US Army Corps
of Engineers
Fort Worth District

RAY ROBERTS LAKE

ELM FORK, TRINITY RIVER, TEXAS

MASTER PLAN

DESIGN MEMORANDUM NO. 8

JANUARY 1983

4A07

CESWF-PL-RR (1110-2-240A) 22 June 89

MEMORANDUM THRU CESWF-PL-R, ~~CESWF-PL~~

FOR SEE DISTRIBUTION

SUBJECT: Ray Roberts Lake, Addendum to Supplement No. 2 to Design Memorandum No. 8 Master Plan

1. Subject Addendum has been approved.

2. Enclosed please find copies of transmittal letter, approval enndorsement, and correspondence with the project sponsors for your reference file.

Bill Cotten

5 encl.

BILL R. COTTEN, ASLA
Chief, Landscape Planning
and Recreation Section

DISTRIBUTION:
CESWF-ED-DC
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CESWD-PL-R (CESWF-PL-RR/5 Jun 89) (1110-2-1150a) 1st End Koechley/fao/7-3045
SUBJECT: Ray Roberts Lake, Addendum to Supplement No. 2 to Design Memorandum No. 8 Master Plan

Cdr, Southwestern Division, Corps of Engineers, 1114 Commerce St., Dallas, Texas 75242-0216 20 JUN 1989

FOR Commander, Fort Worth District, ATTN: CESWF-PL-R

Approved.

FOR THE COMMANDER:

For BARRY G. ROUGHT, P.E.
Chief, Planning Division

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

CESWF-PL-RR (1110-2-1150a) 5 June 1989

MEMORANDUM FOR Commander, Southwestern Division, ATTN CESWD-PL

SUBJECT: Ray Roberts Lake, Addendum to Supplement No. 2 to Design Memorandum No. 8 Master Plan

1. Request approval to amend Supplement No. 2 to the Master Plan to accommodate design changes to the canoe/jon boat launch area in Isle duBois Park.

2. The approved Supplement No. 2 shows features for a canoe/jon boat launch area (in the portion of Isle duBois Park below the dam) as it appears in the approved FDM. This design does not include any trails, ramps, steps, or other means to transport canoe/jon boats from the parking lot area to the river. Presumably, each boater would have to pick his own route to carry a boat down a steep (2:1), 25-foot-high, heavily timbered river bank to the water's edge. We believe this presents a potentially hazardous situation.

3. After consultation with the local sponsors, and the Texas Parks and Wildlife Department, we recommend that the design of the canoe/jon boat launch area be modified to include a one-way loop road, which would be cut into the bank between the parking area and the river. This road would allow park users to unload canoe/jon boats from their vehicles and port them safely to a put-in platform at the water's edge.

4. Additional cost for the proposed modification would be approximately $160,000. Planning Division recommends that 9 picnic shelters and a fish cleaning station at the site be redesignated as future facilities to reduce this additional cost by an estimated $88,000. The remaining cost (approximately $72,000) represents less than one percent of the total cost of recreation facilities at Isle duBois Park (approximately $9 million). The additional cost will be shared 50/50% by the local sponsors and the Federal Government.

5. We are currently seeking formal concurrence of the cities of Dallas and Denton in these design changes. Upon receipt, copies of correspondence will be provided as information.

FOR THE COMMANDER:

Michael J. Mocek

MICHAEL J. MOCEK, P.E.
Chief, Planning Division

dallas water utilities

City Hall • Dallas, Texas 75277 • (214)670-3146

June 13, 1989

Michael J. Mocek, P.E.
Chief, Planning Division
Department of the Army
Ft. Worth District, Corps of Engineers
Post Office Box 17300
Ft. Worth, Texas 76102-0300

Dear Mr. Mocek:

The City of Dallas has reviewed the request for a design change in the Canoe/Jon Boat Launch area below the dam in Isle du Bois Park. The City concurs that the proposed changes would make the access to the launch area less hazardous for park users.

The City further supports redesignation of the picnic tables and a fish cleaning station as "future facilities". We would also continue to encourage the Corps to investigate any other changes which may off-set the increase at Isle du Bois Park. The City believes it is in the best interest of safety that these changes be made and our additional costs are estimated to be $26,700.

Sincerely,

Dennis L. Allen
Interim Director

dfh

c: Howard Martin
City of Denton

ITY of DENTON, TEXAS 215 E. McKINNEY / DENTON, TEXAS 76201 / TELEPHONE (817) 566-8200

June 4, 1989

Michael J. Mocek, P.E.
Chief, Planning Division
Department of the Army
Ft. Worth District, Corps of Engineers
Post Office Box 17300
Ft. Worth, TX 76102-0300

Dear Mr. Mocek:

The City of Denton has reviewed the request for a design change in the Canoe/Jon Boat Launch Area below the dam in Isle duBois Park. The City concurs that the proposed changes would make the access to the launch area less hazardous for park users.

The City supports the redesignation of the nine (9) picnic shelters and a fish cleaning station as "future facilities" but would encourage the Corps to evaluate other potential changes that would offset the increase in the Isle duBois facilities. However, if there are no additional modifications that could reasonably be accommodated, the City of Denton will support the proposed modification and Denton's associated $9,300 increase in the cost of these facilities.

Respectfully,

R.E. Nelson

R.E. Nelson
Executive Director
Denton Public Utilities

cc: Ms. Jody Puckett, City of Dallas
Mr. Howard Martin, E.S.A.
File: RR1DP89

MAY 30, 1989

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

May 25, 1989

Planning Division

DUPLICATE

Mr. Bob Nelson
Director of Utilities
City of Denton
Municipal Building
Denton, Texas 76201

Dear Mr. Nelson

The Texas Parks and Wildlife Department, in their advisory capacity to Dallas and Denton for the recreation development at Ray Roberts Lake, has requested a design change in the Canoe/Jon Boat Launch Area below the dam in Isle duBois Park. This modification, to include a loop road between the parking area and the river, would allow park users to access the launch area without traversing the steep river bank. We concur that the proposed justification will provide a much less hazardous approach to the launch area.

The additional cost for the proposed modification is estimated at approximately $160,000. We recommend that 9 picnic shelters and a fish cleaning station at the site be redesignated as future facilities to reduce the additional cost by an estimated $88,000. The remaining cost (approximately $72,000) represents less than one percent of the total cost of recreation facilities at Isle duBois Park (approximately $9 million). The additional cost will be shared 50/50 percent by the local sponsors and the Federal Government, which would make your city's share approxi- mately $9,300. We are preparing a recommendation to the Southwestern Division office in Dallas that the master plan be amended to reflect this change.

If you concur with this recommendation, please so indicate in a response to this letter as soon as possible.

Sincerely,

Michael J. Mocek, P.E.
Chief, Planning Division

SWFPL-R

23 October 1985

SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

Commander, Southwestern Division
ATTN: SWDPL-R

1. Modifications to currently approved plan of recreation development for Ray Roberts Lake are required due to design change requests from the Texas Parks and Wildlife Department (TPWD) and concurrence to such changes by the FWD and project sponsors.

2. TPWD intends to cost share in the development of Isle duBois Park and the proposed Green Valley Greenbelt Corridor, as well as assuming operation, maintenance, and replacement responsibilities of all recreation facility development at the Ray Roberts Lake project. Draft recreation cost sharing contracts and lease agreements which reflect this situation have been prepared and are currently being coordinated.

3. Modifications consist of the following:

Buck Creek Park

a. Change 4-lane boat ramp to 2-lane facility and down size paved parking area to 30 car/trailer capacity. This is required due to site development constraints. Master Plan plate No. VIII-13 will be revised to reflect these changes and as-built conditions upon completion of recreation construction.

Isle duBois Park

a. Change screened shelter Area L to multi-use camping. Design layout of roads, utilities, sites, etc. are unchanged.

b. Delete boat storage Area D from plan.

c. Change cabin development Area M from initial development to future development. This includes all related utilities and circulation roads. All development in this area will be at 100 percent TPWD cost, based on current cost sharing policy.

d. Master Plan plates No. VI-1&2 (Supplement No. 1) will be revised to reflect these changes and as-built conditions upon completion of recreation construction.

Johnson Branch Park

a. Changes as reflected on attached revised plates VIII-7 and VIII-9.

b. Plate VIII-11 - Add 2-lane boat ramp with 30 car/trailer capacity gravel parking. Boat ramp will be located on west side of park along old FM 455.

c. Include future development plans for the siting of a TPWD wildlife hunter check station/residence and TPWD law enforcement staff residence. Siting to be determined at a future date. These facilities will be at 100 percent TPWD cost, based on current cost sharing policy.

4. Revised unit cost estimates for initial recreation facility development are attached. Costs are for Ray Roberts Lake only. Lewisville Lake recreation costs will be updated once a decision on the proposed Green Valley Greenbelt Corridor acquisition is received from OCE. The estimated total cost for the construction of the proposed recreation facilities at Ray Roberts Lake (initial and future, excluding E&D and S&A) is $47,928,000. This figure reflects Federally cost sharable facilities only. Cost estimates were based on March 1985 prices and indexed to October 1985 price levels.

5. A comparison of the present estimate of cost with the latest approved cost estimate (PB-3 based on currently approved Master Plan and Master Plan Supplement No. 1) is as follows:

Acct. No.	Item	Total Development Current Est.	Latest Approved PB-3	Difference
		in thousands of dollars		
01	Project Lands Acquired for Recreation	4,285.0	4,285.0	0
03	Clearing, Revegetation, Fencing	0	0	0
06	Fisheries Enhancement	933.0	933.0	0
30	Engineering & Design	80.0	80.0	0
31	Supervision & Admin.	68.0	68.0	0
14	Recreation (Initial)1/	26,419.0	25,129.0	+1,290.0
30	Engineering & Design	2,378.0	2,262.0	+116.0
31	Supervision & Admin.	1,981.0	1,886.0	+95.0
14	Recreation (Future)1/	21,509.0	21,509.0	0
30	Engineering & Design	1,936.0	1,936.0	0
31	Supervision & Admin.	1,581.0	1,581.0	0

1/ Includes contingencies.

Mr. Wild/vvt/42095

SWFPL-R 23 October 1985
SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

6. Initial development cost increases are due to the following:

a. Additional day-use development in Johnson Branch Park to compensate for deletion of initial development plans for cabin area in Isle duBois Park.

b. Revised unit cost estimates for facility development.

c. Revised Johnson Branch Park layout.

FOR THE COMMANDER:

3 Encls

MICHAEL J. MOCEK, P.E.
Chief, Planning Division

DOBY SWFPL-R

MOCEK SWFPL

MAIL

RETURN TO
SWFPL-R

Disk #2103 — LTR-SWD

SWDPL-R (20 Dec 83) 3rd Ind
SUBJECT: Ray Roberts Lake, Supplement No. 1 to Design Memorandum No. 8, Master Plan

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, Texas 75242 22 MAY 1984

TO: Commander, Fort Worth District, ATIN: SWFED-DC/SWFPL-R

The subject 2nd Indorsement has been reviewed and has resulted in the finding that the Corps of Engineers cannot cost-share in the screened shelters, as was stated in the 1st Ind. Cost-sharing on screened shelters was disapproved by OCE when proposed at Eisenhower State Park on Lake Texoma. Subsequent approval of this item at Lewisville Lake was due to an oversight. Discussions with OCE personnel on 17 April 1984 indicates that screened shelters are not cost-shareable. The screened shelters are made available for overnight accommodation for a fee as cabins are, and, likewise, are not eligible (reference ER 1165-2-400, app II, which defines cabins as "self-liquidating facilities," not eligible for Federal assistance).

FOR THE COMMANDER:

William R. Pearson
for BARRY G. ROUGHT, P.E.
Chief, Planning Division

SWFED-DC/SWFPL-R (SWFED-DC/SWFPL-R 20 Dec 83) 2d Ind
SUBJECT: Ray Roberts Lake, Supplement No. 1 to Design Memorandum No. 8, Master Plan

DA, Fort Worth District, Corps of Engineers, P. O. Box 17300, Fort Worth, Texas 76102 12 April 1984

TO: Commander, Southwestern Division, ATTN: SWDPL

The following is submitted in response to comments in preceding 1st indorsement. Paragraph references pertain to paragraphs in the indorsement.

a. The cost of the dike and associated pumping equipment to operate the 50 acre multiple use fisheries rearing/recreation pond at Isle du Bois Park will be deleted as a cost-sharable expense. With regard to the screened shelters, ER 1105-2-20 makes no specific mention of screened shelters being noncost-sharable. Additionally, screened shelters at Lewisville State Park, which are similar to the shelters proposed at Isle du Bois Park in form, function and cost, have previously been approved as cost-sharable. Request reevaluation of the present SWD position on this matter.

b. Noted.

c. The revised pages and cost estimates will be provided to the Division office once a resolution to the cost-sharability of the screened shelters is reached.

FOR THE COMMANDER:

William L. Smith

for D. L. MILLS, P.E.
Chief, Planning Division

SWDPL-R (20 Dec 83) 1st Ind
SUBJECT: Ray Roberts Lake, Supplement No. 1 to Design Memorandum No. 8, Master Plan

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, Texas 75242 17 FEB 1984

TO: Commander, Fort Worth District, ATTN: SWFED-DC/SWFPL-R

The subject supplement to the master plan is approved subject to the following comments.

a. The cost of construction for the dike and associated pumping equipment to operate the 50 acre pond at Isle du Bois Park are not cost-sharable items. Also, the Corps of Engineers cannot cost-share in the screened shelters cabins or any utilities or support facilities for these items.

b. If the Texas Parks and Wildlife Dept is willing to pay the full cost of construction for the 50 acre pond, the Corps of Engineers will cost-share in traditional recreation facilities planned around the lake.

c. At such time that the final plan is completed you should furnish this office with revised pages and cost tables as necessary.

FOR THE COMMANDER:

BARRY G. ROUGHT, P.E.
Chief, Planning Division

SWDPL-R (29 Mar 83) 2nd Ind
SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street, Dallas, Texas 75242 15 SEP 1983

TO: Commander, Fort Worth District

1. The above Master Plan is approved subject to the following comment.

2. It is noted that no plans have been provided for relocation of existing or development of new recreation facilities required as a result of the pool raise at Lewisville Lake. The Ray Roberts Lake Master Plan should address, scheduling, budgeting and planning to accomplish the relocation and or development of recreation areas at Lewisville, to accomodate the incremental increase in visitation expected as a result of the larger pool. It is important that necessary recreation facility relocation are accomplished prior to scheduled deliberate impoundment date.

FOR THE COMMANDER:

Barry G. Rought

BARRY G. ROUGHT, P.E.
Chief, Planning Division

SWFED-DC/SWFPL-R (SWDPL-R 29 Mar 83) 1st Ind
SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

DA, Fort Worth District, Corps of Engineers, PO Box 17300, Fort Worth, Texas 76102 12 July 1983

TO: Commander, Southwestern Division
ATTN: SWDPL-R

1. Responses to comments in enclosure to preceding 1st Indorsement are presented in the following paragraphs.

a. Paragraphs 2 through 13, 15, 19, 21, 22, 24, 25, 27, 28b. Concur, see revised pages.

b. Paragraph 1. The proposal to use crushed limestone in lieu of asphalt paving for camping pullouts was presented to the Texas Parks and Wildlife Department and subsequently rejected. TPWD feels that the crushed limestone would require a higher degree of maintenance than would the asphalt paving.

c. Paragraph 14. Wolf Island is devoid of development other than the proposed trail which is shown on Plate VIII-1.

d. Paragraph 16. Boat ramps, as shown in the master plan, are conceptual and therefore only representative of site location and not ultimate design. The upcoming feature design memorandum for recreation facilities will reflect a boat ramp design which requires direct maneuvering to enter the water.

e. Paragraph 17. The proposed access road to the Johnson Branch Marina will be realigned in the upcoming feature DM for recreation facilities.

f. Paragraph 18. Reshaping of the Johnson Branch Park Beach is planned, and budgeted in the cost estimating section.

g. Paragraph 20. Costs shown for the fractional years of project manager, assistant manager, WS-07 foreman, clerk, and typist include salary plus benefits (Salary X 1.6)

h. Paragraph 23. The 130 cfs is the average flow that will be released for water supply. Hydropower will operate on water supply releases.

i. Paragraph 26. U.S. Fish and Wildlife Service, Texas Parks and Wildlife Service, and the Fort Worth District all agree that disking of bermuda pasture, if done in wide enough strips, would enable the reestablishment of native forbes and grasses without the need of reseeding.

j. Paragraph 28A. Space limitations on cost estimating sheets do not allow for any additional information to be included.

SWFED-DC/SWFPL-R (SWDPL-R 29 Mar 83) 1st Ind 12 July 1983
SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

2. The following revised pages are furnished as replacement pages for insertion in the design memorandum:

i-ii and v-vi	Plate VII-1
C-D and E-F	VIII-1 thru VIII-5
II-1 thru II-3	Plates VIII-1 and VIII-2
III-1 thru III-4	IX-1 thru IX-11
Plate III-1	XI-5 and XI-6
V-1 thru V-6	XII-1
VI-1 thru VI-6	XV-1 thru XV-4
VII-1 thru VII-6	XVI-1 thru XVI-20, XVI-23 and XVI-24

Stephenson W Page, LTC, CE
for THEODORE G. STROUP
Colonel, CE
Commanding

2 Encl
1. nc
Added 1 Encl
2. as

DEPARTMENT OF THE ARMY
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS
1114 COMMERCE STREET
DALLAS, TEXAS 75242

REPLY TO
ATTENTION OF:

SWDPL-R

29 MAR 1983

SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

Commander, Fort Worth District

1. Reference letter, SWFED-D, 21 January 1983, SAB, which transmitted the report for review and approval.

2. Review in this office resulted in the inclosed comments which should be corrected by submitting revised pages.

FOR THE COMMANDER:

William R. Pearce for

BARRY G. ROUGHT, P.E.
Chief, Planning Division

1 Incl
as

Comments on Ray Roberts Master Plan

1. General. Savings can be realized by deleting asphalt paving on camping and picnic area pullouts. Recommend using crushed limestone screenings or similar materials on all pullouts. This design can increase the carrying capacity as well as quality of experience to the park user.

2. General. EM 1110-2-410, 31 Dec 82, contains excellent information on layouts of recreation areas. Recommend following the guidance in this EM, especially those sections concerning road design. It should be included in the list of referenced guidelines, paragraph 9-01.

3. Para 2-06, p II-3, Facilities Requirement. The paragraph should be rewritten to clarify the apparent discrepancy between 7,000,000 which is quoted as the optimum capacity and the 6,000,000 design capacity. It is not clear why we are designing for less than the optimum, when this is much less than the demand.

4. Para 3-02, p III-1, Archeological Resources. The Master Plan should contain pertinent data on existing archeological-historical resources which are relevant to management needs. The following should be addressed.

a. Cultural overview.

b. Locations of existing sites.

c. The significance of the sites (individual or as a district) that justifies stabilization, preservation, use or interpretive development.

d. The plans for each site or district.

e. The cost.

f. The responsibilities of each office, including the project.

Further guidance may be found in the "SWD guidance for cultural resources program in 1980."

5. Para 5-02b. The similar projects used in development of the per capita use curve should be cited.

6. Para 5-03 and 5-04. The 7,000,000 optimum use determination does not include water users and accordingly is in error. This figure is used synonymously as recreation days, which is also wrong without water users being included. The methods used in determining initial and average annual use is not apparent and should be explained.

