DESIGN MEMORANDUM NUMBER 1C

REVISED MASTER PLAN

DEVELOPMENT AND MANAGEMENT

OF

BENBROOK LAKE

TRINITY RIVER BASIN

CLEAR FORK, TRINITY RIVER, TEXAS

U. S. ARMY ENGINEER DISTRICT FORT WORTH, TEXAS

MARCH 1972

COPY NUMBER 44

Page Added for Alignment

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SWDPL-R (SWFOD-M 7 Apr 72) 3d Ind SUBJECT: Benbrook Lake, Clear Fork, Trinity River, Texas, Design Memorandum No. 1C, Revised Master Plan

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, Texas 752025 DEC 1972

TO: District Engineer, Fort Worth

<u>ИД/</u> н. в.

2 Incl nc

CF: DAEN-CWP-V DAEN-CWP-V (7 Apr 72) 2nd Ind SUBJECT: Benbrook Lake, Clear Fork, Trinity River, Texas, Design Memorandum No. 1C, Revised Master Plan

DA, Office of the Chief of Engineers, Washington, DC 20314 15 Nov 72

TO: Division Engineer, Southwestern

1. The revised Master Plan for Benbrook Lake is approved subject to comments of the Division Engineer with consideration of the following:

a. In view of the statements on urbanization of adjacent private lands and compatibility with project uses on page 56, Holiday Park, and page 60, Mustang Park, consideration should be given to phasing out camping activities in the Holiday Park Area with a view to developing the entire western side of the project for day use.

b. Mustang Park could then be developed to accommodate overnight and overflow camping. Development along these lines would provide more adequate separation of activities and provide better controls for monitoring various activities and fee collection.

2. Copies of the Design Memo excessive to needs of OCE will be returned separately to Fort Worth District.

FOR THE CHIEF OF ENGINEERS:

2 Incl 1. DM (fwd sep) 2. Comments

E Jackou nnan IRWIN REISLER

Endior Por

Chief, Planning Division Directorate of Civil Works SWDPL-R (7 Apr 72) 1st Ind SUBJECT: Benbrook Lake, Clear Fork Trinity River, Texas, Design Memorandum No. 1C, Revised Master Plan

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, Texas 75202 1 0 JUL 1972

TO: HQDA (DAEN-CWP-V) WASH DC 20314

Forwarded recommending approval subject to the inclosed comments (Incl 2). These comments are largely repetitive of those made on Design Memorandum No. 1, Revised Master Plan for Hords Creek Lake, Hords Creek, Colorado River Basin, Texas, currently in your office for review. They are furnished on this plan, as well, in the interest of continuity of records.

FOR THE DIVISION ENGINEER:

LBar HOWARD R. BARE

Chief, Planning Division

2 Incl l. wd 4 cys Added l incl 2. as

CF: Fort Worth District Comments on Design Memorandum No. 1C, Revised Master Plan for Benbrook Lake, Clear Fork, Trinity River, Texas

The subject DM was prepared as a special task force effort to accomplish updating of master plans on an expedited basis. The decision to accomplish updating of master plans by a special task force was endorsed by this office and, as indicated by 1st Ind SWDPL-R to letter SWFEX dated 28 July 1971, subject: Master Plan Updating, was discussed with representatives of OCE. Also, certain concepts for presentation of the updated master plans were agreed upon in the interest of expediting this essential work, necessary in the preparation of budgetary data and required as the basis of preparation of plans and specifications. It is considered that the subject DM adequately provides the basis required for continued recreation use, development and management of the subject project. It is recognized, as indicated by the comments below, that further refinement is needed which will be made in future updating of this plan and incorporated into subsequently submitted master plans as soon as practicable. Comments resulting from review of the subject plan, including those based on ER's received subsequent to preparation of the plan, are as follows:

a. Narrative.

(1) Para 1.01C1, page 5, Project Purpose. Since recreation and wildlife conservation have not been made project purposes, the last sentence in this paragraph should be deleted.

(2) Para 1.01D1, page 6, <u>Region Served</u>. This sentence should be rewritten to read: "North Central Texas, specifically the City of Fort Worth and its environs, is the major area from which visitors are attracted to Benbrook Lake."

(3) Para 1.02A4, page 13, Table 2.

(a) The total fee and flowage easement acreage should be shown. Also, the elevations of the guidelines for both fee and flowage easement acquisition should be indicated here as well as on Table 4, page 31; Table 5, page 32; and/or plates 2.1 and 2.2.

(b) The elevation, feet (msl), for the emergency spillway crest should be 724.0.

(4) Para 1.02B4, page 16, Other Land Uses. Government lands are also used for project operation for flood control.

(5) Para 1.02B5, page 16, Archeological and Paleontological Resources. Reference should be made to ER 1120-2-402 dated 12 October 1970, subject: Archeological Investigations and Salvage Activities. Also, it is recommended that this paragraph be expanded to explain the Corps' role in protection, preservation, restoration, and administration of archeological sites found on project lands. In this respect, the discussion in the following paragraph concerning historical resources should also be expanded, providing the same information required above (see ER 1105-2-11). (6) Para 1.02C2c(1), page 18, Fish. Specific species of fish should be given; i.e., largemouth bass, white bass, white crappie, channel cat-fish, etc.

(7) Section II, page 28, <u>Land and Water Use Planning</u>. This section should be expanded to include the rationale or concepts for development and management of all project resources. For instance, in addition to the three items discussed under para 2-02A (General Planning, Park Planning, and Outgrants), additional subparagraphs should be included pertaining to fish and wildlife conservation and management, historical and archeological sites, forest resources, natural, ecological areas, etc.

(8) Para 2.02A3b, page 29, Interim Use. It is unclear as to what project operations would require the leasing of lands unless this is a broad statement which includes leasing of lands for recreation development by other agencies. It is doubtful if lands would be leased specifically for soil and vegetative restoration. It appears that this would be a benefit accruing from other leasing programs.

(9) Para 2.02A3c, page 30, Easements. The statement is made that "final approval" for easements, including roads, rests with the district office. This is simply not correct. Road easements are a very ticklish subject and can only be signed in the Office of the Assistant Secretary of the Army for Installations and Logistics. Before road easements are recommended for signature, the availability must be approved by the Operations Division of Civil Works. This paragraph should be rewritten.

(10) Para 3.03, page 33, Environmental Statement, second sentence. The statement made here is not considered appropriate. Environmental statements are required by law for "major Federal actions significantly affecting the quality of the human environment." OCE has determined that environmental statements will be prepared on O&M projects. This sentence should be revised to read: "An environmental impact statement will be prepared for this project in accordance with current guidance."

(11) Para 3.07A3, page 44, <u>Sanitary Facilities</u>. Guidance concerning determination of the type of facility required is furnished in M/L SWDPL-R/SWDCO-O dated 12 Jul 67, subject, Environmental Pollution Control, Recreation Areas, Southwestern Division.

(12) Para 3.07C2, page 47, <u>Specific Parks</u>. The third sentence of the second paragraph is not concurred in. Sufficient data should be available to adequately locate recreation facilities with only minor adjustment in specific locations.

(13) Para 3.07C4, page 67, Summary of Cost Estimates.

(a) Reference is made to the following:

1. Paras 3.07C3a and b, page 47, Youth Group Area and Handicapped Recreation Area.

2. Paras 3.08B2c and d, pages 74 and 75, Youth Group Camp and Handicapped Area.

3. Plates 2.1, C10 and C12.

Cost estimates for the youth group camp and handicapped area are not included. These should be added.

(b) The total project cost for recreation facilities with the total cost of existing development to date, should be furnished.

(14) Para 3.08B2a, page 73, Roads and Rights-of-Way and Plate Cl.

(a) Minimum cuts and fills should be used instead of "no" cuts or fills. In some terrain, it will not be possible to meet maximum grade criteria without the use of earthwork. In this respect, the practice to "follow lay of land" should be followed as closely as possible.

(b) Reference is made to para 7b of ER 1110-2-400 and para 7a(2) of EM 1110-2-400. In accordance with the above reference paragraphs, maximum width for two-way roads is 24 feet and the minimum width is 18 feet. This paragraph should be revised accordingly.

(15) Para 3.08B3, page 75, <u>Facilities Concept Drawings</u>. Recommended approval of the concept drawings is contingent upon the district submitting preliminary drawings and cost estimates to SWD for review and approval prior to preparation of final plans and specifications.

b. Plates.

(1) Plates 3.2 through 3.6. While it is considered that the development as depicted on the individual recreation area plates is not in sufficient detail to make a determination as to the adequacy of either design or long-range requirements, it is noted in the basic letter that detailed site plans will be submitted for approval prior to implementation of the plan. This method of presentation was agreed upon in an effort to expedite updating. Upon completion of this initial task force updating, the detailed site plans will be presented in the master plan in accordance with standard procedure.

(2) Plate Cl. Signs shall conform to those provided in the SWD Sign Handbook. This plate should be revised to reflect the above or justification furnished to support deviation from the Sign Handbook.

c. Cost Estimates, general. Since the quantities shown for boat launching ramps are designated in square yards, there is no way to tell how many ramps are planned. It is recommended that this information be included here in some manner.

d. Appendix.

(1) Para Icla, page 84, Fish Management.

(a) It is recommended that the fifth sentence be deleted since the applicability of P. L. 89-72 to a fish management program on a completed project is subject to question and is not the only means of providing assistance.

(b) The next to the last sentence should be revised to read: "Control of rough fish populations will be accomplished in cooperation with the Texas Parks and Wildlife Department."

(2) Para Iclb(5), page 89, <u>Coordination and Cooperation</u>. It is recommended that the first two sentences be revised to read: "Federal and state fish and wildlife agencies have not expressed an interest in management of lands at Benbrook Reservoir through license or cooperative agreement. However, the management program will be developed and managed by the Corps in cooperation with the Texas Parks and Wildlife Department."



DEPARTMENT OF THE ARMY FORT WORTH DISTRICT, CORPS OF ENGINEERS P. O. BOX 17300 FORT WORTH, TEXAS 76102

SWFOD-M

7 April 1972

SUBJECT: Benbrook Lake, Clear Fork, Trinity River, Texas, Design Memorandum No. 1C, Revised Master Plan

THRU:

Division Engineer, Southwestern

TO: HQDA (DAEN-ZA) Wash DC 20314

1. Design Memorandum No. 1C, Revised Master Plan for the development and Management of Benbrook Lake, Clear Fork, Trinity River, Texas, is submitted for approval.

2. As previously indicated in SWFEX letter dated 28 July 1971, subject, "Master Plan Updating," special emphasis has been given the updating of master plans by the Fort Worth District. The revised Benbrook Master Plan has been prepared by a Task Force formulated for the purpose of providing a concerted effort to meet the current national emphasis on development and management of natural resources for use for our own and future generations.

3. The Revised Master Plan includes existing and planned development at Benbrook Lake and is in compliance with previous endorsements. Included in the revised plan is the 1,207 acres of recently acquired land on the eastern shore. The use of this land will be divided between an area for youth groups, an area for the handicapped, and aesthetic and multiple use recreation areas. Conceptual management objectives and plans will be implemented immediately by the project resource manager and district personnel. Detailed site plans for proposed development shall be prepared subsequent to approval of this Revised Master Plan by higher authority. These site plans shall be forwarded for approval prior to the implementation of any part of the development proposed in the approved Master Plan.

1 Incl Design Memorandum No. 1C Benbrook Lake (9 copies)

yd W. S. I.

FLOYD H. HENK Colonel, CE District Engineer

TRINITY RIVER BASIN, TEXAS

DESIGN MEMORANDUM NO. 1C (REVISED MARCH 1972)

REVISED MASTER PLAN

FOR BENBROOK LAKE

CLEAR FORK, TRINITY RIVER, TEXAS

This report, prepared by the Master Planning Task Force, Fort Worth District, has been coordinated with the Engineering Division, the Real Estate Division, and the Operations Division and is recommended for approval.

D. G. Dundorg Chief, Engineering Division <u>302400</u>1972 Date

<u>Ann S. Durkeait</u> <u>30 mm 1972</u> Chief, Real Estate Division Date <u>Alliel Malona</u> <u>3 April 1972</u> Chief, Operations Division Date

Chief, Operations Division

BENBROOK LAKE

CLEAR FORK, TRINITY RIVER, TEXAS

MARCH 1972

REVISIONS AND UPDATES

DATE

NEW PAGES OR DRAWINGS

July 72

Project Resource Management Plans, Appendix (A), Design Memorandum No. 1C, Revised Master Plan, Benbrook Lake, Clear Fork, Trinity River, Texas; with letter of transmittal (SWFOD-M ltr dtd 4 Aug 72, subj same).

Appendix Section

INTRODUCTION

The objective of resource planning is to obtain proper utilization and adequate stewardship of resources in their operation, maintenance, and management. Accomplishment of this objective through sound planning principles, coupled with proper resource and operational management plans natural, created, and human - will enable public use of the resource while preserving the qualities of the environment.

The Institute for Water Resources recently stated four environmental objectives for the Corps of Engineers. These have now been incorporated into Engineer Regulation 1165-2-500. These objectives form a foundation for master planning and resource management philosophy and will be implemented to the fullest extent possible. They are:

"1. To preserve unique and important ecological, aesthetic, and cultural values of our national heritage.

2. To conserve and use wisely the natura' resources of our Nation for the benefit of present and future generations.

3. To enhance, maintain, and restore the natural and man-made environment in terms of productivity, variety, spaciousness, beauty, and other measures of quality.

4. To create new opportunities for the American people to use and enjoy their environment."

All resources will be managed for multiple use in accordance with current policy (Engineer Regulation 1130-2-400) and other applicable regulations. These resources are the property of both present and future generations. <u>Given these valuable resources, it is our duty as stewards to</u> <u>protect and provide proper management while they are in our care</u>. Proper management is defined as planning, organizing, directing, and controlling the use of project resources. Measures such as limiting or denying the use of all or part of a resource will become part of the management program when such use becomes detrimental or permanently damaging to that resource.

"Ecological" management of both natural and created resources will become the goal of all personnel involved in the management program. In seeking this goal, managers at both the field and district level should recruit professional personnel and provide continued in-service training in resource management principles in order that the objectives outlined above are attained. Management at all levels must be alert to changing technology, new management methods, and changing user preferences as they may affect the development and use of the resource. Through the application of this general philosophy we can insure that short-term uses or gains shall not take the place of long-term goals.

I. BACKGROUND INFORMATION

1.01 Pertinent Data

A. <u>Authority</u>:

	Тур	<u>e</u>	<u>Authority</u>	Date
	1.	Project	Flood Control Act (Public Law 228) 77th Congress, 1st Session	18 Aug 1941
	2.	Recreation	Section 4, Flood Control Act (Public Law 534) 78th Congress, 2nd Session	22 Dec 1944
		•	Amended by: Sect. 4, Flood Control Act (Public Law 526) 79th Congress, 2nd Session	24 Jul 1946
			Amended by: Sect. 209, Flood Control Act	3 Sep 1954
			See "Cost-Sharing" below	
	3.	Fish and Wildlife	Fish and Wildlife Coordination Act	10 Mar 1934
			Amended by: Public Law 85-624 (72 Stat. 563)	12 Aug 1958
			Public Law 89-669	15 Oct 1966
			See "Cost-Sharing" below	en An às
	4.	Land Acquisition	Rivers and Harbors Act (Public Law 14) 78th Congress, 1st Session	2 Mar 1945
			Reconveyance: Public Law 85-500	3 Jul 1958
			Amended by: Public Law 87-386	4 Oct 1961
			ER 405-1-1	1942 - 1952
	5.	Permits	SWDR 1130-2-7	25 Sep 1968
			FWDR O&M Manual	1969
			ER 405-1-830	24 Mar 1964
	6.	Leasing	ER 405-2-835	2 4 Mar 1964
			Amended:	9 Nov 1964
			Amended:	30 Aug 1965
			ER 405-1-830	24 Mar 1964
,	7.	Cost- Sharing	Implementation of the Federal Water Project Recreation Act (Public Law 89-72)	9 Jul 1965
	8.	Vegetation	Public Law 86-717	6 Sep 1950
			Public Law 89-298 Sect. 302	27 Oct 1965

B. <u>History</u>

1. Definite Project Report:

The "Definite Project Report on Benbrook Dam and Reservoir, Trinity River and Tributaries, Texas", was transmitted to the Chief of Engineers, Department of the Army, Washington, D.C., by letter dated 1 April 1946. This report was approved by the Chief of Engineers by 2nd Indorsement, dated 29 July 1946, subject to the comments in the transmittal letter.

2. Master Plan:

The "Draft of the Master Plan for Benbrook Reservoir Project, Clear Fork of Trinity River, Texas" was transmitted to the Office, Chief of Engineers (OCE) by letter dated 6 May 1953. It was returned by the Chief of Engineers through a 2nd Indorsement, dated 20 November 1953. Because of a change in land acquisition policy, the plan was given limited approval authorizing the building of some public use facilities. "Design Memorandum No. 1C" was transmitted to the Office, Chief of Engineers, by letter dated 23 October 1966, and was approved by OCE, 6 February 1967.

3. Status of Project:

Construction of the Benbrook dam was initiated in May 1947. The closure section was completed in November 1950. Deliberate impoundment of water was initiated on 29 September 1952. Prior to fiscal year 1959, only \$2,500 was appropriated for recreational development at Benbrook Lake *. During fiscal years 1959 through 1965 a total of \$728,900 was funded for recreational construction. Between fiscal years 1966 to 1971, a total of \$230,900 was used for construction of such recreational facilities as access roads, parking, boat launching ramps, sanitary facilities, potable water supply, picnicking and camping facilities, park directional signs, and necessary site preparation. A total of \$959,800 has been used for recreational development to date.

* Previously called Benbrook Dam and Reservoir.

C. Scope

1. Project Purpose:

Benbrook Lake is operated principally for flood control and navigation. Conservation water is available for a temporary water supply for the City of Fort Worth (Public Law 782, 84th Congress, 2nd Session approved 24 July 1956) and the City of Benbrook (Public Law 91-282, 91st Congress, 2nd Session, approved 19 June 1970). A pipeline for temporary water supply for the City of Arlington was installed as of 27 July 1971. Usage of this installation is authorized by Public Law 92-222. Recreation and wildlife conservation now receive equal consideration under Public Law 89-72 (9 July 1965) and Public Law 85-624 (12 August 1958).

2. Purpose of the Master Plan:

The purpose of the Master Plan is to provide a comprehensive plan concerned with effective conservation, protection, development, use, enhancement, and/or management of visitors, water, land, vegetation, wildlife, and/or other project operations in the interest of the public. The plan takes into account all existing and contemplated Federal, state, and local public recreation and conservation developments within the region.

3. Purpose of This Revised Master Plan:

This design memorandum presents a Revised Master Plan for development and management of the resources at Benbrook Lake. The concept of the plan includes optimizing the overall project management objectives, obtaining the optimum utilization of the project area for public use, and providing proper stewardship of the natural resources.

4. Purpose of the Plan of Development:

The purpose of the plan of development is to:

a. Indicate and guide the planned development for the project including a detailed 5 year plan.

b. List the accomplished development to date.

c. Indicate areas in need of upgrading such as vegetation, soil conditions, facilities, etc.

d. Provide a guide for budgetary submissions for Code 710 funds.

The plans, cost estimates, and recreational analyses will be reviewed and updated annually. Revised drawings, estimates, and pages of the text will be submitted to Southwestern Division (SWD) and OCE for approval and insertion in the basic Revised Master Plan document herein. Field personnel will aid in the development of a detailed site plan of the proposed management areas to establish the location of roads and facilities at the time construction funds are allocated. A management area will not be developed without a detailed site plan approved in advance by SWD and coordinated with field and district office personnel.

D. Regional Utilization

1. Region Served:

North Central Texas -specifically the City of Fort Worth and its environs - is the major area which attracts visitors to Benbrook Lake.

2. <u>Transportation</u>:

The primary mode of transportation of visitors to the lake is vehicular.

3. <u>Population</u>:

See Section 3.05, page 35 for projected population data.

4. Economy:

The primary zone of influence encompasses the City of Fort Worth which has a diversified urban economy. Formerly a livestock center, Fort Worth is now an agricultural and industrial center having over 1,000 industries manufacturing such diverse products as aircraft, petroleum, supplies, and mobile homes.

5. Related Recreational Areas:

The nearest Corps of Engineers project is Grapevine Lake, approximately 35 miles northeast of Benbrook Lake. Also, there are at least nine state, city, or privately owned recreational parks with 50 radial miles \checkmark of the project (See Table 1, page 10). More than 19 years of operation has shown that the recreational development at this project has complimented rather than competed with surrounding recreational areas. It is expected that this same relationship will continue under the development plan included in Section'III.

6. Local Recreation Habits and Interest:

A recreation survey taken in 1959 indicated that the main activity on the lake is swimming followed by camping, fishing, picnicking, water-skiing, sailboating, and sightseeing. It is expected that, due to the close proximity to the Dallas-Fort Worth metropolitan area, day-use activities will tend to replace overnight use in future years. Because of this trend, as well as only a limited number of suitable land areas for campground development, the total number of overnight sites as determined by the recreational analysis has not been planned. Development of future additional overnight use areas will have to take place on lands possibly better suited for other uses, or in areas designated for day-use activities.

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PARKS, RESERVOIRS, AND LAKES WITHIN 50 RADIAL MILES OF BENBROOK LAKE (Includes Major Areas Outside Radius)

						Available <u>Recreational Facilities</u>							
Index Number	Name	County	Approximate Distance From Benbrook Lake Miles	Administering Agency	Purpose	Fishing	Swimming	Boating	Picnicking	Camping	Historic Structures		
7	Whitney State Park	Hi11	50 S	Texas Parks and Wildlife Department	Recreation	Х	Х	Х	Х	Х			
8	Meridian State Park	Bosque	55 S	Texas Parks and Wildlife Department	Recreation	Х	х		X	х			
9	Possum Kingdom State Park	Palo Pinto	70 W	Texas Parks and Wildlife Department	Recreation	Х	Х	Х	Х	Х			
	Fort Worth City Parks	Tarrant	10 N	City of Fort Worth	Recreation	Х	X	X	Х		Х		

Page 3 of 4 pages

PARKS, RESERVOIRS, AND LAKES WITHIN 50 RADIAL MILES OF BENBROOK LAKE (Includes Major Areas Outside Radius)

Index lumber	Name	County	Approximate Distance From Benbrook Lake Miles	Administering Agency	Purpose	Fishing	Swimming	Boating	Picnicking	Camping	Historic Structures
and Orie	nted:	·									
1	Acton State Park	Hood	34 SW	Texas Parks and Wildlife Department	Historical Site						Х
2	Angelina National Forest	Tyler Angelina	200 SE	United States Forest Service	Multiple Use		X		X	X	
3	Cleburne State Park	Johnson	45 S SE	Texas Parks and Wildlife Department	Recreation	Х	Х	X	X	Х	
4	Davy Crockett National Forest	Houston Trinity	160 SE	United States Forest Service	Multiple Use		Х	Х	X	Х	
5	Dinosaur Valley State Park	Somervell	50 SW	Texas Parks and Wildlife Department	Historical Park	X			X	, .	Х
6	Fort Richardson	Jack	48 NW	Texas Parks and Wildlife Department	Historical Park					Х	Х

Available <u>Recreational Facilities</u>

Q

Page 2 of 4 pages

PARKS, RESERVOIRS, AND LAKES WITHIN 50 RADIAL MILES OF BENBROOK LAKE (Includes Major Areas Outside Radius)

Available <u>Recreational Facilities</u>

Index Number	Name	County	Approximate Distance From Benbrook Lake Miles	Administering Agency	Purpose	Fishing	Swimming	Boating	Picnicking	Camping	Historic Structures
	Grapevine Lake	Tarrant Denton	35 NE	Corps of Engineers	Flood Control Water Supply Recreation	Х	Х	Х	Х	Х	
	Lewisville Dam	Denton	50 NE	Corps of Engineers	Flood Control Water Supply Recreation	X	X	Х	Υ.Χ.	Х	
	Lake Arlington	Tarrant	26 E	City of Arlington	Municipal Industry	Х		Х			
••• • • • •	Lake Bridgeport	Wise Jack	33 NW	Tarrant County Water Control and Improvement District No. 1	Municipal Industry Flood Control Recreation	Х	X	Х	Х	Х	

Page 1 of 4 pages

PARKS, RESERVOIRS, AND LAKES WITHIN 50 RADIAL MILES OF BENBROOK LAKE (Includes Major Areas Outside Radius)

•						Red	creat	Avai tiona	labl 1 Fa	e cilities
Index Number	Name	County	Approximate Distance From Benbrook Lake Miles	Administering Agency	Purpose	Fishing	Swimming	Boating	Picnicking	Camping Historic Structure
Water Ori	ented:				•					
	Pat Cleburne Reservoir	Johnson	31 S	City of Cleburne	Municipal	X	Х	Х	Х	X X
	Lake Granbury	Hood Parker	28 SW	Brazos River Authority	Municipal Industry Irrigation Power	X	Х	Х	X	X
	Lake Weatherford	Parker	31 NW	Weatherford Municipal Water District	Municipal	X	Х	Х	Х	X
	Eagle Mountain Lake	Tarrant Wise	32 N	Tarrant County Water Control and Improvement District No. 1	Municipal Industry Irrigation	Х	Х	Х	Х	
	Lake Worth	Tarrant	18 N	City of Fort Worth	Municipal	Х	X [,]	Х	Х	

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1.02 Project Description

A. General

1. Physical Data:

The land bordering the project is typical of the Grand Prairie region. The uplands are characterized by rolling grasslands, sparsely covered by live oak and various shrubs. Park areas are characterized by gently rolling hills interspersed by more rugged slopes, small bluffs, and groves of live and post oak. Willows and cottonwcods are found near the shoreline.

2. Location:

Benbrook Dam is located on the Clear Fork of the Trinity River 15 miles upstream of its confluence with the West Fork of the Trinity River. It is in the southwestern part of Tarrant County about 10 miles southwest of Fort Worth, Texas.

3. Accessibility

a. Roads:

U.S. Highway 377, extending west-southwest from Fort Worth, passes within one-half mile of the west end of the dam and crosses the Clear Fork of the Trinity River within the reservoir area. A paved county road, extending southwest from Fort Worth, provides access to the east end of the dam. Interstate Highway 20 runs east-west approximately four miles to the north of the dam. Several all-weather county roads leading from the above mentioned roads provide access to the lake area.

b. Railroads:

Fort Worth is one of the leading rail centers of the southwestern United States. A line of the Gulf, Colorado, and Santa Fe Railroad crosses some of the tributary arms of the project.

There are five local airports in the general vicinity of Fort Worth. They are Meacham Field, Russell Field, Luck Field, Sycamore Field, and Oak Grove Airport. The Dallas-Fort Worth Regional Airport is presently under construction approximately 25 miles northeast of the lake.

4. Lake Watershed Provisions:

The watershed above the Benbrook Dam is approximately 55 miles long, 11 miles wide, and covers an area of over 429 square miles. Benbrook lake is approximately 7 miles long and 3 miles wide with a shoreline of approximately 40 miles. For additional information, See Table 2, below, and Pool Elevation ^probability and Duration Curves, Chart 1, page 14. Pool fluctuation as recorded from the years 1951 through 1971 follow closely the Pool Elevation Curves with a high elevation of 713 feet in June 1957 and a low of 688 feet in August 1964. The high since 1957 occurred in May 1966 when it reached 705 feet.

TABLE 2

	Elevation Feet (ms1)-	Lake Area (Acres)	Lake Capacity (Acre - Feet)
Top of Dam	747.0		
Maximum Design Water Surface	741.0	10,300	410,000
Emergency Spillway Crest	742.0	7,630	258,600
Top of Flood Control Pool	710.0 mitch	5,820	164,800
Top of Conservation Pool	694.0	3,770	88,250
Streambed	617.0		
Average Pool Elevation During Peak Recreation Seasons	693.1		
5 Year Pool Level	697.0		
10 Year Pool Drawdown	675.0	.	

POOL ELEVATIONS, AREAS, AND STORAGES

NOTE: All elevations in this report refer to Mean Sea Level datum of 1929.



AVERAGE RECURRENCE INTERVAL IN YEARS.

CHART 1



NOTE:

Curves based upon the hypothetical regulation of the lake during the period 1924-1953 as used in the design of the project.

5. <u>Climate</u>:

Benbrook Lake lies in a region characterized by a relatively mild climate. Summer seasons are long while the winter seasons are short and comparatively mild with occasional periods of freezing temperature. The prevailing winds are from the south during the spring, summer, and fall. The mean annual temperature is 64.5° Fahrenheit with the maximum and minimum temperature recorded at Fort Worth of 112° Fahrenheit and -8° Fahrenheit, respectively. The growing season, between killing frosts, is normally from the latter part of March to the first part of November. The average annual precipitation over the watershed is 31.3 inches.

B. Project Features

1. Parks:

There are five parks located at Benbrook Lake. Two are under lease agreements, one with the City of Fort Worth and the other with the City of Benbrook. See Plate 2.1, following page 31.

2. Structures:

The structures at Benbrook Lake are:

a. Dam - two earthen embankments connected by an uncontrolled concrete spillway

b. Outlet works

c. Plant structures: (Project office, maintenance building, and Resource Manager's residence.

3. Special Features:

a. 27 hole golf course (City of Fort Worth)

b. Soap Box Derby track (City of Fort Worth)

c. Two marina concessions (City of Benbrook and Corps of Engineers).

d. Baseball diamonds, horse stables, rodeo arena, and sailing center (City of Benbrook).

4. Other Land Uses:

Government lands are used for aesthetic/recreation areas, grazing leases, natural areas, and wildlife areas in addition to parks and project maintenance. See Section II for the location and description of these areas.

5. Archeological and Paleontological Resources:

A survey was made under the direction of the Smithsonian Institute in July 1948 of the archeological or paleontological features that would be adversely affected by the lake. This survey indicated that there were no significant archeological or paleontological findings within the boundaries of this project. Any future archeological excavation will be administered in accordance with Engineer Regulation 405-1-876. Upon discovery of a possible site, project personnel will protect the site and will contact the National Park Service who will coordinate each action. Their address is:

National Park Service Arizona Archeological Center University of Arizona Post Office Box 49008 Tucson, Arizona 85717

6. <u>Historical Sites</u>:

The only known historical site in the lake area is the Vernon Castle Memorial Monument located 3/4 mile northwest of the dam.

C. Resources

1. <u>General</u>:

Natural resources are identified as those assets of nature such as water, soil, vegetation, wildlife, scenic areas, etc. The development of resources constitutes improvements to better facilitate their use. The development of the natural resources is most important toward reaching the carrying capacity of the lake and its surrounding lands for public use. The degree of carrying capacity at a project is either the ultimate or desired. The ultimate carrying capacity is the final state of development of the natural resources at a project which will enable the most people to visit,

use, and enjoy the resources at that project but not necessarily protect the natural resources. The desired carrying capacity is the development and management of the natural resources which will enable the most people to visit, use, and enjoy the resources without degrading or destroying these same resources. For greater detail, see Section III, 3.06, B, page 36.

- 2. Natural
 - a. <u>Soils</u>

(1) General Conditions:

Soil conditions within this area lend themselves to a variety of uses. However, care should be taken to provide rest periods for vegetative growth when deemed necessary. The desired carrying capacity of this project will be based primarily on the soil series, its ability to endure certain uses as determined from information provided by the Soil Conservation Service, the slope of the land, and a Soil Conservation Service interpretative report relating these aspects to a carrying acpacity for each management area.

(2) <u>Specifics</u>:

- (a) Soils Table 3, pages 20 through 27.
- (b) Soils Map, Plate 1.2 following page 27.

b. Vegetation:

Vegetation consists of both land and aquatic plants. These resources can be better analyzed and managed with respect to the project needs when both types of vegetation are considered.

(1) Land Plants

(a) Grasses:

The principal grasses native to this region (known as the Grand Prairie region) are big bluestem, little bluestem, Indiangrass, switchgrass, dropseed, lovegrass, buffalograss, gramas, paspalums,

Canadian wildrye, Virginia wildrye, and Texas wintergrass. Where the native grasses have been overused annual weeds and less desirable grasses such as Texas grama, three-awns, forbs, and woody plants (such as yucca, cactus, and mesquite trees) have invaded. Introduced grasses that are predominant in the area are Johnsongrass and bermuda grass. Bermuda grass and buffalograss are recommended for planting at the lower elevation because they tolerate periods of water inundation. A mixture of native grasses can be planted at higher elevations.

(b) Woody Vegetation:

The dominant tree species in the area are live oak, hackberry, American elm, cedar elm, winged elm, burr oak, and post oak. Scattered clumps of trees and shrubs as well as individual trees and shrubs, including pecan, willow, sycamore, and dogwoods are located along the streams, while hackberry, gum elastic, sumacs, elm, persimmons, and live oak grow on the drier uplands.

(2) Aquatic Plants:

Aquatic vegetation at Benbrook Lake includes American lotus (<u>Nelumbo letea</u>), Arrowleaf pondweed (<u>Potamogeton sp.</u>), bushy pondweed (<u>Najas quadalupensis</u>), muskgrass (<u>Chara sp.</u>), cattails (<u>Typha sp.</u>) and smartweed (<u>Polygonum sp</u>.). Lotus is dense in the Rocky Creek and Mustang areas and may become a problem even though it dies back in the winter months. Muskgrass, an algae, is a nuisance to fishermen and boaters at Dutch Branch Park. Aquatic vegetation does not create an odor problem on the lake but does cause release water to develop a "swamp smell" at certain times of the year. Growths of arrowleaf pondweed and bushy pondweed in open areas of water provide shelter and feeding areas for fishes and provide food for waterfowl.

c. Fish and Wildlife

(1) Fish:

The predominate species prior to construction of Benbrook Lake consisted of bass, catfish, crappie, and sunfish. The Texas
Parks and Wildlife Department stocked the lake with bass, redear, green sunfish, bluegill, and channel catfish immediately after impoundment of the project in 1948. Periodic stockings have been made since then. Undesirable quantities of carp and other roughfish now exist.

