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

REPLY TO
ATTENTION OF

SWLED-PV

7 August 1973

SUBJECT: Clearwater Lake, Black River, Missouri, Design Memorandum No. 1-C, Updated Master Plan for Development and Management of Clearwater Lake

Division Engineer, Southwestern

Design Memorandum No. 1-C, Updated Master Plan for Clearwater Lake, is submitted for approval.

1 Incl (9 cys)
as

DONALD G. WEINERT
Colonel, Corps of Engineers
District Engineer

WHITE RIVER WATERSHED
MISSOURI
BLACK RIVER

CLEARWATER DAM AND LAKE
DESIGN MEMORANDUM NO. 1-C
UPDATED MASTER PLAN FOR DEVELOPMENT
AND MANAGEMENT OF CLEARWATER LAKE

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CLEARWATER DAM AND LAKE

DESIGN MEMORANDUM NO. 1-C

UPDATED MASTER PLAN FOR
DEVELOPMENT AND MANAGEMENT OF
CLEARWATER LAKE

PREVIOUSLY ISSUED AND CURRENTLY SCHEDULED DESIGN MEMORANDUMS

Memo No.	Subject	Date submitted or scheduled	Date approved
-	Master Plan for Recreational Development and Reservoir Utilization of Clearwater Reservoir, Black River, Missouri	26 Mar 48	25 Aug 48
1-B	Updated Master Plan for Reservoir Development and Management	8 Mar 65	29 Mar 66
-	Supplement No. 1, Forest Management Plan, Updated Master Plan for Reservoir Development and Management	28 Oct 68	9 Apr 71
-	Supplement No. 2 to the Updated Master Plan for Reservoir Development and Management	13 Apr 72	11 Jul 72

APPENDIXES

Appendix	Subject	Date submitted or scheduled	Date approved
A	Project Resource Management Plan	15 Aug 72	
B	Forest Management Plan	28 Oct 68	9 Apr 71
C	Fire Protection Plan	Jun 73	
D	Fish and Wildlife Management Plan	Aug 73	
E	Project Safety Plan	20 Oct 72	23 Mar 73

WHITE RIVER WATERSHED
MISSOURI

BLACK RIVER
CLEARWATER DAM AND LAKE

DESIGN MEMORANDUM NO. 1-C

UPDATED MASTER PLAN FOR
LAKE DEVELOPMENT AND MANAGEMENT

SECTION I

INTRODUCTION

1-01. Project authorization. The Clearwater project was authorized for construction by the Flood Control Act approved June 28, 1938 (Public Law No. 761, 75th Congress, 3rd Session).

1-02. Project purpose. The project is one unit of a comprehensive plan for flood control and other purposes in the White River Basin and affords protection to the lands in the Black River Valley below the dam. Although the project was authorized and constructed primarily for flood control, a permanent conservation pool with a maximum depth of about 40 feet and a surface area of 1,630 acres is maintained in the lake area above the dam for recreation and for the conservation of fish and wildlife. The utilization of this permanent conservation pool and the development of areas for recreational purposes on the surrounding shoreline constitutes an added resource. The further use of lake project lands for agriculture or grazing and for natural resource conservation results in obtaining maximum benefits on an interim basis from the resources.

1-03. Purpose of master plan. This report updates Design Memorandum No. 1-B for Development and Management on Clearwater Lake approved 29 March 1966. This updated plan provides for an orderly, progressive development of the project and changes in planning and land use resulting from a reevaluation after approximately 7 years of development under the guidance and direction of Design Memorandum No. 1-B.

1-04. Application of Public Laws.

a. General. Section 4 of the Flood Control Act approved 22 December 1944, as amended by Section 4 of the Flood Control Act 1946, and as further amended by Section 209 of the Flood Control Act approved 3 September 1954 (Public Law 780, 83rd Congress), authorizes the Department of the Army to provide for recreational use of the lakes under its control.

b. Implementation of Public Law 89-72. Recreational development after FY 1974 will require implementation of the policy established by the Secretary of the Army in coordination with the Office of Management and Budget as outlined in EC 1130-2-121 dated 14 March 1973, 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.

SECTION II

PROJECT DESCRIPTION

2-01. Location. Clearwater Lake is located on the Black River in Wayne and Reynolds Counties in southeast Missouri. The dam is about 43 miles north of the Missouri-Arkansas State line and is 257 river miles upstream from the mouth of the Black River. It is approximately 5 miles southwest of Piedmont, Missouri, the nearest town, and is 125 miles southwest of St. Louis. The project is situated in a rural area in the eastern part of the Ozark Plateau. The region surrounding the project is scenic and is characterized by narrow ridges between deeply cut valleys most of which are wooded with deciduous trees and shrubs with a scattering of pine and cedar.

2-02. Accessibility. The area is served principally by three paved Missouri State Highways, Routes 21, 34, and 49, which form a complete loop around the lake. Freight service is provided by the mainline of the Missouri Pacific Railroad from St. Louis, through Piedmont and Poplar Bluff, to the southwest. The lake is easily accessible from the towns of Ellington to the west; Poplar Bluff to the southeast; Piedmont from the east; and Des Arc and Annapolis, Missouri, to the northeast. The main hard-surfaced roads have numerous connecting gravel-surfaced roads, graded roads, and unimproved roads that provide access to almost all portions of the lake area.

2-03. Project development and operation.

a. Project construction. Construction of the Clearwater project was begun in May 1940, but was suspended in November 1942 by order of the War Production Board. The project at that time was about 55 percent complete. Construction was resumed in May 1946 and completed in October 1948.

b. Lake operation. The top of the flood-control pool, elevation 567, and the top of the conservation pool, which fluctuates from elevation 494 between October and May and elevation 498 between May and October, are the controlling elevations for recreational development. The project is operated so that 391,000 acre-feet of storage capacity between elevations 494 and 567 are reserved for flood control, and 22,000 acre-feet of storage below elevation 494 is maintained for conservation. Since impoundment of water began at Clearwater Lake in 1948, the maximum experienced high water occurred on 28 May 1957 at elevation 565.6 and the minimum low water at elevation 490 occurred on 20 January 1972. Eighty-nine floods on the Black River have been regulated by the lake between the start of operations in 1948 and 30 June 1970. On the average, flood crests at Poplar Bluff, 46 miles downstream, were reduced about 3.4 feet and flooding was prevented on 7,440 acres of improved land. Flood losses prevented by operation of the project through June 1972 are estimated to be $9,658,000. The experienced fluctuation of the lake is shown on Plates 6 and 7.

c. Initial master plan. The original master plan for the development of recreation around the lake was submitted in March 1948 and approved by the Office, Chief of Engineers, 25 August 1948. The original master plan recommended the development of 10 parks dispersed around the lake with 2 areas designated for future development.

d. Expenditures for recreational development. About $140,000 was spent for initial development of recreational facilities around the lake, and about $318,000 of Code 710 funds have been allocated through FY 1973 for recreational facilities since completion of initial development.

e. Private developments. There are 27 vacation resorts, cottages, camps, lodges, hotels, and similar accommodations located in the vicinity of the lake. These facilities contain 274 overnight accommodations and have an estimated value of $608,400. There are 19 restaurants, cafes, and public dining rooms in the vicinity. There are three commercial boat docks on Clearwater Lake which have a total valuation of $164,793 gross fixed assets as of 1 January 1973. There are 172 persons employed in service trades or businesses located near the lake that are largely dependent on the trade of visitors to the lake. The assessed valuation of all taxable property in Reynolds and Wayne Counties was $37,586,846 in 1972 as compared to $8,511,000 in 1948, the year the lake was filled. There are 284 private recreational or home sites constructed adjacent to the lake boundary. The estimated value of these home sites is $1,275,000. The total value of privately owned houseboats, boats, motors, and boat trailers regularly used on the lake but not in commercial service is estimated at $641,190.

2-04. Project data.

a. Basin hydrologic and climate summary.

(1) Water characteristics. The Black River has a total length of about 326 miles with its source in the Ozark hills in Reynolds County, Missouri. It emerges from the hills about 35 miles below the dam, a few miles above Poplar Bluff, Missouri. The total drainage area of the river is about 8,675 square miles of which approximately 898 square miles are upstream from the dam. The river is primarily a clear stream with a relatively stable bed. The quality of the lake water is excellent for all water sports and for the production of fish.

(2) Climate. The climate of the area in which the project is located is moderate. The average annual temperature is approximately 56 degress, Fahrenheit. However, temperatures of 107 and -19 degrees have been recorded at Clearwater Dam. The prevailing wind direction is from the south with greatest wind movements occurring in the spring of the year.

(3) Precipitation. The average annual precipitation is about 45 inches distributed rather evenly throughout the year.

b. Lake shoreline and general area.

(1) At the top of conservation pool, the lake is Y-shaped, extending up both the Black River Valley and the Logan Creek arm, which junction about three-fourths of a mile upstream from the dam. At the top of the conservation pool the lake extends approximate 7 miles upstream on the Black River and 4 miles upstream on Logan Creek. At the top of the flood control pool, the lake extends some 17 miles upstream on the Black River and 10 miles upstream on Logan Creek. The lake has a maximum width of about one-half mile and a shoreline of 27 miles at conservation pool level increasing at flood-control pool to about three-fourths mile wide with a shoreline of 172 miles. Water level is maintained at or near conservation pool elevation during most of the recreation season. The shoreline varies from steep bluffs to gently sloping points and is indented with numerous coves.

(2) The lakeshore is protected to preserve its natural scenic beauty. The interest of the general public is safeguarded by adequate control over the use of Government-owned land in the lake area. Private floating facilities are not permitted on Clearwater Lake due to the extreme fluctuations experienced and relatively small surface area.

(3) A total of 18,604 acres of land was acquired for the project, all of which was purchased in fee. Of the total area, 1,630 acres lie below elevation 494, the top of the conservation pool, and is subject to almost constant inundation; and 8,720 acres lie between that elevation and elevation 567, the top of the flood-control pool, and is subject to inundation to a varying extent at infrequent intervals during the operation of the lake for flood control. There are about 6,920 acres upstream from the dam and 667 acres downstream from the dam, that are not subject to flooding. The project land above the top of the flood-control pool is an irregular shaped strip varying in width from a few feet to approximately one-half mile and was acquired in a manner to avoid severance and isolation of parcels of privately-owned property. All timber growth and brush have been cleared from the lake area below elevation 500.

(4) There are approximately 16,300 acres of land in the project area upstream from the dam that lie above the conservation pool. About one-half of this land is within the flood-control pool area and is subject to occasional flooding. Most of the land above the top of the flood-control pool is forested and rugged with rock outcropping, and therefore, is not suitable for extensive farming or agricultural purposes. Practically all of the profitable farm units were in the narrow bottoms along the Black River and its tributaries. These are now permanently inundated at conservation pool level. However, the suitable portions of the project lands are leased for agricultural or grazing purposes on an interim basis.

c. Project structures.

(1) The dam is a rolled-fill earth embankment extending across the Black River Valley between the two abutments, has a crest length of approximately 4,225 feet and a maximum height of about 154 feet above the streambed. The dam contains approximately 5,500,000 cubic yards of fill material. The outlet works for releasing impounded waters from the lake consist of a tunnel through the right abutment, an intake structure, a control tower, and a stilling basin and discharge channel. The tunnel, which is circular in section except for the upper and lower transition sections, has an inside diameter of 23 feet and is 1,177 feet long. The stilling basin has a maximum width of 75 feet and is 190 feet long. A total of 37,600 cubic yards of concrete was used in the construction of the outlet works.

(2) The spillway is located in a natural saddle about 1,200 feet from the right abutment end of the dam and provides for the passage of flood flows around the right end of the dam and outlet works.

(3) Pertinent engineering data of the dam and lake are shown in the following Table 1 (elevations shown are feet above mean sea level).

TABLE 1

ENGINEERING DATA

Crest length of dam, feet	4,225
Height of dam (roadway) above streambed, feet	154
Length of outlet tunnel (including transitions) feet	1,177
Diameter of outlet tunnel, feet	23
Width of spillway, feet	190
Height of roadway above spillway crest, feet	41
Volume of earth in dam, cubic yards	5,500,000
Elevation, top of dam (roadway)	608
Elevation, top of flood-control pool	567
Elevation, top of conservation pool (Oct to May)	494
Elevation, top of conservation pool (May to Oct)	498
Elevation, streambed	454
Storage capacity, top of flood-control pool, acre-feet	413,000
Storage capacity, top of conservation pool, acre-feet	22,000
Area, top of flood control pool, acres	10,300
Area, top of conservation pool (elevation 494) acres	1,630
Length of shoreline, top of flood-control pool, miles	172
Lenght of shoreline, top of conservation pools, elevation 494, miles	27

chiefly timber production and grazing on cleared hill land. The water in the lake is of high quality. Air pollution is almost nonexistent.

3-04. Health conditions. There is no record of malaria or any other water associated diseases in the Clearwater Lake area. The physical condition of tne lake, the steep shoreline, exposure to wind and wave action, and lack of vegetation and drift material has limited mosquito breeding. Mosquito propagation is controlled by normal fluctuation of the lake during operation.

3-05. Facilities

a. There are six parks provided by the Corps of Engineers on Clearwater Lake containing public boat launching facilities, picnic and camping facilities, sanitary facilities, and swimming beaches. Three of the parks contain commercial boat docks offering boats and motors for rent and other related services and facilities.

b. Motels, cafes, sporting supply stores, marine supply and repairs, service stations, bait shops, taxidermy shops, and souvenir shops are some of the establishments catering to the public.