7. Table V-7 & V-8, p V-4 & V-5. All figures of the equations should be listed, for example: No. of swimmers x .60 swimmers on beach = No. of beach users should be changed to 9,015 swimmers x .60 swimmers on beach = 5,409 beach users.

8. Para 6-03d. The paragraph appears to be incomplete. If the "intentions" are those listed in paragraph 6-04, that paragraph should be referenced.

9. Sequence No. VII-1, Land Use Allocation Plan. The legend should be changed to the following, and the colors revised accordingly.

Project Operations
Recreation - Intensive Use
Recreation - Low Density Use
Wildlife Management
Separable Recreation Lands (optional)

10. Para 8-04(5), p VIII-2. Change "motorized land travel," to read "off-road vehicle travel."

11. Para 8-04b, p VIII-z. Change recreation: high-use parks, to recreation: intensive use.

12. Para 8-03 & 8-04, p VIII 1 & 2. Reference to low-use parks should be changed to low density. Certain recreation activities require low density use to provide a high quality experience. This should not be confused with "low-use park" which infers..low demand or poor quality.

13. Para 8-10. The recommendation to delete the administrative and maintenance building was not approved. The responding indorsement stated "The proposed VE change is acceptable, provided there are provisions for a minimum staff and supplies." The minimum facilities which should be provided for the staff proposed in paragraph 11-03 should be an office and fenced compound for personnel, supplies, materials, and equipment. Discussion should be revised accordingly.

14. Sequence VIII-1. The Wolf Island development should be designated on this plate.

15. Sequence VIII-2. Recommend consideration be given to deferring the development of Culp Branch Park. According to the plate, the area is almost devoid of tree cover. The cost of developing the amount of vegetative cover necessary to create a desirable atmosphere would likely be excessive at this time.

16. Sequences VIII-9, 13, 14, 17 & 18. The boat ramps on these plates appear to be direct or near direct continuation of access roads. Their design should be such that a deliberate maneuver would be required to drive into the water.

17. Sequence VIII-10. The proposed access road to the marina should not parallel so closely the existing county road. The county road should be accessed or the park road should be moved away from it, both physically and visually.

18. Sequence VIII-15. The below water surface topography appears to be quite variable, with alternating shallow and deep segments along the beach. This situation should be avoided because of the hazard of "step-offs" to non-swimming waters. Another site should be selected or the site should be reshaped to avoid the hazard.

19. Para 9-08b. Parking dimensions should be revised to conform to the guidance contained in EM 1110-2-410.

20. Para 11-03, Table XI-1. Costs shown for the fractional years for project manager, assistant manager, WS 07 foreman, clerk and typist appear to be excessive. These should be checked.

21. Para 11-07b. ER 1130-2-333 was superseded in 1974 by ER 1130-2-406.

22. Para 12-01. If the Texas Parks and Wildlife Dept. assumes management of project lands and recreation developments, as contemplated in paragraph 15-07, it would appear logical, that it would also assume responsibility for fire control of those resources. Recommend the discussion be revised to reflect that eventuality.

23. Para 15-04. Discussion in the last subparagraph speaks of the 130 cfs as a certainty. It should reflect that part of the flow depends on the development of hydropower. Discussion should be revised accordingly.

24. Para 15-05. The woody plant species should be made on the basis of wildlife value, likelihood of successful growth, and availability of plant material. Most of those plants listed won't meet that criteria. Suggest the use of the following species.

Woody Plantings

Shrub Lespedeza	Lespedeza bicolor
Red Mulberry	Morus robra
Western Hackberry	Celtis reticulata
Persimmon	Diasporos Virginiana
Bois D' Arc	Maclura pomitera
Pecan (native)	Carya Illinoensis
Black Walnut	Juglans nigra
Sumac, Flame Leaf	Rhus Copallina
Texas Sophora	Sophora affinis
Hawthorne (native)	Craetaegus viridis or spatulata
Youpon	Ilex vomitoria
Skunkbush	Rnus aromatica
Multiflora Rose	Rosa multiflora

Vines

Fox Grape	Vitis labrusca
Mustang Grape	Vitis Candicans
Passion Flower	Passiflora incarta
Virginia Creeper	Parthenocissus quinquefolia
Dewberry, Blackberry	Rubus spp.
American Bittersweet	Gelastrus scandens

25. Para 15-05c. Food plots are described as being approximately 1/4 ac. Since the opportunity for dove hunting is scarce and in high demand in the metroplex, recommend consideration be given to developing one or more fields for dove shoots.

26. Para 15-05d. Discussion states that disking will be done to encourage the establishment of native vegetation. Recommend that appropriate native seed be sowed at the time of disking.

27. Sec. VIL. An explanation, identifying specific reasons, for the variance in estimated cost between the PB-3 and current estimate should be included.

28. Table XVI-4.

a. Recommend displaying unit cost breakdown.

b. Cost for park roads of $205,000/mi. appears to be excessive. When park roads are designed in accordance with EM 1110-2-410, the cost should be reduced by at least $50,000/mi.

29. We assume the supplement to include the wetland sites and the greenbelt is under preparation and will be forthcoming.

TRININTY RIVER BASIN, TEXAS

DESIGN MEMORANDUM NO. 8

MASTER PLAN
FOR
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

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TABLES

REV 6-22-83

PLATES

FIGURES

EXHIBIT

TRINITY RIVER BASIN, TEXAS

RAY ROBERTS (AUBREY) LAKE

PERTINENT DATA

Location: Ray Roberts Lake dam site is at River Mile 60.0 on Elm Fork of the Trinity River, Denton County, between Sanger and Aubrey, Texas, 30 miles upstream from Lewisville Dam.

Purposes: Water supply, recreation, and fish and wildlife.

Authorization: River and Harbor Act approved 27 October 1965 (Public Law 89-298) in accordance with the plan of improvement in House Document 276 (89th Congress, 1st Session).

Drainage area: *

ELM FORK - TRINITY RIVER	Square Miles
Above mouth Elm Fork of Trinity	2,577
Above Lewisville Dam	1,660
Below Mouth Isle duBois Creek Aubrey Dam site	692
Above gage near Sanger	381
Above gage near Muenster	46

*Drainage areas shown in this report are either as published in Circular No. 63-01, "Drainage Areas of Texas Streams", prepared by the Texas Water Commission in cooperation with the U.S. Geological Survey dated February 1963, or adjusted to agree with areas as given in the circular.

Estimated annual runoff under existing conditions at Ray Roberts Lake for the period 1 January 1924 - 31 December 1979:

	Acre-feet	Inches
Maximum	662,700	17.96
Minimum	0	0
Average	173,600	4.94

Flood at Ray Roberts Dam site	Peak inflow (cfs) (1)
Apr 1957	43,500
May 1958	43,100
Sep 1962	40,200
Oct 1974	94,400
Mar 1977	57,800
Oct 1981	166,900
May 1982	62,100

(1) Estimated from gage records at Sanger (nr.) gage - Elm Fork and Pilot Point (nr.) gage - Isle du Bois Creek.

Spillway:

Length at crest (net)	100 ft.
Type	Broadcrested
Control	None

Outlet works:

Flood control conduit:

Type	1 gate-controlled conduit
Dimension	13' diameter
Invert elevation	551.0 ft msl
Control	Two 6'x 13' service gates

Low-flow outlets (to discharge into stilling basin through separate 5' diameter conduit)

Intake dimensions	4' x 8'
Number	4
Control	One 4' x 8' manually operated slide gate at each intake to wet well and one manually one manually operated service gate operated service gate in wet well to control flow to a 3' x 7' conduit which is connected to a separate 5' diameter conduit (beneath the flood control conduit) continued to a bifurcation with a 4' diameter conduit with an outfall in the stilling basin.

Intake invert elevations:

Upper level	618.0
Upper middle level	603.0
Lower middle level	588.0
Lower level	574.5

Spillway design flood:

Duration of storm	48 hours
Total volume of rainfall	28.00 inches
Average infiltration rate	0.05 in/hr
Total volume of runoff	25.28 inches
Peak inflow to full pool	494,200 cfs
Maximum outflow (pool level 658.8)	
Spillway	14,500 cfs
Outlet Works	0
TOTAL	14,500 cfs

Ray Roberts Lake:

Feature	Elevation (ft. msl)	Area (acres)	Capacity * Acre-feet	Capacity * Equivalent runoff (inches)
Top of dam	665.0	68,500	-	-
Maximum design water surface	658.8	59,620	1,931,900	52.35
Spillway Crest	645.5	42,000	1,261,500	34.19
Top of flood-control pool	640.5	36,900	1,064,600	28.85
Top of conservation pool	632.5	29,350	799,600	21.67
Maximum tailwater	553.3	-	-	-
Streambed	524.0	-	-	-

* Includes 54,600 acre-feet of storage for estimated 100-year sediment deposition, with 50,400 acre-feet below elevation 632.5 and 4,200 acre-feet between elevation 632.5 and 640.5.
Note: Area-capacity data is 1985 condition.

Lewisville Lake with Ray Roberts Lake in System:

Feature	Elevation (ft. msl)	Area (acres)	Capacity * Acre-feet	Capacity * Equivalent runoff (inches)**
Top of dam	560.0	-	-	-
Maximum design water surface	549.2	60,700	1,804,300	34.95
Top of flood control pool and spillway crest	532.0	39,080	954,800	18.49
Top of conservation pool	522.0	28,980	618,400	11.98
Maximum tailwater	471.5***	-	-	-
Streambed (1953 - Original)	435.0	-	-	-

*Includes 73,800 acre-feet of storage for estimated sediment deposition by year 2085, with 63,400 acre-feet below 522.0 and 10,400 acre-feet between 522.0 and 532.0
**Based on drainage area below Ray Roberts dam site of 968 square miles.
***At mouth of spillway discharge channel.

II - PROJECT DESCRIPTION

2-01 General - The Ray Roberts Lake Project is an important unit in the system of reservoirs in the Trinity Basin that includes Lakes Lewisville, Grapevine, Bardwell, Navarro Mills, Benbrook, Lavon and Lakeview, which is presently under construction. Roanoke and Tennessee Colony Lakes are authorized. The locations of the 9 reservoir units are shown on plate II-1. In combination with Lewisville Lake, Ray Roberts will provide additional conservation storage through an exchange of storage with the existing facility while the same degree of flood control provided by the Lewisville project will be maintained. Benefits accruing to Ray Roberts Lake will consist of water supply and recreation, including sport fishing and hunting. The area is served by Interstate Hwy 35, State Hwy 377 and 289, FM 372 and 455.

2-02 Location - The Ray Roberts Lake Project is located in Denton County at mile 60.0 on the Elm Fork, Trinity River, 30 miles upstream from the existing Lewisville Dam.

2-03 Climate - The Elm Fork watershed is located in a region where seasons moderate to mild winters and comparatively long hot summers. It is a temperate climate whose mean annual temperature is 65 degrees F and records 34.4 inches of rainfall in an average year. January, the coldest month, has an average daily temperature of 45 degrees while August will average 84 degrees F. Winds are generally southerly with an average velocity of 11 mph. Thunderstorms and frontal storms are common in this area. Tropical storms and tornadoes occur with some frequency but are generally limited to particular seasons of the year. Each type is capable of producing devastating amounts of precipitation with same of the worst occurring in the 1942, 1945, 1957, 1974, 1977, 1981, and 1982.

2-04 Operations structures - The dam will be rolled earthfill, with a length of 15,250 feet, a top width of 46 feet, and elevation of 141 feet above the streambed. The spillway will be an uncontrolled broadcrested type, 100 feet in length at the crest. The flood control outlet works will consist of a 13 foot diameter conduit with two 6 foot by 13 foot hydraulically operated gates at elevation 545.0 feet msl. The low flow intakes will discharge into a separate five foot diameter conduit and will consist of four gates at input elevations 618.0, 603.0, 588.0, and 574.5. The general embankment plan is shown on plate II-2.

2-05 Lake description - The lake will consist of a conservation pool and a flood control pool. The conservation pool will have a surface area of approximately 29,350 acres, at an elevation of 632.5 feet msl. The flood control pool extends from the top of this pool to 640.5 feet msl and would total 36,900 surface acres of water. A tabulation of the initial area and capacity data for the lake at river mile 60.0 is shown in table II-1.

According to the pool elevation probability and duration curves, as shown in plate II-4, pool elevation can be expected to vary about 23.5 feet

TABLE II-1
AREA AND CAPACITY DATA - 1985
RAY ROBERTS LAKE
River Mile 60.0
Drainage Area = 692 Square Miles

ELEV	0	1	2	3	4	5	6	7	8	9
					AREA IN ACRES					
530					0	5	10	15	20	
540	30	40	45	55	65	75	85	95	10	115
550	130	150	170	190	205	245	280	325	37	415
560	500	600	700	800	940	1,080	1,250	1,450	700	1,970
570	2,260	2,550	2,800	3,050	30300	3,550	3,770	4,000	4,230	4,440
580	4,640	4,890	5,120	5,350	5,600	5,850	6,120	6,400	6,670	7,000
590	7,290	7,540	7,810	8,100	8,400	8,710	9,040	9,380	9,700	10,080
600	10,460	10,820	11,220	11,600	12,000	12,520	12,820	13,240	13,680	14,090
610	14,530	15,000	15,440	15,900	16,400	16,840	17,360	17,860	18,400	18,900
620	20,460	21,000	21,700	22,400	23,100	23,700	24,400	25,200	25,800	26,600
630	27,300	28,100	28,900	29,800	30,700	31,700	32,600	33,600	34,500	35,500
640	36,500	37,300	38,300	39,300	40,400	41,500	42,500	43,600	44,900	46,200
650	47,400	48,700	50,000	51,400	52,800	54,200	55,600	57,000	58,500	59,900
660	61,300	62,700	64,200	65,600	67,000	68,500				
					CAPACITY IN ACRE-FEET					
530					0	2	10	22	40	60
540	90	125	170	220	280	350	430	520	620	730
550	850	990	1,150	1,330	1,530	1,750	2,015	2,320	2,665	3,060
560	3,515	4,065	4,715	5,465	6,335	7,345	8,510	9,860	11,440	13,270
570	15,390	17,790	20,470	23,390	26,570	29,990	33,650	37,540	41,660	45,990
580	50,530	55,300	60,300	65,530	71,010	76,740	82,720	88,980	95,520	102,350
590	109,500	116,900	124,600	132,500	140,800	149,300	158,200	167,400	177,000	186,900
600	197,100	207,800	218,800	230,200	242,000	254,300	266,900	280,000	293,400	307,300
610	321,600	336,400	351,600	367,300	383,400	400,000	434,800	452,900	452,900	471,500
620	491,200	511,900	533,300	555,300	578,100	601,500	625,500	650,300	675,800	702,000
630	729,000	756,700	785,200	814,500	844,800	576,000	908,100	941,200	975,300	1,010,300
640	1,046,300	1,083,200	1,121,000	1,159,800	1,199,600	1,240,600	1,282,600	1,325,600	1,369,900	1,415,400
650	1,462,200	1,510,300	1,559,600	1,610,300	1,662,400	1,715,900	1,770,800	1,827,100	1,884,900	1,944,100
660	2,004,700	2,066,700	2,130,100	2,195,000	2,261,300	2,329,100				

in an average 5-year period. As indicated by the duration curve, the top of conservation pool will be equaled or exceeded approximately 2 percent of the time. The average pool during the period June through August (prime recreation season) is about 11.5 feet below the top of conservation pool. The pool level should equal or exceed the 5-year flood frequency (elevation 632.5 feet msl) only 2 percent of the time.

2-06 Facilities requirement - Initial visitation was computed to be 3.5 million annual visits, assuming 1985 as the first year of operation. The estimated demand far exceeded the estimated optimum capacity of 7,000,000 which is expected to be reached by 2003. The average annual recreation days are computed to be 5,501,300 for general and 498,700 for fish and wildlife, for a total of 6,000,000. Recreational facility planning was, however, based on a reduced level of development as shown in Design Memorandum No. 24, Cost Allocation Report. For further details refer to chapter 5, paragraph 5-03. In Supplement No. 1 to Design Memorandum No. 2, General, it was determined that six parks and two access areas would be required to satisfy the recreation needs for a computed design day load of nearly 60,000. These areas would provide boat ramps, campgrounds, picnic area, beaches, and sanitary facilities.

III. RECREATIONAL AND CULTURAL RESOURCES OF THE PROJECT

3-01. General. - The Ray Roberts Lake project is situated near the Dallas-Denton-Fort Worth metropolitan area, an area which has a projected growth rate above the national average. This location provides an excellent opportunity to develop, close to the people, a lake project with a variety of outdoor recreational opportunities. The demand for recreational outlets is demonstrated by the use of recreational facilities at existing projects in the area. The proposed project should materially enhance the recreational value of the area by providing a water-based recreational attraction. An understanding of the project resources is helpful in identifying potential problems and needs, and in formulating the solutions.

3-02. Cultural Resources Investigations - Prior to the most recent study, this section of the state had received only the most minimum of research attention. A reconnaissance of the lake area by Bousman and Verret in 1973 was the only published effort. A number of specific sites have been excavated or collected, but no records could be found. No synthesis of the local social history has been previously compiled.

In 1980, the Corps of Engineers contracted with Environment Consultants, Inc. of Dallas, TX to accomplish a cultural resources survey of the area to be affected by the project's construction. A number of research goals were to be accomplished: (1) develop a cultural-historical synthesis (2) identify synchronic settlement systems and diachronic settlement pattern change (3) reconstruct a demographic curve for both prehistoric and historic periods (4) identify types and periods of regional exchange of goods (5) clarify the nature of the prehistoric social systems within the area, (6) identify regularities of early historic settlement and identify the origin of these early settlers. (7) identify patterns of historic landscape evolution in the area and reconstruct the early landscape and (8) identify the changing patterns of historic land use.