(2) <u>Wildlife</u>:

Wildlife on lands surrounding Benbrook Lake include such species as quail, mourning dove, mallard, pintail, shoveller, green-winged teal, coot, egret, blue heron, fox squirrel, cottontail, jack rabbit, raccoon, g⁻ y fox, red fox, skunk, coyotes, bobcat, nutria, and armadillo. Present game populations support a moderate hunting pressure. Habitat improvement measures aimed primarily at upland game will benefit most of the other popular game species. A general management plan is given in greater detail in the Appendix under Part I, C., 2., b., page 85. Specific management plans will be made following an on-site survey and will be submitted at a later date as an Appendix to this Master Plan.

d <u>Water</u>:

Surface waters, with specific and limited exceptions, should be suitable for water contact sports and other human uses in recreation activities not involving significant risks from ingestion and possible resultant disease. Lakes receive the most concentrated and varied recreational use of any waters, and provide enjoyment to the greatest number of people. Lakes serve as settling basins which intensify the many pollution problems associated with water and water use. They are the center of many divergent and conflicting interests and desires. Competition is increasing for the pursuit of such water sports as fishing, waterfowl hunting, skin diving, skiing, swimming and pleasure boating. The quality of Benbrook Lake water is acceptable for recreational purposes according to the U.S. Public Health Service standards based on chemical analyses performed twice annually and on monthly profiles of dissolved oxygen and temperature.

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DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

				S						
· · ·	Sewage Disposal									
Soil Series	Filter 。 Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
19 Nimrod Loamy Fine Sand	Severe: Perme- ability	Severe: Perme- ability of sur- face layer, seepage	Moderate: Drainage corrosivity	Slight	Severe: Sandy texture	Severe: Sandy texture	Severe: Sandy texture	Severe: Sandy texture	Openland: suited Woodland: suited	Sandy Range Site: 2,000#- 4,000# * Excellent condition: little blue- stem, Indiangrass, sand lovegrass, purpletop tridens, silver bluestem, scribner panicum, fringeleaf paspalum, post oak, and greenbriar. Pasture Group: Sandy upland, adap- ted species include improved bermuda grass and weeping lovegrass.

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DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

	Soil Ratings and Adverse Features Affecting:									
<u></u>	Sewage D	lisposal		M <u></u> ,,, ,, , , , , , , , , ,						
Soil <u>Series</u>	Filter Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
17 Brackett Loamy Soil	Severe: Perme- ability slopes of 10-30%	Moderate: Slopes less than 7% perme- ability Substrata Severe: slopes more than 7%	Severe: Corrosivity slopes more than 8%	Moderate: traffic supporting capacity slopes less than 15% Severe: 15-30% slopes	Moderate: Perme- ability	Slight: 0-8% slopes Moderate: 8-15% slopes Severe: slopes over 15%	Moderata: perme- ability Severe: slopes over 6%	Moderate: texture and slope Severe: slopes over 25%	Openland: poorly suited Woodland: suited	Adobe Site: 1-8% Slope: 1,500# - 3,500# * Excellent condition: little bluestem, tall grama, tall dropseed, silver bluestem, low panicums, sideoats grama. Steep Adobe Site: 8-30% Slope - 1,000# to 3,000# * Same vegetation as above. Pasture Group: shallow, clayey, adapted species, improved bermuda grass, King Ranch bluestem, and kleberg_bluestem.
18 Tarrant Stony Clay	Severe: Depth to bedrock	Severe: Depth to bedrock	Severe: Bedrock within 20 inches Stoniness, shrink- swell	Severe: Stones depth to bedrock, slope	Severe: texture stones, course fragments on sur- face	Severe: textures stones, course fragments on surface	Severe: texture bedrock, stones slopes 6% course fragments on surface	Severé: texture stones, course fragments on surface	Openland: poorly suited Woodland: suited	Low, stony hill site: 900# - 1,700# * Excellent condition: sideoats grama, little bluestem, Indiangrass, fall- witchgrass, green spangletop, curly- mesquite, bush sunflower, guara, orange zexmenia, liveoak, and shinoak.

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DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

				Sui	1 Ratings	and Adverse	Features A	ffecting:		
Soil Series	<u>Sewage [</u> Filter Fields	Disposal Lagoons	Traffic Construction Ways		ffic Camp s Areas	Camp Picnic Areas Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
14 Bastrop Fine Sandy Loam	Slight	Severe: Perme- ability	Moderate: Electrical conductivity	Moderate: traffic supporting capacity	Slight	Slight	Slight: 0-2% slopes Moderate: on 2-6% slopes	Slight:	Openland: slight Woodland: slight	Sandy Loam Site: 4,500# - 7,000# * Excellent condition: little blue- stem, Indiangrass, switchgrass. Pasture and Hayland Group: loamy upland, adapted species are improved bermuda grass and weeping lovegrass.
15 Purves Clay Loam	Severe: Depth to bedrock	Severe: Depth to bedrock	Severe: Depth to bedrock high shrink- swell potential	Severe: Depth to bedrock high shrink- swell potential	Severe: texture	Severe: texture	Severe: texture depth to bedrock	Severe: texture	Openland: poorly suited Woodland: suited	Pasture and Hayland: shallow clays, the production potential is low to medium for such species as improved bermuda grass, King Ranch bluestem, and kleberg bluestem.
16 Maloterre Stony Clay	Severe: bedrock within 15 inches	Severe: bedrock within 15 inches	Severe: bedrock within 15 inches	Severe: bedrock within 15 inches	Severe: clay loam texture Perme- ability very shallow soil	Moderate: clay loam texture	Severe: depth to bedrock 15 inches slope	Moderate: clay loam texture	Openland: poorly suited Woodland: unsuited	Very Shallow Site: 1,200# - 2,000# * Excellent condition: little blue- stem, sideoats grama, tall grama, buffalograss, silver bluestem, and forbs.

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DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

	Soil Ratings and Adverse Features Affecting:											
<u></u>	Sewage	Disposal										
Soil Series	Filter Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants		
12 Duffau Fine Sandy Loam	None to Slight	Moderate: Perme- ability 2-7% slopes	Moderate: Corrosivity 4-8% slopes	Moderate: traffic supporting capacity	None to Slight	None to Slight	Slight: O-2% slopes Moderate: 2-6% slopes	None to Slight	Openland: well suited Woodland: well suited	Sandy Loam Site: 4,000# - 5,000# * Excellent Condition: little bluestem, big bluestem, Indiangrass, switch- grass, sand lovegrass, side oats grama, scribner panicum, and forbs. Pasture group: loamy upland - production potential is medium to high for such species as introduced bermuda grass and weeping lovegrass.		
13 Travis Fine Sandy Loam	Severe: Perme- ability	Moderate: 1-7% slopes Slope Severe: 7%-Up slopes Slope perme- ability of sub- stratum	Moderate: shrink- swell corrosivity	Moderate: traffic supporting capacity shrink- swell	Slight	Slight	Slight: 0-2% slope Moderate: 2-6% slope Slope Severe: 6-8% slopes Slope	Slight	Openland: well suited Woodland: suited	Sandy Loam Site: 2,500# - 4,000# * Good to excellent condition: Indian- grass, little bluestem, big blue- stem, beaked panicum, purpletop, brownseed paspalum, post oak, and blackjack oak.		

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

			<u></u>	So	il Ratings	and Adverse	Features Af	fecting:		
······································	Sewage	Disposal		·					, ,	
Soil Series	Filter Fields	Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
8 Trinity Clay 9 Trinity Clay, Frequently Flooded	Sever∈: Perme- ability, flood hazard	Slight: organic matter less than 2% Moderate: organic matter more than 2%	Severe: wetness flooding hazard shrink- swell potential, corrosivity	Severe: shrink- swell potential flood hazard, traffic supporting capacity	Severe: flood hazard perme- ability texture	Severe: texture	Severe: flood hazard perme- ability texture	Severe: texture	Openland: suited Woodland: suited	Clayey Bottomland Site: 5,000# - 10,000# * Excellent Condition: Eastern gamagrass, Virginia wildrye, little bluestem, purpletop, switch- cane, vine-mesquite, plumegrass, beaked panicum, meadow dropseed, and stipa. Pasture group: heavy, clayey bottom- land - production is high for such species as improved bermuda grass.
10 Frio Clay Loam 11 Frio Clay Loam Frequently Flooded	Severe: Perme- ability flood hazard	Slight:	Severe: Corrosivity, flood hazard	Moderate: floods less than once in 5 years; shrink- swell Severe: floods more often than once in 5 years	Moderate: perme- ability texture, no flood hazard during season of use Severe: flood hazard during season of use	Moderate: flood hazard texture	Moderate: perme- ability texture flood hazard less than once in 2 years Severe: flood hazard more than once in 2 years in season of use	Moderate: texture	Openland: suited Woodland: well suited	Bottomland Site: 3,500# - 6,500# * Excellent Condition: big bluestem, little bluestem, switchgrass, In- diangrass, Texas wintergrass, and Virginia wildrye. Pasture group: friable, clayey bottomland. Adapted species include improved bermuda grass, Johnsongrass, and kliengrass.

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DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

a				So	il Ratings	and Adverse	Features A	ffecting:		
Soil Series	<u>Sewage</u> Filter Fields	Disposal Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
6 Krum Clay	Severe: perme- ability	Severe: 0-2% slopes Moderate: 2-7% slopes	Severe: shrink- swell; corrosivity bearing strength	Severe: traffic supporting capacity; shrink- swell	Severe: texture	Severe: texture	Severe: texture	Severe: texture	Openland: well suited Woodland: suited	Rolling Blackland Site: 4,500- 8,000 * Excellent condition: big bluestem, little bluestem, Indian- grass, Eastern gamagrass, switch- grass, sideoats grama, Virginia wildrye and vine mesquite Pasture group: friable, clayey up- land, adapted species include im- proved bermudagrass, Johnsongrass, kleingrass, indiangrass, switch- grass, weeping lovegrass, King Ranch bluestem, kleberg bluestem
7 Lindy Clay	Severe: Depth to bedrock	Severe: Depth to bedrock	Severe: High shrink- swell potential	Severe: Depth to bedrock	Moderate: Perme- ability	Slight:	Moderate: Perme- ability	Slight:	Openland: well suited Brushland: well suited	Redland Site: 3,000# - 5,000# * Excellent condition: big bluestem, little bluestem, Indiangrass, plains lovegrass, and Canada wild- rye. Pasture Group: friable,clayey up- land; bermudagrass,Johnsongrass, kleingrass, Indiangrass, switch- grass, King Ranch bluestem, weeping lovegrass, kleberg bluestem.

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

			· · · · · · · · · · · · · · · · · · ·	So	il Ratings	and Adverse	Features Af	fecting:		
Soil S <u>eries</u>	<u>Sewage [</u> Filter Fields	Disposal Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
3 San Saba Clay	Severe: perme- ability	Severe: bedrock	Severe: bearing strength: shrink- swell potential; corrosivity	Severe: traffic supporting capacity; shrink- swell potential; bedrock	Severe: perme- ability: texture	Severe: texture	Severe: perme- ability texture	Severe: texture	Openland: suited - clay texture Woodland: poorly suited plastic clay	Deep upland Site - 3,500 6,000 * Excellent condition: little bluestem, big bluestem, indiangrass, switch- grass, sideoats grawa, tall dropseed, Texas wintergrass, and live oaks. Pasture group is heavy, clayey up- land adapted species include improv- ed bermudagrass, kleingrass, King Ranch bluestem, and kleberg bluestem
4 Lewis- ville Silty Clay	Moderate: perme- ability	Slight to Moderate: perme- ability below 3 inches	Severe: Shrink- swell corrosivity bearing strength	Severe: traffic supporting capacity shrink- swell	Severe: soil texture	Severe: texture	Severe: soil texture slope	Severe: soil texture	Openland: suited Woodland: well suited	Rolling Blackland Site: 5,000-8,000 * Excellent condition: Indiangrass, big bluestem, switchgrass, little bluestem, Florida paspalum, Virginia wildrye.
5 Bolar Clay Loam	Severe: depth to bedrock	Severe: depth to bedrock	Severe: 4-8% slope depth to bedrock Moderate: 1-4% slope Moderate shrink- swell	Severe: plastic soil material, depth to bedrock	Slight: loam texture All other moderate texture or course fragments	Slight loam texture All other moderate texture	Slight loam texture 1-2% slopes Moderate: 2-6% slopes All other: 1-6% slopes Moderate 6-8% slopes severe	Slight loam texture All other moderate	Openland: well suited on 1-5% slopes well suited on 5-8% slopes suited on stoney phases 8-12% slope Woodland: well suited on 1-5% slope and 5-8% slope suited on stony phase 8-12% slope	Deep Upland Site - 3,500-5,500 * Excellent condition: Indiangrass, switchgrass, big bluestem, tall dropseed, Texas wintergrass and scattered live oak motts. Pasture and Hayland Suitability - 1-8% slope fiable, clayey upland to sloping fiable, clayey upland - medium to high production potential for bermudagrass and kleingrass.

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DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, TARRANT AND PARKER COUNTIES, TEXAS

				· .						
				So	il Ratings	and Adverse	Features A	ffecting:	· · · · · · · · · · · · · · · · · · ·	
Soil Series	<u>Sewage D</u> Filter Fields	isposal Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play- grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production, and Plants
l Wilson Clay Loam	Severe: perme- ability	Slight: O-2% slopes Moderate: 2-5% slopes	Severe: shrink-swell potential, corrosivity uncoated steel	Severe: shrink- swell potential traffic supporting capacity	Severe: perme- ability wetness	Moderate: wetness texture	Severe: perme- ability	Moderate: Wetress texture	Openland: well suited Woodland: suited	Grayland Range Site: 3,500-6,500 * Excellent conditions: little blue- stem, indiangrass, big bluestem, Virginia wildrye, vine-mesquite, Florida paspalum, sideoats, grama, Texas wintergrass, silver bluestem, tall dropseed, hairy dropseed, plains lovegrass, forbs and sedges.
2 Houston Black Clay	Severe: very slow perme- ability	Slight: 0-2% slopes Moderate: slopes exceed 2%	Severe: very high shrink- swell potential; corrosivity	Severe: very poor supporting capacity	Severe: clay texture very slow perme- ability	Severe: clay texture	Severe: clay texture; very slow perme- ability	Severe: clay texture	Openland: slight Woodland: severe - no woodland	Rolling Blackland Site: 6,000-10,000* Excellent conditions: big bluestem, little bluestem, indiangrass, and switchgrass. Pasture group is heavy, clayey upland, adapted to such spe- cies as improved bermudagrass and kleingrass.

VALUES FOR RATING DEGREE OF LIMITATION OF SOILS FOR SPECIFIED USES:

None to slight:	The soil has no limitation or no more tha	some limitation. The limitation is not serious and is easy to overcome.
Moderate:	The soil has moderate limitation to use. by means that in general are practical.	The limitation needs to be recognized, but it can be overcome or corrected

Severe: The soil has severe limitation. Use of the soil is questionable because the limitation is difficult to overcome.

* Pounds of estimated production of air dry herbage per acre per year.



II. LAND AND WATER USE PLANNING

2.01 General

A. <u>Trends</u>:

A major portion of the surrounding lands are owned by major landholders and are presently used for ranching. Due to the close proximity with the cities of Fort Worth and Benbrook, housing developments will eventually influence the recreation trends toward urban usage. Overnight usage will be further minimized and urban park playgrounds will be increasing in demand. Residential developments on the west and southwest portions of the lake adjoin Government-owned land and have expanded considerably since 1966. St. Francis Village, a residential complex for serior citizens, is located on the eastern side of the lake next to Rocky Creek park. A large portion of the eastern shore ine connecting Longhorn and Rocky Creek Parks, amounting to 1,207.00 acres, has been recently acquired. This area has been under joint possession since 30 July 1971 and was acquired as of 31 January 1972.

B. <u>Objectives</u>:

The basic objective of land planning is to provide proper stewardship of the land and its resources through protection, development, and management. To help meet present and future needs in consonance with the land capability and aesthetics of the area, lands will be allocated as changing needs and priorities dictate. All current Federally-owned government project lands are considered necessary to meet the current and future needs of the project. Woodland areas and desirable grasses will not be disturbed unless a more desirable vegetative type will benefit the area. Improvements and revegetation will be accomplished through lease agreements and comprehensive vegetative management plans and practices. Erosion control and revegetative practices will be in accordance with the Resource Management Plans required by Engineer Regulation 1130-2-400 and in accordance with Federal, state, and local governments. Water areas are planned for specific activities to minimize safety hazards allowing maximum utilization of the water areas available. These areas will be marked for their intended use.

2.02 Types of Usage

A. Land Planning

1. General Planning:

A general land use map indicating the various types of usage is shown on Plate 2.1 following page 31. Descriptions of these areas are printed in Table 4, page 31.

2. Park Planning:

A more detailed plan is shown on the individual park plates. A description of the areas, indicating their usage and amount of existing and proposed development is shown on the pages preceding the individual park plates. See Plates 3.2, 3.3, 3.4, 3.5, and 3.6 following pages 50, 54, 58, 62, and 66 respectively.

3. Outgrants

a. General:

The Resource Manager will maintain an up-to-date listing of all outgrants and their locations which will be readily available at the project office.

b. Interim Use:

The Land Use Planning Map, Plate 2.1 indicates the proposed land allocation. Lands may be leased for programs for management of fish and wildlife, project operations, non-profit group organizations, and soil and vegetative restoration. All grazing leases will be primarily for purposes of wildlife management or vegetative restoration. Stocking will be by animal-unit per month (AUM) based on the lands carrying capacity. At present, there are two concessionaires located on Benbrook Lake. One is located in Dutch Branch Park and the other in Rocky Creek Park.

c. Easements:

All outgrants, including easements for roads and utility lines, will be processed on an individual case basis through the Project Resource Manager with final approval granted at the District Office. The policy of attempting to have roads and utility lines located on privately owned lands, where feasible, to minimize any adverse aesthetic efforts on Government-owned lands will be adhered to.

B. <u>Water Planning</u>:

A water planning map showing the various planned water areas is shown on Plate 2.2 following page 32. Descriptions of these areas are printed in Table 5, page 32.

LAND USE PLANNING

USE	DESCRIPTION		REFERENCE LOCATION	ACRES
Recreational Areas	Areas under constant intense use with a variety of activities and development. Marina concessions are located in Dutch Branch and Rocky Creek Parks. The Pecan Valley golf course is located in Longhorn Park.		1 Corps of Engineers Management 2 Management by Others	2,896
Aesthetics Areas and Multiple Use Recreation Areas	Natural areas under vegetative and wildlife management; rec- reation activities do not re- quire support facilities. Limited hunting is permitted.		3	1,254
Special Use Areas	Areas set aside for the handi- capped and special youth groups to be used on a reservation ba- sis administered by local non- profit groups.	•	4 Handicapped Area 5	51 95
			Group Camp	
Wildlife Area	Wildlife and waterfowl in this area will be free from human threat since hunting will not be permitted. This area will be accessible only by trails and boats.		6	193
Operation and Maintenance	Pertinent works and project headquarters area.		7	176
	· · · ·		SUB TOTAL	4,665
Flowage Easement	These land areas provide for periodic inundation by lake waters. Buildings for human habitation will not be con- structed on these lands.		8	2,823
	TOTAL LA	ND US	SE ACREAGE	7,488



WATER USE PLANNING

USE	DESCRIPTION	REFERENCE LOCATION
Swimming Area	Swimming and related activities are allowed. No boats or fish- ing will be permitted.	1
Restricted Area	To insure visitor safety, the water area within 300 feet of the dam and pertinent works is restricted from public use.	2
Skiing, Sailing, and Power Boat- ing Area	Area has sufficient amount of depth and is clear of debris to provide the necessary space for these activities. Boat fishing is prohibited from sunrise to sunset during the peak recreation season	3
Fishing and Low Speed Boating Area	Area to be used by fishermen, canoeists, and low speed boating enthusiasts.	4
•		
	Total Water Use Acreage	3,770 *
	Total Land Fee Acreage	4,665
	Total Fee Acreage	8,435 **
	Total Land Easement Acreage	2,823
	Total Acreage	11,258

* Surface acreage at Conservation Pool Elevation 694 Feet Mean Sea Level.
** Acreage shown is in accordance with GSA Form 1166, dated 30 June 1971.



3.01 General

The plan is designed to be flexible enough to meet variable conditions and changing needs. It is to serve as a guide for the comprehensive management and development of the lake through sound planning principles and basic site design criteria. Appropriate provisions are included in the plan for providing recreational facilities for current and projected design loads. It is also proposed to provide sufficient services to meet the visitor's needs and demands within the desired carrying capacity of the resource.

3.02 Ecological Considerations:

Areas disignated for public use as well as those designated for other land uses should be continually observed by project personnel to detect ecological imbalances, for example: soil erosion, vegetative wear due to heavy foot and/or vehicular traffic. Areas in question should, be referred to qualified personnel at project level or District level as appropriate.

3.03 Environmental Statement:

Reference is made to the requirement set forth in the National Environmental Policy Act of 1969 (Public Law 91-190). Environmental Impact Statements are not required by law for existing projects, but they are to be prepared in the future in accordance with SWD and OCE guidance previously received.

3.04 Methodology:

Factors considered in selecting the areas for recreational development as presented in this Revised Master Plan are as follows:

A. Access to existing roads

B. Topography of the area

C. Scenery

D. Location of the area with respect to the usable exposure of water for recreational activities

E. Degree of shelter for proctection

F. Water depths

G. Existing land use

H. Drainage

I. Soils surveys

J. Wind - velocity and direction

3.05 <u>Recreation Facilities</u>:

The following concepts were used in this plan:

A. Provide adequate facilities to handle the present and future annual visitation.

B. Limit the development of recreational facilities to the desired carrying capacity of the area for protection of the resources.

3.06 <u>Analyses</u>:

Analyses were conducted to determine visitation projections, ultimate carrying capacity, and facilities required. The desired carrying capacity has not yet been determined. It will be determined in the future according to criteria outlined in paragraph C, page 36.

A. Visitation Projection Analysis:

In formulating the estimated recreation visits the population within the day-use market area was projected through the year 2020. The population projections for Benbrook Lake are based on a Series C population projection. The day use market area (the geographical area from which 80 percent of the daytime users originate) was determined to be 25 miles. The population projection for the market area is:

POPULATIONS PROJECTIONS FOR THE MARKET AREA											
		(<u>SERIES</u> C	POPULATION	<u>s</u>)							
<u>1970</u>	1980	1990	2000	2010	2020						
712,275	831,701	975,059	1,120,276	1,284,706	1,464,550						

The per capita use rate for Benbrook's 25 mile zone was computed for 1970 and was adjusted through 2020. The existing per capita use rate is 3.22.

* The per capita rate factors used to adjust the existing per capita use rate thorugh 2020 are:

1970	1980	1990	2000	2010	2020
1.00	1.22	1.44	1.62	1.80	1.96

The adjusted per capita use rate vas applied to the population projections to arrive at the estimated visitation expected to originate from the day-use market area. Then, by addirg the additional projected visitation which originates beyond the day-use market area (amounting to 20 percent of the total visitation), the total projected participation demand was computed. The projected annual visitation at Benbrook Lake, based on the above population projections and per capita use participation rates are:

Year	Projected Annual Visitation *
1972	2,531,700
1976	2,808,400
1980	3,269,600
1990	4,553,000
2000	5,972,600
2010	7,608,100
2020	9,433,900

3,000,000 = Ultimate Capacity

* Based on Project Area Evaluation 1/ by Recreation Section, Sacremento District, dated November 1968.

B. <u>Ultimate Carrying Capacity</u>:

A combination of related aspects which concern the ability of the project resources to sustain intense use were studied to determine an ultimate carrying acpacity. This ultimate capacity is estimated to be 3,000,000. This figure is a reflection of the aspects of size, location, sustained ecological balance, and other characteristics of the project. At Benbrook Lake, the projected visitation demand in the year 1980 is greater than the anticipated carrying acpacity of the project resources. Future updates will reflect ary changes in this capacity due to changing conditions.

C. Desired Carrying Capacity:

The lands adjacent to the lake have a definite desired carrying capacity for recreation use. This capacity will be less than the ultimate carrying capacity, thereby eliminating overuse, deterioration, and misuse by the visiting pbulic. As of this date the desired carrying capacity has not been determined. Field office and district personnel shall monitor site deterioration in conjunction with user density and the influencing factors listed below to develop a desired carrying capacity for the natural resources at this project.

- 1. Access
- 2. Slope
- 3. Existing vegetation
- 4. Ecological consideration
- 5. Existing land use
- 6. Aesthetics
- 7. Scenic vistas
- 8. Drainage and soil types
- 9. Orientation sun and wind (See Wind Rose Index)
- 10. Social Interaction Zones

These factors will precede the detailed site planning phase at the time funds are appropriated for construction of the planned facilities listed in this Master Plan.

D. Facilities Analysis:

Current and projected recreation visitation was broken into the following divisions:

- 1. Design day load
- 2. Picnicking
- 3. Camping
- 4. Boat ramps for boating, fishing, and skiing
- 5. Beaches for swimming

For facility requirement computations see the following Tables 6, 7, 8, 9, and 10, pages 39, 40, 41, 42, and 42 respectively.

E. Future Development:

The ultimate carrying capacity for public use at Benbrook Lake was estimated to be 3,000,000 visitors annually. Facility requirements, determined by the recreation analysis, to support the ultimate visitation is 321 picnic units and 1,892 camping units. Based on site analysis during field reconnaissance the revised Master Plan supports a total of 523 picnic units and 250 camping units. The number of facilities required by the recreation analysis reflects demand, while the number of facilities supported in the Master Plan reflects a measure of what can be supplied in areas that are feasible for development without permanent damage to the resource. Only through additional land acquisition or through intensive resource management, including visitor and physical resource management (tree planting, etc.) can existing land areas currently not feasible for development be made desirable for recreational development. To approximate the ultimate number of camp units, as determined by the recreational analysis, there are approximately 250 picnic units located in Holiday, Mustang, and Rocky Creek Parks that may be developed as camp sites. However, these areas are not ideally suited for campground development, but may accommodate the user during such peak demand periods as the Memorial Day or 4th of July weekends. Tree planting and other revegetative practices should begin immediately in those areas scheduled for future development. See paragraph 4, page 45.



WIND ROSE INDEX



This wind rose index represents the approximate regional conditions only, and is taken from data representing the nearest U.S. Weather Bureau data collection location.

Airport:	Greater Southwest International
Location:	Fort Worth, Texas
Source:	U.S. Weather Bureau
Period:	August 1953 - July 1958

FACILITY REQUIREMENTS - FY 73

Project: Benbrook

Total annual attendance: 2,531,700 Design load computations: 22,357

Design Day Load

2,531,700 total annual attendance X 0.41 visits during summer months X 0.56 which occurs on weekends = 581,278 total number of weekend users.

Total number of weekend users \div 26 weekend days = 22,357 design day load.

Picnicking

Design day load X C.17 of total are picnickers = number of picnickers.

Number of picnickers X 0.40 of picnickers requiring facilities = number of picnickers requiring facilities.

Number of picnickers requiring facilities \div turnover rate of 2 \div 2.8 persons per vehicle = 271 picnic units required.

Camping

Design day load X (.20 of total are campers = number of campers.

Number of campers : 2.8 persons per vehicle = 1,597 camping units required.

Boat Ramps

Design day load : load factor of 2.8 = number of vehicles.

Number of vehicles X 0.25 of vehicles with boats = number of boats.

Number of boats : 60 launchings per day = 33 boat launching ramps required.

Beaches

Design day load X 0.23 swimmers = number of swimmers.

Number of swimmers X 0.60 swimmers on beach = number of beach users.

Number of beach users \div turnover rate of 3 = number of users on beach at any one time.

Number of users on beach at same time X 50 square feet of beach per person = 1.18 acres of land area required for sand beaches.

Number of swimmers X 0.30 are swimmers in water = number of swimmers in water.

Number of swimmers in water \div turnover rate of 3 = number of swimmers in water at any one time.

Number of swimmers in the water at any one time $\frac{1}{2}$ 100 square feet of water surface per user = 1.18 acres water surface required.

FACILITY REQUIREMENTS - FY 74

Project: Benbrook

Total annual attendance: 2,623,900

Design load computations: 23,171

Design Day Load

2,623,900 total annual attendance X 0.41 visits during summer months X 0.56 which occurs on weekends = 602,447 total number of weekend users.

Total number of weekend users \div 26 weekend days = 23,171 design day load.

Picnicking

Design day load X 0 17 of total are picnickers = number of picnickers.

Number of picnickers X 0.40 of picnickers requiring facilities = number of picnickers requiring facilities.

Number of picnickers requiring facilities : turnover rate of 2 : 2.8 persons per vehicle = 281 picnic units required.

Camping

Design day load X 0.20 of total are campers = number of campers.

Number of campers \div 2.8 persons per vehicle = 1,655 camping units required.

Boat Ramps

Design day load : load facotr of 2.8 = number of vehicles.

Number of vehicles X 0.25 of vehicles with boats = number of boats.

Number of boats : 60 launchings per day = 34 boat launching ramps required.

Beaches

Design day load X 0.23 swimmers = number of swimmers.

Number of swimmers X 0.60 swimmers on beach = number of beach users.

Number of beach users \div turnover rate of 3 = number of users on beach at any one time.

Number of users on beach at same time X = 50 square feet of beach per person = 1.22 acres of land area required for sand beaches.

Number of swimmers X 0.30 are swimmers in water = number of swimmers in water.

Number of swimmers in water \div turnover rate of 3 = number of swimmers in water at any one time.

Number of swimmers in the water at any one time X_0^2 100 square feet of water surface per user = 1.22 acres water surface required.

TABLE 8FACILITY REQUIREMENTS - FY 75

Project: Benbrook

Total annual attendance: 2,716,200 Design load computations: 23,986

Design Day Load

2,761,200 total annual attendance X 0.41 visits during summer months X 0.56 which occurs on weekends = 623,640 total number of weekend users.

Total number of weekend users \div 26 weekend days = 23,986 design day load.

Picnicking

Design day load X 0.17 of total are picnickers = number of picnickers.

Number of picnickers X 0.40 of picnickers requiring facilities = number of picnickers requiring facilities.

Number of picnickers requiring facilities \div turnover rate of 2 \div 2.8 persons per vehicle = 291 picnic units required.

Camping

Design day load X 0.20 of total are campers = number of campers.

Number of campers $\div 2.8$ persons per vehicle = 1,713 camping units required.

. Boat Ramps

Design day load \div load facotr of 2.8 = number of vehicles.

Number of vehicles X 0.25 of vehicles with boats = number of boats.

Number of boats : 60 launchings per day = 36 boat launching ramps required.

Beaches

Design day load X 0.23 swimmers = number of swimmers.

Number of swimmers X 0.60 swimmers on beach = number of beach users.

Number of beach users \div turnover rate of 3 = number of users on beach at any one time.

Number of users on beach at same time X 50 square feet of beach per person = 1.27 acres of land area required for sand beaches.

Number of swimmers X 0.30 are swimmers in water = number of swimmers in water.

Number of swimmers in water \div turnover rate of 3 \approx number of swimmers in water at any one time.

Number of swimmers in the water at any one time X = 100 square feet of water surface per user = 1.27 acres water surface required.

FACILITY REQUIREMENTS - FY 76

Project: Benbrook

Total annual attendance: 2,808,400

Design load computations: 24,800

Design Day Load

2,808,400 total annual attendance X 0.41 visits during summer months X 0.56 which occurs on weekends = 644,809 total number of weekend users.

Total number of weekend users \div 26 weekend days = 24,800 design day load.

Picnicking

Design day load X 0.17 of total are picnickers = number of picnickers.

Number of picnickers X 0.40 of picnickers requiring facilities = number of picnickers requiring facilities.

Number of picnicke's requiring facilities \div turnover rate of 2 \div 2.8 persons per vehicle = 301 picnic units required.

Camping

Design day load X 0.20 of total are campers = number of campers.

Number of campers < 2.8 persons per vehicle = 1,771 camping units required.

Boat Ramps

Design day load : load factor of 2.8 = number of vehicles.

Number of vehicles X 0.25 of vehicles with boats = number of boats.

Number of boats : 60 launchings per day = 37 boat launching ramps required.

Beaches

Design day load X 0.23 swimmers = number of swimmers.

Number of swimmers X 0.60 swimmers on beach = number of beach users.

Number of beach users \div turnover rate of 3 = number of users on beach at any one time.

Number of users on beach at same time X 50 square feet of beach per person = 1.31 acres of land area required for sand beaches.

Number of swimmers X 0.30 are swimmers in water = number of swimmers in water.

Number of swimmers in water \div turnover rate of 3 = number of swimmers in water at any one time.

Number of swimmers in the water at any one time X 100 square feet of water surface per user = 1.31 acres water surface required.

FACILITY REQUIREMENTS - ULTIMATE

Project: Benbrook

Total annual attendance: 3,000,000 Design load computations: 26,492

Design Day Load

3,000,000 total annual attendance X 0.41 visits during summer months X 0.56 which occurs on weekends = 688,800 total number of weekend users.

Total number of weekend users ÷ 26 weekend days = 26,492 design day load

Picnicking

Design day load X 0.17 of total are picnickers = number of picnickers.

Number of picnickers X 0.40 of picnickers requiring facilities = number of picnickers requiring facilities.

Number of picnickers requiring facilities : turrover rate of 2 : 2.8 persons per vehicle = 321 picnic units required.

Camping

Design day load X U 20 of total are campers = number of campers. Number of campers ÷ 2.8 persons per vehicle = 1,392 camping units required.

Boat Ramps

Design day load : load factor of 2.8 = number of vehicles.

Number of vehicles X 0.25 of vehicles with boats = number of boats.

Number of boats \div 60 launchings per day = 39 boat launching ramps required.

Beaches

Design day load X 0.23 swimmers = number of swimmers.

Number of swimmers X 0.60 swimmers on beach = number of beach users.

Number of beach users \div turnover rate of 3 = number of users on beach at any one time.

Number of users on beach at same time X 50 square feet of beach per person = 1.40 acres of land area required for sand beaches.

Number of swimmers X 0.30 are swimmers in water = number of swimmers in water.

Number of swimmers in water \div turnover rate of 3 = number of swimmers in water at any one time.

Number of swimmers in the water at any one time X 100 square feet of water surface per user = 1.40 acres water surface required.

3.07 Development

A. General Planning Considerations

1. Selection of Areas:

New areas were selected and some old areas were designated or redesignated for camping, picnicking, and other uses based on site characteristics, recreational demands, and resource management objectives. These objectives include, but are not limited to:

a. Control visitor use

- b. Separate non-compatable uses(day use overnight use)
- c. Define activity areas
- d. Manage and control each area as a separate unit
- e. Utilize screened or buffered areas

2. Road Developments:

New area circulation roads have been proposed while some existing roads are scheduled to be deleted. The objectives in constructing new interior circulation roads and deleting some of the old roads are:

a. To provide uniform and defined traffic flow

b. To provide vehicular access to existing and proposed camp or picnic units via means of individual pullouts

c. To prevent excessive through-traffic

d. To provide traffic control in fee areas

The area circulation roads will be plotted in the field. The centerlines of these roads are secondary in importance to the preservation of existing tree cover.