3-06. Fish and wildlife.

a. Approximately 17 stream miles of the Black River upstream from the dam are affected by the lake when water is stored to the top of the flood-control pool. The important native game fish found in the lake include large- and small-mouth bass, warmouth bass or goggle-eye, wall-eyed pike, crappie, several species of sunfish, and yellow bullhead. Only 7 miles of the Black River are permanently inundated by the project, and therefore, the sport of float fishing which was popular before impoundment is still a popular sport.

b. In the region in which the project is situated, there are several units of the Clark National Forest and Bozarth State Forest. Virginia white-tailed deer, wild turkey, fox and gray squirrels, quail, opossum, rabbits, red and gray fox, raccoons, mink, beaver, striped skunk, muskrat, and migratory water fowl are found in the area. The region for the most part is forested and contains only limited agricultural or other openings in the forest cover. For this reason quail are not numerous in the area. The mourning dove is not an important game species in this area since they are not present in great abundance. Cottontail rabbits are also scarce in the vicinity of Clearwater Lake and will probably remain relatively unimportant. In view of the strategic location of the project area with regard to adjacent public lands which are managed for wildlife and forestry, it is reasonable to expect that deer and small game will continue to be available in the vicinity in satisfactory numbers.

SECTION III

RECREATIONAL AND ENVIRONMENTAL RESOURCES OF THE PROJECT AREA

3-01. Geologic.

a. The overburden in the flood plain of the lake varies in depth from 25 feet to 32 feet, is fairly uniform and consists, in general, of an alluvial deposit of sand and gravel to bedrock. The surface strata of the overburden in the flood plain is composed of a spotty blanket of sandy silt varying in depth from a few inches to about 9 feet. The topsoil along the slopes and hillsides leading down to the flood plain consists of a layer of loam varying from about 1 to 2 feet in depth. The surface of the topsoil is strewn with rock fragments ranging from gravel size to small boulders. A soil structure map is shown on page 3-4. In general, the topsoil contains small quantities of a mixture of red to yellow clay or silt and a rock and gravel content varying up to 50 percent. Immediately beneath the topsoil is a poorly compacted layer consisting of silt, sand, clay, chert boulders and fragments which is underlain with a residual clay zone. The residual clay zone in the overburden consists, generally, of from 50 to 70 percent residual silty clay with 30 to 50 percent fragments and boulders. The clay is firm, impervious, and plastic when wet. It stands nearly vertical in road cuts and shows little signs of sliding.

b. The overburden above the flood plain becomes soft after heavy rains, as a large percent of the rainfall is absorbed by the overburden through which it percolates to the top of the nonporous, residual silty clay. It then moves laterally to emerge as seeps on the hillsides and road cuts where such seepage continues for several days. Bedrock is weathered limestone covered by a thick mantle of residual silty clay containing chert fragments. Many large springs in the region, most of which occur near the mouths of the longer tributaries, indicate that much of the drainage is underground. Dolomite limestone containing occasional thin chert bands is the principal rock exposed. Limestone outcroppings on the tops of the higher hills and ridges are composed of thin Gunter sandstones.

3-02. Archeologic and historic sites. There are no known historic or archeological sites within the project area. However, the Gads Hill area is about 4 miles east of the lake and is the site where the notorious James Boys held up a train in 1874. This was the first train robbery in the State and the second in the world. Big Spring is the world's largest single outlet spring. The spring is located about 15 miles south of Clearwater Lake in Big Spring State Park. The spring flows from a mountainside with enough water to supply a city the size of St. Louis.

3-03. Environmental. The region surrounding the lake is forested and rugged with rock outcropping. There are numerous narrow ridges with steep rocky slopes adjacent to the lake area. Land utilization is

chiefly timber production and grazing on cleared hill land. The water in the lake is of high quality. Air pollution is almost nonexistent.

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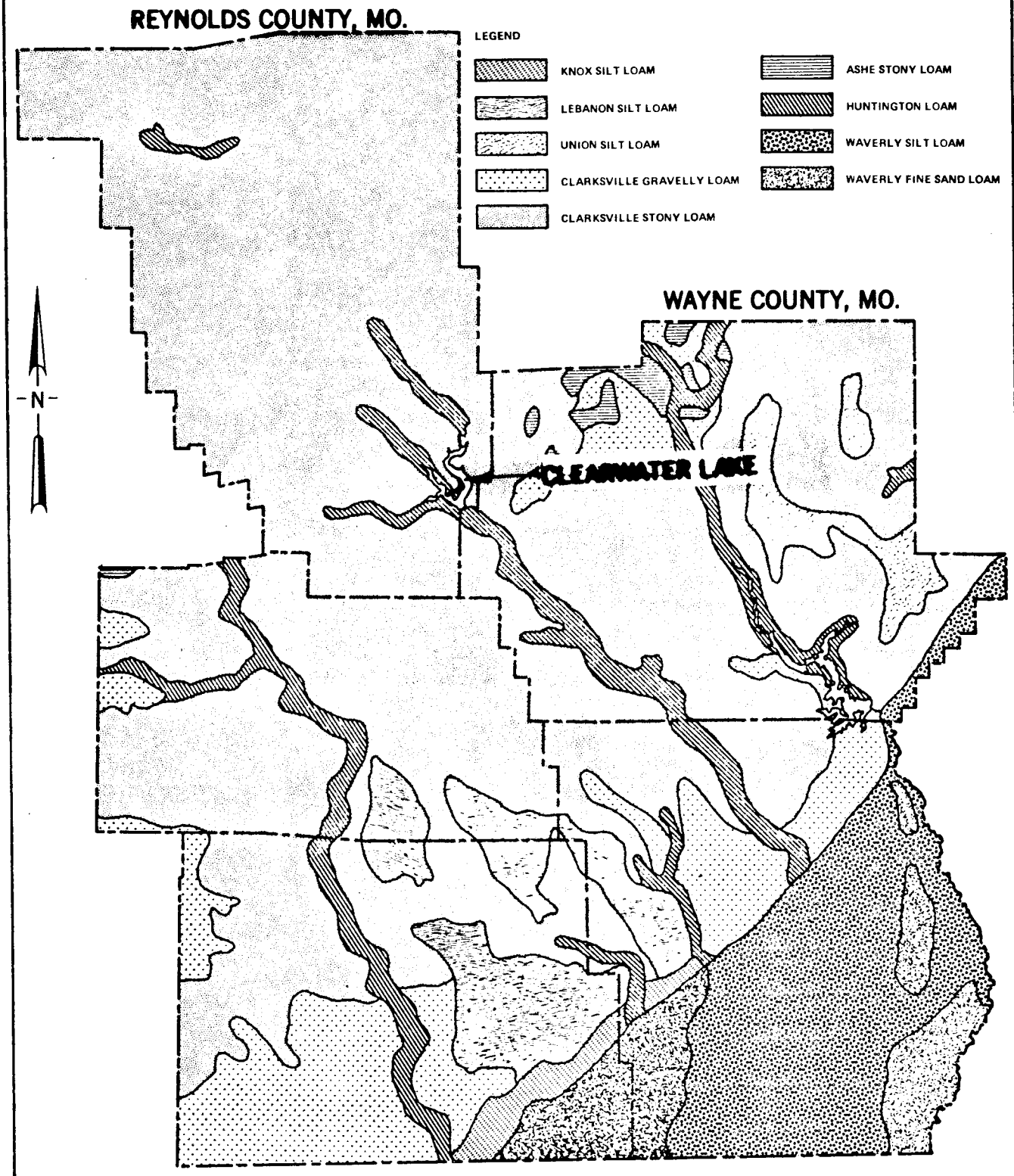
The project is in the "Mississippi Flyway," one of the principal routes of waterfowl migrations. Since the conservation pool was established the region has attracted and held ducks and geese, and thereby materially improved waterfowl hunting.

OZARK FOOTHILLS REGION

SOIL STRUCTURE



SOURCE: OZARK FOOTHILLS REGIONAL PLANNING COMMISSION
COMPREHENSIVE WATER-SEWER PLAN

SECTION IV

FACTORS INFLUENCING RECREATIONAL DEVELOPMENT

4-01. Region served. Recreational use surveys conducted on Clearwater Lake during 1969 and 1970 indicate that almost 100 percent of the visitors reside within an elliptically shaped zone which extends northward for 150 miles encompassing St. Louis, Missouri, as shown on Plate 1.

4-02. Competing recreational areas.

a. Wappapello Lake is the only body of water comparable in size within a 50-mile radius of Clearwater. It is located on the St. Francis River about 35 miles southeast of Clearwater and was constructed by the Memphis District Corps of Engineers for flood-control purposes. There are historical and scenic areas within the 100-mile zone. Several State parks with overnight and camping facilities are available nearby for vacationers. By far the largest and most popular park in the immediate vicinity is Meramec State Park in Missouri which is about 70 miles north of Clearwater Lake.

b. Norfork Lake is located about 95 miles southwest of Clearwater Lake in northern Arkansas and southern Missouri. Visitation figures in 1972 showed that 3,185,500 persons visited Norfork.

c. Several flood-control lakes either proposed or authorized are located within the 100-mile zone. It is believed that should these lakes be completed, the concentration of lakes formed in an area already possessing considerable scenic attraction will attract more visitors from a greater distance than would any individual project. The locations of regional recreation areas are shown on Plate 1.

4-03. Visitation. Almost 100 percent of the visitation originates within 150 miles of the lake. The metropolitan St. Louis area, which is about 125 miles from the lake, is the source of many visitors. A summary of past visitation to the project is shown in Table 2.

TABLE 2

VISITATION TO CLEARWATER LAKE

Year	Visitation	Year	Visitation	Year	Visitation
1949	108,600	1957	434,000	1965	549,900
1950	139,500	1958	493,000	1966	573,700
1951	225,000	1959	460,000	1967	603,700
1952	165,200	1960	414,600	1968	608,900
1953	189,300	1961	479,800	1969	718,100
1954	225,100	1962	541,200	1970	748,600
1955	280,000	1963	474,100	1971	795,500
1956	296,000	1964	483,400	1972	847,400

4-04. Determination of present recreation use.

a. Source of data. Recreational use surveys were conducted at Clearwater Lake during the spring, summer, and fall of 1969 and 1970. Bluff View, River Road, and Webb Creek Parks were surveyed in April June, October and November of 1969 and 1970. The Highway K Park was surveyed in April, June, and October of 1970 and the future Funk Branch Park was surveyed in April, June, and November of 1969. Data from the surveys were analyzed and participation rates were determined which may be applied to the experienced visitation to compute facilities requirements. The surveys also sampled visitor origin and indicated the relationship of weekend to weekday visitation. The surveys were conducted as the visitors entered the park areas; thus, they were expressing a desire to participate in various recreational activities.

b. Planning base. The normal summer weekend day demand is the basis for determining facility requirements. The normal summer weekend day-use of the project, expressed in activity days is determined by the following procedure:

(1) The visitation from monthly reports for June, July and August are totaled. This total is divided by 13 (13-week summer base) to arrive at a normal summer weekly visitation. The normal summer weekly visitation is then multiplied by the percentage of visitors using the project on the weekend to arrive at the normal summer weekend demand. It is assumed that visitation is equally distributed between Saturday and Sunday. Therefore, one-half of the normal summer weekend visitation will equal the visitation for a normal summer weekend day. A tabulation of this visitation is shown in Table 3.

TABLE 3

1971-72 SUMMER VISITATION DATA - CLEARWATER LAKE

	1971	1972
June	138,775	124,881
July	156,439	183,684
August	112,295	117,015
Total	407,509	425,580
Normal weekly (÷ 13)	31,347	32,740
Normal weekend (÷ 2)	15,674	16,370
Normal weekend day (÷ 2)	7,837	8,185

Normal weekend day visitation = 8,185 say 8,200

Distance traveled - 8,200 visitors

0-25 miles (19%)	1,555
26-75 miles (13%)	1,070
76-100 miles (10%)	820
101-150 miles (58%)	4,755

(2) The number of activity days which visitors generate is calculated by multiplying the normal summer weekend day visitation by the weekend percentage of participants in each activity.

c. Participation rates. The surveyed and normal summer weekend day participation rates for the surveyed outdoor recreational activities at Clearwater Lake in 1969 and 1970 are shown in Table 4. The average weekend activity days for the various activities at Clearwater Lake are also shown in Table 4.

TABLE 4

1969-70 PARTICIPATION RATES EXPRESSED IN ACTIVITY DAYS PER HUNDRED VISITORS CLEARWATER LAKE

Activity	Activity per hundred visits 1969 Survey	1970 Survey	Average	Normal weekend activity days*
Boating	24	31	27	2,220
Fishing	54	51	53	4,350
Water skiing	7	22	15	1,230
Swimming	68	58	63	5,170
Subtotal				12,970

TABLE 4 (con.)

	Activity per hundred visits 1969 Survey	1970 Survey	Average	Normal weekend activity days*
Camping	42	47	44	3,600
Picnicking	3	4	4	330
Subtotal				3,930
Sightseeing	10	19	14	1,150
Total				18,050

* Based on normal summer weekend day visitation of 8,200

4-05. Basis for estimating future recreational use. In order to expand the number of activity days generated during the year of 1972 to the year 2000, the following assumptions are made.

a. Eighty percent of the day-use visits are generated within 75 highway miles of the project and 100 percent of visits are generated within 150 miles of the project.

b. The participation rates for outdoor recreational acitivities will be the same as those determined by the Recreational Use Surveys conducted during 1969 and 1970. 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 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 directly related to per capita personal income.

4-06. Development of population and per capita personal income projections. The projections of population and per capita personal income to the year 2000 for the Clearwater Lake recreation zone of influence is shown in Table 5. The data for this table was taken from the Censuses of Population by the Bureau of the Census and the Missouri Economy Study, 1950-1965, by the University of Missouri at Columbia, and from the Office of Business Economics.

TABLE 5

POPULATION-INCOME PROJECTIONS FOR THE ZONE OF INFLUENCE - CLEARWATER LAKE

	Estimated population	Per capita personal income	Total income ($1,000's)
1960	2,038,292	$2,860	$5,829,515
1970	2,257,769	3,750	8,466,833
1980	2,500,000	5,000	12,500,000
1990	2,800,000	6,500	18,200,000
2000	3,100,000	8,600	26,660,000

4-07. Projected recreational use. The number of normal summer weekend activity days experienced during 1972 was projected to future years on the premise that increasing income and population would produce proportionate increases in the number of activity days. Total income is used in these projections in order to consider increases in both population and per capita personal income. A summary of the projected use of Clearwater Lake is shown in Table 6.

