace deposits along the streams are residual in nature. Generally they are residual clays, yellow buff to red, formed by the decomposition of limestone or dolomite parent material. They usually contain chert fragments ranging from sand size to small boulders. The depth of soil overlying the Boone formation is generally deeper and is extremely variable in thickness. It varies in depth from about 2 to 40 feet with the average thickness probably being 10 feet. These soils are moderately low in fertility but are good timber producers. The soil associations of Beaver Lake are described below:

Captina-Nixa Association: This association is deep to moderately deep, moderately well drained, slowly and very slowly permeable, acid, loamy soils developed over cherty limestone on broad, nearly level to gently sloping uplands. Captina 50%, Nixa 30%, (inclusions of Pembroke, Clarksville, and Baxter 20%). Captina soils have brown silt loam or cherty silt loam surface soil over yellowish-brown silty clay loam subsoil that has a gray, mottled fragipan in the lower part. Nixa soils have grayish-brown cherty silt loam surface soil over yellowish-brown, mottled cherty silt loam or cherty silty clay loam subsoil that is a fragipan.

Captina-Nixa-Pickwick Association: This association is deep and moderately deep, moderately well and well drained, very slowly to moderately permeable, loamy and cherty soils developed over cherty limestone on broad, nearly level to gently sloping uplands. Captina 32%, Nixa 17%, Pickwick 16% (inclusions of Clarksville, Baxter, Guin, Jay, Pembroke, Johnsburg and Taloka 35%). The moderately well drained Captina soils have brown silt loam surface soil over yellowish-brown silty clay loam subsoil that has a gray, mottled fragipan in the lower part. The moderately well drained Nixa soils have grayish-brown cherty silt loam surface soil over yellowish-brown, mottled cherty silt loam or cherty silty clay loam subsoil that is a fragipan. The well drained Pickwick soils have brown or dark brown silt loam surface soil over yellowish-red silty clay loam subsoil.

Clarksville-Nixa-Baxter Association: This association is moderately deep and deep, moderately well to somewhat excessively drained, rapidly to slowly permeable, acid, loamy soils developed from cherty limestone. This association is on gently sloping narrow ridgetops and steep side slopes. Clarksville 30%, Nixa 30%, Baxter 20%, (inclusions of Corydon, Sogn, Captina, and Pembroke 20%). The somewhat excessively drained Clarksville soils are grayish-brown, over pale brown, very cherty silt loam. In most places they are deep, but are shallow to massive chert in some places. The moderately well drained Nixa soils are on ridgetops. They have grayish-brown cherty silt loam surface soil over yellowish-brown, mottled cherty silt loam or cherty silty clay loam subsoil that is a fragipan. The well drained Baxter soils have brown cherty silt loam surface soil over yellowish-red or red cherty silty clay or clay subsoil.

Corydon-Sogn Association: This association is moderately deep and shallow, well and somewhat excessively drained, moderately slowly and moderately permeable soils have developed from limestone and cherty limestone on moderately sloping to steep hillsides. Corydon 35%, Sogn 35%, (inclusions of Colbert 30%). Corydon soils have dark brown cherty silt loam surface soil over mottled reddish-brown clay subsoil. They are 20 to 40 inches deep to limestone bedrock. Sogn soils are dark grayish-brown cherty silt loam surface soil over yellowish-brown, mottled cherty silt loam or cherty silty clay loam subsoil that is a fragipan.

Enders-Allegheny-Mountainburg Association: This association is deep and shallow, well drained, very slowly to moderately rapidly permeable, gravelly and stony soils developed in acid sandstone and shale and in colluvium from these materials. They are on moderately sloping benches and steep mountainsides. Enders 35%, Holston 25%, and Hector 15% (inclusions of Linker, Mountainburg, Cleora, Elsah, Allen, and Locust soils, and rock outcrop 25%). Enders soils have grayish-brown, gravelly or stony loam surface soil over yellowish-red or red clay subsoil that is mottled gray in the lower part. Allegheny soils have grayish-brown stony loam surface soil over yellowish-brown clay loam subsoil. Hector soils are less than 20 inches thick over sandstone bedrock.

They have brown stony fine sandy loam surface soil over yellowish-brown stony fine sandy loam subsoil.

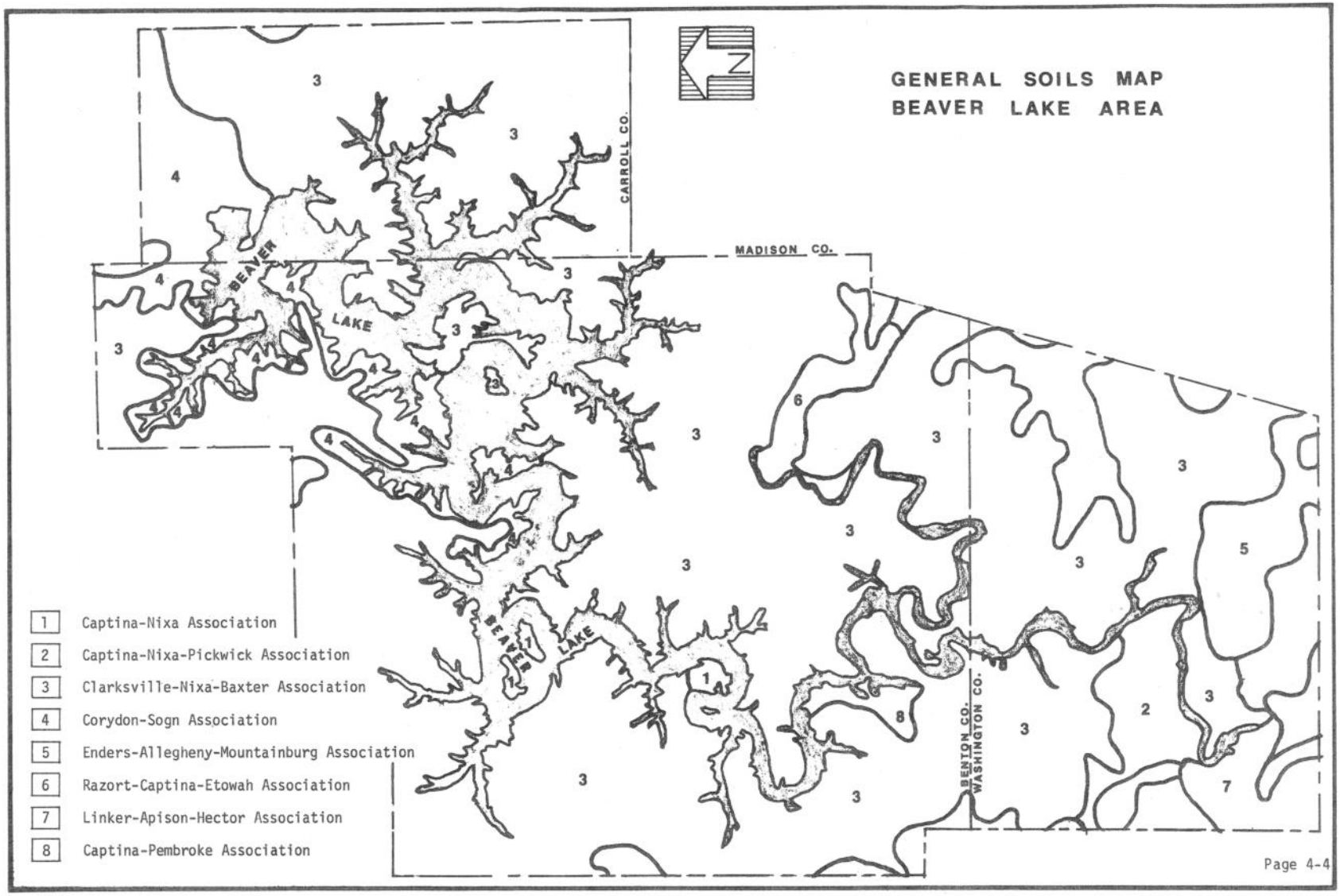
Razort-Captina-Etowah Association: This association is deep, well and moderately well drained, moderately and slowly permeable, loamy soils on flood plains and terraces of local streams. Razort 40%, Captina 20%, Etowah 20% (inclusions of Ashton, Greendale, Elsah, and Sloan soils 20%). Razort soils are brown and dark brown, gravelly silt loam on flood plains. Captina soils have brown silt loam or cherty silt loam surface soil over yellowish-brown silty clay loam or cherty silty clay loam or cherty silty clay loam subsoil that has a gray, mottled fragipan in the lower part. Etowah soils have brown, gravelly silt loam surface soil over yellowish-red gravelly silty clay loam subsoil.

Linker-Apison-Hector Association: This association is moderately deep and shallow, well drained. moderately and moderately permeable, acid, loamy soils on nearly level to moderately sloping hilltops and ridges. Linker 40%, Apison 20%, Hector 15%, (inclusions of Mountainburg, Enders, Johnsburg, and Allen 25%). Linker soils have brown loam or gravelly loam surface soil over yellowish-red or red loam or clay loam subsoil. Apison soils have brown loam or gravelly loam surface soil over yellowish-brown or strong brown clay loam subsoil. Hector soils are less than 20 inches thick over sandstone bedrock. They have brown stony or gravelly fine sandy loam surface soil over yellowish-brown stony or gravelly fine sandy loam subsoil.

Captina-Pembroke Association: This association is deep, moderately well and well drained, slowly and moderately permeable, loamy soils on broad, nearly level to gently sloping uplands. Captina 60%, Pembroke 20%, (inclusions of Nixa, Johnsburg, and Taloka 20%). Captina soils have brown silt loam or cherty silt loam surface soil over yellowish-brown silty clay loam or cherty silty clay loam subsoil that has a gray, mottled fragipan in the lower part. Pembroke soils have brown silt loam surface soils over yellowish-red silty clay loam subsoil.

The location of each soil association is shown on page 4-4.

4-02. Cultural resources. As early as 1906, Federal agencies were required to consider the cultural resources on public lands. Since that time, numerous acts have clarified these responsibilities. The Secretary of Interior has been designated as the office of primary responsibility,and it wasn't until May 1974, with the enactment of Public Law 93-291, the Archeological Conservation Act, that other Federal agencies were authorized to submit a separate line item on a budget submission for cultural resource considerations. This Act allows up to 1% of project funds to be allocated for cultural resource identification and management.


GENERAL SOILS MAP
BEAVER LAKE AREA
N
CARROLL CO.
MADISON CO.
BENTON CO.
WASHINGTON CO.
BEAVER LAKE
BEAVER LAKE
1 Captina-Nixa Association
2 Captina-Nixa-Pickwick Association
3 Clarksville-Nixa-Baxter Association
4 Corydon-Sogn Association
5 Enders-Allegheny-Mountainburg Association
6 Razort-Captina-Etowah Association
7 Linker-Apison-Hector Association
8 Captina-Pembroke Association

Consideration is being given to the establishment of a training program for resource managers to assist them in identifying and managing the cultural resources in the District. This training will also be made available to selected employees of the District Office. Upon completion of an inventory survey, a plan will be developed to insure the protection and management of this non-renewable resource.

4-03. Archeological resources. During the past fifty years scientific investigation of archaeological sites in the Beaver Lake area has been carried out in three discrete phases. The first was by R.M. Harrington who excavated some twenty-five bluff shelters and caves during 1922 and 1923. Fifteen of these sites are in the bluffs which encompass Beaver Lake. The second phase took place between 1928 and 1935 by S.C. Dillinger who located and excavated approximately 85 bluff shelters in northwest Arkansas. The third phase began in 1960 as a direct result of the construction of Beaver Dam and Lake. A negotiated agreement between the National Park Service and the University of Arkansas provided for site reconnaissance and excavation with C.R. McGemsey III as principal investigator. The study consisted of surveying the area immediately surrounding the axis of the proposed dam and of areas to be used as sources of earth fill in dam construction with 17 sites being located within these limits. Approximately 300 sites were located, most within the inundated area, and a master thesis was written by James A. Scholtz, on the findings. Some bluff shelters with evidence of prehistoric occupation were located above the flood pool. Based on the typological comparison of projectile points, the lake area was occupied from approximately 7500 B.C. until very late in the prehistoric period. The Osage Indians are known to have been present in the western Ozarks late in the historic period and hunting parties of that tribe may have made forays into the lake area (Chapman 1948: 148; Wejckoff 1964:9). Settlement patterns of occupants in the lake area from Proto to late archaic stages indicate that the inhabitants lived both in shelters and in open sites with perhaps a shift in location due to seasonal rounds of hunting.

Since completion of the lake, twelve sites have been added including bluff shelters, bluffedge sites, and bottomland sites. Many well-preserved artifacts and mummified bodies have been found in the area and are now contained in the University of Arkansas Museum at Fayetteville, Arkansas

4-04. Historical resources. The turbulent period of the Civil War was keenly felt in northwestern Arkansas. One of the major battles west of the Mississippi was fought in the northwestern corner of Arkansas at the Battle of Pea Ridge. Monte Ne is an amphitheater

constructed near the Monte Ne branch of White River by W.H. "Coin" Harvey. The amphitheater is southeast of Rogers, Arkansas, and is a historic place, but it is not listed on the National Register of Historic Places. The Crypt of Coin Harvey and his son was moved to higher ground and the amphitheater was flooded with the construction of Beaver Dam. The National Register of Historic Places has been consulted and no national historic properties are affected by the operation and maintenance of the property. In the case of new Federal developments within the project, liason will be maintained with the appropriate State Historic Preservation Officer.

4-05. Environmental resources.

a. Ecologic. The construction and use of Beaver Lake has resulted in changes in the environment of the immediate lake area. Vegetation changes have resulted from flooding of the lake as summarized in Paragraph C, below. Wildlife has been displaced from its original habitat by this flooding. The fishery has been changed both in the lake and in the river below the dam. Before impoundment, smallmouth bass was the principal game fish. Several other species were abundant in the river such as largemouth bass, spotted bass, channel catfish, longear sunfish, green sunfish and other sunfish species. After impoundment, largemouth bass, white bass, and crappie became the most important species for fishermen. Below the dam releases of cold water have resulted in a complete change in the downstream fishery. The river is now stocked with rainbow trout on a "put and take" program to replace the warm water fishery that was adversly affected by the construction and operation of Beaver Dam.

b. Topography. The Beaver Dam and Lake area is a part of the Ozark Uplift, and is typical of the Ozark Highlands, which is characterized by the rugged terrain, containing narrow ridges and U-shaped valleys, steep, rocky slopes, and bluffs. Many of the hills and flat-topped ridges in the vicinity rise to elevations of 1,100 feet to 1,200 feet m.s.l., with some of the higher peaks in the region reaching an elevation of more than 1,400 feet above m.s.l.

c. Vegetation. There is a wide variation in the vegetative composition of the lake as a result of man-made changes in the environment brought about by the construction of a high dam. Formerly the forests were second growth upland hardwoods in the large creek bottoms. As a result of the dam and subsequent impoundment of Beaver Lake, the majority of the bottomland hardwoods were killed and the upland hardwoods were subjected to periodic flooding, siltation, and wave action. Although the majority of the upland forest still exists, there now exists a new ecotone between the lake front and the original

forest. This land is now being reforested naturally by pioneer species which normally have a short life span.

d. Visual. Because of the mountainous terrain in the Beaver Lake area there are many overlooks which offer a breathtaking view of the countryside. The lower end of the lake especially near Lost Bridge Park offers the best sightseeing opportunities.

e. Water quality. Water within the lake is of high quality and offers excellent opportunities for all water-related activities. See Section 5-07.

4-06. Recreational resources.

a. General. The Corps of Engineers has designated seventeen parks on the lake for use as recreational area. Eleven of the areas have been developed as parks, with six reserved for future development. The parks feature facilities for camping, picnicking, swimming, boating, and hiking. Future development will provide additional facilities for the above activities, and additional facilities will be planned for playgrounds, group camping, multi-family camping and hiking. Bear Creek Island Park, near the Highway 12 bridge crossing west of Rogers is proposed for development of a group facility with an interpretive center. See Sections 7-01 and 9-05.

Brief descriptions of each developed park including a summary of the facilities provided and proposed are contained in the following paragraphs.

b. Developed parks.

(1) Dam Site. (See Plates 12, 12A and 12B.) This park contains 707 acres above the top of conservation pool and consists of two areas, Dam Site North and Dam Site South. Dam Site North is located on the northwestern shore of a large embayment immediately upstream from the left abutment of the dam structure. It contains approximately 40 developed acres above the top of the conservation pool. Dam Site South is situated on the western most tip of the mainland at the south end of the dam. A causeway has been constructed which connects this tip to what was an island, making it accessible by vehicle. Another area for camping has been developed below the dam adjacent to the White River and contains approximately 8 acres. The total area contains about 60 developed acres on steep to moderately steep terrain with heavy tree coverage. Access is by way of a paved county road from U. S. Highway 62. Recreational facilities constructed within the area include three concrete launching ramps, picnic area, 76 campsites, one group shelter, drinking water, masonry overlook shelter with waterborne restroom, swimming beach, change shelter, five masonry restrooms, two wooden restrooms, 500 feet of concrete walk, two nature trails totaling approximately 3,400 feet, parking area for 414 cars, and 1.2 miles of paved road.

Proposed facilities for Dam Site Park include individual and group camping facilities, picnic sites, sanitary facilities, a campers washhouse, sewage treatment facilities, playgrounds, parking areas, a water distribution system with drinking fountains, and access and circulation roads.

The observation tower proposed for this park will be built similar to the design of the look-out tower contained in: Park Practice Program, Index No. 1-6851, Plate No. 470H, Dated December, 1965.

This is a Class B use fee park. When fully developed this will be a Class A use fee park.

Visitation to this area was 143,629 in 1974 and is expected to be 262,000 by 1980.

(2) Indian Creek. (See Plates 13 and 13A) This park is located approximately 5 miles south of Gateway, Arkansas. Access to the park is by gravel road. The park contains approximately 98 acres above the conservation pool elevation. The area has moderate to heavy tree coverage and a variety of slopes.

Recreational facilities constructed within the area include two concrete launching ramps, 34 picnicking sites, 38 camp sites, one group shelter, drinking water, a change house, a swimming beach, 4 masonry restrooms, a short nature trail, 118 feet of concrete walk, parking area for 175 cars, 0.80 mile of gravel road, and 1.8 miles of paved road.

Proposed development includes camping and picnic facilities, a water distribution system with drinking fountains, picnic shelter, access and circulation roads, and a nature trail.

This park will be a free park with a Class D use fee designation.

Visitation to this park was 21,921 in 1974 and anticipated visitation by 1980 is 29,000.

(3) Lost Bridge. (See Plates 14 and 14A) This park is located directly across the Indian Creek Arm of the lake from Indian Creek Park about 6 miles from Garfield, Arkansas. It contains 460 acres above the top of the conservation pool. Access is by paved State Highway 127. Moderate tree cover is available in the area and the terrain is quite steep with limited areas level enough for facility development.

Recreation facilities constructed within the area include a commercial boat dock, 2 concrete launching ramps, picnic sites, 57 campsites, drinking water, 2 masonry restrooms, 4 wooden restrooms, 2 swimming beaches, a nature trail approximately 7,920 feet long, parking area for 215 cars, 2.6 miles of paved road, and 1,437 feet of concrete walk.

Future development of Lost Bridge Park will include additional camping and picnic facilities; electrical services to all camp sites; parking areas, access and circulation roads; restrooms and sewage treatment facilities; a water distribution system with drinking fountains, two courtesy docks, and a trail system.

This is a Class C fee use park. After full development Lost Bridge will be designated as a Class A fee use area.

Visitation to the area was 105,750 in 1974 and 162,000 visitors are expected by 1980.

(4) Starkey. (See Plates 15 and 15A) This park is located on the end of a large peninsula on the main body of the lake, approximately 10 miles west of Eureka Springs, Arkansas. The park contains approximately 105 acres above the top of the conservation pool. The area is moderately steep with adequate tree cover. Access is by paved Arkansas State Highway 187.

Recreational facilities developed within the park include a commercial boat dock, snack bar, concrete launching ramp, picnic areas, 27 campsites, drinking water, change house, swimming beach, four masonry restrooms, 495 feet of concrete walk, parking area for 270 cars, 0.28 miles of gravel road and 2.1 miles of paved road.

Additional facilities proposed are: camping facilities, a water distribution system with drinking fountains, access and circulation roads, and sanitary facilities. A playground, beach, change house, trailer sanitary station, and courtesy dock will also be added.

This is a Class C fee use park. After full development this will be a Class B fee use park.

Visitation to this park was 37,064 in 1974 and is expected to be 64,000 by 1980.

(5) Rocky Branch. (See Plates 16 and 16A) Rocky Branch Park located about 6.5 miles northwest of the town of War Eagle contains approximately 157 acres above the conservation pool. A paved road from Arkansas State Highway 12 serves the park. The area is ideally suited for recreational development because of the relatively gentle slopes, adequate tree cover, and protective coves.

Recreational facilities developed in the park include a commercial boat dock, cafe, heated fishing dock, one concrete launching ramp, picnic sites, 56 campsites, two group shelters, drinking water, a change house, a swimming beach, five masonry restrooms, parking areas for 351 cars, and 2.6 miles of paved road.