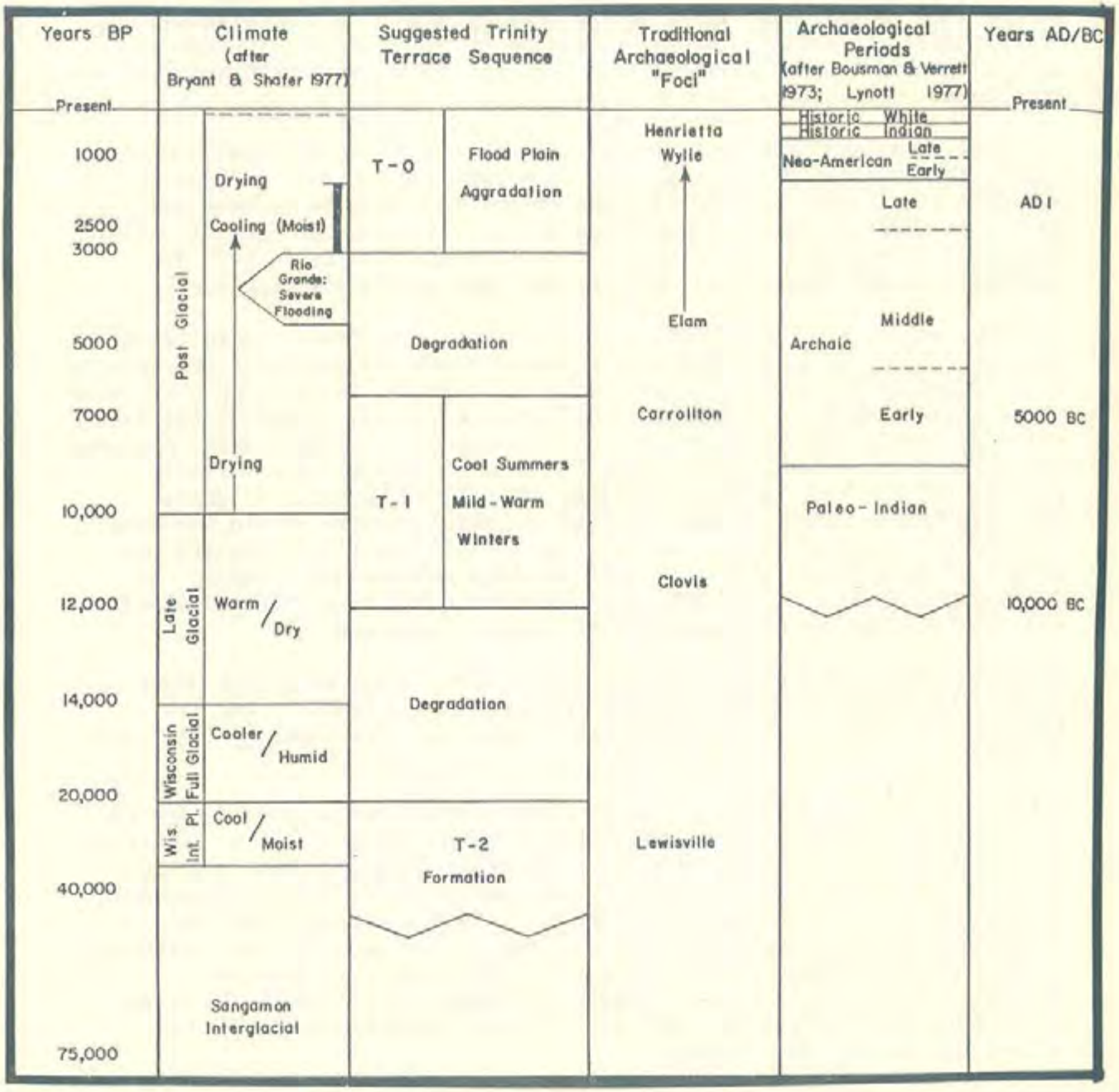
From the extensive archeological investigations conducted in the upper Trinity Watershed, and supplemented by the material found in the Ray Roberts area studies, a chronological sequence was developed. (See Table III-1).

A total of 355 cultural resources were recorded or re-recorded during the initial phase of the field survey. These include 90 prehistoric archaeological sites, 142 historic archaeological sites, (27 sites with both prehistoric and historic archaeological components), 102 historic standing structures, 16 recorded cemeteries (two of which are associated with standing structure complexes), and 5 bridges. The ages of these resources range from the Archaic period (4000 B.C. - A.D. 800), through the Neo-American period (A.D. 800 - 1600), and again with historic European settlement about A.D. 1840. The most intense historic occupation was around the turn of the century.

Numerous small tracts of land within the project area were not available for initial field survey because of landowners' refusals to permit access. These tracts included a total of approximately 3,917 acres. Between 1981 and 1983 E.C.I. gained access to 1,241 acres and located 16 additional historic archeological sites.

Correlation of reconstructed north Texas climatic sequence and suggested Trinity terrace sequence with traditional archeological "Foci" and archeological periods.

TABLE III-1



Environment Consultants, Inc. (E.C.I.) recommended that 173 of the cultural resources located by the survey had rendered the information they contain through the recording process ahd should be determined ineligible for further study. Fifty-five of the sites, containing 11 prehistoric and 10 historic components, and including 34 historic standing structures, were recommended to be eligible for inclusion on the National Register of Historic Places. Sixteen cemeteries were also recommended for further research, although they are not eligible for inclusion on the National Register. The remaining resources needed further investigation through testing to determine if they are eligible for the National Register.

The significance of these resources is discussed in detail in the "Results" chapter of The Archaeology and History of Lake Ray Roberts Volume I, Cultural Resources Survey (Skinner, et al, 1982) and its "Addendum" (Skinner, et al, 1983).

In order to clear the areas of the project scheduled to be impacted first by the construction of the dam and associated barrow areas, a two phase testing program was carried out in the fall of 1980 and the summer of 1981 by E.C.I. A total of 60 cultural resources sites were examined during both phases of testing within the Lake Ray Roberts "construction area." These included a total of 15 sites with prehistoric occupations, 29 historic archeological sites, and 16 historic archeological sites with standing structures. It was recommended by E.C.I. that 26 of the cultural resources tested within the construction area had yielded most of their useful information by being located, recorded and tested and that further research on these sites was unwarranted as these sites could not contribute further to understanding the research problems relevant to the area. Thirty-one of the sites, containing 8 prehistoric and 13 historic components, and including 10 historic standing structures, were recommended as eligible for inclusion on the National Register of Historic Places. The significance of these resources is discussed in detail in The Archaeology of Lake Ray Roberts Volume II, Construction Area Testing, (Skinner, et al 1982).

Environmental Consultants Incorporated is preparing a third report which will be entitled, The Archaeology and History of Lake Ray Roberts, Volume III: Settlement in a Transitional Zone. This report will include the results of historic and prehistoric archaeological site excavation, investigation of eleven historic cemeteries, oral history and documentary research and detailed recording and evaluation of eight historic standing structure sites.

Upon the successful completion and acceptance of the above document, mitigation in the construction zone will essentially be complete, with the exception of 10 sites which require more testing and documentation.

There are approximately 1500 acres of the project area that remain unsurveyed and no testing, documentation or mitigation has been accomplished outside the immediate construction zone. In addition to the work above to take place in the Lake Ray Roberts project area proper, there will be a minimum of 5,700 acres to be surveyed at Lewisville Lake as the Ray Roberts Project will raise the conservation pool at Lewisville Lake by 7 feet (from 515 ft. above MSL to 522). and these areas will be inundated. Access will be cut-off to the Lewisville Paleo-Indian site completely (which is approachable presently only during low water conditions) and to numerous poorly reported and uncategorized aboriginal and historical sites.

A 1950 Smithsonian Institution, River Basin Survey performed by D. L. Stephenson was little more than a reconnaisance level effort concentrating on the lower lying areas of what was to become Garza - Little Elm Reservior and it recorded only aboriginal sites. Another reconnaisance level investigation by Parker Nunley was performed in 1973 using amateur personnel. The 1973 effort also exclusively dealt with the discovery of aboriginal sites and, while 60 sites were found during the reconnaisance, site forms were never completed and filed with the Texas State Historical Commission. The nature and location of sites in the area to be inundated is therefore, sketchy and unreliable.

Map III-1 shows the diversity of site types and locations of selected significant cultural resources in the Lake Ray Roberts project area.

3-03. Cultural Resources Overview and Management Plan - In May, 1982, the U.S. Army Corps of Engineers, the Advisory Council on Historic Preservation and the Texas State Historic Preservation Officer (SHPO) signed a Memorandum of Agreement (MOA) on the assessment and treatment of historic properties in the project area after the Corps, in consultation with the SHPO, had determined that the proposed undertaking would have an adverse effect on several properties eligible for the National Register of Historic Places. This agreement was made pursuant to the regulations of the Advisory Council on Historic Preservation, "Protection of Historic and Cultural Properties" (36 CFR part 800) and Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec 470(f)), and provides a formal framework for preservation measures related to the project. The agreement establishes that the Corps will implement a historic preservation program and will cause to be developed an overview of the lands within the project boundaries to describe known historic properties, to predict the types and locations of not yet known historic properties affected or potentially affected by the project, to develop strategies for acquiring further data concerning such properties where necessary, and to develop strategies for treatment of historic properties affected by the project. Specific stipulations in the Agreement are that the Corps will ensure that the following measures are carried out.

"I. Assessment and Treatment of Historic Properties in Areas of Undertaking.

A. The Corps will ensure that the "Historic Preservation Program: Lake Ray Roberts", is carried out. Toward this end, the Corps will ensure that it, or its representative, participate in one or more scoping meetings prior to development of the overview and strategies required in Part I of the Program. The purpose of this meeting, or meetings, to which all signatories to this Agreement will be invited, will be to ensure that the overview reflects the principles and standards contained in the Program and to discuss possibilities for the content of the overview and strategy. The overview and strategy documents need not be completed prior to implementation of initial construction as described in Stipulation II.A. of this Agreement.

B. The Corps' supervision, review, and monitoring of performance of the Program will be conducted by or under the supervision of a qualified professional(s) meeting one or more of the qualifications standards set forth in "Appendix C - Professional Qualifications" 42 Federal Register 5382 (January 28, 1977).

C. During its review of the overview and strategies in accordance with Part II of the Program, the Corps will consult with the Texas SHPO in the following mannner:

1. The Corps will forward the overview and strategy documents(s) to the SHPO and afford the SHPO a 30-day period in which to make recommendations.

2. The Corps will adopt the SHPO's recommendations when feasible.

3. If the Corps determines that adoption of the SHPO's recommendations is not feasible, the Corps will:

a. forward the overview and strategy documents, Corps recommendations and those of the SHPO to the Council; and,

b. consulting parties will consult further to determine the appropriateness of the recommendations.

4. If the SHPO does not comment, the Corps will forward a copy of the overview and strategy document(s) to the Council and afford it a 30-day period in which to make recommendations.

D. Identification, evaluation, and treatment of historic properties will be carried out in accordance with the strategies aproved in accordance with Part II of the Program and Stipulation I.C., and will take into account information obtained as a result of Stipulation II of this Agreement.

E. In accordance with Part III of the Program, the Corps will monitor implementation of the strategies by providing regular reports to the Texas SHPO, and periodically inspecting any areas where strategies are being implemented, and will honor all request by the SHPO to participate in inspections.

F. In the event that identification or treatment of historic properties is not conducted in accordance with the approved strategies, the Corps will establish remedial actions, after consulting with the Texas SHPO, consistent with the Program.

G. The Corps will ensure that the Texas SHPO receives all data and analyses that result from development of the overview and from implementation of strategies.

II. Assessment and Treatment of Historic Properties in Areas of Embankment and Spillway Construction, and Associated Borrow Areas (elements of initial construction).

A. The Corps will ensure that properties significant primarily for the information they contain will be treated in accordance with Section X of Part II of the Council's Handbook, Treatment of Archeological Properties (Handbook), and such that treatment will take into account Parts I and III of the Handbook.

B. The will ensure that properties significant primarily for reasons other than the information they contain will be recorded prior to

demolition or alteration so that there will be a permanent record of their history and present appearance. The National Architectural and Engineering Record (NAER), (National Park Service, Department of the Interior, 5000 Marble Avenue, N.E., Room 211, Albuquerque, New Mexico 87110; (505) 766-3514) will first be contacted to determine what documentation is required. All documentation must be accepted in writing by NAER, and the Council notified of its acceptance, prior to the demolition or alteration. Copies of this documentation will be provided to the Texas SHPO.

III. If any of the signatories to this Agreement determines that the terms of the Agreement cannot be met and believes that a change is necessary, the signatory will immediately request the consulting parties to consider an amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement."

In response to the above stipulations in the MOA the Fort Worth District is preparing a Feature Design Memorandum (FDM) on Cultural Resources which will incorporate the Overview discussed above in the stipulations of the MOA and the implementation strategies which will become the Cultural Resources Management Plan for the project.

3-04. Procedures and Responsibilities for Handling Cultural Resources During Construction - Project managers and the Construction Area Office Engineer will be provided with maps showing all of the cultural resources sites within the project lands. These maps will be complemented by the FDM on Cultural Resources which will be provided upon its completion. Any activities in or near designated cultural resources sites will be reported and coordinated with the Fort Worth District, Planning Division Staff archeologists prior to commencement of the activity so that monitoring or coordination arrangements can be made. The cultural resources site maps will not be released to the public under any circumstances and will be utilized by Corps personnel on a need-to-know basis. This information must be safeguarded in order to protect the resources from vandalism.

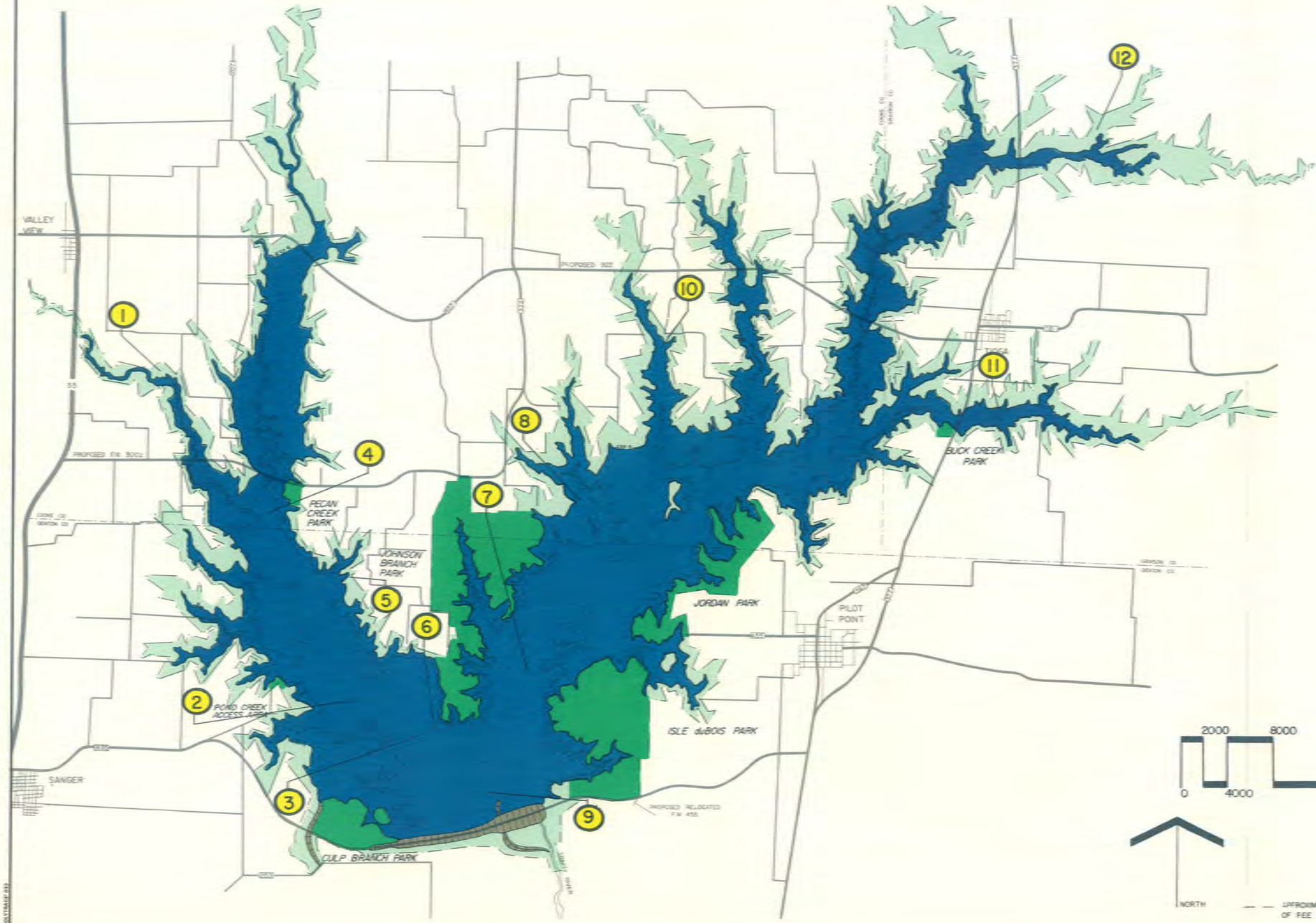
If, during the course of construction activities archeological, historical or materials of scientific importance are encountered, work will cease and the contractor will inform the Corps Inspector and/or construction Area Office Resident Engineer who will inform the District Engineer, the Fort Worth District staff archeologists and project manager. Sole authority and responsibility for halting construction rests with the District Engineer. An assessment of the situation and consultation with the State Historic Preservation Officer will then be made and coordination intiated, if necessary.

3-05. Soils. - The soil characteristics present vary from moderate to severe limitations for recreation development, engineering and land management. However, soil conditions within the area lend themselves to a variety of uses. The desired carrying capacity is based on the soil series, its ability to endure certain uses as determined by the Soil Conservation Service, the slope of the land, and a Soil Conservation Service interpretative report relating these aspects in a carrying capacity for each area. The project soils survey maps are shown on plate III-2. (For soil limitations see table III-2)

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
AUBREY Fine Sandy Loam 1	Severe: perme-ability	Slope: up to 7% slope Severe: over 7% slope perme-ability of substratum	Moderate: shrink swell corrosivity	Moderate: traffic supporting capacity shrink-swell	Slight	Slight	Slight: 0-2% slopes Moderate: 2-6% slopes Severe: 6-8% slopes	Slight	Openland: well suited Woodland: suited	Sandy Loam Site:2,500# - 4,000#* Excellent condition: major vegetation is little bluestem indiangrass, beaked panicum, big bluestem. purpletop, brownseed paspalum, post oak and blackjack oak.
BIROME Fine Sandy Loam 2	Moderate: perme-ability	Slope: slope slope Severe: over 7% slope perme-ability of substratum	Moderate: shrink-swell corrosivity	Moderate: traffic supporting capacity shrink-swell	Moderate:	Moderate:	Severe: 0-2% slopes Severe: 2-6% slopes Severe: 6-8% slopes	Moderate:	Openland: well suited Woodland: suited	Sandy Loam Site:2,500# - 4,000#* Excellent condition: major vegetation is little bluestem indiangrass, beaked panicum, big bluestem, purpletop, brownseed paspalum, post oak and blackjack oak.



KEY

1. TURN OF THE CENTURY WATER POWERED MILL
2. PREHISTORIC ARCHEOLOGICAL SITE
3. ABANDONED TOWN OF COSINER (VAUGHANTOWN)
4. ROCK-FACED ELIZABETHAN REVIVAL HOUSE
5. HAMMONS HOUSE
6. PREHISTORIC ARCHEOLOGICAL SITES
7. PREHISTORIC BURIAL SITE
8. CUMBERLAND HOUSE
9. TURN OF THE CENTURY HESTER HOMESTEAD
10. PREHISTORIC ARCHEOLOGICAL SITE
11. HISTORIC ARCHEOLOGICAL SITE
12. NEO-AMERICAN CAMP SITE

2000 8000
0 4000 16000 ft

NORTH

— — APPROXIMATE LIMITS OF FEE ACQUISITION

SYMBOL NO. | ACTION | DATE | DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

TYPES OF SIGNIFICANT CULTURAL RESOURCES

TO ACCOMPANY DESIGN MEMORANDUM NO 8

INVITATION NO. | DATE
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 OF 1 | SEQUENCE NO. III-1

V - OUTDOOR RECREATION NEEDS AND FACILITIES

5-01. General. - The methodology used for predicting recreation needs follows the instructions presented in ER 1120-2-403, dated 26 March 1970. The procedure utilizes the "similar project" concept for recreation prediction. This technique involves using recreation information from existing projects of the same approximate size and character.