TABLE 6

PROJECTED NORMAL SUMMER WEEKEND DAY USE OF CLEARWATER LAKE EXPRESSED IN TERMS OF ACTIVITY DAYS

Item	1972	1980	1990	2000
Total income from Table 5 (in millions of dollars)	9.3	12.5	18.2	26.7
Total activity days	18,050	24,185	35,335	51,940
Boating, skiing, and fishing	7,800	10,450	15,260	22,430
Swimming	5,170	6,930	10,115	14,870
Subtotal	12,970	17,380	25,375	37,300
Camping	3,600	4,825	7,050	10,360
Picnicking	330	440	640	940
Subtotal	3,930	5,265	7,690	11,300
Sightseeing	1,150	1,540	2,270	3,340
Total	18,050	24,185	35,335	51,940
Annual project visitation	847,400	1,138,900	1,658,200	2,432,600

4-08. Comparison of projections. The Clearwater project is located in the mid-Missouri Recreation Planning Region as defined in the "Missouri Statewide Comprehensive Outdoor Recreation Plan, 1970." The Clearwater Lake zone of influence is shown on Plate 1 and includes all or portions of the following counties: St. Charles, St. Louis, Franklin, Jefferson, Crawford, Washington, St. Francois, Ste. Genevieve, Perry, Dent, Reynolds, Shannon, Carter, Oregon, Ripley, Iron, Madison, Wayne, Bollinger, Cape Girardeau, and Butler. Recreational needs and demands as shown in Volumes I, II and III of the "Missouri Statewide Comprehensive Outdoor Recreation Plan, 1967," are presented in Table 7. Recreational needs are given as the difference in supply and demand in activity occasions. These data are presented for comparison only.

TABLE 7

NEEDS AND DEMANDS FOR OUTDOOR RECREATION COMPILED
FROM VOLUMES I, II, AND III
MISSOURI STATEWIDE COMPREHENSIVE OUTDOOR RECREATION PLAN, 1967
(In thousands)

Item	1965	1980	2000	2020
Camping need in activity occasions	+3,371	+2,149	-1,117	-4,555
Picnicking need in activity occasions	+27,845	+22,750	+8,634	-6,229
Swimming need in activity occasions	+136,217	+120,095	+81,529	+40,707
Fishing need in activity occasions	-5,598	-11,291	-23,180	-35,694

NOTE: Positive (+) activity occasions indicate a surplus supply.
Negative (-) activity occasions indicate unsupplied needs.

4-09. Facility supply capacity. Each recreational facility is capable of supporting a certain number of activity days. The following is a discussion of the supply capacity of various recreational facilities for a normal summer weekend day. Requirements are based on the criteria as stated in EM 1110-2-400, dated 1 September 1971, and ER 1110-2-400 dated 1 February 1971.

a. Picnic units. One picnic unit will support 10 to 15 picnickers per day. One group shelter should be provided for each 225 picnicking activity days.

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 days.

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

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

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

f. Launching ramps. On a project basis, one launching lane should be provided for every 40,000 annual visitors to the project.

g. Chemical vault toilet. This is a self-contained, portable unit consisting of one to four stools with a chemical-activated holding tank. Four of these units will be placed in one structure in Camp Area No. 3 at Bluff View Park. During periods of high water they will be moved to higher ground. Each one-stool unit will serve 50 campers per day.

TABLE 8

COMPARISON OF EXISTING FACILITIES
WITH CALCULATED FACILITY REQUIREMENTS
CLEARWATER LAKE - 1973

Facility	No. existing January 1973	Calculated 1973 requirements	Deficiency
Picnic units	19	26	7
Group picnic shelters	5	2	0
Camp units	227	720	493
Swimming beach (lin. ft.)	1,000	860	0
Change shelters	1	12	11
Toilets	16	31	15
Launching ramps	7	21	14

4-10. Water area capacity

a. The capability of a lake to support fishing is not dependent on the number of fishermen using the project within a short period of time, such as a weekend day, but rather on the ability of the lake to support a sustained fishery. It is believed that Clearwater Lake can adequately support 60 fishing activity days of high quality per acre annually. With a surface area of 1,630 acres at the top of the conservation pool, the lake can support about 100,000 fishing activity days of high quality annually. No data on productivity are available to correlate the ability of this lake to support this number of fishing activity days. The estimate is based on experienced use of this lake.

b. The ability of a lake to satisfy boating and skiing activity days is dependent upon surface area and daily use rate. Clearwater Lake has a zone reserved for skiing and speed boating which contains about 600 acres. The zone can provide 1.5 boating or skiing activity days per acre. Considering a turnover of 2, Clearwater Lake can accommodate 1,800 boating or skiing activity days on an average summer weekend day.

c. Clearwater Lake is the most heavily used lake in the Little Rock District per surface area. The Missouri Boat Commission has exercised its authority to regulate use of the water area by restricting speedboating and water skiing to the lower portion of the lake.

4-11. 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 was determined by dividing the facility supply capacity into the projected use shown in Table 6. The calculated 1973 facility requirements are compared with the number of facilities actually available at the beginning of 1973 in Table 8.

b. Facilities required to serve the anticipated use of the project. The facility supply capacities discussed in paragraph 4-09 were applied to the projected summer weekend day-use shown in Table 6 to estimate future facility requirements through the year 2000 are tabulated in Table 9. These facility requirements are based on projected visitation increases using current trends in recreational activities and equipment. The development shown on the plan includes all facilities that should be developed in the existing parks. The demand for recreational development presently exceeds that which can be developed within the present limits of the existing parks on Clearwater Lake.

TABLE 9

FACILITIES REQUIRED TO SUPPORT THE
ANTICIPATED NORMAL SUMMER WEEKEND
DAY USE OF CLEARWATER LAKE

Facility	Requirements				Development shown in plan (1)
	1973	1980	1990	2000	
Picnic units	26	34	50	73	12
Group picnic shelters	2	3	4	5	5
Camp units	720	930	1,360	2,000	228
Swimming beach (lin.ft.)	860	1,110	1,620	2,380	1,000
Change shelters(2)	12	16	23	34	1
Toilets(3)					
For swimmers	12	16	23	34	2
For campers	15	20	28	42	23
For others	4	5	8	12	3
Total	31	41	59	88	28
Launching lanes(4)	21	27	40	58	7

(1) The "plan" is the development as shown on the site layout plans.
(2) Change facilities are to be provided where suitable in future toilet facilities.
(3) Requirements are based on the number of planned waterborne toilets plus the carrying capacity of vault type toilets.
(4) Severed roads are also used for launching boats and will be adequate to satisfy the total demand.

4-12. **Availability of water and project lands to accommodate expected activities.**

a. Water. Clearwater Lake has the capacity to accommodate about 100,000 fishing activity days annually. The lake can also support about 1,800 boating or skiing activity days on a normal weekend day. The use of the available water surface is becoming critical.

b. Project lands. A study of Table 9 reveals that much of the development in the existing parks is already experiencing overuse. It is believed that by (1) implementation of this updated master plan, (2) the proper control of pedestrian and vehicular traffic, (3) implementation of adequate restoration programs, and (4) implementation of the fee program, the project can be developed to meet its current usage without further deterioration of the existing parks.

4-13. Factors constraining resource development and management. Development of the recreational potential of this project has been constrained by the nonavailability of funds. Poor access, remoteness, severe fluctuation of the lake, and sparse settlement of the immediate area have served to constrain overuse of the available recreatinnal facilities only during periods of below normal use. If unabated, overuse of the existing park facilities will in a short time partially destroy the recreational and natural resources of the existing parks.

SECTION V

COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

5-01. Coordination.

a. Initial coordination. The initial recreational development of Clearwater Lake was coordinated with all interested Federal, State, and local governmental agencies. The coordination was accomplished through personal contacts, correspondence, and principally through the public hearing on recreational development and lake management held in Piedmont, Missouri, on 25 November 1947. The U.S. Fish and Wildlife Service and National Park Service were requested to consider any additional land requirements within the project boundary they might desire for future needs. A negative reply was received from both agencies. Due to its central location with respect to Clark and Mark Twain National Forests, Clearwater Lake is sometimes utilized as a base for U.S. Forest Service's pontoon aircraft used in firefighting.

b. State agencies. The Missouri Department of Conservation recommended the zoning now in effect on Clearwater Lake. During the vacation season, the Missouri Boat Commission assigns enforcement officers and a patrol boat for the administration of State boating laws.

5-02. Recent coordination. Coordination was accomplished prior to the updating of this master plan by advising the Missouri Water Resources Board of the updating studies and requesting information. This Board acts as a clearinghouse for all Missouri State agencies. Information and suggestions were received from the Water Resources Board, the Missouri State Park Board, the Division of Health of Missouri, and the Missouri Department of Conservation. Following is a discussion of the replies received.

a. Missouri Water Resources Board. This agency acted as a clearinghouse and furnished copies of letters from the other State agencies.

b. Missouri State Park Board. Self-explantory.

c. Division of Health of Missouri. Self-explantory.

d. Missouri Department of Conservation. The initial zoning of Clearwater Lake was accomplished at the request of the Missouri Department of Conservation. This agency is now responsible for the enforcement of fish and game laws. The Missouri Boat Commission is responsible for enforcing boating laws and has not recommended the rezoning of Clearwater Lake.

SWLED-PV

9 September 1971

Mr. Clifford L. Summers
Executive Director, Water Resources Board
Post Office Box 271
Jefferson City, Missouri 65101

Dear Mr. Summers:

We have initiated studies for the purpose of updating the Master Plan for Development and Management of Clearwater Lake. The Updated Master Plan will serve as a guide for the administration and operation of Clearwater Lake; to assure preservation of the scenic, biological, historical, and recreational resources of the area; and to assure coordination with interested Federal, State, and local agencies. A Clearwater information folder map is inclosed.

It would be appreciated if you would furnish information regarding the inclosed questions for use in the preparation of the Clearwater Updated Master Plan. Any additional information that you consider pertinent would also be appreciated. Similar information was furnished by your office for our use in the preparation of the Table Rock and Norfork master plan. This information was very useful in our updating studies.

Receipt of this information by 15 October 1971 will aid in the timely completion of the updated plan.

Sincerely yours,

2 Incl
As stated

D. R. RIPPEY
Acting Chief, Engineering Division

QUESTIONS REGARDING UPDATING OF THE CLEARWATER MASTER PLAN
LITTLE ROCK DISTRICT, CORPS OF ENGINEERS

1. Have incidences of malaria and other water associated diseases been noted in the vicinity of the reservoir? Are there any conditions which could develop into public health problems on or near the reservoir?

2. What have the fish and wildlife population trends been since impoundment of the reservoir? What are the future management plans for the fish and wildlife resources of the reservoir area in Missouri? What specific fish and wildlife resources could be brought to the attention of the visiting public by information centers, informative signs, and fireside talks by reservoir personnel?

3. Are there any areas of archeological or historical significance in the vicinity of the reservoir area that should be brought to the attention of the visiting public?

THE STATE OF MISSOURI

Water Resources Board

Department of Business and Administration
JEFFERSON CITY, MISSOURI 65101

CLIFFORD L. SUMMERS
Executive Director

P. O. Box 271
Area Code 314
Telephone 635-9251

October 26, 1971

Colonel W. C. Burns, Jr.
District Engineer
Little Rock District, Corps of Engineers
P. O. Box 867
Little Rock, Arkansas 72203

Dear Colonel Burns:

This is in reply to Mr. Rippey's letter of 9 September 1971 requesting comments to be used in your review of the Master Plan for Clearwater Lake.

The attached letters constitute replies received from the appropriate state agencies in response to questions 1, 2, and 3. The Missouri Water Pollution Board has not as yet responded to question 4. However, I have discussed the matter with them and wish to report as follows. The present water quality of streams tributary to Clearwater Lake is acceptable in all cases within limits of the water quality standards established by the Water Pollution Board. There is considerable mining activity in the tributary area. However, these discharges are monitored with records being available from either the Missouri Water Pollution Board or through the Storette Data Bank operated by the Environmental Protection Administration. The Water Pollution Board is presently conducting hearings that will require all new subdivisions to provide them with a program of pollution abatement or control prior to filing subdivision plats. Municipal sewerage systems in the drainage above Clearwater serve extremely small population centers and in all instances receive a minimum of secondary treatment. It is anticipated that the quality of water entering the reservoir will be maintained at its present quality or improved in the future.

Sincerely,

Clifford L. Summers
Acting Executive Director

CLS:rjk

Encl.

MISSOURI
STATE PARK BOARD
P.O. BOX 176 • 1204 JEFFERSON BLDG.
JEFFERSON CITY, MO. 65101 • 314/635-9156

September 30, 1971

Mr. Clifford L. Summers
Executive Director
Water Resources Board
Department of Business and Administration
Jefferson City, Missouri 65101

Dear Mr. Summers: (B-2-20)

Your letter of September 15, requesting information concerning archaeological or history sites in the vicinity of Clearwater Lake, has been forwarded to my desk for reply. We have checked this area at the State Historical Survey and Planning Office, and, so far as we know, there are no known historic or archaeological sites within the project area at this time. As our research progresses over the years we may provide data at some future date.

Sincerely,

MISSOURI STATE PARK BOARD

Orval L. Henderson, Jr.
Assistant Director
Historical Division

OLH:mvs

cc: Mr. H. D. "Matt" Matheney

THE DIVISION OF HEALTH OF MISSOURI
OF THE DEPARTMENT OF PUBLIC HEALTH AND WELFARE
JEFFERSON CITY, MISSOURI 65101

October 5, 1971

HERBERT R. DOMKE, M.D., Dr.
ACTING DIRECTOR OF
THE DIVISION OF HEALTH

ADDRESS ALL COMMUNICATIONS
TO THE DIVISION OF HEALTH

Mr. Clifford L. Summers
Executive Director
Missouri Water Resources Board
P. O. Box 271
Jefferson City, Missouri 65101

Dear Mr. Summers:

This is in response to your letter of September 15, 1971, concerning updating of the Master Plan for development of Clearwater Lake.