Proposed facilities for future development at Rocky Branch Park are: individual and group camping sites; picnic facilities, sanitary facilities, access and circulation roads, additional launching facilities and parking. A sewage treatment facility, water distribution system with drinking fountains, trailer sanitary station, and an amphitheater, and entrance complex are also included in future expansion of this park.

Rocky Branch is now a Class C use fee park. After full development this park will be designated as a Class A use fee park.

Visitation at this park was 77,920 in 1974 and is expected to be 117,000 by 1980.

(6) Ventris. (See Plates 17 and 17A) Ventris is located in a remote area with access being provided by a severed gravel road. The park is located 6.5 miles south of Garfield, Arkansas and Highway 62, and the park contains 73 acres above the conservation pool. Terrain in the area varies from steep to moderately steep and there is adequate tree cover. The park recreational facilities include a concrete launching ramp, picnic sites, 8 campsites, one group shelter, drinking water, three masonry restrooms, one overlook shelter, parking area for 68 cars, 0.54 miles of gravel road, and 0.94 miles of paved road. This area has been designated a "free" area and use fees will not be collected.

Future facilities for Ventris Park include camping facilities, water wells, access and circulation roads and parking areas.

Visitation in this area was 6,195 in 1974 and anticipated visitation in 1980 is 9,000.

(7) Prairie Creek. (See Plates 18 and 18A) This park has the greatest visitation and is the most developed park on Beaver Lake. Located 3 miles east of Rogers, Arkansas just off Highway 12, the park contains 179 acres of gentle to steep sloping terrain with an abundance of tree cover. Access is by paved road.

Recreational facilities in the park include a commercial boat dock, a two-lane concrete launching ramp, picnic areas, 108 campsites, two group shelters, six masonry restrooms, swimming beach, one bathhouse, a nature trail approximately 3,960 feet long, 818 feet of concrete walk, sanitary dumping station, electrical outlets for all camping sites, and 5.18 miles of paved roads. The park is almost completely developed with regard to previous plans with the exception of additional camping and picnic sites.

Future development will add individual and group camping facilities, picnic sites, drinking fountains, sanitary facilities, and a sewage treatment plant. Courtesy docks will be added near the launching ramp and the existing beach will be expanded.

This park will be a Class A fee use park when fully developed. See Paragraph 15-03 for a discussion of the recovery of operation and maintenance costs through a user fee program.

Visitation to the park was 383,004 in 1974 and is expected to reach 453,000 by 1980.

(8) Horseshoe Bend.(See Plates 19 and 19A) This park is located on the main body of the lake on a large peninsula approximately 6 miles southeast of Rogers, Arkansas. The park contains 166 acres above the top of the conservation pool. Access is by paved State Highway 24. Moderate to steep slopes with moderate tree cover make this park ideally suited for all types of water oriented recreational activities. Recreational development of this area includes a commercial boat dock, one concrete launching ramp,swimming beach,change house, picnic sites, 97 camp sites, 4 masonry restrooms,807 feet of concrete walk, parking area for 164 cars and 3.3 miles of paved roads. All campsites have electrical service.

Future development will include additional camping and picnic facilities, a picnic shelter, a travel trailer area,water distribution system with drinking fountains.Also proposed are additional sanitary facilities and a sewage treatment plant.

This park when fully developed will be a Class A fee use area.

Visitation to this park was 125,138 in 1974 and is expected to be 212,500 by 1980.

(9) Hickory Creek.(See Plates 20 and 20A) This park contains 142 acres above the conservation pool and is located on the west side of the lake about 7 miles northeast of Springdale, Arkansas on State Highway 264. Recreational facilities at the park are a commercial boat dock,two concrete launching ramps,picnic sites, 31 campsites, two group shelters,drinking water, change house,swimming beach, four masonry restrooms,525 feet of concrete walk,parking areas, 0.96 miles of gravel road and 2.1 miles of paved roads.

Future development will include a water distribution system with drinking fountains,camping and picnic facilities,sanitary facilities, a campers washhouse, sewage treatment facilities, fishing dock, nature trail and an expanded swimming beach.

This is a Class B use fee park, and when fully developed it will be a Class A use fee park.

Visitation at Hickory Creek Park was 226,132 in 1974 with expected visitation to be 275,000 by 1980.

(10) War Eagle. (See Plates 21 and 21A) Approximately 48 acres above the conservation pool are contained in this park located on the east side of the Lake. Adequate tree cover and suitable terrain exist for all types of recreational development. The park is a very popular fishing area because of its location on a large peninsula formed by a large bend in War Eagle Creek which is a highly productive part of the Lake. Developments for recreational purposes include a commercial boat dock, one concrete launching ramp, picnic sites, 16 campsites, drinking water, one overlook shelter, two masonry restrooms, 480 feet of concrete walk, parking areas for 114 cars and 1.6 miles of paved roads.

Future facilities include single and multi-family camp sites with electricity. Additional facilities proposed include sanitary facilities and a sewage treatment plant, additional paved roads, parking, and a courtesy dock. Upon completion of development this park will be a Class A user fee area.

Visitation to War Eagle Park was 49,686 in 1974 and by 1980 it is expected that 71,000 visits will occur.

(11) Blue Springs. (See Plates 22 and 22A) Blue Springs Park contains 66 acres above the conservation pool and is located on the north shore of the Brush Creek arm of the Lake near the junction of the Brush Creek and Richland Creek arms. Paved Arkansas Highway 68 provides access. The area has a variety of slopes, adequate tree cover and is near several good fishing creeks. Developed recreational facilities include a concrete launching ramp, a small picnic area, 11 camp sites, drinking water, one group shelter, two masonry restrooms, 130 feet of concrete walk, parking for 120 cars, 0.27 miles of gravel road, and one mile of paved road.

Future development includes single and multi-family camping facilities, picnic facilities, an additional restroom, courtesy docks, a boat launching ramp, parking areas, and paving of existing gravel road. Upon completion of development this will be a Class A user fee area.

Visitation for 1974 was 66,024 and is expected to reach 80,000 by 1980.

c. Other Recreational Development

(1) Beaver Shores. This park is located at Beaver Shores Housing Development where State Highway 12 crosses the lake. The area is developed on Government and adjacent privately owned land and is open to the public without charge. The park includes five acres of government land. Recreation facilities constructed within the area include picnic tables, changehouse with restroom, a buoyed swimming area, boat launching ramp, roadway, parking area, and children's playground equipment.

(2) Other. There are 39 existing public launching ramps operated and maintained by counties and other organizations. These ramps are shown on the Land Use Plates 3 through 6. Also, numerous gravel and paved county roads provide access to the lake.

SECTION V

FACTORS INFLUENCING AND CONSTRAINING RESOURCE DEVELOPMENT AND MANAGEMENT

5-01. General. Before Beaver Lake was built and before the areas for recreation were developed, many of the effects that development of the project would have on the environment were considered. Among these considerations were effects on the vegetation, fish and wildlife, water quality, and population. Further development of the project within the purposes and scope of this plan will not adversely affect the resources of the project area.

The following is a discussion of factors which will be considered in the future planning and management of Beaver Lake.

5-02. Demographic.

a. Population: Population in the immediate area of the lake declined for several decades but has experienced an increase since the 1960 census. Population in the Beaver Lake area was primarily rural with no large population centers until the late 1950's and early 1960's. At this time industrial development began in the Fayetteville, Springdale, and Rogers area and there was a large population growth. The Beaver Lake project was influential in some measure as many retirement and vacation homes were built in the area. Population within the Beaver Lake zone of influence has grown from an estimated population of 1,577,000 in 1966 to an estimated population of 1,650,000 in 1973. The population by 2020 is expected to be approximately 2,840,000.

Within the 100 mile zone of influence there are relatively large urban areas. These are the areas of Springfield, Missouri, population 120,000 in 1970, Fayetteville-Springdale-Rogers, Arkansas, urban area with a population of 58,500 in 1970, and Ft. Smith-Van Buren, Arkansas urban area with a population of approximately 71,200 in 1970. Other population centers which contribute significantly to visitation are the Little Rock-North Little Rock, Arkansas area and the cities of Tulsa, St. Louis, Kansas City, and Memphis. Other projects in the area serve these cities as well.

Day use visitation to Beaver Lake is composed primarily of people who reside in the immediate area whereas overnight use is contributed by those in more distant areas.

5-03. Topography and geology. Project land development is limited by the topography in the area. As with most land in the area it is characterized by rugged terrain, containing narrow ridges and U-shaped valleys, steep, rocky slopes, and bluffs. Intensive development is

therefore prohibited in many locations and only a limited number of sites of acceptable slope and size are available for recreational facilities. The Corps of Engineers has issued guidelines which prohibit extensive alterations in the landscape. At the present time the exhaustion of areas suitable for development is not a critical problem.

The geology of the area does not prohibit construction of facilities for recreational use except with relation to ground water contamination. In many areas the soil is very shallow and porous rock is exposed which allows surface water to percolate into the water table or sub-surface rock strata. Because of this condition sewage treatment and disposal is a problem as the use of septic tanks with absorption fields is severely restricted.

Over development of a park must be avoided because of the limited ability of some soils to withstand intensive use. Intensive use may result in the compaction of the soil thus increasing runoff and erosion. The vegetative cover will be adversly affected should this occur.

5-04. Accessibility. Beaver Lake is served by a well developed system of U.S., State and County roads. These roads include U.S. Highway 62 on the north, and U.S. Highway 71 on the west. These roads are paved two-lane highways which are main arteries through the cities of Fayetteville, Springdale, Rogers and Bentonville. The U.S. Highways are all adequate in width and are in good condition. State Highways which serve the area include 23 and 12 on the east and 68 and 45 on the south. The State Highways are two-lane narrow and curving, low-type, bituminous paved in fair, to good condition with narrow shoulders.

5-05. Area of influence. Within the 100 mile zone of influence 70 percent of day-use visitors originate. Surveys conducted in 1968 and 1969 indicate that approximately 46 percent of all visitors to Beaver Lake come from areas outside the 100 mile zone of influence. In the survey 28 percent of the visitors camped at the project and 23 percent stayed in the Beaver Lake area. The average stay for campers was 4.6 days and the average stay in the area using other facilities was 5 days.

a. Income. Per capita personal income in the Beaver Lake zone of influence is below the national average. In 1970 the average per capita personal income in the U. S. was $2,940. Per capita personal income will not reach this figure in the zone of influence until sometime in the 1970 to 1980 period. In the Comprehensive Basin Study, White River Basin, Arkansas personal income is predicted to rise on the average of 3 percent per year. Table 2-5 shows projections of income and population of the zone of influence.

b. Economy. The economy of the Beaver Lake area has experienced an upward trend in the 1960's due to industrialization of the area by firms attracted by low wages and the absence of unionization. This industrialization has also had an effect on the population in that it retained a portion of the population which had previously migrated to other areas for employment. Beaver Lake has had a tremendous impact upon the leisure industry of the area. Retirement and vacation home construction and the influx of this segment of the population has boosted the local economy.

5-06. Related recreational-historical-scientific areas. There are ten other completed Corps of Engineers projects offering similar recreational opportunities within 100 miles of Beaver Lake, as shown on Plate 1. Visitation to these projects is shown in Table 5-1. Another Corps of Engineers lake project within 100 miles that is authorized is Pine Mountain. Recreational development will also be provided within this zone by navigation pools 13, 14 17 and 18 on the Arkansas River. Table 5-2 lists other recreational areas within the Beaver Lake zone of influence.

TABLE 5-1

VISITATION TO CORPS OF ENGINEERS RESERVOIR PROJECTS
WITHIN 100 HIGHWAY MILES OF BEAVER LAKE

Project	1968 Visitation	1973 Visitation	1974 Visitation
Fort Gibson	2,406,500	4,008,300	-
Webbers Falls*	-	218,600	-
Robert S.Kerr*	-	680,700	-
Table Rock	3,931,800	5,754,600	5,591,000
Bull Shoals	2,781,300	3,066,100	3,695,340
Blue Mountain	211,800	265,000	262,406
Dardanelle	1,033,600	2,128,200	2,325,668
Ozark*	-	490,700	580,627
Norfork	1,767,100	2,984,400	3,197,089
Tenkiller	1,465,000	4,055,300	-
Total	13,597,100	23,651,900	15,652,130

* Project incomplete in 1968

TABLE 5-2

RECREATIONAL FACILITIES IN THE BEAVER LAKE ZONE OF INFLUENCE
(MAJOR LAKES EXCLUDED)

OWNERSHIP	OKLAHOMA	MISSOURI	ARKANSAS
Federal:	McClellan-Kerr Arkansas River Navigation Systems Parks	Pond Ford Nat. Forest Table Rock Nat. Forest	Buffalo Nat. River* Pea Ridge National Military Park * McClellan-Kerr Arkansas River Navigation System Parks Lake Weddington
State:		Roaring River	Devils Den Willow Springs
Private:		Lake Taneycomo	

* These facilities are administered by the National Park Service of the U.S. Department of the Interior.

5-07. Water quality of pool and tailwater. Beaver Lake and the White River below Beaver Dam are both classified in Use Class A by Arkansas Water Quality Standards, Regulation No. 2 as promulgated in September, 1973 by the Arkansas Department of Pollution Control and Ecology. This classification defines Class A waters as suitable for primary contact recreation, propagation of desirable species of fish, wildlife and other aquatic life, raw water source for public water supplies, and other compatible uses.

5-08. Anticipated attendance. Using methods of population and visitation projection as outlined in Section 2-05, b, 1, 2 and 3, estimates were made for future visitation of Beaver Lake. The estimates are shown below:

TABLE 5-3

PROJECTED VISITATION

Year	Projection Factors from Table 2-5	Visitation
1973	1.00	3,227,004
1980	1.34	4,324,000
1990	2.01	6,486,000
2000	3.02	9,746,000
2010	4.56	14,715,000
2020	6.90	22,266,000

5-09. Determination of present recreational use.

a. Source of use data. Data for this report were taken from the Recreational Planning Studies conducted by the Sacramento District, Corps of Engineers. These studies have provided considerable visitor-use data on Beaver Lake. These data were collected, reported, analyzed, and interpreted in a uniform manner and are published in the Appendix to ER 1120-2-403, dated 26 March 1970. Seasonal factors derived from these surveys were applied to the monthly traffic counter readings to estimate visitation, and sampled visitor origin indicated the relationship of weekend to weekday visitation.

b. Planning base. The summer weekend day demand is the basis for estimating the land, water area and types of facilities required to adequately serve the recreational users of the project. Average summer weekend day-use of the project, expressed in activity occasions was determined by the following procedure:

(1) Determine the total summer visitation for the months of June, July, and August from monthly visitation reports. Divide this total by 13 (13 week summer base) to arrive at an average summer weekly visitation. The average summer weekly visitation was then multiplied by the percentage of visitors using the project on the weekend (40%) to arrive at the average summer weekend demand. It was assumed that the visitation was equally distributed between Saturday and Sunday. Therefore, one half of the average summer weekend visitation would equal the visitation for an average summer weekend day.

(2) The number of activity occasions which these visitors generated was calculated by multiplying the average summer weekend day visitation by the weekend percentage of participants in each activity. The surveys were conducted as the visitors entered the lake area; thus, they were expressing their desire to participate in various recreational activities.

c. Participation rates. The annual, summer and average summer weekend day participation rates for the surveyed outdoor recreational activities at Beaver Lake in 1973 is shown in Table 5-4.

d. Total activity days generated during the base year 1973. Application of the participation rates shown in Table 5-4 to the annual, summer and calculated average summer weekend day visitation to the project yields an indication of the number of recreation days that the project was required to support. A summary of the activity days experienced during 1973 is shown in Table 5-5.

TABLE 5-4

PARTICIPATION RATES EXPRESSED IN ACTIVITY
OCCASIONS PER VISIT - BEAVER LAKE

Activity	Average Summer Weekend Day (1)	Summer (2)	Annual (2)
Boating	0.05	0.08	0.05
Fishing	0.50	0.55	0.57
Water Skiing	0.04	0.03	0.01
Swimming	0.14	0.23	0.09
Subtotal	0.73	0.89	0.72
Camping	0.20	0.27	0.17
Picnicking	0.09	0.09	0.08
Subtotal	0.29	0.36	0.25
Sightseeing	0.28	0.21	0.28
Total	1.30	1.46	1.25

(1) ENG Form 3912A (21-6-69)
(2) Multiple letter SOKED-P, 7 May 1969, subject: Recreation Planning Studies, Standardized Data Collection

TABLE 5-5

ACTIVITY OCCASIONS GENERATED
AT BEAVER LAKE 1973

Activity	Average Summer Weekend Day	Summer	Annual
Boating	1,150	119,400	161,400
Fishing	11,500	820,800	1,839,400
Water Skiing	900	44,800	32,300
Swimming	3,200	343,200	290,400
Subtotal	16,750	1,328,200	2,323,500
Camping	4,600	403,000	548,600
Picnicking	2,100	134,300	258,200
Subtotal	6,700	537,300	806,800
Sightseeing	6,400	313,400	903,600
Total	29,850	2,178,900	4,033,900
Number of visitors to parks			1,335,849 (1)
Number of visitors to project	22,960	1,492,383(1)	3,227,004 (1)

(1) Source: SWD Form 388-C.

Calculation of 1973 average summer weekend day visitation:

1973 Summer Visitation (June, July, August) = 1,492,383
1973 Summer Weekly Visitation = 1,492,383 ÷ 13 = 114,799
1973 Summer Weekend Visitation = 114,799 x 0.40 = 45,920
1973 Summer Weekend Day Visitation = 45,920 ÷ 2 = 22,960

5-10. Basis for estimating future recreational use. In order to expand the number of activity days generated during the base year 1973 to the year 2020, the following assumptions were made:

a. Approximately 70 percent of the average summer weekend day visitation will continue to be generated by the population residing within 100 miles of Beaver Lake.

b. The participation rates for outdoor recreational activities will be the same as those determined by the Recreational Use Survey conducted during 1968. These participation rates will apply to the entire family unit and will consider all family members as occupying space and utilizing facilities.

c. Outdoor recreation has an economic value to the participant in that each dollar spent on outdoor recreational activity is a dollar that cannot be spent for other commodities or services. Therefore, the per capita demand for outdoor recreation is closely related to per capita personal income.

5-11. Facilities required to serve the anticipated use of the project.

a. Facilities required to serve the base year use. The estimated number of facilities required to serve the public in the base year 1973 was determined by dividing the facility supply capacity into the use experienced in 1973 as shown in Table 5-6. Table 5-7 compares the calculated facility requirement with the number of facilities actually available during 1974. Table 5-8 shows needs for outdoor recreation in the Beaver Lake area as compiled by the Arkansas Department of Planning and presented in the 1974 Arkansas Statewide Comprehensive Outdoor Recreation Plan. This information is presented for comparison only but does reflect a need for facilities and land uses which are proposed in the park site plan and Land Use sections of this design memorandum.

b. Future facility requirements. The facility supply capacities as discussed in Section 8-02 were applied to the projected summer weekend day use shown in Table 5-6 to estimate future facility requirements. The estimated requirements through the year 2020 are shown in Table 5-9.

TABLE 5-6

PROJECTED AVERAGE SUMMER WEEKEND
DAY USE OF BEAVER LAKE
EXPRESSED IN TERMS OF ACTIVITY OCCASIONS

Item	1973	1980	1990	2000	2010	2020
Projection Factors	1.00	1.34	2.01	3.02	4.56	6.90
Summer Weekend Day Visitation	22,960	30,770	46,150	69,340	104,700	158,400
Total Activity Occasions	29,850	40,000	60,000	90,100	136,200	206,000
Boating						
Skiing						
Fishing	13,550	18,150	27,250	40,900	61,800	93,500
Swimming	3,200	4,300	6,450	9,700	14,600	22,100
Subtotal	16,750					
Camping	4,600	6,150	9,250	13,900	21,000	31,700
Picnicking	2,100	2,800	4,200	6,300	9,600	14,500
Subtotal	6,700					
Sightseeing	6,400	8,600	12,850	19,300	29,200	44,200
Annual Project Visitation (1000's)	3,227	4,324	6,486	9,746	14,715	22,266

TABLE 5-7

COMPARISON OF EXISTING FACILITIES WITH CALCULATED FACILITY REQUIREMENTS
BEAVER LAKE

Facility	Number Existing January 1975	Calculated 1973 Requirements	Deficiency
Picnic Units	135	210	75
Group Picnic Shelters	10	10	0
Camp Units	529	920	391
Swimming Beach (Ft.)	975	530	0
Change Shelters	7	7	0
Restrooms	47	35	0
Launching Ramps	14 In Parks	48	0
	39 *Other		

* In 1974, there were 39 public launching ramps operated and maintained by counties and other organizations. These ramps are shown on the Land Use Plates, numbers 3 through 9.