5-02. Day-use market area evaluation.

a. Projected population of the day-use market area. - the population within the day-use market area (the geographic area within 50 road miles of the project) was projected from the base year 1985 through the year 2020. These projections were based on the current Series E population projections. A summary of the current projected populations by decade for the years 1985 through 2020 are shown in table V-1.

Table V-1

PROJECTED POPULATION IN THE MARKET AREA
(Series E projections)

Decade	Population
1985	3,013,591
1990	3,353,900
2000	3,878,800
2010	4,398,200
2020	4,903,200

b. Selection of initial per capita use rate. - In order to minimize the chance of an erroneous attendance based on a unique situation, recreation use data from similar projects were pooled to derive a per capita use curve. Similar projects used were, Keystone Lake in the Tulsa District, Old Hickory Lake in the Nashville District, Beaver Lake in the Little Rock District and Lewisville and Grapevine Lakes in the Fort Worth District. The selection of an initial per capita use curve for Ray Roberts Lake project was made by adjusting and revising the per capita use curve to more nearly fit the prospective project. From the initial per capita use curve, a per capita use rate was found for each zone of influence (table V-2).

Table V-2

PER CAPITA USE RATES FOR DAY-USE MARKET AREA

Zone	Per capita use rates
I (0-10 miles)	5.1
II (11-20 miles)	2.7
III (21-30 miles)	1.5
IV (31-40 miles)	.8
V (41-50 miles)	.5

c. Estimating total initial recreation needs. - After the per capita use rates were found for each zone of influence, the per capita use rates for each county in each zone were determined. The principal city of each county was used as a proxy for the population centroid of the county. The road-mile distance from the centroid to the project was then calculated. The per capita rate multiplied by the county population gives the expected recreation attendance from that county. This process is repeated for all counties within the market area, and the sum of these figures give the initial recreation (day-use) for the base year 1985 from within the market area. It has been found that the initial recreation needs from within the market area will constitute about 90 percent of the total recreation attendance, with 10 percent originating from outside the market area. From the project survey data, overnight use is estimated to be 15 percent of the total use. The total projected recreational needs (base year 1985) has been estimated to be 3,550,699 annual recreation days.

d. Projection of potential recreation needs. - An important part of the recreation analysis of the proposed project is the estimation of potential future recreation use. Although there are many factors that may affect future recreation attendance projections, there are essentially two basic items to be considered: (1) anticipated increase in future per capita rates, and (2) population projections. Because present recreation participation rates on existing projects are increasing and are predicted to continue increasing the initial per capita use rate must be adjusted to reflect the anticipated increase in per capita rates by decade. The initial per capita rates were adjusted by the factors presented in table V-3.

Table V-3

ADJUSTMENT FACTORS FOR PER CAPITA USE RATES

1985 - 1.00
1990 - 1.17
2000 - 1.33
2010 - 1.48
2020 - 1.62

Then the adjusted per capita use rates were applied to the population projections to arrive at the projected unsatisfied recreation needs. The total projected recreation needs by decade is shown in table V-4.

Table V-4

PROJECTED UNSATISFIED RECREATION NEEDS

1985	1990	2000	2010	2020
3,550,699	5,035,745	5,967,105	8,988,316	11,435,554

5-03. Attendance. - On the basis of experience at other projects, it is obvious that the Ray Roberts Lake project would not have the capacity to accomodate all the unmet needs of the area without resource deteriora-

tion. Accordingly, it was necessary to establish an estimate of optimum capacity in order that facilities requirements and benefits might be based on use that could be accommodated on a continuing basis. The optimum capacity of this project for the recreational activities anticipated is estimated to be 7,000,000 recreation-days. This estimate was based on an analysis of project capabilities, available water, and types of development proposed. On the basis of projections cited above, it was determined that the optimum capacity would be reached shortly after the year 2000. The initial annual visitation was computed to be 3,550,699, rounded to 3,500,000 recreation days. Average annual visitation, which is a weighted average of the initial and optimum annual visitation over the life of the project, was computed to be 6,000,000 recreation days. The project local sponsors have, however, elected to participate in a level of development which is less than the initial and optimum levels of recreation development determined to be needed for the project. Tables V-4 and 5 reflect initial (1985) and optimum annual visitation attendance projections prior to this reduction. Table V-5 presents the methodology used to determine the optimum capacity.

Table V-5

Calculations:

21,000 water acres* ÷ 8.5 acres/boat = 2,471 boats on lake at one time.

2,471 x 3 (1/3 boats active) = 7,413 boats (total boats).

7,413 x 3 persons/boat = 22,239 persons lake at one time.

22,239 x 3 (2:1 ratio of the number of land users compared to the number of water users) = 66,717 design day load.

66,717 x 26 weekend days = 1,734,642 summer weekend users ÷ .42 summer weekend visitation rate = 4,130,100 summer visitation ÷ .60 summer visitation rate = 6,883,500 optimum use. Rounded to 7,000,000.

*The water acres represent the average surface acreage during the prime recreation season.

5-04. Level of recreation development. - The project local sponsors which will assume responsibility for recreation development, requested information regarding various plans of recreation development ranging from minimum facilities for public health and safety to the optimum plan presented in the previous authorizing document. Seven plans were evaluated to see what level of recreational development could be formulated which would result in the lowest total overall cost for the project. The level of development which represents an approximate 20 percent reduction from optimum recreational development was selected for its optimized cost to the local sponsors. Table V-6 shows the projected visitation for initial, average annual, and optimum development in comparison to the plan selected by the project local sponsors.

TABLE V-6

Visitation	Optimum Plan	Current Plan
Initial	3,500,000	3,100,000
Average Annual	6,000,000	5,333,000
Optimum	7,000,000	6,000,000

5-05. Recreation facilities analysis. - The recreation facilities analysis in tables V-7 and V-8 was used to determine the basic recreation facilities for the initial and optimum stages of development.

5-06. Supporting recreation facilities. - Supporting facilities such as sanitary facilities, trash receptacles, and change shelters were determined through an analysis of the needs of the recreation layout. The design criteria presented in EM 1110-2-400 as well as the guidelines presented in Chapter IX will serve as guidelines in planning for these facilities.

TABLE V-7

RECREATION FACILITIES ANALYSIS

Design day load: 30,050

Project: Ray Roberts Lake

Total Annual attendance: 3,100,000 (initial)

Design day load

3,100,000 total annual attendance x .42 visits during summer months x .60 which occurs on weekends = 781,200 total number of weekend users. Total number of weekend users ÷ 26 weekend days = 30,046 design day load.

Picnicking

Design day load (30,050) x .15 of total are picnickers = 4,508 of picnickers. 4,508 picnickers x .40 of picnickers requiring facilities = 1,803 picnickers requiring facilities.
1,803 picnickers requiring facilities ÷ turnover rate of 2 : 3 persons per vehicle = 301 picnic units required.

Camping

Design day load (30,050) x .15 of total are campers = 4,508 campers.

4,508 campers ÷ load factor of 5 = 902 camping units required.

Boat ramps

Design day load (30,050) ÷ load factor of 3 = 10,017 vehicles.
10,017 vehicles x .20 of vehicles with boats = 2,003 boats.
2,003 boats ÷ 60 launchings per day = 33 boat launching ramps required.

Beaches

Design day load x .30 swimmers = 9,015 swimmers.
9,015 swimmers x .60 swimmers on beach = 5,409 beach users.
5,409 beach users ÷ turnover rate of 3 = 1,803 users on beach at any one time.
1,803 users on beach at same time x 50 square feel of beach per person = 2.1 acres of land area required for sand beach.

9,015 swimmers x .30 are swimmers in water = 2,705 swimmers in water.
No. of swimmers in water ÷ turnover rate of 3 = 902 swimmers in water at any one time.
902 swimmers in the water at any one time x 100 square feet of water surface per user = 2.1 acres surface required.

10% of swimmers need no additional land.

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TABLE V-8

RECREATION FACILITIES ANALYSIS

Design day load: 58,150

Project: Ray Roberts Lake

Total annual attendance: 6,000,000 (optimum)

Design day load

6,000,000 total annual attendance x .42 visits during summer months x .60 which occurs on weekends = 1,512,000 total number of weekend users. Total number of weekend users ÷ 26 weekend days = 58,154 design day load.

Picnicking

Design day load (58,150) x .15 of total are picnickers = 8,723 picnickers. 8,723 picnickers x .40 of picnickers requiring facilities = 3,489 picnickers requiring facilities. 3,489 picnickers requiring facilities ÷ turnover rate of 2 : 3 persons per vehicle = 582 picnic units required.

Camping

Design day load (58,150) x .15 of total are campers = 8,723 campers. 8,723 campers ÷ load factor of 5 = 1,745 camping units required.

Boat ramps

Design day load (58,150) ÷ load factor of 3 = 19,383 vehicles. 19,383 vehicles x .20 of vehicles with boats = 3,877 boats. 3,877 boats ÷ 60 launching per day = 65 boat launching ramps required.

Beaches

Design day load (58,150) x .30 swimmers = 17,445 swimmers. 17,445 swimmers x .60 swimmers on beach = 10,467 beach users. 10,467 beach users ÷ turnover rate of 3 = 3,489 users on beach at any one time. 3,489 users on beach at same time x 50 square feet of beach per person = 4.0 acres of land area required for sand beach.

17,445 swimmers x .30 are swimmers in water = 5,234 swimmers in water. 5,234 swimmers in water ÷ turnover rate of 3 = 1,745 swimmers in water at any one time. 1,745 swimmers in the water at any one time x 100 square feet of water surface per user = 4.00 acres surface required.

10% of swimmers need no additional land.

Rev 6-22-83

6-01. General. - During the development of this master plan, every effort was made to evaluate, and when practical, incorporate the ideas of other State & Federal agencies and the general public regarding the overall development of the project. Both solicited and and non-solicited viewpoints were drawn upon in the development of the master plan document.

6-02.- History of Project Coordination Prior to the development of the Master Plan

a. During 1956 and 1957, the Trinity River Authority held public hearings in each of the 17 counties within its jurisdiction. The public expressed desires for improvements in flood control, water conservation and quality, fish and wildlife, and recreation. In this plan, adopted in 1958 and modified slightly in 1960, the Trinity River Authority proposed the construction of Aubrey Lake.

c. In December 1961, the Corps of Engineers, Fort Worth District, held a public hearing to present its preliminary plan and to obtain the public's views and desires. This plan, which was submitted in 1962 and authorized in 1965, provided for the construction of Aubrey Lake.

d. In July 1966, the Texas Water Development Board held a public meeting in Arlington, Texas, concerning the Trinity plan. As a part of their comprehensive development of the state, they proposed the construction of a lake in the same vicinity as Aubrey Lake.

e. On 30 April 1971, the Corps of Engineers, Fort Worth District, held a public meeting in Denton, Texas, to obtain the public's views and desires for the purpose of gathering data to make a final decision on the site location for the dam at Aubrey Lake.

f. On 18 August 1972, a coordination meeting was held in Denton, Texas, for the purpose of discussing the location of the proposed public-use areas and the cost-sharing requirements under Public Law 89-72 (21). Representatives of the Corps of Engineers, the Texas Paks and Wildlife Department, and the cities of Denton and Dallas were present.

g. On 27 October 1972, a public meeting was held by the Corps of Engineers, Fort Worth District, in the Civic Center Community Building in Denton, Texas. The meeting was held to inform the nearly 400 attendees of the latest details concerning the Aubrey project, to present results of environmental studies, and to explain the alternative actions studied.

h. In letters dated October 9 & 12, 1973 the cities of Denton and Dallas provided continued assuances that they were financially able

and willing to coorporate in the design and construction of the Aubrey Project.

i. In October 1980 the Corps of Engineers held a public meeting in Denton, Texas concerning the proposed plan of land acquisition for Aubrey Lake.

6-03. - Summary of project coordination since the initiation of the Master Plan.

a. The cities of Dallas and Denton sponsored and held a public meeting on 13 May 1981 in Denton, Texas, to collect public input for recreation development at Ray Roberts Lake (formerly Aubrey Lake). This early stage meeting provided the public with a forum to make suggestions and recommendations regarding the recreation development for the lake. The information was then provided to the Corps of Engineers and Texas Parks and Wildlife Department for developing the master plan for recreation development. A survey questionaire which listed a broad range of recreational activities was completed by meeting participants to help determine trends in recreation facility preferences. The same questionaire was printed in the Denton Record Chronicle and was used in the analysis. A synopsis of the public meeting, along with a talley of the questionaire responses is presented on pages VI-8 thru VI-15.

b. A second questionaire of a more limited scope was distributed as part of a petition against the development of a marina in Johnson Branch Park. This was conducted independently of the Corps or its project sponsors. The methods of distributing this petition are unknown. A sample form letter and talley of results are shown on page VI-15.

c. U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department.

The district requested the cooperation of these agencies in appraising the fish and wildlife potentialities of the project pursuant to this request. A field reconnaissance was made with representatives from these agencies and the Corps of Engineers in March 1982. Reports were submitted by the Texas Parks and Wildlife Department which recommended pre and postimpoundment development recommendations for fish and wildlife management. The recommendations were conducted through the U.S. Fish and Wildlife Service and presented on pages VI-18 thru VI-31.

d. Recreation sponsors. -TPWD has expressed a desire to assume a portion of Dallas and Denton's recreation responsiblity and enter into a cost sharing agreement with the Corps of Engineers for land and development costs for recreation facility development at Isle duBois Park. The Parks Division of TPWD further proposes to manage all remaining developed park areas to be cost shared by the Corps and cities of Dallas and Denton for parks and recreation purposes under a lease agreement from the Corps of Engineers. Designation of management of the lake surface by Parks Division would be primarily administrative and would not preclude appropriate management activities by the Inland Fisheries and Enforcement Division of TPWD. The Wildlife Division of TPWD proposes to manage the remaining intermittent lands, guide-take lands, and joint

acquisition lands, (exclusive of the embankment) for wildlife purposes. These real estate instruments will be comsumated after the contract is entered into. Letters of intent were furnished to the Corps by TPWD relative to the above discussions. The letters are presented on pages VI-16 and VI-17.

6-04. Summary of Fish and Wildlife Coordination. - Coordination with U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department in their Section 2 (b) Coordination Act Report of June 1973, the U. S. Fish and Wildlife Service made several recommendations to optimize fish and wildlife resources of the project. In May 1975, because of project changes the Service submitted another report containing the following recommendations.

1. Project funds in the amount of $15,000 annually be made available to the Fish and Wildlife Service for funding of a fishery study of five years duration to be undertaken by the Texas Parks and Wildlife Department in cooperation with the Corps of Engineers and the interested State and Federal agencies, beginning one year prior to the impoundment of Ray Roberts Lake.

2. When project lands are acquired, the Texas Parks and Wildlife Department and the U. S. Fish and Wildlife Service be notified so that farm ponds and floodwater retarding structures located at or within the conservation pool may be investigated as to their suitability for use as nursery ponds.

3. The numerous ponds and floodwater retaining structures located between the guide take line and the conservation pool be left intact.

4. Four fish nursery coves be developed at existing floodwater retarding structures suitable for this purpose.

5. Four seining areas be constructed within the conservation pool.

6. Impoundment of Ray Roberts Lake be initiated in the fall of the year to permit early spring stocking of gamefishes.

7. To increase sport fishing use at Ray Roberts Lake, 12 access areas of three acres each, providing parking space, boat launching ramps, and sanitary and drinking water facilities, be developed around the middle and upper portions of the reservoir.

8. Access facilities to be inundated at Lewisville Lake be fully replaced above the new conservation pool elevation.

9. A zoning plan to minimize conflicts and promote safety for water-oriented recreationists be developed for both Lewisville and Ray Roberts Lakes by the Corps of Engineers in cooperation with the Texas Parks and Wildlife Department, the Fish and Wildlife Service, and other interested agencies.

10. The operational plan for the release of conservation storage water to supply downstream demands be programmed so as to provide for continuous flows in the Elm Fork between Ray Roberts Dam and the headwaters of

Lewisville Lake. A minimum continuous release of 15 second-feet December 1 - February 14; 140 second-feet February 15 - May 31; and 25 second-feet June 1 - November 30 be provided for. The release of water in excess of flows recommended for minimum releases be programmed so as to provide additional flows over weekend or holiday periods.

11. Three access areas having facilities similar to those listed in Recommendation No. 7, except for boat-launching ramps, be provided below the dam; one in the tailwater vicinity and one each at the two major road crossings.

12. To compensate for loss of sport hunting opportunities and to provide for the maintenance of a productive natural habitat, approximately 12,500 acres of project lands acquired in fee title be designated as natural areas and made available to the Texas Parks and Wildlife Department under the terms of a General Plan as provided in Section 3, of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended ; 16 U.S.C. 661 et seq).

Initial development costs of $29,450 and annual maintenance and replacement costs of $14,630 should be borne by the project.

13. In conjunction with Recommendation No. 12 and in order to provide lands of suitable dimensions for effective management, those lands currently scheduled as flowage easement areas (approximately 4,960 acres) be purchased in fee simple and made available to the Department under the terms of a General Plan.

14. The duration of inundation of lands within the floodpool be kept to a minimum with 30 days as a maximum storage period. To assure attainment of this flood storage goal, with the probability that necessary releases would cause overbank flooding downstream, that portion of the downstream subject to flooding, estimated to be less than 2,000 acres, should be acquired in fee simple. These lands should then be designated as a natural area and made available to the Texas Parks and Wildlife Department under the terms of a General Plan.

6.05 Late Stage Coordination.

In January 1982 the Fort Worth District requested that the U. S. Fish and Wildlife Service provide updated recommendations for further consideration in preparation of this Master Plan. Formal response by the Service with the assistance and cooperation of the Texas Parks and Wildlife Department in March 1982, in addition to their previous recommendations, provided the following:

Wildlife

1. All project lands be fenced to regulate access and prevent uncontrolled livestock grazing on wildlife areas.

2. Low water retaining structures be developed at selected locations within the reservoir basin. These structures, constructed of gated earthen embankments, would permit water level manipulations in shallow-water areas for management of waterfowl.

3. Shrubs valuable as wildlife food and cover to be planted in strips or motts along fence rows, edges of pastures or fields, drainageways, etc. These plantings should comprise at least 100 acres of project lands.

4. Perimeter lands currently in bermudagrass pasture be disked in strips in order to promote the growth of native forbs valuable as wildlife food.

5. Plant food plots of one-fourth to one-half acre in size near woody cover on select project lands. The total amount of food plots and disked areas should include a minimum of 300 acres.

Fisheries

1. The maintenance of existing farm ponds and flood control structures within the summer (621 ft. msl) and conservation pools (632.5 ft msl) to use as one time nursery ponds and serve as structure following impoundment.

2. The need to develop and effectively manage a minimum of 70 acres of permanent nursery ponds above the project's conservation pool elevation.

3. A timber clearing plan for the basin which will optimize fisheries production, while allowing multiple use of the reservoir surface area.

4. Creation of fish attractors throughout the reservoir basin.

5. Development of sufficient access for anglers and boaters in both the reservoir and tailrace.

Consideration has been given to each recommendation of the fish and wildlife agencies and some are proposed for implementation later in this Chapter. Various institutional constraints prevented incorporation of several of TPWD's recommendations into this master plan. Coordination will continue, however, during project construction and the Master Plan will be supplemented as necessary.

Recreation cost sharing contracts have been signed by the cities of Dallas and Denton obligating them to cost share with the Federal Government for recreation development at the Ray Roberts Lake project. They are further obligated to operate, maintain and replace such development.