There is no record of malaria or any other water associated diseases in the Clearwater Lake area. The physical condition of the lake, the steep shoreline, exposure to wind and wave action, and the lack of vegetation and drift materials has limited mosquito breeding. Thus, the mosquito population has not been a problem even though control is confined to fluctuation. Mosquito control programs, however, may be necessary for the area below the dam.

The Master Plan should recognize that, as recreational activities increase, there will be problems relative to sewage and solid waste disposal. A solid waste management plan covering approved refuse storage, collection and disposal in a sanitary landfill should be developed. There should also be control and planning to insure that subdivisions, housing developments and individual homes are provided with properly constructed sewage disposal systems.

Consideration of these factors and recognition that Poplar Bluff uses the Black River as a source for their public water supply will provide for protection of the public health and the development of the area. If this Division can provide additional information or assistance relative to the Master Plan of the Clearwater Lake area, please let me know.

Sincerely,

L. F. Garber/d

L. F. Garber, Director
Section of Environmental Health

LFG:RSM:dp

MISSOURI DEPARTMENT OF CONSERVATION

2901 North Ten Mile Drive - Jefferson City, Missouri 65101

P. O. Box 180 - Telephone 314 893-2626

CARL R. NOREN, Director

October 18, 1971

Mr. Clifford L. Summers
Acting Executive Director
Missouri Water Resources Board
308 East High Street
Jefferson City, Missouri 65101

Dear Cliff:

We appreciate the opportunity to offer comments and information on the Clearwater Lake project. In your letter you asked specific questions concerning the fish and wildlife resources. We have attempted to answer them as follows:

1. The fishery at Clearwater Lake was studied from pre-impoundment condition through the reservoir fishery development stages into an apparently "stable" condition. Our 1964 creel census, the most recent conducted on Clearwater, revealed the highest amount of fishing pressure of all Missouri reservoirs except Lake Taneycomo.

   During the creel census period, fishing success remained stable with a constant rise in fishing pressure. The revision of water levels in 1967, including higher levels following bass spawning, was found to increase survival of young bass. However, the survival of young bass has not been fully evaluated as to its effects on fishing success.

   Wildlife populations have not changed noticeably since our last comments on this project in 1968.

2. Because of the apparently stable nature of the fishery and wildlife populations in the reservoir area, we would not anticipate any changes in the fish and wildlife management. In recent years, we have seen the growing conflict and safety problem resulting from heavy reservoir use. We do not believe that Clearwater Lake is adequately zoned to protect the safety of all interests, and we would look to better reservoir zoning to prevent unfortunate incidents.

The full waterfowl potential of Clearwater Lake has not been reached. At present, only a few hundred birds are harvested each year. With increased land planted in waterfowl foods and an area set aside as a refuge, there could be an increase in waterfowl use and harvest.

3. Several ideas have been suggested for visitor centers, informative signs, and fireside talks. We have slide series on fall colors, wild flowers, and tree identification. The change from a river to a lake through fish population changes has been well documented and would make an interesting slide presentation or information board. We would be happy to work with the Little Rock District on any of these suggestions.

I hope that we have at least partially answered your request for information and that if you have additional questions, you will call upon us.

Sincerely,

Larry R. Gale

LARRY R. GALE
ASSOCIATE DIRECTOR

SECTION VI

GENERAL DEVELOPMENT PROGRAM

6-01. General description of plan. The plan presents existing and proposed recreational development of the land and water areas at the Clearwater project. The plan of development includes providing additional facilities at the existing parks to meet the increased public demand for such facilities. Careful attention was given to the health and safety of the visiting public, as well as to the proper maintenance and management of the lake area. The plan is considered to be sufficiently flexible to meet conditions resulting from changing demands.

6-02. Location of areas. The general locations of all parks are shown on Plate 2. The outline and relative size of each area, as well as lands designated for other uses, are shown on Plates 3 through 5.

6-03. Allocation of lands. Lands necessary for project operation, lands reserved for recreational purpose, and lands reserved for preservation of the natural resources are indicated by symbols on the land-use maps (see Plates 3 through 5). Lands of each designation are similar throughout the lake in general characteristics of soil, topography, and vegetative cover. The scenic beauty of these areas is greatly enhanced by the unspoiled, natural condition of the lands surrounding the lake. The various land allocations are described in the following paragraphs.

a. Project operations. There are approximately 10,670 acres required for operation of the project. Included in this allocation are all lands below the top of the flood control pool elevation 567, the dam, spillway outlet area, and the resident office and service area. The dam, spillway outlet area, and resident office and service area are shown uncolored on Plate 3. The area below the flood control elevation is shown in blue on Plates 3, 4, and 5.

b. Recreation areas. Provision has been made for two categories of recreational use of project lands, "Recreation-Intensive Use, "Recreation-Low Density Use." These uses are described as follows:

(1) Recreation-Intensive Use. This category includes lands acquired for project purposes and contains about 1,636 acres above the top of flood control pool elevation 567 in 6 existing parks and 2 future parks. Also, there are about 609 acres, between elevation 567 and top of conservation pool elevation 494, which are available for this use. Areas for concession and quasi-public development are included. No agricultural uses are permitted on these lands except on an interim basis for terrain adaptable for maintenance of open space and/or scenic values. These sites are described in Section VII of this plan and are shown on Plates 3 through 5.

(2) Recreation-Low Density Use. These lands were acquired for project operations and allocated for low density recreation activities in areas between intensive recreational developments. These areas contain about 6,556 acres above the flood control pool and are designated for ecological workshop and forums, hiking, limited camping, or similar low density use in playing a significant role in promoting public understanding and appreciation of the environment. Also, there are about 4,958 acres, between the flood control pool and the top of the conservation pool elevation 494, which are available for this use. No agricultural uses are permitted on this land except on an interim basis.

c. Natural areas. These lands were acquired for project purposes and were allocated for preservation of scenic, scientific, ecological, historical, or archeological values. There are approximately 1,709 acres above flood control elevation 567 in four areas. An additional 1,506 acres are available for this use between the flood control pool elevation and the top of the conservation pool elevation 494. Portions of these lands are used for agricultural purposes and will continue to be used in this manner where it is not considered detrimental to the natural setting or natural resources. Little or no development is planned for these areas. See Plates 3, 4, and 5.

d. Reserve forest lands. On lands allocated for low-density use timber will be harvested only when required to acheive other management objectives, such as wildlife habitat improvement. Timber planting and vegetation manipulation may be required for erosion control.

e. Collateral use. Lands in the categories described above are used on a collateral basis, where suitable, for such uses as wildlife mangement, reserve forest management, and ecological enhancement.

6-04. Shoreline control. There are three concessionaire-operated commercial lease areas on the lake. They are required to maintain their facilities within the leased areas. There are no private floating facilities, such as boat docks or swimming floats on the lake at this time. The only zoned water area on the lake is the "ski and speedboat zone" near the dam and is shown on Plate 3.

6-05. Interim use. There are 37 agricultural and grazing lease plots ranging in size from 43 acres to 856 acres with a total of 11,570 acres These lands will be used for conservation and management of wildlife until they are needed for recreational use.

6-06. Landscaping and beautification.

a. A minimum of artificiality will be the primary objective in the program for landscaping and beautifying Clearwater Lake. Each park area will be studied to determine how the natural resources may be preserved and recreation facilities constructed to best blend with the surroundings. Naturally cleared areas may be used for play areas.

b. Structures and facilities will be sited to minimize adverse impacts on natural beauty and to take advantage of opportunities to enhance the natural beauty of the areas. Each structure and its landscaping is to be designed as a unit.

c. The landscaping plans will use native materials and hardwood trees. Nonnative materials will only be used where native materials will not thrive.

d. Limbs pruned from trees will be chipped or shredded into small enough pieces to be used for trail litter. The developing of trails using this litter will assist in controlling foot traffic and thereby prevent soil compaction which is detrimental to plant life.

SECTION VII

PLAN OF DEVELOPMENT

7-01. General. Clearwater Lake is a single purpose project constructed for flood control. The recreational possibilities of the lake created by the dam constitute a second resource, but the policies governing the development of this second resource must not conflict with the primary purpose for which it was authorized.

a. Since the development to date was planned for public use and benefit, utmost consideration was given to the maintenance of the highest standards of public health, safety, and sanitation. This policy will be followed in all future expansions and developments.

b. Leases for commercial enterprises on Government-owned land around the lake are granted in a fair and impartial manner. The prices charged for facilities and services provided by concessionaires are subject to the approval of the District Engineer.

c. The interest of the general public is paramount and that interest is safeguarded by adequate control over the use of the Government-owned land adjacent to the lakeshore. The lakeshore is being retained in its present natural state insofar as consistent with making ample facilities available to the public. Ownership of land adjacent to the Government-owned land is not considered sufficient reason to allow the adjacent owner to have private and exclusive access to the lake across Government-owned land. However, access roads and docks of quasi-public nature are permitted provided that the nature and extent of these facilities may be considered as supplying a demand that is in harmony with the overall development of the lake and not in conflict with the public interest as determined by the District Engineer.

d. Public health and safety are prime considerations in providing sanitary drinking water, adequate sanitary facilities, and the control of mosquitoes. Waterborne toilets, mobile dump stations, sewer systems, lift stations and tertiary treatment plants are proposed in this plan.

e. To meet an increasing demand by the public, about 51 miles of trails are planned around the lake. The trail complex consists of multiple-use segments, terminating at convenient access points, for hiking, walk-in camping, nature study, bicycle, two-wheel motorized vehicle, and horseback riding. Prior to construction of the trails a detailed site analysis will be made to determine the appropriate use of each trail segment. These trails will provide access to the more rugged, remote, and scenic areas of the lake. Where foot trails are constructed they will be winding to keep interest high and occasional return trails will be provided to reduce fatigue. See Plates 3, 4, and 5.

f. The lakeshore is protected on a continuing basis to preserve its natural scenic beauty. The interest of the general public is safeguarded by adequate control over the use of Government-owned land in the lake area. Boat operations are regulated under rules and regulations considered necessary to prevent unsafe boating practices. The State of Missouri has enacted State Boating Acts governing boat operation and registration. Enforcement of the provisions of these acts is a responsibility of State and local law enforcement personnel.

g. The advice, assistance, and cooperation of various Federal, State, and local governmental agencies, which are familiar with recreational programs and the management of public water and land areas, are sought periodically to the fullest extent practicable in the development, maintenance, and management of the project.

7-02. Design criteria.

a. Criteria applicable to the facilities planned for the parks are those contained in EM 1110-2-400 dated 1 September 1971, ER 1110-2-400 dated 1 February 1971, ER 1130-2-400 dated 28 May 1971, ER 1165-2-400 dated 3 August 1970, and ER 1120-2-400 dated 1 November 1971.

b. Estimates of cost used for masonry waterborne toilets with showers, conversion of vault type toilets to waterborne, and vehicle sanitary stations are based on the designs shown on Plates 15, 16, and 17 respectively.

c. Approved plans previously used by this District will be used as guides and new designs developed with the intent of providing facilities that blend esthetically and harmoniously with the sites being developed. Approval of these new designs will be obtained prior to advertisement for bids.

d. The foot trails will be constructed similar to that shown in the Information-Education Bulletin No. 4, titled "Trail Planning and Layout," published by the National Audubon Society, second printing in 1967.

e. The trailside shelters proposed at Highway K Park shall be of the same design as that shown in the National Park Service "Grist" Manual, Volume 10, No. 3, page 21.

f. The concept for the combination toilet and changehouse is included in this section of the master plan. The exterior of the combination toilet and changehouse will be of wood and native stone.

g. The four self-contained, portable, chemical toilets proposed for Bluff View Park will be similar to the Jet-O-Matic Model 1000 FE-P, manufactured by Monogram Industries, Inc., of Los Angeles, California.

h. Recreation road details are shown on Plate 8.

i. The facilities for water supply and sanitation, including chemical portable toilets, will be coordinated with the appropriate State agencies as to the general type and location. The design and operation will meet the appropriate standards required by State and Federal laws.