TABLE 5-8

FACILITY NEEDS* FOR OUTDOOR RECREATION COMPILED FROM
THE ARKANSAS STATEWIDE COMPREHENSIVE OUTDOOR RECREATION PLAN
ARKANSAS REGION 1**

	1975	1980	1985	1990
Camping (No. of Sites)	141	199	258	332
Group and Organized Camping (No. of Beds)	239	290	338	401
Hunting (Acres)	179,186	207,044	246,093	290,563
Horseback Riding (Miles of Trails)	14	15	20	24
Bicycling (Miles of Trails)	55	67	80	98
Picnicking (No. of Sites)	1,565	1,941	2,366	2,847
Hiking and Walking (Miles of Trails)	635	696	811	950
Fishing (Acres of Water)	13,806	16,121	19,694	23,917
Swimming (Sq. Ft. of Water)	143,998	190,197	229,990	303,741

*Needs are unsatisfied demands

**Region 1 is comprised of Benton, Washington, Carroll, Madison, Boone, Newton, Marion, Baxter and Searcy counties.

5-12. Prediction of over-use. As stated previously, facilities have been proposed at Beaver Lake so that the natural resources in the area will be preserved and the facilities have not been sited in areas of terrain or vegetative restrictions.

Over-use will develop if visitor control is not exercised. The extent of over-use can best be determined by comparing the number of facilities required to the number of facilities proposed in this master plan. In Table 5-7 it can be seen that critical deficiencies presently exist in camp units.

Table 5-10 extends deficiencies from 1980 to 2020. Again, critical deficiencies assert themselves in the areas of camping, picnicking, and boating facilities. By the early 1990's all facilities except sanitary will be used to maximum capacity. By 2000, if present use patterns persist, facilities will be critically over-loaded. Additional land will be needed for parks, if the recreation demand is to be accommodated.

5-13. Application of public law 89-72. Recreational development after FY 1974 will be subject to the cost-sharing policy as established by the Secretary of the Army in coordination with the Office of Management and Budget. As relates to Beaver Lake, development, enhancement, and management of recreation and fish and wildlife resources shall be shared with a non-Federal agency on a 50-50 basis unless a system of user fees is established at parks to recover all costs of operation and maintenance.

5-14. Environmental and ecological features. A large portion of the visitors of Beaver Lake come to enjoy the scenery of the area. Many varieties of wild flowers and grasses can be found along the lower slopes of the ridges and wild azalea shrubs and flowering dogwood, especially beautiful in the spring, are found along limestone ledges and boulder outcrops. The many varieties of hardwood in the area provide enjoyment in the fall when the foliage assumes brilliant hues of orange, red, yellow, and brown. These colors mixed with the greens of the evergreen varieties provide breathtaking beauty to the sightseer.

Development of the parks will be done in a manner so as to protect the flowers, shrubs, and trees and assure the enjoyment of the natural setting. Bluff areas have been designated as natural areas in the Land Use portion of this plan.

TABLE 5-9

FACILITIES REQUIRED TO SUPPORT THE ANTICIPATED
AVERAGE SUMMER WEEKEND DAY USE OF BEAVER LAKE

Facility	1973	1980	1990	2000	2010	2020
Picnic Units	210	280	420	630	960	1,450
Camp Units	920	1,230	1,850	2,780	4,200	6,340
Swimming Beach (Ft.)	530	720	1,080	1,620	2,430	3,680
Change Shelters	7	10	14	22	32	49
Sanitary Facilities						
(a) Campers	19	25	37	56	84	127
(b) Swimmers	7	10	14	22	32	49
(c) Others	9	12	18	27	40	61
Launching Ramps	48	64	96	145	218	330
Group Picnic Shelter	9	13	19	28	43	65

TABLE 5-10

COMPARISON OF PROPOSED FACILITIES WITH

CALCULATED FACILITY REQUIREMENTS, 1980-2020

Facility	Facilities Proposed In Plan	Deficiency				
		1980	1990	2000	2010	2020
Picnic Units	354	0	66	276	606	1096
Group Picnic Shelter	26	0	0	2	17	39
Camp Units	1442	0	408	1338	2758	4898
Swimming Beach (ft.)	1400	0	0	220	1030	2280
Change Shelters	12	0	2	10	20	37
Restrooms (1)(2)(3) V-70 (5) WB-36 CW-5	480(4)	0	0	0	0	0
Launching Ramps (6)	25	0	0	0	0	1

1 Waterborne restrooms are converted to equivalents in vault type restrooms in order to measure deficiencies.

2 Deficiency stated in terms of vault restrooms.

3 Campers wash house equivalent to 10 vault type units. One waterborne unit equivalent to 10 vault type units. One convert to waterborne unit is equivalent to 5 vault type restrooms.

4 All restrooms are equivalent to 480 vault type units.

5 Number of existing restrooms.
V - vault
WB- waterborne
CW- campers' wash house

6 There are 39 public launching ramps operated and maintained by other agencies such as counties and other organizations in 1974. These ramps are shown on the Land Use Plates numbers 3 through 6. Deficiencies shown were calculated with due consideration of these other public ramps.

SECTION VI

COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

6-01. Original coordination. Original coordination for the development of recreational facilities at Beaver Lake was accomplished through personal contacts, correspondence and a public hearing with all interested Federal, State and local governmental officials. The public hearing was held in Eureka Springs, Arkansas, on October 18, 1960. Represented at the hearing were the U.S. Fish and Wildlife Service, Arkansas Highway Department, Arkansas Game and Fish Commission, University of Arkansas and numerous nearby cities and towns.

6-02. Recent coordination. Inquiries were submitted to various government agencies by the Corps of Engineers concerning the updating of this Master Plan. Replies were received from the Arkansas Archeological Survey, Bureau of Sport Fisheries and Wildlife, Northwest Arkansas Regional Planning Commission, City Administrator, Fayetteville, Arkansas Game and Fish Commission and U.S. Forest Service. Copies of this correspondence are contained in this Master Plan. The following is a summary of the correspondence.

a. Arkansas Archeological Survey. This letter states that archeological conditions of the lake are deteriorating and no discussion concerning archeological sites was offered.

b. Bureau of Sport Fisheries and Wildlife. Suggestions as to steps which may be taken to improve fishing and preservation of natural areas and endangered species of wildlife were offered. Also suggestions were made for improving habitat of wildlife. Several ideas concerning improvment of trout fishing and stocking of exotic and native fish were suggested.

c. Northwest Arkansas Regional Planning Commission. Four reports concerning Beaver Lake and/or recreational facilities in the area were submitted by this agency. The reports are too voluminous to include in this Master Plan, therfore a summary is included as follows:

(1) Land Resource Management Plan. This plan shows planned land use with regard to Residential, Commercial, Industrial, Agricultural, and Open Space/Public.

(2) Physical Features Planning Study. Policy statements have been included in this study which discourages the development of floodable areas and areas of steep slope. Wise development is encouraged for the entire area. Development is discouraged for areas in which soil types limit the use of septic tanks which in turn may adversely affect health and safety of residents.

(3) Open Space and Recreation Planning Study. This study indicates that the Northwest Arkansas Region is going to have an increase in population with more time, money, and mobility. The population is demanding new and varied facilities for their leisure time activity and will continue to do so. New and improved neighborhood parks will provide some relief but other types of recreational facilities will be required to satisfy the demand. These facilities may be the city-wide or area park and regional parks.

(4) Septic Tank Pollution of Beaver Reservoir. The conclusions of this report indicate that pollution of the impoundment is occuring due to improperly operating septic tank absorbtion fields located in the vicinity of the Lake.

d. City Administrator, Fayetteville, Arkansas. Mr. Don Grimes, City Administrator, indicated that construction of Highway 265 will increase use of Blue Springs, War Eagle and Hickory Creek Parks.

The city of Fayetteville may pump sewage effluent from its treatment plant to the Illinois River watershed in the future.

e. U.S. Forest Service. No pertinent information.

f. Arkansas Game and Fish Commission. Three recommendations were made by this agency. These were:

(1) Construct a nursery pond to raise and stock desirable fish in Beaver Lake.

(2) More use of wildlife management practices on lands surrounding the Lake.

(3) Refrain from leasing land for grazing purposes.

g. Arkansas Department of Planning. Correspondence from this agency recommended that an area known as the Devil's Eyebrow located near Beaver Lake be considered for preservation. This area is privately owned except for a portion of Section 26, T21N, R28W, which is located on Beaver Lake. See Page 6-14 for information.

h. Other state agencies or persons, including the U.S. National Park Service, contacted concerning the updating of this Master Plan that did not reply were as follows:

Agricultural Stabilization and Conservation Services, Berryville
Agricultural Stabilization and Conservation Services, Bentonville
Agricultural Stabilization and Conservation Services, Fayetteville
U.S. National Park Service

Department of Parks and Tourism
Arkansas State Department of Health
State Geologist
Arkansas Forestry Commission
Ozark Regional Commission
Arkansas Department of Pollution Control and Ecology
Northwest Arkansas Planning and Development District
Honorable Fred L. Naff, Mayor of Eureka Springs
White River Planning and Development District
Honorable Park Phillips, Mayor of Springdale
Honorable Ed Bautts, Mayor of Rogers
Mr. Dan M. Douglas, City Administrator, Bentonville

PRESERVING THE PAST FOR THE FUTURE

ARKANSAS ARCHEOLOGICAL SURVEY

DIRECTOR • CHARLES R. MCGIMSEY III
STATE ARCHEOLOGIST • HESTER A. DAVIS

Coordinating Office
University of Arkansas Museum
Fayetteville, Arkansas 72701
April 10, 1974

Mr. D. R. Rippey
Chief, Engineering Division
Little Rock, District, Corps of Engineers
P. O. Box 867
Little Rock, AR 72203

Dear Mr. Rippey:

This is in response to your letter of 25 March concerning the updating of your master plans for Beaver and Greers Ferry Lakes. We haven't been to look of course, but we must assume that if sites are in public use areas or where they are on the shore line that there has been another year or so of damage. It would probably be realistic to say the "archeological condition" at the lake is deteriorating rather than remaining stable.

If we can provide any further information, please let me know.

Sincerley,

Hester A. Davis
State Archeologist

HAD/aps
cc: Southwest Region, NPS

United States Department of the Interior
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
17 EXECUTIVE PARK DRIVE, N. E.
ATLANTA, GEORGIA 30329

June 10, 1974

District Engineer
U.S. Army Corps of Engineers
P.O. Box 867
Little Rock, Arkansas 72203

Dear Sir:

This responds to Mr. Calvin W. Shelton's letter (SWLED-PV) dated February 26, 1974, and is for your consideration in planning for the further development and use of Beaver Lake, Arkansas.

The objective of your fish and wildlife program should be to sustain the maximum number and diversity of plants and animals on a quality basis for the use and enjoyment of the public. Since the land acquired in fee title around the perimeter of the lake is narrow in most places, the prospects for management of terrestrial flora and fauna are somewhat limited. Aquatic habitat, however, is much greater in extent and offers more opportunity for improvement.

In regard to the current Master Plan dated May 1969, paragraph 3-05, Fish and Wildlife, we have the following comments by subparagraph:

A. After impoundment, smallmouth bass and rock bass have not thrived. Smallmouth bass may reappear in the future, but have not yet through the 10 years of impoundment. Northern pike have virtually disappeared. Walleye are of minor importance. "Bream" is a redundant term, inasmuch as "sunfish" was used in the previous sentence. Add striped bass as "trophy fish" being stocked periodically. Add blue catfish.

B. The statement that, ". . . the overall benefits to fish and wildlife have offset upland game losses many times over" should be deleted. We refer you to paragraph 11c in ER 1105-2-129, dated August 15, 1973, which says in part, "One type of fish and wildlife benefit will not be used as an offset for another type of fish and wildlife damage, nor will only the net effect be shown.

C. This discussion cites an estimate of 282,000 man-days of recreational fishing in 1968. Our National Reservoir Research Program survey estimates of lake-angler days have ranged from 125,000 to 212,000, with a mean of about 175,000 days. About 20 percent could be added for nightfishing (175,000 + 35,000 = 210,000). No estimate was made for tail-water fishing. To the best of our knowledge, there has not been a survey to determine how much of this activity would have occurred in other water bodies in the absence of Beaver Lake. Tail-water fishing could be significantly increased with additional stocking of trout.

D. While it is true that the Corps complied with the State's and Bureau's recommendation for a pipe in the dam for future water supply for a fish hatchery and for use in augmenting downstream flows, no further action has been taken to provide a hatchery or low-flow augmentation.

G. The title of South Central Reservoir Investigations is scheduled to be changed to White River Reservoir Studies on July 1, 1974.

Appendix D of the Master Plan, entitled Fish and Wildlife Management Plan and dated April 1972, includes many relevant and appropriate comments for the conservation and use of fish and wildlife resources. It does not document any coordination with this Bureau, and in fact, our file indicates your last correspondence for Beaver Lake was dated January 1962.

The following general recommendations are listed for your consideration in the further development and use of fish and wildlife resources at Beaver Lake.

Wildlife Resources

1. Provide for an appraisal of the status of all wildlife species, particularly rare forms. Evaluate wildlife habitat, prepare a plan prescribing practices for improving or maintaining habitat, and annually evaluate the success of the plan.

2. Exclude livestock from project lands because they generally destroy forest reproduction, compact the soil, cause erosion and reduce wildlife food.

3. Manage the flora to favor an interspersion of food, nesting, and cover-producing vegetation. Mast- and cavity-producing trees should be preserved and encouraged. Plant trees or groupings of shrubs with high wildlife values such as red oak, beech, dogwood, autumn olive, red cedar, honeysuckle, and elderberry.

4. Special effort should be made to provide protection for nesting areas of the bald eagle.

5. Provide nesting boxes for wood ducks, squirrels, and other animals as needed at appropriate sites around the lake. Consider purple martin houses near public use areas for insect control and esthetics.

Fishery Resources and Utilization

1. Provide for immediate development of Big Clifty, Pine Top, and Blackburn public use areas.

2. Provide for immediate development of boat-launching access at:

(a) Monte Ne (End of Highway 945)
(b) Neill's Bluff
(c) Hickory Flat Hollow on War Eagle Embayment
(d) Highway 45 bridge area

3. Provide for immediate development of a public use area including boat launching on project lands approximately 1 mile below the dam.

4. Provide additional boat-launching ramps at Rocky Branch and Hickory Creek public use areas.

5. Institute an immediate moratorium on permitting additional private boat docks and houses until this problem can be studied by an interagency group and guidelines developed. This Bureau and the Arkansas Game and Fish Commission should be afforded an opportunity to participate in developing these guidelines.

6. Provide for some flexibility in water level fluctuation to enhance sport fish production.

7. Construct and maintain two nursery subimpoundments: (1) an approximately 100-acre pond for native fish production to insure against loss of year-class spawn caused by unfavorable water level and fluctuation; (2) an approximately 40-acre pond for production of non-native fishes such as striped bass to fill vacant niches in Beaver Lake.

8. Provide for stocking of about 1,000,000 striped bass fry annually.

9. Modify existing fixed-level intake on water supply pipe to multiple level intake to alleviate the low water temperature problem and toxicity attributable to manganese in solution because of low dissolved oxygen.

10. Explore means to establish and maintain a trout fishery to fill cold water niches in the lake and tail-water habitats.

11. Aerate waters released from the dam when dissolved oxygen falls below 6 milligrams per liter, which is the minimum required for healthy cold-water fishes.

12. Reserve a small area of the lake for cage-fish rearing operation for supplemental fish stocking of project waters.

13. Provide safe-use facilities for bank fishing in the tail-water immediately below the dam.

14. Give consideration to removing or limiting the restriction on fishing immediately above the dam.

We appreciate this opportunity to provide information for your consideration in planning for the further development and use of Beaver Lake. We have informally coordinated our recommendations with the Arkansas Game and Fish Commission in the development of specific measures for fish and wildlife resources.

Sincerely yours,

Ray F. Vaughn

Deputy Regional Director

NORTHWEST ARKANSAS REGIONAL PLANNING COMMISSION
P. O. BOX 745 — SPRINGDALE ARKANSAS 72764 — (501)—751—7125

March 1, 1974

Mr. Calvin W. Shelton
Acting Chief, Engineering Division
Department of the Army
Little Rock District, Corps of Engineers
Box 867
Little Rock, Arkansas 72203

Attention: SWLED-PV

Dear Mr. Shelton:

In accordance with your request of February 26, 1974, I am pleased to transmit herewith for your use the following materials:

1. Adopted Land Resource Management Plan
2. Open Space and Recreation planning study
3. Physical Features planning study
4. Septic Tank Pollution of Beaver Reservoir

In addition to these studies the Commission is presently preparing a draft Water Quality Management Plan on which the public hearing is to be held on April 25. We will provide you a copy of the draft report as soon as it is reproduced.

Sincerely,

Kenneth D. Riley
Director

KDR/djs

Enclosures

FAYETTEVILLE, ARKANSAS

OFFICE OF CITY MANAGER

P. O. DRAWER F 72701 (501) 521-7700

March 4, 1974

Mr. Calvin W. Shelton
Acting Chief, Engineering Division
Department of the Army
Little Rock District, Corps of Engineers
P.O. Box 867
Little Rock, AR 72203

To Attention of: SWLED-PV

Dear Mr. Shelton:

I am writing in reply to your letter of February 26, 1974, concerning information which might be pertinent to planning for future development and use of Beaver Lake.

One item which might have some long range effect upon the use of the lake is the planned construction in the spring of 1974 of Highway 265 (Cross-over Road) from Highway 45 east of Fayetteville to Highway 68 east of Springdale. The comprehensive transportation plan for the communities of Fayetteville and Springdale contemplates the eventual extension of this highway northward along the east side of Springdale to tie into Route 264 which leads to Hickory Creek marina. I feel the construction of this highway will make the Blue Springs, War Eagle and Hickory Creek public use areas much more accessible and will result in increased usage of these areas.

One item of additional interest is the possibility that, as a result of the pending new EPA effluent discharge regulations, the City of Fayetteville may at some time within the next few years start piping all sewage effluent from the present pollution control plant located on the White River over the ridge to the Illinois River water shed. A final decision has not yet been made but this is a very distinct possibility.

Lake Fayetteville is presently being developed by the communities of Fayetteville and Springdale as a public recreation area. This could possibly relieve some of the pressure on public use areas at Beaver Lake -- especially if the gas shortage becomes more acute.

Sincerely,

Donald L. Grimes

Donald L. Grimes
City Manager

DLG:al

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Southeastern Area, State and Private Forestry
Atlanta, Georgia 30309

March 18, 1974

3520

Mr. Calvin W. Shelton
Acting Chief, Engineering Division
Department of the Army
Little Rock District, Corps of Engineers
Post Office Box 867
Little Rock, Arkansas 72203

Dear Mr. Shelton:

At this office, we have no information that would be pertinent to updating your project master plan for Beaver and Greers Ferry Lakes.

We are forwarding a copy of your 26 February letter to Mr. Robert Baker, our field representative in Little Rock. If he has any pertinent information, we are asking him to contact you directly.

If you have any specific questions concerning the forest resources in the area of these lakes, please contact Mr. Baker. His address and phone number are:

Little Rock Zone Office
3508 Federal Office Building
Little Rock, Arkansas 72201
501 378-5814

Sincerely,

CARTER P. QUALLS
Acting Area Director

Arkansas
Game and Fish Commission

LITTLE ROCK, ARKANSAS 72201

March 1, 1974

Mr. Calvin W. Shelton
Acting Chief
Engineering Division
Department of the Army
Little Rock District
Corps of Engineers
Post Office Box 867
Little Rock, Arkansas 72203

Re: SWLED-PV

Dear Mr. Shelton:

Reference is made to your letter dated February 26, 1974, requesting pertinent information for further development and use of Greers Ferry and Beaver Lakes.

The following are practices which the Arkansas Game and Fish Commission would like to see implemented on these Corps Lakes.

1. The construction of a nursery pond on Beaver Lake to enable the Commission to raise and stock desirable fish species to be released into Beaver Lake.

2. More use of wildlife management practices on the lands surrounding these lakes, such as controlled burning, planting of food and cover plots, selective thinnings of trees, bushhogging and disking, particularly in areas open to hunting.

3. Refrain from letting more grazing leases than are now in effect, and not renewing grazing leases when they expire, as grazing does not assure preservation of the scenic, biological, historical and recreational resources of these lake areas.

Very truly yours,

Andrew H. Hulsey
Director

AHH:LJ;lr

STATE OF ARKANSAS
DEPARTMENT OF PLANNING
400 TRAIN STATION SQUARE • VICTORY AT MARKHAM
LITTLE ROCK 72201

DALE BUMPERS
GOVERNOR

CHARLES T. CROW
DIRECTOR

May 2, 1974

Mr. Calvin W. Shelton
Acting Chief, Engineering Division
Department of the Army
Little Rock District, Corps of Engineers
Post Office Box 867
Little Rock, Arkansas 72203

Dear Mr. Shelton:

This is in response to your letter dated 26 February 1974 reference code SWLED-PV, requesting pertinent planning information on Beaver and Greers Ferry Lake. Although we do not have any information which might prove beneficial in the development and management of the Greers Ferry Lake area, we are able to furnish you with a report on the Devil's Eyebrow, an area located adjacent to Beaver Lake.

Enclosed is information on the location and description of the Devil's Eyebrow with added recommendations for preservation of this natural area. Also included is a map showing the relationship of this ravine to Beaver Lake. The area of primary concern which is worthy of preservation is outlined in Sections 22 and 27 (owned by Dale Legg, Gateway, Arkansas), while the land in Sections 23 and 26 is an additional area for possible protection (ownership unknown). We do believe that the Corps owns at least part of the land in Section 26. More precise information on ownership is being gathered, and boundaries for a preservation unit are being defined.