The TPWD has expressed a desire to assume a portion of Dallas and Denton's responsibility and enter into a cost sharing agreement with the Corps of Engineers for land and development costs for recreation facility development at Isle duBois Park. TPWD would also be responsible for 100% of the operation, maintenance, and replacement of those facilities. The Parks Division of TPWD further proposes to manage all remaining developed park areas to be cost shared by the Corps and cities of Dallas and Denton for parks and recreation purposes under a lease agreement from the Corps of Engineers. The Wildlife Division of TPWD proposes to manage the remaining intermittent lands, guide-take lands, and

joint acquisition lands, (exclusive of the embankment) for wildlife purposes under a license from the Corps. Management of the lake surface by the Texas Parks and Wildlife Department would include appropriate management activities by the Parks, Inland Fisheries, Wildlife and Enforcement divisions of TPWD. These real estate instruments will be consumated after the contract is entered into.

Letters of intent were furnished to the Corps by TPWD relative to the above discussions. The letters are presented on pages VI-16 and VI-17.

6-06. Coordination to be accomplished.

a. The approved master plan will be sent to interested Federal, State, and local Governmental agencies for review and comment.

b. Wastewater treatment design and other pollution abatement plans will be coordinated with the Environmental Protection Agency up completion of the feature design memorandum on recreation facilities.

6-07. Comments received since initiation of the Master Plan. - To facilitate finding certain comments of particular agencies, organizations, or individuals, a cross index is presented in Table VI-1.

TABLE VI-1

Coordinating Entities

VII - LAND AND WATER USE PLAN OF DEVELOPMENT

7-01. General. - The basic concept behind the land and water use plan of development is the integration of authorized uses of the project land and water areas into a balanced development plan for the best use of all project resources in the best interest of the public throughout the life of the project. The intent is to present a plan of development which is flexible enough to meet the present and future needs of the project in consonance with the land capabilities and the esthetics of the project. The objectives of this plan are to: (1) present a complete zoning and land use allocation plan which offers specific recommendations for the ultimate use and possible interim use to which all land and water should be dedicated; (2) to serve as a resource management guide for the comprehensive use of all project land and water areas through planned use of designated areas; and (3) to present the concept and objectives for the management of all project resources.

7-02. Land use allocations plan. - ER 1120-2-400 requires all lands at civil works water resource projects to be designated for a specific purpose in accordance with a land use allocation plan. The basic objective of the land use allocation plan is to provide stewardship of the project lands and its resources through prudent land use designation and management. Project lands were allocated for specific purposes only after considerable research was conducted to determine their highest and best use. It has been necessary to allocate certain lands for both interim and ultimate use. Land areas will be marked according to designated use as indicated on the land use allocation plan with appropriate signs wherever necessary for proper land management and administration. Table VII-1 presents a summary of the land use acreages. The land use allocation plan showing various designated land uses is present in plate VII-1. Descriptions of each of the allocated land areas follow:

a. Project operations. - Lands are acquired and allocated to provide for safe, efficient project operation for those authorized purposes other than recreation, and fish and wildlife. Agricultural use of these lands will be permitted only on an interim basis when not in conflict with the designated use.

b. Recreation: Intensive use - Certain lands acquired for both project operations and specific recreation are allocated for ultimate use as developed public use areas for intensive recreational activities by the visiting public, including areas for concessions and quasi-public development. Fishing will be permitted except in restricted areas such as beach areas. No agricultural uses are permitted on these lands except on an interim basis for maintenance of open space and scenic values.

c. Recreation: low density use - Certain lands acquired for both project operational needs and specific recreation are allocated for the purposes of multiple low-density recreation activities. Activities which will be suited to this land classification are: primitive camping, nature study, horseback riding, & hiking. These lands may also provide suitable habitat for the propagation and preservation of native species of wildlife.

d. Wildlife Management - These lands will be acquired for project operational needs and allocated for the purposes of wildlife management. These lands will also be available for low-density recreation activities such as hiking, nature study, fishing access, and in some cases hunting activities.

TABLE VII-1

LAND USE ACREAGES

LAND USE ALLOCATIONS	ACRES
PROJECT OPERATIONS	325
RECREATION - INTENSIVE USE	3,135
RECREATION - LOW DENSITY USE	1,510
WILDLIFE MANAGEMENT	14,246
TOTAL LANDS ABOVE EL.632.5	19,216
CONSERVATION POOL	29,350
TOTAL PROJECT LANDS	48,566

7-03. Water use plan. - Water areas are zoned to minimize safety hazards while allowing maximum utilization of all the water areas available. Exclusive use activities such as private boathouses or yacht clubs will not be allowed. Due to the frequent and prolonged drawdowns, the water areas will be marked with buoys according to corresponding uses, restrictions, and rules as indicated on the water use planning plate. The water use map is shown on plate VII-2. A description of these areas is presented below.

a. Swimming. - All authorized swimming areas will be identified by project signs and buoys. Only swimming and related activities are to be allowed in these areas. No boating or fishing will be permitted.

b. Skiing and high-speed boating areas. - Only cleared areas having sufficiently deep water and the necessary space will be designated and managed as a water skiing and high-speed boating area. Due to drawdowns, the averge size of the conservation pool during the summer recreation season will be 21,000 surface acres. Optimum water skiing and high-speed boating areas will be in the deep water section of the lake as shown on plate VII-2.

No effort will be made to restrict this area from other boating activities; however, appropriately marked signs and buoys will be placed to properly identify the area.

c. Low-speed Boating Areas. - Areas designated as low-speed boating areas will include shallow water and areas in proximity to

beaches, boat docks, marinas, and ramps. Skiing will not be allowed in these areas. Appropriately marked buoys will be placed limiting the speed of watercraft to a no wake speed.

d. Uncleared areas. - Uncleared (timbered) areas exist where surface and subsurface debris create a hazard to any type of boating activity. No effort will be made to restrict these areas from public use; however, they will be marked to alert the public. A recommended clearing plan which is subject to revision is presented on plate XV-2.

e. Shallow areas. - Areas that are intermittent with shallow and deep water will be managed as shallow water areas in the interests of public safety. Floats advising the public of these areas will be maintained at the entrance or perimeter of the areas, as conditions warrant.

f. Restricted areas. - To insure visitor safety, the water area within 300 radial feet of the outlet and intake structures will be restricted from public use. Project personnel will classify any additional areas requiring extra safety restrictions. Buoys will be installed to indicate restricted areas.

7-04. Collateral and interim use. -

a. Agricultural leases. - It is anticipated that agricultural leases for grazing, hay production and/or crop production may be employed as a means to compliment project purposes of recreation and wildlife management. The primary objective in the administration of a leasing program should be to optimize the benefits to the public from operation of the project.

b. Nonprofit groups and private clubs. - The recreational needs of nonprofit groups and private clubs will be accommodated as per the administering agencies' regulations on a nonexclusive, first-come-first-served, or short-term reservation basis. There is a large group-use area in Johnson Branch Park which has been planned. (Plates, VIII-7 & 8). Groups requiring additonal recreation facilities can be assigned to a specific location within the high-use recreation areas.

c. Easements. - All outgrants, including easements for roads and utility lines, will be processed on an individual basis. The policy of attempting to have private roads and utility lines located on non-Government land will be adhered to as much as possible. Lands will be acquired in flowage easement to allow for possible inundation, and no buildings for human habitation will be constructed on these lands. The written consent of the District Engineer or his authorized representative shall be obtained for the type and location of any structure and for appurtenances thereto now existing or to be erected or constructed on flowage easement lands.

7-05. Hunting restrictions. - Consideration will be given to the U. S. Fish and Wildlife Service and Texas Parks and Wildlife Departments recommendations to provide for hunting and other wildlife oriented activities at Ray Roberts Lake. Although the need to supply hunting

opportunities does exist within the project area, any decision to allow such activities must be looked at on a case by case basis. There would be a number of considerations which would have to be addressed before allowing any hunting activities:

a. Cooperation and endorsement of local sponsors.

b. Safety and noise considerations

c. Possible need for variance to local laws in the event of annexation of project lands by surrounding cities.

d. Proper management and maintenance of hunting areas.

Final approval, for the incorporation of hunting areas on project lands and water areas would be by the Corps of Engineers. For further discussions on this subject see Chapter XV, Fish and Wildlife Plan.

7-06. Fishing. - Fishing in accordance with State laws and regulations will be permitted for all fish species on all water areas except in swimming areas and other restricted use areas shown on the water use map.

7-07. Management of environmental and recreational resources. -

a. General. - The concept underlying the management of project resources is to conserve, improve, and manage the resources for their best use and proper stewardship for the benefit of the general public. The intent of this section is to present the objectives for management of each project resource management techniques available. This will include but not be limited to controlling soil erosion, enhancing the vegetative cover for erosion control, providing wildlife habitat, increasing forage production, and providing for high quality public use. Specific management plans for the various resources will be developed by the project office following an on-site survey; they will be submitted as an appendix to the master plan.

b. Archeological and historical. - The objectives of an archeological and historical management program is to salvage and preserve the archeological and historical resources associated with the project. During the development of the program, the Corps of Engineers will seek cooperation from the National Park Service, State universities, and State and county historical societies and commissions. In addition, the Corps of Engineers will exert every effort to develop an archeological and historical program agreeable to all cooperating agencies so that the maximum benefits can be obtained.

c. Scenic. - In developing the scenic resources, the purpose is to provide sensory pleasure to the majority of the visitors. Since a water resource project of this type greatly modifies the environment the primary objective will be to minimize the impact of the project on the environment by protecting existing resources. In addition, a landscaping and beautification program will be initiated to harmonize facility development with its environs; it will be designed to emulate

as far as practical the esthetically pleasing "natural" environment presently existing within the project area.

d. Soils. - The primary objectives in developing a soil resource management program will be conservation, improvement, and enhancement. Improvement and development of the soil resources will be accomplished by controlling erosion on graded and disturbed areas, stabilizing gullies, and establishing and maintaining desirable vegetative cover.

e. Vegetation. - The basic objective of a vegetative management program is to provide stewardship of the land and resources through protection, improvement, and management of vegetative cover. This will be accomplished by planting, maintaining, and improving desirable trees and grasses. During the early stages of development of the project, cultivated crops will be replaced with desirable woody plantings, and grasses. It is essential that this revegetation and tree planting be initiated as soon as is practical to prevent further deterioration of the resources. During clearing operations, esthetically desirable and water tolerant trees at the 632.5 contour will be left. These trees will be selected by district personnel to remain after clearing. Areas above the upper clearing contour containing adequate tree and grass cover will not be disturbed. Due to the probable lengthy period of time which will be required to fill the reservior and the low percentage of time at which the reservoir will be at elevation 632.5 (2% of the time) selected trees between elevations 621 and 632.5 will be flagged by TPWD personnel and excluded from normal reservoir clearing. These trees will be located adjacent to park areas. Once prolonged inundation occurs, removal of all dead trees will be the responsibility of the Texas Parks and Wildlife Department.

f. Fisheries. - A fisheries management program will be provided for the purpose of conservation of species and derivation of maximum benefit from the fisheries resources. In managing the fisheries resources, the primary objective will be to increase the quality and quantity of the desirable game fish population. Such a program includes but is not limited to methods of controlling rough fish populations, the construction of nursery coves to raise and stock game fish, and bouying known areas of fish concentration points to facilitate their harvest by anglers. Although the responsibility of the fisheries resource is essentially that of the Texas Park and Wildlife Department, the Corps of Engineers will supply all possible aid and assistance to insure an adequate fisheries program.

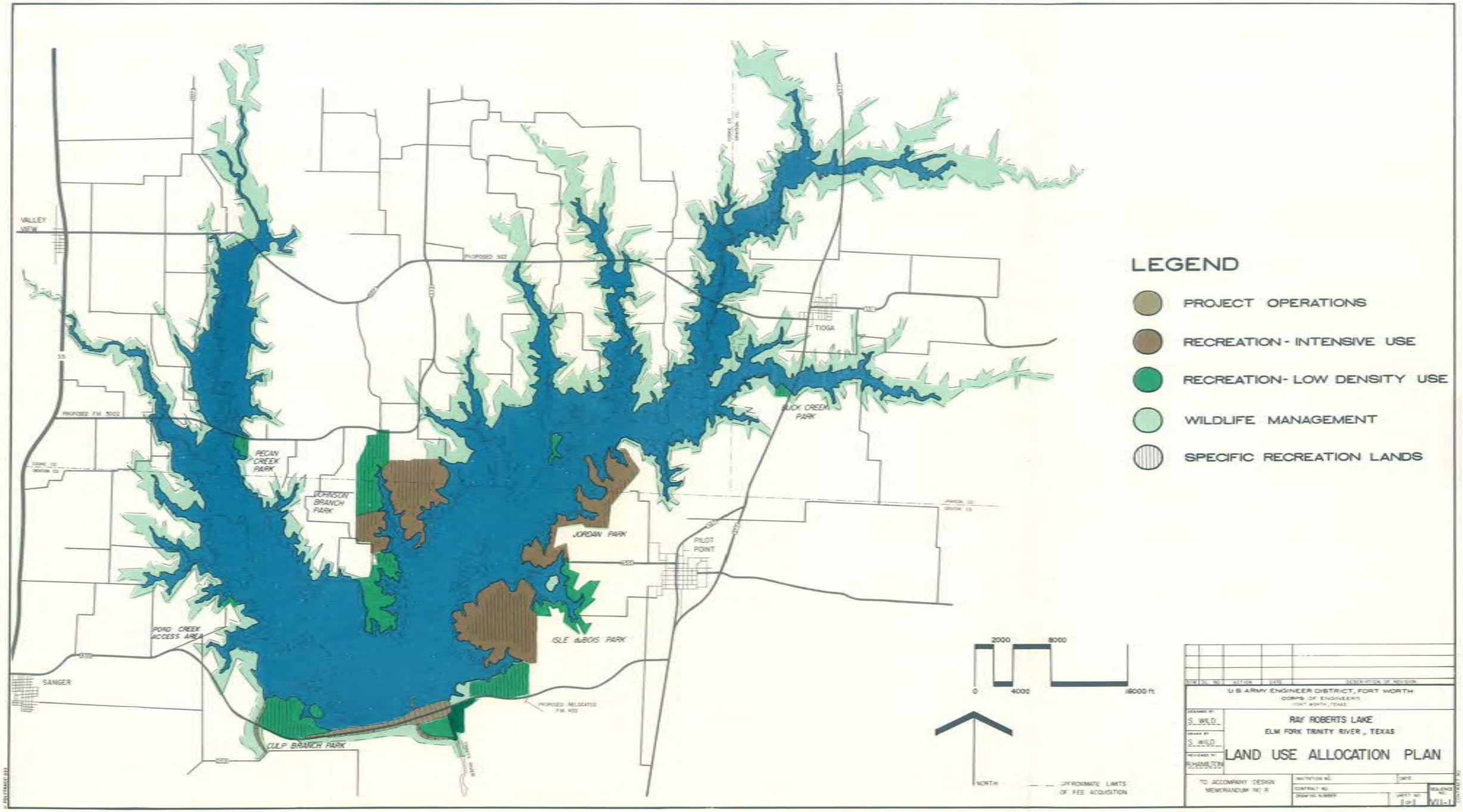
g. Wildlife. - In order to obtain the greatest benefit from the wildlife resources, a scientifically based wildlife management program will be provided. The fundamental objective in managing this resource will be to attract the greatest variety of wildlife species and to maintain game populations consistent with the carrying capacity. This objective can be accomplished by providing plants which will supply both food and cover and create an edge effect. Every effort will be employed to protect endangered wildlife species.

h. Water. - The ultimate objective of managing the water resources will be to maintain the highest water quality possible. This

can be accomplished by coordinating water management with the other resources management programs to prevent soil erosion, contamination by pollutants, and other factors influencing water quality. In addition, an appropriate water level regulation program will be necessary to optimize the multiple-use concept of this project. This program must be flexible enough to handle the assigned water storage and flood control responsibilites and still provide a water resource that will accentuate the other multiple-uses associated with the project.

7-08. Turfing and landscaping the public use areas. - Landscape planting including trees, shrubs, vines, perennials, annuals, and turf establishment will be an integral component in the design of the recreation sites, areas, and facilities. The objectives of the beautification program include, but are not limited to harmonizing development with the surrounding environment, provision of shade, reduction of undesirable wind, noise, dust, and erosion, and enhancement of structures. Each public use area has been analyzed to determine what natural resources are available, which should be preserved, and how recreational facilities should be blended with the surroundings to best complement the area. In keeping with sound landscape architectural principles, the primary consideration should be to develop a planting plan which is simple, functional, esthetically pleasing, and economical to maintain. Plant species will be limited to those proven hardy and tolerant of specific site conditions. Generally, plantings will be naturalistic and will avoid arboretum patterns. A landscape plan and implementation for all park areas will be the responsibility of the Texas Parks and Wildlife Department. This will be accomplished after the completion of construction for each park and will be subject to the review and approval of the Corps of Engineers.

7-09. Seaplane operations - Title 36 has been amended to allow seaplanes to land on Corps of Engineers lakes except in restricted areas established by the District Engineer. A final decision has not been made on seaplane landings at Ray Roberts Lake. A decision will be made once the project is operational.


VALLEY VIEW
PROPOSED FM 3002
PROPOSED 922
TIOGA
BUCK CREEK PARK
PECAN CREEK PARK
JOHNSON BRANCH PARK
JORDAN PARK
PILOT POINT
ISLE duBOIS PARK
POND CREEK ACCESS AREA
SANGER
GULP BRANCH PARK
PROPOSED RELOCATED FM. 455
LEGEND
PROJECT OPERATIONS
RECREATION - INTENSIVE USE
RECREATION - LOW DENSITY USE
WILDLIFE MANAGEMENT
SPECIFIC RECREATION LANDS
2000
8000
0
4000
16000 ft
NORTH
APPROXIMATE LIMITS OF FEE ACQUISITION
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS
LAND USE ALLOCATION PLAN
S. WILD
S. WILD
R.HAMILTON
TO ACCOMPANY DESIGN MEMORANDUM NO. 9
WI-1

VIII- RECREATION PLAN OF DEVELOPMENT

8-01. General. The purpose of the recreation plan of development is to delineate the areas selected for public use, to determine the type of use to which they should be put, and to present a conceptual plan of how the selected public use areas could be developed and managed. This plan is intended to serve as a guide for recreation development while being flexible enough to meet the changing conditions and future variations in public demands. All public use areas and associted facilities will be located on land under the jurisdiction of the Corps of Engineers.

8-02. Basis for selection of public use areas. The preliminary selection of the public use areas is described in Design Memorandum No 2. The location of the sites selected for public use are shown on Plate VIII-1. Several variables analyzed in the selection of these areas include, but are not limited to the following:

a. Access to existing roads;
b. Topography of the area;
c. Existing vegetation in the area;
d. The existence of scenic areas;
e. Availability of shoreline access for recreational activities;
f. Degree of shelter for boats; and
g. Water depths for swimming beaches and boat ramps.