3. Sanitary Facilities:

All existing concrete vault type toilets are scheduled to eventually be converted to waterborne facilities. Additional sanitary facilities are proposed to meet visitor needs and demands. Criteria used in determining the number of sanitary facilities considered two basic concepts:

- a. Anticipated visitor use of each area
- b. Accessibility by visitors within an area
- 4. Additional Picnic and Camp Units:

The number of additional picnic and camp units was based on the recreation analysis in conjunction with a five year development program with respect to the desired carrying capacity of the lake resource. Each area's site characteristics and existing development were considered before any additional units were scheduled. The number of units proposed is lower than that required by the visitation computations due to site characteristics, the influencing social interaction zone, and the lack of available land that can be developed that is within easy access to the shoreline.

5. Traffic Control Gates:

Traffic control gates are proposed at strategic locations. These gates are to be used as management tools and have the following functions:

a. Define and separate areas

b. Provide visitor direction and control

c. Provide control for fee areas

d. Provide a means of closing areas during construction, revegetation, and revitalization periods.

6. Courtesy Docks:

Courtesy docks have been incorporated in the development of public use areas. These facilities are to be located adjacent to boat launching sites and at selected sites within activity areas. Courtesy docks are to be used only for loading or unloading passengers and gear. No boats will be allowed to anchor to the piers except when loading. Appropriate signs will be placed at the piers informing visitors of this restriction.

7. Boat Launching Sites:

One new public boat launching site is proposed as part of the development in this revised plan. This particular site is now used by individuals launching either their own or rented sailboats. The launch area will be designated to accommodate sailboats rather than powerboats. There may be launch facilities proposed for the special use areas (group camp and handicapped area). However, these launch ramps would not ordinarily be used by the general public. Where two or more existing 10 feet wide ramps parallel each other and are separated by grass medians, it is proposed that these ramps be consolidated by construction with reinforced concrete to provide wider ramps.

B. Project Works Area:

No new development is planned for the Master Plan in the Operations and Maintenance area.

C. Parks

1. General Description:

There are five Corps of Engineers parks, two of which are operated by local governments under lease agreements (Longhorn Park and Dutch Branch Park). Rocky Creek Park has been under lease agreement with the City of Fort Worth but was returned to Corps of Engineers management effective 1 February 1972. The development which is proposed in licensed areas will be scheduled by the applicable city government as their fiscal funding allows. Soil conditions, coupled with continuous off-road vehicular traffic, require intense vegetative management. Paved interior circulation roads leading to campsites with paved pullouts have been incorporated in this plan to meet the visitors demand to drive as close to their ultimate destination as possible. This plan, coupled with proper enforcement, will alleviate vegetative and erosion problems created by offroad use of vehicles.

2. Specific Parks:

The following pages illustrate public use areas indicating planned development, present status and future requirements of each park. The location of a planned management area is specified by a numbered "bubble". No specific facility locations are shown because environmental, vegetation, and visitation conditions change constantly. However, planned development has been determined, based on field reconnaissance criteria to assure that the site can accommodate the planned facilities. Specific locations will be determined on-site by qualified personnel prior to construction.

3. Special Use Area Development

a. Youth Group Area:

A youth camp activity area has been designated in accordance with a Department of the Army message cated 4 August 1971. This youth camp will be developed entirely at Federal expense and will be available on a reservation basis to youth groups with primary consideration being given to disadvantaged, inner-city youth groups.

b. Handicapped Recreation Area:

A recreation area for handicapped persons has been designated on the eastern shore, south of Longhorn Park. This area will be developed at Federal expense or on a cost-sharing basis emphasizing facilities which will primarily accommodate handicapped persons. This area will also be available on a reservation basis and administered by a non-profit organization.



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TABLE 11

\$ 136,8

LONGHORN PARK

(728 Acres)

This park includes 63 acres which are adjacent to the east end of the dam and 665 acres which are downstream from the dam embankment. Primary access is from two direction on county roads connecting with U.S. Highway 377 (west) and the City of Fort Worth (east). All of Longhorn Park is licensed to the City of Fort Worth and administered by their Parks and Recreation Department with the exception of an 8 acre observation area maintained by the Corps of Engineers. The primary development of the area below the dam is a 27 hole golf course. Some picnicking areas are also provided. A new Soap Box Derby track was built on the north end of the park in 1971. The 50 year plan of development which the City of Fort Worth submitted with its lease is behind schedule. This plan includes athletic fields, ternis courts, play areas, picnicking facilities, paved roads, and a water system. This area is ideally suited for these uses. It is important that this plan be implemented according to the original schedule. The improvements suggested in this plan for Longhorn Park will compliment the existing urban park atmosphere. It is recommended that the City of Fort Worth return the 55 acres of park area adjacent to the project office for Corps of Engineers management and development. This transfer will enable development and upgrading to be scheduled sooner than the City of Fort Worth can accomplish according to their fiscal management schedule. The proximity of this parcel to the project office will allow better control and management of visitors and will reduce existing resource management problems. The sanitary landfill area located in Management Area Number I should be eliminated as soon as other disposal means can be found.

LONGHORN PARK

(City of Fort Worth)

Management Area	Existing Conditions	5-Year Improvement Plan
l Day Use Area	4 picnic units 1 drinking fountain	
2 Day Use Area	<pre>16 picnic units with- out shelters 1 concrete vault toilet</pre>	
3 Day Use Area	20 picnic units with- out shelters 1 concrete vault toilet 1 drinking fountain 1 water well	
4 Day Use Area (Corps of Engineers)	2 p ^c cnic units with shelters 1 waterborne toilet	l group shelter with 3 tables Foot trails Close existing sanitary land fill
5 Day Use Area (Proposed to be returned to Corps of Engineers Management)	10 picnic units (7 with shelters)	6 picnic units with shelters Pave boat ramp Parking area (10 cars) 3 two car pullouts
6 Natural Area	Gravel pit	Discontinue graveling
Additional Support	ing Facilities	
	8.70 miles paved park road 2.30 miles gravel park road 20,569 sq. yds. paved parking 2 launch ramps - 1 site	660 sq. yds. paved parking 132 sq. yds. paved pullouts 660 sq. yds. paved parking

1.0 mile hiking
2.0 mile surfaced bicycle trail
1 waste treatment plant
TABLE 12

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VORTH, TEXAS	IN THIS COLOR.		BUILDING WATER AREA	



DUTCH BRANCH PARK

(525 Acres)

Dutch Branch Park is on the west side of the lake adjacent to the embankment and spillway. Primary access is from U. S. Highway 377 which is the west boundary of the park. Almost half of the park is under lease agreement with the City of Benbrook. The City of Benbrook administers 205 acres in addition to the Benbrook Marina and Sailing Center concession. The Corps of Engineers manages 320 acres. This area has been annexed into the city limits of Benbrook. The City of Benbrook has no master plan for future development, but have agreed to adopt development suggested by the district and implement it as their fiscal funds allow. This development plan will be attached to the lease agreement. This park attracts a very high visitation due to being one of the primary access points to the lake from Fort Worth. Most visitors are sightseers and picnickers. It is important that Dutch Branch Park create the proper recreation image due to its proximity to the main entrance to the lake. It is presently the only park which the City of Benbrook maintains and thus particularly important to the local residents as an urban open space. The areas managed by the Corps of Engineers are used for swimming and picnicking. The swimming area will be developed to handle summer crowds and will be completely buoyed to separate the power boat channel used by marina customers. The sailing activities will be separated from power boating both in the launching area and in the channel access to avoid accidents. The highest elevation on the west side of the lake lies within this park and is an excellent overlook location. This area will be developed as a combination group shelter and visitor interpretation area. Future urban use will influence this entire area such that an administration area may be needed. This location will also provide for a ranger sub-station, if needed.

DUTCH BRANCH PARK

(City of Benbrook)

Management <u>Area</u>

1 Recreation Area

2 Recreation Area

3 Recreation Area

4 Day Use Area

5 Day Use Area

6 Concession

7 Day Use Area 3 baseball fields 1 masonry toilet 2 picnic units without shelters

Existing Conditions

1 baseball field 1 masonry toilet 3 picnic units (2 with shelters)

3 baseball backstops 4 picnic units with shelters

3 picnic units with shelters Beach area 6 picnic units with shelters

5-Year Improvement Plan

Beach Expan1 parking

Ultinate: no additional facilities

14 picnic units (3
 with shelters)
1 masonry toilet
1 water well
1 drinking fountain

Marina concession Sailing concession 1 boat ramp

- 4 picnic units with shelters
- l concrete vault toilet
- 1 drinking fountain

12 picnic units with shelters

6 two car pullouts Convert existing toilet to waterborne

2 two car pullouts

Ultimate: No additional units

Management Existing Conditions 5-Year Improvement Plan Area 1 picnic unit with 20 picnic units with shelters 8 Day Use Area shelter 10 two car pull outs 2 drinking fountains Ultimate: 30 additional units

> 1 visitor overlook/group sheiter 1 drinking fountain foot trails

1 waterborne toilet

Ultimate: Ranger sub-station

Additional Supporting Facilities

9

Day Use Area

5.20 miles paved

1 picnic unit with

shelter

- park road 2.56 miles gravel
- park road
- 1,630 sq. yds. paved rarking
- 1,180 sq. yds. gravel parking 1 launch ramp, l site

8,160° sq. yds. paved parking

748 sq. yds. paved pullouts 1.4 miles area circulation road (2-way)

2 launch ramps - 1 site 3 traffic control gates 1 waste treatment plant

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACILITIES BENBROOK IAMOUNTS IN THOUSANDS OF DOLLARSI TOTAL: UNIT UNIT COST QUANTITY COST 74 75 76 77 PROJECT-PUBLIC AREA HOLIDAY F.Y.73 THRU E.Y.77 I TEN Sec. Sec. . . . ROADS A PARK ROADS (BIT) MILE: 50,000 0.0 \$ 0.0 0.0 0,1: 0,1:\$ 0,0 0.0 5,0 B PAVE EXIST, GRAVEL PK, RD. C AREA CIRCULATION I-WAY D AREA CIRCULATION 2-WAY 0,0 \$ 0,0 \$ \$ 11,000 \$ 25,000 0.0 0,8 1,5 0,6 0,3 0.0 1,5 \$' 2,5 \$ 16,5 GRAVEL ARKING AREAS \$.0,005:0.0 \$ 0.0 220.0 \$.0,022.0.0 \$ 0.0 3050.0 PAVED (PIT) PAVE EXIST, GRAVEL. PAVED PULLOUTS GRAVEL PULLOUTS GRAVEL PULLOUTS 440,0 0,0 440.0 1100.0 \$ 5.3 0.0 3050.0 792. 132.0 440.0 4414.0 \$ 8,8 AUNCHING WIDE 32 FT.NIDE 3-LANES 50 FT.WIDE 4-LANES 68 FT.WIDE EXTENSIONS 0,0 \$ 0,035 0.0 \$ 0.0 176.0 \$ 6.2. 0.0 176.0 0.0 EACH \$ 43500 0.0 0.0 0.0 \$ 0.0 1.0 1.0 2.0 5 9,0 0.0 \$: 0.200 0,0 S 14,0 20.0 \$ 0:0 4,0 2,0 4,0 EACH. 0.0 5.0 \$ \$ 10,000 0,0 \$ U,0 5,0 0,0 0,0 BATHHOUSE HITH TOILETS SANITARY DUVP STA, [TRAILER] \$ 2,500 0.0 \$ 0.0 0.0 SINITARY DUVP STA, [TRAILER] \$ 2,500 0.0 \$ 0.0 SINITARY DUVP STA, [MARINE] HASTE TREATMENT PLANTS FRAME TOILETS SIDO.000 0.0 \$ 0.0 SIDO.000 0.0 \$ 0.0 SIDO.000 0.0 \$ 0.0 SIDO.000 0.0 SIDO.0000 0.0 SIDO.000 0.0 SIDO.0000 0.0 Í,0 ... 0.0 0.0 2:0 5. 5,1 0.0 0.0 1.0 \$ 100.0 FRAME DISPOSAL PLANTS FRAME TOILETS [CONC: VAULT] VILITIES. KATER DISTRIBUTION LINES ELECTRIC SERVICE I THE \$ 17,440. 0,0 \$ 0,0 1,0 1,0 0,0 1,0 3,0 \$ 17,4 ELECTRIC SERVICE LIVES LIGHT STANDARDS EIC; ELECTRIC HOCKUPS HATER HOCKUPS TCNIC AND CAMPING UNITS. 5 0,355 0,0 5 0,0 15,0 14,0 6,0 14,0 51,0 5' 18,6 UNITS PICNIC UNIIS CAMP UNITS I UNIT=1-TABLE,1=COOKER,AND I-TRASH CAN] 38.0 10.0 0.0 0.0 48.0 5 . 0.0 \$. 0.0 19.2 EACH TABLE SHELTERS ABLE SUELIE SINGLE [1-TABLE] GROUP [3-TABLES] GROUP [10-TASLES] DBSERVATION SHELTERS. 8.0 14.0 107.0 8 EACH. WITH WATEROORNE TOILETS NO TOILETS LDATING DOCKS COUTESY (BOATING) FISHING EACH \$ 24000 0.0 3.0 0.0 3.0 \$ 6.0 CLEANING HOUSE EACH \$ 54000 SKINMING BEACHES 0.0 1.0 0.0 5 0.0 0.0 1,0 2.0 5 10.0 Ĵ0B SIGAS BUCYS PARK ENTRANCE SIGNS DIRECTIONAL SIGNS BULLETIN BOARDS, REG; BOOTHS BUOYS ANCHOR SITE IMPROVEMENT UNDERBRUSHING COLDING DRAINAGE \$ 1,600 0.0 105 \$ 2450 4.0 5 0.0 \$ 0.0 1.0 1:0 1.0 -1,0 2,2 1,0 0,0 GRADING-DRAINAGE Reforestation \$ 16:000 \$ 2:500 0.0 1.0 0.0 1.0 1.0 SEEDING CHANNEL EXCAV. JOB ANDSCAPING TURFING AND LANDSCAPING EACH \$ 0.500 RAFEIC CONTROL GATES 4.0 0.0 5 0.0 0.0 0.0 0.0 2.0 MILE. 500 RAILS HIKING TRAILS BICYCLE TRAILS 0.7 0.3 0.0 \$ 0.0 0.7 0.6 0,0 BRIDGES BRIDGES (STEEL) 4FT ... ₿**, €**, [] []

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NTEPPRETIVE FACILITIES... VISITOR INTERP, CENTER

B

TABLE 13



HOLIDAY PARK

(486 Acres)

This park is located about 2 miles upstream from the dam on the west side of the lake. Access is from Highway 377 on county roads and a project road. The major activity in this area is picnicking although two areas will be developed for camping. Almost all of the land between the water and the surfaced road has very good sightlines to the lake frontage and thus is suitable for picnicking and sightseeing enjoyment. The slope of the shoreline is gentle enough in some areas for swimming. Lands adjacent to this park have been developed with many sub-divisions. It is anticipated that this trend will continue in undeveloped areas adjacent to the park. For this reason much of the border area of the park now serves and will continue to serve as a buffer area between these high-density housing areas and the park. This is especially true of the two overnight use areas. These buffer areas, if they were to be developed, would be indesirable to use due to the adjacent sub-division. For this reason, they will serve as trail areas and for those types of recreation uses that do not require supporting facilities. The grazing lease in the buffer area in Management Area Number 4 should be eliminated at its expiration (December 1972). This portion of the management area will be developed for nature trails.

Management		
Area	Existing Conditions	5-Year Improvement Plan
6 Day Use Area	<pre>11 picnic units; 10 with shelters 1 concrete vault toilet 1 water well</pre>	9 picnic units with shelters Convert existing toilet to waterborne 45 two car pullouts 7 two car pullouts Ultimate: No additional units
7 Day Use Area	8 picnic units; 6 with shelters	<pre>14 picnic units with shelters 7 twc-car pullouts 4 two-car pullouts and 2 shelters Beach 1 change shelter with toilet 1 water well 2 drinking fountains</pre>
		Ultimate: No additional units
8 Camping Area	<pre>22 Camp units; 18 with shelters 1 launch ramp (2 lanes) 1 concrete vault toilet 2 drinking fountains</pre>	20 camp units with shelters and pullouts 22 pullouts Consolidate 2 lane ramp 1 courtesy dock Convert existing toilet to waterborne 5 water hydrants 1 sanitary dump station
		Ultimate: 22 additional camp

Additional Supporting Facilities

- 6.38 miles paved park road4.29 miles gravel park road
- 13,870 sq. yd paved parking 8 launch ramps - 6 sites

0.1 mile paved park road

 1.5 miles area circulation road 1-way
 2.5 miles area circulation road 2-way
 5,514 sq. yd. paved parking

units; 1 camper service building

1 waste treatment plant
4 traffic control gates

HOLIDAY PARK

Management Area	Existing Conditions	5-Year Improvement Plan
l Day Use Area	3 picnic units with shelters 1 concrete vault toilet	Convert existing toilet to waterborne l drinking fountain l two-car pullout
	•	Ultimate: No additional units
2 Day Use Area	8 ວ໋cnic units with srelters	<pre>16 picnic units with shelters 8 two-car pullouts 4 two-car pullouts Beach 1 change shelter with toilet 1 water well 2 drinking fountains</pre>
	·	Ultimate: No additional units
3 Day Use Area	9 prenic units; 8 with shelters 1 concrete vault toilet 1 launch site	<pre>12 picnic units with shelters Convert existing toilet to waterborne 6 two-car pullouts 4 two-car pullouts 1 courtesy dock 3 drinking fountains Ultimate: 24 additional picnic units</pre>
4 Camping Area	9 camp units; 3 with shelters	<pre>10 camp units with shelters and pullouts 7 pullouts for existing units 3 water hydrants Foot trails 1 sanitary dump station</pre>
		ortinate: No additional units
5 Camping Area	<pre>10 camp units; 8 with shelters 1 concrete vault toilet 2 drinking fountains 1 launch ramp (2 lanes)</pre>	<pre>18 camp units with shelters and pullouts Convert existing toilet to waterborne 3 water hydrant Consolidate existing two land launch ramp 10 pullouts and shelters 1 courtesy dock</pre>
		Ultimate: No additional units



TABLE 14

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3 POAT LAUNCHING RAMPS_[CONC] A 1-LANE: 14 FT, HIDE B 2-LANES 32 FT, HIDE C 3-LANES 50 FT, HIDE C 3-LANES 50 FT, HIDE	<u>S,Y</u> ,			·····			· · · · · · · · · · · · · · · · · · ·	 Kopis on Sec. In Sec. Manufacture (Sec. Sec. Sec. Sec. Sec. Sec. Sec. Sec.	
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A HELLS (PRESSURE TYPE)	EACH \$ 4,500	1,0 \$	4,5	0,0	0,0	0.0	<u>ġ</u> iġ	1,0 S	415
B LAKE PUMP AND FILTER C DRINKING FOUNTAINS	\$ 0.200	2:0 \$	1,8	3,0	6,0	0,0	······0.0	18,0 \$	3,6
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B CONVERT TO WATERBORNE TOILE C MASONRY CONC.VAULT TOILETS	TS \$ 10,000	3,0 \$	30,0	0.0	0,0	0.0	0,0	3,0 \$	30,0
D SERVICE BLG, IMITH TOILETS, Showers, Laundry Facilities E Bathhouse with Toilets	\$ 45 000	<u>0</u> ,0 \$		0.0	1,0	0 ŧ Ŏ	0,0	1.0 \$	45,0
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D BUOYS ANCHOR		•			···· ···· ··· ··· ··· ··· ··· ··· ···				
A UNDERBRUSHING	J08 \$ 2,550	0.0 \$	0.0	1,0	1.0	0.0	0,0	2,0 \$	2,5
B GRADING-DRAINAGE C REFORESTATION	\$ 40,000	0,0 \$	0.0	1.0	1.0	1.0	Ĩ.0	4.0 \$	40.0
D SEEDING E CHANNEL EXCAV.	\$ 2,500	0,0 \$	0,0	1,0	1,0	0.0	0,0	2.0 \$	2,5
14 LANDSCAPING A TURFING AND LANDSCAPING	Ĵ08								
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16 TRAILS	MILE			····		••••	· • • •	210 ×	71¥
B CICYCLE TRAILS	. . 		•						
A FOOT BRIDGESISTEELJAFT, A FOOT BRIDGESISTEELJAFT, A VISITOR INTERP, CENTER	5 0.100 EACH	0 • 0 · 5	0.0	0.0	50.0	Ø•Ö	0,0	50,0 S	\$ • 0
IDIALS	· · · · · · · · · · · · · · · · · · ·	5	146,8					S	385,9

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MUSTANG PARK

(732 Acres)

This area is located between Bear and Mustang Creeks where they enter the main body of the lake. It also includes an area of 100 acres west of Bear Creek. Access is from U.S. Highway 377 and FM Highway 1187. It is one of the more popular areas for swimming, camping, and fishing. The secluded location of this park is desirable for those activities. Subdivision developments may eventually surround the lake and could reduce camping usage in this area. However, development will not significanly alter recreation patterns in this park. It will remain one of the better areas of the lake for camping and would be the last park area to be affected by urban development. If camping continues to be a popular activity the 100 picnic units in area 8, as well as the 50 units in areas 2 and 3, can be developed for camp usage. However, an extensive tree-planting program would have to be initiated in these areas in order to provide for a quality recreation experience. The grazing leases presently in this park will not be renewed upon their expiration in order to allow the areas to obtain a natural cover. This action coupled with the tree-planting program will enable future development of these areas. The vegetative improvement program, however, should be initiated as soon as possible. Lack of a formal vegetation program is not sufficient reason to allow them to be grazed. These tree-less 'areas, due to their elevation, will enable future users to obtain good views of the lake.

Management Area Existing Conditions 5-Year Improvement Plan 7 4 Camp units with 40 camp units with shelters Camping Area shelters and pullouts 4 pullouts for existing units 2 frame toilets 1 camper service building 1 water well 7 water hydrants 1 sanitary dump station 1 footbridge Ultimate: No additional units 8 2 picnic units with Day Use Area shelters

Ultimate: 100 additional picnic units

4 1 1 1

Additional Supporting Facilities

8.4 miles paved park road

3.50 miles gravel park
 road
16,280 sq. yd. paved
 parking

5 launch sites - 4 sites

0.9 mile area circulation road
 l-vay
0.6 mile area circulation road

2-way

2,200 sq. yd. paved parking

3,452 sq. yd. paved pullouts 1 waste treatment plant 4 traffic control gates

MUSTANG PARK

	. <i>и</i>	
Management Area	Existing Conditions	5-Year Improvement Plan
l Camping Area	12 camp units; 9 with shelters	<pre>37 camp units with shelters and pullouts 7 pullouts for existing units</pre>
~	l concrete vault toilet	Convert existing toilet to
	2 launch sites	2 courtesy docks 6 water hydrants
		Ultimate: No additional units
2 Day Use Area	Pichic and beach area 1 change shelter with shower	Expand existing beach
		Ultimate: 20 picnic units
3		
Day Use Area		Ultiwate: 30 picnic units
4 Day Use Area	13 picnic units; 6 with shelters	
	l concrete vault toilet	5 two-car pullouts Convert existing toilet to waterborne
	l drinking fountain	2 drinking fountains
	l launch site (2 ramps)	Consolidate two existing ramps and expand parking 1 courtesy dock
		Ultimate: 6 additional units
- · ·	1 	
5 Day Use Area		Ultimate: 16 additional picnic units
6 Camping Area	12 camp units; 6 with shelters	12 camp units with shelters and pullouts
	l launch site l concrete vault toilet	<pre>12 purrouts 1 courtesy dock Convert existing toilet to waterborne</pre>
	l water well	3 water hydrants
		Ultimate: No additional units



TABLE 15

DETAILED ESTIMATE OF COST FOR ADDITIONAL RECREATIONAL FACTI TIES

5

		ENBRUU	ĸ			LAMOUN	ITS IN TH	OUSANDS	OF DOLLA	RSI		
FUBLIC AREA	ROCKY CREEK		••••••• ,	F.Y.73 H	ŲŭĢĘ	Ţ COSTI	[QUANTI	TIES BY	FISCAL Y	TOTAL EARS)	TOTAL QUAN,	COST
ITEM	الم		UNIT - Cost	QUANIIT	Y.	COST	74	75	76	77	E.Y.73 THRU E.	¥ • 77
S ROADS		MILE	50 o0f		<u>.</u> .		• • • •	 				60 n
B PARE EXIST.	GRAVEL PK. RD.		20.000				715		V 1 V		1,2 3	
D AREA CIRCUL D AREA CIRCUL	ATION 1-WAY ATION 2-WAY	s; 5	25,000	0 0.0	5 5	0.0 0.0	0,0 0,5	0.2	0,0 0,0	0.0	0,25	2,2
É CRAVEL: 2 Parking Area	S	5; Y			-	·		• • = • ·	•···· · · · · · · ·			
A PAVED (BIT)	CRAVEL	\$	0.005	ē: 0,0	\$	0.0	1105.0	0,0	0.0	0,0	1105.0 \$	5,3
(AVED PULLO	UIS	\$	0.002	2. 0.0	\$	0.0	484.0	1320.0	0.0	0.0	1804.0 \$	2 . 6
D CRAVEL PULL S BOAT LAUNCHI	NG RAMPS_ICONCI	S.Y.					-					
A G-LANE 14 ELANES 32	FT+WIDE FT+WIDE		·									,
C FALANES 50 D -LANES 68	FT,WIDE FT,WIDE											
E EXTENSIONS	CVCTENS	S FACH	0.035	5. 0.0	5	Q • 0	88.0	0 • D'	0.0	Q.∎Ó	88.0 \$	3,1
A VELLS (PRES	SURE TYPE!	\$	4,500	0.0	\$	0,0	1.0	0 e 1 ⁰	0.0.	0.0	1.0 \$	4,5
C RINKING FO	NU FILIER UNTAINS	\$	0,200	<u>.</u>	\$. Q .Q		······			11,0 5	2,2
SANITARY FAC A HASONRY WAT	ERBORNE TOILETS	EACH.				•••••						
B GONVERT TO	WATERBORNE TOILET C.VAULT TOILETS	'S \$	10,000	0.0	\$	0.0	2.0	0 ; Ce	0.0	0,0	2,0 \$	20:0
D SERVICE BLG	WITH TOILETS,						· · · · · · · · · · · · · · · · · · ·	· . 				·
E ATHHOUSE N	ITH TOILETS		43,000	0,0	\$	0.0	0.0	0 •)*	5.0	0.0	1.0 \$	43,0
6 SANITARY DU	MP STATITRAILER)	\$	24500	0.0	\$	0.0	1,0	0.8	0.0	0.0	1,0 5	2,5
H JANITARY DU 1 Fastê trêat	MP STA,[MARINE] MÊNT PLANTS	\$	100,000	0.0.0	\$	0,0	1.0	0.0	0.0	0.0	1.0 \$	100 0
J VASTE DISPO K ERAME TOTLE	SAL PLANTS			• • • •								
UTILITIES_	leurion linec	JOB .			с.		••••••••••••••••••••••••••••••••••••••	4				• • • • • • • • •
D ELECTRIC SE	RVICE LINES	· · · · · · · · · · · · · · · · · · ·	10,000	0,0	\$.	0.0	0,0	1.0	0,0	0,0	1.0 5	10.0
D FLECTRIC HO	DRUPS	······ ×	1,200	2	2	0.00	110			0.0	2,0 \$	<u>.</u>
E WATER HODKU PICNIC AND C	AMPING UNITS_	EACH:						• • • • • • • • • • • • • • • • • • • •	·····			
A PICNIC UNIT	5	5	0.365	0,0	\$		16.0	10,0	0.0	0,0	26.0 \$	915
11 UNIT=1-TAB	E.1-COOKER, AND	<u>-</u>		0.0	- e	· · · · · · · · · · · · · · · · · · ·	······		11.5.9 n n			· · · · · · · · · · · · · · · · · · ·
feliveðu fauf		art a star martine game	44475	· • • • •	.	••••		42.0 <u>0</u>		· ·	· · · · · · · · · · · · · · · · · · ·	212
A SINGLE LITE	RS AĐĽEJ	EACH.	0,500	0.0	\$	0.0	28.0	26.0	0.0	0.0	54.0 S	27,0
B GROUP [3-TA	BLESI	S	3.000	0.0	8	Q . Q	1.0	0 • 0	0.0	0.0	1.0 \$	3.0
OBSERVATION	SHELTERS.	EACH		- <u> </u>								
B NO TOILETS			···································					-				······
A COURTESY (B)	CS DATING:	EACH:	\$,000	0,0	S	0,0	\$, 0	0.0	0,0	0.0	1.0 \$	2,0
B FISHING C FISH CLEANI	NG HOUSE	\$	5,500 7,500	0+0 0+0	\$. \$	0 • 0 0 • 0	0.0	140	- 0.0	0.0	1.0 S 1.0 S	5,5 7,5
SWIMMING BEA	CHES	EADH	5,000	0.0	- s	0.0	n n	0.0	1.0		1.0 €	5.0
BUNIMPROVED		- 100		, , , , ,	•		····	••••	····	· · · ·		
A PARK ENTRAN	CESIGNS	ήψο.										
C BULLETIN BO	ARDS,REG,ROOTHS.	- S	0.800) <u>ô</u> •ō	2	<u> </u>	7.0	1.0	0.0	0.0	2,0 \$	0.8
D BUOYS _ AND SITE IMPROVE	HORT	JOB										999 - Contenant Conten
A UNDERBRUSHI		F	1,200	0.0	5	Õ • Õ	1.0	1.0	0.0	0 , 0	5°0 2.	1,2
C REFORESTATI	DN	Š	12,000	0.0	s	0.0	1.0	1.0	1.0	0.0	3.0 \$	11.9
E CHANNEL EXC.	A.V	\$ 	2,500	0.0		0.0	1.0	1.0	0.0	0.0	2+0 x	2+5
LANDSCAPING A TURFING AND	LANDSCAPING	ΫŎΒ		47					· · · · · · · · · · · · · · · · · · ·			
GATES A TRAFFIC CON	TROL GATES	EACH	0.500) 0_0	S.	0.0	2.0	2.1	0-0	0.0	- 4.0 S -	2.0
TRAILS		MILE					- T V			······································		
B PICYCLE TRA	IČS	9 3 17	ų • ⊃ Ų Ū	, U+U	•	649 	U e U	V I D.		140	1 0 %	¥ 6 0 -
A FOOT BRIDGES	SISTEEL14ET.	LIEIS	0.100	0.0	5	0.0	0.0	D . O	0.0	50.0	50.0 S	5.0
INTERPRETIVE	FACILITIES_	EACH										(

405.3

s

TOTALS

ROCKY CREEK PARK

(425 Acres)

This park is located on the east side of the lake approximately 3 miles upstream from the dam. Primary access is available over a project access road which connects with local county roads. The entire park had been under a lease agreement with the City of Fort Worth from 1963 until recently. Effective 1 February 1972, the entire park was returned to Corps of Engineers management. The existing marina concession is now a direct agreement between the concessionaire and the Corps of Engineers. The concession operation area is now confined to an area in the middle of the park. The previous agreement leased the entire park to the concessionaire. Most of the land area within this park is used for day use activities although camping activity occurs in the south end of the park. The land area across Rocky Creek from the south end of the park will be used as a nature trail. Access to this area will be across a foot bridge capable of withstanding high water. The fishing area at the north end of the park will receive extensive use by people living in the retirement community adjacent to the park. It is estimated that lands adjoining the park area will enentually be developed for homesites.

·		
Management	Eviating Engiliting	
Area	Existing Facilities	5-Year Improvement Plan
. •		
7 Camping Area	4 camp units	<pre>16 camp units with shelters and pullouts</pre>
	l concrete vault toilet	4 pullouts for existing units Convert existing toilet to waterborne
	l water well	water borne
•	l drinking fountain	3 water hydrants Hiking trails Foot bridge
		Ultimate: No additional units
Additional Supp	porting Facilities	
	l.97 miles paved park road	1.2 miles paved park road
	2.[1 miles gravel park	
	3,213 sq. yd. paved parking	1,105 sq. yd. paved parking
•		1,804 sq. yd. paved pullouts 0.2 mile area circulation road
		1.9 mile area circulation road 2-way
	2,306 sq. yd. gravel parking	
1 · · · · ·	4 launching ramps-3 sites	
		l waste treatment plant

4 traffic control gates

ROCKY CREEK PARK

Management Area

Existing Facilities

1 Fishing Area

2 Picnic Area

2 picnic units with shelters

5-Year Improvement Plan

Fishing pier Fish cleaning house 2 drinking fountains Pave foot trail with rest benches

Ultimate: No additional development

4 picnic units with shelters

2 two-car pullouts 1 two-car pullout for existint units

Ultimate: No additional units

3 License Area

Λ Picnic Area 8 p⁺cnic units; 4 with shelters

1 concrete vault toilet

1 drinking fountain

5 Picnic Area

6 Day Use Area 4 picnic units

- 14 picnic units with shelters 4 table shelters for existing units
- 4 two-car pullouts for existing units

7 two-car pullouts Convert existing toilet to

waterborne

4 drinking fountains

6 additional picnic Ultimate: units

8 picnic units with shelters 4 table shelters for existing units

1 group shelter (3 tables) Sand beach

1 change shelter without toilet

1 water well

Ultimate: No additional units

2 picnic units with shelters 1 launching site (2 ramps)

Consolidate two existing ramps Expand parking 1 courtesy dock

12 additional picnic Ultimate: units





4. Summary of Cost Estimates

a. General:

The cost estimates for the planned development used in the Cost Estimates Tables are based on:

(1) July 1970 price levels

(2) Experienced cost of similar facilities

(3) Estimated cost of facilities not previously

constructed (See Section 3.08)

The projected cost for all recreational facilities through FY 77 under this plan is an increase of \$722,990 over the total projected cost estimate in the Updated Master Plan approved by the Chief of Engineers. The increase in cost is due to the following conditions:

(1) Additional recreational facilities needed to accommodate the general public use of the project as indicated in the Facilities Analysis under Section III of this plan.