If the Department of Planning can be of any further assistance, please feel free to contact us.

Sincerely,

Ranny Cullom
Manager, Environmental Planning

RC/bas

Enclosures

DEVILS EYEBROW

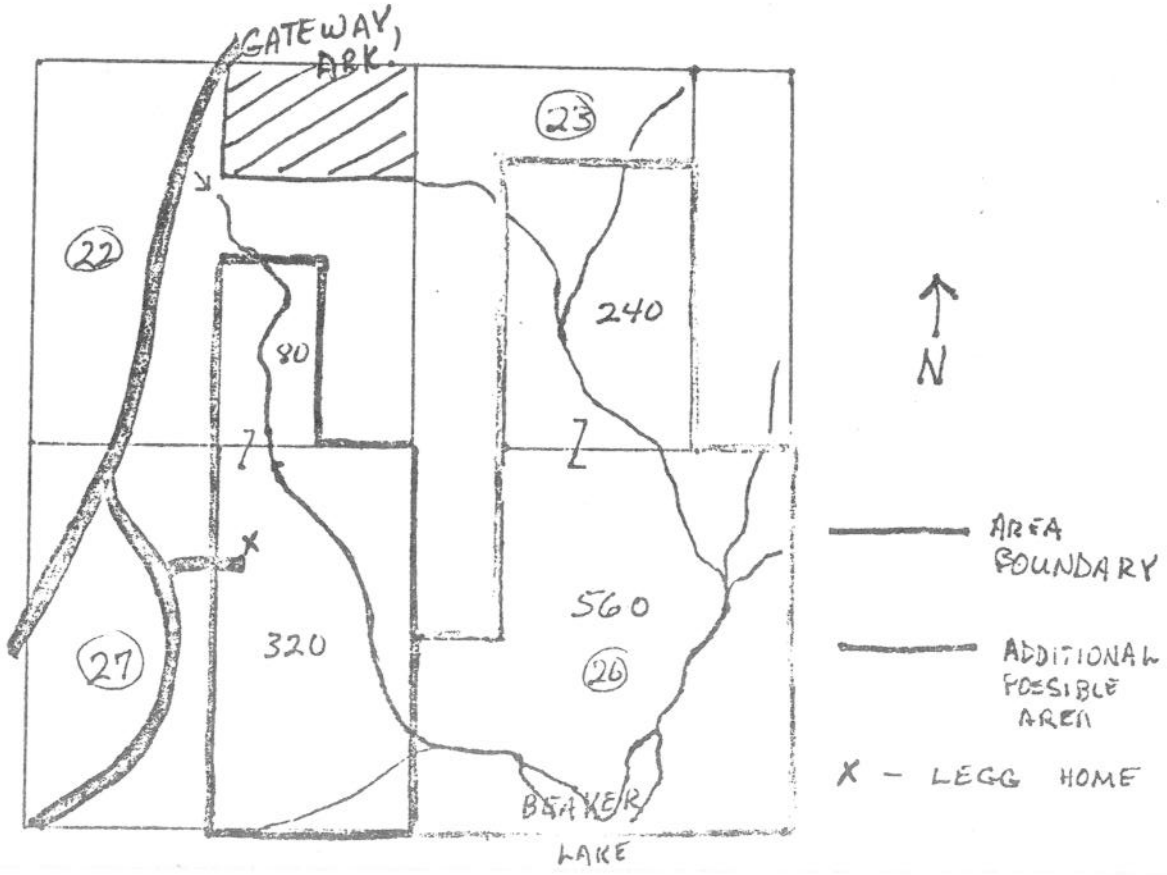
BENTON CO.

SEC. 22, 23, 27, 28, T 21N R 28W

S.	T.	R.	OWNERSHIP	DESCRIPTION	ACREAGE
22	21	28	Dale Legg	W½ SE	80
27	21	28	Dale Legg	E½	320

OWNER'S ADDRESS

Dale Legg; Gateway, Arkansas



DEVIL'S EYEBROW

Benton County

Summary

The Devil's Eyebrow is an extremely steep and rugged ravine running in a southerly direction into Beaver lake. There is a very pretty small stream at the bottom of it, fed by other small streams and springs coming to it form 90 degree angles.

Heavy woodland is found only along a very narrow flood plain in the bottom of the ravine, the slopes contain little soil, are very rocky, and have vegetation typical of cedar glades. On upper slopes and on top, there appears to have been some clearing. Trees are scattered but at times very large.

The area contains two species of trees not known in any other area. This is a spectacular redeeming feature for an otherwise mediocre ravine.

Recommendations

Due to the steepness, poor soil and location, the Devil's Eyebrow ravine should be very inexpensive as far as cost per acre.

The lower portion, near the lake is owned by the U.S. government as a buffer strip to Beaver lake. The upper portion, which is in private ownership, apparently would only include from 2 to 3 hundred acres. Due to the presence of extremely rare species of plants , this area must be

highly regarded. But it is also true that it is unlikely that any act of the landowner would endanger the presence of these species, simply because the terrain does not lend itself to extensive logging or farming.

If acquired, this area would best be administered by the University of Arkansas nearby, as a scientific area.

Introduction

Location:

Devil's Eyebrow begins one mile south of Gateway, Arkansas, and extends into Beaver lake, which is about 2 to 3 miles south of Gateway. State Highway 62 from Gateway to Rogers, Arkansas runs parallel to the ravine about 2 miles to the west. Entrance to the area can be obtained through the property of Mr Dale Legg, who lives at the end of a gravel road off of the highway.

Character:

The ravine is approximately 130 feet deep, and very narrow at the bottom. There are several small caves along the slopes, and springs feed the stream. According to a local citizen, a sow Black Bear (Ursus americanus) has lived in the ravine for years and raised cubs there. The stream is small, with small pools up to 3 feet in depth. These are occupied only by small minnows, yet in one there was a huge Alligator Snapping Turtle (Macroclemys temmenecki) which was nearly too large for the small pool. He was about 2 1/2 feet in diameter. He was so large and old he could hardly move out of the pool, and likely his presence indicates the influence of the nearby lake. It was one of nature's strangest oddities.

There is another oddity in the Devil's eyebrow area, and that is the presence of a typical northern species of tree that is known nowhere else in Arkansas. It is the Black Maple (Acer nigrum), and seems to be the dominant species of tree in the Devil's Eyebrow ravine, both in the creek bottom, and on the slopes and top. This tree is one of the prettiest species imagineable. It grows quite large apparently. The average size in Devil's Eyebrow is about 8 to 10 inches in diameter and approximately 35 feet in height. However, several specimens were observed much larger, up to 18 or 20 inches in diameter.

The foilage of the tree is a deep bluish-green, and thicker than foilage of other hardwoods, even the Sweet Gum (Liquidambar styraciflua). The leaves are distinctly-shaped maple leaves except they have deep narrow lobes.

Another rare species found in the area, not as common as the Black Maple, was the Rock Elm (Ulmus thomasii). This species was identified by Gary Tucker, professor of botany at Arkansas Tech College at Russellville.

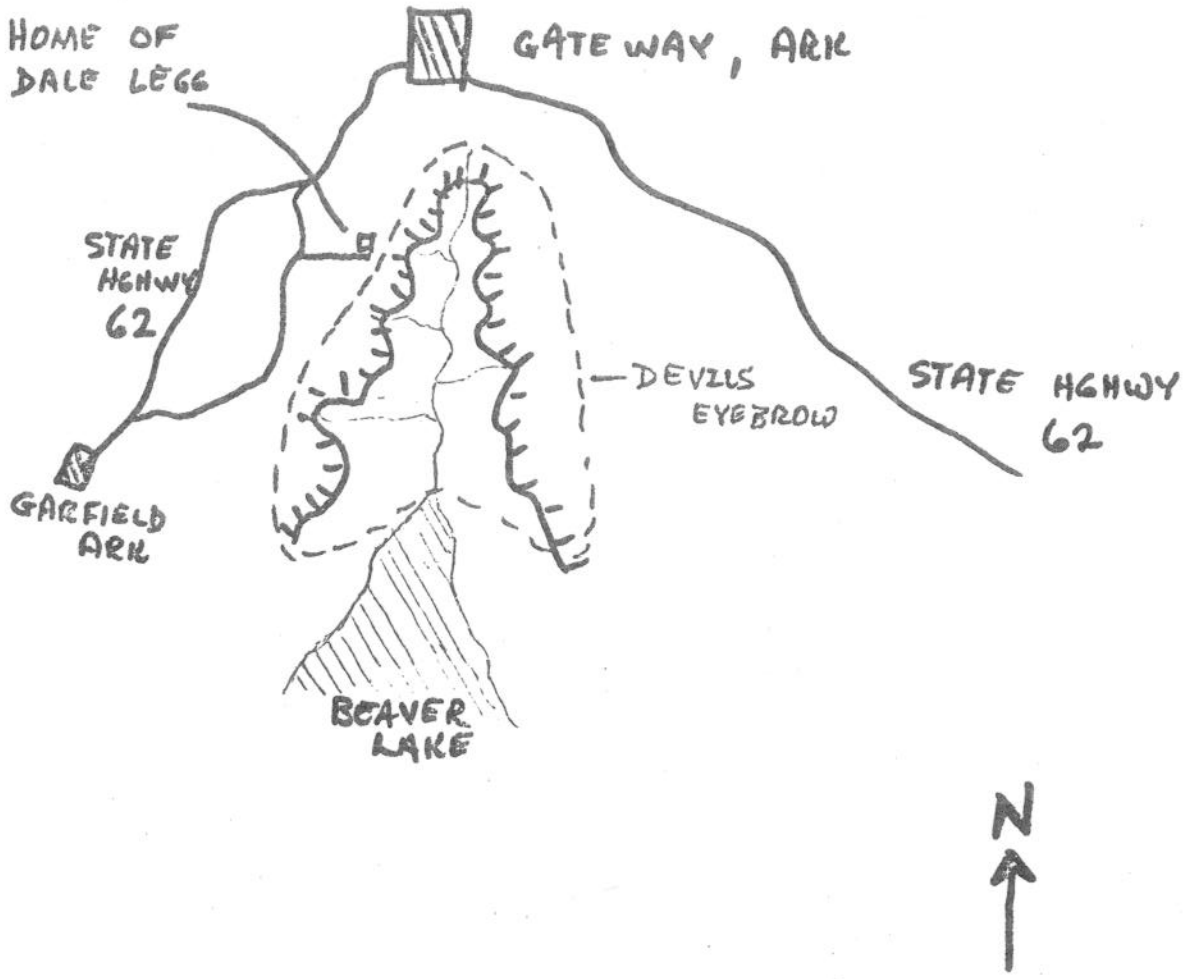
Glade species are numerous at Devil's Eyebrow. It has abundant rock outcroppings and little soil high on the slopes, and they are studded with Red Cedar (Juniperus virginianus). Common glade wildflowers are abundant.

Most of the woodland is in the very narrow bottom and on lower slopes. Red Oak, (Quercus rubra) and Sweet Gum, (Liquidambar styraciflua) and Sycamore (Platanus occidentalis) are common there.

On the ridge tops, some large White Oaks (Quercus alba) and Dogwoods (Cornus florida) were observed.

Ownership:

The lower portion of the ravine is in government ownership, and the upper portion is owned by Mr. Dale Legg, Gateway, Arkansas.


HOME OF
DALE LEGG
GATE WAY, ARK
STATE
HGHWY
62
DEVILS
EYEBROW
STATE HGHWY
62
GARFIELD
ARK
BEAVER
LAKE
N

SECTION VII

PHYSICAL PLAN OF DEVELOPMENT

7-01. Allocation of project land and waters. The physical plan of development has two components: land and water use; and facility development. The land and water use portion identifies all the resources of the project and depicts in detail the relationships of varied land and water uses appropriate to these resources. The resources of the project have been discussed in other portions of this plan. The land resources of Beaver Lake are divided into the following categories. These areas are shown on the Land Use Maps, Plates 3-9.

a. Project operations. These lands are allocated to provide for safe, efficient operation of the project for authorized purposes other than recreation and fish and wildlife. In all cases this will include, but is not limited to, the land on which project operational structures are located. Agricultural use of these lands will be permitted on an interim basis when not in conflict with use for authorized purposes, recreation use or wildlife habitat.

b. Operations: Recreation-intensive use. These lands are for project operations and are allocated for use as developed park areas for intensive recreational activities by the visiting public, including areas for concession and quasi-public development. Agricultural uses are permitted on these lands on an interim basis. The existing parks are described in Section 4-06 and the future parks are described in the following paragraphs. Six areas have been reserved for future development to supplement the eleven existing parks which have been discussed in Section 4-06. These six areas are subject to the cost-sharing provision of Public Law 89-72 as approved 9 July 1965 under policy established by the Secretary of the Army as outlined in EC 11-2-138, Recreational Development at Completed Projects, dated 15 May 1974. See Section 1-05.

(1) Big Clifty (Plate 23) This area contains approximately 100 acres above the top of the conservation pool. It is located on the Big Clifty arm of the lake about 10 miles from Eureka Springs, Arkansas. Access from the north is by county gravel road from paved Arkansas Highway 23 and from the south by county gravel road from Arkansas Highways 23 and 127. A desirable area for outdoor recreation is provided by moderate to steep slopes and ample tree cover. A cost-sharing contract with Carroll County, Arkansas, for the development of this park is scheduled for FY 1976. The proposed development consists of 2,900 lin. ft. of paved road, 2,230 sq. yds. of paved parking, a concrete launching ramp, two vault restrooms, seventeen picnic units and a group picnic shelter. Future development for this park includes: 17 picnic units, 55 camping units, 2 launching lanes, drinking water, 1 picnic shelter, 3 vault type and 2 waterborne masonary restrooms, 1 multi-purpose court and 1.5 miles of trails.

(2) Pine Top (Plate 24). The area is located on the east shore of the main body of the lake on the Big Clifty Arm. It contains approximately 97 acres above conservation pool elevation and is reached by gravel road from State Highway 12. The area is moderately sloped with moderate to heavy tree cover. Future facilities will include: 72 camp sites, 62 units with electricity, 2.05 miles of paved roads, parking for 120 cars, 1 concrete launching ramp, 3 playgrounds, 7 vault type masonary restrooms, drinking water, and one travel trailer sanitary station. This will be a Class B use fee area when fully developed.

(3) Slate Gap (Plate 25). This area contains 288 acres above the conservation pool and is located in the wider part of the lake on a large pennisula. Access is by gravel road south of Lost Bridge Park and Highway 127. The park has moderate to steep slopes and adequate tree cover. Future development includes: 142 camp sites, drinking water, 3.2 miles of paved roads, parking for 310 cars, one concrete launching ramp, 6 waterborne restrooms, 1 with showers, 7,300 feet of trails and 5 playgrounds. This area will be designated as a Class A use fee park after full development.

(4) Alpine (Plate 26). This area is located on the west side of the Ventris Hollow Arm of the lake approximately 6½ miles east of the city of Rogers, Arkansas, and contains approximately 49 acres above the conservation pool. A severed gravel road traverses practically the entire area, providing easy access to the water. An ideal setting is provided for recreational development because of moderate slopes and adequate tree cover. Future facilities will include: 45 camp sites with electricity, drinking water, 1.15 miles of paved roads, parking for 40 cars, one concrete launching ramp, 3 waterborne restrooms, 1 with showers, one 10,000 gallons per day tertiary sewage treatment plant and playgrounds in 2 areas of the park. This will be a Class A use fee area when fully developed.

(5) Blackburn Creek (Plate 27). This area contains 119 acres above the top of the conservation pool. It is located on the east side of the main stem of the lake with access by graveled county road from Arkansas State Highway 12. Relatively gentle slopes, adequate tree cover and protective coves make this a very desirable location for all types of water-related activities. Future development includes: 97 camp sites with electricity, 27 picnic sites, drinking water, 2.57 miles of paved roads, parking for 500 automobiles, 2 concrete launching ramps, 7 masonry waterborne restrooms (1 with showers), 1 campers' washhouse, one 10,000 gallons per day tertiary treatment plant, 14 travel trailer pull-outs with electricity, 1600 feet of trail, and playground equipment for 6 play areas.

(6) Bear Creek Island (Plate 28). Bear Creek Island is located near the Highway 12 Bridge approximately 5 miles east of Rogers. For development of this island, it is necessary that a causeway be constructed from Highway 12 to the island, a distance of approximately 2000 feet.

Proposals for this park call for a visitors center and interpretive facility to be located on the southwest side of the island on a bluff overlooking Beaver Lake. It is anticipated that the interpretive center will have as it's theme the early Indian and pioneer culture of the Beaver Lake area. On the eastern most end of Bear Creek Island it is proposed that a lodge be constructed for large group meetings. A picnic, swimming, and boating area is proposed for the northwestern section of the island.

For development of Bear Creek Island as discussed in the previous paragraph, the following facilities are proposed: 34 picnic units, 2 picnic shelters, 2 amphitheaters, drinking water, one changehouse, 2 swimming beaches, 2 courtesy docks, 2 concrete launching ramps, 4 waterborne restrooms, 3 with showers, parking for 350 cars, 1100 feet of trail, one group dining facility, 25 screened camp cabins, 2 playgrounds, one interpretive center with an overlook and 1.82 miles of paved roads.

c. Operations: Recreation - low density use. These lands, designated with the color yellow, were acquired for project operations and allocated for low density recreational activities in areas between intensive recreational development. These areas are designated for ecological workshops and forums, hiking, limited camping, or similar low density use. These activities are designed to play a significant role in promoting public understanding and appreciation of the environment. Private floating facilities may be permitted in accordance with ER 1130-2-406 and the lakeshore management plan when such use will not detract from the natural setting of the shoreline. Tramways may be allowed by license agreement after due consideration of the compatibility with the desired natural setting of the shoreline. Requests for private floating facilities and tramways will not be given favorable consideration on lands allocated for recreation-low density use when such allocation is for park buffering, development of trails, public access, or will in anyway restrict use of the shoreline. Agricultural uses are permitted on an interim basis.

d. Operations: Natural areas. These lands are for project operations and are allocated for preservation of scientific, ecological, historical, archeological or visual values. Lands managed to protect rare and endangered species of flora or fauna are allocated as natural areas. Normally, limited or no development is contemplated on land in this allocation. Narrow bands of project land located between the normal recreation pool and the project boundry generally fall within this category. Natural areas may be entirely undeveloped or may contain limited development such as trails. No trails may be terminated on natural areas. No agricultural uses are permitted on this land.

e. Operation: Wildlife Management. These lands are for project operations and are allocated as habitat for fish and wildlife or for propagation of such species. Such lands are available for low density recreational activities. The Arkansas Game and Fish Commission has been granted a license for management of wildlife on approximately 34,000 acres of lands and water areas within Beaver Lake.

f. Easement lands. These lands may be used for agricultural purposes. The construction of structures on these lands for human habitation is prohibited. The erection of other structures is subject to review and approval by the District Engineer.

A Lakeshore Management Plan for Beaver Lake was completed in 1971 and will be submitted as Appendix F to the Master Plan. The objective of this plan was to maintain a shoreline that is aesthetically pleasing and yet provides the individual an opportunity to construct or place a floating facility on the lake which would meet his needs. A map of the lake has been prepared and the shoreline color-coded to differentiate the various areas where private floating facilities are prohibited. These areas are:

a. Parks

b. Bluff or scenic area.

c. Areas subject to rapid dewatering.

d. Areas unprotected against weather.

e. Adjacent to parks, boat storage should be provided by a commercial facility. Consideration is given to placing floating facilities at other locations.

f. Areas in close proximity to water supply intake facilities. A water supply intake facility and pipeline, operated by the Beaver Water District, is located on Beaver Lake approximately four miles east of the city of Lowell, Arkansas, as shown on Plate 7. Private floating facilities are restricted from the lake for a distance of one mile upstream and one-half mile downstream from the facility.

7-02. Recreation sites and areas. In the development of park sites and facilities several items were considered. These were:

The need for additional facilities to accomodate present and future visitation.

The need to improve, remove, or change the use of existing facilities.

The necessity to control traffic within the park system and assure efficient and safe circulation.

The control of visitors to accomplish the task of providing for collection of fees as required by Public Law 93-303.

These items are discussed as follows:

a. Additional facilities. Visitation to Beaver Lake in 1974 was 3,478,486 and it is expected to increase to 9,746,000 by the year 2000. To accommodate this increase, additional facilities will be required. This design memorandum proposes the development of additional facilities in existing parks and the development of the future parks. Additional facilities are not limited to camping and picnicking development. There is a need for playgrounds and playground equipment for children, and to provide a varied experience, additional trails and interpretive facilities such as amphitheaters will be provided.

b. Improved facilities. Using criteria contained in the Engineering Regulations listed in Section 8-01, facilities will be upgraded and improved. Interviews with Corps personnel at Beaver Lake were conducted to gather information for use in planning optimum development of camping and day use areas in the parks. As a result of this information and field trips to the parks, several changes have been made in the use of areas and in providing such things as group and multi-family facilities. In providing multi-family camps, approximately twenty-five percent of the camp sites are proposed for use as multi-family units.

c. Traffic control and circulation. Changes were made in areas where it was considered that hazards existed and nuisances resulted from through traffic. Several roads were closed and others added to obtain efficient and safe traffic circulation.

d. Visitor control and fee collection. Three objectives are inherent in visitor control. They are: separation of activities to avoid conflict in use, collection of fees by uniformed personnel as required by Public Law 93-303, and visitor security. To accomplish these objectives entrance complexes are proposed at parks where feasible. These complexes consist of a shelter for personnel, a gate, a small parking area, a holding area for overflow use, and an information board and restrooms.