8-03. Recreation use allocation plan. The intent of this section is to present a balanced recreation plan that offers the greatest variety of outdoor recreation experiences within the limits of the recreation resource and its authorized purposes. Experience at completed projects in the Fort Worth District and at similar projects elsewhere indicated a significant demand for land managed for the specific role of shaping public understanding of the environment. While some may consider areas under-utilized when all available acreage is not designed for optimum high-density use, it is considered that a higher quality experience is obtained when conditions are less crowded. Certain types of outdoor recreation activities, such as hiking, bird watching, nature study, and primitive camping can only be experienced in areas receiving relatively light use. Portions of Johnson Branch, Jordan, and Isle duBois Parks will be suited to these types of activities.

8-04. Management of the public use areas.

a. Recreation: low-density use parks. - Management of the low-density parks will be designed to protect, maintain, and enhance existing environmental and recreational values. The primary objective will be to provide opportunities for outdoor recreation activities, such as hiking, nature study, photography, and primitive camping. To achieve this objective, it will be necessary to take the following action:

(1) All camping areas will be sited in the field by district personnel and project sponsors. Attention will be focused on the proper distribution and use of the area to protect the natural resources and to enhance the recreational experience.

(2) A carrying capacity will be determined and implemented for each primitive camping area. The carrying capacity is the ability of a site to absorb outside influence and still retain its quality.

(3) The "fallow campground" concept, which requires camping areas to be rested from use periodically, should be employed.

(4) Simple comfort stations will be provided for recreation users. These toilets will be designed and located so that they are in harmony with their surroundings, and easily operated and maintained.

(5) Off road vehicle travel, except that required by project personnel to protect and maintain the parks, will be prohibited.

(6) Cleaning contracts will be initiated when the parks are in use.

b. Recreation: intensive use parks: The management of intensive use parks shall give primary emphasis to providing the optimum number of recreation facilities for the continued enjoyment and maximum sustained use by the visiting public, consistent with the carrying capacity and the esthetic and biological values. This requires a balanced approach to facility development which must take into consideration both the recreational and environmental goals in order to achieve equilibrium between conservation of the natural environ-ment and development for public use.

8-05. Schedule of recreation facility development. - The following schedule respresents the current anticipated completion dates for the construction of recreation facilities at Ray Roberts Lake:

	Completion date
Isle duBois Park	FY 1987
All remaining park areas	FY 1989

8-06. Design criteria for recreation facilities. - Engineering design of the recreation facilities will be in accordance with Texas Parks and Wildlife Department Facility Guidelines unless exceeded by Corps criteria outlined in ER 1110-2-400, "Design of Recreation Sites, Areas, and Facilities," EM 1110-2-400, "Recreation Facilities Planning and Design Criteras.".

8-07. Recreation facility plan of development. - This section translates the land and water use plan into specifics for actual facility development and cost as required for the life of the project. Proposals for facilities and associated site layout for the initial public use development will serve as the basis for preparation of plans and specifications. Table VIII-1 presents pertinent acreage data for each of the seven public use areas.

TABLE VIII-1

ACRES AVAILABLE IN PUBLIC USE AREAS

Public Use Areas	Project lands	Specific Rec. Lands	Total
Culp Branch Park	230	201	431
Pecan Creek Park	31	17	48
Johnson Branch Park	759	755	1,514
Buck Creek Park	5	6	11
Jordan Park	407	70	477
Isle duBois Park	525	872	1,397
Pond Creek Access Area	20	0	20
TOTAL	1,977	1,921	3,898

8-08. Hiking trails. - Since many areas within the project are well suited for nature study, plant and animal photography, and primitive camping, a system of hiking and nature trails are planned to provide access to these areas. The proposed locations of the hiking trails are shown on Plate VIII-1. The final location of the hiking trails will be determined by district and project personnel in the field.

8-09. Marinas. - Sites suitable for the development of marina facilities (both wet and dry storage) have been located in Isle duBois and Johnson Branch Parks. The size and scope of the marinas will vary according to the requirements of the area and the physical limitations of each specific site location. A boat storage capacity of 200 is generally considered the minimum size for which a reasonable economic return can be realized. This can be accomplished with a combination of wet and dry storage facilities. Initial development plans do not call for the implementation of any wet storage marina facilities in either Isle duBois or Johnson Branch Parks, however, both sites as identified on plate VII-2 could be used for such use if future demands warrant marina development. Initial development of approximately 120 dry storage boat stalls in Isle duBois Park are planned. Consideration will be given to additional marina concessions if demand for additional boat storage facilities is determined, and a suitable site is selected. If during preimpoundment construction activities the need exists for random fill excavation, consideration should be given to locate such excavation in an area which could ultimately be used as a marina site.

8-10. Administration and Maintenance Building. - A site has been selected for the administration and maintenance building on the east abutment, approximately 1,600 feet from the start of the main embankment. In light of the present intent of the Texas Parks and Wildlife Department to operate and maintain all park areas and project lands, except for the embankment area, the need for a Corps of Engineers administration and maintenance building has been questioned. Provisions for a facility which will house a minimum staff and supplies is being considered. Location of such a facility will be determined at a later date.

Administration and maintenance buildings for park operations will be located in the Isle duBois and Johnson Branch Parks and will be staffed by Texas Parks and Wildlife Department personnel.

8-11. Visitors Overlook. - The visitors overlook facility will be located approximately 1,600 ft. northeast of the embankment. It will overlook the reservoir, outlet works tower, and embankment. Public toilet facilities will be nearby. The parking area for the overlook facility is to be located a short distance from the structure to encourage visitors to leave their automobiles to fully utilize the facilities.

8-12. Public Use Areas and Facility Development. - An analysis of the physical characteristics of the land adjacent to the project was made to identify appropriate uses of each site. The purpose of the analysis was to insure a rational mix and distribution of uses that best related to existing physical features, public user access, and potential economic return. The location of the parks is shown on Plate VIII-1.

a. Culp Branch Park (Plate VIII-2) - 431 Acres. - Culp Branch Park is located on the west end of the embankment, adjacent the spillway and relocated F.M. 455. Positive attributes include excellent accessibility from F.M. 455, and good physical size and views. However, such limiting factors as lack of tree cover, adverse subjectibility to lake level drawdowns, and a general lack of land form diversity will limit development to a relativily small day-use facility. This park is planned for future development with facilities consisting of picnic sites, group picnic shelter, playground, parking, and restrooms. Access will be fee controlled once developed.

b. Pond Creek Access Area (Plate VIII-1)- 20 Acres. - This area will be developed with a four lane boat launching ramp and vault toilet. Access will be provided by an existing county road. (Free access)

c. Pecan Creek Park (Plate VIII-3) 48 Acres. - Access to this park will be provided by relocated Road 3002, just off of Interstate 35. Initial development will be limited to a four lane boat launching ramp and vault toilet. Future development will consist of picnic sites, playground, and parking facilities. Access will be free.

d. Johnson Branch Park (Plates VIII 4 thru 12) 1514 Acres. - Access to Johnson Branch Park will be served by relocated road FM 3002. The park will have both high and low-use recreational areas. High use areas will be located primarily within the eastern portion of the park. Initial and future development for this area will consist of multi-use camping, screened shelters, picnic and group picnic areas, along with circulation roads, parking areas, waterborne toilets, swimming beach, trails, and four lane boat ramps. Plans for the development of a historical working farm complex to be developed by the Texas Parks and Wildlife Department are also being considered. Low use recreational areas will be located within the western portions of the park. Planned facility development will include hiking and interpretive trails, primitive camping areas, and vault toilets. The southern portion of the park will be set aside as a multi-use area for large group activities. Access will be by existing county roads, however will be controlled by park personnel on a reservation basis. Uses for this area might include Boy Scout Jamborees, general group gatherings, hiking, and nature study. Facility development will be limited to parking, bulk water station, and vault toilets. Future development along the western portion of the park

will consist of circulation roads, multi-use and group camping areas, and sanitary facilities. Should the need for additional boat storage facilities be needed on the project, a well suited cove within this area of the park (Plate VIII-10) has been selected for such use. Johnson Branch Park should provide a quality recreation experience for a broad range of recreational preferences. Access will be fee controlled.

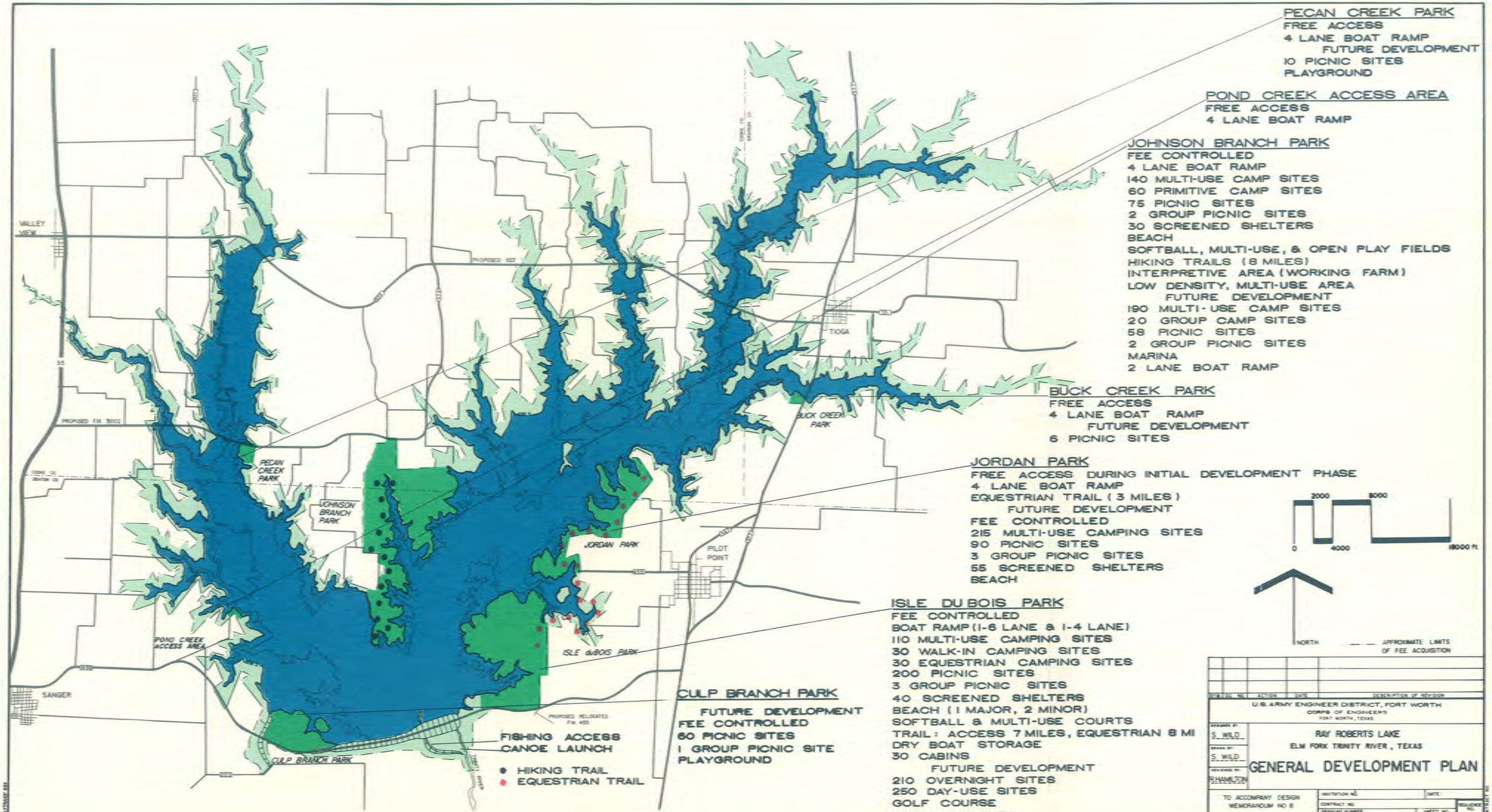
e. Buck Creek Park (Plate VIII-13) 11 Acres. - Access to this area will be provided by U. S. Highway 377. Initial development will be limited to a four lane boat launching ramp and sanitary facilities. There is a good variety of topography and vegetation which gives the potential for future development of day-use facilities. Access will be free.

f. Jordan Park (Plates VIII-14 thru 17) 477 Acres. - Access to Jordan Park will be from the existing F.M. 455 west of Pilot Point. Due to the areas outstanding land form, it will be suited for a variety of day and overnight uses. Initial development will be limited to a four lane boat ramp, vault toilets, and horseback riding. A staging area for horseback riders will be located in Isle duBois Park, where the trail will originate. Vehicular control measures will be implemented at this point to restrict off-road vehicles from entering the area. Future development will consist of circulation roads, parking areas, waterborne toilets, swimming beaches, camping and picnic sites, along with other facilities shown on plates VIII-15 thru 17. Access for initial development will be free.

g. Isle duBois Park (Plate VIII-18) 1397 Acres. - Isle duBois Park will be developed initially as a high-use recreational area with such facilities as camping and picnic sites, cabins, swimming beaches, boat ramps, marina, waterborne toilets, circulation roads, and other facilities as shown on plate VIII-18. The park is located east of the embankment with access from relocated F.M. 455. This will be a fee controlled park.

h. Wolf Island (Plate VIII-19) 50 Acres. - This island is located within the eastern arm of the lake. Access will be by boat only. Development will be limited to a short hiking trail and overlook. Recreational uses could consist of picnicking, hiking, and nature study.

i. Area Below Embankment (Plate VIII-20) - Portions of the area immediately below the embankment are proposed for low-density day-use activities. Recreational opportunities to be provided in this area will include a fishing access platform along the stilling basin with accompaning parking and sanitary facilities. A canoe launch facility will also be provided along the natural river of the Elm Fork. The canoe launch will serve as fishing, canoeing, and general recreation access to the Elm Fork River.



PECAN CREEK PARK
FREE ACCESS
4 LANE BOAT RAMP
FUTURE DEVELOPMENT
10 PICNIC SITES
PLAYGROUND

POND CREEK ACCESS AREA
FREE ACCESS
4 LANE BOAT RAMP

JOHNSON BRANCH PARK
FEE CONTROLLED
4 LANE BOAT RAMP
140 MULTI-USE CAMP SITES
60 PRIMITIVE CAMP SITES
75 PICNIC SITES
2 GROUP PICNIC SITES
30 SCREENED SHELTERS
BEACH
SOFTBALL, MULTI-USE, & OPEN PLAY FIELDS
HIKING TRAILS (8 MILES)
INTERPRETIVE AREA (WORKING FARM)
LOW DENSITY, MULTI-USE AREA
FUTURE DEVELOPMENT
190 MULTI-USE CAMP SITES
20 GROUP CAMP SITES
58 PICNIC SITES
2 GROUP PICNIC SITES
MARINA
2 LANE BOAT RAMP

BUCK CREEK PARK
FREE ACCESS
4 LANE BOAT RAMP
FUTURE DEVELOPMENT
6 PICNIC SITES

JORDAN PARK
FREE ACCESS DURING INITIAL DEVELOPMENT PHASE
4 LANE BOAT RAMP
EQUESTRIAN TRAIL (3 MILES)
FUTURE DEVELOPMENT
FEE CONTROLLED
215 MULTI-USE CAMPING SITES
90 PICNIC SITES
3 GROUP PICNIC SITES
55 SCREENED SHELTERS
BEACH

ISLE DU BOIS PARK
FEE CONTROLLED
BOAT RAMP (1-6 LANE & 1-4 LANE)
110 MULTI-USE CAMPING SITES
30 WALK-IN CAMPING SITES
30 EQUESTRIAN CAMPING SITES
200 PICNIC SITES
3 GROUP PICNIC SITES
40 SCREENED SHELTERS
BEACH (1 MAJOR, 2 MINOR)
SOFTBALL & MULTI-USE COURTS
TRAIL: ACCESS 7 MILES, EQUESTRIAN 8 MI
DRY BOAT STORAGE
30 CABINS
FUTURE DEVELOPMENT
210 OVERNIGHT SITES
250 DAY-USE SITES
GOLF COURSE
LODGE COMPLEX

CULP BRANCH PARK
FUTURE DEVELOPMENT
FEE CONTROLLED
60 PICNIC SITES
1 GROUP PICNIC SITE
PLAYGROUND

2000 8000
0 4000 18000 ft

NORTH

APPROXIMATE LIMITS OF FEE ACQUISITION

SYMBOL NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

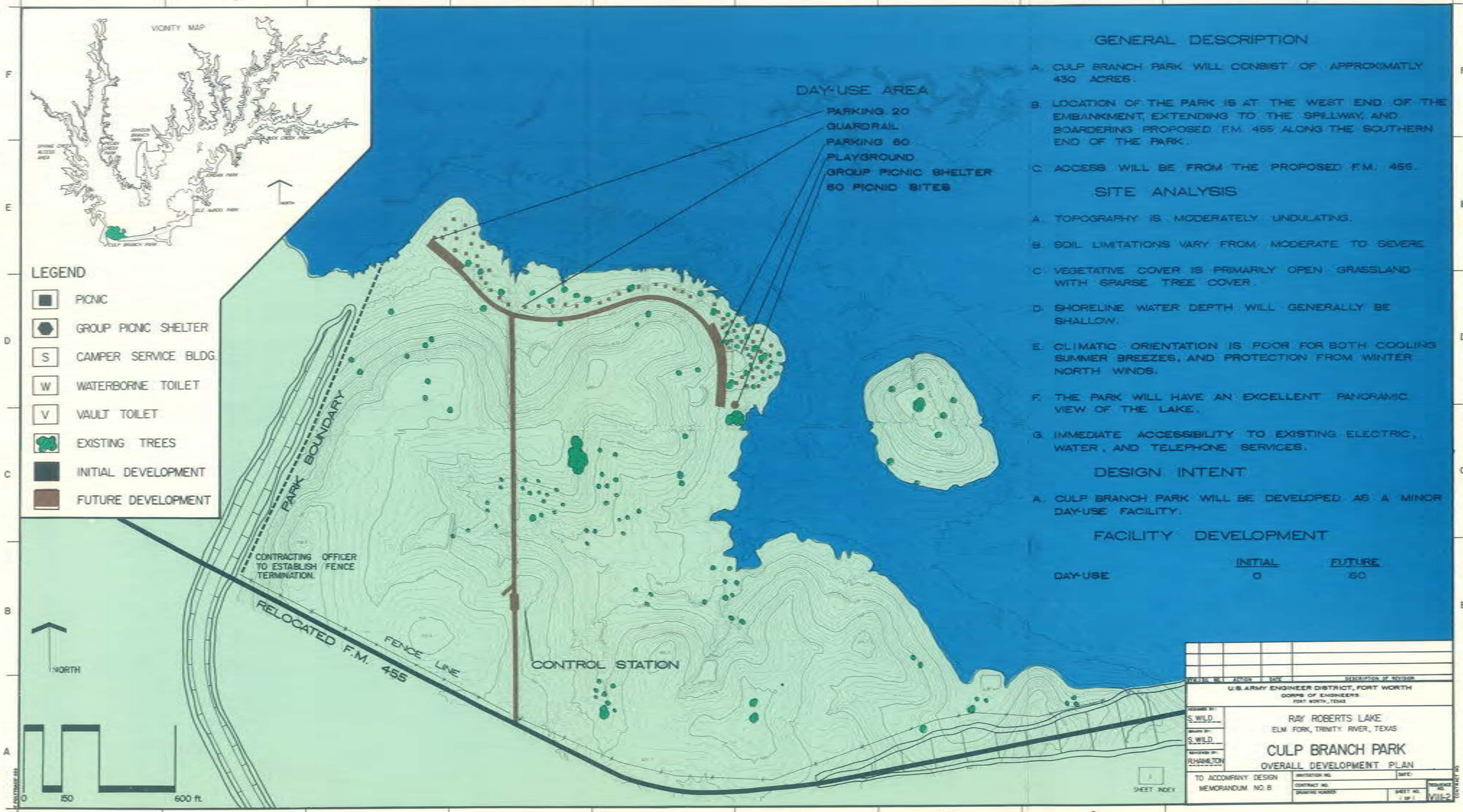
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: P. HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

GENERAL DEVELOPMENT PLAN

TO ACCOMPANY DESIGN MEMORANDUM NO 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 1 of 1
RESUBMIT NO.
VIII-1



GENERAL DESCRIPTION

A. CULP BRANCH PARK WILL CONSIST OF APPROXIMATLY 430 ACRES.

B. LOCATION OF THE PARK IS AT THE WEST END OF THE EMBANKMENT, EXTENDING TO THE SPILLWAY, AND BOARDERING PROPOSED F.M. 455 ALONG THE SOUTHERN END OF THE PARK.