7-03. Developed parks. Since approval of the original master plan, six parks have been partially developed. None of the parks have been fully developed. Based on the success achieved in user fee areas, entrance gates were built in those parks with high visitation that are threatened with overuse. The gates are closed when the park is full and the campers are directed to parks that are less heavily used. Three of the parks contain commercial boat docks, where all facilities are provided and maintained by the concessionaire under a lease agreement. The developed parks are described in the following paragraphs. At or near four parks, a holding area for temporary parking of overflow camping vehicles is proposed. (See Plates 10, 12, 13, and 14).

a. Piedmont Park. This park is immediately upstream from the left abutment of the dam. It is the most popular park on the lake, having a recorded visitation of 213,930 during 1972. This visitation included more than 118,000 fishermen. Facilities provided include a commercial boat dock, a concrete boat launching ramp, 7 picnic sites, a group picnic shelter, 71 camp sites, drinking water wells, toilets, a trailer sanitary dumping station, and a masonry changehouse located between 2 swimming beaches. The access road and main circulation roads are paved, and interior circulation and service roads are gravel surfaced. Access is by way of paved Missouri Highway "H", about 6 miles from the town of Piedmont. An entrance complex is proposed. The park contains about 78 acres above the flood control pool elevation 567. There are three interconnecting ridges separated by ravines extending to the shoreline. Tops of the ridges are relatively flat and offer good views of the dam and lake. The ravines provide natural separation of camping areas. Further camping facilities are planned for a small peninsula in the north part of the park. See Plates 9 and 9A.

b. Bluff View Park. There are about 86 acres, above the flood-control pool elevation 567, in this park, which is located on the east side of the lake about 9.5 miles northwest from the town of Piedmont. Access is by way of paved Missouri Highway "A-A". Approximately one-half of the park has a deciduous tree cover on the higher elevations. Flat ground slopes lead to the lake, and a cover of sand and fine gravel provides a good swimming beach. The lake is about 600 feet wide and is from 15 to 20 feet deep. Existing facilities include 34 camp sites, 5 picnic sites, 2 concrete boat launching ramps, a commercial boat dock, toilets, drinking water wells, a swimming beach, a group picnic shelter, a public telephone, and a trailer sanitary dumping station. On privately owned lands adjacent to the park, there is an increasing development of commercial and home sites. This will increase considerably the visitation to the park and further contribute to the overuse of the facilities. It is proposed to develope 88 additional camp sites in the northern portion of the park. See Plates 10 and 10A.

c. Webb Creek Park. This small park contains only 17 acres above the flood-control pool elevation 567. It is located on the west side of Webb Creek, about 3/4 mile upstream from the confluence of Webb and Logan Creeks, and about 2 miles from the dam. The park is situated at the end of severed paved Missouri Highway H about 13 miles southeast of the town of Ellington. For its size, the park is well used. With an annual visitation of 48,500 in 1972, approximately one-fourth were registered as campers, and there are only 26 existing camp sites. Twenty-two additional camp sites are proposed. In addition to the camp sites, existing facilities include a concrete boat launching ramp, commercial boat dock, a swimming beach, a group picnic shelter, toilets, and drinking water wells. The terrain is moderately steep with flat slopes along the shoreline. The lake is about 700 feet wide. There is a fair deciduous tree cover above elevation 540. About a dozen homesites have been developed along the highway near the project boundary. See Plates 11 and 11A.

d. Thurman Point Park. There are approximately 64 acres in this park above the flood-control pool. The park is situated on the south side of Logan Creek about 1.5 miles from the dam. Access is by way of 1.75 miles of gravel road from Missouri Highway H-H. The area is a rounded peninsula divided into two portions by a moderately deep ravine and has a fairly open deciduous tree cover. The terrain has gentle to steep slopes, which will provide well separated camp areas. Existing facilities include a concrete boat launching ramp, a vault toilet, drinking water well, and picnic sites, all served by a graded gravel road. See Plates 12 and 12A.

e. River Road Park. This park contains about 747 acres above the flood-control pool and is situated on both banks of the Black River downstream from the dam. Access from the north is by way of Missouri Highway H, about 6 miles from the town of Piedmont. From the south, access is by way of Missouri Highway H-H. The area along the left river bank has been more highly developed. There are 61 existing camp sites and 92 additional sites are proposed. During 1972, a total of 73,448 campers visited this area on the left bank. Also, two group picnic shelters are located near the outlet structure of the dam and are reasonably well separated from the camp sites. The open sandy shore located east of the existing picnic shelters provides a natural sand swimming beach. A total of 43,408 swimmers visited the area on the left bank during 1972. A changehouse is proposed near this beach. On the right bank, there are 12 existing camp sites which received a visitation of 19,619 campers during 1972. A 2.3-mile nature trail is proposed in this park. See Plates 13, 13A, and 13B.

f. Highway K Park. Located on the Black River at the northern end of the project, this park contains about 300 acres above the flood-control elevation 567, but only about 23 acres have been developed. Being at the upper end of the lake, the park is more adversely affected

by floods on the river than from the floodwaters of the lake. There is a sharp bend in the river immediately at tne north end of the park. A stone revetment has been constructed at this point, but it has proved ineffective as protection from floods on the river. However, a problem of severe shoreline erosion was corrected. The developed portion of the park is north of Missouri Highway K and the major portion lies on the sand-gravel bar on the right bank of the river. The camp area is located in a good cover of willow, cottonwood, and sycamore trees. Between the camp sites and the river is a natural sand-gravel bar which is a very popular swimming area, even though no development has been provided. A combination toilet-changehouse is planned to serve these visitors. No boat launching ramp is provided. Existing facilities include 17 camp sites, a drinking water well, and vault toilet. In 1972, there were 84,800 visitors to the park, with 24,000 being campers who were served by only 17 camp sites. Four additional camp sites are proposed. To relieve the overuse of the park, approximately 83 acres are proposed for development immediately downstream from the present development. In this area, 36 additional camp sites are proposed at an elevation about 40 feet higher than the present development. The river is tangent at this point and erosion is not a problem. Access to the existing and proposed portions of the park is from paved Missouri Highway K, about 5 miles west of the town of Annapolis. See Plates 14 and 14A.

7-04. Future parks. In addition to the six parks described above, two additional areas have been designated for future park development at the time it is possible to implement the cost-sharing provision of Public Law 89-72 approved 9 July 1965, under Administration policy as outlined in EC 1130-2-121 dated 14 March 1973, Recreation Development at Completed Projects. See Section 9-02.

a. Riverside Park. The 244-acre area is located about 9 miles by water upstream from the dam and on the left bank of Black River, being approximately 4 miles upstream from the main body of the conservation pool. The town of Gads Hill is about 5 miles east. Access to the north end of the area is by way of paved Missouri Highway C-C, 4 miles west of the town of Gads Hill. Access to the south end is by way of 4 miles of gravel road from paved Missouri Highway A-A, and by way of 2.5 miles of gravel road from paved Missouri Highway C-C. The area is approximately 0.25 mile wide by 1.25 miles long. A gravel road extends the full length of the area slighly below the flood-control elevation 567. There are several ravines perpendicular to the river side of this area, which produce naturally separated sites well suited for group camping or picnicking. The terrain slopes are moderate to steep and there is good deciduous tree cover. Between the river and elevation 567 there is an expanse of cultivated land about 800 feet wide, which would be well suited for camping development. There were 44,480 visitors to the area in 1972 primarily for fishing and swimming.

b. Funk Branch Park. There are approximately 30 acres in the park above the flood-control pool elevation 567, and the terrain slope is gentle. The site lies on the left bank inside a sweeping bend of Black River about 1.25 miles downstream from Missouri Highway K bridge. Between elevation 567 and the river there is a curving sand-gravel bar about 600 feet wide. Tree cover at the park is sparse, and the adjacent land is being cultivated. A small area containing the Mann Cemetery is surrounded by the park lands. Access is by way of about 5 miles of gravel road from paved Missouri Highway K, and the area is approximately 6 miles southwest of the town of Annapolis. Access is also provided by about 1.75 miles of gravel road from the termination of paved Missouri Highway B-B. There was a recorded visitation of 18,500 in 1972 to this undeveloped park primarily for swimming activities.

SECTION VIII

COSTS, BENEFITS, AND ECONOMIC VALUES OF THE PROJECT

8-01. Costs. Detailed cost estimates are included in Section IX. Funds in the amount of $458,000 have been allocated through FY 74 for recreational developments. This plan proposes the expenditure of an additional $2,576,000 after FY 74 for a total project cost of $3,034,000. Recreational development will be subject to the cost sharing provisions as outlined in EC 1130-2-121. Letters were written to local and State agencies soliciting cost sharing participation. Favorable replies were not received.

8-02. Benefits and economic values. Prior to completion of Clearwater Lake, the project area was well known for its hunting and fishing. After impoundment of the lake these resources as well as other outdoor recreation activities have improved. Between the years of 1949 and 1972, visitation to the lake increased from 108,600 to 847,400 an increase of 738,800. Based upon standards for the evaluation of recreational benefits contained in Supplement No. 1 to Senate Document No. 97, 87th Congress, 2d session, Evaluation Standards for Primary Outdoor Recreation Benefits, the estimated value of an average visit to the lake is $1.03. Application of this value to the visitation to the project of 847,400 experienced in 1972 yields a benefit of $872,822. The economic impact of Clearwater Lake upon the general area is indicated by the data shown in Table 10.

TABLE 10

DATA RELATING TO COLLATERAL BENEFITS OF THE PROJECT

		1948	1972
1.	Number of vacation resorts, cottages, camps, lodges, hotels and similar accommodations where overnight facilities are provided in vicinity of the lake.	0	27
2.	Number of overnight accommodations available in above establishments	0	274
3.	Estimated value of establishments	0	$608,400
4.	Number of restaurants, cafes and public dining rooms in vicinity of the lake	0	19
5.	Assessed valuation of all taxable property in counties in which the lake is located: Reynolds and Wayne in Missouri		
	Reynolds	$2,442,063	$23,317,820
	Wayne	6,068,916	14,269,026
		8,510,979	37,586,846

TABLE 10 (con.)

		1948	1972
6.	Number of real estate transfers in counties in which lake is located	1,119	1,617
7.	Percentage of change in value of adjoining property since 1948	100%	342%
8.	Number and value of private recreational or home sites constructed adjacent to lake		284 $1,275,000
9.	Value of non-resident construction		$405,000
10.	Number of persons employed in service trades or businesses in vicinity of lake that are largely dependent on trade of visitors and fishermen	0	172
11.	Value of fishing tackle, bait, boats, motors and all other equipment for outdoor recreation sold annually in vicinity of the lake	0	$140,200
12.	Value of hunting and fishing licenses sold in counties in which the lake is located: Reynolds and Wayne, Missouri		
	Reynolds		$24,861.00
	Wayne		54,575.00
	Total		79,436.00
13.	Value of privately owned boats, houseboats, motors, boat trailers regularly used on lake and not in commercial service		$641,190.00
14.	Value of commercial boat docks, boats, motors, and all boating facilities used for commercial purposes.		$164,793.00

NOTE: The above valuation of the boat docks includes the total valuation of the lessee's quarters and the total stock inventory as of December 31, 1972. Capital improvements for the year totaled $9,861.98.

SECTION IX

COST ESTIMATES

9-01. General. The following paragraphs are presented to facilitate review of expenditures for public use facilities and the cost of existing facilities completed through Fiscal Year 1972 and summarize the quantity and cost of proposed new work. Table 14 shows the existing facilities completed through Fiscal Year 1972 and summarizes the quantity and cost of proposed new work.

9-02. Cost sharing - Public Law 89-72. In accordance with current cost sharing policy established by the Secretary of the Army in coordination with the Office of Management and Budget, development of all future parks will require participation by a non-Federal body furnishing 50 percent of the cost of recreational development and providing operation and maintenance upon completion of the development. Also, all recreational development will be subject to the cost sharing policy after FY 1974 unless a system of user fees is established to recover all operation, maintenance and replacement costs.

9-03. Facility costs. Cost estimates of public use facilities used in the following tables are based on July 1973 price levels, experienced costs of similar facilities, and estimated cost for those facilities not previously constructed. Estimates for facilities not previously constructed are based on the concept plan presented in Section VII.

9-04. Summary of estimated costs. The estimated total cost of construction for the proposed public use facilities is $2,576,000. The total estimated cost for the overall plan of development for public use facilities, including the cost of existing facilities is $3,034,000.

9-05. 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 11. The total project cost of $3,034,000 for all recreational facilities would be an increase of $2,105,000 over the total project cost of $929,000 shown in the revised cost estimate (PB-3) dated 1 July 1972. The increase in cost is due to additional recreational facilities which are considered necessary in the long range plan to accommodate general public use of the project and an increase in unit prices to more accurately reflect 1973 price levels.

9-06. Operation and maintenance. A summary of the operation and maintenance costs is shown in Table 12.

9-07. Summary of estimated cost. A summary of estimated cost for additional development by parks is shown in Table 13. A summary of

estimated cost for the additional development by facilities planned is shown in Table 14. A detailed cost estimate for additional recreational facilities in each park is shown in Table 15.

TABLE 11

ALLOCATION AND EXPENDITURES OF FUNDS
(In Thousands of Dollars)

Item	Cost
Cost of initial construction	$140.0
Total 711 funds allocated through FY 74	318.0
Allocations through FY 74 including initial construction	458.0
Cost after FY 74	2,576.0
Total project cost	3,034.0

Schedule of funds required by fiscal years for recreation facilities:

1974
(1)0

After FY 1974:

1975	1976	1977	1978	1979	1980	1981	1982
(2)616.0	500.0	400.0	300.0	200.0	200.0	200.0	160.0

Cost to be borne by non-Federal bodies	$980.0
Total Federal cost after FY 1974	1,596.0
Total cost after FY 1974	2,576.0

(1) Funds were not made available for Fiscal Year 1974.
(2) FY 1975 Code 710 program submitted in accordance with Change 1 to EC 1130-2-121 for continued construction at 100% Federal cost of the River Road Park. Justification based on complete recovery of all OM&R costs.

TABLE 12

SUMMARY OF OPERATION AND MAINTENANCE COSTS FOR
RECREATIONAL FACILITIES AND REAL ESTATE MANAGEMENT SERVICES

Item	Public Use	Real Estate Activities
Fiscal Year 1972		
Real Estate	-	15,000
Recreational Facilities	205,000	-
S&I and Overhead	31,000	2,100
Total	236,000	17,100
Fiscal Year 1977		
Real Estate	-	19,000
Recreational Facilities	368,000	-
S&I and Overhead	56,000	2,700
Total	424,000	21,700
Ultimate		
Real Estate	-	40,000
Recreational Facilities	465,000	-
S&I and Overhead	70,000	5,600
Total	535,000	45,600

TABLE 13

SUMMARY OF ESTIMATED COST FOR ADDITIONAL
RECREATIONAL FACILITIES BY PARKS

Account No.	Area	Cost
14	Recreational Facilities	
	Piedmont	$641,200
	Bluff View	323,400
	Webb Creek	115,400
	Thurman Point	164,500
	River Road	626,000
	Highway K	217,900
	Project trails	132,500
	Total direct cost	2,220,900
30	Engineering and design	222,000
31	Supervision and administration	133,100
	TOTAL	2,576,000

TABLE 14

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE
SUMMARY

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	10.00	24,800	1,800	18,000
(2) Flexible pavement	do	-	28,700	-	-
(a) New construction	do	15.25	-	17,100	260,800
(b) Existing gravel	do	3.80	-	20,200	76,800
c. 12 feet wide					
(1) Gravel	do	-	4,700	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	10,700	128,400
(b) Existing gravel	do	2.75	-	1,500	4,100
Parking areas					
a. Gravel	SY	-	7,930	-	-
b. Flexible pavement	do	-	14,380	-	-
(1) New construction	do	7.60	-	29,940	227,600
(2) Existing gravel	do	2.50	-	7,930	19,900
Launching ramps, concrete	Ea	20,000	7	1	20,000
Toilets					
a. Masonry					
(1) Vault	do	14,000	12	(1)12	164,000
(2) Waterborne	do	27,000	-	1	27,000
(3) Waterborne with showers	do	35,000	-	3	105,000
(4) Convert to waterborne	do	12,000	-	3	36,000
b. Wooden, vault	do	-	4	-	-

(1) One toilet at Highway K Park is a combination toilet and changehouse and one toilet at Bluff View Park is a chemical type toilet that can be moved to higher ground.