In addition to providing overall control of the parks, entrance complexes also function as information centers.

7-03. Special considerations in camp and picnic site development.

a. Tent pads. Tent pads are furnished at several sites at Beaver Lake. These pads not only furnish convenient areas for pitching a tent but provide a tool in preserving vegetation.

b. Table canopies. Table canopies are provided for shade in areas where there are no trees and revegetation has not been accomplished. These facilities will be removed as sufficient shade vegetation can be developed.

7-04. Special considerations in sanitary facilities.

Vault aeration systems. Odor from vault type masonry restrooms is of major concern in the operation of parks on Beaver Lake. Research is presently being conducted using aeration systems which have been installed in the vaults of existing masonry restrooms. Preliminary results of the tests have shown that odor is diminished drastically and frequency of vault pump-out is reduced. If final results of these tests are satisfactory, aeration systems will be installed in all vault-type masonry restrooms.

SECTION VIII

FACILITY LOAD AND OTHER DESIGN CRITERIA

8-01 Design Documents. Criteria for design of recreational facilities are contained in the following guidance:

a. EM1110-2-400 dated 1 September 1971. Recreational Planning and Design Criteria.

b. ER1110-2-400 dated 1 February 1971. Design of Recreation Sites, Areas, and Facilities.

c. ER1120-2-400 dated 1 November 1971. Recreation Resources Planning.

d. ER1130-2-400 dated 28 May 1971. Recreation-Resource Management of Civil Works Water Resources Projects.

e. ER1165-2-400 dated 3 August 1970. Recreational Planning, Development, and Management Policies.

f. Park Practice Design Manual of the National Park Service.

g. Public Law 93-303, enacted 7 June 1974, which provides for collection of fees at Corps of Engineers parks (See Paragraph 9-04).

8-02. Specific criteria used at Beaver Lake. Each recreational facility is capable of supporting a certain number of activity occasions. The following criteria were used in determining facility requirements at Beaver Lake.

a. Picnic units. One picnic unit will support 10 picnickers per day. One group shelter should be provided for each 225 picnicking activity occasions.

b. Camp units. As a rule, only one group will use each camp site on a normal summer weekend day. It is assumed that each group consists of 5 persons. Therefore, each camp unit will support 5 camping activity occasions.

c. Swimming beach. Twenty-five linear feet of shoreline will support 150 swimming activity occasions.

d. Change shelters. One change shelter will support 450 swimming activity occasions.

e. Sanitary facilities. One waterborne restroom will support 250 camping activity occasions. One double vault type restroom will support 50 caming activity occasions. One double vault type or waterborne restroom will support 450 swimming activity occasions. One double vault type or waterborne restroom will support 2,500 other activity occasions.

f. Launching ramps. On a project basis, one launching ramp is provided for each 40 boat launchings per average summer weekend day. From calculations based on visitation studies, one boat launching lane is required for each 480 average summer weekend day visitors to the project. (Estimating Initial Reservoir Use, Vol. II of V, IWR Research Report 74-R1 dated June 1974, page C-13.)

g. Slopes. The terrain in many of the parks is quite severe. No roads in the area are proposed on slopes greater than 10 percent. Maximum slopes for camp sites will be 15 percent.

h. Playgrounds and equipment. Playgrounds are proposed for several of the parks for use by smaller children. Playground concepts are included in this design memorandum on pages 8-3 and 8-4.

i. Entrance complex. The precise arrangement of the various elements comprising entrance complexes will be determined according to terrain and the particular requirements of the individual parks. General locations of park entrance complexes are shown on individual park plans. A concept drawing of a typical entrance complex is shown on Plate 29.

j. Group Camp. There is a need for group camps to accommodate church groups, clubs, and scouting groups. Six of these camps are proposed for different parks on Beaver Lake. It is suggested that these camps contain the following elements: 1 picnic shelter, a council fire, a playground, an amphitheater, a drinking fountain, and from 10 to 20 tent pads.

Parks in which these group camps are proposed are: Dam Site, Pine Top, Starkey, Rocky Branch, Prairie Creek, and Blackburn Creek.

SCHEDULE OF PLAYGROUND EQUIPMENT

TYPE 1 PLAYGROUND

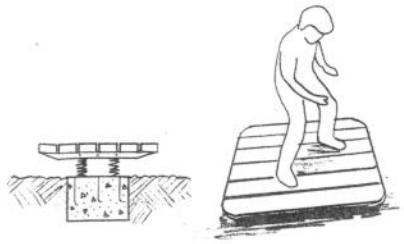
(1) PLAY CLUSTER
TIMBERFORM 1304 OR EQUAL
(2) SPRING PADS
TIMBERFORM 901 OR EQUAL

TYPE 2 PLAYGROUND

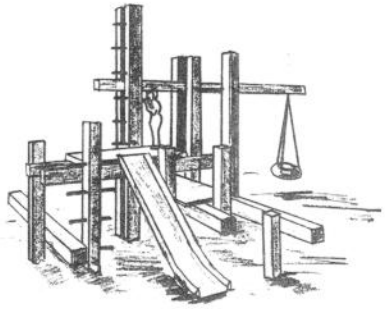
(1) PLAY CLUSTER
(4) SPRING PADS
(3) BENCHES - 8'
TIMBERFORM 1520 OR EQUAL

TYPE 3 PLAYGROUND

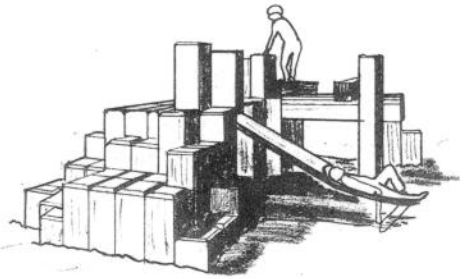
(1) PLAY CLUSTER
(4) SPRING PADS
(5) BENCHES
(2) LOG ROLLERS
TIMBERFORM 912 OR EQUAL
(1) STEPPING COLUMN GROUP
TIMBERFORM 310 OR EQUAL
(1) BARREL OF FUN
MIRACLE EQUIPMENT CO. OR EQUAL



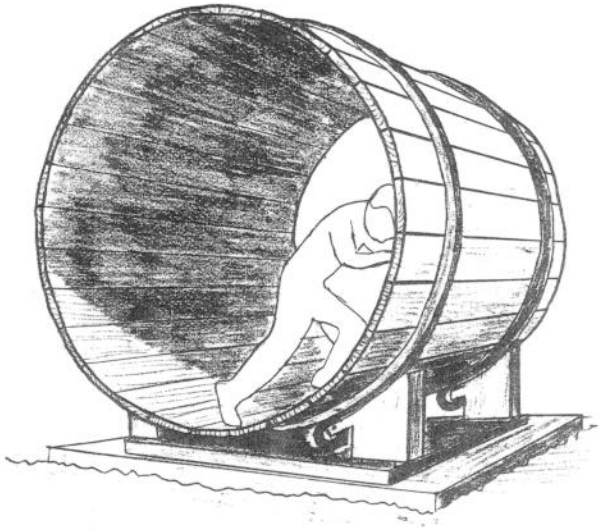
SPRING PAD



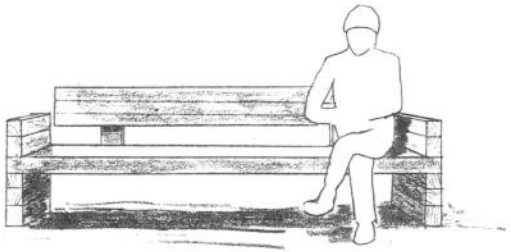
PLAY CLUSTER



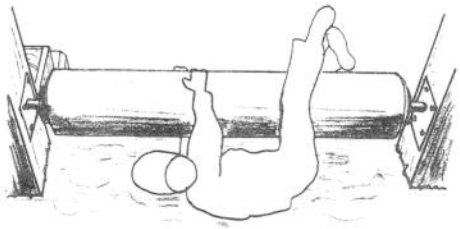
STEPPING COLUMN GROUP



BARREL OF FUN



BENCH



LOG ROLLER

COSTS OF PLAYGROUND EQUIPMENT

Type 1 Playground		
Play Cluster		$2060
Timberform 1304		
Spring Pads (2)	@ $330 ea.	660
Timberform 901		
	SUB-TOTAL	$2720
Type 2 Playground		
Play Cluster		2060
Timberform 1304		
Spring Pads (4)	@ $330 ea.	1320
Timberform 901		
Benches (3) - 8'	@ $160 ea.	480
Timberform 1520		
	SUB-TOTAL	$3860
Type 3 Playground		
Play Cluster		2060
Spring Pads (4)	@ $330 ea.	1320
Benches (5) 8'	@ $160 ea.	800
Log Rollers (2)	@ $395	790
Timberform 912		
Stepping Column Group		3380
Timberform 310		
Barrel of Fun (447 in 71 + 35% increase)		604
Miracle Equipment Co.		
	SUB-TOTAL	$8954

NOTE: All figures are exclusive of shipping costs and assembly costs by Corps Personnel.

8-03. Trails criteria.

a. General. Guidelines for the construction and location of equestrian, hiking, (including connecting trails), interpretive and trails for the physically limited are listed in Table 8-1. 1, 2, 3, 4, 5, 6, and 7.

b. Trails for the physically limited. Trails designed for use by physically limited persons should be interpretive in function. They should have a minimum surface width of 48 inches paved with a smooth, hard, non-skid surface, and should be reasonably level in cross-section. Rest areas should be on the same elevation as the trail, and constructed of the same surface material. Rest areas should be provided with park benches. These benches should have backs, and arm rests spaced 24 inches apart along their length. Guardrails or curbs should be placed at hazardous locations. Painted lines, as well as a variation in surface material, which could be sensed by blind persons, should be located at the edges of the trail.

1 Ashbaugh, Bryon L. and Raymond J. Kordish. 1971 Trial Planning and Layout. National Audubon Society.

2 Bureau of Land Management, U. S. Department of the Interior. 1965. BLM Roads Handbook. Section 9115, Release 9-39. U. S. Government Printing Office.

3 Bureau of Outdoor Recreation, U. S. Department of the Interior. 1971. Off-Road Recreation Vehicles. U. S. Government Printing Office.

4 Proceedings: National Symposium on Trails. U. S. Government Printing Office.

5 National Park Service, U. S. Department of the Interior. 1963. The Park Practice Program. Index B-3101. National Conference on State Parks and National Park and Recreation Association.

6 State Council of Parks and Outdoor Recreation, State of New York. 1967. Outdoor Recreation for the Physically Handicapped. Department of Conservation, State of New York.

7 Corps of Engineers. 1974. Use of Off-Road Vehicles on Civil Works Projects, ER 1130-2-405 Dated 17 January 1974. Office of the Chief of Engineers, Department of the Army.

c. Hiking and connecting trails. There will be no facilities for overnight camping on hiking and connecting trails.

TABLE 8-1

TRAIL GUIDELINES

Criteria	Type of Trail			
	Hiking	Interpretive	Equestrian	Physically Limited
Tread Width	3'	4' - 6'	4'	4'
Clearing Width	6' - 8'	8' - 10'	8' - 10'	6' - 8'
Clearing Height	8' - 10'	8' - 10'	10' - 12'	8' - 10'
Grade	10-15% maximum (20% for no more than 150 feet)	10% maximum	10-15% maximum	1-3% maximum
Soils	Few limitations	Few limitations	Well-drained, stable; sandy or wet areas should be avoided	Few limitations
Surfacing	None	None or wood chips, gravel, native stone (Depending on amount of use)	None	Sealed asphalt, asphaltic concrete
Cross-Section	Whatever is required for good drainage	Level	Whatever is required for good drainage	Level
Direction	Two-way	One-way	One-way	One-way
Configuration	Linear or loop	Figure-8 or loop	Figure-8 or loop	Loop
Length	Any	1/8 - 1/4 mi.	Any	1/8 - 1/4 mi.
Location	Scenic or remote	Scenic and varied (Depends on program)	Scenic, convenient to good access roads	Scenic and varied If possible, nearly level terrain
Alignment	Curving with frequent changes in direction and grade	Gently curving, more gradual grade changes	Curving with grade changes as required by terrain	Minimal curving, avoid grade changes, avoid steps for elevation changes
Elevation Changes	By natural grade	By natural grade	By natural grade	By smooth, non-slip ramp of no more than 8% grade
Marking	Durable, easily read, permanent	Durable, easily read, permanent	Durable, easily read, removable	Durable, easily read, (Braille incl.) permanent
Other Use	None	None	None	May be used by non-handicapped (Suitable for elderly)
Hours of Use	Any	Any	Any	Any
Rotation of Use	None necessary	None necessary	Should be rotated, if possible	None necessary
Rest Areas and Campgrounds	None	Rest areas should be provided	None	Rest areas should be provided
Interpretive Stations	If desired	As appropriate, more in first half of trail	None	As appropriate, more in first half of trail
Safety Measures	As developed through alignment and clearing	As developed through alignment and clearing	As developed through alignment and clearing	Curbing, handrails, smooth surface transitions, guardrails, surface markings
Hazards	None, if possible	None	None	None
Degree of Difficulty	Variable	Low	Appropriate for average rider-moderate	Low

SECTION IX

SPECIAL PROBLEMS

9-01. Natural resource preservation and interpretation. Additional facilities are needed for interpretive activities at Beaver Lake. Emphasis will be placed on providing trails of an interpretive nature, and an interpretive center has been proposed near Rogers as outlined in Paragraph 7-01. The outdoor and primitive setting of several of the parks present unique opportunities in developing a system of nature trails and other programs emphasizing natural resources.

9-02. Fish and wildlife resources. The Arkansas Game and Fish Commission has a license with the Corps of Engineers to manage approximately 34,000 acres of land and water areas at Beaver Lake. Management activities conducted to enhance fish and wildlife resources include the following:

a. Fish.

(1) Stocking fish indigenous or adapted to the lake.

(2) Locating an acceptable site for fish nursery pond.

(3) Conducting fish population studies to analyze productivity.

(4) Stocking rainbow trout in tailwaters for "put and take" fishery. In 1974 there were 43,300 trout 9-inches long stocked in the tailwater. These trout were supplied from the Greers Ferry National Fish Hatchery operated by the U. S. Fish and Wildlife Service.

b. Wildlife.

(1) Planting of food plots in selected areas.

(2) Establishing island refuges.

(3) Managing hardwoods for squirrel production.

(4) Keeping open area to provide nesting areas for quail.

9-03. Archeological and historical resources. No recent archeological study of the Beaver Lake area is available. Correspondence from the Arkansas State Archeologist indicates that archeological conditions in the area are somewhat unknown. See paragraph 4-02 for additional information. The history of the region would be interesting and an informative subject for an interpretive program. This program would consist of displays and public information programs rather than visits to actual sites.

9-04. Fee systems and collection. Public law 93-303, enacted 7 June 1974, provides for the collection of fees at camp grounds having various types of facilities, as follows:

a. Class A. Waterborne restrooms, potable water, shower (warm water), sanitary disposal station, camp sites with table, fireplace (rock ring or grill); refuse containers, paved roads; designated tent or trailer space, visitor protection control; personal fee collection (honor system will not be used).

b. Class B. Vault restrooms; potable water; sanitary disposal station, camp sites with table, fireplace (rock ring or grill); refuse container; access and circulation roads; designated tent or trailer spaces; visitor protection control; personal fee collection.

c. Class C. Pit or vault restrooms; potable water; camp sites with table, fireplace (rock ring or grill); refuse containers; access and circulation roads; designated tent or trailer spaces; visitor protection control; personal fee collection.

d. Class D. Portable or pit restrooms; potable water, fireplace (rock ring or grill); refuse containers; access and circulation roads; designated tent or trailer space; visitor protection control; personal fee collection.

e. Additional charge may be made for use of electrical hookups in parks in Classes A, B, C, or D.

f. At each Corps lake, where, camping is permitted, at least one primitive campground containing designated campsites, sanitary facilities,and vehicular access will be provided where no fee will be charged. The primitive campground will contain sufficient campsites to qualify as reasonably large. See Table 9-1 for additional information.

9-05. Special land and water uses.

a. Land Uses

(1) Group camp and interpretive center. Paragraph 16 of ER 1120-2-400 outlines requirements for group use of project lands. Provisions are made for the Corps to provide group use areas if the need is fully justified. In anticipation of this need it is proposed that a group use facility be developed with primary consideration for this facility given to Bear Creek Park, near the Highway 12 bridge approximately 7 miles northeast of Rogers. Bear Creek Island has suitable terrain for development and access can be gained by construction of a causeway, approximately one-fourth of a mile long, from Highway 12. It is also proposed that an interpretive center be included in the development of Bear Creek Island. The east side of the island contains a bluff approximately 80 feet high which is ideally suited for this facility. A proposed concept for this facility is shown on Plate 28.

TABLE 9-1
USE FEE CRITERIA AND SCHEDULE OF FEES
GROUP AND FAMILY CAMP AREA
CORPS OF ENGINEERS

FEE RANGE	CLASS E	CLASS D	CLASS C	CLASS B	CLASS A
Group Camp Areas	No Fee	No Fee	Minimum $3	$6 - $20	$11 - $25
Family Camp Areas	No Fee	$1 [1]	$1 - $3 [2]	$3 - $3 [2]	$3 - $3.50 [2]
FACILITIES					
Restrooms	Portable-Pit	Portable-Pit	Pit-Vault	Vault	Flush
Potable Water	No	Yes	Yes	Yes	Yes
Fireplaces [4]	No	Yes	Yes	Yes	Yes
Refuse Containers	No	Yes	Yes	Yes	Yes
Access Road	Yes	Yes	Yes	Yes	Yes [3]
Designated Tent or Trailer Spaces	Yes	Yes	Yes	Yes	Yes
Visitor Protection	Yes	Yes	Yes	Yes	Yes
Personal Fee Collection	No	No	No	Yes	Yes
Showers	No	No	No	No	Yes
Sanitary Disposal Sta.	No	No	No	Yes	Yes
Picnic Tables	No	No	Yes	Yes	Yes
Circulatory Roads	No	Yes	Yes	Yes	Yes [3]

1 Primitive Camp Area Each Corps project where camping is permitted will have at least one primitve camp area containing designated campsites, sanitary facilities and vehicular access, where no charge shall be imposed.

2 Additional charge of up to 50¢ per day may be imposed for use of electrical hookups where available. How ever, total daily camping fee for family camp areas will not exceed $4. A charge can be made for electrical service only if the camp area in which that service is located meets the minimum criteria for fee collection.

3. Roads must be dust proofed or paved.

4 A simple device for containing a campfire (where campfires are permitted) e.g. rock ring, fireplace or grill.

5 Reasonable control for protection of campers consists of regular ranger or local law enforcement surveillance

b. Trails.

(1) Nature trails. Several additional trails are included in the park site plans. These trails will furnish activities to complement camping and picnicking activities. It is proposed that the trails include interpretive information.

(2) Hiking trails. Several miles of trails suitable for hiking activities have been proposed for Beaver Lake. The land available is limited because it consists of a narrow band around the lake. The proposed trails begin and end at easily accessible points in parks or near public roads.

c. Wastewater treatment systems. Presently, vault type restrooms are pumped out by a private contractor and the waste is hauled to a municipal treatment facility for disposal and treatment.

Proposals in this design memorandum provide underground collection facilities composed of four or six inch lines which feed a centrally located mechanical tertiary treatment plant. Consideration was given to installation of septic tanks but the idea was discarded due to geological restrictions. Sewage lagoons were also considered but discarded because sufficient area was not available.

Treatment plants were sized using the following volumes:

1,800 gallons/day per waterborne restroom

4,200 gallons/day per waterborne restroom with showers

2,250 gallons/day for convertible vault restroom

Effluent from treatment plants will be discharged into the lake in compliance with the State Board of Health requirements.

SECTION X

PROJECT RESOURCE MANAGEMENT PLAN

10-01. Policies. The administration and management of the recreational program at Beaver Lake is governed by the policies and guidance established in manuals, circulars, and regulations that are issued to implement laws passed by Congress. The natural environmental conditions of project lands are being retained for use by the general public in accordance with guidance contained in ER 1130-2-400 dated 28 May 1971. These policies will insure that project resources are developed to provide for optimum use in satisfying the recreational demands of the project. A Project Resource Management Plan has been prepared as Appendix A to this master plan.

10-02. Ranger training. Training courses and conferences for lake rangers and managers are conducted periodically as required. All lake rangers and new employees recruited for rangers positions receive training for lake management positions in accordance with requirements set forth in SWDR 690-1-36 dated 26 March 1973.