(2) Upgrading basic facilities to current standards.

(3) Inclusion of waterborne sanitary facilities,

(4) Increase in unit prices to reflect 1970 price

levels.

b. The planned development cost for FY 73 is shown in Table 16, page 55. The planned development cost through FY 77 is shown in Table 17, page 69. A summary of cost by park is shown in Table ¹⁸, page ⁷⁰.

c. In accordance with the Federal Water Recreation Act (Public Law 89-72), recreation facilities and improvements installed at this project after 30 June 1976 will be on a 50-50 cost sharing basis. The City of Benbrook has expressed an interest in a cost-sharing program for development of Dutch Branch Park. Neither the City of Fort Worth nor the City of Benbrook have filed a letter of intent with the District Engineer.

d. Funds required for operation and maintenance at Benbrook Lake are shown in Table 19, page 71.

SUMMARY OF FACILITIES PLANNED FOR FY 73

Ite	n. Itom	Unit	Planned Fa	cilities FY 73
NO.	1 Lem	UILL	Quantity	Cost
١.	Roads:	Mile		
	b. Pave Exist. Gravel Park Road			
	c. Area Circulation 1-way			
	d. Area Circulation 2-way			
2.	Parking Areas:	Sa.Yd.		
	a. Paved (Bit.)			
	b. Pave Existing Gravel	and the second		
	d. Gravel Pullouts	•	· · · · · · · · · · · · · · · · · · ·	
3.	Boat Launching Ramps: (Conc)	Sq.Yd.	·	
	a. 1-Lane 14 ft. wide	• •		
	c. 3-Lanes 50 ft. wide			
	d. 4-Lanes 68 ft. wide			
n	e. Extensions Mater Supply Systems:	Each		
4.	a. Wells (pressure type)	Lati	1.0	4,500.
	b. Lake Pump and Filter			_
۲.	c. Drinking Fountains	Fach	9.0	1,800.
J.	a. Masonry Waterborne Toilets	Lach		
	b. Convert to W. terborne Toilets		3.0	30,000.
	c. Masonry Concrete Vault Toilets,		e que	
	toilets, laundry facilities)			
	e. Bathhouse, no. toilets	•••		
	f. Bathhouse with toilets a Sanitary Duke Station (Trailer)	••	10	2 500
	h. Sanitary Duop Station (Marine)		1.0	2,500.
	1. Waste Treatment Plants		1.0	100,000.
	j. Waste Disposal Plant k. Frame Toilets (Cope Vault)			
6.	Utilities:	Job	·	
	a. Water Distribution Lines		1.0	7,548.
	D. Electric Service Lines c Light Stangards, Etc.		1.0	500
	d. Electric Hookups			
-,	e. Water Hookups	Feeb		
1.	A. Picnic Units:	Lach		
	b. Camp Units (1 Unit = 1 cooker		•	
0	and 1 trash can)	r		
٥.	a, Single (1 Table)	Each		
	b. Group (3 Tables)			
^	c. Group (10 Tables)	C		
9.	a. With Waterborne Toilets	cach		
	b. No Toilets			
0.	Floating Docks:	Each		
	a. courtesy (Boating) b. Fishing			
	c. Fish Cleaning House			
1.	Swinning Beaches	Each		
	b. Unimproved	Van		
2.	Signs and Buoys:	Job		
	a. Park Entrance Signs	•••		
	b. Directional Signs			
•	d. Buoys and Anchor			
3.	Site Improvement:	Job		
	a. Underbrushing	•		
	c. Reforestation	•		
	d. Seeding			
٨	e. Channel Excav.	1		
	a. Turfing and Landscaping	000		
5.	Gates:	Each		
6	a. Traffic Control Gates	W27-		
υ.	a. Hiking Trails	mile		
_	b. Bicycle Trails			
7.	Bridges	L.F.		
8.	a. FOUL DEFEDSES (STEEL) 4 Ft. Interpretive Facilities	Fach		·
	a. Visitor Interp. Center	÷u vi		
		*~~-		A 345 3
		IUIA	L DIRECT COST	\$ 145,848.

TOTAL DIRECT COST ENGINEERING AND DESIGN SUPERVISION AND ADMINISTRATION

TOTAL

\$ 146,848. 13,215. 8,811. \$ 168,875.

(Unit costs are reflected on individual park cost estimates)

TOTAL EXISTING AND PLANNED FACILITIES

_		•	Existing Fac.	Discussion	
Ite No.		Unit	Quantity	Quantity	Cost
-					
1.	Roads: a. Park Roads (Bit.)	Mile	21.4	1.3	\$ 65,000.
	b. Pave Existing Gravel Pk. Rd.				• ••••••
	c. Area Circulation, 1-Way d Area Circulation 2-Way	•		2.6 6 4	28,600. 160,000
	e. Gravel		10.3	0.4	100,000.
2.	Parking Areas:	Sq. Yd.	20 /00 0	13 225 0	63 490
	b. Pave Existing Gravel		23,430.0	13,223,0	05,400,
	c. Paved Pullouts			10,550.0	21,100.
3.	Boat Launching Ramps: (Conc.)	Sq. Yd.			
	a. 1-Lane , 14 Ft. Wide	•	17.0	100 0	14 010
	c. 3-Lanes, 32 Ft. Wide			426.0	14,910.
	d. 4-Lanes, 68 Ft. Wide				10 000
4.	e. Extensions Water Supply Systems:	Each		352.0	12,320.
	a. Wells (Pressure Type)		12.0	4.0	18,000.
	 b. Lake Pump and Filter c. Drinking Fountains 		16.0	. 52.0	10.400.
5.	Sanitary Facilities:	Each		\$N10	10,100,
	a. Masonry Waterborne loilets b. Convert To Waterborne Toilets		1.0	11.0	110.000
	c. Masonry Con Vault Toilets		15.0		,
	d. Service Building (With Toilets Showers, Laundry Facilities)	9		1.0	45,000
	e. Bathhouse With Toilets		0	3.0	129,000.
	f. Bathhouse With No Toilets G. Sanitary Duran Station (Trailer)	}		1.0	8,000.
	h. Sanitary Dump Station (Marine)	,		J.	12,000.
	i. Waste Treatment Plants			5.0	500,000.
	k. Frame Toile's (Conc. Vault)	•	2.0		
6.	Utilities:	Jop	11 698 0	10.0	41 340
	b. Electric Service Lines		As Regid	3.0	14,472.
	c. Light Standards, Etc.		As Req'd	5.0	3,498.
	e. Water Hookups				
7.	Picnic and Camping Units:	Each	152 0	107 0	A6 255
	b. Camp Units (1 Unit = 1 Table,		102.0	127.0	40,000.
0	1 Cooker, and 1 Trash Can)	Fach	73.0	153.0	61,200.
ο.	a. Single (1 Table)	Edun	128.0	300.0	150,000.
	b. Group (3 Tables)			2.0	6,000.
9.	Observation Shelters:	Each		1.0	20,000.
	a. With Waterborne Toilets				
10.	Floating Docks:	Each			
	a. Courtesy (Boating)			10.0	20,000.
	c. Fish Cleaning House			1.0	7,500.
11.	Swimming Beaches	Each	· · ·		
•	b. Unimproved		1.0	5.0	25,000.
12.	Signs and Buoys:	Job	2.0		
	 a. Park Entrance Signs b. Directional Signs 		As Req'd As Reo'd	βΛ	3 700
	c. Bulletin Boards, Reg. Booths		no neg u	0.0	3,700.
13.	d. Buoys and Anchor Site Improvement:	Job	As Req'd	1.0	200.
	a. Underbrushing		As Req'd	12.0	7,300.
	 b. Grading-Drainage c. Reforestation 		•	ח כו	75 000
	d. Seeding			10.0	12,500
]4.	e. Channel Excav. Landscaping	Job			•
	a. Turfing and Landscaping	00 0 3.			
15.	Gates a. Traffic Control Gates	Each		15.0	7 500
16.	Trails	Mile		15.0	7,500.
	a. Hiking Trails b. Bicycle Trails			3.3	1,650.
17.	Bridges:	Ĺ.F.		2.0	12,000.
18	a. Foot Bridges (Steel) 4 Ft.	Fach		100.0	10,000.
	a. Visitor Interp. Center	~~~	· · · ·		
			16 F		

	T01	AL I	DIREC	CT	COST
ENG	INEEF	RING	AND	DE	SIGN
SUPERVISION	and	ADM]	INIST	[RA]	TION

\$ 1,729,905.
155,691.
103.794.

TOTAL \$ 1

•

\$ 1,989,390.

(Unit costs are reflected on individual park cost estimates)

SUMMARY - COST ESTIMATES BY PARK

Account Number	Park Areas	Estimated Cost	
711	Recreational Facilities:		
	Longhorn Park	\$ 136,800.	
	Dutch Branch Park	294,200.	
	Holiday Park	507,700.	
	Mustang Park	385,900.	
	Rocky Creek Park	405,300.	
	TOTAL DIRECT COST	\$ 1,729,900.	
30	Engineering and Design	155,700	
31	Supervision and Administration	103,800.	
	TOTAL	\$ 1,989,400.	

FUNDS REQUIRED FOR OPERATION AND MAINTENANCE

BENBROOK LAKE

1. The estimated annual cost of operation and maintenance and real estate management is listed below:

Recreation Facilities

Operation and maintenance facilities (includes contract cleanup, mowing, grading and maintenance of roads, repair of structures, nature areas,		
etc.)	\$	186,000
Project office		20,000
District office staff functions		15,000
	·	
Subtota	1 5	221,000

Real Estate L'anagement Services

Real estate records, reports, au and Federal jurisdiction	idits,	•\$	1,00 0
Compliance inspections			1,000
Outgrants			10,000
Crops, timber, and gravel			1,000
Utilization	~		1,000
Other			5,000
	Subtotal	\$	19,000
	TOTAL	\$	240,000

2. The above breakdown is developed from the past three years of actual cost. For planned recreational development, the average annual estimate is based on the capital outlay of the facilities for FY 1976.

3.08 Facility Design Concepts

A. Planning for An Indigenous Character:

The recreational environment will endeavor to maintain an indigenous character which will compliment the existing environment. Before a structure is designed for any location, a physiographical analysis of the land shall be performed to include the guidelines mentioned in Part III, Section 3.06, C. Each of these processes interact with the other and has implications which can affect facility design solutions. The design of any structure shall blend into the natural environment using indigenous materials which best relate to the character of the region.

B. Standard Construction Methods

1. General Guidelines

a. Flexibility:

Any design shall be able to adapt to various sizes as local needs dictate. Buildings and shelters shall be scaled to human beings. Interchangable building components which are mobile and adaptable to a variety of construction types should be considered.

b. <u>Simplicity</u>:

Any proposed design shall be harmonous with its surroundings and simple to build. Good recreation planning and design principles shall be employed to assure that appropriate designs are developed. For example, austerity does not necessarily degrade designs, nor does standardization result in stereotyped facilities.

2. Facilities Descriptions:

Engineer Regulations 1110-2-400, 1120-2-400, 1130-2-400, and 1165-2-400, and the following comments shall be used only as guides to planning new facilities. Every effort shall be made to meet program requirements and preserve natural resource qualities.

a. Roads and Rights-of-Way:

Clearing for road rights-of-way in public access areas will be confined within the top of the back slope and/or toe of the fill as far as practicable. In order to prevent the needless destruction of desirable trees and shrubs, the back slope shall be warped around such growth. Excessive ditching will be eliminated in order that vegetation may grow as close to the road as possible. Selective plantings will be performed to encourage desirable growth on the back slopes. Selective clearing will be performed or supervised by trained district personnel by an on-the-site analysis. In all cases natural vegetation and understory should continue to grow as close to the road as possible to maintain a park-like appearance as well as to discourage off-road use. Area circulation roads, expect in extreme instances, will conform to the following general practices in order to lessen their impact on the park environment.

- (1) Use no cuts or fills
- (2) Follow lay of land
- (3) Natural drainage pattern to continue across the road
- (4) Maximum width for one way roads will be 12 feet (10 feet minimum) with no shoulders
- (5) Maximum width for two way roads will be 16 feet (14 feet minimum) with 2 feet shoulders

These roads will compliment units and facilities and will be designed to make these facilities accessible to vehicular traffic via paved pullouts. It is not the intent to design these roads solely for the purpose of moving traffic. Consequently, site designs with specific unit locations will determine where access is needed. Designation of road centerlines will take place during the site design phase of construction. Site designs will also determine relocation of existing units to conform to new or proposed road patterns in order to prevent possible management problems such as off-road use, multiple access, clustering, overcrowding, etc.

b. Controlled Access Ways:

Means will be developed to control the access routes into the project areas. For example, vegetation programs and physical barriers using indigenous materials such as berms, wooden posts, rustic fence, rock out-croppings, and natural vegetation can be used to control access into and within park areas.

c. Youth Group Camp:

This area will provide the following facilities to accommodate 200 persons for overnight camping in accordance with SWFED-P letter dated 10 August 1971 to ENGCW-OR, subject, "Supplemental Information Required for Code 710. - Construction - General Appropriation Justification, FY 73".

(1) A parking area to accommodate 40 cars and a one mile road.

(2) A 10,000 square feet headquarters building which includes dining room, kitchen, office, toilets, counselor's quarters, first aid station, etc.

(3) A central shower building consisting of two laundry tubs, two shower fixtures, four lavatories, four toilet fixtures on each side (men and women).

(4) Two sub-shower-toilet buildings consisting of two showers, two lavatories, two toilets on each side (men and women).

(5) A sewage treatment plant with a 10,000 gallon

capacity.

(6) A water treatment plant with a 20 gallon per

minute capacity.

(7) A 1,200 square feet caretaker's home.

(8) An amphitheater and fire circle.

(9) A beach with change shelter (no toilets).

(10) A boat dock.

(11) Hiking and nature trails.

(12) Playground equipment consisting of tennis courts, baseball, and other athletic facilities.

(13) Forty wooden tent platforms.

d. Handicapped Area:

The close proximity of Benbrook Lake to the Dallas-Fort Worth metropolitan area makes it an ideal location to construct a dayuse area for the handicapped. This area will accommodate small to medium sized groups and will be designed for outdoor educational and recreational activities. Supervision will be the responsibility of the groups using the facilities. This site offers opportunities for picnicking, fishing, swimming, nature study, and other general outdoor activities. Under some circumstances, overnight use may be accommodated. Design of this facility will be accomplished through consideration of the special needs, circumstances, and limitations of the potential user population. All aspects of design and construction will be coordinated fully with local and national groups and organizations serving these special user populations.

Facilities Concept Drawings: 3.

9

Below is a list of the concepts included in the Revised Master Plan. These drawings follow page 76.

С	1	General Facilities: Traffic control gates Signs Area Circulation Road
С	2	General Facilities: Road Barriers Information Board Garbage Can Picnic Tables
C	3	Camp and Picnic Shelter (Group Application
С	4	Group Shelter (12 Tables)
С	5	Picnic Shelter
С	6	Restroom Facility
С	7	Change Shelter
С	8	Foot Bridges
C	9	Fishing Pier and Fish Cleaning House

C 10 Handicapped Area

C 11 Typical Beach Layout

C 12 Youth Group Camp Layout

C 13 Waste Treatment Plant

C 14 Group Campfire Circle



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OSPLY B.U. ROOF 2×6 joists @ 16" o.c. > 2×12 FASCIA a 2 2×2× × × 3" 2-2×85 (between 4x4 colo) METAL STRAP PLATES WOOD COL (each 12" AYWD. PIN (2" THI) PLASTER PIN (2" THI) 0 2"×2 TRIM WALL PLATE BETWEEN COLS. 1-11 TEXTURE PLYND SIDING (OIL FINISH) SECTION A-A DM C . 50 OPEN 1x6 WD. LOUVERS -SECTION B-B PLATE C6 FACILITIES CONCEPT NUMBER



















3.09 Coordination With Other Agencies:

Coordination with local, state, and Federal agencies is imperative for the operation, management, and development of the natural and manmade resources at Benbrook Lake. The Corps of Engineers has sustained a very strong working relationship with other agencies. This effort enables both interested agencies and the Corps of Engineers to exchange thoughts aimed at developing and managing the project's resources in the best interest of the public. The organizations contacted with a summary of their contribution to the operation, management, and development of the resources at Benbrook Lake are listed below.

A. <u>Public Hearing</u>:

A public hearing was held at Benbrook, Texas, 20 November 1952. The purpose of this hearing was to inform the public of the proposed recreational development plans, to obtain expressions of public sentiment for or against the plans. The hearing was attended by approximately 150 persons representing various segments of the local population. The plan was favorably received by all present. Federal, state, and local agencies have been contacted with continual coordination since the initial hearing.

B. National Park Service:

Representatives of the National Park Service and Corps of Engineers visited the proposed lake area prior to development and were familiar with the general features of the locality. The National Park Service submitted a report entitled "Recreational Use and Development, Benbrook Reservoir on Trinity River", which was incorporated in Appendix I to the initial Master Plan Draft.

C. Federal and State Health Services:

The U.S. Public Health Service, in cooperation with the State Board of Health, submitted a Reconnaissance Malaria Survey Report on March 1946 which was incorporated in Appendix VIII, C, to the "Definite Project

Report". The lake was cleared to the elevation recommended by the Public Health Service. This office has complied with other recommendations included in this report. The Texas State Health Department furnishes the monthly laboratory analysis for bacteriological matter and a chemical analysis annually or bi-annually according to the source (surface waters are analyzed biannually). They also approve all sanitary facility designs.

D. Texas A&M Extension Service:

The Corps of Engineers coordinates with Texas A&M Extension Service regarding insect and animal control.

E. Department of Agriculture:

The Corps of Engineers coordinates with the Department of Agriculture regarding weed control. The Soil Conservation Service provided the Corps of Engineers with soils maps and pertinent information used as an aid in development of Corps of Engineers parks and lands.

F. Federal Aviation Administration:

The Corps of Engineers coordinates with the Federal Aviation Administration for approval of all aerial applications for weed control.

G. Bureau of Sports Fisheries and Wildlife:

The Fish and Wildlife Service submitted a report in May 1947 entitled "A report On Fish And Wildlife Resources In Relation To The Water Development Plan for the Authorized Demand Reservoir Project, Clear Fork of the Trinity River, Western Gulf Basin, Texas". A copy was incorporated in Appendix I to the Master Plan Draft. On 23 July 1963 the initial follow-up report on fish and wildlife resources at Benbrook Lake was submitted by the Fish and Wildlife Service and is retained in the District files.

H. Texas Department of Public Safety:

The Corps of Engineers coordinates with the Texas Department of Public Safety concerning law enforcement problems and practices.

I. Texas Parks and Wildlife Department:

The Texas Parks and Wildlife Department has primary responsibility for management of the fish and wildlife resources at Benbrook Lake. The department conducts an annual test-netting program to determine species composition, growth rates, and general condition of the fish population. The Corps of Engineers provides assistance to the department when requrested. The officials of the Texas Parks and Wildlife Department advised the Corps of Engineers that they were interested in developing parks and recreational areas at all lake projects. However, no funds for additional facilities at this lake have been provided to date by this agency.

J. City of Benbrook:

The City of Benbrook has under license a portion of Dutch Branch Park. This area is immediately south and west of the City of Benbrook providing the City with a special interest in the sanitation and safety aspects respective to their own future development. The City has actively participated in the planning process for the five year development plan for Dutch Branch Park. The City of Benbrook currently has a lease to 205 acres of Dutch Branch Park which has been in effect since 1958.

K. City of Fort Worth:

The City of Fort Worth has two lease agreements for Longhorn Park. One agreement, originating in October 1957, involves 55 acres in the area east of the embankment. The other agreement, originating in August 1962, involves 665 acres containing the municipal golf course in the area downstream from the dam. The City of Fort Worth previously held a lease agreement for 425 acres in the Rocky Creek Park, established in May 1962. This area was transferred back to the Corps of Engineers management 1 February 1972.

L. Council of Social Agencies:

The Council of Social Agencies of the City of Fort Worth represents the following non-profit organizations: The Boy Scouts, Camp Fire Girls, Girl Scouts, YMCA, and YWCA. The application requesting approximately 500 acres of land did not specify a particular location for their outdoor camping activities. A copy of the application was incorporated into the draft of the original Master Plan as Appendix II, Exhibit H. Implementing action was not taken by this organization.

M. <u>Texas Christian University</u>:

Texas Christian University made formal application by letter dated 15 January 1955 to lease an area at the project to be used primarily for recreational purposes and secondarily for educational studies and establishment of a biological station. The University has conducted biological studies on the Clear Fork and expressed a desire to continue studies in the area. Officials of the University stated they would furnish the Corps of Engineers the results of its findings. A copy of the application was incorporated in the draft of the Master Plan as Appendix II, Exhibit Q. A lease agreement was not granted in this instance.

N. Other Interested Parties:

Applications were received from several quasi-public, religious, and educational organizations and private clubs for areas to be developed for recreational purposes. For various reasons, none of the organizations were granted use of land adjacent to the lake. New areas will be developed in the recently acquired lands lying between Longhorn Park and Rocky Creek Park. This area will be available to various groups for use on a reservation basis.

IV. SUMMARY

4.01 Analysis:

This Revised Master Plan incorporates recent criteria and concepts as a result of the OCE Task Force on resource management and eliminates some existing information included in past updated Master Plans. This was done in an effort to develop a more comprehensive and workable plan.

4.02 Estimate of the Situation:

Benbrook Lake is in need of additional recreation facilities to accommodate the expected visitation. A means for controlling the use of parks is necessary to prevent further deterioration of project resources. All control measures will need to be in effect before the year 1980. Partial control measures for individual management areas or isolated park resource problem areas should be implemented immediately.

4.03 <u>Conclusions</u>:

The development of Benbrook Lake is dependent upon the management of its resources and the visiting public. The plan of development and management herein will enable future visitors to continue to have a quality recreational experience without permanently damaging project resources.

4.04 Submittal For Approval:

It is recommended that the planned development as shown herein be implemented. The Revised Master Plan for Benbrook Lake is submitted for approval.

APPENDICES

I. MANAGEMENT CONCEPTS

A. General:

The protection and enhancement of natural and created resources will receive equal consideration to other project purposes. The key to successful use and upkeep of project resources is proper resource management. With this in mind, these concepts are furnished as initial and interim guidance for Resource Managers and are to be used within the context of Fort Worth District Regulation 1130-2-61 and Southwestern District Regulation 1130-2-7 and applicable Engineer Regulations until such time as a management plan required by Engineer Regulation 1130-2-400 is prepared and published by the Fort Worth District Operations Division.

B. Human Resources

1. <u>District Level</u>:

The recruitment of additional resource specialists to serve as consultants for problems encountered on the project and development of proper resource management plans are essential to provide proper guidance for project operation.

2. Project Level:

Proper implementation of the Revised Master Plan including the resource management plan is necessary to insure adequate stewardship of the project's resources. Protective measures include protection not only from natural elements such as fire, flood, etc., but also from overuse by the visiting public. This plan shall be a guide for such protection in addition to the resource management plan and Engineering Regulation 1130-2-400. Individual protective measures shall include, but not be limited to, such items as prevention of the deterioration ^{or} destruction of resources through overuse (such as closing public use areas to allow for revegetation), reduction of mowing to allow for propagation of a younger growth of trees, clearing only those individual areas for picnicking and camping facilities, and

leaving a vegetative barrier between camp sites. Each year an annual questionnaire will be forwarded by the district to the project for completion by the Resource Manager. The purpose of the questionnaire is to provide a means for the Resource Manager to express himself on visitor management, new trends in public use at the project, management problems encountered during the year, current project needs, and other resource management problems. Information from this survey will be used in conjunction with user surveys to make adjustments in management programs and shall be reflected in the update of the project Master Plan. Personnel for proper operation of facilities and for the maragement of the resources will be needed to accomplish the objectives for this report. These requirements are estimated to be as shown in the Table below.

TABLE 20

PERSONNEL REQUIREMENTS

Administration

Title		Present Grade	<u>Optimum Grade</u>
]]	Resource Manager General Clerk	GS-11 GS-05	GS-12 GS-07
	Publ	ic Use	
1 1 2 6	Supervisory Resource Ranger Park Technician Resource Ranger Resource Rangers Ranger Aides (Seasonal)	None None GS-05 None	GS-09 GS-07 GS-07 GS-05
	<u>Operation</u> a	nd Maintenance	
1	Reservoir Maintenance	WS-07	WS-07
3 4 1 2	Worker Foreman Reservoir Maintenance Workers Laborers Reservoir Maintenance Worker Reservoir Maintenance Workers	WG-08 None WG-05 None	WG-08 WG-03 WG-05 WG-05

Seasonal laborers as needed

3. Required Inspections:

To insure management objectives and goals are being attained at project level, routine and random inspections of licensed areas, leased areas, and outgrants should be made by project personnel. The frequency and responsibility of the inspections shall be determined in the field by the Resource Manager. Inspections required, the frequency involved, and the personnel responsible are given in Table 21, below.

TABLE 21

REQUIRED INSPECTIONS

Туре	Frequency	Purpose	Responsibility
Project Inspections	Annual	To determine the condition of pro- ject structures.	Operations Division and Engineering Division
Maintenance Inspections	Monthly	To inspect dams.	Resource Manager
Distress Inspections	Daily	To detect abnormal conditions.	Resource Manager
Stilling Basin Inspections	To be scheduled	To insure conditions of the stilling basin.	Resource Manager
Compliance Inspections	Annual	To insure compliance with lease, license, easements, and regulations.	Real Estate Division and Operations Division
Utilization Inspections	Annual	Inspection of all project lands and facilities.	Real Estate Division and Operations Division

C. Natural Resource Management Concepts

1. Fish and Wildlife Management Concepts

a. Fish Management:

An appropriate fish management program is necessary to provide a constant, well balanced fish population. Such a program is essentially the responsibility of the Texas Parks and Wildlife Department. However, the large number of lakes under local, state, and Corps of Engineers jurisdiction has imposed an overload on the Department. It is now necessary that the Corps of Engineers supply aid and assistance on a larger scale to provide adequate management of the Benbrook fishery. Public Law 89-72, the Federal Water Project Recreation Act of 1965, authorizes Corps of Engineers participation in certain phases of the management program. The Texas Parks and Wildlife Department management plan consists of establishing creel limits, size limits, and seasons. Test-netting samples were scheduled to determine species composition and relative abundance. Methods used to control rough fish populations will be coordinated with the Parks and Wildlife Department. Benbrook Lake has become overpopulated with rough fish and the catch of more desirable species has declined. The Corps of Engineers can assist the Texas Parks and Wildlife Department in devising ways and means to determine the cause for too few desirable fish and too many rough fish, to increase angler success, to conduct creel census studies for evaluation of management, and by other forms of authorized aid or cooperation.

b. Wildlife Management

(1) Game Species:

The major game species at Benbrook project are waterfowl. Mourning dove, bobwhite, cottontail rabbit, jack rabbit, fox squirrel, and white-tailed deer are also resident breeders but are seldom hunted. Other wild animals of aesthetic interest include bobcat, coyote, gray fox, red fox, nutria, skunk, opossum, and armadillo. Recorded hunter harvest figures are not available. Dove and waterfowl support little hunting. Bobwhite quail, squirrel, and cottontail could be utilized for dog training purposes and a minor amount of hunting. Due to the heavy use by people, hunting in parks is unsafe and will not be allowed.

(2) <u>Requirements for Game Species</u>:

Prairie-type vegetation dominates the landscape at Benbrook project. Mature oak, elm, pecan, and hackberry form an aesthetic, wooded area below the dam. Cottonwood, willow, and buttonbush grow above the waterline around the lake. Bois d'arc, chinaberry, hackberry, cedar, elm,

sumac, and skunkbush form small stands in draws and along hills and slopes. These species of woody vegetation provide food and cover for squirrel. and a variety of birds. The uplands of prairie grasses and forbs comprise fair habitats for bobwhite, dove, and cottontail. Seeds of sunflower, croton, sumac, hackberry, pecan, and acorns are good food sources for upland game birds and songbirds. Aquatic vegetation bordering the lake is limited and less important to waterfowl than that growing in the lake. Arrowleaf pondweed, submerged muskgrass, and bushy pondweed in the lake are more important to coots and diving ducks than emergent or floating vegetation.

(3) Habitat Improvement Measures:

A general plan of wildlife habitat improvement for Benbrook Lake project lands is presented herein. It is to be a guide for the development of Appendix D (Engineer Regulation 1130-2-400). Habitat improvement measures will be those designed to increase the quality of food and cover resources for upland game. These measures include fireguards, fallow-disked strips to produce volunteer weeds for food and cover, brush piles and half-cut tree limbs for ground cover, brush and tree trimming to open oversized stands, and controlled grazing.

(a) Fireguards and Fallow-Disked Strips:

Fire protection of wildlife habitats is a vital part of game management. The installation of fireguards should be coordinated with other land uses and designed to protect the whole area or individual units of valuable woody cover that are slow to grow and costly to replace. Fireguards can be made with disks and plows, bulldozers, or road maintainers but should be wide enough to meet the threat of wildfires. Fireguards should be leveled and planted with rye, oats, or wheat mixed with hairy vetch to reduce erosion. Rotation of fireguards on a two-year basis will benefit wildlife more than using one fireguard in the same area. Seed production on alternate fireguard strips can be employed to increase food resources for the species or groups of wildlife named in preceding paragraphs. Locations of fireguards and food strips should be determined by the areas to be protected or to be enhanced. Food strips can be developed by fallow-disking or planting. A common technique is to disk or plow just deep enough to break the soil or scrape openings in grass sod. Plantings need a thorough preparation and should be made on fertile, level soils. Disked strips can be made after the growing season during fall, winter, or early spring. Preparation of disked strips can be on a rotational basis. In parks they should be located in the least developed portions. Size of disked or planted strips will have to be determined from the space available and the number of individuals using it. Most planted plots are at least 0.25 acre. Food resources produced by planting or disking should be within 100 yards of brush or tree cover to assure safe use.

(b) Brush Piling:

Brush piles can be built in quail range by using trees or limbs which result from debrushing or thinning. In park areas, brush piles should be located away from the heavily used recreation sites and within the outer, unmowed portion. In grazing areas, brush piles can be built by thinning dense stands of trees. Brush piles should be at least 12 feet in diameter and larger if possible. Brush piles have to be filled with smaller brush to achieve a compact, dense convert. Brush pile converts should be located in open areas but no more than 100 yards from living brush or spaced 100 yards apart as stepping stones to bridge gaps between living, woody vegetation.

(c) <u>Half-cutting</u>:

Ground cover for quail and cottontails can be created by half-cutting limbs or trees. A half-cut is made by axe or saw on the upper side of a limb or on tree trunks opposite the desired direction of fall. Limbs should be notched 3 feet above ground and slowly pushed over until the canopy makes a ground cover. Half-cuts are made so that the living limb or tree remains hinged to the trunk and continues to leaf out in the following year. Half-cuts should be made where trees lack lower limbs or any woody undercover. Half-cuts can be made along the edges of tree stands or along a line through trees and brush. Lines of half-cuts should be no further than 600 feet apart.

(d) <u>Thinning</u>:

Thinning to open large stands of trees or brush should be selective and designated to save the mature specimen that produce large volumes of food. Fruit, berry, or nut-producing trees should be saved when possible. A detailed thinning plan will be made in conjunction with a site survey only on small isolated areas for game management.

(e) Modified Land Use:

Early action should be taken to stop or modify land use that degrades soil, vegetation, or wildlife habitat. Degrading types of land use can originate in accepted practices of farming, grazing, and recreation. Any activity that destroys vegetative cover, compacts soils, or initiates erosion should be promptly stopped or modified. Small wire enclosures should be established on each grazing area to determine the amount of annual vegetative growth. Overgrazing can be reduced by strict adherence to the lease agreement. Overuse of recreation areas may require closure of damaged portions and application of specific measures to remedy them. Specific management of heavily used areas will be worked out in cooperation with other divisions of the Fort Worth District.

(4) <u>Hunting Restrictions</u>:

Waterfowl hunting can be permitted in certain designated areas from boats or blinds that meet Federal requirements. A limited amount of squirrel hunting could be permitted. Hunting should be conducted with shotguns and shot shells according to State laws and regulations and in accordance with the safety portion of Title 36.

(5) <u>Coordination and Cooperation</u>:

Lands at Benbrook Lake were not sufficient to attract other Federal or state agencies. Consequently, they will be managed by project personnel. State game laws are in effect at Benbrook and are enforced by Game Management Officers of the Texas Parks and Wildlife Department. Coordination of wildlife management with the objectives of vegetative management will be provided in the specific plan for Benbrook Lake.

(6) Rare and Endangered Species

(a) Endangered Species:

The original range of the Southern Bald Eagle extends into Texas. This endangered species is associated with rolling prairies where it feeds on rodents. Confirmed sightings at Benbrook Lake have been reported within the past year. Also classified as endangered is the a American Peregrine Falcon. Its range includes southwest Texas and extends into the region around Benbrook Lake. Project personnel should familiarize themselves with the characteristics of the Southern Bald Eagle and the American Peregrine Falcon. All possible sightings should be reported to the Bureau of Sports Fisheries and Wildlife. Benbrook Lake also lies within the range of the Red Wolf. This animal resembles the coyote in many ways and many times determination of its true identity can only be made by a skeletal examination. All possible sightings of the Red Wolf should be reported to the District biologist for confirmation prior to reporting to the Bureau of Sports Fisheries and Wildlife. The Southern Bald Eagle, the American Peregrine Falcon, and the Red Wolf are endangered and on the verge of extinction.

(b) <u>Rare Species</u>:

Benbrook Lake lies within the range of the Prairie Falcon. This medium sized hawk is classified as rare and has disappeared from many localities within its overall range.

2. Soil Management Concepts:

The soils in this area are predominately clay and clay loam with some fine, sandy loam. These soils have developed from limestone bedrock with abundant limestone outcroppings. Soil is the basic factor used in determining the carrying capacity of the resource, therefore, soil protection and stabilization is a most important consideration of resource management. The best protection for these soils is a good vegetative cover.