TABLE 14(con.)
SUMMARY

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	6,400	70,400
b. Outfall lines, 6" steel in lake	do	11.00	-	2,236	24,600
c. Manholes	Ea	500	-	15	7,500
d. Treatment plant, tertiary 10,000 GPD	SumJob	-	-	2	190,000
e. Electrical, outside	SumJob	-	-	-	4,000
Contingencies, 15%	-	-	-	-	41,300
Water system					
a. Waterline, 3/4" PVC	LF	2.20	500	3,340	7,300
b. Waterline, 1" PVC	do	2.75	-	1,150	3,100
c. Waterline, 1-1/2" PVC	do	3.00	1,200	600	1,800
d. Waterline, 2" PVC	do	3.25	-	3,995	13,000
e. Waterline, 2-1/2" PVC	do	3.50		1,150	4,050
f. Water wells	SumJob	-	11	11	174,500
g. Wellhouse, pump & pressure system	do	-	3	5	61,000
H. Electrical, outside	do	-	-	-	10,400
Contingencies, 15%	-	-	-	-	27,150
Picnic units	Ea	440	12	-	-
Camp units	do	440	228	165	72,650
Camp units w/electric service	do	650	-	200	130,000
Group camp	do	440	-	-	-
Table canopies	do	200	57	41	8,200
Picnic shelters	do	8,100	5	-	-
Amphitheaters	do	440	-	1	450
Drinking fountains	do	1,000	-	26	26,000
Changehouses	do	12,000	1	2	24,000
Sanitary stations (travel trailer)	do	4,000	3	2	8,000
Swimming beaches	do	6,500	6	-	-
Mercury vapor lights	do	350	17	9	3,150
Trail system (parks)	Mile	5,400	-	3.50	18,950
Shelters (rain)	Ea	215	-	6	1,300
Playground equipment	SumJob	-	-	-	22,000
Foot bridge	Ea	110	-	1	100
Overlook shelters	SumJob	-	1	-	-

TABLE 14 (con.)

SUMMARY

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	2	$550
Landscaping & beautification	SumJob	-	-	-	8,350
Site preparation	Acre	140	-	65.50	9,000
Entrance complex	Ea	7,000	-	4	28,000
Project trails	Mile	2,500	-	53	132,500
Total					2,220,900

VISITATION

1967 - 603,700	1969 - 718,100	1971 - 795,500
1968 - 608,900	1970 - 748,600	1972 - 874,400

TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE

PIEDMONT PARK

Acres 78 — See Plate 9

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	-	8,200	-	-
(2) Flexible pavement	do	-	10,000	-	-
(a) New construction	do	15.25	-	5,200	$79,300
(b) Existing gravel	do	3.80	-	3,600	13,700
c. 12 feet wide					
(1) Gravel	do	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	1,200	14,400
(b) Existing gravel	do	2.75	-	-	-
Parking areas					
a. Gravel	SY	-	3,500	-	-
b. Flexible pavement	do	-	1,650	-	-
(1) New construction	do	7.60	-	4,300	32,700
(2) Existing gravel	do	2.50	-	3,500	8,800
Launching ramp, concrete	Ea	20,000	1	-	-
Toilets					
a. Masonry					
(1) Vault	do	14,000	3	1	14,000
(2) Waterborne	do	27,000	-	-	-
(3) Waterborne with showers	do	35,000	-	2	70,000
(4) Convert to waterborne	do	12,000	-	3	36,000
b. Wooden, vault	do	-	-	-	-

TABLE 15 (con.)

PIEDMONT PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	4,200	46,200
b. Outfall lines, 6" steel in lake	do	11.00	-	1,636	18,000
c. Manholes	Ea	500	-	9	4,500
d. Treatment plant, tertiary 10,000 GPD	SumJob	-	-	1	108,000
e. Electrical, outside	SumJob	-	-	-	3,000
Contingencies, 15%	-	-	-	-	27,100
Water system					
a. Waterline, 3/4" PVC	LF	2.20	-	1,590	3,500
b. Waterline, 1" PVC	do	2.75	-	-	-
c. Waterline, 1-1/2" PVC	do	3.00	-	-	-
d. Waterline, 2" PVC	do	3.25	-	2,245	7,300
e. Waterline, 2-1/2" PVC	do	3.50	-	850	3,000
f. Water wells	SumJob	-	2	3	48,000
g. Wellhouse, pump & pressure system	do	-	-	2	20,000
H. Electrical, outside	do	-	-	-	2,000
Contingencies, 15%	-	-	-	-	12,400
Picnic units	Ea	440	7	-	-
Camp units	do	440	71	-	-
Camp units w/electric service	do	650	-	66	42,900
Group camp	do	440	-	-	-
Table canopies	do	200	14	-	-
Picnic shelters	do	8,100	1	-	-
Amphitheaters	do	440	-	-	-
Drinking fountains	do	1,000	-	11	11,000
Changehouses	do	12,000	1	-	-
Sanitary stations (travel trailer)	do	4,000	1		
Swimming beaches	do	6,500	2	-	-
Mercury vapor lights	do	350	5	2	700
Trail system (park)	Mile	5,400	-	-	-
Shelters (rain)	Ea	215	-	-	-
Playground equipment	SumJob	-	-	-	5,000
Foot bridge	Ea	110	-	-	-
Overlook shelters	SumJob	-	-	-	-

TABLE 15 (con.)

PIEDMONT PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	-	-
Landscaping & beautification	SumJob	-	-	-	$1,200
Site preparation	Acre	140	-	11	1,500
Entrance complex	Ea	7,000	-	1	7,000
Total					641,200

VISITATION

1967 - 150,968	1969 - 177,886	1971 - 208,337
1968 - 202,500	1970 - 211,259	1972 - 213,900

TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE

BLUFF VIEW PARK

Acres 86 — See Plate 10

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	-	2,000	-	-
(2) Flexible pavement	do	-	6,400	-	-
(a) New construction	do	15.25	-	5,800	88,450
(b) Existing gravel	do	3.80	-	2,000	7,600
c. 12 feet wide					
(1) Gravel	do	-	2,300	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	1,800	21,600
(b) Existing gravel	do	2.75	-	600	1,650
Parking areas					
a. Gravel	SY	-	2,640	-	-
b. Flexible pavement	do	-	2,330	-	-
(1) New construction	do	7.60	-	9,500	72,200
(2) Existing gravel	do	2.50	-	2,640	6,600
Launching ramp, concrete	Ea	20,000	2	1	20,000
Toilets					
a. Masonry					
(1) Vault	do	14,000	3	(1)2	18,000
(2) Waterborne	do	27,000	-	-	-
(3) Waterborne with showers	do	35,000	-	-	-
(4) Convert to waterborne	do	12,000	-	-	-
b. Wooden, vault	do	-	2	-	-

(1) One vault is a chemical type toilet that can be moved to higher ground.

TABLE 15(con.)

BLUFF VIEW PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	-	-
b. Outfall lines, 6" steel in lake	do	11.00	-	-	-
c. Manholes	Ea	500	-	-	-
d. Treatment plant, tertiary 10,000 GPD	SumJob	-	-	-	-
e. Electrical, outside	SumJob	-	-	-	-
Contingencies, 15%	-	-	-	-	-
Water system					
a. Waterline, 3/4" PVC	LF	2.20	-	-	-
b. Waterline, 1" PVC	do	2.75	-	-	-
c. Waterline, 1-1/2" PVC	do	3.00	1,200	-	-
d. Waterline, 2" PVC	do	3.25	-	-	-
e. Waterline, 2-1/2" PVC	do	3.50	-	-	-
f. Water wells	SumJob	-	2	1	16,000
g. Wellhouse, pump & pressure system	do	-	1	-	-
H. Electrical, outside	do	-			
Contingencies, 15%	-	-	-	-	-
Picnic units	Ea	440	5	-	-
Camp units	do	440	34	29	12,750
Camp units w/electric service	do	650	-	55	35,750
Group camp	do	440	-	-	-
Table canopies	do	200	22	41	8,200
Picnic shelters	do	8,100	1	-	-
Amphitheaters	do	440	-	-	-
Drinking fountains	do	1,000	-	-	-
Changehouses	do	12,000	-	-	-
Sanitary stations (travel trailer)	do	4,000	1	-	-
Swimming beaches	do	6,500	1	-	-
Mercury vapor lights	do	350	3	-	-
Trail system (park)	Mile	5,400	-	-	-
Shelters (rain)	Ea	215	-	-	-
Playground equipment	SumJob	-	-	-	3,500
Foot bridge	Ea	110	-	-	-
Overlook shelters	SumJob	-	-	-	-

TABLE 15 (con.)

BLUFF VIEW PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	-	-
Landscaping & beautification	SumJob	—	-	-	1,300
Site preparation	Acre	140	-	20	2,800
Entrance complex	Ea	7,000	-	1	7,000
Total					323,400

VISITATION

1967 - 47,603	1969 - 75,758	1971 - 97,546
1968 - 63,700	1970 - 84,923	1972 - 94,800

TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE

WEBB CREEK PARK

Acres 17 — See Plate 11

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	-	3,200	-	-
(2) Flexible pavement	do	-	3,100	-	-
(a) New construction	do	15.25	-	1,000	15,250
(b) Existing gravel	do	3.80	-	3,200	12,200
c. 12 feet wide					
(1) Gravel	do	-	1,400	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	-	-
(b) Existing gravel	do	2.75	-	900	2,450
Parking areas					
a. Gravel	SY	-	770	-	-
b. Flexible pavement	do	-	2,850	-	-
(1) New construction	do	7.60	-	1,580	12,000
(2) Existing gravel	do	2.50	-	770	1,900
Launching ramp, concrete	Ea	20,000	1	-	-
Toilets					
a. Masonry					
(1) Vault	do	14,000	2	1	14,000
(2) Waterborne	do	27,000	-	-	-
(3) Waterborne with showers	do	35,000	-	-	-
(4) Convert to waterborne	do	12,000	-	-	-
b. Wooden, vault	do	-	-	-	-

TABLE 15(con.)

WEBB CREEK PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	-	-
b. Outfall lines, 6" steel in lake	do	11.00	-	-	-
c. Manholes	Ea	500	-	-	-
d. Treatment plant, tertiary 10,000 GPD	SumJob	-	-	-	-
e. Electrical, outside	SumJob	-	-	-	-
Contingencies, 15%	-	-	-	-	-
Water system					
a. Waterline, 3/4" PVC	LF	2.20	-	-	-
b. Waterline, 1" PVC	do	2.75	-	-	-
c. Waterline, 1-1/2" PVC	do	3.00	-	-	-
d. Waterline, 2" PVC	do	3.25	-	-	-
e. Waterline, 2-1/2" PVC	do	3.50	-	-	-
f. Water wells	SumJob	-	2	1	16,000
g. Wellhouse, pump & pressure system	do	-	-	-	-
H. Electrical, outside	do	-	-	-	-
Contingencies, 15%	-	-	-	-	-
Picnic units	Ea	440	-	-	-
Camp units	do	440	26	-	-
Camp units w/electric service	do	650	-	22	14,300
Group camp	do	440	-	-	-
Table canopies	do	200	13	-	-
Picnic shelters	do	8,100	1	-	-
Amphitheaters	do	440	-	-	-
Drinking fountains	do	1,000	-	-	-
Changehouses	do	12,000	-	1	12,000
Sanitary stations (travel trailer)	do	4,000	-	1	4,000
Swimming beaches	do	6,500	1	-	-
Mercury vapor lights	do	350	6	-	-
Trail system (park)	Mile	5,400	-	-	-
Shelters (rain)	Ea	215	-	-	-
Playground equipment	SumJob	-	-	-	3,000
Foot bridge	Ea	110	-	-	-
Overlook shelters	SumJob	-	-	-	-

TABLE 15 (con.)

WEBB CREEK PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	-	-
Landscaping & beautification	SumJob	-	-	-	600
Site preparation	Acre	140	-	5	700
Entrance complex	Ea	7,000	-	1	7,000
Total					115,400

VISITATION

1967 - 39,032	1969 - 46,674	1971 - 50,004
1968 - 46,500	1970 - 47,964	1972 - 48,500

TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE

THURMAN POINT PARK

Acres 64 — See Plate 12

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	-	2,500	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	15.25	-	1,800	27,500
(b) Existing gravel	do	3.80	-	2,500	9,500
c. 12 feet wide					
(1) Gravel	do	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	1,800	21,600
(b) Existing gravel	do	2.75	-	-	-
Parking areas					
a. Gravel	SY	-	350	-	-
b. Flexible pavement	do	-	-	-	-
(1) New construction	do	7.60	-	3,100	23,600
(2) Existing gravel	do	2.50	-	350	900
Launching ramp, concrete	Ea	20,000	1	-	-
Toilets					
a. Masonry					
(1) Vault	do	14,000	1	2	28,000
(2) Waterborne	do	27,000	-	-	-
(3) Waterborne with showers	do	35,000	-	-	-
(4) Convert to waterborne	do	12,000	-	-	-
b. Wooden, vault	do	-	-	-	-

TABLE 15 (con.)