10-03. Staffing needs. Project staffing needs and fund requirements have been submitted for consideration in an effort to implement new program objectives with respect to the Corps of Engineers recreation environmental resources planning, development, and management responsibilities. Pending the outcome of filling current staffing needs, the present organizational arrangement for administration and management will be continued. See Table 16 for present staffing.

10-04. Administration. The administration of the recreational program at Beaver Lake is carried out jointly by District Office personnel and Project Office personnel. The District Office personnel as well as Project Personnel are responsible for the planning nature and extent of development; planning site layouts, coordinating, and reconciling activities relative to policies and regulations; and coordination with other agencies, preparation of budgets, leases, licenses, permits; and public relations. Project Office personnel are also responsible for the day-to-day administrative functions required at the project level.

10-05. Management. Project Office personnel are concerned with the direct management and supervision of the recreational program, including supervision of the use of lands and waters of the project; recommending changes in the development based on observed use; obtaining compliance with terms of leases, concessions, permits; protecting and maintaining Government property; and maintaining high standards of public health and safety. The lake is under the direct supervision of the Resident Engineer, Beaver Resident Office, Rogers, Arkansas.

TABLE 10-1

BEAVER LAKE STAFFING

Management

Resident Engineer

Administrative

1 Administrative Officer
1 General Clerk
1 Clerk-Typist

Ranger & Surveillance Section

3 Park Managers
2 Park Aids
1 Park Technician

Preventive Maintenance Section

1 Fac. Maintenance Supt.
1 Const. Maintenance Foreman
1 Const. Inspector
2 Engineer Equipment Operator
1 Carpenter
1 Auto Worker
1 Elec Worker
1 Cement Finisher
1 Cement Worker
2 Mtr. Veh. Oper
2 C&M Leaders
2 C&M Workers
2 Laborers

10-06. Monumentation. A continuing program of project boundary monumentation is under way on Beaver Lake. As of 13 February 1975 it is estimated that 92% of the monumentation has been completed.

10-07. Signs and markers. Appropriate signs, markers, and exhibit materials are provided at the project to welcome, guide and inform project visitors. These signs are provided in the interest of optimizing public benefits and properly protecting and administering project resources.

10-08. Concession activities. Concessionaire facilities are furnished at seven of the parks on Beaver Lake. Services provided at these facilities include fishing boat and motor rental, boat storage, live and artificial bait and other tackle, gasoline, and prepackaged food and drinks. The parks where the concession facilities are available are War Eagle, Hickory Creek, Horseshoe Bend, Prairie Creek, Rocky Branch, Lost Bridge, and Starkey.

All concessionaire facilities have potable water and screened fish cleaning facilities on the dock. The docks are inspected periodically to insure that local laws and regulations relative to sanitation and public safety are being observed.

10-09. Visitor interpretation and education.

a. Interpretation. An interpretive program serves to inform and educate the public about the purpose and operation of the project and the historical and natural features of the area. By increasing public understanding and appreciation of the project, it is hoped that increased public cooperation in preservation and enhancement of the area will result.

(1) Ranger fireside programs. These programs are oriented toward the aesthetic qualities of Beaver Lake. The programs consist of slides around which a 15-30 minute verbal presentation has been prepared covering water-oriented sports, camping, picnicking, safety on the campground and in the water. Flora and fauna of the area as well as the rugged beauty of the bluffs, are some of the areas around which some of the programs have been prepared.

(2) Nature trails. There is an expanding need for trails, nature and interpretive, on Beaver Lake. These trails are designed to permit the hiker to become more closely associated with nature. Trees, flowers, animals, insects, as well as the beauty of expanse, are all avaiable for observation and study.

b. Education.

(1) Signs. Signsare posted at all intersections of main arteries and access roads to advise the motorist of the location of the nearest recreational area. Once in the area appropriate routed wood or reflective metal signs are posted for information.

(2) Maps. Folder maps, contour maps, geological survey maps, and appropriate portions of real estate segment maps are available to the public.

(3) Buoys and informative floats. These are placed at all strategic locations to inform the boat operator or to warn him of danger areas or restricted zones.

10-10. Law enforcement. Rangers have authority to issue citations for designated offences; however, they do not have the authority to make arrests. A low-key enforcement policy is in use with the visitor being controlled through facility design and non-offensive, suggestion-type signs. Where arrests are required, local, State, or Federal law enforcement agencies assist. The enforcement personnel perform their duties with little or no disruption to the surrounding visitors.

10-11. Safety. Safety of personnel and visitors alike is of primary importance in the project area. Devices and procedures which have been implemented to promote safety include; signs, ranger talks for visitors, information folders, news media releases, regular inspection of concession and recreation facilities, periodically scheduled employee safety meetings, and safety and first-aid demonstrations. In addition, various written manuals and directories on safety are kept in the project office for reference. A Project Safety Plan has been prepared and will become Appendix E to this master plan upon master plan approval.

SECTION XI

FOREST MANAGEMENT

11-01. General. The Forest Management Plan for Beaver Lake establishes policies, standards, and aids for the orderly management of the woodlands on Beaver Lake; to protect the real estate investments of the Governemnt from depreciation, exploitation, and depletion; to protect and improve the wildlife, recreational, and scenic value of the forested land; and to improve water quality and control soil erosion.

11-02. Character of woodlands. The Beaver Lake area is a part of the Ozark uplift, and is typical of the Ozark Highlands, which is characterized by rugged terrain, containing narrow ridges and V-shaped valleys, steep, rocky slopes, and bluffs. Many of the hills and flat-topped ridges in the vicinity rise to elevations of 1100 feet to 1200 feet m.s.l., with some of the higher peaks in the region reaching an elevation of more than 1400 feet above m.s.l. There is a wide variation in the vegetative composition of the lake as a result of man-made changes in the environment brought about by the construction of the dam. Formerly the forests were second growth upland and hardwoods with mixed stands of short leaf pine, and Eastern red cedar and bottom land hardwoods in the larger creek bottoms. As a result of the impoundment of Beaver Lake, the majority of the bottom land hardwoods were killed and some upland hardwoods were subjected to periodic flooding, siltation, and wave action. Although the majority of the upland forests still exist, there now exists a new ecotone between the lake front and the original forest. This land is now being reforested naturally by pioneer species which normally have a short life span.

11-03. Treatment and programs. Management of the forest resources of the area is aimed primarily at enhancement of recreational and wildlife values and benefit to the ecosystem. All forested areas are classified as non-commercial stands. Yearly surveys will be made to determine any silviculture treatment which may be necessary to prevent hazards or to improve exisitng stands. Application of herbicides, rodenticides, and other pesticides will be reported in accordance with ER 1130-2-232, Pest Control Program for Civil Works Projects dated 1 November 1971.

11-04. Personnal and fiscal requirements. Personnel required to implement the Forest Management Plan are as follows:

Lake Manager
Wildlife Biologist
Forester
Landscape Architect
Recreation Resource Specialist
Hydrologist
Laborer

Incurred costs for implementation are expected to be approximately $19,000 annually. Economic and recreational use benefits due to implementation of this plan is expected to be $75,000 when measured in monetary terms. Net annual benefit attributed to this plan is $56,000.

11-05. Work plans. Field studies of Government land indicate that there is a need for selective clearing, erosion control, and improvement of the vegetative cover on some areas. Many areas around Beaver Lake are being cleared for development of homesites. To offset this trend it is imperative that Government land be returned to its former condition to prevent increased or continuing erosion and siltation of the lake.

SECTION XII

FIRE PROTECTION PLAN

12-01. General. The purpose of the fire protection plan is to establish policies, equipment, specific actions, and manning guides, and to train personnel in the protection of woodlands from fires. The fire protection plan for Beaver Lake is being prepared in accordance with ER-1130-2-400 dated 28 May 1971 and will be submitted as Appendix C to this master plan.

12-02. Assistance by other agencies. The U.S. Forest Service will furnish air tanker equipment, upon request on a reimbursable basis, to suppress fire on Government lands surrounding Beaver Lake. The Arkansas Forestry Commission will also assist in suppressing fire on project land in the event private or state properties are threatened.

12-03. Training. Appropriate personnel on the project staff are trained in fire prevention and suppression methods. This training program assures that qualified personnel will be available to detect potential fire hazards in the project, and also to assist in fire suppression in emergency situations. Proper training in fire fighting techniques and safety factors is a joint responsibility of the park manager and the district office. The U.S. National Forest Service has agreed to include Corps personnel in their annual fire simulator training. The Arkansas Forestry Commission is also cooperating to provide training.

12-04. Equipment. All tools and equipment for use in fire prevention and suppression activities will be described in the fire protection plan with respect to quantity, type, location, condition, and adequacy.

12-05. Prevention, presuppression and suppression activities. Activities of fire prevention, presuppression and suppression will be part of the fire protection plan. Procedures will be established for the assignment of duties in each phase to various personnel.

SECTION XIII

FISH AND WILDLIFE MANAGEMENT

13-01. General. The Fish and Wildlife Management Plan has been prepared in accordance with ER 1130-2-400 dated 28 May 1971. It will implement Section 3 of the Fish and Wildlife Coordination Act (P.L. 85-624) which provides for the use of civil works projects for the conservation, maintenance, and management of fish and wildlife resources. Lands and waters have been made available to the Arkansas Game and Fish Commission and the U. S. Department of Interior for fish and wildlife management and areas not managed through licenses or other formal agreements with wildlife agencies will be managed by the Corps of Engineers. This plan will include the major species being managed, wildlife habitat maintenance and enhancement plans, and coordinated efforts with other agencies relative to fish and wildlife management on the project.

13-02. Aquatic. Beaver Lake has 28,220 acres at the top of the conservation pool. Management programs for aquatic fauna are aimed primarily at providing game fish which are desirable for recreational fishing. The Fish and Wildlife Management Plan contains detailed descriptions of the fish propagation, stocking, and research programs which have been conducted, as well as plans for future programs. Fish management and regulation is the responsibility of the Arkansas Game and Fish Commission and the Fish and Wildlife Service and Department of Interior. We will assist by controlling water releases to aid the downstream fishery by fluctuating water levels in the lake as feasible.

13-03. Terrestrial. Programs for wildlife management on Beaver Lake include a program of management by the Arkansas Game and Fish Commission which controls, manages, restores, conserves, and regulates birds, fish, game and other wildlife resources at Beaver Lake consistant with existing authority. Programs established by the Corps in wildlife management include planting of food plots in selected areas, establishing island refuges, managing existing hardwood species for squirrel production and preserving open area to provide nesting areas for quail, rabbits, and other wildlife.

SECTION XIV

PROJECT SAFETY PLAN

14-01. General. In accordance with ER 1130-2-400 dated 28 May 1971, a Project Safety Plan has been prepared. This plan, approved 23 March 1973 will become Appendix E upon approval of this Design Memorandum. The plan discusses design criteria and precautionary actions to prevent, reduce or control hazardous situations. Areas considered in the plan include administration facilities, structures, sanitation facilities, access roads, park facilities, public information and general safety criteria.

14-02. General public. Common recurrent hazards and unsafe conditions have been identified and procedures implemented to protect the public and to take measures which will minimize or eliminate the possibility of personal injury. These procedures include not only the provision of equipment such as handrails for steps and ramps, adequate lighting for sanitary facilities, and warning signs, but also frequent inspection and maintenance of public facilities and the implementation of a continuing program of pollution and disease vector control. Numerous methods are employed to educate the public concerning possible safety hazards, and rules and regulations have been established for visitor protection.

14-03. Employee. It is the policy of the Corps of Engineers that no employee shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety. Accordingly, appropriate sanitation procedures and safety precautions have been implemented and an equipment monitoring system instituted in compliance with Corps safety regulations.

SECTION XV

COST ESTIMATES

15-01. Summary of estimated costs. The following tables summarize estimated costs for facilities proposed for park development at Beaver Lake. The estimated total costs for this development is $15,452,000. Table 15-1 gives total costs for development at each park. Table 15-6 summarizes costs for proposed facilities for the total project, and Tables 15-7 through 15-23 estimate costs for facilities in each park. All cost estimates are based on December 1974 price levels, as applied to experienced cost of similar facilities in the Little Rock District. Costs for facilities not previously constructed were based on other sources. The total estimated cost for the overall plan of development for public use facilities, including the cost of existing facilities is $18,427,600.

15-02. Cost-sharing policy.

a. Policy subsequent to Public Law 89-72. Current administration policy, which started with the Fiscal Year 1975 program, requires that further development at Corps operating projects include a cost-sharing arrangement with a non-Federal public agency except where urgently needed sanitary facilities are required to meet requirements of applicable State and Federal laws.

b. Ozark National Recreation Area. A study is being conducted to determine if Bull Shoals, Norfork, Beaver, Table Rock, Greers Ferry, and the authorized Bell Foley Lake should be made the Ozark Unit of the National Recreation System. If the Ozark National Recreation System is created, future recreational development and operation will be carried out by the Federal Government. Cost-sharing under policy developed subsequent to PL 89-72 will not be applicable.

15-03. Recreation user fee analysis. Under the current user fee program as outlined in ER 1130-2-404 there exists the potential to further develop Prairie Creek Park to the level necessary to recover operation and maintenance costs through the user fee program. Following is an analysis of the user fee potential and operation and maintenance costs that can be expected upon development of Prairie Creek Park as provided for under this master plan.

a. Consideration for the selection of Prairie Creek Park for development to recover operation and maintenance costs.

(1) This park is about 200 miles round trip from such large centers of population as Springfield and Joplin, Missouri; Tulsa and Muskogee, Oklahoma; and Fort Smith, Arkansas.

(2) This park is within 25 miles of the cities of Rogers, Springfield and Fayetteville, Arkansas.

(3) Prairie Creek Park received extensive development under the past Code 712 Program and has 89 camp sites now existing. Site conditions permit further development which will include 46 additional camp sites, making this a prime site for an efficient user fee operation.

b. Assumptions.

(1) The demand experienced at Prairie Creek Park will continue to at least the same level.

(2) Development of this Park to recover operation and maintenance costs under this program will require deviations from current cost-sharing policies.

(3) The public will value protection provided by visitor control and other amenities available within the park to be in excess of the user fee charged.

c. Analysis. Tables 15-4 and 15-5 contain operation and maintenance costs and fee potential under existing and ultimate development. These comparative analyses reveal that potential exists for efficient development to recover operation and maintenance costs under the user fee program.

15-04. Benefits. Between the time of initial impoundment in 1965 and 1973, visitation to the lake increased from 548,200 to 3,227,000. Based upon the standards for the evaluation of recreational benefits contained in Supplement No. 1, Senate Document No. 97, 87th Congress, June 1964, the estimate value of an average visitor day to Beaver Lake is $1.18. Application of unit values to the annual number of recreation days for each activity results in a gross benefit of $3,816,000 in 1973.

15-05. Allocations and expenditures of funds. A resume of allocations and expenditures to date and a schedule of funds by fiscal years for the recreational development are shown in Table 15-3.

15-06. Operation and maintenance. A summary of the operation and maintenance costs is shown in Table 15-2.

TABLE 15-1
SUMMARY OF ESTIMATED COST FOR ADDITIONAL RECREATIONAL FACILITIES BY PARKS

BEAVER LAKE

PARK	COST
Dam Site	$ 1,381,000
Indian Creek	130,100
Lost Bridge	705,250
Starkey	384,600
Rocky Branch	979,450
Ventris	145,500
Prairie Creek	963,900
Horseshoe Bend	1,341,400
Hickory Creek	863,250
War Eagle	249,000
Blue Springs	255,700
Bear Creek Island	1,756,900
Pine Top	644,400
Slate Gap	1,290,300
Alpine	610,100
Blackburn Creek	1,431,450
Big Clifty (Phase I)	188,000
Total Direct Cost	$13,320,700
Engineering and design 10%	1,332,100
Supervision & administration 6%	799,200
	$15,452,000

TABLE 15-2
SUMMARY OF OPERATION AND MAINTENANCE COSTS
FOR RECREATIONAL FACILITIES AND REAL ESTATE MANAGEMENT SERVICES

BEAVER LAKE

Item	Public Use	Real Estate Activities
Fiscal Year 1974		
Real Estate	0	$ 29,900
Recreational Facilities	$ 581,000	--
S&I and Overhead	80,000	5,300
	$ 661,000	$ 35,200
Fiscal Year 1979		
Real Estate 5 year renewal	0	74,000
Recreational Facilities	725,000	--
S&I and Overhead	100,000	17,000
	825,000	91,000
Ultimate (2000)		
Real Estate	0	150,000
Recreational Facilities	1,100,000	--
S&I Overhead	175,000	37,000
	1,275,000	187,500

TABLE 15-3

ALLOCATION AND EXPENDITURES OF FUNDS
(In Thousands of Dollars)

Item	Cost
Cost of initial construction	$ 2,232,000
Total 710 Funds allocated through FY 75	743,600
Allocation through FY 75 including initial construction	2,975,600
Tentative FY 76 allocation - Big Clifty	
Federal	109,000
Non-Federal Contribution	109,000
Tentative FY 75 TQ Allocation	71,000
Cost after FY 76	15,163,000
Total Project Cost	$ 18,427,600

Schedule of funds required by fiscal years for recreation facilities

Recovery of O & M costs	1977	1978	1979
Prairie Creek	372,700	372,700	372,700

Needed development for public demand
in addition to recovery under the fee program

	1977 through 1989	1990
Federal	512,000	510,950
Non-Federal	512,000	510,950

TABLE 15-4

COST OF OPERATION

PRAIRIE CREEK PARK

			Existing Facilities		Ultimate Facilities	
	Unit	Unit Cost	No.	Cost	No.	Cost
Labor-Rangers-Fee Collection	L.S.			$17,200		$17,200
Labor for Sewage Treatment Plants	L.S.(1)			1,200	L.S.(2)	5,900
Operating Equipment	L.S.			2,800	L.S.	2,800
Clean Up, Waste disposal, Mowing (includes Materials & Supplies)	ea. unit	110.00	122	13,400	168	18,480
Parking Areas (Flex. pav.)	S.Y.	0.14	17,000	2,380	19,900	2,786
Buildings	ea. unit	5.00	122	610	168	840
Roadways	S.Y.	0.14	42,700	5,978	44,600	6,244
Signs & Buoys	ea. unit	10.00	122	1,220	168	1,680
	SUBTOTAL			44,788		55,930
	Direct District Costs 20%			8,957		11,186
	SUBTOTAL			53,745		67,116
	District & Field Office O.H. & S. & A. 14%			7,524		9,396
				$61,269		$76,512
			Say	$61,300	Say	$76,500

(1) 1/10 of WG9 @ $10,753 + 10% Dist. Costs
(2) 1/2 of WG9 @ 10,753 + 10% Dist. Costs

A unit is defined as one picnic or camp unit

TABLE 15-5

REVENUES - EXISTING FACILITIES - PRAIRIE CREEK PARK

Season	Days	Number Camp Sites	Percent occupied	Fee	Revenue	Number Electrical Outlets	Percent(1) Occupied	Fee	Revenue
Jun - Aug	100	89	85	$2.00	$15,130	89	42.5	$0.50	$1,891
May & Sep	55	89	67	2.00	6,559	89	33.5	0.50	820
Oct - Apr	210	89	24	2.00	8,971	89	12.0	0.50	1,121
				SUBTOTAL	$30,660				$3,832
				TOTAL					$34,492
								Say	$34,500

REVENUES - ULTIMATE FACILITIES - PRAIRIE CREEK PARK

Season	Days	Number Camp Sites	Percent Occupied	Fee	Revenue	Number Electrical Outlets	Percent Occupied	Fee	Revenue
Jun - Aug	100	135	85	$3.62	$41,540	135	42.5	$0.50	$2,869
May & Sep	55	135	47	3.62	12,633	135	23.5	0.50	872
Oct - Apr	210	135	17	3.62	17,447	135	8.5	0.50	1,205
				SUBTOTAL	$71,620				$4,946
				TOTAL					$76,566
								Say	$76,500

(1) Assume that 1/2 the campers require electrical service

TABLE 15-6

SUMMARY OF ESTIMATED COST FOR ADDITIONAL RECREATIONAL FACILITIES BY ITEMS

BEAVER LAKE

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do		2.19		
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do		3.86		
(a) New construction	do	100,000.00		1.34	134,000
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00	1.51	0.53	29,700
(2) Flexible pavement	do		18.1		
(a) New construction	do	82,000.00		12.00	984,000
(b) Existing gravel	do	15,000.00		2.51	36,900
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		2.49		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00	0.44	0.07	2,600
(2) Flexible pavement	do		2.79		
(a) New construction	do	55,000.00		4.89	269,000
(b) Existing gravel	do	10,000.00		1.65	16,500
Parking Areas					
a. Gravel	S.Y.	5.90	160		
b. Flexible pavements			66,845		437,100
(1) New construction	S.Y.	8.00		54,638	
(2) Existing gravel	S.Y.	2.70		3,140	8,500
Launching ramps, concrete	EA.	25,000.00	14	14	350,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	42	26	416,000
(2) Waterborne	do	28,000.00	1	25	700,000
(3) Waterborne w/showers	do	30,500.00		14	427,000
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00		16	160,000
b. Wooden, vault	do	1,600.00	4		

TABLE 15-6 (Con.)