3. Vegetative Management Concepts

a. General:

In the recreational areas to be revitalized, vegetation that can withstand or resist overuse will be favored in order to preserve the beauty of the recreation areas and sustained use.

b. <u>Grasses</u>:

Grasses are broken into three catagories: Climax Decreasers, Increasers, and Invaders. Climax is defined as the highest natural vegetative types supported on this earty as determined by soils, topography, and climate. An increaser is a plant that increases in number temporarily due to climate or man-made events such as fire, cutting, grazing, bulldozing, slashing, etc. A decreaser is a plant that decreases in number due to climate or man-made events. An invader is a plant that enters an area and spreads by means of wind, animals, humans, etc. See Table 22, page 91, for a list of the grasses found at Benbrook Lake.

c. Woody Vegetation:

Some of the trees in the area are live oak, burr oak, post oak, pecan, willow, bois d'arc, mesquite, juniper, hackberry, and elm. Ground vegetation is usually thin and cannot take an excessive amount of use. A management plan will be developed to control general use and prevent overuse by humans and animals.

TABLE 22

GRASSES AT BENBROOK LAKE

Native Climax Grasses That Decrease From Overuse

Big bluestem Little bluestem Indiangrass Switchgrass Virginia wildrye Sideoats grama Tall dropseed Texas bluegrass Native Grasses That Increase From Overuse

Sand dropseed Vine mesquite Fall witchgrass Silver bluestem Buffalograss Meadow dropseed Broom sedge bluestem Slim tridens Hairy grama Seep muhly Knotgrass Knotroot bristlegrass Tumble windmillgrass Plains lovegrass Purple lovegrass Vegetation That Invades From Overuse

Texas croton One seeded croton Oil field three-awn Wright three-awn Purple three-awn Red grama Arrowfeather three-awn Hooded windmillgrass

d. Revegetation Plan:

Soils are so shallow that (without ground cover) erosion becomes a critical problem. It is proposed that a revegetative plan be developed for those areas with sparse vegetative cover. In developing this .plan, the following statements should be considered:

(1) These areas should be seeded with native grasses or introduced grasses that are adaptable to the area and can best withstand heavy use. Grasses such as bermuda or buffalograss are recommended in those areas that may be inundated for long periods of time.

(2) At Benbrook, because of frequent drought periods which may last from a few months to several years, some system of irrigation should be considered by coordinating with the City of Benbrook in order to use water for irrigation under their contract in the most heavily used park areas.

(3) A shrub and tree planting plan should also be established or developed. Trees and shrubs native or adaptable to the area should be planted where determined necessary by the Resource Manager in coordination with District personnel. (4) Brush control should be considered in the revegetative plan. Mesquites have invaded because of long periods of overuse of the native vegetation. Brush control should take place only in areas where the brush is not desireable. Eradication should be done selectively on an individual or area basis. Proper control measures must be taken so that no desirable vegetation is destroyed. The practice of spraying by planes and dragging by dozers will be avoided because there is little control of what is destroyed. The brush cleared should not be burned or hauled off, but piled or placed where wildlife can utilize it for protection. Brush that is not piled should be left lying where it falls, providing a place for grass to grow with some protection. This practice will, in some cases, prevent erosion.

(5) The grasses and trees in this area are well adapted to dry seasons, however, severe drought has a devastating affect on the vegetation. During drought periods the carrying capacity of the land must be reduced, even to the point of virtually no use. Good land management must be practiced on grazing leases also. Field samples should be taken periodically by qualified personnal and used to determine the condition of the vegetation.

e. Agriculture and Grazing Leases:

The year prior to expiration of all existing grazing leases the carrying capacity by animal units will be determined by field analysis. The carrying capcity must be subject to change when conditions deem necessary. Proper management will include livestock distribution by fencing, water, salt placement and feeding. Rotation systems for livestock should be established where practical. This allows some areas to rest when it has been grazed adequately. Short term leases (6 months to one year) should be implemented when the present lease agreements expire because, as stated earlier, conditions may develop where no use by livestock should exist. The practice of allowing grazing leases to exist within park areas is damaging to younger vegetative growth and will be discontinued. Leases may be extended where revegetation practices are implemented by the leaseholder but in no case should they exceed five years.

4. Water Management Concepts:

The lake water area will be zoned and buoys will be placed to control various activities and the speed of watercraft at the spillway, boat ramps, courtesy docks, around swimming areas, and other sites. During peak periods of visitation measures must be taken to provide necessary control and to help maintain water safety.

a. Control of Floating Debris:

A continual check on floating debris will be made for water safety purposes. Cleanup measures will be made where necessary.

b. Mooring Policy:

In order to (a) prevent the despoilment of the natural scenic beauty of the shoreline; (b) preserve the shoreline area in as near the natural state as possible; (c) protect the public interest in the project from the standpoint of fire control and navigational safety; (d) safeguard the public health by an effective program of water pollution control; and (4) provide for general public use, in liet of private use, of project lands and waters. The storage and/or mooring of houseboats, boats, barges, and other vessels on lake waters for periods of excess of three days shall not be permitted except at concession areas.

c. Hazard Markings:

Areas which may present a hazard to boating, skiing, fishing, etc. will be marked to indicate the hazard involved.

d. Consumptive Uses:

Consumptive uses of water will be regulated by the Trinity River Authority in conjunction with the Cities of Benbrook, Fort Worth, and Arlington (i.e. human uses, irrigation, industrial uses, etc.).

D. Created Resources

1. Dam and Pertinent Works:

The Operation and Maintenance Manual (Fort Worth District Regulation 1130-2-68) contains technical data on the operation and maintenance procedures for structures and equipment.

2. Park Areas

a. General:

These areas will be generally administered and managed in accordance with Engineer Regulations 405-1-830, 705-2-835, 1120-2-400, 1130-2-400, Southwestern Division Regulation 1130-2-7, and the Operation and Maintenance Manual.

b. Inspection of Areas:

Park areas shall be continually monitored to detect problem areas, changes in use trends, performance of proper maintenance of facilities and to manage visitors. See Table 21, page 84.

c. Recreational Attitude:

The maintenance and operation of public use areas will reflect an attitude conducive to proper public service. Accomplishment will be through ranger presence, good sanitation measures, continual cleanup of areas and constant evaluation of maintenance procedures. Project personnel will continually offer aid to the visitors. The ranger will also inform the visiting public of their misuse as well as commend them on their good practices; for example, boating habits, camping habits, trash disposal practices, water sport safety habits, etc. One means of accomplishing this commendation will be through the "Johnny Horizon" Award Program for good camping and picnicking habits. Training will be provided project personnel who have contact with the public in such areas as listed in Appendix B, paragraph 3, of the new Safety Regulation, Fort Worth District Regulation 385-1-90.

d. <u>Park Evaluation</u>:

Each park will be evaluated on a continuing basis to determine usage needs; public trends, public demands; and the condition of soil, vegetation, and facilities. Based on these evaluations, overused parks may be closed for revitalization. User surveys shall be conducted at the project as least once each quarter, and more often if necessary, during heavy use periods. Detailed guidance will be furnished the project by Operations Division. These surveys will establish user trends by providing data that can be used to:

- (1) Analyze recreational attendance
- (2) Estimate facility design loads
- (3) Estimate future recreational use
- (4) Estimate optimum use levels
- (5) Determine (analyze) visitor preference and needs
- (6) Determine visitor socio-economic characteristics
- (7) Determine visitor reaction to local and district management actions

e. Boundary Marking

(1) <u>Marked Areas</u>:

Land areas will be marked according to corresponding land uses on the Land Use Plan with signs appropriate to the purpose. Examples: aesthetic/recreation areas, nature trails, wildlife conservation areas, picnic areas, camping areas, beaches, boat launching areas, etc. Hazardous areas will be marked for the safety of the visiting public. Water areas will be marked with buoys according to corresponding uses, restrictions, and rules indicated on the Water Use Plan. Buoys will be marked to specify type, use, size, and speed of boats and restricted areas. Hazardous areas will be marked to alert the public to any area where caution is to be taken. A monthly check of the condition and location of buoys will be made.

(2) Monumentation and Signs

(a) <u>Signs</u>:

Signs will be installed in accordance with instructions outlined in Engineer Manual 1110-2-400 and the Handbook on Signs issued by the Southwestern Division. Signs currently in use will remain, but signs which must be replaced for maintenance reasons and the new signs which are installed should comply with the preceeding criteria.

(b) Monumentation:

Monuments have been set out along the Government's fee acquisition line in order to improve administration of the lands over which the Government has acquired fee title. The Government property lines should be clearly marked to prevent encroachments. Clearing of any overgrowth which obstructs the monuments should be done regularly.

f. Vandalism Control:

If mecessary, vandalism will be curbed by providing ranger presence on a 24-hour basis, especially during the peak recreation season. Contact with local law enforcement officials by rangers should be maintained by radio where possible. Because of the close proximity of this lake to an urban area, vandalism may become a major problem unless preventative measures are taken. Use of "quiet hours", traffic control gates, and proper road circulation patterns can do much to prevent this problem from occuring.

3. Commercial Concession Management:

A commercial concession, although privately owned, is a public service located on Federally owned land and must be managed to insure that it fulfills its purpose in a safe and functional manner. A condition of the Commercial Lease Agreement states in part, "The leasee shall keep the premises in good order and in a clean, sanitary and safe condition and shall at all times maintain all structures and equipment in a condition satisfactory to the District Engineer". Although Real Estate Division is required to conduct compliance inspections of the lease area at least annually, it is

the Resource Manager's responsibility to ensure that the concession is continually operated in a condition which reflects favorably upon the Corps of Engineers. Therefore, Resource Managers should perform periodic inspections of grounds and facilities. Visits as frequent as weekly would be conceivable should the condition of the facility warrants. Insuring the safety of the visitors should be one of the main objectives of the inspections. A standard checklist for project use in recording results of visits or inspections will be developed in the near future. See Table 23 for typical items to be included on the checklist.

4. User Fee Management

a. General:

The Land and Water Conservation Fund Act of 1965 (Public Law 88-578) included the Corps of Engineers under the Golden Eagle Entrance Permit program. The Corps of Engineers withdrew from the program in 1969 in compliance with Section 210 of the Flood Control Act of 1968 (Public Law 90-483) which prohibits the use of entrance fees. Under existing directives, it is the policy of the Corps of Engineers to charge user fees for highly developed camping areas and where special services are provided.

b. Fee Criteria:

Areas meeting Class "A" or Class "B" campground criteria under existing directives are to be designated as user fee areas. Class "A" criteria are as follows:

(1) Continuous presence of Corps of Engineers personnel at the lake, but not necessarily continuous at any one area, for maintenance and supervision of recreation facilities.

(2) Thirty-five or more sites with defined tent or

trailer pads.

- (3) Readily available potable water.
- (4) Quality toilets.
- (5) Controlled access to the campground.

(6) Access and circulation roads reasonably dust free.

- (7) Table and grill or fire circle.
- (8) One sanitary dump station convenient to the

campground.

- (9) Hot showers.
- (10) One of the following: Electrical outlets Firewood or electric grill

Class "B" campground criteria includes the above numbers (3) through (8). However, toilet facilities do not need to meet "quality" criteria. Benbrook has three existing fee areas which meet the Class "B" criteria. They are located in Mustang, Dutch Branch, and Holiday Parks. Benbrook participated in the Golden Eagle program in 1966, 1967, and 1963. Mustang Park was included in the fee program. This criteria is flexible and may change upon direction from higher authority.

c. <u>Personnel</u>:

All project personnel are responsible for making the fee program successful. However, only designated, uniformed rangers and/or ranger aids will collect the fee in the field.

d. Enforcement:

Rangers provide surveillance and control and their continual presence is essential for security and safety to the general public. Certain personnel may be designated officers for limited citation authority only under the provisions of Engineer Regulation 190-2-4. Local enforcement agencies will retain law enforcement responsibilities. (See paragraph D, page 103.

e. Survey:

Surveys have been conducted in the user fee areas to determine the facilities and services desired. The information was obtained by passing out a questionnaire to the overnight campers and requesting they list in numerical order their preference of facilities and service. Their preferences, in order, were flush toilets, hot showers, electrical outlets, ranger presence, other individual hook-ups and campfire programs.

TABLE 23

CONCESSIONAIRE CHECK LIST

Pricelist posted in a conspicuous location.

Nondiscrimination notice posted in a conspicuous location.

Commercial advertising signs on lease area in accordance with Standing Operating Procedure Number 26.

Land and water areas in the lease area free from litter.

Suitable trash receptacles provided.

Facilities in a good state of repair.

Roof and decking properly maintained.

Soft drink bottles neatly stored.

Trailers and boats stored on shore are neatly arranged.

Replacement flotation materials stored out of travel paths.

Merchandise and supplies are stored or displayed in an orderly manner.

Nonserviceable boats, except ones left for repair, removed from area.

Rental boats properly marked, clean, and in good repair.

Grass kept mowed or equipment on grounds moved when project personnel are mowing in the area.

Cables, anchoring devices, and other hazards to pedestrians, including exposed weights, are prominently marked.

All handrails are secure.

Walkways and gangplanks are free of obstructions.

Electric lines and facilities operated per National Electric Code.

Lines leading to the dock allow for safe travel beneath them.

Extra electric service lines stored in a safe location.

Gas pumps and gas and oil storage areas have "No Smoking" signs. Fire extinguishers available.

No insect nests (wasp, spider, etc.) on dock.

Sanitary facilities clean and well maintained.

Leasee is complying with all safety requirements.

Boat cushions, life jackets, and running lights are serviceable.

f. <u>Management</u>:

Operations Division is responsible for determining quantities of user fee permits required for the season and issuing them to the project clerk or project managers, the authorized collector and alternate collector respectively. The Office of Administrative Services is responsible for accepting all permits received in the District and issuing them to Operations Division. The Authorized Collector is responsible for accountability of all permits issued to him, sale of permits to the public, and transmission of proceeds from sales to the Finance and Accounting Officer. The Finance and Accounting Branch is responsible for accounting for all collections from the sale of permits. Details are given in existing, applicable Fort Worth District regulations.

II. SPECIAL ACTIVITIES

A. <u>Fire Protection</u>:

A fire prevention and control plan will be developed by the Resource Manager and agreements shall be made with local fire departments to assist in supressing fires. Burning will not be authorized or permitted on Govermment lands without the Resource Manager's approval and supervision.

B. Safety:

A project safety plan will be developed for each park or separate facility under the responsibility of the Resource Manager. Under this plan, the Resource Manager is required to identify common, recurring hazards or unsafe conditions in each major phase or area of his operation. Such areas will include construction, maintenanc¹, public use areas, visitor protection, equipment operation, and office operation. Once hazardous situations have been identified, the Resource Manager will indicate the precautionary actions to be taken to prevent reduce, or control such hazards. This plan will be coordinated with the District Safety Office for review and recommendations prior to approval and will become an item of interest on safety surveys and inspections.

C. Public Health

1. General:

Public health protection is one of the primary responsibilities of the O&M program. All visitors must obey all Federal and state laws and regulations. State Health Department approval of all water and sewage systems to be installed on Government property is required. Bacteriological analysis of public water supplies are conducted monthly and chemical analysis either annually or semi-annually, dependent on the source. Liquid and solid wastes are collected on schedule and disposed of in an approved manner. Camping, picnic and sanitary facilities are cleaned and serviced on regular schedules. The insect and rodent control programs are designed to protect the health and well-being of the visitors. Project personnel are trained in the principles of first aid and will participate actively in water safety programs under FWDR 385-1-90 (Project and Recreation Safety Program.)

2. <u>Sanitation</u>:

Sanitation, or good housekeeping, is the most effective and economical method of protecting the public health. Therefore, good sanitation programs are stressed and Federal and state rules and regulations are adhered to in design, construction and servicing.

3. Insect and Animal Control

a. Insect Control

(1) <u>Control Problem</u>:

Undesirable insects, besides attacking man, attack his supplies, materials, structures, and both ornamental and natural vegetation. They are detrimental to his health and adversely affect his morale. It is therefore imperative that the projects maintain a satisfactory degree of control of undesirable species.

(2) Management:

Project personnel will make routine inspections for insect damage and initiate control programs on an "as needed, where needed" basis. Control programs on private property adjacent to Government land or where extensive areas must be treated, will be accomplished in cooperation with the appropriate local, State or Federal agencies having authority or interest in the problem.

b. Animal Control

(1) Control Problem:

Rodents may serve as disease carriers, destroy supplies and materials, damage structures, cause fire losses, and damage grasses and shrubs. Their burrows may even cause erosion problems. For these reasons, the projects must maintain a satisfactory degree of control over rodent population. Predators and similar types of animals will not normally need to be controlled as they are a natural part of the ecosystem. However, in emergency or extreme instances, control will be accomplished by the Bureau of Sports Fisheries and Wildlife's Division of Wildlife Services.
(2) Management:

The most effective and economical management plan is a preventive program to avert possible outbreaks which could cause serious losses. Project personnel will make routine inspections for signs of rodents and initiate control programs when necessary. Control of predators should be accomplished by the Bureau of Sports Fisheries and Wildlife by means of shooting or trapping individual target animals. Measures such as placing poison baits or the use of "coyote getters" are prohibited. Before any control measures for prairie dogs are attempted on government lands, including lands that are outgranted, determination should be made by the Bureau of Sport Fisheries and Wildlife that no Black-Footed Ferrets are present in or near the dog towns.

D. Law Enforcement:

Enforcement of civil and criminal laws at the lake on Government land and water remains the responsibility of duly constituted officers of Federal, State and local governmental agencies. The Corps of Engineers, through field personnel, will cooperate fully with all officers responsible for the enforcement of laws relative to civil actions, game and fish conservation, public health and sanitation, boating, and prevention of pollution. Citation authority governs refuse dumping and the provisions of Title 36 only (see paragraph 4d, page 80 for enforcement of fee areas). Where practicable, Resource Managers will provide rangers to man selected park areas on a 24-hour basis during peak recreation periods to provide visitor protection and reduce vandalism. The project manager will attempt to gain passage of local ordinances or laws which will encompass all Corps rules and regulations. DESIGN MEMORANDUM NUMBER 10

REVISED MASTER PLAN

APPENDIX (A)

PROJECT RESOURCE MANAGEMENT PLAN

FOR

BENBROOK LAKE

TRINITY RIVER BASIN

CLEAR FORK, TRINITY RIVER, TEXAS

U. S. ARMY ENGINEER DISTRICT FORT WORTH, TEXAS

JULY (1972)

APPENDIX A

PROJECT RESOURCE MANAGEMENT PLAN

I. AUTHORIZED PURPOSE OF THE PROJECT:

Benbrook Lake is a flood control and navigation storage project which is heavily utilized for recreational purposes due to the proximity to the City of Fort Worth, Texas. Benbrook Dam is located on the Clear Fork of the Trinity River 15 miles upstream from its confluence with the West Fork of the Trinity River. The lake is located in the southwest quarter of Tarrant County, approximately 10 miles southwest of the City of Fort Worth, Texas. Construction of the project was authorized under the River and Harbor Act of 1945 (Public Law 534, 78th Congress, 1st Session). Public Law 782 (84th Congress, 2nd Session) authorized the Corps of Engineers to negotiate a contract with Fort Worth for use of navigation storage for water supply storage until such time as it is needed for navigation purposes. Recreational development was authorized by the Flood Control Act of 1944 (Public Law 534, 78th Congress, 2nd Session). Reformation of recreational development is required due to Engineer Regulations 1110-2-400, 1110-2-404, 1120-2-400, Public Law 89-72 (Federal Water Project Recreation Act), Senate Document No. 97, changing conditions, North Central Texas Council of Governments, and emphasis on environmental features.

II. OPERATIONAL CONCEPT:

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A. Although recreation is not a project purpose, operation of the project is directed almost entirely toward serving the recreational needs of the visiting public. The conservation pool is elevation 694.0 feet msl and recreational facilities are planned and constructed using this elevation as a guide. The five year frequency between high and low pools is nine feet which does not adversely affect the recreational use of the lake. After the reformulation plan is completed, as discussed in Paragraph I, recreation may become a project purpose. If flood conditions occur, barricades and warning signs are placed on all roads entering the lake. Public use is restricted due to flood waters covering most recreation facilities. The duration of flooding is usually for a short period of time.

B. Guidance for operation of the project is contained in the following publications:

> Engineer Regulation 1130-2-400, Project Operation -Resource Management of Civil Works Water Resource Projects

Southwestern District Regulation 1130-2-7, Project Operation - Administration of Reservoir Lands and Waters

Fort Worth District Regulation 1130-2-10, Project Operation - Reservoir Regulations

Fort Worth District Regulation 1130-2-61, Reservoir Operation and Maintenance

Fort Worth District Regulation 1130-2-64, Benbrook Reservoir - Operation and Maintenance Manual

C. Recreational facilities are developed in accordance with the approved Master Plan. Contracts are awarded as needed for major maintenance of access roads. The project has limited facilities for patchwork of roads. Rest rooms are painted annually unless otherwise needed to maintain proper sanitation standards. Project signs, shelters, waste receptacles and maintenance equipment are painted and maintained as necessary. Directional signs in all parks have been replaced with routed wood signs. These are more in keeping with the "design with nature" concept. The program is considered extremely successful and eventually all park directional and information signs will be of the routed wood type. If O&M funds permit, all signs will be replaced by the end of calendar year 1972. Mowing and cleaning of recreation areas have, in the past, been performed by contract. Mowing contractors have been performing adequately, therefore, for the 1972 season we will exercise our option to extend the present contract. Cleaning contracts have proven difficult to administer and usually resulted in a second-rate cleaning job. For these reasons, the 1972 cleaning contract was not readvertised and the project has assumed all responsibility for cleaning park areas and facilities. This is done by using boys from the Tarrant County Mental Health and Mental retardation Center employed by the Corps of Engineers specifically for clean-up. These people work 16 hours per week (4 days per week, 4 hours per day) during winter months and a full 40 hours per week during heavy-use summer months. If this program continues to result in improved cleaning, it will be continued in future years.

D. The City of Arlington, Texas, has a five-year license commencing 1 September 1971 to construct, maintain, and operate a pumping station, 30inch pipeline and service road for the purpose of withdrawing water from Benbrook Lake. It will be used as an emergency supply when the City's supply is diminished during periods of drought. Other arrangements are presently being made by Arlington for a more constant supply to meet their full-time needs. Withdrawal of water by Arlington during normal or wet seasons would be minimal; however, during periods of drought, drawdown can be 22 feet below the top of conservation pool (elevation 694.0 msl). If this condition should occur the receding shoreline would have a detrimental effect on recreation resources of the project. The pipeline crosses the Rocky Creek Park entrance road about 1,200 feet southwest of the first camppicnic area. That portion of the water supply line crossing the park road is buried and the road has been restored to its previous condition. All of

the 30-inch line crossing Government property, except the road crossing, is above ground. Reflective tape marks the above ground line to insure visibility at night. Because of the distance from the developed park area and the temporary term of the license, this line will not adversely affect public use of the area; however, natural aesthetics are upset in that the line is visible to persons entering the park. Provisions in the license require restoration of the area to its natural condition when the pipeline is removed. The intake structure is located near the shoreline about 2,000 feet north of the park limits of Rocky Creek. About 1,800 cubic yards of excavated materials has been stockpiled in an area just north of the job site. This material is approximately five feet high. Winter rye grass has been seeded to prevent erosion. At this time the intake structure has little effect on public use because the area has not been developed. The Revised Master Plan calls for a handicapped youth area and a group camp which would be available by reservation. Land not used for the two camps will be set aside for nature areas, hiking trails, and bicycle trails. However, removal of the line and restoration to its natural state will be necessary before full utilization of this area will be accomplished.

III. LAND ACQUISITION POLICY:

A. At the time the project was initiated, land acquisition totaled 11,247 acres and 1,298.7 acres under declaration of taking. Flowage easements were obtained on an additional 618 acres. Under Public Law 87-386, lands not needed for project purposes, public use, or recreational development were offered for reconveyance to the former owners. Completed in July 1961, the program resulted in reconveyance of 2,788 acres, of which the Government retained flowage easement over 2,324.2 acres. A total of 8,434.6 acres of fee-owned lands is currently in the project area (3,770) acres inundated), including 2,760 acres of lesser interest. An agreement has been reached on 1,298.7 acres (the Sid Richardson property) which was under the original declaration of taking. This agreement has been forwarded to Office, Chief of Engineers, for approval. The entire shoreline of this area, approximately three to four miles, will be available for development by the Corps of Engineers after acquisition. After acquisition, studies will be made to determine the best zoning and use for management of the land. This study will be included in the Revised Master Plan.

B. Present residential development at the lake consists of Saint Francis Village, a retirement community at the north end of Rocky Creek Park, Bear Creek Camp, a trailer park and small store southwest of Mustang Park, Bear Creek Estates, a two to five acre lot subdivision southwest of Mustang Park, Chisholm Trail Park, a trailer park on flowage easement property on the west side of Bear Creek, Lake Shore Estates, a two to five acre lot subdivision due west of Holiday Park and south of county road 1148, and a one to five acre lot subdivision south and west of Dutch Branch Park. Because of its proximity to a large metropolitian center and growth to the south and west of the Cities of Fort Worth and Benbrook, subdivisions will eventually surround the lake. This will result in many encroachments upon Government property, possibly pollution of lake waters from septic tank seepage to the water table and despoilment of land immediately adjacent to these developments. The Corps of Engineers should make every attempt to acquire, as it becomes available, additional land around the lake. Ownership of these lands would provide a buffer zone between commercial developments and those lands owned by the Corps of Engineers and developed as parks. These lands could be used and developed as nature areas or in a manner that would provide the visiting public with more varied recreational opportunities. Lands are still available for this purpose at the south end of the lake on the point between Rocky Creek and Mustang Parks. Additional lands that the Corps of Engineers should obtain are located on the east side of the lake, specifically the Hughes' property between Longhorn Park and the Richardson property. A settlement has been reached on the 1,298.7 acres of Richardson property which was originally placed under declaration of taking. However, additional Richardson property adjacent to the Corps of Engineers property should also be obtained. This additional land should be in those areas where present Government holdings do not extend a sufficient distance from the lake's normal waterline to protect the resources in case of development next to Corps of Engineers' property.

IV. PUBLIC USE AREAS:

There are five parks at Benbrook: Longhorn, Dutch Branch, Holiday, Mustang, and Rocky Creek. Two of these parks are under lease agreements, one to the City of Fort Worth and one to the City of Benbrook.

A. Longhorn Park:

This area consists of 728 acres, of which 63 acres are located adjacent to the east end of the dam and 655 acres located adjacent to and downstream from the embankment. Fifty-five of the sixty-three acres at the east end of the embankment are under a 25 year lease to the City of Fort Worth for a 50 year development plan. Access to the area is available over two paved roads. One of the roads connects to U.S. Highway 377 near the west entrance to the park and to comprehensive system of all weather county roads at the east end of the reservoir. The other road connects directly to the City of Fort Worth. Existing recreational development by the Corps of Engineers consists of paved and gravel access and secondary roads, water systems and extensions, picnicking and camping facilities, sanitary facilities, and park and directional signs. Federal investment in this park through FY 71 was \$86,100. Development by the City of Fort Worth consists of gravel surfaced and paved roads and parking areas, boat launching ramps, sanitary facilities, drinking water systems, picnic facilities, a 27-hole municipal golf course, a soap box derby track and other facilities associated with this development. Non-federal development through FY 71 in Longhorn Park has been accomplished through an investment of \$476,600 by the City of Fort Worth and its concessionaires. The 50 year development plan for this area calls for the construction of additional recreation facilities in license area Number Two consisting of an athletic field, play areas, tennis courts, picnic facilities, additional roads and water systems. The City will be encouraged to conduct its program in accordance with the provisions in the plan submitted with its license application in Area Number Two. The City of Fort Worth has concentrated the majority of their efforts in the development of the gold course.

Future growth by the Cities of Fort Worth and Benbrook will justify development of varied recreational facilities. For this reason, emphasis must be placed on the other facilities outlined in their original development plan. Estimated cost to the City of Fort Worth for development of the remainder of their 50 year plan is approximately \$700,000. In 1913 (first year of record) the park attracted 327,400 visitors. This figure increased to 465,600 in 1965, which was 28 percent of total visitation to the project. In 1970, visitation was 509,100 or 22 percent of total visitation. This percentage decrease was due to improved facilities in other parks that attracted a greater number of visitors. The golf course attracted approximately 50,000 players in 1965, and this figure increased to about 65,000 in 1970. Projected visitation is estimated to be 653,400 persons by 1975. If the City of Fort Worth will develop new facilities in accordance with their 50 year plan, an even greater number of visitors will be attracted to this park in the future. The Corps of Engineers have no future plans for recreational development in this park. Fort Worth's plan of development will adequately serve the foreseeable needs of park visitors.

B. Dutch Branch Park:

This area consists of 525 acres adjacent to and upstream from the west end of the embankment and emergency spillway. The City of Benbrook has a 25 year lease which began 1 September 1957 on 205 acres of the park; the other 320 acres are administered by the Corps of Engineers. Existing federal development consists of paved and gravel roads and parking areas, masonry toilets, picnic facilities and informational and directional signs. The Federal Government's investment is \$91,800. Development by the City of Benbrook and its concessionaires consists of paved and graveled roads and parking areas, a marina with covered boat stalls, rental boats, rental outboard motors, concrete boat ramps, cafe, and commercial fishing barge. Other development by the City of Benbrook includes picnic and sanitary facilities, rodeo arena, riding stable, ball fields, and an unsupervised swimming beach. A sailing center that rents and sells sail boats is also located in Benbrook's lease area. Investment by the City of Benbrook and its concessionaires through FY 71 was \$257,300. Formal plans for future development of the park have not been submitted by the City of Benbrook. The city will be requested to submit a current development plan. The marina is in a delapidated condition and should either be replaced completely or upgraded immediately. If the Federal Government could enter into a cost sharing arrangement with the City of Benbrook, it would expedite rebuilding the marina, prevent present despoilment of natural resources in this area, and provide facilities to better accommodate the visitors. Visitation to Dutch Branch Park has increased from 98,000 in 1953 to 461,700 visitors in 1965 and to 779,800 in 1970. Visitors to this park in 1970 accounted for 33.2 percent of total project visitation. Visitation in 1975 is forcast to be 986,000 visitors.

C. Holiday Park:

This park consists of 486 acres south of Dutch Branch Park, approximately two miles upstream from the dam and on the west side of the lake. Access is by paved county road from U.S. Highway 377 and a Corps of Engineers built paved road from U.S. Highway 377 that enters at the south end of the park. Control and development of this area lies entirely with the Corps of Engineers. Present development in the park consists of paved and gravel roads and parking areas, picnic and camping facilities, boat ramps, two trailer dump stations, masonry toilets and water supply systems. The Fort Worth Radio Control Thunderbirds operate and maintain a landing strip for radio controlled model aircraft near the north end of the park. The facility is available for use by the general public at no charge and is also used for official contests and meets sponsored by the club. Investment by the Federal Government in Holiday Park through FY 71 was \$331,500. Future maintenance in this park will be directed at improving and upgrading existing facilities. In some sections of the park there are no established roads through picnic areas. An effort will be made to direct and control the flow of traffic, thereby replacing the present maze

of roads between picnic units with grassy areas. This will be done by the use of rocks, posts, cable barriers, or a combination thereof. Future recreational development including first class access roads will be in accordance with the Revised Master Plan. Visitation to this park was 126,500 people in 1953, 199,000 in 1965, and 338,600 in 1970. Attendance in 1970 accounted for 14.4 percent of total project visitation. Attendance in 1975 is expected to be 427,700 visitors. Improvement of existing facilities should attract a greater number of people and provide a more enjoyable atmosphere for those who utilize the area.

D. <u>Mustang Park</u>:

This park consists of 815 acres and is located approximately four miles upstream from the dam. About 100 acres of the park are located on the west side of Bear Creek where it enters the main body of the reservoir. The remainder is on the peninsula formed by Bear Creek and Mustang Creek. Access to the park is by a paved county road to the west end of the park and a paved county road to the south end of the park. Both of the roads connect to Farm to Market Highway 1187. Development in the park consists of paved and graveled roads and parking areas, masonry vault-type toilets and waterborne toilets, an unsupervised swimming beach, a masonry change shelter for visitors utilizing the beach, concrete boat ramps, two trailer dump stations, picnic and camping facilities, and a water supply system. Investment by the Federal Government through FY 71 was \$237,400. Visitation in the park was 11,100 in 1953, 211,200 in 1965, and in 1970 had increased to 335,400. In 1970 this park accounted for 14.3 percent of total project visitation. Projected visitation for 1975 is 424,700 visitors. Lack of adequate traffic control is severely inhibiting or eliminating vegetative plant growth in many areas of the park. During summer months dust created by cars on the dirt roads to the tip of the peninsula is a problem. The roads will be paved or upgraded as shown in the Revised Master Plan. This area is very popular with campers and will be further developed for his purpose. Camping sites will be specifically

designated by a post with campsite number. Camping at undeveloped sites will not be permitted. Regulation of this sort will distribute visitors to a larger area of the park in a controlled manner and therefore would also renew the scenic beauty and depleted vegetative growth of the park. Approximately 300 acres of this park are under a grazing lease agreement terminating 31 December 1972. Renewal of grazing leases will be reduced to an annual lease period. The Corps of Engineers is limiting grazing removal to 50 percent of the annual growth. This policy will improve vegetative conditions, lessen soil disturbance and compaction, increase rainfall insoak, and increase ground cover for bobwhite, dove, rabbit, and other wildlife. Grazing can be a game management tool when properly regulated because it results in selective reduction of grasses throughout the whole pasture thereby making more food available and reducing the hazard of potentially destructive fires.

E. <u>Rocky Creek Park</u>:

This park consists of 425 acres on the east side of the lake approximately three miles upstream from the dam. Access is over a Corps of Engineers paved road which connnects to a paved county road. The entire area was under lease agreement to the City of Fort Worth until 1 February 1972. Corps of Engineers development in the park consists of paved and gravel roads and parking, water supply system, boat ramps, a trailer dump station, masonry toilets and picnic and camping facilities. Investment by the Federal Government is \$115,310. Developments by the City of Fort Worth and its concessionaires consist of a rock jetty, floating boat storage, boat and motor rental, a commercial fishing barge, fuel dock, and picnic and camping facilities. Very little development has been accomplished by the City of Fort Worth and the Revised Master Plan provides for a complete revitalization of this park including additional access road construction. At present, vegetative resources in the park are severely damaged due to the lack of traffic control. This is especially evident on the peninsula directly west of Rocky Creek Marina where almost half the land is barren from overuse by vehicular traffic. Construction

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of good access roads and additional signs will provide access to the recreation sites and prevent uncontrolled use by vehicles in this park. This park, with continued development and proper management of resources, could accommodate twice the present visitation. Returning Rocky Creek Park to the Corps of Engineers will allow direct control of the quantity and more important the quality of any new facilities and upgrading existing facilities in the park. Visitation to the park has remained relatively constant over the past several years, 351,900 people in 1965 and 346,980 in 1970. With upgrading of present facilities and proper construction of new facilities, visitation to this park could increase greatly and serve an estimated 445,500 visitors in 1975.