THURMAN POINT PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	-	-
b. Outfall lines, 6" steel	do	11.00	-	-	-
in lake			-	-	-
c. Manholes	Ea	500	-	-	-
d. Treatment plant, tertiary	SumJob	-	-	-	-
10,000 GPD					
e. Electrical, outside	SumJob	-	-	-	-
Contingencies, 15%	-	-	-	-	-
Water system					
a. Waterline, 3/4" PVC	LF	2.20	-	-	-
b. Waterline, 1" PVC	do	2.75	-	-	-
c. Waterline, 1-1/2" PVC	do	3.00	-	-	-
d. Waterline, 2" PVC	do	3.25	-	-	-
e. Waterline, 2-1/2" PVC	do	3.50	-	-	-
f. Water wells	SumJob	-	1	2	32,000
g. Wellhouse, pump & pressure	do	-			
system			-	-	-
H. Electrical, outside	do	-	-	-	-
Contingencies, 15%	-	-	-	-	-
Picnic units	Ea	440	-	-	-
Camp units	do	440	7	39	17,200
Camp units w/electric service	do	650	-	-	-
Group camp	do	440	-	-	-
Table canopies	do	200	6	-	-
Picnic shelters	do	8,100	-	-	-
Amphitheaters	do	440	-	-	-
Drinking fountains	do	1,000	-	-	-
Changehouses	do	12,000	-	-	-
Sanitary stations	do	4,000	-	-	-
(travel trailer)					
Swimming beaches	do	6,500	-	-	-
Mercury vapor lights	do	350	-	-	-
Trail system (park)	Mile	5,400	-	-	-
Shelters (rain)	Ea	215	-	-	-
Playground equipment	SumJob	-	-	-	2,500
Foot bridge	Ea	110	-	-	-
Overlook shelters	SumJob	-	-	-	-

TABLE 15 (con.)

THURMAN POINT PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	-	-
Landscaping & beautification	SumJob	-	-	-	900
Site preparation	Acre	140	-	6	800
Entrance complex	Ea	7,000	-	-	-
Total					164,500

VISITATION

1967 - 8,828	1969 - 9,965	1971 - 9,076
1968 - 6,900	1970 - 11,657	1972 - 8,900

TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE

RIVER ROAD PARK

Acres 747 — See Plate 13A

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	-	4,300	-	-
(2) Flexible pavement	do	-	9,200	-	-
(a) New construction	do	15.25	-	3,100	47,300
(b) Existing gravel	do	3.80	-	4,300	16,300
c. 12 feet wide					
(1) Gravel	do	-	1,000	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	3,800	45,600
(b) Existing gravel	do	2.75	-	-	-
Parking areas					
a. Gravel	SY	-	670	-	-
b. Flexible pavement	do	-	7,550	-	-
(1) New construction	do	7.60	-	9,130	69,400
(2) Existing gravel	do	2.50	-	670	1,700
Launching ramp, concrete	Ea	20,000	2	-	-
Toilets					
a. Masonry					
(1) Vault	do	14,000	2	3	42,000
(2) Waterborne	do	27,000	-	1	27,000
(3) Waterborne with showers	do	35,000	-	1	35,000
(4) Convert to waterborne	do	12,000	-	-	-
b. Wooden, vault	do	-	2	-	-

TABLE 15 (con.)

RIVER ROAD PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	2,200	24,200
b. Outfall lines, 6" steel in lake	do	11.00	-	600	6,600
c. Manholes	Ea	500	-	6	3,000
d. Treatment plant, tertiary 10,000 GPD	SumJob	-	-	1	82,000
e. Electrical, outside	SumJob	-	-	-	1,000
Contingencies, 15%	-	-	-	-	14,200
Water system					
a. Waterline, 3/4" PVC	LF	2.20	500	1,200	2,600
b. Waterline, 1" PVC	do	2.75	-	450	1,200
c. Waterline, 1-1/2" PVC	do	3.00	-	-	-
d. Waterline, 2" PVC	do	3.25	-	1,750	5,700
e. Waterline, 2-1/2" PVC	do	3.50	-	300	1,050
f. Water wells	SumJob	-	3	3	46,500
g. Wellhouse, pump & pressure system	do	-	1	2	29,000
H. Electrical, outside	do	-	-	-	5,900
Contingencies, 15%	-	-	-	-	9,450
Picnic units	Ea	440	-	-	-
Camp units	do	440	73	57	25,100
Camp units w/electric service	do	650	-	57	37,050
Group camp	do	440	-	-	-
Table canopies	do	200	2	-	-
Picnic shelters	do	8,100	2	-	-
Amphitheaters	do	440	-	-	-
Drinking fountains	do	1,000	-	7	7,000
Changehouses	do	12,000	-	1	12,000
Sanitary stations (travel trailer)	do	4,000	1	-	-
Swimming beaches	do	6,500	1	-	-
Mercury vapor lights	do	350	3	3	1,050
Trail system (park)	Mile	5,400	-	2.10	11,350
Shelters (rain)	Ea	215	-	-	-
Playground equipment	SumJob	-	-	-	5,000
Foot bridge	Ea	110	-	1	100
Overlook shelters	SumJob	-	1	-	-

TABLE 15 (con.)

RIVER ROAD PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	-	-
Landscaping & beautification	SumJob	-	-	-	1,350
Site preparation	Acre	140	-	16.50	2,300
Entrance complex	Ea	7,000	-	1	7,000
Total					626,000

VISITATION

1967 - 179,633	1969 - 197,087	1971 - 202,462
1968 - 167,600	1970 - 188,809	1972 - 217,100

TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES

CLEARWATER LAKE

HIGHWAY K PARK

Acres 300 — See Plate 14

Item	Unit	Unit Cost	Existing Facilities FY 72 Quantity	Proposed Facilities Quantity	Proposed Facilities Cost
Roads					
a. 22 feet wide					
(1) Gravel	LF	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	$18.50	-	-	-
(b) Existing gravel	do	5.00	-	-	-
b. 18 feet wide					
(1) Gravel	do	10.00	4,600	1,800	18,000
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	15.25	-	200	3,000
(b) Existing gravel	do	3.80	-	4,600	17,500
c. 12 feet wide					
(1) Gravel	do	-	-	-	-
(2) Flexible pavement	do	-	-	-	-
(a) New construction	do	12.00	-	2,100	25,200
(b) Existing gravel	do	2.75	-	-	-
Parking areas					
a. Gravel	SY	-	-	-	-
b. Flexible pavement	do	-	-	-	-
(1) New construction	do	7.60	-	2,330	17,700
(2) Existing gravel	do	2.50	-	-	-
Launching ramp, concrete	Ea	20,000	-	-	-
Toilets					
a. Masonry					
(1) Vault	do	14,000	1	(1)3	48,000
(2) Waterborne	do	27,000	-	-	-
(3) Waterborne with showers	do	35,000	-	-	-
(4) Convert to waterborne	do	12,000	-	-	-
b. Wooden, vault	do	-	-	-	-

(1) One toilet is a combination toilet and changehouse.

TABLE 15(con.)

HIGHWAY K PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Sewage system					
a. Sewer lines, 6", gravity	LF	$11.00	-	-	-
b. Outfall lines, 6" steel in lake	do	11.00	-	-	-
c. Manholes	Ea	500	-	-	-
d. Treatment plant, tertiary 10,000 GPD	SumJob	-	-	-	-
e. Electrical, outside	SumJob	-	-	-	-
Contingencies, 15%	-	-	-	-	-
Water system					
a. Waterline, 3/4" PVC	LF	2.20	-	550	1,200
b. Waterline, 1" PVC	do	2.75	-	700	1,900
c. Waterline, 1-1/2" PVC	do	3.00	-	600	1,800
d. Waterline, 2" PVC	do	3.25	-	-	-
e. Waterline, 2-1/2" PVC	do	3.50	-	-	-
f. Water wells	SumJob	-	1	1	16,000
g. Wellhouse, pump & pressure system	do	-	1	1	12,000
H. Electrical, outside	do	-	-	-	2,500
Contingencies, 15%	-	-	-	-	5,300
Picnic units	Ea	440	-	-	-
Camp units	do	440	17	40	17,600
Camp units w/electric service	do	650	-	-	-
Group camp	do	440	-	-	-
Table canopies	do	200	-	-	-
Picnic shelters	do	8,100	-	-	-
Amphitheaters	do	440	-	1	450
Drinking fountains	do	1,000	-	8	8,000
Changehouses	do	12,000	-	-	-
Sanitary stations (travel trailer)	do	4,000	-	1	4,000
Swimming beaches	do	6,500	1*	-	-
Mercury vapor lights	do	350	-	4	1,400
Trail system (park)	Mile	5,400	-	1.40	7,600
Shelters (rain)	Ea	215	-	6	1,300
Playground equipment	SumJob	-	-	-	3,000
Foot bridge	Ea	110	-	-	-
Overlook shelters	SumJob	-	-	-	-

*Natural gravel beach

TABLE 15 (con.)

HIGHWAY K PARK

Item	Unit	Unit cost	Existing facilities FY 72 quantity	Proposed facilities Quantity	Proposed facilities Cost
Reforestation	Acre	$275	-	2	550
Landscaping & beautification	SumJob	—	-	-	3,000
Site preparation	Acre	140	-	7	900
Entrance complex	Ea	7,000	-	-	-
Total					217,900

VISITATION

1967 - 27,011	1969 - 55,791	1971 - 59,398
1968 - 21,600	1970 - 62,095	1972 - 84,800

SECTION X

ADMINISTRATION AND MANAGEMENT

10-01. Policies. The administration and management of the recreational program at Clearwater Lake is governed by the policies and guidance established in manuals, circulars, and regulations that are issued from time to time to implement laws passed by Congress. Current guidance being followed in the administration of project lands and water is set forth in Part 327, Title 36, Chapter III, of the Federal Code of Regulations, which are applicable to Clearwater Lake, and SWDR 1130-1-7 dated 25 September 1968. The natural environmental conditions of project lands are being retained for use by the general public in accordance with guidance contained in EC 1130-2-59 dated 8 October 1969. These policies will insure that project resources are developed to provide for optimum use in satisfying the recreational demands of the project.

10-02. Ranger training. Training courses and conferences for lake rangers and managers as directed by EC 1130-2-64 dated 22 October 1969 are conducted annually or more frequently when the need arises. All currently employed lake rangers who meet entrance requirements and all new employees recruited for lake ranger positions receive formal training for lake management positions in accordance with requirements set forth in SWDR 690-1-36 dated 9 September 1968.

10-03. Staffing needs. Project staffing needs and fund requirements as required by EC 1165-2-79 dated 21 November 1969 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.

10-04. Administration. The administration of the recreational program at Clearwater Lake is carried out jointly by District Office personnel and project office personnel. The District Office personnel are concerned mainly with the planning nature and extent of development; planning site layouts, plans and specifications for construction requirements, and codes; initiating, 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 primarily concerned with 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 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, Clearwater Resident Office, Piedmont, Missouri. In addition to the Resident Engineer, 1 Facility-Maintenance Superintendent, 2 Rangers, 1 Clerk-Damtender, 1 Engineering Equipment Operator, 1 Dam Operator, 1 Carpentry Worker, 1 Vehicle Operator, 3 Construction-Maintenance Workers and 1 Laborer are assigned to the resident office to handle the operation and maintenance activities at the project. Additional temporary personnel are employed as needed.

10-06. Monumentation. A continuing program of project boundary monumentation is under way on Clearwater Lake. As of 1 January 1973, it is estimated that the perimeter of the project lands is 114 miles and 12 miles have been monumented or the program is 12 percent complete. This program will continue as funds and the workload permit.

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.

SECTION XI

PROJECT RESOURCE MANAGEMENT PLAN

11-01. General. The project resource management plan was prepared in accordance with ER 1130-2-400 dated 28 May 1971, and was submitted for approval in August 1972 as Appendix A to Design Memorandum No. 1-B, Updated Master Plan for Reservoir Development and Management. The goal of this plan is to establish the operational concepts for management of the project for its authorized purposes. This general plan is to be used as a guide in the preparation of the various operation and maintenance work plans. The plan contains a general description of the various facilities of the parks; a detailed description of maintenance and storage facilities; the educational program for visitors and employees; administration of user fees and concessionaire activities; and other activities concerning proper supervision and administration of the project. Upon approval of this master plan, the project resource management plan will be attached as Appendix A.

SECTION XII

FOREST MANAGEMENT PLAN

12-01. General. A detailed forest management plan was prepared in accordance with ER 405-2-835 and EM 1130-2-302, and it followed the outline prescribed in TM 5-631. The plan was prepared as Appendix 3 to Design Memorandum No. 1-B, Updated Master Plan for Reservoir Development and Management. It was submitted for approval in October 1968 as Supplement No. 1 to DM No. 1-B and was approved 9 April 1971. Upon approval of Design Memorandum No. 1-C, Updated Master Plan for Development and Management of Clearwater Lake, the forest management plan will be attached as Appendix B.

12-02. Physical and ecological resources and characteristics. Most of the land above the top of the flood-control pool is forested and rugged with rock outcropping. There are numerous narrow ridges with steep rocky slopes adjacent to the lake area. There is a wide variation in the vegetative composition of the Black River as a result of man-made changes in the environment brought about by the construction of the dam and lake. There now exists a new ecotone between the lake front and the original forest. The land is being reforested naturally by pioneer species.

12-03. Treatments and programs. The policy and objectives for development of the Clearwater Lake forest resources are as follows:

a. Policy. The forest resources of Clearwater Lake will be managed to protect and enhance the scenic and environmental values of the project, and to support recreational development and wildlife management.

b. Objectives. Efforts are being made to achieve the following objectives:

(1) General. Varying age classes and species will be effected to produce a perpetual stand of many-sized species more suitable for recreational and wildlife use. The species of present relative abundance will be favored. The forest will be cultivated for receational and wildlife benefit, and thinning of dense stands of timber will be required to break up stagnation and provide desirable open spaces. Forest "giants," specially appealing trees, and all unusual species will be preserved.