BEAVER LAKE

Item	Unit	Unit Cost	Existing Facilities Jan. 1975 Quantity	Existing Facilities Jan. 1975 Cost	Proposed Facility Quantity	Proposed Facility Cost
Sewage system						
a. Sewer lines, 6" gravity	LF	8.00			30,510	244,100
b. Sewer lines, 4" gravity	do	6.50			2,955	19,200
c. Sewer lines, 4" c.i. or steel force main	do	10.00			17,195	172,000
d. Outfall lines, 4" steel	do	8.50			4,770	40,600
e. Outfall lines, 6" steel	do	12.00			500	6,000
f. Manholes	EA.	450.00			79	35,500
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			2	53,000
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			6	207,000
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00				
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			1	45,000
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			2	110,000
l. Lift Station	do	20,000.00			18	360,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			11	55,000
n. Electrical	SUM JOB	15,500.00				139,500
o. Outside contingencies 15%						222,000
Water System						
a. Water line, 3/4 PVC	LF	2.50			35,975	90,000
b. Water line, 1" PVC	do	3.25			14,810	48,800
c. Water line, 1.5" PVC	do	4.00			22,670	90,600
d. Water line, 2" PVC	do	4.50			14,130	63,700
e. Water line, 2.5" PVC	do	5.00			1,150	5,800
f. Water line, 3" PVC	do	5.40			3,520	19,000
g. Water line, 4" PVC	do	7.00			3,600	25,200
h. Gate valves and boxes	SUM	500.00			88	44,000
i. Water wells		3,500.00	26	19		66,500
j. Wellhouse and equipment	EA.	8,000.00	10	11		88,000
k. Electrical	LS	3,800.00				57,000
l. Contingencies 15%						107,500
Picnic units	EA.	1,400.00	135	248		347,200
Camp units	do	2,000.00	158	96		192,000
Camp units w/electrical service	do	2,400.00	371	836		2006,400
Group camp*	do	25,000.00			6	154,000
Travel trailer pullouts w/electricity	do	2,400.00			41	98,400
Electrical service to camp sites		400.00			201	80,400

*$4,000 added for 1 small group camp at Lost Bridge

TABLE 15-6 (Con.)

BEAVER LAKE

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do		2		
Table canopies	do	1,500.00	77	94	141,000
Picnic Shelter	do	12,000.00	10	16	192,000
Amphitheaters	do	3,100.00	1	5	15,500
Drinking fountains	do	1,200.00		250	300,000
Changehouses	do	10,000.00	7	6	60,000
Sanitary stations		5,000.00	3	8	40,000
(travel trailer)	do				
(marine)	do	10,000.00	1	7	70,000
Wash houses	do	40,000.00		5	200,000
Swimming beaches	do	9,500.00	8	9	85,500
Mercury vapor lights	do	500.00	48	13	6,500
Courtesy docks	do	3,000.00		21	63,000
Trail system	LF	3.00	10,200	42,500	127,500
Fishing dock	SUM	6,500.00		2	13,000
	JOB				
Group dining facility	EA.	50,000.00		1	50,000
Screened camp cabin	do	10,000.00		25	250,000
Playground equipment	LS				289,600
Telephone	do		6		
Information center	SUM			1	200,000
	JOB				
Road obliteration	SUM				15,400
	JOB				
Reforestation	ACRE	1,000.00		227	227,000
Entrance complex	EA.	50,000.00	5	12	600,000
Multi-purpose Slab		10,000.00		2	20,000
Baseball Field		2,000.00		1	2,000
Observation Tower		100,000.00		1	100.000
Causeway (Bear Creek Island)		300,000.00		1	300,000
Interpretive Center		500,000.00		1	500,000
TOTAL					$13,132,700

TABLE 15-7

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

DAM SITE PARK

Acres 707 — See Plate 12

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do		3.48		
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.38		
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00		0.53	29,700
(2) Flexible pavement	do		2.05		
(a) New construction	do	82,000.00		0.55	45,100
(b) Existing gravel	do	15,000.00		0.47	7,000
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.30		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do		0.76		
(a) New construction	do	55,000.00		0.80	44,000
(b) Existing gravel	do	10,000.00		0.58	5,800
Parking Areas					
a. Gravel	S.Y.	5.90	20		
b. Flexible pavements			12,400		
(1) New construction	S.Y.	8 00		2100	16,800
(2) Existing gravel	S.Y.	2.70		220	600
Launching ramps, concrete	EA.	25,000.00	3		
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	5	4	64,000
(2) Waterborne	do	28,000.00		1	28,000
(3) Waterborne w/showers	do	30,500.00		3	91,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00	2		

TABLE 15-7

DAM SITE PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975 Quantity	Existing Facilities Jan. 1975 Cost	Proposed Facility Quantity	Proposed Facility Cost
Sewage system						
a. Sewer lines, 6" gravity	LF	8.00			3000	24,000
b. Sewer lines, 4" gravity	do	6.50				
c. Sewer lines, 4" c.i. or steel force main	do	10.00			850	8,500
d. Outfall lines, 4" steel	do	8.50			800	6,800
e. Outfall lines, 6" steel	do	12.00				
f. Manholes	EA.	450.00			4	1,800
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00				
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			2	69,000
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00				
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00				
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00				
l. Lift Station	do	20,000.00			1	20,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			2	10,000
n. Electrical	SUM	15,500.00				15,500
o. Outside contingencies 15%	JOB					23,300
Water System						
a. Water line, 3/4 PVC	LF	2.50			1850	4,600
b. Water line, 1" PVC	do	3.25				
c. Water line, 1.5" PVC	do	4.00			1550	6,200
d. Water line, 2" PVC	do	4.50			1950	8,800
e. Water line, 2.5" PVC	do	5.00				
f. Water line, 3" PVC	do	5.40				
g. Water line, 4" PVC	do	7.00				
h. Gate valves and boxes	SUM	500.00			4	2,000
i. Water wells		3,500.00	5		4	14,000
j. Wellhouse and equipment	EA.	8,000.00	3		1	8,000
k. Electrical	LS	3,800.00				3,800
l. Contingencies 15%						7,100
Picnic units	EA.	1,400.00	17		11	15,400
Camp units	do	2,000.00	18		37	74,000
Camp units w/electrical service	do	2,400.00	56		68	163,200
Multi-family camp units	do					
Group camp	do	25,000.00			1	25,000
Travel trailer pullouts w/electricity	do	2,400.00				
Electrical service to camp sites		400.00			20	8,000

TABLE 15-7

DAM SITE PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00	29	3	4,500
Picnic Shelter	do	12,000.00	1		
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00	5	13	15,600
Changehouses	do	10,000.00	1		
Sanitary stations		5,000.00			
(travel trailer)	do		1		
(marine)	do				
Wash houses	do	40,000.00		1	40,000
Swimming beaches	do	9,500.00	1		
Mercury vapor lights	do	500.00	9	3	1,500
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00		3600	10,800
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				29,500
Telephone	do				
Information center	SUM		1		200,000
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00		22	22,000
Entrance complex	EA.	50,000.00	1	2	100,000
Observation Tower		100,000.00		1	100,000
TOTAL					1,381,400

NOTES: All sewer lines are 6" Diameter.

TABLE 15-8

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

INDIAN CREEK PARK

Acres 98

See Plate 13

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do		0.38		
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00	0.36		
(2) Flexible pavement	do		1.25		
(a) New construction	do	82,000.00		0.08	6,600
(b) Existing gravel	do	15,000.00		0.36	5,400
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do		0.13		
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00			
(b) Existing gravel	do	10,000.00		0.26	2,600
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			3885		
(1) New construction	S.Y.	8.00		250	2,000
(2) Existing gravel	S.Y.	2.70		110	300
Launching ramps, concrete	EA.	25,000.00			
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	4		
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-8

INDIAN CREEK PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i: or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM JOB	15,500.00			
o. Outside contingencies 15%					
Water System					
a. Water line, 3/4 PVC	LF	2.50		1590	4,000
b. Water line, 1" PVC	do	3.25			
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		2	1,000
i. Water wells		3,500.00	3	2	7,000
j. Wellhouse and equipment	EA.	8,000.00	1		
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					2,500
Picnic units	EA.	1,400.00	4	13	18,200
Camp units	do	2,000.00	37	13	26,000
Camp units w/electrical service	do	2,400.00			
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-8

Indian Creek Park

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table Canopies	do	1,500.00	2		
Picnic Shelter	do	12,000.00	1	1	12,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		6	7,200
Changehouses	do	10,000.00	1		
Sanitary stations		5,000.00			
(travel trailer)	do				
(marine)	do				
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00	1		
Mercury vapor lights	do	500.00	1		
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00	1600	3800	11,400
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				11,600
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				500
	JOB				
Reforestation	ACRE	1,000.00		2	2,000
Entrance complex	EA.	50,000.00			
TOTAL					$130,100

TABLE 15-9

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

LOST BRIDGE PARK

Acres — See Plate 14

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		1.97		
(a) New construction	do	82,000.00		1.88	154,100
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.65		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.3	16,500
(b) Existing gravel	do	10,000.00		0.08	800
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			4700		
(1) New construction	S.Y.	8.00		1150	9,200
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00	2		
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	2	6	96,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00		1	30,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00	2		

TABLE 15-9

LOST BRIDGE PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		650	5,200
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50		600	5,100
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00		1	450
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00		1	26,500
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM JOB				15,500
o. Outside contingencies 15%					8,700
Water System					
a. Water line, 3/4 PVC	LF	2.50		3070	7,700
b. Water line, 1" PVC	do	3.25		3600	11,700
c. Water line, 1.5" PVC	do	4.00		6270	25,100
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		10	5,000
i. Water wells		3,500.00		1	3,500
j. Wellhouse and equipment	EA.	8,000.00		1	8,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					9,200
Picnic units	EA.	1,400.00		17	23,800
Camp units	do	2,000.00	54		
Camp units w/electrical service	do	2,400.00	21	37	88,800
Multi-family camp units	do				
Group camp	do	25,000.00			4,000
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00		54	21,600

TABLE 15-9

LOST BRIDGE PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table Canopies	do	1,500.00			
Picnic Shelter	do	12,000.00		1	12,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		25	30,000
Changehouses	do	10,000.00		1	10,000
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00		1	10,000
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00	2		
Mercury vapor lights	do	500.00	3		
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00	3600	8400	25,200
Fishing dock	SUM	65,000.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				21,300
Telephone	do		1		
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00			
Entrance complex	EA.	50,000.00	1		
TOTAL					$705,250

NOTES: Sewer line is 6" Dia.

Where pipe sizes cannot be shown the following will apply:
Service lines to Drinking fountains - 3/4" Dia.
Service line to WB Restroom - 1½" Dia.

Electrical and Water lines to Camping Areas 2,3,4, and 5 will be laid in same trench and are shown as a common line.

TABLE 15-10

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES
BEAVER LAKE

STARKEY PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do		0.30		
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		1.20		
(a) New construction	do	82,000.00		0.15	12,300
(b) Existing gravel	do	15,000.00		0.25	3,800
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.30		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.27	14,800
(b) Existing gravel	do	10,000.00	0.1		
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			5995		
(1) New construction	S.Y.	8.00		833	6,700
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00	1		
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	4	3	48,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-10

STARKEY PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM JOB	15,000.00			
o. Outside contingencies 15%					
Water System					
a. Water line, 3/4 PVC	LF	2.50		1720	4,300
b. Water line, 1" PVC	do	3.25		920	3,000
c. Water line, 1.5" PVC	do	4.00		980	3,900
d. Water line, 2" PVC	do	4.50		830	3,800
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		6	3,000
i. Water wells		3,500.00	3		
j. Wellhouse and equipment	EA.	8,000.00	3		
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					3,300
Picnic units	EA.	1,400.00	5	8	11,200
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00	26	39	93,600
Multi-family camp units	do				
Group camp	do	25,000.00		1	25,000
Travel trailer pullouts w/electricity	do	2,400.00	3	3	7,200
Electrical service to camp sites		400.00		5	2,000

TABLE 15-10

STARKEY PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table Canopies	do	1,500.00	5		
Picnic Shelter	do	12,000.00		1	12,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00	3	13	15,600
Changehouses	do	10,000.00	1	1	10,000
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00		1	10,000
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00		1	9,500
Mercury vapor lights	do	500.00	7	5	2,500
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00			
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				16,700
Telephone	do				
Information center	SUM				600
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00			
Entrance complex	EA.	50,000.00			50,000
TOTAL					$384,600

TABLE 15-11

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

ROCKY BRANCH PARK

Acres 157 — See Plate 16

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00	0.57		
(2) Flexible pavement	do		2.40		
(a) New construction	do	82,000.00		0.55	45,100
(b) Existing gravel	do	15,000.00		0.61	9,100
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.15		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do		0.21		9,400
(a) New construction	do	55,000.00		0.17	25,300
(b) Existing gravel	do	10,000.00		0.04	400
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			7,800		
(1) New construction	S.Y.	8.00		730	6,200
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00	1	1	25,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	5		
(2) Waterborne	do	28,000.00		2	56,000
(3) Waterborne w/showers	do	30,500.00		2	61,000
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00		4	40,000
b. Wooden, vault	do	1,600.00			

TABLE 15-11 (Con.)

ROCKY BRANCH PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		3,610	28,900
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00		2,240	22,400
d. Outfall lines, 4" steel	do	8.50		200	1,700
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00		13	5,850
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00		1	45,000
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00		3	60,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM JOB	15,500.00		1	15,500
o. Outside contingencies 15%					27,600
Water System					
a. Water line, 3/4 PVC	LF	2.50		2,810	7,000
b. Water line, 1" PVC	do	3.25		2,350	7,600
c. Water line, 1.5" PVC	do	4.00		1,430	5,700
d. Water line, 2" PVC	do	4.50		2,420	10,900
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		8	4,000
i. Water wells		3,500.00	3	2	7,000
j. Wellhouse and equipment	EA.	8,000.00	1	2	16,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					9,900
Picnic units	EA.	1,400.00	6	18	25,200
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00	51	67	160,800
Multi-family camp units	do				
Group camp	do	25,000.00		1	25,000
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00		51	20,400

TABLE 15-11 (Con.)

ROCKY BRANCH PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00			
Picnic Shelter	do	12,000.00	1		
Amphitheaters	do	3,100.00	1	1	3,100
Drinking fountains	do	1,200.00		23	27,600
Changehouses	do	10,000.00	1		
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00		1	10,000
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00	1		
Mercury vapor lights	do	500.00	4		
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00			
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				19,300
Telephone	do		1		
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00		94	94,000
Entrance complex	EA.	50,000.00		1	50,000
TOTAL					$979,450

NOTE: All sewers are 6" Dia.

TABLE 15-12

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES
BEAVER LAKE

Acres 73 VENTRIS PARK See Plate 17

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do		0.11		
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		0.61		
(a) New construction	do	82,000.00		0.18	14,800
(b) Existing gravel	do	15,000.00		0.38	5,700
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.04	2,200
(b) Existing gravel	do	10,000.00		0.18	1,800
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			1510		
(1) New construction	S.Y.	8.00		660	5,300
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00	1		
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	3	1	16,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-12

VENTRIS PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM	15,500.00			
o. Outside contingencies 15%	JOB				
Water System					
a. Water line, 3/4 PVC	LF	2.50			
b. Water line, 1" PVC	do	3.25			
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00			
i. Water wells		3,500.00	2	4	14,000
j. Wellhouse and equipment	EA.	8,000.00			3,800
k. Electrical	LS	3,300.00			2,100
l. Contingencies 15%					
Picnic units	EA.	1,400.00	4	2	2,800
Camp units	do	2,000.00	12	36	72,000
Camp units w/electrical service	do	2,400.00			
Multi-family camp units	do	4,800.00			
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-12

VENTRIS PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00	1		
Picnic Shelter	do	12,000.00	1		
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00			
Changehouses	do	10,000.00			
Sanitary stations		5,000.00			
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00			
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00			
Trail system	LF	3.00			
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00		5	5,000
Entrance complex	EA.	50,000.00			
TOTAL					145,500

TABLE 15-13
DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES
BEAVER LAKE

Acres 179 PRAIRIE CREEK PARK See Plate 18

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do		1.40		
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		2.02		
(a) New construction	do	82,000.00		0.18	14,800
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.91		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00	0.07	0.02	700
(2) Flexible pavement	do		1.29		
(a) New construction	do	55,000.00		0.19	10,400
(b) Existing gravel	do	10,000.00		0.07	700
Parking Areas					
a. Gravel	S.Y.	5.90	1,600		
b. Flexible pavements			17,000		
(1) New construction	S.Y.	8.00		1,300	10,400
(2) Existing gravel	S.Y.	2.70		1,600	4,300
Launching ramps, concrete	EA.	25,000.00	2	3	75,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	6		
(2) Waterborne	do	28,000.00	1	4	112,000
(3) Waterborne w/showers	do	30,500.00		1	30,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00		6	60,000
b. Wooden, vault	do	1,600.00			

TABLE 15-13

PRAIRIE CREEK PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		6810	54,500
b. Sewer lines, 4" gravity	do	6.50		2105	13,700
c. Sewer lines, 4" c.i. or steel force main	do	10.00		2570	25,700
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00		250	3,000
f. Manholes	EA.	450.00		24	10,800
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00		1	55,000
l. Lift Station	do	20,000.00		2	40,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM	15,500.00			15,500
o. Outside contingencies 15%	JOB				33,500
Water System					
a. Water line, 3/4 PVC	LF	2.50		3545	8,900
b. Water line, 1" PVC	do	3.25	1000	900	2,900
c. Water line, 1.5" PVC	do	4.00	3200	530	2,100
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00	1800		
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		3	1,500
i. Water wells		3,500.00			
j. Wellhouse and equipment	EA.	8,000.00			
k. Electrical	LS	3,800.00		1	3,800
l. Contingencies 15%					2,900
Picnic units	EA.	1,400.00	43		
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00	89	46	110,400
Multi-family camp units	do	4,800.00			
Group camp	do	25,000.00		1	25,000
Travel trailer pullouts w/electricity	do	2,400.00		5	12,000
Electrical service to camp sites		400.00		46	18,400
		15-30			

TABLE 15-13

PRAIRIE CREEK PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Table canopies	do	1,500.00	30	5	7,500
Picnic Shelter	do	12,000.00	2		
Amphitheaters	do	3,100.00		2	6,200
Drinking fountains	do	1,200.00	7	24	28,800
Changehouses	do	10,000.00	1		
Sanitary stations		5,000.00	1		
(travel trailer)	do	10,000.00		1	10,000
(marine)	do				
Wash houses	do	40,000.00		1	40,000
Swimming beaches	do	9,500.00	1	expansion	9,500
Mercury vapor lights	do	500.00	3	5	2,500
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00	5000	7200	21,600
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				10,400
Telephone	do		1		
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00		8	8,000
Entrance complex	EA.	50,000.00		1	50,000
TOTAL					963,900

NOTE: Service lines from waterborne restrooms will be 4". Sewer lines shall be 6" dia.

TABLE 15-14

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

HORSESHOE BEND PARK

cres 166

See Plate 19

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do		0.38		
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		2.50		
(a) New construction	do	82,000.00		0.59	48,400
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do		0.72		
(a) New construction	do	55,000.00		0.63	34,600
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90	160		
b. Flexible pavements			8,025		
(1) New construction	S.Y.	8.00		6,000	48,000
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00	1	2	50,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	5		
(2) Waterborne	do	28,000.00		4	112,000
(3) Waterborne w/showers	do	30,500.00		1	30,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00		5	50,000
b. Wooden, vault	do	1,600.00			

TABLE 15-14 (Con.)

HORSESHOE BEND PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		4,600	36,800
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00		5,280	52,800
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00		250	3,000
f. Manholes	EA.	450.00		8	3,600
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00		1	55,000
l. Lift Station	do	20,000.00		4	80,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM JOB	15,500.00			15,500
o. Outside contingencies 15%					37,300
Water System					
a. Water line, 3/4 PVC	LF	2.50		4,860	12,100
b. Water line, 1" PVC	do	3.25		1,470	4,800
c. Water line, 1.5" PVC	do	4.00		2,110	8,400
d. Water line, 2" PVC	do	4.50		4,000	18,000
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		12	6,000
i. Water wells		3,500.00	4		
j. Wellhouse and equipment	EA.	8,000.00	2		
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					8,000
Picnic units	EA.	1,400.00	22	16	22,400
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00	101	123	295,200
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00		19	45,600
Electrical service to camp sites		400.00			

TABLE 15-14 (Con.)

HORSESHOE BEND PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Table canopies	do	1,500.00	2	5	7,500
Picnic Shelter	do	12,000.00	1	1	12,000
Amphitheaters	do	3,100.00		1	3,100
Drinking fountains	do	1,200.00		33	39,600
Changehouses	do	10,000.00	1	1	10,000
Sanitary stations		5,000.00	1		
(travel trailer)	do				
(marine)	do	10,000.00		1	10,000
Wash houses	do	40,000.00		1	40,000
Swimming beaches	do	9,500.00		1	9,500
Mercury vapor lights	do	500.00	7		
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00		2,500	7,500
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				47,400
Telephone	do		2		
Information center	SUM				
	JOB				
	SUM				
	JOB				
Reforestation	ACRE	1,000.00		12	12,000
Entrance complex	EA.	50,000.00	1	1	50,000
Road Obliteration	LS				
TOTAL					$1,341,400

NOTE: All sewer lines are 6" Dia.