V. MAINTENANCE FACILITIES:

Benbrook has no specific areas designated as a paint shop, sign shop, carpenter shop, or mechanic shop. Equipment available for each of these jobs is adequate for everyday operation of the project. Specialty tools include a sandblasting machine and a steam cleaner. Equipment such as a radial arm saw, gas generator, drill press, acetylene welder, and an assortment of small hand tools are utilized for all maintenance work as needed. Maintaining facilities and roads at this project are best accomplished by negotiating construction, equipment rental, or hired labor contracts. Such a contract was awarded in June 1971 for resurfacing recreational roads. Project personnel are equipped to perform routine maintenance, including repairs to recreation facilities as a result of vandalism. Wood routed signs are made in the maintenance shop for replacement of all directional and information signs in public use areas at Benbrook. The wood routed signs are easy to make and are constructed in periods when weather conditions curtail outdoor activities. Further, the signs are more compatible with the natural environment, more vandal proof than metal signs and are relatively inexpensive to make. The signs are constructed of 2" X 6" redwood, hand routed, painted white letters and a painted brown background. Sign posts are 4" X 4" brown stained rough cedar. Present facilities are adequate for maintaining our sign program.

VI. STORAGE FACILITIES:

Project office and related storage facilities are surrounded by a six-foot chain link fence with a three-strand barbed wire barrier on the top. Fenced area is 37,888 square feet (256' X 148'). Of this, approximately 6,000 square feet are devoted to administrative and storage buildings and 1,215 square feet grassed and the remainder paved. Approximately 4,700 square feet of paved parking is available to employees and visitors immediately north of the fenced area. Inclosed storage at Benbrook Project consists of one metal building (2,048 square feet), one small brick building (90 square feet) and approximately 2,575 square feet in the administration building. The metal building is at the north end of the enclosure and is used for storage of signs, hand tools, lumber, cable for traffic barriers, cement, garden tools and other equipment that would deteriorate if left exposed to the elements. (All paint and oil is kept in the brick building along the west fence. The 2,575 square feet of administration building are used for maintenance of vehicles, storage of a 12 foot aluminum boat, hand tools used in the maintenance of vehicles, and other tools used routinely at the project. This is also used as a work area during the winter months. Vehicles, tractors, large mowers and other large equipment is stored in the open inside the the fence. Storage facilities are adequate at this time; however, the Revised Master Plan calls for much development and will probably require the purchase of additional equipment. An additional 5,000 square feet of paved parking would be needed. Moving the west fence of the administration area 20 feet to the west and paving the additional space would accomplish this. Additional equipment will include three more vehicles and a boat with trailer. Additional vehicles will be for additional rangers and the boat will be used as a patrol-work vessel.

VII. OFFICE AND ADMINISTRATIVE FACILITIES:

Approximately 300 square feet of the administration building are devoted to administrative activities and facilities. This includes office space for the Reservoir Manager, Reservoir Rangers, Clerk, Maintenance Foreman, and space for reception of visitors to the Project Office. Included also are spaces for project maps, cabinets, bookshelves, and necessary file cabinets to accommodate project publications and office supplies. In the future it will be necessary to expand the office and administrative facility to accommodate additional personnel shown in the staffing and organization paragraph of this Appendix. An additional 300 square feet will be needed to serve the needs of added personnel.

VIII. STAFFING AND ORGANIZATION:

The project is presently staffed with a Reservoir Manager (GS-11), a Reservoir Ranger (GS-07), two Reservoir Rangers (GS-05), one Clerk-Typist (GS-05),one Maintenance Worker Foreman (WS-07), four Reservoir Maintenance Workers and three temporary laborers. The present staff and the future staff requirements are shown below:

<u>Administration</u>

		<u>Initial</u>	Future
1	Reservoir Manager	GS-11	GS-12
1	General Clerk	GS-05	GS-06

Public Use

] *	Supervisor Reservoir Ranger	None	GS-09
2	Reservoir Rangers	GS-07	GS-07
2	Reservoir Rangers	GS-05	GS-07

Operation and Maintenance

]	Reservoir Maintenance	Worker Foreman	WS-07	WS-07
3	Reservoir Maintenance	Worker	WG-08	WG-08
1	Reservoir Maintenance	Worker	WG-05	WG-05
2 *	Reservoir Maintenance	Worker	None	WG-05
3	Laborers		WG-03	WG-03

Future staff.

Additional temporary Reservoir Rangers will be college students majoring in recreational resource management, natural resources, forestry, biology (fish and wildlife management), and/or agronomy. Permanent Reservoir Rangers will be college graduates or present personnel who are qualified by training and experience. The additional rangers will also administer, at project level, any user fee program initiated at Benbrook. Increased surveillance from 0800 to 2100 hours during the peak recreational season will also be possible. One ranger will be assigned a boat to patrol the lake and administer water safety regulations. Additional reservoir maintenance workers and laborers will be required for proper maintenance of facilities to be provided at the lake as the Revised Master Plan is implemented.

IX. USER FEE AREAS:

There are no user fee areas at the project at this time; however, funds have been requested in the FY 73 Code 711 program and when these funds are made available, and facilities constructed, Mustang and Holiday Parks may be developed to the point of meeting the criteria established by the Chief of Engineers for user fee areas. Improvements completed in Mustang Park include a change shelter with showers, flush toilets, a swimming beach and potable water. This area, with very little additional improvement, would qualify as a user fee area. Establishing fee areas is encouraged as the increased surveillance, justified by providing additional rangers, materially reduces vandalism which is a continuing problem at Benbrook Lake.

X. COOPERATIVE ACTIVITIES WITH OTHER AGENCIES:

Other agencies directly associated with the project are the Cities of Benbrook and Fort Worth, Texas. Fort Worth has not fully followed their proposed plan of development. Their efforts have been concentrated almost entirely on developing the golf course. Future expansion by both cities will place an increased demand on other water-oriented recreational development to furnish the recreation needs of the visiting public. The City of Fort Worth will be encouraged, through closer contact with city officials, to provide facilities for a varied recreational program as presented in their original lease. The City of Benbrook has done much in developing their areas although they are plagued with financial problems caused by a low tax base. It would benefit both the Corps of Engineers and the two cities if we could enter into a cost sharing program for recreational development. This program would alleviate some of the financial difficulties faced by cities attempting to develop parks on Government lands. This program would also do much in establishing better public relations between the Corps of Engineers and the cities. Cooperative arrangements with the law enforcement agencies of the City of Fort Worth and the City of Benbrook are outlined in the paragraph on law enforcement arrangements and procedures.

XI. RANGER ACTIVITIES:

The Reservoir Ranger holds a key position at the project he serves. His duties constantly place him in direct contact with the public and he represents the District Engineer in upgrading the Corps of Engineers' image in the field. The Ranger's attitude, actions, efficiency, appearance and his willingness to be helpful to those he meets does much in creating this image. Rangers must have a good working knowledge of a wide variety of subjects. He must be conservation minded and deeply concerned with the protection and management of public resources. Rangers are required to possess a vast knowledge of rules and regulations relating to administration, conservation, environmental protection and enhancement of Government property. Land activities include, but are not limited to, inspections of leases and recreation facilities including reevaluation of mowing and cleaning contracts. Rangers patrol project lands for the purpose of detecting encroachmnnts, unauthorized use, construction, timber cutting, vandalism, forest fire detection, pollution problems and theft. The Ranger recommends placement of additional recreation facilities in recreational areas in connection with updating the recreation Master Plan. Rangers promote good public relations by responding to inquiries to available recreation facilities, history of the project, wildlife, weather, facts about flora and fauna and visitor interpretative programs. A Ranger performs survey work as needed for construction of roads and other recreation facilities. Boundaries for leases and reservoir land are reestablished to insure that encroachments do not occur on project lands. Data for many recreational reports such as the annual reservoir report required by the Chief of Engineers are gathered by the Rangers. Water activities include, but are not limited to, patrolling the lake area to enforce rules and regulations, promoting water safety by furnishing safety regulations, advising as to hazards of the lake and giving information regarding State and Federal regulations relating to water safety laws, and fishing and hunting. In the event of a disaster, the Ranger takes charge or lends assistance in rescuing persons in distress and renders first aid to the

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injured. Currently Benbrook has two Rangers enrolled in the Ranger Training Program conducted by the District Office. All new permanent Rangers will receive this training and eventually all Rangers will be college graduates in recreation related fields of study.

XII. LAW ENFORCEMENT ARRANGEMENTS AND PROCEDURES:

The City of Fort Worth assigns parks and recreation enforcement officers to periodically patrol those areas leased to the city. Benbrook, because of its proximity of the lake, has their local police officers patrol the areas in their park lease. The Tarrant County Sheriff's Department provides periodic patrol for all other parts of the lake outside the city lease areas. One Corps of Engineer ranger vehicle is equipped with two-way radio contact with the Benbrook Police Department. One other ranger vehicle will be equipped with a police radio in 1972. This will give the project even better communications with local enforcement agencies. Cooperative activities and coordinated efforts between the Corps of Engineers and local law enforcement agencies have helped reduce the vandalism problem. Strengthening these efforts will be achieved by more frequent contact with the agencies in an increasing effort to combat the heavy vandalism problem at Benbrook Lake. A resolution has been drafted and will be presented to the local Commissioner's Court for adoption. It requests the Texas State Parks and Wildlife Commission to enforce the prohibition of swimming, boating, fishing and maintaining speed limits for boats in certain designated areas near approaches to boat ramps, outlet channels, flood control intake structures including the earthern embankment and other designated hazardous water areas. Since citation authority has been granted to some project personnel, we will be able to control certain activities more effectively. Duty hours for rangers will be extended to include the evening and we will be able to more effectively curb some of the undesirable activities which are known to occur after 1700 hours. At present, all boating rules and regulations are enforced by the Texas Parks and Wildlife Department enforcement officers. When we acquire a boat suitable for patrol, we will be able to help with this enforcement. A patrol boat with trailer is needed to enforce water safety laws in accordance with Title 36. The cost of the patrol boat and trailer is estimated to be \$5,200. This has been included in Table 1, Estimated Costs.

XIII. SAFETY - VISITOR AND EMPLOYEE

A. The safety of the visiting public is a prime responsibility of the Reservoir Manager. All recreation facilities provided by the Government are maintained in a good, safe condition at all times. Project personnel continually inspect concession establishments for unsafe conditions or violations of public health codes. Unsafe or hazardous health conditions are brought to the concessionaire's attention immediately and he is notified to correct the deficienty promptly. Questionable health conditions are reported to State health agencies. A survey is continually made of the lake and project lands for potential hazards to visitors. Appropriate signs, buoys, and barricades are installed to warn visitors of any unsafe conditions. Special problems requiring a large outlay of funds are referred to Chief, Operations Division for guidance. A safety study was completed in November 1971 of existing swimming beaches at Benbrook. Funds were requested in the mid-year review O&M budget for buoys and signs to properly mark existing swimming beaches in Mustang Park and Dutch Branch Park at an estimated cost of \$7,400. Capsule type buoys (alternating white and orange) with a connecting cable will be installed to restrict boats from entering the beach areas. Appendix E, Project Safety Plan, will be prepared to supplement the Master Plan. This plan will identify hazards to safety and prescribe preventive measures, also the quality and type of safety equipment to be used. Coordination agreements with the Texas Parks and Wildlife Department will be part of the plan. This plan will be coordinated with the District Safety Office for review and recommendations prior to approval and will become a guide in the performance of safety surveys and inspections. Fort Worth District Regulation 385-1-90, dated 3 November 1971, establishes guidelines for conducting a project and recreational safety program to enhance the safety of project personnel and and the general public while in attendance at the Districts' Lake projects. Prime objectives of this program are:

 Establish a water safety council in the vicinity of each lake where sufficient local interests exist or can be generated to support council activities.

2. Establish and train a recreational safety ranger at the project.

3. Establish a lake safety patrol. Patrol activities will be coordinated with responsible State agencies.

4. A water safety program will be designed to meet specific project needs.

5. A project safety program will be designed to meet specific project needs.

Guidance for project safety is also contained in the following publications:

Engineer Regulation 385-1-1

Engineer Manual 385-1-1

Fort Worth District Regulation 1130-2-61

Title 36, Chapter III - Code of Federal Regulations

Boating rules and regulations, Title 36, and the project brochure, all containing water safety information, are distributed to the visiting public.

XIV. CONCESSIONAIRE ACTIVITIES:

All concession operations at Benbrook Lake are presently through third party license agreements with the City of Fort Worth and the City of Benbrook. One marina concession in Rocky Creek Park is being converted to a direct lease agreement since the City of Fort Worth has relinquished their license on Rocky Creek Park. Fort Worth has license to 665 acres of land in Longhorn Park. The City has developed a 27 hole golf course with a pro shop and associated maintenance equipment. They are also developing a soap box derby track in this license area and will complete Phase III of a IV phase program in 1972. The soap box derby track is directly supervised and all safety precautions are met. This facility affords greater safety to participants than temporary tracks using blocked off city streets or roads. The location below the dam provides excellent utilization of project lands. Other recreation facilities have been constructed for picnickers in the area; however, this development is minor compared to the golf course and race track. An area in the Longhorn Park license, south of the Corps of Engineers management area, has not been developed by the city and we have requested that it be returned to the Corps of Engineers for development and management in accordance with the Revised Master Plan. Fort Worth also had license to 425 acres in Rocky Creek Park until 1 February 1972 for water oriented recreational purposes. A marina, fishing barge, covered and open boat storage, rental boats, Aqua Peds, skis, bait, fuel, sporting goods, food and beverages are offered the visiting public. The concession operator has been requested to upgrade this facility including clean-up and repairs to the building interior, dock, and walkways. Now that the Corps of Engineers has regained this area, more complete utilization of the area may be made including additional recreational facilities and upgrading the concession which would be under direct control of the Corps of Engineers. The City of Benbrook has license to 205 acres for recreational purposes in Dutch Branch Park. The development consists of a marina, barge and boat storage, snack bar, bait and tackle shop, boat rental, fuel dispensing facilities,

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and rental and sale of sailboats. The license area also has a stable area which boards and rents horses, conducts hayrides, and holds rodeos in an arena area. Picnic facilities near the lake are also provided by the licensee. Location of the area developed by the city is adequate and this area has been reduced from the original license area. The city will be encouraged to upgrade present facilities in lieu of constructing additional facilities. Safety features of the Benbrook marina are not in accordance with good safety practices. The City of Benbrook has been notified to hazardous walkways to boat docks, exposed electric wiring, no life preservers on the docks, and no fire extinguishers. To date, these safety features have not been corrected. More frequent safety inspections by the District Safety Engineer with his recommendations may improve these conditions.

XV. ENCROACHMENTS:

No major encroachments have occurred at Benbrook Lake. Approximately 70 percent of the project boundary has been surveyed and marked. Minor problems such as removal or breakage of boundary markers have occurred. Markers are standard brass cap concrete monuments, so there is no real way to solve the problem except to keep close surveillance and check all markers at least once a year, replacing immediatley those that are missing. Problems of land owners adjacent to Government property creating their own access roads have occurred and continues to be a problem. These are handled on an individual basis, roads are either closed with guard posts or chain, and the land owners notified. A possible solution to this problem would be to fence the entire Government border with a suitable fence. This would delineate project boundaries and act as a physical barrier to encroachments by adjacent land owners. As the Cities of Fort Worth and Benbrook expand, we anticipate that this problem will increase in magnitude and eventually require the fencing of all Government properties which are adjacent to residential developments. Other minor problems, such as cattle on Government property and unauthorized mooring of barges on the lake, are dealt with on an individual basis by whatever means is most expeditious to solving the problem.

XVI. IN-SERVICE TRAINING PROGRAMS:

The in-service training program for Reservior Rangers is a continuing program. The training instructor at the project is the Reservoir Manager. Training coverage follows the outline for Phase II Reservoir Rangers Training Program (orientation and basic training). Training coverate is as follows:

> General Orientation and Briefing Office Administration Project Administration and Maintenance Work

Rotational training is conducted in the District Office by:

Personnel Office of Counsel Office of Administrative Services Supply Public Affairs Office Safety Office Security Officer Operations Division

Training is also given pertaining to the normal and abnormal conditions that arise in the field. The District training program is presently being revised and updated to include courses available from colleges and universities.

XVII. VISITOR EDUCATION AND INTERPRETATION:

A public project overlook facility, with the exception of an access road and parking area, has not been developed at Benbrook. Development of a project information center apart from the Project Office is not considered feasible at this time due to the high incidence of vandalism. Construction of entrance signs on U.S. Highway 377 on the west side of the dam and near the headquarters office on FM Road 1043 to the east are proposed as an alternate information program in lieu of a project overlook or information center. A bulletin board may be used in connection with the sign containing a large map, Title 36, and other project rules and regulations for public information. At present, brochures, maps, Title 36 and other District publications are furnished the public at the project office or by the Rangers. Guided tours of the project are conducted for groups such as the Boy Scouts upon request. Project personnel speak and conduct visual educational meetings not only to improve the image of the Corps of Engineers but to properly inform the public concerning the project.

XVIII. PEST CONTROL PROGRAM:

A mosquito surveillance program has been conducted during the period when mosquitoes are most active (April to October). Mosquito samples are forwarded to the Fort Worth District Biologist and analyzed for possible disease causing organisms. When tests show positive cases of disease causing organisms, local County and State Health Departments are advised in order that effective measures may be taken. Trees and shrubs in headquarters and rest room areas are seasonally sprayed for spiders, tree borers, candle bugs, bag worms, army ants, and grub worms. Control of tree spiders, borers, and other insects is accomplished by the use of either Cythion 5-E (56% Malathion emulsive), chloridane (72% emulsive) or Sevin. Mosquito control is by the use of technical malathion applied aerially. Spraying and control activities are coordinated through the Fort Worth District Biologist and local and county health officials.

TABLE 1

FUNDS NEEDED TO INITIATE ADDITIONAL RECREATION MANAGEMENT PROGRAM

Information Engrance Signs	(FY 76)	\$	2,000
Office and Administration Facilities 300 Square Feet Additional Office Space	(FY 74)		5,000
Storage Yard 5,000 square feet Additional Paved Parking	(FY 75)		2,500
Safety Patrol Boat, Motor, and Trailer	(FY 74)		5,200
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TOTAL \$ 14,700

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DESIGN MEMORANDUM NUMBER 1C

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REVISED MASTER PLAN APPENDIX (B) VEGETATIVE MANAGEMENT PLAN FOR

BENBROOK LAKE

TRINITY RIVER BASIN CLEAR FORK, TRINITY RIVER, TEXAS



U.S. ARMY ENGINEER DISTRICT

MARCH 1975

FORT WORTH, TEXAS

COPY NUMBER

28

SWDCO-R (SWFOD-M 10 Mar 75) 1st Ind

SUBJECT: Vegetative Management Plan, Appendix B to Design Memorandum No. 1C Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, TX 75202 8 April 1975

TO: District Engineer, Fort Worth, Texas, ATTN: SWFOD-M

1. Appendix B, Vegetative Management Plan for Benbrook Lake, is approved subject to the following comments or inclusions, whichever is appropriate.

a. Paragraph 1.03: The fifth sentence line should be changed to read, "Public Law 85-500." Public Law 87-386 amended PL 85-500 by extending the law one year. The last sentence should be revised to read "in addition to" instead of "including."

b. <u>Paragraph 2.02</u>: The climate should not be described as humid and subtropical. The first sentence should be revised to more accurately describe the climate.

c. <u>Paragraph 3.03</u>: It is suggested line 7 be changed to read as follows, "However, on that date the term of the leases expired and were not renewed due to higher priority project use."

d. <u>Paragraphs 3.04B and 3.05G</u>: Discussion in these subparagraphs imply that excessive soil erosion could significantly shorten the life of the lake. The importance of soil erosion and need to control it should be recognized and presented; however, the above implication is misleading and should be corrected. An average loss of one foot of soil from the entire land area of the project, including flowage easement land, could only reduce the conservation pool storage by 8% and the flood pool by 3%.

e. <u>Paragraph 3.05</u>: It is suggested that Bermuda grass be included as a plant to be used in erosion control. It is considered more desirable than buffalo grass. Alfalfa is not usually recommended as a crop for erosion control.

f. <u>Paragraphs 3.05C, 3.05F and 5.02A</u>: Fencing is provided for the following reasons:

(1) Security and safety. This includes areas such as project buildings, outlet works, dams, storage yards, etc.

(2) To prevent the trespassing of livestock.

2

SWDCO-R

8 April 1975

SUBJECT: Vegetative Management Plan, Appendix B to Design Memorandum No. 1C Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

(3) To implement management programs for wildlife areas, nature areas, public use areas, and vehicle control.

Based on the above criteria, fencing the entire boundary should be reevaluated.

g. Paragraph 3.05H: ER1130-2-332 has been superseded by EC1130-2-140.

h. Paragraph B.07 should read 3.07.

i. <u>Paragraph 3.07B, Prescribed Burning</u>: It is suggested this method be the lowest priority and as the last resort.

2. Appendix B should be a detailed plan for implementing the project's forest or vegetative program. Future Appendices B should be in more detail; specifically what will be done and where. Maps and aerial photos are excellent exhibits that should be used to supplement the plan.

FOR THE DIVISION ENGINEER:

houseW

l Incl (7 cys) wd

3

GEORGE W. STAPLES Chief, Construction-Operations Branch

CF: HQDA (DAEN-CWO-R) (in dup)


DEPARTMENT OF THE ARMY FORT WORTH DISTRICT, CORPS OF ENGINEERS P. O. BOX 17300 FORT WORTH, TEXAS 76102

REPLY TO ATTENTION OF:

SWFOD-M

10 March 1975

SUBJECT: Vegetative Management Plan, Appendix B to Design Memorandum No. TC, Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

Division Engineer, Southwestern ATTN: SWDCO-OR

1. Reference Engineer Regulation 1130-2-400 dated 28 May 1971, SWDPL-R letter dated 8 March 1972, subject: Recreation Resource Planning and Management, and 2nd Indorsement thereto dated 17 May 1972.

2. In accordance with schedules previously furnished, seven copies of Appendix B, Vegetative Management Plan for Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas are submitted for approval.

FOR THE DISTRICT ENGINEER:

l Inclosure (7 cys) As stated

ALLIE J. MAJORS

Chief, Operations Division



APPENDIX B

VEGETATIVE MANAGEMENT PLAN

BENBROOK LAKE

REVISIONS AND UPDATES

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<u>Date</u>

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٦	Vegetative	Cover	Мар

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APPENDIX B

VEGETATIVE MANAGEMENT PLAN

I. INTRODUCTION

1.01 Purpose:

The Corps of Engineers has the responsibility of maintaining the natural resources on certain public lands; the purpose of the Benbrook Lake Vegetative Management Plan is to discharge these responsibilities by providing guidelines for the conservation of soil, timber, grassland, water, and wildlife by reducing waste, by preventing fires, and by proper resource management. This plan prescribes applicable management procedures to improve the land, to increase it's usefulness, to promote it's natural beauty, to correct or reduce hazards in the use of the land, and to control undesirable vegetation around the reservoir.

1.02 <u>Authority</u>:

The Vegetation Management Plan is developed in accordance with Public Law 86-717, Army Regulation 420-74, Engineer Regulations 405-1-830 (Section II, paragraphs 18, 19, 20a(2), and 22), 405-2-835 (paragraphs 4c, 5d, 6, 7, and 8), 1130-2-400, Southwestern District Regulation 1130-2-7, and the Project Operation and Maintenance Manual.

1.03 History:

Benbrook Lake was approved under Public Law 77-228 dated August 1941. At the time the project was initiated, in 1947, land acquisition totaled 11,247 acres and 1,298.7 acres under declaration of taking. Flowage easements were obtained on an additional 618 acres. Under Public Law 87-386, lands not needed for project purposes, public use, or recreational development were offered for reconveyance to the former owners. Completed in July 1961, the program resulted in reconveyance of 2,788 acres, of which the Government retained flowage easement over 2,324.2 acres. A total of 8,434.6 acres of fee-owned lands is currently in the project area (3,770 acres inundated), including 2,760 acres of lesser interest.

1.04 Market:

There is a ready market for hay production and grazing leases for farmers in the immediate area. However, due to the inflexibility of leases, minimal number and small size of those tracts available for lease, all grazing and agricultural leases were terminated on 31 December 1972 and should not be renewed until they can more closely serve the need of the project. Abuse of leased lands was prevalent, but with them under direct Corps control, it will be much easier to apply proper management.

II. PHYSICAL CHARACTERISTICS

2.01 Soil Types and Conditions:

The soils at Benbrook are typical of the Blackland Prairie and Crosstimbers complexes. There are approximately 19 different soils present and include the Houston Black Clay, Wilson Clay Loam, Lewisville Silty Clay, Travis Fine Sandy Loam, Bastrop Sandy Loam, Maloterre Stony Clay, and the Brackett Loamy Soil types. The loamy soils range from shallow (6 inches) to moderately deep (32 inches) and are on a limestone base. The silty clays and loamy clays range to 62 inches on a deep subsoil. Limiting factors to consider are: (1) moderate to slow permability, (2) depth to bedrock (some within 15 inches of surface, (3) high shrink-swell potential, (4) high erodability when ground cover is gone, (5) flooding on soils such as the Trinity Clays and the Frio Clay Loams. Slope is generally 6% or less. However, there are some slopes of 50% or greater. Erosion varies from very slight to exposed bedrock. Complete soils data is available in the Revised Master Plan.

2.02 Meteorology:

Benbrook Lake is located in the temperate zone and characterized by a humid subtropical climate with hot summers. Climatological data was obtained from records (1950-1967) maintained by the National Weather Service as reported from the project weather station.

			Temperatures			
High Average	Low Average	Annual Average	Extreme High	Extreme Low	Free <u>First</u>	ze Dates <u>Last</u>
Aug 96 . 7	Jan 31.2	64.8	111	4	15 Nov	15 Mar
			Precipitation			
Annual Average	<u>H</u> .	<u>igh</u>	Low		High Period	
31.3	Ma	ay 5.6	Mar 1.54		April-June	13.17

Sixty percent of all precipitation falls during the months of April, May, June, September and October. November through March yields only 27% of the yearly precipitation. Normal winters are usually mild, although some freezing does occur.

2.03 Ground Cover Classification:

Benbrook Lake is in the vegetation zone covered by the Crosstimbers and Prairie's region. The land areas are characterized by predoninately grass lands with tree cover in the draws and along the creeks. Most grasses are the native species and include big and little bluestem, Indiangrass, gramas, dropseeds, Texas wintergrass, and buffalograss. Bermuda and King Ranch bluestem have been introduced to the project lands. Tree and shrub species are oaks, mesquite, pecan, elms, cottonwood, willow, snowberry, rabbitbush, prickly pear, yucca, junipers, sumac as well as others. Forbs represented are broomweed, ragweeds, croton, sunflower, Indian paintbrush, and vetch. This is just a partial list. A representative list of native vegetation is presented as Table 1, Pages B-05 thru B-09. A cover type map is included as Plate 1, Page B-10.

<u>TABLE I</u>

REPRESENTATIVE LIST OF NATIVE VEGETATION AT BENBROOK LAKE

1. Vince

Trees and Shrubs

32 Ashe juniper ²¹² eastern red-cedar cottonwood blackwillow pecan . Texas black walnut blackjack oak bur oak post oak live oak hackberry winged elm American elm cedar elm Osage-orange mulberry ^hawthorn chickasaw plum Mexican plum wildrose multiflora rose mesquite Texas sophora Hercules-club Chinaberry skunkbush flameleaf sumac smooth sumac dogwood boxelder western soapberry inland ceanothus 1otebush wooly buckthorn persimmon white ash green ash elderberry

Juniperus ashei J. virginiana Populus deltoides <u>Salix nigra</u> <u>Carya illinoensis</u> Juglans microcarpa Quercus marilandica Q macrocarpa Q <u>stellata</u> Q <u>virginiana</u> <u>Celtis laevigata</u> <u>Ulmus alata</u> U. <u>americana</u> U. erassifolia Maclura pomifera Morus rubra <u>Cratagus</u> spp Prunus angustifolia P mexicana Rosa bracteata R. multiflora Prosopis glandulosa Sophora affinis Xanthoxylum clava-herculis Melia azaderach Rhus aromatica R. copallina R. glabra <u>Cornus florida</u> (18) - C. deuromoniti Acer negundo process <u>Sapindus</u> drummondii <u>Ceanothus herbaceus</u> <u>Condalia obtusifolia</u> <u>Bumelia lanuginosa</u> Diospypos texana Fraxinus americana F. pennsylvanica Sambucus canadensis

Forbs and Vines

Jack-in-the-pulpit dayflower western commandera wildbuck wheat prostrate knotweed curltop smartweed sheep sorrel curly dock lambsquarter poverty weed Arisaema <u>spp</u> <u>Commelina angustifolia</u> <u>Commandera pallida</u> <u>Eriogonum annum</u> <u>Polygonum aviculare</u> <u>P lapatyifolium</u> <u>Rumex acetosella</u> <u>R crispus</u> <u>Chenopodium album</u> <u>Monolepis nutlaliana</u> Forbs and Vines (Continued)

Russian thistle white four-o'clock pokeberry spring beauty rockpink chickweed cowlily American columbine virgins bower (H) annual larkspur (H) plains larkspur (white to hopping) large buttercup golden corydalis rock cress (R) draba Carolina draba western wallflower prairie pepperweed Virginia pepperweed smooth twistflower yellow stonecrop Texas saxifrage wild strawberry white avens wild dewberry taperpod milkretch gyp milkvetch Nuttall's milkvetch prairie senna dwarf dalea Illinois bundle flower tick clover western indigo roundhead lespedeza slender lespedeza deervetch Texas bluebonnet prairieclover roundleaf scurfpea catclaw sensitivebriar hairy vetch stork's bill blue flax puncturevine bullnettle woolly croton Texas croton poison ivy Virginia creeper mustang grape fox grape sida field pansy Missouri violet yellow passionflower Texas Pricklypear devil's pincushion plains gaura wavyleaf gaura fourpoint evening primrose showy sundrops coriander wild carrot shooting star prairie gentian

Salsola kali Mirabilis albida Phytolaeca americana <u>Claytonia virginica</u> Talinum calycinum Cerastium brachypodum Nuphas spp Aquilegia canadensis Clematis drummondii (B) Court guiane Delphinium ajacis D_o virescens Ranunculus macranthus Corydalis aurea <u>Arabis canadensis</u> Draba cunneifolia D. reptans Erysimum capitatum Lepidium densiflorum L. virginicum <u>Streptanthus hyacinthoides</u> Sedum nuttallianum Saxifraga texana Fragaria virginiana Geum canadense Rubus aboriginum Astragalus amphioxys (Menthamberlu) <u>A. gypsodes</u> A. nuttallianus Cassia fasciculata <u>Dalea nana</u> Desmanthus <mark>illinoensis</mark> Desmodium spp <u>Indigofera miniata</u> Lespedeza capitata L. virginica <u>Lotus purshianus</u> Lupinus texensis Petalostemum spp <u>Psoralea rhombifolia</u> <u>Schrankia uncinata</u> <u>Vicia villosa</u> Erodium texanum Linum lewisii Tribulus terrestris Cnidoscolus texanus Croton capitatus C texensis <u>Rhus radicans</u> Parthenocissous guinquefolia <u>Vitis candicans</u> V. vulpina <u>Sida physocalyx</u> Viola bicolor V. missouriensis Passiflora lutea Opuntia lindheimeri Echinocactus texensis Gaura brachycarpa <u>G sinuata</u> Oenothera rhombipetala <u>O. speciosa</u> Corianderum sativum Daucus carota Dodecatheon meadia Eustoma grandiflorium

Forbs and Vines (Continued)

 \mathcal{J}_{i}

prairie rosegentian slimpod Indian hemp milkweed butterfly milkweed antelopehorn O bindweed dodder morningglory red gilia pointed phlox gromvel1 forget me not turkey tangle fosfruit verbena azurea sage buffalobur Indian paintbrush (angle partiant foxglove trumpetcreeper ruellia slender Plantain honeysuckle buffalogourd yarrow common ragweed western ragweed bloodweed heath aster thistle gumweed sunflower hairy sunflower Maxmilian's sunflower marshelder wild lettuce blackeyed susan groundsel tall goldenrod dandelion slender greenthread ironweed cocklebur

<u>Sabatia</u> <u>campestris</u> <u>Amsonia</u> <u>illustris</u> 1. Burn and Barry and States Aposynum cannabinum Asclepias amplexicaulis H (Januara) <u>A. tuberosa</u> <u>A. firdiflora</u> Convovululus hermannioides Cuscuta glabrior Impomoea purpurea <u>Ipomopsis</u> rubra Phlox cuspidata Lithospormum incisum Myosotis macrosperma <u>Phyla nodiflora</u> <u>P incisa</u> Verbena bipinnatifida Salvia azurea Solanum rostratum Castilleja purpurea (Pro Constituto , Penstemon cobaea <u>Bignonia radicans</u> Ruellia humilis Plantage elongata <u>Lonicera albiflora</u> Cucurbita foetidissims Achillea millefolium Ambrosia artemisiifolia A. psilostachya A trifida <u>Aster ericoides</u> <u>Cirsium texanum</u> <u>Grindelia</u> texana Helianthus annuus <u>H. hirsutus</u> <u>H. maxmilliani</u> <u>Iva angustiflolia</u> <u>Lactuca</u> canadensis Rudbeckia amplexicaulis <u>Senecio imparipinnatus</u> <u>Solidago altissima</u> <u>Taraxacum officinale</u> Thelesperm simplicifolium Vernania baldwinii Xanthium italicum

Grasses and Grasslike Plants

horsetail ephedra western wheat grass big bluestem bushy-beard bluestem splitbeard bluestem broomsedge slimspike threeawn oldfield threeawn wildoats King Ranch bluestem silver bluestem sixweeks grama sideoats grama Equisetum laevigatum Ephedra antisyphlitica Agropyron smithii Andropogon gerardii A. glomeratus A. ternarius A. ternarius A. ternarius A. virginicus Aristida longespica A. oligantha A. oligantha A. purpurea Avena sativa Bothrioehloa ischaemum B. saccharoides Bouteloua barbata B. curtipendula

Grasses and Grasslike Plants (Continued)

hairy grama Texas grama red grama Japanese brome downy brome rescuegrass buffalograss sandbur hooded windmill grass Nash windmill grass tumble windmill grass bermudagrass * coastal bermudagrass cottontop hairy crabgrass Canadian wildrye Virginia wildrye weeping lovegrass plains lovegrass red lovegrass purple lovegrass curly mesquite Zittle barley red sprangletop green sprangletop fall witchgrass redtop panigrass witchgrass filly panicum wooly panicgrass Scribner's panicum roundseed panicgrass Texas panicgrass switchgrass knotgrass hairyseed paspalum Carolina canarygrass Texas bluegrass Kentucky bluegrass tumblegrass little bluestem knotroot bristlegrass bristlegrass green bristlegrass yellow indiangrass johnsongrass tall dropseed sound dropseed whorled dropseed povertygrass Texas wintergrass white triden purpletop slim triden sixweeks fescue hairsedge Woodland sedge littletooth sedge bearded flatsedge blacksedge large apikesedge rush

B. hirsuta B. <u>rigidiseta</u> B. <u>trifida</u> Bromus japonicus B. tectorum B. unioloides Buchloe dactyloides <u>Cenchrus</u> incertus <u>Chloris</u> cucullata <u>C. latisquamea</u> C. verticiltata Cynodon dactylon C. dactylon maritimus Digitaria adscendens <u>D. sanguinal</u>is Elymus canadensis E. virginicus Eragrostis curvula E. intermedia E. oxylepis E 。<u>spectabilis</u> <u>Hilaria belangeri</u> <u>Hordeum pusillum</u> Leptochloa filiformis <u>L. dubia</u> Leptoloma cognatum Panicum agrostoides P. capillare P. filipes P. lanvsinosum P. scribnerianum P. scribnerianum P. <u>Spnuc</u> P. <u>texanum</u> sphaerocarpon P. virgatum Paspalum distichum P. pubiflorum <u>Phalaris caroliniana</u> <u>Poa arachnifera</u> P. pratensis <u>Schedonnardus</u> paniculatus Schizachyrium scoparium <u>Setaria geniculata</u> <u>S. leucopil</u> <u>S. viridis</u> Sorghastrum nutans Sorghum halepense <u>Sporobolus</u> asper <u>S. cryptandrus</u> <u>S. pyramidatus</u> S. vaginiflorus <u>Stipe leucothricha</u> Tridens albescens T. flavus T. muticus Vulpia octoflora <u>Bulbostylis capillaris</u> <u>Carex blanda</u> C. microndonta Cyperus aristatus <u>C. niger</u> Eleocharis maarstachya Juncus effosus

Grasses and Grasslike Plants (Continued)

inland rush Texas rush Canadian garlic ⊮ wild onion prairie onion camassia dogstooth-violet Arkansas yucca Nuttall's deathcamas J. <u>interior</u> J. <u>texanus</u> <u>Allium canadense</u> <u>A. drummondi</u> <u>A. stellatum</u> <u>Camassia angustata</u> <u>Erythronium albidum</u> <u>Yucca arkansana</u> <u>Zygadenus nuttalli</u>

TABLE 2

VEGETATIVE COVER TYPES

1. Upland:

Dry, shallow soils, predominately live oak, post oak, and mesquite with associated species including hawthorns, junipers and osage-orange.