(2) By land-use allocation. The following is the plan for forest management on the various allocations of the project lands.

(a) Project lands. There are approximately 16,300 acres of fee-owned land above the top of conservation pool elevation of 494. Suitable areas of these lands will be utilized for planting and maintaining the trees, shrubs, and plants required for landscaping and reforestation.

(b) Recreation-intensive use. This category contains about 2,200 acres of land above the top of the conservation pool, elevation 494. An occasional well-shaped tree or clump of flowering shrubbery will be planted at strategic locations at play areas, beaches, and concession areas. Shrubs and understory trees will be placed in picnic areas, which will have an open stand of large trees to serve as shade. Around the camping sites the objective will be to provide a slightly open canopy to afford shade and privacy screening for campers. An effort is being made to provide a tree cover of diverse size and specie, which will be thinned to relieve crowding and to remove badly deformed or diseased trees. All trees, which are dangerous to visitors, will be removed.

(c) Recreation-low density use. There are about 11,500 acres of land in this allocation above the top of the conservation pool, elevation 494. In these areas special management efforts will be made to provide or maintain an all-age stand of various species. Particular attention will be given to maintaining a plant cover natural to the areas.

(d) Natural areas. In this allocation there are about 3,200 acres of land above the top of the conservation pool, elevation 494. These areas will receive a minimum of management. Silvicultural practices will be limited to those necessary for protection of visitors, prevention of forest fires, and prevention and control of forest insects and diseases.

(e) Wildlife management. No areas have been specifically allocated for wildlife management. There are about 11,800 acres contained in 52 agricultural and grazing lease plots. These lands will be used for the conservation and management of wildlife until they are needed for recreational use. The silvicultural practices will involve creating small clearings and irregualr edges, planting wildlife food producing trees and shrubs, thinning to encourage growth of understory plants, and releasing desirable wildlife species from competition. Existing or potential den trees will be preserved in cutting operations.

(f) Reserve forest lands. This designation of lands is included in the "Recreation-Low Density" allocation. The management objective is a healthy, all-aged forest community. Emphasis will be placed on soil improvement, wildlife habitat improvement, maintenance of scenic values, and soil erosion control.

12-04. Personnel and fiscal requirements. The Resident Engineer is primarily concerned with the protection of the forest areas for the preservation of the resource. He will be assisted by a wildlife biologist, a forester, and other personnel of the District as may be necessary. The estimated annual cost of this management plan is $7,000; however, it is estimated that the annual benefits of the program is $28,000.

12-05. Work plans. The Resident Engineer promptly reports to the District Engineer any unusual conditions found in the forest such as disease, insect,

fire, ice damage, or wind damage. The stands will be managed on an uneven-age basis as this produces a perpetual stand of various sized species more suitable for recreational and wildlife use. Surveys indicate the most desirable cutting cycle of the same area is 10 years. The forest is divided into 10 compartments containing about 1,000 acres each. One compartment will be worked each year. New recreation parks will be thinned at least 5 years before being opened to the public. All "forest giants" and other desirable trees will be preserved.

SECTION XIII

FIRE PROTECTION PLAN

13-01. General. The fire protection plan will be prepared and submitted in accordance with ER 1130-2-400 dated 28 May 1971 as Appendix C to this updated master plan. This plan will provide for grass and forest fire prevention, presuppression and suppression functions, training of personnel, and necessary equipment and tools.

SECTION XIV

FISH AND WILDLIFE MANAGEMENT

14-01. General. The fish and wildlife management plan, which is being prepared in accordance with ER 1130-2-400 dated 28 May 1971, 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 and wildlife habitat thereon. Lands, waters, and interest thereon have been made available to State fish and wildlife agencies and the U.S. Department of Interior for fish and wildlife management. Land and water areas which are suitable for fish and wildlife management and not managed through licenses or other formal agreements with wildlife agencies will be managed by the Corps of Engineers. The plan will include major species being managed, wildlife habitat maintenance and enhancement plans, and coordinated efforts with other agencies relative to fish and management on the project. The vegetative cover surrounding the lake is composed of an overstory of pine-oak with an understory made up of smaller trees of the same species, or shrubs of different species. This type of vegetation is typical of an upland game wildlife habitat type, one which can be managed successfully for deer, turkey, squirrel, and rabbits. (See maps on pages 14-2 and 14-3.) Management techniques to be used are as follows, but not limited to those mentioned:

a. Selective burning.

b. Food plots.

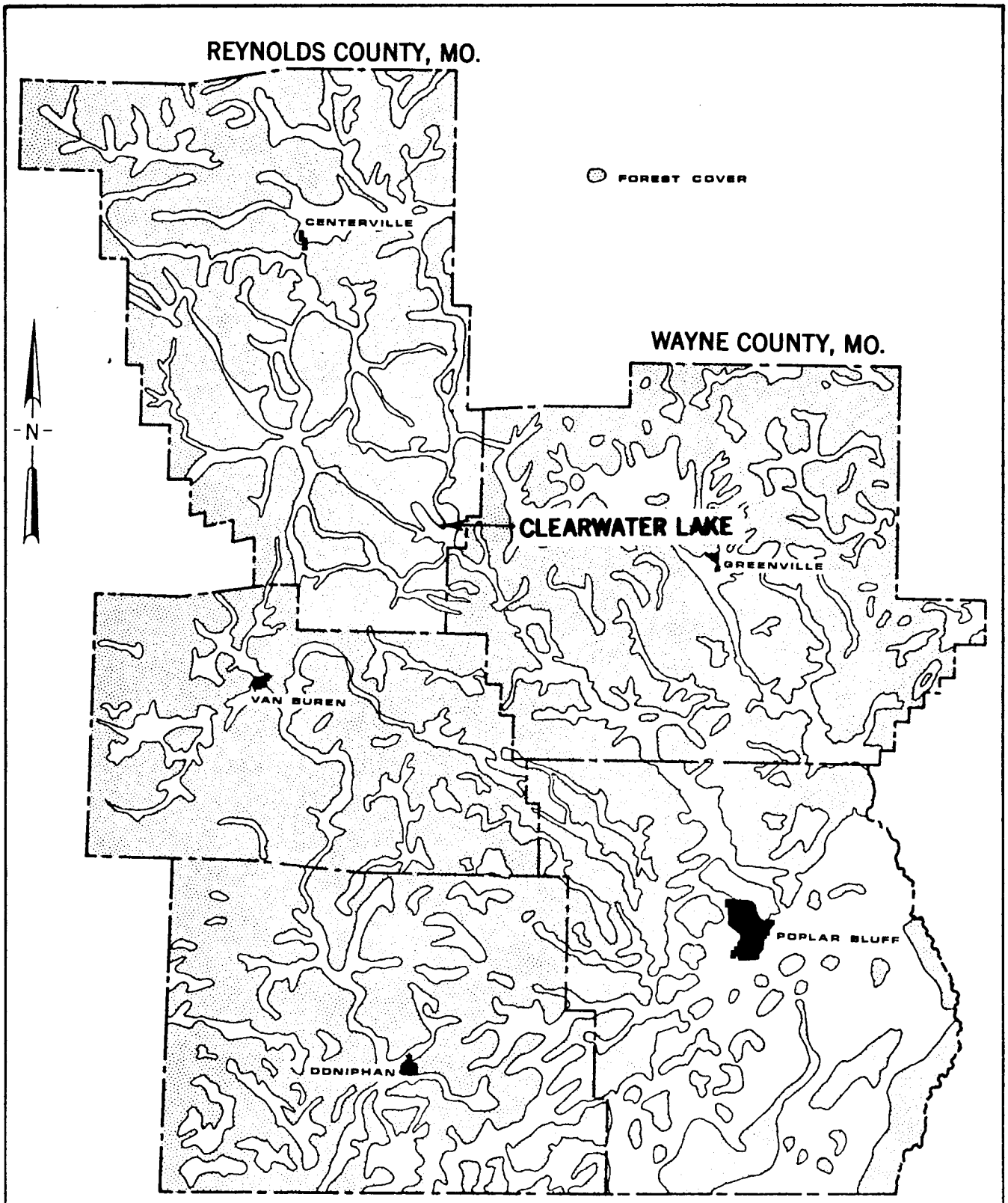
c. Timber stand improvement.

d. Manage grazing leases.

e. Cultivate crops.

f. Aerate and fertilize areas.

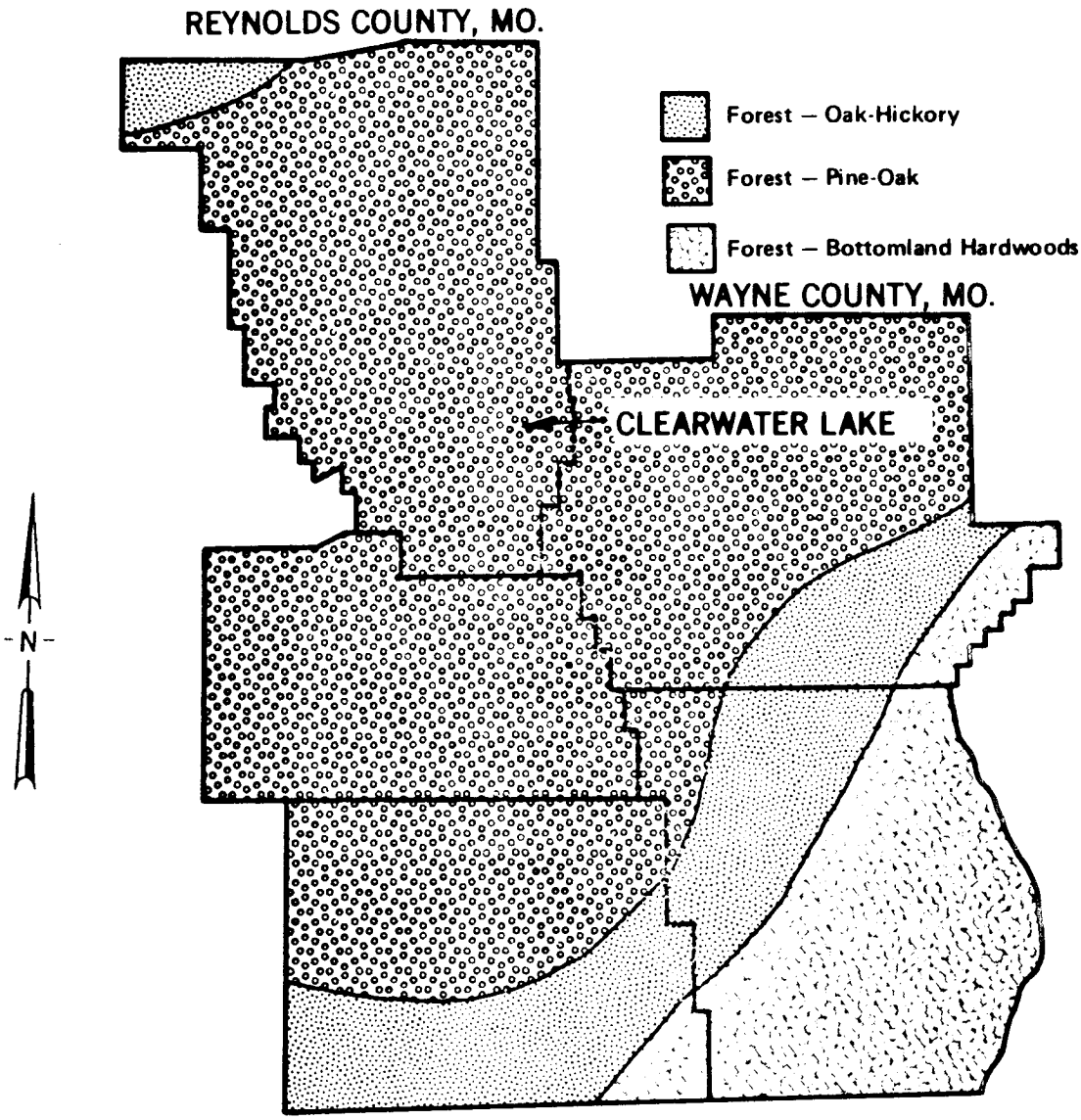
The management and regulation of fish and wildlife is the prerogative of the State of Missouri, and the only active part for the Corps to engage in is water level fluctuation for fish spawning and survival. Upon approval of Design Memorandum No. 1-C, Updated Master Plan for Development and Management of Clearwater Lake, the fish and wildlife management plan will be attached as Appendix D.



SOURCE: OZARK FOOTHILLS REGIONAL PLANNING COMMISSION
COMPREHENSIVE WATER-SEWER PLAN

OZARK FOOTHILLS REGION
FOREST COVER

FOREST TYPE MAP
OZARK FOOTHILLS REGION



SOURCE: Soils of Missouri

SECTION XV

PROJECT SAFETY

15-01. General. A project safety plan has been prepared in accordance with ER 1130-2-400 dated 28 May 1971. This plan was approved 5 April 1973 as Appendix E to Design Memorandum No. 1-B. It will become Appendix E of this updated master plan. The plan prescribes precautionary actions to be taken to prevent, reduce, or control hazardous situations. Areas considered include construction, maintenance, park facilities, visitor protection, equipment operation, and office operations.

SECTION XVI

CONCLUSIONS AND RECOMMENDATIONS

16-01. Conclusions:

a. It is concluded that the Clearwater Lake should be developed in accordance with this general plan. Although the lake is small in size, it receives a great amount of recreational usage because of its proximity to heavily populated areas. Development and management of the project area for public use and other purposes will permit and create increased use of the project and will assist in preserving the natural resources of the area.

b. This plan uses the Government-owned lands in a desirable manner, but is flexible and will allow adjustments compatible with future public needs.

16-02. Recommendations. It is recommended that this plan be approved as a basis for further development of the existing parks, retention of the areas for future recreation use, and the development detailed in Section VII and shown on the plates contained in Section XVII.

SECTION XVII

PLATES