TABLE 15-15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE
HICKORY CREEK PARK

Acres 142 — See Plate 20

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		1.93		
(a) New construction	do	82,000.00		0.50	41,000
(b) Existing gravel	do	15,000.00		0.03	500
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00	0.40		
(2) Flexible pavement	do		0.36		
(a) New construction	do	55,000.00			
(b) Existing gravel	do	10,000.00		0.40	4,000
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		5,540	44,300
(2) Existing gravel	S.Y.	2.70		110	300
Launching ramps, concrete	EA.	25,000.00	1		
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00		2	32,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00		1	10,000
b. Wooden, vault	do	1,600.00			

TABLE 15-15 (Con.)

HICKORY CREEK PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		780	6,200
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00		1,320	13,200
d. Outfall lines, 4" steel	do	8.50		750	6,400
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00		3	1,350
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00		1	34,500
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00		1	20,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM	15,500.00			15,500
o. Outside contingencies 15%	JOB				14,800
Water System					
a. Water line, 3/4 PVC	LF	2.50		3,680	9,200
b. Water line, 1" PVC	do	3.25			
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50		340	1,500
e. Water line, 2.5" PVC	do	5.00		1,150	5,800
f. Water line, 3" PVC	do	5.40		3,520	19,000
g. Water line, 4" PVC	do	7.00		3,600	25,200
h. Gate valves and boxes	SUM	500.00		6	3,000
i. Water wells		3,500.00	2		
j. Wellhouse and equipment	EA.	8,000.00			
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					9,100
Picnic units	EA.	1,400.00	26	44	61,600
Camp units	do	2,000.00	20		
Camp units w/electrical service	do	2,400.00		57	136,800
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00		20	8,000

TABLE 15-15 (Con.)

HICKORY CREEK PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
	do				
Table canopies	do	1,500.00		57	85,500
Picnic Shelter	do	12,000.00	2	4	48,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00	4	17	20,400
Changehouses	do	10,000.00	1		
Sanitary stations		5,000.00	1		
(travel trailer)	do			1	10,000
(marine)	do	10,000.00			
Wash houses	do	40,000.00		1	40,000
Swimming beaches	do	9,500.00	1	Expansion	9,500
Mercury vapor lights	do	500.00	4		
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00		2,800	8,400
Fishing dock	SUM	6,500.00		1	6,500
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				2,700
Telephone	do		1		
Information center	SUM				
	JOB				
Road obliteration	SUM				5,200
	JOB				
Reforestation	ACRE	1,000.00		30	30,000
Entrance complex	EA.	50,000.00	1	1	50,000
Multi-purpose Slab		10,000.00		1	10,000
Baseball Field		2,000.00		1	2,000
TOTAL					$863,250

NOTE: Service lines from waterborne restrooms will be 4" Dia.

Sewer lines will be 6" Dia.

TABLE 15-16

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

WAR EAGLE PARK

cres 48 See Plate 21

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do		1.17		
(a) New construction	do	82,000.00		0.04	3,300
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do		0.15		
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00	0.17		
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			2,530		
(1) New construction	S.Y.	8.00		1,600	12,800
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00	1		
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	2	1	16,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-16 (Con.)

WAR EAGLE PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM JOB	15,500.00			
o. Outside contingencies 15%					
Water System					
a. Water line, 3/4 PVC	LF	2.50		550	1,400
b. Water line, 1" PVC	do	3.25	800	930	3,000
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50	2,000		
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		4	2,000
i. Water wells		3,500.00	2		
j. Wellhouse and equipment	EA.	8,000.00			
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					1,000
Picnic units	EA.	1,400.00	4	6	8,400
Camp units	do	2,000.00	17		
Camp units w/electrical service	do	2,400.00	17	25	60,000
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00		5	2,000

TABLE 15-16 (Con.)

WAR EAGLE PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do		1		
Table canopies	do	1,500.00	6		
Picnic Shelter	do	12,000.00		1	12,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00	4	7	8,400
Changehouses	do	10,000.00			
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00		1	10,000
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00	1		
Mercury vapor lights	do	500.00	6		
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00		7,800	23,400
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				7,700
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				4,800
	JOB				
Reforestation	ACRE	1,000.00		11	11,000
Entrance complex	EA.	50,000.00	1	1	50,000
TOTAL					$249,000

NOTE: All service lines to drinking fountains are 3/4" I.D.

TABLE 15-17

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

BLUE SPRINGS PARK

Acres 66 — See Plate 22

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00	.58		
(2) Flexible pavement	do		1.00		
(a) New construction	do	82,000.00			
(b) Existing gravel	do	15,000.00			
e. 16 feet wide				0.36	5,400
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00	.04		
(2) Flexible pavement	do		.06		
(a) New construction	do	55,000.00		0.06	3,300
(b) Existing gravel	do	10,000.00		0.04	400
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements			3,000		
(1) New construction	S.Y.	8.00		900	7,200
(2) Existing gravel	S.Y.	2.70		1,100	3,000
Launching ramps, concrete	EA.	25,000.00	1	1	25,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00	2	2	32,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-17 (Con.)

BLUE SPRINGS PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM JOB	15,500.00			
o. Outside contingencies 15%					
Water System					
a. Water line, 3/4 PVC	LF	2.50		580	1,400
b. Water line, 1" PVC	do	3.25		940	3,100
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		3	1,500
i. Water wells		3,500.00	2		
j. Wellhouse and equipment	EA.	8,000.00		1	8,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					2,600
Picnic units	EA.	1,400.00	4	16	22,400
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00	10	26	62,400
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-17

BLUE SPRINGS PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00	3	16	24,000
Picnic Shelter	do	12,000.00	1		
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		6	7,200
Changehouses	do	10,000.00		1	10,000
Sanitary stations		5,000.00			
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00		1	9,500
Mercury vapor lights	do	500.00	4		
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00		1100	3,300
Fishing dock	SUM	6,500.00		1	6,500
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				7,700
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE				
Entrance complex	EA.	50,000.00			
TOTAL					255,700

TOTAL

TABLE 15-18

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

BIG CLIFTY PARK

Acres 100 — See Plate 23

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do				
(a) New construction	do	82,000.00		0.34	27,800
(b) Existing gravel	do	15,000.00		0.32	4,800
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00			
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		3,600	28,800
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00		1	25,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00			
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00		2	37,000
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-18 (Con.)

BIG CLIFTY PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26.500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM				
o. Outside contingencies 15%	JOB	15,500.00			
Water System					
a. Water line, 3/4 PVC	LF	2.50			
b. Water line, 1" PVC	do	3.25			
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00			
i. Water wells		3,500.00			
j. Wellhouse and equipment	EA.	8,000.00			
k. Electrical	LS	3,800.00			
l. Contingencies 15%					
Picnic units	EA.	1,400.00		16	22,400
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00			
Multi-family camp units	do				
Group camp	do	25,060.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-18 (Con.)

BIG CLIFTY PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00			
Picnic Shelter	do	12,000.00		1	12,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00			
Changehouses	do	10,000.00			
Sanitary stations		5,000.00			
(travel trailer)	do				
(marine)	do				
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00			
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00			
Trail system	LF	3.00			
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				
Foot bridge	SUM				
	Job				
Benches	EA				
Telephone	do				
Information center	SUM				
	JOB				
Reforestation	ACRE	1,000.00			
Landscaping and beautification	SITE	100.00		22	2,200
Site preparation	ACRE	2,000.00		14	28,000
Entrance complex	EA	50,000.00			
Engineering/Design					
Supervision/Administration					
Shelters (rain)	do	1,500.00			
					188,000
E&D and S&A					30,000
TOTAL					$218,000

The total cost of $218,000 will be cost-shared with Carroll County, Arkansas This work (Phase I) is scheduled to be constructed during FY 1976 and will not be shown on the summary sheet (Table 15-6).

BEAVER LAKE

PINE TOP PARK (FUTURE)

Acres 97 — See Plate 24

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00		0.15	15,000
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do				
(a) New construction	do	82,000.00		1.50	123,000
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.40	22,000
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		2675	21,400
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00		1	25,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00		7	112,000
(2) Waterborne	do	28,000.00			
(3) Waterborne w/showers	do	30,500.00			
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-19 (Con.)

PINE TOP PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM	15,500.00			
o. Outside contingencies 15%	JOB				
Water System					
a. Water line, 3/4 PVC	LF	2.50		2070	5,200
b. Water line, 1" PVC	do	3.25		1370	4,500
c. Water line, 1.5" PVC	do	4.00		1610	6,400
d. Water line, 2" PVC	do	4.50		850	3,800
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		5	2,500
i. Water wells		3,500.00		1	3,500
j. Wellhouse and equipment	EA.	8,000.00		1	8,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					5,700
Picnic units	EA.	1,400.00			
Camp units	do	2,000.00		10	20,000
Camp units w/electrical service	do	2,400.00		62	148,800
Multi-family camp units	do				
Group camp	do	25,000.00		1	25,000
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-19 (Con.)

PINE TOP PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00			
Picnic Shelter	do	12,000.00			
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		13	15,600
Changehouses	do	10,000.00			
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00			
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00			
Trail system	LF	3.00		2600	7,800
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				10,400
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00			
Entrance complex	EA.	50,000.00		1	50,000
TOTAL					644,400

TABLE 15-20

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

SLATE GAP PARK (FUTURE)

:res 288 — See Plate 25

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00		0.51	51,000
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do				
(a) New construction	do	82,000.00		2.00	164,000
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.72	39,600
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		6200	49,600
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00		1	25,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00			
(2) Waterborne	do	28,000.00		5	140,000
(3) Waterborne w/showers	do	30,500.00		1	30,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-20 (Con.)

SLATE GAP PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		4160	33,300
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00		1660	16,600
d. Outfall lines, 4" steel	do	8.50		1120	9,500
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00		9	4,000
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00		1	26,500
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00		1	34,500
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00		2	40,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		2	10,000
n. Electrical	SUM	15,500.00			15,500
o. Outside contingencies 15%	JOB				28,500
Water System					
a. Water line, 3/4 PVC	LF	2.50		3990	10,000
b. Water line, 1" PVC	do	3.25		1330	4,300
c. Water line, 1.5" PVC	do	4.00		3650	14,600
d. Water line, 2" PVC	do	4.50		1950	8,800
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		9	4,500
i. Water wells		3,500.00		2	7,000
j. Wellhouse and equipment	EA.	8,000.00		2	16,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					10,000
Picnic units	EA.	1,400.00			
Camp units	do	2,000.00		15	21,000
Camp units w/electrical service	do	2,400.00		144	345,600
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-20 (Con.)

SLATE GAP PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00			
Picnic Shelter	do	12,000.00		2	24,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		23	27,600
Changehouses	do	10,000.00			
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00			
Swimming beaches	do	9.500.00			
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00			
Fishing dock	SUM	6.500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				17,000
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00			
Entrance complex	EA.	50,000.00		1	50,000
TOTAL					$1,290,300

NOTE: All sewer lines will be 6" Dia.

TABLE 15-21

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE

ALPINE PARK (FUTURE)

Acres 49 — See Plate 26

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00		.42	42,000
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do				
(a) New construction	do	82,000.00		.42	34,400
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00		.05	1,900
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.15	8,300
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		900	7,200
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00		1	25,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00			
(2) Waterborne	do	28,000.00		2	56,000
(3) Waterborne w/showers	do	30,500.00		1	30,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-21 (Con.)

ALPINE PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		900	7,200
b. Sewer lines, 4" gravity	do	6.50		850	5,500
c. Sewer lines, 4" c.i. or steel force main	do	10.00		1000	10,000
d. Outfall lines, 4" steel	do	8.50		400	3,400
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00		4	1,800
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34.500.00		1	34,500
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00		2	40,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM	15.000.00			15,500
o. Outside contingencies 15%	JOB				18,400
Water System					
a. Water line, 3/4 PVC	LF	2.50		600	1,500
b. Water line, 1" PVC	do	3.25		620	2,700
c. Water line, 1.5" PVC	do	4.00		1200	4,800
d. Water line, 2" PVC	do	4.50		1000	4,500
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		6	3,000
i. Water wells		3,500.00		1	3,500
j. Wellhouse and equipment	EA.	8,000.00		1	8,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					24,700
Picnic units	EA.	1,400.00		10	14,000
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00		45	108,000
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-21 (Con.)

ALPINE PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00			
Picnic Shelter	do	12,000.00			
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		10	12,000
Changehouses	do	10,000.00			
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00			
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00			
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				7,700
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				4,300
	JOB				
Reforestation	ACRE	1,000.00		3	3,000
Entrance complex	EA.	50,000.00		1	50,000
TOTAL					$610.100

TABLE 15-22

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITY
BEAVER LAKE

BLACKBURN CREEK PARK (FUTURE)

Acrea 119 — See Plate 27

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00		0.26	26,000
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do				
(a) New construction	do	82,000.00		1.30	106,600
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		1.01	55,600
(b) Existing gravel	do	10,000.00			
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		11,000	88,000
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00		2	50,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00			
(2) Waterborne	do	28,000.00		6	168,000
(3) Waterborne w/showers	do	30,500.00		1	30,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-22

BLACKBURN CREEK PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00		6000	48,000
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00		2275	22,800
d. Outfall lines, 4" steel	do	8.50		900	7,700
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00		13	5,850
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00		1	34,500
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00		3	60,000
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00		1	5,000
n. Electrical	SUM JOB	15,500.00			15,500
o. Outside contingencies 15%					29,900
Water System					
a. Water line, 3/4 PVC	LF	2.50		5060	12,700
b. Water line, 1" PVC	do	3.25		380	1,200
c. Water line, 1.5" PVC	do	4.00		3340	13,400
d. Water line, 2" PVC	do	4.50		790	3,600
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00		10	5,000
i. Water wells		3,500.00		2	7,000
j. Wellhouse and equipment	EA.	8,000.00		2	16,000
k. Electrical	LS	3,800.00			3,800
l. Contingencies 15%					9,400
Picnic units	EA.	1,400.00		38	53,200
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00		97	232,800
Multi-family camp units	do				
Group camp	do	25,000.00		1	25,000
Travel trailer pullouts w/electricity	do	2,400.00		14	33,600
Electrical service to camp sites		400.00			

TABLE 15-22

BLACKBURN CREEK PARK (FUTURE)

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00		8	12,000
Picnic Shelter	do	12,000.00		3	36,000
Amphitheaters	do	3,100.00			
Drinking fountains	do	1,200.00		24	28,800
Changehouses	do	10,000.00		1	10,000
Sanitary stations		5,000.00		1	5,000
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00		1	40,000
Swimming beaches	do	9,500.00		2	19,000
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00		1	3,000
Trail system	LF	3.00		1600	4,800
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility	EA.				
Screened camp cabin	do	10,000.00			
Playground equipment	LS				32,200
Telephone	do				
Information center	SUM				
	JOB				
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00		10	10,000
Entrance complex	EA.	50,000.00		1	50,000
Multi-purpose Slab		10,000.00		1	10,000
TOTAL					1,431,450

NOTE: All sewer lines will be 6" Diameter.

TABLE 15-23

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

BEAVER LAKE
BEAR CREEK ISLAND PARK

177 acres

See Plate 28

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Roads					
a. 26 feet wide					
(1) Gravel	Mile				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
b. 22 feet wide					
(1) Gravel	do	68,000.00			
(2) Flexible pavement	do				
(a) New construction	do	100,000.00			
(b) Existing gravel	do	18,000.00			
c. 20 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
d. 18 feet wide					
(1) Gravel	do	56,000.00			
(2) Flexible pavement	do				
(a) New construction	do	82,000.00		2.08	170,500
(b) Existing gravel	do	15,000.00			
e. 16 feet wide					
(1) Gravel	do				
(2) Flexible pavement	do				
(a) New construction	do				
(b) Existing gravel	do				
f. 12 feet wide					
(1) Gravel	do	37,000.00			
(2) Flexible pavement	do				
(a) New construction	do	55,000.00		0.15	8,300
(b) Existing gravel	do				
Parking Areas					
a. Gravel	S.Y.	5.90			
b. Flexible pavements					
(1) New construction	S.Y.	8.00		12,750	102,000
(2) Existing gravel	S.Y.	2.70			
Launching ramps, concrete	EA.	25,000.00		2	50,000
Toilets					
a. Masonry					
(1) Vault	EA.	16,000.00			
(2) Waterborne	do	28,000.00		1	28,000
(3) Waterborne w/showers	do	30,500.00		3	91,500
(4) Convert to waterborne	do	18,500.00			
(5) Conversion of vault to waterborne		10,000.00			
b. Wooden, vault	do	1,600.00			

TABLE 15-23

BEAR CREEK ISLAND PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Sewage system					
a. Sewer lines, 6" gravity	LF	8.00			
b. Sewer lines, 4" gravity	do	6.50			
c. Sewer lines, 4" c.i. or steel force main	do	10.00			
d. Outfall lines, 4" steel	do	8.50			
e. Outfall lines, 6" steel	do	12.00			
f. Manholes	EA.	450.00			
g. Treatment plant, tertiary 5,000 GPD	do	26,500.00			
h. Treatment plant, tertiary 10,000 GPD	do	34,500.00			
i. Treatment plant, tertiary 15,000 GPD	do	40,000.00			
j. Treatment plant, tertiary 20,000 GPD	do	45,000.00			
k. Treatment plant, tertiary 30,000 GPD	do	55,000.00			
l. Lift Station	do	20,000.00			
m. Holding tank, dosing siphon chlorinator, analyzer and house	do	5,000.00			
n. Electrical	SUM	15,500.00			
o. Outside contingencies 15%	JOB				
Water System					
a. Water line, 3/4 PVC	LF	2.50			
b. Water line, 1" PVC	do	3.25			
c. Water line, 1.5" PVC	do	4.00			
d. Water line, 2" PVC	do	4.50			
e. Water line, 2.5" PVC	do	5.00			
f. Water line, 3" PVC	do	5.40			
g. Water line, 4" PVC	do	7.00			
h. Gate valves and boxes	SUM	500.00			
i. Water wells		3,500.00			
j. Wellhouse and equipment	EA.	8,000.00			
k. Electrical	LS	3,800.00			
l. Contingencies 15%				34	47,600
Picnic units	EA.	1,400.00			
Camp units	do	2,000.00			
Camp units w/electrical service	do	2,400.00			
Multi-family camp units	do				
Group camp	do	25,000.00			
Travel trailer pullouts w/electricity	do	2,400.00			
Electrical service to camp sites		400.00			

TABLE 15-23

BEAR CREEK ISLAND PARK

Item	Unit	Unit Cost	Existing Facilities Jan. 1975	Proposed Facility Quantity	Proposed Facility Cost
Overlook	do				
Table canopies	do	1,500.00			
Picnic Shelter	do	12,000.00		2	24,000
Amphitheaters	do	3,100.00		1	3,100
Drinking fountains	do	1,200.00		13	15,600
Changehouses	do	10,000.00		1	10,000
Sanitary stations		5,000.00			
(travel trailer)	do				
(marine)	do	10,000.00			
Wash houses	do	40,000.00			
Swimming beaches	do	9,500.00		2	19,000
Mercury vapor lights	do	500.00			
Courtesy docks	do	3,000.00		2	6,000
Trail system	LF	3.00		1100	3,300
Fishing dock	SUM	6,500.00			
	JOB				
Group dining facility w/rr	EA.	50,000.00		1	50,000
Screened camp cabin	do	10,000.00		25	250,000
Playground equipment	LS			2	48,000
Telephone	do				
Interpretive Center, overlook	SUM				
with restroom	JOB	500,000.00		1	500,000
Road obliteration	SUM				
	JOB				
Reforestation	ACRE	1,000.00		30	30,000
Entrance complex	EA.	50,000.00			
Causeway	L.S.	300,000.00			300,000
TOTAL					1,756,900

TABLE 15-24

DATA RELATING TO COLLATERAL BENEFITS OF PROJECT

		1960	1973
1.	Number of vacation resorts, cottages, camps, lodges, motels, and similar accommodations located on private property adjoining Government ownership providing overnight accommodations.	0	13
2.	Number of accommodations in above establishments.	0	1,289
3.	Number of restaurants, cafes, etc., on property adjoining Government ownership.	0	5
4.	Number of real estate transfers in counties in which lake is located.	5,625	12,823
5.	Assessed valuation of all taxable property in counties in which lake is located.	$75,955,727	$222,922,230

SECTION XVI

CONCLUSIONS AND RECOMMENDATIONS

16-01. Conclusions.

a. It is concluded that Beaver Lake should be developed in accordance with this master plan. Development and management of the project area, as outlined herein, for public use and other purposes will support the expected increase in project use and will assist in preserving the natural resources of the project for present and future generations.

b. This master plan utilizes the Government-owned land to the best possible advantage and highest use. The plan is flexible and will allow adjustments to be made compatible with future needs.

16-02. Recommendations. It is recommended that this master plan be approved as a basis for land and water utilization and management activities, retention of areas for future recreational use, and further development of public facilities as detailed herein and as shown on the plates contained herein.