Q.

2. <u>Transition</u>:

Transition zone between Bottom land/shoreline types and upland or pasture land, contains species of all types including pecan, oaks, mesquite, cottonwood ashes and several grass species.

3. Bottom and Shoreline:

Consists of typical bottom land/shoreline species including pecan, cottonwood, black willow button bush, white and green ash, elms, chinaberry, sumacs and hercules-club.

4. Pasture - Improved and Native:

All pasture lands. Grasses and forbs dominate with scattered tree cover. Representative species are bluestems, curly mesquite, gramas, buffalograss and coastal bermudagrass with oaks and mesquite.



III. GENERAL MANAGEMENT

3.01 <u>Inventory of Use</u>:

Listed below is the land use inventory as of 1 January 1973. All figures were obtained from the approved Master Plan dated March 1972, (reference Section II, Land and Water Use Planning, Tables 4 and 5) and derived from GSA Form 1166 (30 June 1971).

Total water ac conservation	creage at 1 pool	3770
Total land fee	e acreage	4665
		8435
Project Operations	176	
Corps of Engineers Parks	1,963	
Commercial concessions wit	ch	
CofE	13	
Parks Managed by Others	933	
Commercial Concessions with Others	105	
Aesthetic and Multiple-Use	Areas1,254	
Special Use Areas	136	
Wildlife-Nature Area	193	
	4,665	

There are 8,435 acres of fee land, of which 3,770 are permanently inundated, and 2,896 are developed as Corps and city parks. The Corps also has flowage easements on an additional 2,823 acres above the present fee line. On 31 December 1972 all agri-grazing leases were terminated, making 1,117 acres available for other uses.

3.02 Administration:

The administration of this plan is directed by the Office, Chief of Engineers, Southwestern Division and Fort Worth District policies. The plan shall be implemented at the project level with guidelines and assistance from the Fort Worth District Office involving Operations and Real Estate Divisions.

3.03 Treatment Since Acquisition:

Since inception of the project all those lands outside of designated parks have been used for agri-grazing lease purposes. Any vegetative manipulations on these lands were directed at either greater grass or hay production. Grazing and control of woody vegetations have been the only controls placed on the land. Vegetative management in established parks has been non-existent. Prior to 31 December 1972 there were 17 agri-grazing leases totaling 1,117 acres. However, on that date all leases were cancelled due to:

- A. Abuse of land by lessees.
- B. Small size of most tracts.
- C. Lack of control over tracts.
- D. Lack of wildlife habitat on leased land.

With cancellation of all leases the Corps now has complete control of all fee land and can thereby exercise proper controls on land use.

3.04 Present Uses:

There are presently 4,665 acres above normal conservation pool elevation. Park and public use areas involve 2,896 acres, of which 350 acres are totally undeveloped. There are 1,593 acres of undeveloped land currently designated as Multiple-Use and Wildlife-Nature areas. Recreation visits for 1972 numbered 2,430,540 visitors. Most recreational activities place extreme pressure on vegetation. The pressure will increase since the Master Plan projects the ultimate carrying capacity to be 30 million. When visitation reaches this number, it will be necessary to limit access to parks. Intense people and vegetation control will be necessary to insure lasting availability of present resources. There is evidence of overuse, erosion, and loss of control over the vegetation cover type. Where grazing leases have put pressures on the land, adequate measures will be implemented to recover and rehabilitate these areas.

3.05 Proposed Usage:

The proposed usage of lands at Benbrook Lake is presented in the Resource Planning and Management Section (Section II) of the Revised Master Plan. All land areas at Benbrook will be managed in accordance with the approved Master Plan. Uses which conflict with each area's designation will not be permitted. An annual management plan will be developed by the project and coordinated with the District elements. This plan will include any management program proposed for the year and will include a detailed prescription for each individual job. This Appendix will be used as a general guideline.

A. <u>Tree Planting</u>:

Tree planting will be undertaken in the park areas to beautify and landscape those areas having little or no tree cover. Native tree stock will be used to preserve or enhance the natural aesthetic value of the park. Landscaping and screening patterns will be dictated by the use and the area. Information on this operation is available from Operations Division. Detailed landscaping plans will be developed as funds become available.

B. Erosion Control:

Erosion control is necessary to prevent the untimely demise of the reservoir and to maintain the quality of water for consumptive use as well as to provide an aesthetically pleasing lakeshore. Erosion can be a tremendous problem if not controlled. Control action can be initiated by some mechanical methods, but economically, vegetation management is more feasible. Many sodding plants such as buffalograss, soil developing legumes such as alfalfa and ground covering forbs are suitable for soil control and reduction of erosion. Any litter producing vegetation will also aid in this control. Any of these plants will work by reducing rainfall impact, dispersing runoff and by increasing penetration and perculation of the water. All mechanical methods such as terracing or gully plugs will work better when combined with vegetative means.

C. <u>Grazing Control</u>:

Grazing by livestock is an interim measure of land use for control of ground cover by a means of harvesting grasses. Grazing is secondary to the priority demands for project use, recreation and wildlife. At present there are no grazing leases at Benbrook; however, grazing may be used in the future to gain management objectives. Fencing is required in order to reduce grazing encroachments, to retain more complete control of Corps of Engineers property, and to control any leases. A perimeter fence is most essential in order to restrict access, while interior cross fences aid in controlling movement between leases, restrict access into sensitive areas, and provide authorized routes of travel. The perimeter fence should be planned for completion in three to four years.

D. <u>Recreation Use Control</u>:

The abuse from recreational use contributes greatly to vegetation destruction, soil compaction, erosion through foot and vehicular traffic, and to the general deterioration of the site through litter and improper trash disposal. Much damage is done by the use of motor vehicles in unauthorized areas. This includes motorcycles in sensitive areas such as in gullies or along stream banks and any offroad use of vehicles in other than authorized zones. Means of achieving the control necessary are few but effective. These are: Fencing along roads, restricting ingress to any undeveloped area, and control barriers in campgrounds, picnic areas, swimming areas, toilets, and along all roads and parking lots in recreation use areas. Footpaths, walkways, and developed trails will limit foot travel to those places where desired. They should be placed where most feasible to route the flow of traffic with a minimum of control. Poor planning will result in the development of unauthorized trails. Examples of this are common in all park areas. This causes excessive compaction and, indirectly, the death of the surrounding trees. Information on fencing, compaction relief, replacement of vegetation (trees, shrubs, or grass), and routing of traffic can be obtained from the Fort Worth District Office.

E. General Treatment in Recreation Use Areas:

Treatments which would improve the quality of the vegetation as well as the aesthetic value in the parks and headquarters area are:

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 Relief of compaction around arboreal perennials is important, especially in areas that have extensive foot or vehicular travel. Two methods of combating compaction are outlines in Illustration
page B-15. Other information is available from the Fort Worth
District Office, the Soil Conservation Service, and the County Agent of
Denton County.

 Landscaping is necessary to maintain a pleasant atmosphere around a campground or picnic area. Plans concerning landscaping will be developed and implemented as soon as possible.

3. Pruning and trimming aids in making both trees and shrubs more attractive as well as removing diseased branches and protecting the lower branches from undue breakage by outside sources. A general rehabilitation program will be carried out as funds become available.

When control of vehicles in the park areas has 4 been effected, the reestablishment of grass and shrub cover in the impacted areas will begin. These impacted areas include those parts of the lakeshore used for unauthorized parking and camping, the impromptu pullouts and turn arounds in picnic and camp areas, as well as convenience roads anywhere. Convenience roads and pullouts have denuded or damaged an estimated 30 acres which need to be rehabilitated. Most of this should be seeded in fast spreading grasses and/or forbs to reduce potential erosion. Grass seed, such as buffalograss, bluestem, or gramas, can be disked into the compacted ground. Also, shrubs, such as yaupon, multiflora rose, or bois d'arc, can be planted or seeded to provide screening, barriers, or for aesthetics. In many instances, disking can create a suitable seedbed for natural regeneration while late winter disking in most annual forbs will stimulate growth over a longer season.

5. Mowing in some parks is sensitive. There are dry side hills with thin soil and light ground cover such that mowing can destroy the present cover. A great deal of short cutting of native grasses has been done. These grasses should not be cut lower than six inches since excess cutting will reduce the root system,

B-15

therefore retarding the growing capacity and recovery rate of the grass. Any mowing on steep or shallow soiled hillsides should be rigidly controlled.

F. Control in Subdivision Areas:

Large areas of land surrounding Benbrook Lake have been extensively developed and others are currently in the planning and development stages. New homes are being constructed around the reservation perimeter. This increases the probability of encroachments and subsequent damage to the vegetation. A "soft" fence of vegetation such as multiflora rose or yaupon, is recommended to reduce these encroachments. The vegetation can be supplemented with fences built from woven net wire (bullwire, sheepwire, etc.) on steel posts. These fences are not as offensive as barbed wire, but will as effectively control access to the lake front. This will prevent, to a large extent, the use of public land for private lawns, picnic units, lots and privately developed beaches, docks, and mooring areas, while allowing controlled access from the housing developments. This also prevents or reduces the formation of unauthorized roads. Control fences can be landscaped to provied a more aesthetically pleasing barrier, as well as increasing the efficiency of the fence. Cable and post barriers will work to control vehicular traffic and do not restrict foot travel. Mowing of vegetation on the public side of the fence will reduce the fire hazard while, indirectly, creating a more pleasant view for the residents. This will achieve our management objectives as well as reduce some of the friction with our neighbors.

G. <u>Watershed Protection</u>:

Watershed protection, while not mentioned previously, if of importance. Any one thing that disturbs or destroys the vegetation can conceivably shorten the life of the reservoir as well as change quantity and quality of the water. Rejuvenation of the vegetation on the land areas can reduce erosion by holding the soil together prolonging the life of the lake. Plants aid in holding down the soil's temperature and reducing evaporation. The roots open channels or pores by mechanical means, increasing soil permeability and perculation. The crown intercepts the force of the rainfall, reducing impact damage to the soil, which reduces runoff and erosion. All of these factors affect the quality and quantity of the water in the lake. Planting of erosionpreventing vegetation (any sod-forming plant) and of shrubs and trees, should be done to provide watershed protection. Fencing, or some other means of control, can be utilized to protect a sensitive area until recovery can be accomplished. Areas such as roads on hills, water crossings, and other such places, should be provided with erosion control methods such as waterbars or culvert pipes.

H. Pesticide Use:

The use of pesticides must be strictly controlled. All pesticides shall be handled in the prescribed manner and in accordance with the Pesticide Working Group recommendations and restrictions set forth in Engineer Regulation 1130-2-332. All label instructions will be strictly followed. Private individuals should not be allowed to use any pesticide on public lands without close supervision from trained project personnel. This includes concessionaires and lessees as well as farmers and ranchers in the surrounding area. The widespread use of pesticides can alter or destroy the ecological balance of natural resources which dictates that wise use be made of all chemical controls. All pesticide use programs will be coordinated through the Operations Division Office.

3.06 Wildlife Management:

Vegetation is vital to a good wildlife management plan. This is a brief outline of what can be done with vegetation manipulation. Greater details are presented in the Wildlife Management Plan, Appendix D to the Revised Master Plan.

A. <u>Wildlife Species</u>:

A large variety of wildlife species, which includes songbirds, gamebirds, small game animals and deer, as well as some predators, is present at Benbrook. Management must provide a wide variety of habitats including those for mourning dove, bobwhite quail, mocking bird, redwinged blackbird, meadow-lark, cottontailed and jack rabbits, red fox, raccoon, various waterfowl and water birds, as well as many others. Habitat improvement measures will be directed toward other than game species in the aesthetic and natural areas.

B. <u>Habitat Requirements</u>:

Some habitat requirements that can be met through vegetation management are nesting sites, shelter from predators and the elements, and food.

1. <u>Shelter</u>:

The various forms of shelter to be provided include nesting and home sites. Preservation of nest trees (Mature, sound trees with large spreading crowns), den trees (trees and snags with natural openings in the trunk), thickets (wild plum, yaupon, privit, hawthorn) and cover such as tall grass or weeds should be augmented by strategic placement of brush piles.

2. Food:

Food may be provided by planting crops such as African millet, maize and alfalfa or sunflowers and ox-eye daisies. Vines provide food for deer while their fruits furnish nourishment for many birds and animals such as raccoon or fox. Shrubs and trees such as oak, wild plum, mesquite, and black locust support wildlife by supplying both food and water.

C. Habitat Improvement Measures:

Some plants, such as forbs, can be planted by methods used in any cultivated crop or produced by fallow disking or burning. Others, such as trees and shrubs, require specialized methods. Shelters can be constructed by the cutting and piling of brush or by means of half-cuts (cutting of a small tree part way through and pushing it over). Cut brush may be utilized in fish management by anchoring such brush into water 10 to 15 feet deep to provide protection and shelter.

B.07 Methods of Management:

Management objectives can be obtained by methods used in improving a commercial timber stand. Techniques such as thinning, pruning, clearing, and prescribed burning can be utilized in the management of vegetation for recreation, wildlife, and watershed protection. Planting of trees and shrubs is another major management tool.

A. <u>Thinning and Pruning</u>:

Thinning, pruning, and opening of a heavy stand of trees will stimulate development of undergrowth. This will provide natural regeneration of desirable apecies, ground cover for wildlife and protection of the soil. Thinning and pruning can be used in recreation areas to relieve competition for the more desirable trees and to beautify the residual stand. Thinning can be used to remove undesirable trees from a stand for any reason.

B. Prescribed Burning:

Burning, if done in a proper manner at a proper time, can be an effective management tool. Burning can be used in place of grazing or mowing for habitat improvement, fire hazard reduction, and stimulation of range plants.

C. Tree and Shrub Planting:

Tree or shrub planting can be used to obtain more desirable species, to establish trees where there were none, and to beautify or enhance the natural beauty of any area.

IV. FIRE PROTECTION:

A plan involving vegetation manipulation can be devised to reduce the hazards of fire. This plan should be developed in conjunction with the Fire Protection Plan, Appendix C to the Revised Master Plan. Methods such as fuel breaks and fire lanes can be utilized. Fuel breaks are strips or lanes of low intensity fuels. They are obtained by the mowing of grasses, the use of fall and winter-green grasses, all clearing of underbrush, pruning and thinning of trees, and their maintenance. These areas should tie into natural breaks such as the lake or roads, and should be at least fifty feet wide. Fire lanes are areas totally denuded by fire or by plowing. These strips can be narrower than a fuel break but should be at least ten feet wide. They can also be created by clearing with the use of a soil sterilent such as the general herbicides T.C.A. and T.D.E. This reduces the maintenance costs but fire lanes are not as attractive as fuel breaks and do not serve any other function. All breaks should follow natural boundaries and should be easy to maintain; ridgelines and hilltops are the best locations to prevent the spread of wildfire. All clearing, disking, planting, etc., should be done on the contour and not straight up and down the slope. Any down-slope strips should be provided with waterbars to prevent erosion.

V. FUNDING AND COST ESTIMATES:

5.01 Funding:

Funding will be accomplished as to function. A line item cost account will be provided for wildlife management; erosion control, revegetation, landscaping and property line control. Each project or job should be budgeted well in advance in order to allow for adequate planning. Any delay in budgeting and planning could lead to deterioration of the site through over use or erosion, loss of control of the vegetative cover, loss of control due to various encroachments, and impacts as a result of increased recreational pressure.

5.02 Cost Estimates:

The following cost estimates are to aid in budgeting only. Costs are subject to change before implementation. Estimates were obtained from the Bardwell Lake area.

A. Fencing:

The cost of fencing is based on a four strand barbed wire fence on steel posts. The posts are on 12 foot centers with treated pine braces at each turn and in straight runs of more than one-fourth mile in length. The contracted cost is approximately \$2500 per mile. Cost using project labor is approximately \$2000 per mile. An estimated 50 miles of fence is needed for a cost of \$100,000 (project personnel) to \$125,000 (contracted). This includes crossfencing.

B. Landscaping:

1. <u>Nursery Trees</u>:

Nursery stock costs approximately \$40 a tree for twoto-four inch caliper trees.

Estimate by park are:

Park	Number of Trees	Cost
Headquarters Holiday Mustang Rocky Creek	45 617 715 401	1,800 24,680 28,600 16,040
lotal	1,778	71,120

2. Corps of Engineers Equipment:

The estimated cost of transplanting trees using the Corps of Engineers equipment is \$25 per tree or a total cost of \$44,450.

3. Erosion Control and Revegetation:

These costs include basic tilling and fertilizing.

Coastal	bermudagrass	lawn cover	\$440/acre
		18" rows	175/acre
		35" rows	100/acre

Grass mixture (seeding) - 70/acre

Forbs (clover, alfalfa, etc.). - 50/acre

Extensive revegetation in the parks amounts to 30.0 acres at an average cost of \$300 per acre or \$9,000. Revegetation outside the parks amount to approximately 75 acres for a cost of \$22,500.

C. <u>Wildlife</u>:

1. Forbs:

The cost of most wildlife foods is approximately \$18.00 a hundredweight. The basic cost per acre with tilling and fertilizing is \$50 per acre in large areas. Small food plots may cost more.

2. Shrubs and Trees:

Most species from commercial nurseries cost \$1.50 to \$3.50 per plant depending on species and size. Plants from state and federal nurseries - if available - \$2.50 to \$5.00 per hundred, depending upon species.

VI. SUMMARY:

The Corps of Engineers is a land use management agency, and as such, is responsible for the proper management of public use of these lands. As stated throughout the Master Plan, "people control" is a vital function necessary to preserve the natural resources. Fencing and barriers, as unpopular as they may be, are the most efficient and practical methods of control and should be widely utilized. Benbrook, although small in acreage, has a large number of urban and agricultural problems. Per unit area, Benbrook has a greater visitation than any project in the district; therefore, the resources are taxed greater than other projects. A job description should be developed for each problem, outlining the problem, type of area involved, size of area, and type and amount of vegetation desired. The outline will include scheduling of time and materials to meet a given deadline. Aid in the further development of any section of this plan may be obtained from Operations Division in the Fort Worth District Office. DESIGN MEMORANDUM NUMBER 1C

APPENDIX (C) FIRE PROTECTION PLAN REVISED MASTER PLAN

BENBROOK LAKE

TRINITY RIVER BASIN

CLEAR FORK, TRINITY RIVER, TEXAS



U.S. ARMY ENGINEER DISTRICT

FORT WORTH, TEXAS

SEPTEMBER, 1974

SWDCO-R (SWFOD-M 8 Nov 74) 1st Ind SUBJECT: Project Resource Management Plans, Appendix C to Design Memorandum No. 1C, Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, TX 75202 09 DEC 1974

TO: District Engineer, Fort Worth, ATTN: SWFOD-M

Appendix C, Fire Protection Plan to Design Memorandum No. 1C, Master Plan for Benbrook Lake, is approved subject to the following comments or inclusions at subsequent revisions, whichever is appropriate:

a. A cooperative agreement between the Corps of Engineers and state or local governments, preferably written, for fire control should be entered into and presented in this plan.

b. <u>Section 1</u>. An additional paragraph should be provided to describe the history of fire occurrence and damage.

FOR THE DIVISION ENGINEER:

IA.

GEORGE W. STAPLES Chief, Construction-Operations Division

wd all incl

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DEPARTMENT OF THE ARMY FORT WORTH DISTRICT, CORPS OF ENGINEERS P. O. BOX 17300 FORT WORTH, TEXAS 76102

SWFOD-M

REPLY TO ATTENTION OF:

8 November 1974

SUBJECT: Project Resource Management Plans, Appendix C to Design Memorandum No. 1C, Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

Division Engineer, Southwestern ATTN: SWDCO-OR

1. Reference Engineer Regulation 1130-2-400 dated 28 May 1971, SWDPL-R letter dated 8 March 1972, subject: Recreation Resource Planning and Management, and 2nd Indorsement thereto dated 17 May 1972.

2. In accordance with schedules previously furnished, seven copies of Appendix C, Fire Protection Plan for Benbrook Lake, Clear Fork, Trinity River, Texas are submitted for approval.

FOR THE DISTRICT ENGINEER:

l Inclosure As stated

ALLIE . MAJORS Chief, Operations Division

APPENDIX C

FIRE PROTECTION PLAN BENBROOK LAKE

REVISIONS AND UPDATES

Date

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APPENDIX C

FIRE PROTECTION PLAN

I. INTRODUCTION

1.01 Purpose:

The purpose of this fire protection plan is to establish policies, procedures, equipment, and train personnel in the protection of both grassland and woodlands from damage or destruction by fires at Benbrook Lake.

1.02 Authority:

This Appendix to the Benbrook Master Plan is prepared in accordance with Engineer Regulation 1130-2-400 dated 28 May 1971.

1.03 Location:

Benbrook Lake is located on the Clear Fork of the Trinity River, about 574 miles above the mouth of Trinity River and 15 river-miles upstream from the confluence of the Clear Fork with the West Fork of the Trinity River at Fort Worth, Texas. The dam is in the southwest corner of Tarrant County, approximately 10 miles southwest of Fort Worth.

1.04 Access:

Benbrook Lake is readily accessible by federal, state, and county roads. Corps of Engineers roads servicing the primary facilities, as well as the designated public use areas, are conveniently connected to this public road network. U.S. Highway 377 and State Farm Road 1187 parallel the lake on the west and south sides respectively. Several county roads provide access to park areas for emergency rescue work, and fire fighting purposes.

C-01

1.05 Description of Project Area:

There are 11,258 acres of fee owned land at Benbrook and 2,823 acres of flowage easement land. Lands bordering the project are typical of the Grand Prairie region. Uplands are characterized by rolling grasslands, sparsely covered by live oak and various shrubs. Park areas are characterized by gently rolling hills interspersed by more rugged slopes, small bluffs and groves of live and post oak. Over 75% of the eastern side of the lake remains in natural grasslands and will be reserved as a natural area. Timber is confined to occasional isolated patches, small drainage ways and along the river.

1.06 Forested Lands:

The upper portion of the main tributary contains the more forested lands. The upper portion of the Clear Fork of the Trinity River is a broad, flat, fertile alluvial valley. Dominant tree species of the area are live oak, hackberry, American elm, cedar elm, winged elm, burr oak, and post oak. Scattered clumps of trees and shrubs as well as individual trees and shrubs, including pecan, willow, sycamore, and dogwoods are located along the streams, while hackberry, gum elastic, sumacs, elm, persimmons, and live oak grow on the drier uplands.

1.07 Grassed Lands:

On 31 December, 1972 all agricultural outgrants expired and none were renewed. Any future lease will include a land management program designed to benefit wildlife as well as the leasee. This program will require the conversion of all open areas and formerly cultivated areas to permanent pastures. Bermuda grass and buffalograss are recommended for planting at lower elevation because they tolerate periods of inundation. Principal native grasses are big bluestem, little bluestem, Indiangrass, switchgrass, dropseed, lovegrass, buffalograss, several species of grama, paspalums, wildrye, and Texas winter grass. Where native ranges have been abused, annual weeds and less desirable grasses have invaded. Introduced grasses common to the area are Johnsongrass and bermuda grass.
II. FIRE PROTECTION

2.01 General:

Wildlife is a major enemy of forest and grasslands. An adequate fire control plan is one of the components of a sound management program. This section includes plans for prevention and control of fire in forest, grass, and brush areas, with emphasis on organized fire prevention, firefighting, selection of tools and equipment, and facilities needed.

2.02 Objective:

The objective is to reduce the number of man-perpetrated fires and acres burned to the lowest possible extent, both on Corps of Engineers owned lands and on private land adjoining the project.

2.03 Fire Detection:

Corps of Engineers personnel will normally be notified of fires by one of the home or ranch owners who live adjacent to government land. Additionally, information as to the type and location of fires may be obtained by Corps of Engineers mobile radio units operating on the frequency with the City of Benbrook police and fire departments. During periods of dry weather and high fire danger days, project personnel will remain alert to the possibility of detecting fires visually, both off and on Corps of Engineers land, and notify the proper authorities at once.

2.04 Fire Prevention:

All project personnel and contractor personnel working on Government lands will be fire conscious, especially during periods of dry weather and assure that no Corps of Engineers project activity develops into an uncontrolled fire. It will be the duty of each maintenance Foreman and Ranger to properly instruct the employees working under their supervision so that uncontrolled fires are not permitted to develop. Special attention will be given to the following procedures: A. Firelanes will be developed and maintained around all public lands at Benbrook where space and terrain permits. Lanes will be placed to prevent damage, both aesthetic and structural to government as well as private properties. Where space permits two (2) adjacent firelanes will be established, each disked on alternate years. Double lanes will serve a dual purpose, while one is serving as a fire break the other will be producing a crop of herbaceous weedy vegetation which benefits quail, dove, rabbits and a variety of other animals of aesthetic value. Maintaining two lanes would be no more costly than maintaining one.

B. Lanes will be disked at least once each year in late February or March. During years with particularly wet summers, when the lanes will revegetate themselves rapidly, there will be an additional disking of boundary line firelanes in late September or October. This will provide a lane for winter when vegetation dries out and is highly susceptible to fire. Lanes will be a minimum of 8 feet wide, where double lanes occur they will be adjacent to each other, no strip will be left between the two. Disking should turn under all vegetation leaving bare soil.

C. Besides those lanes established along property lines, additional interior lines will be disked to sub-divide large parcels of government property which are particularly susceptive to the rapid spread of fire. These interior lines will also help improve the quality of wildlife habitat at the lake.

D. Adjacent landowners with valuable property, either agricultural or residential will be encouraged to provide firelanes or other appropriate means of containing fire to their property or preventing its encroachment onto their property.

2.05 Preparedness - Organization:

The current fire control plan for headquarters and project area is contained in Appendix E to FWDR 190-2-3, revised 1 February 1972. Project area fire detection and control organization will be composed of personnel at the project office.

Fire danger will be measured quantitatively by the following scale: Very low fire danger. Moderately low fire danger. Moderately high fire danger. Extremely volatile conditions the following precautions will be observed for each danger level. None-normal operations.

Rangers will be alerted to the danger and advised to be on the alert. All project personnel will be alerted to the danger and advised to report any smoke immediately whether on government or private property. Water truck will be kept ready for use at all times. (Pump to be started at least three (3) times each week to assure its serviceability and water tank will be kept full of water at all times. Gas tanks on water truck will be filled after each use).

All project personnel will be alerted to the danger and advised to report any smoke immediately whether on government or private property. All fire fighting equipment will be kept gased, full of water and ready to be put into operation at all times. Tractor attachments listed in paragraph 3.01 will be kept on said tractor except when they are in other use. If fire danger is extremely high (e.g. fourth of July, Memorial day holiday, etc.) extra personnel will be placed on duty to man strategic lookouts on the lake and watch for fires, these to be reported to rangers by radio who will in turn notify the appropriate authority or fire department.

Plate I shows the relative hazard of fire ignition andspread and Plate II shows potential damage which could be caused by fire, aesthetics were considered when determining potential damage losses.

2.06 Firefighting Equipment:

Firefighting equipment will be kept updated and in **a** state of readiness at all times.

2.07 Fire Crew Training:

Project personnel will participate in firefighting training

schools offered by Texas A&M University, Fireman's Training School, Bryan, Texas to keep current on latest methods. Personnel will be further trained by participating in weekly fire drills employing the use of firefighting tools and equipment, and the most current methods of controlling wildfires.

III. EQUIPMENT AND TOOLS

3.01 Equipment and Tools Available:

The following equipment and tools are available for fighting fires and providing emergency first aid to those fighting fires at Benbrook Lake.

1 John Deere 340 Dozer 1 Farm tractor with rear-mounted blade 1 Farm tractor with rotary mower attachment 6 Vehicles equipped with 2-way radios 1 Portable 2-way radio 6 First Aid kits 1 Chain saw 1 500 gallon water tank mounted on 2 1/2 ton truck with fire pump.

3.02 Location of Equipment:

All firefighting equipment is located at the project office at Benbrook Lake.

3.03 Assignment of Personnel:

The fire suppression team for the Benbrook Project consists of:

Duties	<u>Duties</u>	Title of Personnel Assigned
	Fire Chief	Reservoir Manager
	Assistant Fire Chief's	3 Reservoir Rangers
	First Alternate	Reservoir Maintenance Work Foreman
	Dozer Operator	Reservoir Maintenance Worker
	Tractor Operator	Reservoir Maintenance Worker
	Tractor Operator	Reservoir Maintenance Worker
	Fire Fighter	Laborer
	Fire Fighter	Laborer
	Communications	Reservoir Ranger
	Communications	Project Clerk









DESIGN MEMORANDUM NUMBER 1C

APPENDIX (E) Project safety plan Revised master plan

BENBROOK LAKE

TRINITY RIVER BASIN

CLEAR FORK, TRINITY RIVER, TEXAS



U.S. ARMY ENGINEER DISTRICT

-

FORT WORTH, TEXAS

SEPTEMBER, 1974

SWDCO-R (SWFOD-M 5 Nov 74) 1st Ind SUBJECT: Project Resource Management Plans, Appendix E to Design Memorandum No. 1C, Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street Dallas, TX 75202 1 2 DEC 1974

TO: District Engineer, Fort Worth, ATTN: SWFOD-M

Appendix E, Project Safety Plan to Design Memorandum No. 1C Master Plan for Benbrook Lake, is approved subject to the following comments or inclusions at subsequent revisions, whichever is appropriate.

a. <u>Section IV</u>. Swimming areas should be monitored in accordance with SWDR 1130-2-9.

b. <u>Paragraph 4.01B</u>. ER 1130-2-407 should be referenced in this paragraph. Lessee's water systems should also be in accordance with ER 1130-2-407.

c. A discussion should be included on the safe storing, handling, and applying of chemicals and pesticides and the disposal of used containers in accordance with current regulations.

d. It is recognized that this plan provides the information as outlined in ER 1130-2-400; however, since swimming and boating accidents are of major concern, it would be more meaningful if the appendix presented additional information on water safety. The following are some items that should be covered in greater detail or included in this appendix.

(1) Establishing with the community a Water Safety Council. Such organizations as the Coast Guard Auxiliary, Power Squadron, Boy Scouts, concessionaires, Red Cross, community leaders, etc., are excellent groups for participating in this type of activity.

(2) The placement of buoys for restricting boats and identifying hazards should be coordinated with the Texas Parks and Wildlife Department. This coordination should be indicated in the appendix.

(3) Procedures for patrolling and identifying hazards.

(4) Procedures for checking and using the search, rescue and recovery equipment.

2

1 2 DEC 1974

SWDCO-R (SWFOD-M 5 Nov 74) 1st Ind SUBJECT: Project Resource Management Plans, Appendix E to Design Memorandum No. 1C, Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

(5) Types of search, rescue and recovery equipment available. FOR THE DIVISION ENGINEER:

GEORGE W. STAPLES

Chief, Construction-Operations Division

wd all incl

CF: w/incl HQDA (DAEN-CWO-R) 2 cy



DEPARTMENT OF THE ARMY FORT WORTH DISTRICT, CORPS OF ENGINEERS P. O. BOX 17300 FORT WORTH, TEXAS 76102

REPLY TO ATTENTION OF:

SWFOD-M

5 November 1974

SUBJECT: Project Resource Management Plans, Appendix E to Design Memorandum No. 1C, Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas

Division Engineer, Southwestern ATTN: SWDCO-OR

1. Reference Engineer Regulation 1130-2-400 dated 28 May 1971, SWDPL-R letter dated 8 March 1972, subject: Recreation Resource Planning and Management, and 2nd Indorsement thereto dated 17 May 1972.