C. ACCESS WILL BE FROM THE PROPOSED F.M. 455.

SITE ANALYSIS

A. TOPOGRAPHY IS MODERATELY UNDULATING.

B. SOIL LIMITATIONS VARY FROM MODERATE TO SEVERE.

C. VEGETATIVE COVER IS PRIMARILY OPEN GRASSLAND WITH SPARSE TREE COVER.

D. SHORELINE WATER DEPTH WILL GENERALLY BE SHALLOW.

E. CLIMATIC ORIENTATION IS POOR FOR BOTH COOLING SUMMER BREEZES, AND PROTECTION FROM WINTER NORTH WINDS.

F. THE PARK WILL HAVE AN EXCELLENT PANORAMIC VIEW OF THE LAKE.

G. IMMEDIATE ACCESSIBILITY TO EXISTING ELECTRIC, WATER, AND TELEPHONE SERVICES.

DESIGN INTENT

A. CULP BRANCH PARK WILL BE DEVELOPED AS A MINOR DAY-USE FACILITY.

FACILITY DEVELOPMENT

	INITIAL	FUTURE
DAY-USE	0	60

REVISION NO.	APPROV.	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

CULP BRANCH PARK
OVERALL DEVELOPMENT PLAN

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 OF 1 | DRAWING NO. WIL-2

IX - FACILITY LOAD AND OTHER DESIGN CRITERIA

9-01. General. - The purpose of establishing design criteria is to provide guidelines for insuring that the public is provided with a safe, high quality recreation development that will enhance their outdoor experience and minimize the damage to the environment. Because each project has different site characteristics, design criteria that are appropriate in one situation may not apply to another. Therefore, determination of design criteria and facility load has been based on analysis of each situation in regard to its particular requirements and characteristics. Engineering design of the recreation facilities will be in accordance with Texas Parks and Wildlife Department Recreation Facility Guidelines unless exceeded by Corps criteria outlined in ER 1110-2-400, 1120-2-400, 1130-2-400, 1165-2-400, EM 1110-2-400, 1110-2-410, & TM 5-822-2.

At the time of the preparation of the master plan document, the intent of all concerned parties was to have the Corps of Engineers prepare plans and specifications and administer construction of all park areas at the project, with review by the cities of Dallas and Denton and the Texas Parks and Wildlife Department. Should the Texas Parks and Wildlife Department choose to do their own design and construction, then the Corps reserves the right to review and approve all plans and specs prior to construction. In either case, during the construction phase TPWD will provide construction management and review personnel to assist in the inspection of all recreational construction activities.

9-02. Architectural theme. All facilities for public use, including those constructed by concessionaires, will follow a common design theme for continuity and unity. The theme for Ray Roberts Lake will be one of functional utility and esthetic harmony with the area. The architecture which has been introduced into this natural environment is a simplistic statement of function, structure, and geometry to compliment rather than compete with the site. The architectural elements comprise a minute portion of the bigger picture of this very large natural setting. For that reason, it was felt that the natural setting would provide the excitement of and introduction to the site and the architectural elements would function in a supportive capacity. An architectural theme has been established in DM No. 6, Appendix 1, however, the Texas Parks and Wildlife Department has requested that they be given the opportunity to alter the theme established in this DM. Any changes made to the architectural theme for recreation facilities will be handled by a supplement to DM No 6, and will be subject to approval by the Corps and the projects' local sponsors.

9-03. Siting. - All facilities have been sited to take advantage of natural vegetation, topography, and other environmental features. Purely functional structures such as comfort stations have been sited for maximum convenience without being physically and visually obtrusive, while other structures such as overlooks, and pavillions have been designed and sited to take advantage of views and to become visual and physical focals. Siting and general alignment of major structures, roads and facilities have been developed based upon

desirable design criteria and preliminary field siting. More detailed surveys will be required for certain areas prior to preparation of plans and specifications. Changes in road alignments and siting of facilities may be necessary to preserve vegetation, wildlife, archeological and environmental features. Due to the terrain and vegetation, trails are schematic and will require further study and evaluation during preparation of the Feature Design Memorandum for recreation facilities. Actual alignment of trails will be sited in the field to insure maximum advantage of views, vegetation, and topographic features, and to provide a varied recreational experience. Such field work will be accomplished by Corps and Texas Parks & Wildlife Department personnel.

9-04. Water system. - Water service will be connected to existing municipal transmission mains wherever possible. At this time however, this appears only possible in Culp Branch Park. Distribution and service lines will be sized to accommodate the facilities and anticipated ultimate use. If municipal water is not available at the time of construction, potable water in each public use area will be provided from water wells. All facilities for water supply and public use will be coordinated with the Texas State Department of Health according to their general type and location. These facilities should be designed in accordance with EM 1110-2-4201 and should meet the standards required by Federal, State, and local laws. Arrangements will be made with the cities of Dallas and Denton for the withdrawal of water from the reservoir by TPWD for potable water or irrigation purposes.

9-05. Sewage treatment and disposal. - At present, biological sewage treatment plants are proposed to process the sewage generated by the waterborne toilets, service buildings, change shelters, and sanitary dump stations. Other elements included in this treatment system will be lift stations, manholes, collector lines, effluent discharge lines, and electric service lines. At the time of construction, the various systems will be investigated to develop a concept for sewage treatment facilities based upon the best available, practicable, and economical treatment and disposal system that meets Federal, State, and local requirements. Specific guidance is presented in applicable portions of TM-5-814-3, in the USPHS manual, "Septic Tank Practices," and in the Texas State Department of Health manual, "Rules and Regulations Public Waterworks Projects." Reference should also be made to the Federal Water Pollution Control Act of 1972 (Public Law 92-500).

9-06. Electric supply. - Lighting will be provided for personal safety, security of property, and aesthetic enhancement. A minimal outdoor lighting system will be installed to provide a low level of illumination in keeping with the natural, rural nature of the park and will be used to focus on primary destinations and to reinforce circulation systems. The lake area will be served by the Denton County Electric Cooperative, Inc. and Community Public Service Company. The power lines can be extended as required for project needs. All power lines in all major recreation sites will be placed underground unless special conditions make such an installation impracticable. The design and construction of any electrical facility will conform to the companies' standards and will comply with Government codes.

9-07. Roads - Existing State and County roads which provide access to the various park sites will be used whenever practicable. In addition, the State and County will be encouraged to continually improve existing roads that provide access to the project. Circulation roads will be constructed to provide 2-way transportation within park boundaries. Those roads will be paved (except where noted ('gravel') and shall be 20 feet wide with 2 foot shoulders. Loop roads as found in camping and picnic areas will be 2-way, 18 feet wide and have 2 foot shoulders. Maximum design speeds on the major access roads will vary from 25 to 30 mph and on loop roads will vary from 15 to 20 mph; variations are due to road conditions, type of use, and potential hazards. All roads will be aligned to save the greatest amount of existing vegetation and to minimize scarring of the land while providing for the maximum sight distance. Surface runoff will be adequately controlled by grade, ditches, and drainage structures; flume downdrains will be used to guard against the formation of tunnels or channels. Culverts or bridges will control cross drainage. They will be located as required and sized in accordance with current Texas culvert practices. Barriers will be installed to prevent vehicles from going off the travelway and will generally be constructed of natural materials such as large rocks, timber, and logs. Cut and fill slopes will be rounded where this will not destroy existing vegetation or rock formations, or create drainage problems. Additional guidance for the planning and design criteria of access park and service roads is presented in ER 1110-2-400.

9-08. Parking.

a. Parking systems. - Two different systems of parking will be used at the project. Parking areas for boat launching ramps, restrooms, swimming beaches, and marinas will employ large numbers of concentrated parking spaces due to the anticipated public use. Occasional plantings will interrupt the broad expanse of paving. The second system will use single parking spaces which are skewed parallel or perpendicular to circulation and loop roads.

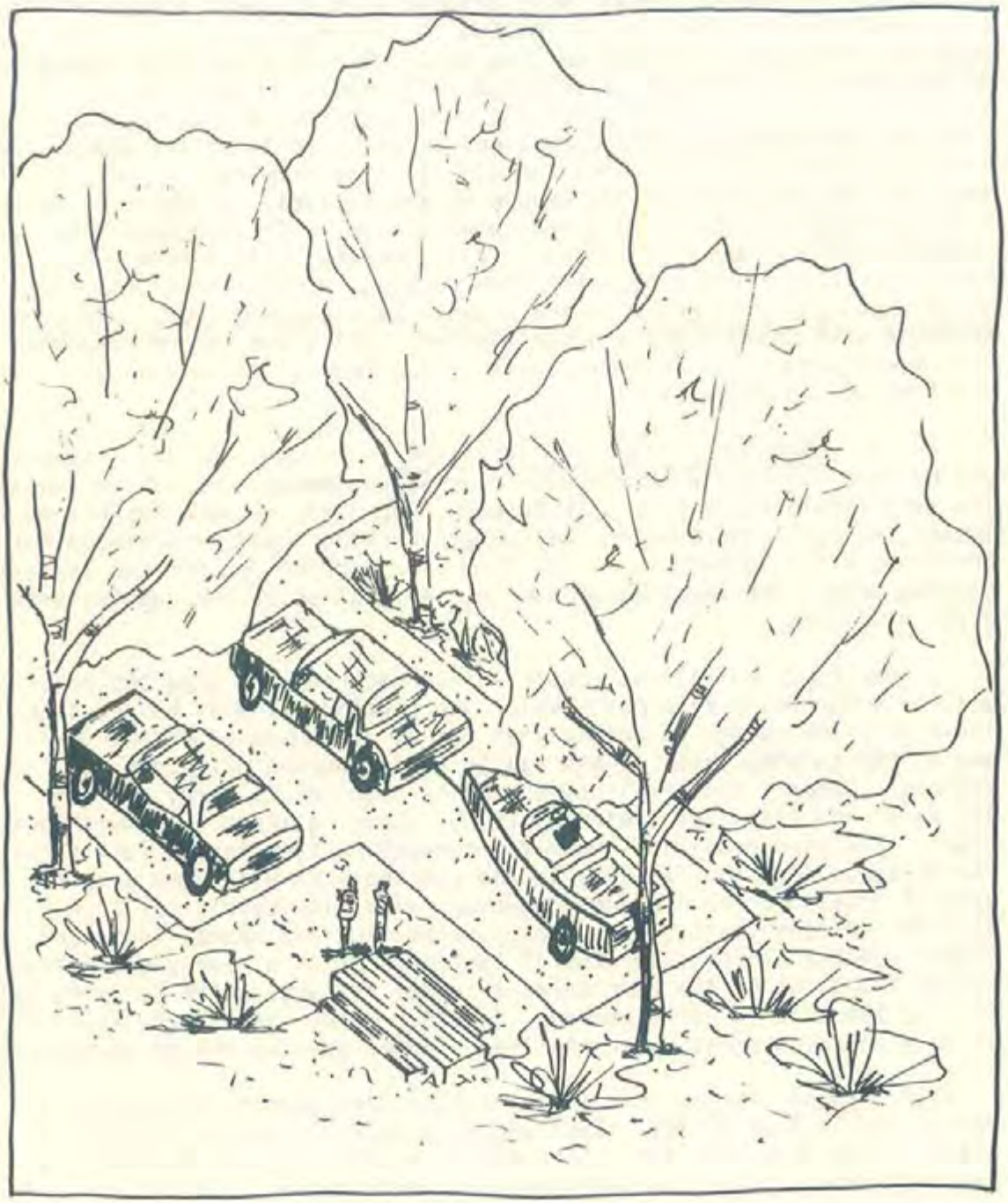
b. Parking spaces. - The parking areas will be sited in such a manner as to be in harmony with the environment as much as possible. In addition, parking areas will be designed to avoid vehicular backing onto heavily traveled access roads. Parking facilities for vehicles pulling trailers at boat ramps should be pull through type parking. The spaces should be 10 feet wide by 42 feet long. The angle of the parking may vary to suit existing conditions but it should be remembered that all inside turning radii should be a minimum of 15 feet. A car-trailer parking space of 10 feet by 55 feet will be provided for each "stub-out" type camping site. Camping loop roads which are not heavily tree covered will have a double stub-out for every fifth camping space. (See Figure IX-1) Loop roads which are heavily wooded will be provided with off-road head-in parking spaces of five car capacity each, as shown on plan drawings. These areas will not have any double stub-outs. This procedure is felt to have a reduced impact on the amount of tree removal required within each camping site location. All parking areas will be paved unless otherwise noted 'gravel'. Guidelines contained in EM 1110-2-410 should be followed whenever practicle.

9-09. Boat launching ramps and courtesy docks. - Boat launching ramps will be 14 feet wide or multiples thereof, with the length governed by the slope of the land and estimated water level fluctuations. The upper and lower vertical limits and the slope of the ramps will be in accordance with paragraph 3a of Appendix A of EM 1110-2-400 wherever practicable. Boat ramps will be constructed of concrete according to approved plans and will be located so as to minimize hazards to boating operations. Ramps will be provided with riprap protection as required. Boat ramps will be designed in such a manner as to require deliberate maneuvering to access the ramp from the road. This is done to reduce the hazard of accidental entry into the lake. Courtesy docks will be provided at all boat launching ramps whenever possible. Due to the anticipated severity of lake level drawdown, special design considerations may have to be given to courtesy docks at certain boat ramp locations. A TPWD designed, tract-rail dock system will be considered as a solution to the extreme drawdown conditions. The minumum design capacity requirement for a courtesy dock is an expected 60 boat launchings per normal weekend day.

9-10. Marinas.- Marina sites have been located in Isle duBois and Johnson Branch Parks on a future development, or as needed basis. All marinas should be no less than 200 boat storage capacity. Because of the expected high fluctuations in lake levels and its effect of reducing the boat storage capacity, it will be necessary to consider alternate means of boat storage services. One such alternative would be dry storage facilities. Traditionally, dry storage facilities have had a high potential of becoming 'eye-sores' due to the often chaotic and unkept manner in which they are often operated. To minimize the potential for such operations, it is suggested that dry storage facilities be contained within a large building in which boats are stacked in individual stalls. Boats can then be removed by a forklift and placed in the water by means of a rail launching system. This type of dry storage operation could be used in conjunction with a relatively small wet-slip storage facility to meet the boat storage demands of the project and also be large enough to enable a reasonable economic return. Dry storage facilities will be sited in Isle duBois Park as part of initial development plans.

9-11. Camping units. - Camping facilities for an initial design day load of 30,050 will be provided. All initial camping sites will be located in Johnson Branch and Isle duBois Parks. Water and sanitary facilities will be provided for within close proximity of each site. Primitive camping sites will be provided with composting type toilets only. The types of camping facilities to be provided are discussed below.

a. Multi-use camping. - Multi-use camping sites are intended for use by visitors with travel trailers, recreation vehicles, pop-up trailers, pick-up campers or tents. These sites will include a paved pull-through loop or back-in parking. On camping loop roads, pull-through and back-in stalls can be mixed, but back-in stalls should be carefully planned and designed to facilitate ease of backing a trailer from the blind right side. Both pull-through and back-in stalls should be orientated so as to have the picnic table and accompanying



TYPICAL DOUBLE STUB-OUT

FIGURE IX-1

facilities on the passenger side of the vehicle and orientated away from the road. Sites should be no closer to each other than 100 ft. on center. A cleared, level, well-drained area at least 12' by 18' in size should be provided and designated at each multi-use site to be used as a tent pad. If such an area does not exist, the site should be modified or a tent pad constructed. The angle the parking pad makes with the road should generally be between 40° and 60° or as close to this range as site conditions permit. In locations where site conditions will not allow for a 55 foot parking pad, a parking area for side-by-side parking should be substituted. If there is no natural shade provided to a given camping site, a shelter should be constructed over the picnic table. All campsites will have a picnic table over a concrete pad, waist high barbeque stove, electrical and water hook-ups, pitt grill, & trash can. Each camping loop, will have a restroom with showers and a group shelter. All sites, where feasible, will meet handicapped design criteria. See Chapter XI on Special Problems and Considerations.

b. Hike-in or Primitive Campsites. - These sites are intended for use by park visitors with portable camping equipment. Primitive campsites can vary considerably from park to park, depending on such factors as the intent, resource and funding available. Parking shall be provided for the primitive sites, generally in the form of a parking lot for the overall camping area. The location of the lot in relation to the camping area or areas will vary.

A user capacity will be specified for each camping area and this will be enforced by park personnel. The parking lot will be sized to serve only the number of people that can be accommodated on the trail and in the camping areas. This can be varied during different seasons. Campers and trail users will be required to carry in their own water and carry out their own trash. Camping areas in remote locations, will have provisions made for composting type toilet facilities. The distance from the facility to the camping area will vary with the ease of access for maintenance, however, with site conditions such as environmental sensitivity, topography, vegetation and nearby resources. A higher density can be tolerated if the focus is on a nearby attractive resource and not on the camping experience, as long as the carrying capacity of the site is not exceeded. In other areas, especially where there is only sparse understory vegetation, a lower density may be necessary.

9-12. Picnic Units. - Initial facility development is based on a design day load of 30,050. Each picnic site will consist of a table (steel frame with wood top & benches) on a concrete pad, a waist high barbecue stove, trash can, and shelters where needed. Picnic units will generally be clustered along the shoreline, no closer than 50 feet apart, whenever possible. Each picnic cluster will be serviced by a centrally located restroom and parking facility. Restroom facilities should be located so that they are generally no more than 600 feet from the picnic sites.

9-13. Group shelters. - Group shelters will be located in both day-use and over-night camping areas. Within day-use areas the group shelters will generally be entermixed within picnic sites. Restroom and

drinking water facilities should not be any more than 150 feet from the shelter. Unless otherwise noted on plan drawings, all shelters will be of an eight table capacity. Group shelters within camping areas will be centrally located within the camping loop. All shelters will consist of a concrete pad, large barbecue stove, and trash receptacles. Shelters within camping areas will be equipped with electric outlets and lighting.

9-14. Swimming areas. - Swimming areas will be provided at most public use areas. Permanent restrooms with change shelters will be provided at locations above the 5-year flood pool. Isle duBois and Johnson Branch Parks will have formal beach areas complete with food concessions, change houses, sheltered picnic sites, grassed beaches with landscaped surroundings, playgrounds, and buoyed swimming areas. Buoys will be placed to delineate swimming areas. Beaches shall be graded to a maximum of 15% slope, 5 to 10% is ideal. Excavation of the Johnson Branch, Jordan, and Isle duBois Park beach will be required to insure safe & continual summer swimming.