2. In accordance with schedules previously furnished, seven copies of Appendix E, Project Safety Plan for Benbrook Lake, Trinity River Basin, Clear Fork, Trinity River, Texas are submitted for approval.

FOR THE DISTRICT ENGINEER:

l Inclosure (7 cys) As stated

ALLIE & MÁJORS

Chief, Operations Division

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APPENDIX E

PROJECT SAFETY PLAN BENBROOK LAKE

REVISIONS AND UPDATES

Date

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APPENDIX E

PROJECT SAFETY PLAN

I. INTRODUCTION

1.01 Purpose:

The purpose of the Project Safety Plan is to identify common, recurring hazards or unsafe conditions in each major phase or area of operations. Such areas include construction, operation, maintenance, equipment, public use areas, visitor protection, and office operations. Precautionary actions to be taken to discover, prevent, reduce, or control hazardous conditions or situations are planned and set out herein.

1.02 Authority:

This plan is prepared in accordance with the requirements of Engineer Regulation 1130-2-400, dated 28 May 1971.

1.03 Master Plan:

This Appendix is a part of the Revised Master Plan for the development and management of Benbrook Lake.

II. ADMINISTRATION FACILITIES

2.01 Office Area

A. <u>Staffing</u>:

The office area will be open Monday through Friday from 0800 hours until 1645 hours. On weekends and holidays, one Ranger will be on duty at the project from 0800 to 1645 hours; however, he will be assigned to project operation and surveillance duties and will not be in the office at all times. Information containing safety and general project operations will be available to the puclic at the project office or from Rangers on duty at the other project locations. First aid information and service is available at the office and emergency telephone numbers are posted at the office entrance for immediate use. In the event of fire, each employee will assume his duties as outlined in Appendix E, Fire Control Plan for Headquarters and Reservation, Fort Worth District Regulation 190-2-8, Change 1, dated 1 February 1972.

B. Housekeeping:

All trash and other solid wastes shall be cleared from the office daily and such areas shall be maintained free of accumulation of material or wastes. Housekeeping shall be in accordance with Engineer Manual 385-1-1, Section XII, paragraph 12.B.

C. <u>Trash Containers</u>:

Trash containers shall be metal and of a type manufactured for the specific use to which they will be employed. All rags, waste, etc., soiled by combustible or flammable materials shall be placed in tightly closed, metal containers, and disposed by an acceptable means daily.

D. Entrances and Walkways:

All walkways and porches shall be kept free of mud, ice, snow, grease, or any other material or obstructions which would create unsafe footing for persons using them. Non-skid surfaces or safety tread will be provided on walks and steps.

E. Inside Electrical Facilities:

All electrical outlets and extension cords shall be in accordance with the requirements of the National Electric Code and the National Electrical Safety Code. Electric service shall be installed and maintained in strict compliance with Engineer Manual 385-1-1, Section XV, paragraph 15.B.

F. Outside Electrical Facilities:

Switches, circuit breakers, fuse panels, motor controls, and electrical outlets in wet locations or installed outside shall be inclosed in a weather proof housing or be of a moisture proof type. All 120-volt, single-phase, 15 and 30 ampere receptacle outlets installed outdoors will have approved ground-fault circuit protection for personnel.

G. Lighting:

Offices, workrooms, stairways, corridors, passageways, and working areas shall be adequately lighted while work is in progress. Lighting intensities shall be equal to those specified in Engineer Manual 385-1-1, Section IX, paragraph 09.A.03. Exit lights shall be checked daily and shall be continuously illuminated.

H. Heating Devices and Systems:

All space heating units and other heating apparatus shall be installed in accordance with applicable National Fire Codes of the National Fire Protection Association. Furnaces shall be separated from office space by masonry walls and steel doors. Temporary heating devices shall be in accordance with Engineer Manual 385-1-1, Section XII, paragraph 12.D.05.

I. Firefighting Equipment:

A fire alarm horn is installed on the west side of the office and is audible throughout the headquarters area. This alarm system is tested weekly. Fire extinguishers are either CO₂ or dry chemical type and are placed at locations approved by the District Safety Officer. Two (2) project-owned fireplugs are located in the headquarters compound. Firefighting equipment is serviced monthly by project personnel in accordance with Engineer Manual 385-1-1, Appendix L.

2.02 <u>Maintenance Area</u>

A. Entrance:

The general public is not allowed uncontrolled entrance to maintenance areas. Visitors authorized to enter maintenance areas will be accompanied by a project representative.

B. Tools and Equipment:

Tools and equipment shall be kept in good working condition to eliminate safety hazards to the users. Defective power tools and safety gear will be removed from service. Throwing tools or materials from one location to another, from one worker to another, or dropping them to the lower levels will not be permitted. When work is being performed overhead, tools not in use will be secured or placed in holders. The use of the right tool for the right job will be strictly adhered to in all work performance. Overloading or placing tools under unreasonable stress will be avoided. Tools and equipment shall be blocked or lashed down when conveyed in vehicles so that they will not overturn, collide with each other, impact the hauling vehicle, or otherwise be damaged. Proper shields, guards, and goggles of the recommended shade for filter lenses (Engineer Manual 385-1-1, Appendix A) shall be used in drilling, grinding, chipping, and welding operations. All electrical tools, extension cords, receptacles and male plugs will be of three-conductor type.

C. Tool Storage:

All tools shall be stored in designated racks or compartments when not in use, and shall be color or number coded so they can be easily returned to their correct storage area after use.

D. Protective Apparel:

Goggles, gloves, aprons, respiratory equipment, safety shoes, and foul weather gear shall be worn by all employees who are engaged in work which requires such protection. Safety hats, Class B, shall be worn at all times by all employees, when engaged in maintenance and construction work. Personal protective apparel will be provided in accordance with Fort Worth District Regulation 385-1-50.

E. Ladders:

The type and usage of ladders shall be in conformity with Engineer Manual 385-1-1, Section XXX, paragraph 30.A. Portable metal ladders shall not be used for electrical work or where they may contact electrical conductors.

F. Firefighting Equipment:

A fire alarm horn is installed on the west side of the office and is audible throughout the headquarters area. This alarm system is tested weekly. Fire extinguishers are either CO_2 or dry chemical type and are placed at locations recommended by the District Safety Officer. Two (2) project-owned fireplugs are located in the headquarters compound.

G. Storage of Flammables:

All gasoline, oil, diesel, paint, thinners, solvents, and other volatile materials shall be stored in the oil and paint storage building which has been provided for such storage. No smoking, open flame, exposed heating elements, or other sources of ignition of any kind shall be permitted in areas or rooms where volatile fuels are stored. Hand sized (5 gallons or less) containers used for storage and handling of flammable liquids shall be Underwriters Laboratories approved type safety containers with flame arrestors. Bulk storage of gasoline and diesel shall be in underground tanks and dispensed with electric pumps.

H. Paints and Painting:

Packaging, storage, mixing, and application of paints shall be in accordance with Engineer Manual 385-1-1, Section XII, part 12.F. Spray painting shall be performed in a well ventilated area when possible. When paints containing toxic substances are being used in closed areas, respirators and protective clothing will be worn. No smoking, open flame, exposed heating elements, or other sources of ignition of any kind shall be permitted in areas or rooms where spray painting is done. Signs to this effect shall be posted at points of entry to spray paint operations.

I. Vehicle Storage:

All vehicles shall be stored in the headquarters compound whenever they are on the project overnight. For orderly parking in the compound area, striping has been provided on the asphalt pavement. Sedans and vehicles assigned to Ranger personnel which has radio equipment, and other valuable material aboard, will be stored in the equipment storage bay of the administration building. All portable flammables shall be removed from vehicles at night and placed in the oil and paint storage building.

J. Storage of Material and Supplies:

Material and supplies shall be stored in an orderly manner. Like items shall be grouped for ready access. Walk-through lanes shall be provided between stacks of lumber, fertilizer, cement, and blasting sand for accessibility and fire protection purposes. Disposal action will be initiated for surplus material and equipment.

K. Warning Signs:

Warning signs shall be displayed near hazardous shop equipment, fuel storage areas, and entrance gates.

L. Bulletin Board:

A bulletin board shall be provided in the maintenance area

for the prominent display of safety posters and all other information material essential to the safety and welfare of maintenance workers.

M. Working Environment:

No employee shall, ordinarily, be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety without adequate safety precautions, clothing, and/or equipment.

III. STRUCTURES

3.01 Dam and Appurtenant Structures:

A. Embankment:

The embankment is 1.73 miles in length. Its maximum height is 130 feet above stream bed. The slopes are protected with riprap stone upstream and grass turf downstream. The asphalt surfaced service road of approximately 1.73 miles in length is not open to public travel and is closed with chain link barricades at each end. "ROAD CLOSED" signs are placed on these barricades. At the request of the Corps of Engineers, the City of Benbrook, Texas passed an ordinance making it unlawful to operate any motor vehicles on the slopes of the dam. Signs relating to this are conspicuously posted. This structure is provided with signs warning of shifting or falling rocks, dangerous slopes, and slippery surfaces. Recreational activities are not permitted on the embankment.

B. Outlet Works:

A chain link barricade is in place at the service bridge entrance to this structure to prohibit unauthorized public entry. The tower is encircled by restricted area buoys. Navigation and small craft warning lights are operated at night for the protection and use of boaters.

C. Stilling Basin:

The portal structure and stilling basin are enclosed on all sides except the end sill area with chain link fences. "KEEP OUT" signs are posted on this fence along with signs warning of dangerous currents, rapid changes in water level, shifting or falling rocks, and dangerous and slippery slopes. Signs and markers setting out a restricted zone to 300 feet downstream of the structure are displayed.

D. Spillway:

This concrete structure is open to pedestrian access only.

"KEEP OFF" signs are prominently displayed on the structure. Pipe handrail have been provided on the structure for the safety of the visiting public.

E. <u>Bridges</u>:

The service bridge to the outlet works structure is the only project-owned and operated bridge. It is closed to public use by chain link gates.

3.02 Toilet Buildings and Bath Houses:

A. Design:

Design of these structures is accomplished by Engineering Division of the District Office and all aspects of safety have been satisfied in such design. Safety features include vandal-proof fixtures, handrails for porches and steps, and for the physically handicapped. Electrical wiring and lighting meets the requirements of the National Electric Codes. All walking surfaces are of non-skid type. Vehicles parking has been provided and equipped with wheel stops or guard post for traffic control.

B. Service and Maintenance:

Cleanup of these facilities is done by project personnel on a daily basis, cleaning schedules have been developed from several years experience and are adequate to protect the health and safety of all users. All cleaning agents, disinfectants, and insecticides must have the prior written approval of the Reservoir Manager and the District Biologist. Pumpout and maintenance of vaults is by Corps of Engineers on all structures. The latest manufacture of bacterial enzymes and deodorants are utilized. Aerobic digestor systems have been installed on vault type toilets.

C. <u>Repair</u>:

Reservoir Rangers inspect these structures twice weekly and submit work orders for needed repairs. Repair work is accomplished by

project personnel.

3.03 Visitor Centers and Shelter Houses:

This project has no visitor centers or shelter houses at this time.

3.04 Overlook Structures:

This project has no overlook structures at this time.

3.05 Administrative Structures:

This project office is located in the project administration building. The building is of brick veneer type construction. Project safety, as it relates to offices, is included in Section II, Administrative Structures, paragraph 2.01, A., through 2.01, I.

3.06 Concession Buildings:

A. Commercial Marinas:

These structures are inspected monthly for unsafe physical condition, unsafe equipage, and for fire hazards. Deficiency listings are furnished to the responsible operators. All marina operators have been furnished copies of "Corps of Engineers Minimum Safety Requirements for Marinas and Boatyards" prepared by the Kansas City District Safety Office, March 1970, and requested to bring their facilities in compliance therewith.

B. Commercial Floating Fishing Barge:

There are two floating commercial fishing barges, (piers) on the project. One of these structures is basically of sound construction, and requiring some minor repair work. The other structure has depreciated to an extent where considerable repair work is needed on it. The floor plan on one structure has placed the food service area adjacent to the entrance ramp. Since the galley is the high risk area, an escape ramp on the barge will be required by the Corps of Engineers so that persons on the barge will not be trapped from exit by a fire in the galley.

C. Landside Concession Buildings:

These structures consist of, supply and service, and sales or display buildings. Construction of these units has been in accordance with plans approved by the Corps of Engineers. Utility service is in compliance with applicable codes and adequate parking is available. Concessionaires are being required to plan new buildings to conform to the latest standards for park design and in harmony with present ecological and environmental considerations.

3.07 <u>Recreation Structures</u>:

A. Private Mooring Facilities:

None.

B. Picnic and Camp Units:

Parking spurs or turn outs will be provided for each unit. These areas are being surfaced for all weather use and inclosed with guard posts or wheel stops to prevent vehicles from rolling into structures, over embankments, or into ditches. Night lighting is provided to the greatest extent possible for the safety and security of these users. Shelters are provided on a majority of these units for shade and shelter.

C. Electrical Hookups:

These facilities have been constructed in accordance with the National Electric Code. Wiring is installed underground or encased in rigid metal conduit if above ground. Moisture proof, self closing receptacles are used throughout the system. All outlets are of a three conductor type and ground fault circuit breakers are of proper rating for the circuits being protected.

D. Boat Launching Ramps:

Boat launching ramps are of non-skid corrugated surface concrete slabs. Ramps are provided with medians for orderly flow of usage. Width of ramps are 14 feet in gradient of 12 percent or less. The majority of the ramps extend into the water a sufficient distance for safe usage. Shorter ramps are posted against usage during low water levels. Also, signs are displayed prohibiting swimming in approaches to ramps. Mercury vapor lights are located on the parking areas by some of the ramps, for the safety and convenience of night time users. Mercury vapor lights are planned to be installed at all boat ramps.

IV. SANITATION

4.01 Public Water Supply:

A. Administration Facilities:

The potable water supply for these facilities is furnished by a project well.

B. Public Drinking Water Supply:

The potable water supply in the public use areas is produced from 11 drilled wells. Water is pumped from the Woodbine water bearing sand which varies from 147 feet to 404 feet in depth. All wells are pressure cemented outside the casing from the lower end to the earth's surface. Submersible pumps are used, and a pressure tank is housed in a masonry pump house. The casing projects 18 inches above the pump house floor and is closed with a sanitary well seal. The pump houses are cleaned semi-monthly and are kept locked. Water samples are taken weekly from random tap points on the distribution. system of each well and submitted to bacteriological analysis by the State Health Department. Hyprochlorinators will be installed and checked daily during the recreation season. Rarely are coliform organisms found and no contamination in the wells has occurred during the life of the project. A chemical analysis is made of the production of each system annually and chemical substances have been found to be within the allowable range established by the State Health Department.

4.02 Sewage Facilities:

A. Administration Facilities:

The administration facilities are served by a septic tank and tile disposal field.

B. Vault-Type Toilets:

Vault-type toilets are pumped out by project personnel and

the waste placed in the sewage treatment plants of Benbrook or Fort Worth, Texas. After pumpout of the vault, and clean out of the collected solids, the vault is back filled with 100 gallons of fresh water and a recommended dosage of cultured bacteria added.

C. <u>Waterborne Toilets</u>:

Waterborne toilets are provided with septic tanks and tile disposal fields. The systems are constructed in accordance with State Health Department plans and are adequately serving the toilet wastes. Bacterial enzymes are placed in the septic tanks in July and January each year. The tanks require little pump out.

D. Trailer Dump Stations:

Travel trailer dump stations are served by the same type sewage disposal system as the waterborne toilets.

E. Sewage From Adjacent Development:

Presently there are no sewage effluent problems from adjacent homes. A new sub-division being started next to Holiday Park will be watched closely.

4.03 Solid Waste Disposal:

Solid wastes from public use areas are collected by commercial packer truck service and disposed of off the project premises. The contractor places the wastes at a disposal site operated by the City of Fort Worth, and approved by the State Health Department. Solid wastes generated by in-house operations are disposed of by the Government at this same location.

4.04 Insect and Poisonous Plant Control:

A. Flies:

Control of flies in public recreation building and in public

use areas are controlled by the use of both liquid and granular insecticides. The trash barrel contractor is furnished a list of acceptable insecticides for this use. He is required to furnish a statement as to the product selected, and approval of the District biologist is required before any application is made.

B. Mosquitoes in Public Use Areas.

Mosquito control is not a significant problem at Benbrook. Acceptable insecticides are used when the need arises.

C. Poisonous or Unsafe Plants:

Poison ivy, poison oak, and poison sumac are removed from the vicinity of camp and picnic units by clearing operations. Briar and cactus are removed in the same manner. Park visitors have assisted in containment of these pests.

D. General Vegetative Control:

Weed control is accomplished by the use of biologically safe killers produced by the leading chemical manufacturers. Elimination of all vegetative growth is not desired.

V. ACCESS

5.01 Roads:

A. Primary Roads:

Roads providing primary access to the public use areas and primary project operational facilities have been designed for adequate public safety. Minimum running surface is 20 feet wide, maximum grades are 6 percent and curves are low degree. Intersections are at 90 degree angles in most instances and the best consideration has been given to sight distance from danger points.

B. Secondary Roads:

These roads are designed for low speed, interior flow of traffic. They are laid lightly on the ground providing almost no hazardous conditions.

C. Camp Roads and Turn-Outs:

Camp roads and turn-outs are designed and constructed to provide minimum despoilment of terrain, yet provide safe grade, clearance, and visibility for users. All camp roads are in the process of being regraveled. Gravel car and trailer pads have been constructed at all sites in Holiday and Mustang Parks that now have individual electrical and water outlets. Vehicle parking is restricted to these pads and/or planned parking lots.

5.02 Trails:

A 7.3 mile Horse and Nature Trail was completed in April 1974. The trail begins in Dutch Branch Park and ends near the south end of Holiday Park. Specification of the District Safety Office were followed. Nature trails in Longhorn Park and near the waters edge in Holiday Park are planned. SWDCO-OR (SWFOD-M 4 Aug 72) 1st Ind

SUBJECT: Project Resource Management Plans, Appendix (A), Design Memorandum No. 1C, Revised Master Plan, Benbrook Lake, Clear Fork, Trinity River, Texas

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, TX 75202 07 MAR 1974

TO: District Engineer, Fort Worth, ATTN: SWFOD-M

1. Appendix A to Design Memorandum No. 1C Revised Master Plan for Benbrook Lake, Clear Fork, Trinity River, Texas, is approved subject to the following comments or inclusions at subsequent revisions whichever is appropriate:

a. Paragraph I. "Reformation" should be changed to "Reformulation."

b. Paragraph III.

(1) This paragraph should be rewritten to spell out the original land acquisition policy together with a discussion of the effect of the reconveyance act. The discussion should reflect total acreages and should relate these acreages to the latest GSA Form 1166 for the project.

(2) Analysis of available lands and statements regarding acquisition of additional lands should be presented and justified in the basic Master Plan. Accordingly, this paragraph should be revised.

(3) A duplication of information regarding the Sid Richardson property occurs in this paragraph. This should be corrected when the paragraph is rewritten.

c. Paragraph IV. The information regarding each park is required by ER 1130-2-400; however, it would be more meaningful if resource management problems associated with park operation were included along with proposed solutions. This concept is covered lightly in paragraph IIC. Also, management philosophies associated with the project that are required outside the parks should also be discussed in separate paragraphs. Some items that could be discussed are:

(1) Control of traffic.

(2) Overflow areas.

(3) Various items of contract work versus project forces in light of personnel limitations currently being experienced.

2

SWDCO-OR (SWFOD-M 4 Aug 72) 1st Ind

SUBJECT: Project Resource Management Plans, Appendix (A), Design Memorandum No. 1C, Revised Master Plan, Benbrook Lake, Clear Fork, Trinity River, Texas

(4) Number of cleanups required to keep facilities in a satisfactory condition whereby visitor complaints are minimized.

(5) Management philosophies regarding grass cutting; e.g., how much to cut, when to cut, what should remain in natural state, etc.

(6) Disposal of solid waste or vault toilet contents; i.e., frequency, disposal location, etc.

(7) Debris removal from lake.

(8) Use of adjoining land and water areas by adjoining landowners.

(9) Inspection of commercial leases.

(10) Use of off road vehicles.

(11) Testing water systems

(12) Management of historical or archaeological sites if applicable.

(13) Rodent control.

(14) Brush removal by adjoining landowners.

d. Paragraph V.

(1) Information regarding vehicle maintenance should be included in this paragraph.

(2) Signs should conform to the SWD Sign Handbook and reference should be made to this document.

e. Paragraph IX. This paragraph should be revised in light of the most recent legislative action regarding Corps of Engineers Use Fee Program. Also, the mention of Code 711 Program should be deleted.

f. Paragraph XI. Ranger citation authority should be covered in this paragraph with emphasis being given to training received, procedure for issuing citations, etc.

3

SWDCO-OR (SWFOD-M 4 Aug 72) lst Ind SUBJECT: Project Resource Management Plans, Appendix (A), Design Memorandum No. 1C, Revised Master Plan, Benbrook Lake, Clear Fork, Trinity River, Texas

g. Paragraph XVIII. This paragraph should be revised to indicate that mosquitoes are collected and identified for the purpose of determining whether they are known vectors of disease. When found in significant numbers, proper health authorities are informed and control measures undertaken as required. Also, a general mention of insect control should be included as compared to specific examples and control methods.

h. The spelling errors should be corrected along with the year, (1913), shown in paragraph IVA, page A-08.

2. This appendix should be reviewed and updated annually. A page should be inserted at the end of the plan showing the date the appendix was reviewed and the signature of the reviewer. Minor pen and ink changes can be approved by the District. This plan should be completely reevaluated and submitted for approval every five years.

3. Approval of this appendix does not circumvent the need of additional approvals at District, Division, or OCE level when required by existing directives. Specific examples that would require additional approval would include personnel spaces, replacement or purchase of equipment, modification of structures, and purchase of additional lands.

Δ

FOR THE DIVISION ENGINEER:

wd all incl

GEORGE W. STAPLES

Chief, Construction-Operations Division

CF: w incl HQDA (DAEN-CWO-R) 2 cy incl


DEPARTMENT OF THE ARMY FORT WORTH DISTRICT, CORPS OF ENGINEERS P. O. BOX 17300 FORT WORTH, TEXAS 76102

SWFOD-M

SUBJECT:

4 August 1972

: Project Resource Management Plans, Appendix (A), Design Memorandum No. 1 C, Revised Master Plan, Benbrook Lake, Clear Fork, Trinity River, Texas

Division Engineer, Southwestern Attention: SWDCO-OR

1. Reference Engineer Regulation 1130-2-400 dated 28 May 1971, SWDPL-R letter dated 8 March 1972, subject, Recreation Resource Planning and Management and 2nd Indorsement thereto dated 17 May 1972.

2. In accordance with schedules previously furnished, nine copies of Appendix (A), Project Resource Management Plans for Benbrook Lake, Design Memorandum No. 1C, Revised Master Plan, is forwarded for approval.

FOR THE DISTRICT ENGINEER:

ALLIE J. MAJÓRS

Chief, Operations Division

1 Incl Appendix (A), Design Memorandum No. 1C, Revised Master Plan Benbrook Lake (9copies)

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5.03 Parking Areas

A. Tiolets, Shelters, Launching, and Swimming Areas:

Parking areas have been provided to adequately accommodate vehicle parking at toilets, boat ramps, and swimming areas. Guard posts, wheel stops, or other suitable barriers are provided to contain vehicles on the areas surfaced for parking and to protect them from rolling into the lake, into ditches, or using meadows for parking. The parking areas are located on low gradient terrain when the existing topography permits. Parking areas are set back from through roads for safe flow of traffic.

B. Camping and Picnic Areas:

Extensive work has been done in the picnic and camp areas during the last fiscal year with more being planned during the coming year. Graveling of all camp and picnic roads will be completed this year. Sixteen campsites at the south end of Holiday Park and seventeen campsites in the south and west sections of Mustang Park now have individual electrical and water hook-ups. A utility fee of \$0.50 per twenty-four hours is charged at these locations. Vehicles at these sites are permitted on the pads only. Visitor and fisherman parking lots will be constructed in these areas. Plans for a guard-post and cable traffic barrier to enclose the picnic area on the point in Rocky Creek has been approved. Vehicular control is a prime factor in the planning and construction of new facilities.

5.04 Traffic Control:

A. Road Signs:

Roads shall be provided with safety signs in accordance with the manual on Uniform Traffic Control Devices, as required by Engineer Manual 1110-2-400, dated 1 February 1971, and in accordance with the Southwestern District sign handbook.

B. Entrance Gates and Ranger Stations:

Entrance gates and Ranger stations will be provided at Class A and B campgrounds as applicable. These facilities will be designed to control traffic during quiet periods, and to limit users to numbered sites and to allowable over-flow spaces.

C. Control of Motorcycles and Motorbikes:

To prevent vehicle accidents and possible injury to persons, the applicable sections of Title 36, Chapter III, to the Code of Federal Regulations, is being enforced on all project lands. Adequate signs will be maintained and Ranger personnel will be used to insure safe operation of these vehicles. There are no designated area for use by off road vehicles, except in an area leased to the City of Fort Worth.

VI. <u>PUBLIC USE FACILITIES</u>

6.01 Camping and Picnic Areas:

A. Fireplaces and Grilles:

Fireplaces and grilles have been installed for each camp and picnic site. These facilities are cleaned frequently in accordance with schedules established by the amount of usage received. Suitable area had been cleared around each fireplace or cooking grill to prevent the spread of wildfire.

B. Dead Tree Hazards:

Continued surveillance is provided by Ranger personnel to insure that standing dead trees do not become a hazard to users of these areas. Such trees are removed and used for firewood.

C. Uneven Surface Hazards:

Areas around tables are graded and landscaped to provide safe use by pedestrian traffic. Conditions which would cause tripping or stumbling are kept under control.

D. Trash Receptacles:

A fifty-five gallon trash barrel is presently provided at each table site. It is planned to group these receptacles on concrete pads where they can be conveniently used by visitors and serviced by the cleaning contractor.

6.02 Swimming Areas:

A. <u>Signs</u>:

Designated swimming areas are being planned for the 1974 recreation season. Appropriately worded warning and information signs will be placed. Script for all signs will be in accordance with the particular need of each location and will be in accordance with the Southwestern Division handbook.

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B. Buoyed Areas:

Capsule type buoys with interconnecting cables are provided and maintained at the designated swimming in Mustang park. Can type buoys provided with "NO BOATING" signs are used on the outer periphery of swimming areas. Project brochures will be prepared to show swimming areas and areas where boating is prohibited. Steep slopes and underwater hazards will be eliminated from designated swimming areas.

6.03 Boat Ramps:

Siting of boat launching ramps in areas protected from the wind will be accomplished to the greatest possible extent. Present ramps are 14 feet wide with three foot medians between each ramp in multiple installations to facilitate orderly lineup of boat trailer and towing vehicles. Riprap stone is used for erosion control at ramp locations. To provide traction on ramp surfaces, the concrete surface is cross-grooved at time of construction. Both high water stages, high water ramps are posted with signs to prevent attempted use. The maximum gradient for ramps at this project is 12 percent. Mercury vapor night lights are provided for safety of night time users.

VII. PUBLIC INFORMATION

7.01 <u>Weather Warnings</u>:

The United States Weather Bureau weather warning information is obtained by the standard broadcast radio media who repeatedly broadcast this information to the public. Storm warning pennants are no longer displayed at the project. Special warnings will be disseminated to marinas, contractors, and other through the use of an alert notification list.

7.02 Terrain Hazards:

Signs have been erected where needed to warn of shifting or sliding rock, dead end roads, deep step off, dangerous areas, restricted areas, speed limits, caution and yield signs. Barricades are placed when and as needed. Continuing surveillance will be directed toward early detection and treatment of terrain hazards.

7.03 Bulletin Boards:

Posters and bulletins relating to visitor safety and needed information are displayed in public use areas, concession areas, and at administration areas.

7.04 Cooperative Safety Programs:

The project staff will cosponsor or actively participate in all local safety programs such as safe boating week, fire prevention week and all clean up and pollution abatement programs.

7.05 Fireside Programs:

Ranger personnel conduct campfire programs using movies and slides, and present talks on safety, sanitation, and interpretative subjects in camping and picnic areas during periods of heavy visitation to the project.

7.06 Local Speaking Engagements:

Reservoir Manager and Ranger personnel will contribute to the

enlargement of public safety education by presenting talks in service clubs, schools, churches, and various organizational meetings. Recreational safety on Corps of Engineers project will be vigorously promoted through this means of public contact.

VIII. GENERAL

8.01 Project Safety Officer:

A project safety officer and an alternate project safety officer will be appointed for the project. These appointees will administer a well oriented safety program in accordance with Engineer Manual 385-1-1, General Safety Requirements, Fort Worth District Regulation 385-1-10, Safety Policies and Program and the Project Recreational and Safety Program, Fort Worth District Regulation 385-1-90.

8.02 Accident Reporting:

A. <u>Responsibility</u>:

Reservoir maintenance workers and laborers will report all accidents to their Lead Foreman. All other project personnel will report accidents directly to the project safety officer. It will be the responsibility of the Lead Foreman to convey any accident reports from his workmen to the project safety officer. The project safety officer will insure that all incident and accident reports have been submitted.

B. <u>Reports</u>:

The Reservoir Manager, Lead Foreman, and all Rangers will be qualified for and carry a standard first aid card. The Lead Foreman is appointed to administer first aid to field personnel. U.S. Department of Labor Form CA-1 & 2 will be filled out at the time of injury by the employee and his supervisor. Department of the Army Form 285, Accident Report will be prepared by the project safety officer in accordance with Fort Worth District Regulation 385-1-10 Appendix I. Incident Report, Engineering Form 4337, relative to accidents and incidents will be prepared by the project safety officer in accordance with Fort Worth District Regulation 190-1-1.

8.03 Crowd Control:

A. Ranger Patrols:

Rangers will patrol the public use areas during periods of

peak visitation to determine the temperament and conduct of crowds.

B. <u>Communications</u>:

Direct radio contact is available with the Benbrook Police Department in two of the three Ranger vehicles. These vehicles also have the capability to contact through Benbrook Police Department the county sheriff, Fort Worth Police Department and the Fort Worth Park Ranger Service. All Ranger vehicles are equipped with blue lights, siren, bull horn and a radio on the Corps of Engineers frequency.

C. Local Law Enforcement Coordination:

The county sheriff, state game officers, Fort Worth park rangers and local police shall be utilized as the law enforcing agencies. In cases of civil disturbances, all incidents relating to proposed or actual civil disturbances or demonstrations will be promptly relayed to the District Physical Security Officer and to local law enforcement officials. A chronological log of events shall be maintained by the project for record and a report made on Engineering Form 4337, Incident Report. The District Physical Security Officer or Deputy Engineer shall relay the telephone report to Southwestern District Provost Marshal, Southwestern District, telephone area code 214, 749-3337.

8.04 Safety Education:

A. Indoctrination:

Upon reporting for duty, all new employees will receive initial safety indoctrination. This indoctrination will be conducted by the project safety officer with the cooperation of the Lead Foreman.

B. <u>Training</u>:

All employees will receive training designed to implement safe conduct of their work. Continuing instruction will be provided for all employees. A minimum of one, five minute "on-the-job" safety meeting per week will be conducted by the project safety officer or the Lead Foreman. Minutes of these meetings will be maintained at the project.

C. Special Instructions:

Instruction in the use of new equipment and/or special or infrequently performed tasks will be provided when necessary.

8.05 Operation of Motor Vehicles:

A. Qualifications for Operator:

Operators of all motor vehicles must possess a valid State Operators Licnese and a U.S. Government Vehicle Operator's permit. No employee shall operate any motor vehicle while under the influence of intoxicants, sleep inducing medication, hallucinogens, or when such employee is not fully possessed of all his natrual senses and unimpaired reflexes. It shall be the duty of all employees to disqualify themselves from motor vehicle operation when any of the above circumstances exist.

B. Usage:

The operation of all vehicles will be in accordance with state and local laws. No vehicles shall be driven on a down grade with gears in neutral or clutch disengaged. No vehicle shall be left unattended until the motor has been shut off, the ignition key removed, parking brake securely set, and gear engaged in low, reverse, or park. If stopped on a hill or grade, front wheels shall be turned into the curb or securely chocked.

C. Loading:

The number of passengers shall not exceed the design carrying capacity, nor shall the load bearing and dimensional limits of the vehicle be exceeded. Under no circumstances shall any person be permitted to ride with arms or legs outside the truck body, in a standing position on the body, on the running boards, seated on side fenders, cab shields, rear of truck, or on the load. Getting on or off any vehicle

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while it is in motion is prohibited.

D. <u>Safety Devices</u>:

Hand brakes, horns and rear view mirrows will be maintained in good working order on all cars, trucks and pickups. Seat belts will be provided on all vehicles and shall be worn when the vehicle is in motion. Rollover bars and positive braking devices will be required on all tractors. Operation of machinery and mechanized equipment shall be in accordance with Engineer Manual 385-1-1, Section XVIII, paragraph 18.A through paragraph 18.H. Emergency signals shall be published and understood by each employee as to meaning and the proper response. Operators of construction type equipment (tractors-wheeled or tracked: cranes-wheeled or tracked; front loaders, etc.) shall be tested and licensed in accordance with Engineer Regulation 385-1-20 and Army Regulation 600-58.

8.06 <u>National Emergency</u>:

The service room of the outlet structure is designated as a fallout shelter. The shelter capacity is sixty people. The Reservoir Manager and Lead Foreman are designated as shelter manager and alternate shelter manager. These employees have completed the prescribed courses conducted by the Office of Civil Defense, Fort Worth, Texas, for shelter management, and medical self help. Access to the fallout shelter is along the embankment service road which is controlled by locked chain link barricades at each end. Passage through these barricades is controlled by the Corps of Engineers. At this time, there are no food provisions stored in the shelter. Provisions are stored at the administration building. A gasoline powered emergency generator is available for use at the shelter with 55 gallons of fuel. During a national emergency, the Corps of Engineers will work in coordination with defense officials at the Federal Center near Denton, Texas.