9-15. Playground facilities. - Playground lots will be considered at some of the large campgrounds and next to formal beaches. Equipment will be constructed of durable woods and materials which are native to the are or blend with the surrounding landscape. Playground equipment will be designed for durability and safety, and will be vandal-resistant.

9-16. Trails and pathways. - Trails and pathways will be designed to provide maximum circulation efficiency and visitor convenience and to protect the aesthetic and ecological qualities of the area. Switchbacks will be avoided wherever possible. Directional signs will be provided at trail junctions and trail markers will be provided as required on longer trails. Earthwork will be minimized, as will clearing of the natural vegetation except where required for fire reduction. Drainage will be provided. Water bars and ditches will be used where necessary to divert periodic rainflows which would otherwise flow down the trails causing erosion problems. Bollards will be removable to permit passage of fire fighting equipment. The basic types of trails and the pathways which will be used are described below:

a. Hiking and backpacking trails. - These trails offer the user a natural hiking experience and usually provide foot access to primitive campsites, remote bank fishing, and generally scenic areas. Traffic on these trails is usually low volume and the trails should be located so that their construction and use create minimum environmental impact. These trails will be constructed to provide a clear tread width of two to four feet and an eight foot high clearance. Judgement should however be used by the contracting officer not to destroy unique or aesthetic vegetation in any attempt to meet such clearances. Selective clearing of trees and vegetation may be required to create the best views possible for overlook areas. Trail base shall be existing natural material when desirable. Other surface types allowable are soil, turf, crushed limestone or crushed iron ore (3" crowned and packed), crushed granite (3" crowned and packed), wood chips (crowned and packed), stabilized earth (crowned and packed), or gravel, assuming

they are visually compatible with the surrounding environment. If pea gravel is used, it should only be in amounts that can be packed into existing surface.

b. Nature/interpretive trails. - These trails provide the user with opportunities to walk and study interesting or unusual natural features at their leisure. The trails are generally short-to-moderate in length and will have informational stops to explain points of interest. Trails will generally follow a short, closed loop design, beginning and ending at approximately the same location. They will be cleared and graded to a width of five feet, with an eight foot high clearance. Sustained grade to be under ten percent. The interpretive trail at Johnson Branch Park will be approximately one mile in length. The trail layout will be accomplished by Corps and project sponsor personnel. Monies will be set aside for the contracting of an interpretive study and writing of a script. See Figure IX-2.

c. Pathways. - Within intensively used recreation areas, pathways will be constructed to concentrate foot traffic in specific areas. This will reduce trampling of the natural vegetation and will provide efficient circulation routes. Pathways will lead from the parking lots to picnic areas and beaches. They will also connect campsites with restrooms. Pathways will be 5 feet wide with a stabilized aggregate or asphalt surface.

d. Equestrian trails. - Equestrain trails can be expected to cause environmental problems such as increased erosion and destruction of vegetation. These impacts should be carefully considered when locating and designing facilities. In most cases, equestrian trails are incompatible with any of the other trail types discussed and should be designed so as not to conflict with them.

The surface of equestrian trails shall be formed of compacted materials, resistant to normal use and erosion, usable when wet and not dusty when dry. If possible, use of existing natural material or grass is preferred. Erosion control and stabilization shall be given a high priority in the design and construction of these trails and vegetation growth should be encouraged as much as possible to stabilize all areas adjacent to the trail not receiving direct foot traffic.

Where not restricted by space or conflicting uses, designated trails should not be used. This will incourage horseback riders to utilize more of the available lands, resulting in an improvement in the overall recreation experience and reducing the potential for serious errosion which is often the result of heavily used trails. The majority of Jordan Park is well suited for the undesignated trail concept. Although plate VII-14 shows a designated trail throughout Jordan Park this should be viewed as conceptual in nature with project personnel field siting the trail where necessary.

Although no maximum trail length is specified, a trail 8 to 20 miles long is desirable. Rest areas are generally recommended every 5 to 10 miles or at major vistas or scenic areas, but located so as not to result in degradation of the scenic resource or adjacent areas.

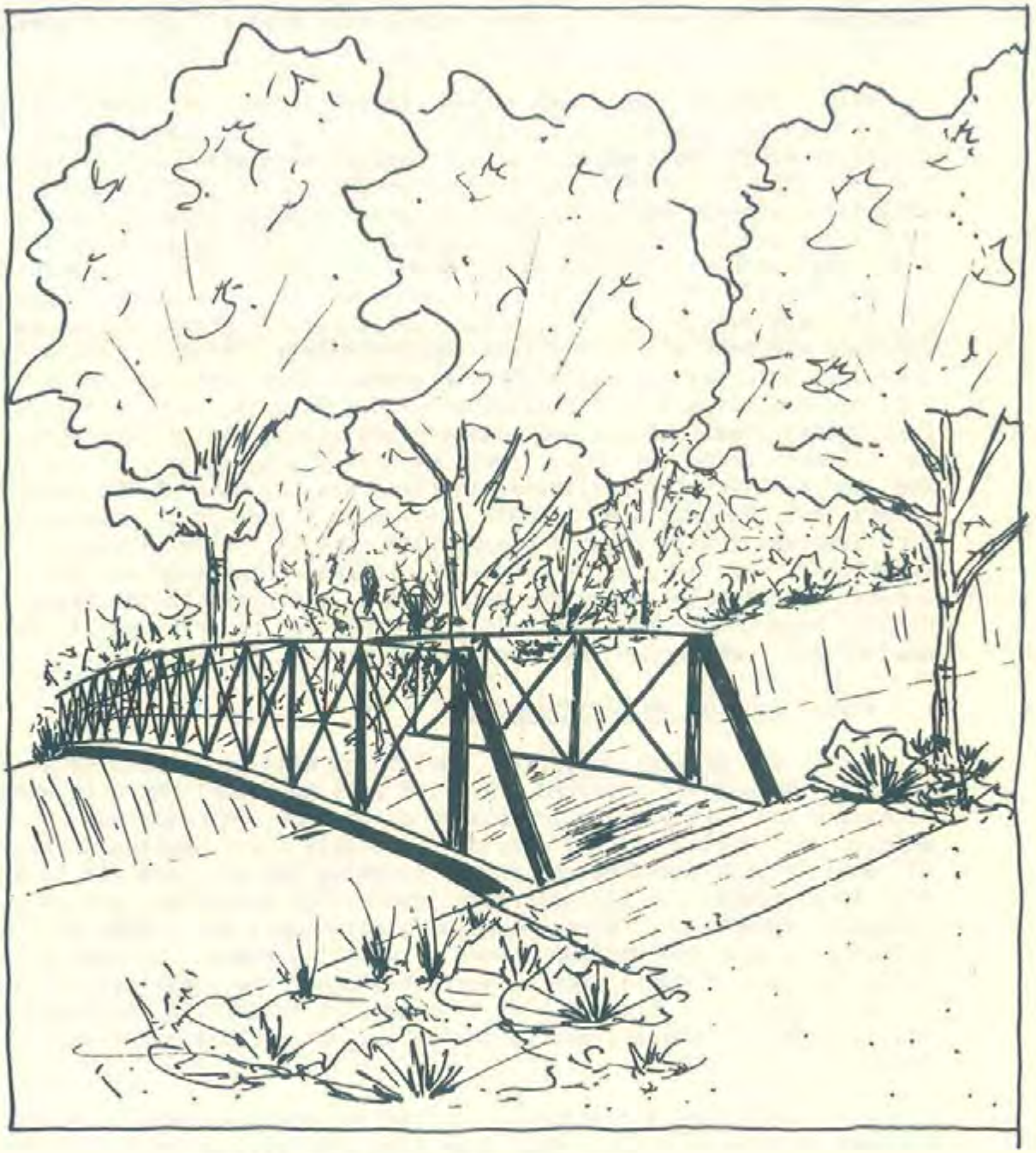
9-17. Trail bridges. - Foot bridges will be required in several of the recreation areas. They will be either custom built or prefabricated. They will be a clear span design with all metal framework to lessen maintenance. See figure IX-3.

9-18. Bicycle access and paths. Statewide outdoor recreation demand by activity as reported in the 1980 Texas Outdoor Recreation Plan, ranks bicycling as the most popular of all outdoor recreation activities during the year 1985 thru 2000. Due to the current and projected popularity of bicycling, efforts should be taken to provide paved bicycle paths within park areas and to incourage the adaptation of existing and proposed relocated roads within the project area to facilitate safe and convenient bicycle travel. The TPWD currently has plans to construct a paved bicycle path within Isle duBois Park which will originate at the park entrance and loop within the park (approximately 3 miles), providing access to most day and overnight use areas. Such paths should be a 6 foot paved section 1 foot shoulders (with a 2% cross slope within a 8 foot graded area). State and county roads around the project area, particularly relocated roads, could be easily adapted with proper signage and lane markings to facilitate bicycle travel as most of the major road relocations (FM 455, 922, & 3002) will have 8 foot paved shoulders. Such adaptation will require cooperation from the State Highway Department. As the project progresses towards completion and when local demands for bicycle access are better know, contact with the State Highway Department should be made to arrange for bicycle traffic on appropriate roads around the project area.

9-19. Grading and landscaping.

a. Grading criteria. Facilities will be located so as to minimize the grading required. Grading will be undertaken only where necessary to: (1) provide acceptable grades for vehicular and pedestrian circulation, (2) provide reasonably level parking areas, (3) provide boat launches and formal swimming beaches, and (4) to provide level foundation for restrooms, concession buildings, and other permanent structures. Where necessary, alignments and grades will be selected to save the maximum number of existing trees. Grading criteria for each of these uses is described under the individual design criteria sections. Grading will also be used in certain locations to create berms for privacy and to screen out undesirable views and noises.

b. Planting criteria. - Planting has been primarily considered on a large scale. Mass tree plantings will be made in several of the camping areas with sparse tree cover. Activity areas such as campgrounds, beaches, and picnic areas will be buffered from parking lots and roads by mass plantings of primarily native trees. Wherever possible, facilities have been sited to take advantage of existing vegetation for screening or aesthetic purposes. Trees will be saved to the maximum extent possible. Trees will be preserved in parking lots by use of tree wells (above grade), meeting the existing grade with the paved surface, or leaving unpaved islands around the trees. Major native tree species used in mass plantings will be post oak, cedar elm, eastern red cedar, red bud, and roughleaf dogwood for upland



TYPICAL BRIDGE FOR TRAIL CROSSING

FIGURE IX-2

areas. Trees for areas near the reservoir would include green ash, red oak, american elm, eastern cottonwood, and eastern red cedar. Turf for parking areas, playgrounds, and landscaping of buildings will consist of species of grass which are drought tolerant, traffic resistant, and blend with the natural surroundings. Indian grass, little bluestem, bushy bluestem, and buffalo grass are well suited for these purposes.

9-20. Signs and interpretive guidance. - The objectives of a sign and interpretive guidance program at Ray Roberts Lake will be to provide appropriate signs, markers, and displays for the proper protection and administration of the project resources and to guide, inform, educate, and protect the visiting public. Recognition will be given to each agency who was responsible for the construction of each given park area. Signs, markers, and displays needed to accomplish these objectives will be developed and placed in accordance with instructions outlined in EM 1110-2-400, ER 1110-2-400, ER 1130-2-400, Handbook on Signs issued by the Southwestern Division, Corps of Engineers, and TPWD signing procedures. All construction and implementation of park signage other than entrance portal and Corps & local sponsor recognitiion signs will be the responsibility of TPWD. Concepts for signs are displayed in DM No. 7 (Revised).

a. Interpretive signs. - Low, unobtrusive, and approximately 2 feet high, interpretive signs will have plaques varying in size with the type and amount of information to be conveyed. The sign plaque will be placed at a 45° angle from vertical. Interpretive signs will be located primarily along hiking trails where the major purpose of the trail is hiking, but an occasional interpretive plaque would be helpful in describing a view, rock outcrop, or other natural features. Interpretive concepts, methods and signs will be designed and developed by the Texas Parks and Wildlife Department.

g. Fishing and hunting. - Fishing and hunting on Government-owned lands and water will be in accordance with applicable Federal, State and local laws; enforcement will be the responsibility of Federal and State agencies. In addition, fishing and hunting will be in accordance with the project land and water zoning plan. Reservoir managers should refer to SWDR 1130-2-100 and Title 36 for guidance.

h. Interim use. - Lands not required for immediate or near-future use for public use, fish and wildlife, and project operations may be leased for nonprofit group activities and grazing purposes, may be designated for hunting, or may be left idle for soil restoration through native plant succession. Grazing will be used as a management tool.

i. Archeological and historical. - Any further investigations concerning the archeological and historical resources of the project will be administered under the authority of Public Law 93-291 and EP 405-1-2.

j. Protection of biological resources of project lands and waters. - A biological management program is planned for the purpose of deriving maximum benefits from the project resources, while still preserving them for future generations. The Corps of Engineers will solicit the assistance of and coordinate the efforts of the US Public Health Service, the Texas Parks and Wildlife Department, and the Texas Department of Health in the implementation of this program.

k. Shoreline erosion - It will be the responsibility of the Texas Parks and Wildlife Department to control any shoreline erosion problems within park areas which might ultimately threaten recreation facility development, boundary fencing, or recreational use areas. Shoreline erosion outside of park areas will be controlled with the assistance of the Corps of Engineers in the event that such erosion threatens to undermine boundary fencing.

11-05. Visitor and facility protection.

a. Law enforcement. - Enforcement of civil and criminal laws at the reservoir will remain the responsibility of duly constituted offices of Federal, State, and local governmental agencies. The Corps of Engineers, through field personnel, will cooperate fully with all law enforcement 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 covers refuse dumping and the provisions of Title 36 only. The policy of the Corps of Engineers regarding law enforcement is contained in ER 190-2-3.

b. Pest control. - Insecticides, herbicides, and other chemicals may be used to control insects, weeds, and other pests which may be harmful to the health and safety of the public or detrimental to the natural features of the project when they cannot be controlled by other methods. The use of biological or mechanical control other than chemical pesticides is encouraged where practicable and where such methods will not prove harmful to the ecosystems. All spraying and control activities will be coordinated through the Fort Worth District biologist and local and county health officials. ER 1130-2-232 (Pest Control Program for Civil Works Projects) and instructions on the labels will be followed when using and handling all pesticides, insecticides and other chemicals.

c. Pollution control. - The control of air and water pollution and solid waste disposal shall be in accordance with Executive Order No. 11507 on Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities, and the Executive Order dated 23 December 1970 entitled Administration of Refuse Act Permit Program. All project personnel will maintain constant vigilance for sources of pollution to the reservoir and its stream tributaries. Guidance for this program is contained in ER 1165-2-116. Additional pollution control will be administered in accordance with ER 1130-2-400, EP 405-1-2, and the Operation and Maintenance Manual.

11-06. Health and safety.

a. Safety. - A comprehensive safety program will be developed for all project land and water areas. Chapter XIII presents general guidance for the safety program until such time as a project safety plan can be added to the master plan as an appendix.

b. Health and sanitation. - The development and use of the reservoir are planned for the public interest and the utmost consideration has been given to the maintenance of high standards of public health and safety. The State health laws, rules, and regulations are applicable to all facilities constructed and provided at the project. Commercial operators and licensees are also required to abide by the State health laws, rules, and regulations. Disposal of waste, trash, and debris will not be permitted on Government land without authorization, and then only in accordance with State laws and at designated locations.

c. Solid waste disposal. - All feasible solutions to solid waste disposal should be given thorough consideration, and studies should include discussions with the responsible local health officials. Solid waste disposal may be by contract with off-project sanitary collectors when such a method is economically and administratively feasible. Where practicable, arrangements should be made for disposal of solid wastes on nonproject lands. Where this is not feasible, disposal will be accomplished on the project by means of land fill in isolated areas or by incineration.

11-07. Boating.

a. General. - All boating activities will be in accordance with applicable State laws or acts covering boats, boating, and water safety, and SWDR 1130-2-7. Boaters will be required to comply with such laws and regulations. These boating laws and regulations will be posted at launching ramps, public use areas and the project office.

b. Mooring policy. - The mooring policy will be in accordance with the instructions presented in ER 1130-2-406 and SWDR 1130-2-7. In accordance with paragraph 17 of ER 1120-2-400 power boats should be accommodated in conjunction with the operation of any marina concession.

XII - FIRE PROTECTION

12-01. General. The primary responsibility for the preparation, administration, and implementation of a fire protection plan will be that of the Texas Parks and Wildlife Department with aid and cooperation from the Corps of Engineers. It should be finalized and submitted for approval by COE as soon as practicable, but no later than 3 years after the project becomes operational. The objectives of the plan are to prevent, detect, and suppress all unwanted fires that may occur on the project lands, or on adjacent lands from which they could spread to project lands.

12-02. Cooperative agreements. This plan will include or provide for cooperative agreements with State, County, and local agencies for mutual assistance in fire detection and suppression, training of personnel, procedures in case of fire, and provision for necessary equipment and tools to be readily available for prompt suppression activities.

12-03. Training. A training program for field personnel will be established when the project becomes operational. This training program will cover methods of fire prevention, safety characteristics and behavior, methods of attack, use of hand tools, and use of power equipment.

12-04. Equipment. Each project vehicle will carry fire tools at all times, with additional tools available at the project building. Power equipment specifically designed for suppression will be stored at the project building. All tools and equipment shall be checked and serviced at regular intervals to ensure serviceability.

12-05. Suppression and prevention. A public information program will be initiated to aid in the detection and reporting of fires. News releases, signs, and other means will gain the support of the general public, and will give information on how and where to report fires. High fire danger periods are broadcast daily by the area radio stations. During these time Corps or TPWD employees will periodically check high risk areas. The park manager will be responsible for the organization of firefighting crews. This will assure that every employee will have a specific duty during a fire. The primary means of communnication between park manager and firefighting crews will be by radio. Hand-carried radios will be of assistance on large fires and on those fires not accessible to vehicular mounted radios. Fire prevention signs with information about fire safety and reporting fires will be placed at the entrance to public use areas. Additional signs throughout the areas at places such as water wells, picnicking and camping sites, and stenciled fire prevention slogans on refuse containers will assist in promoting fire prevention. Any leases or contracts for use of project lands will contain fire prevention. Any leases or contracts for use of project lands will contain fire prevention and suppression clauses.

XV - FISH AND WILDLIFE, VEGETATIVE MANAGEMENT PLAN

15-01. General. The intent of this section is to present a conceptual plan for developing and managing fish and wildlife resources of the project. This plan will serve as a guide until more detailed management plans are developed. The broad objective of the fish and wild-life management plan is to conserve, maintain, or enhance fish and wildlife habitat on project lands in order to produce the greatest dividend for the benefit of the general public. Implementation of this plan will aid in achieving the goals of the Fish and Wildlife Coordination Act (PL 85-624).

15-02. Aministration of the Fish and Wildlife Management Plan. The Fort Worth District of the Corps of Engineers will assume the basic responsibility for developing and implementing a fish and wildlife management plan in consultation with the fish and wildlife agencies. The responsibility for managing resident fish and wildlife species is essentially that of the Texas Parks and Wildlife Department. The U.S. Fish and Wildlife Service also assumes a responsibility for management of those resources with particular emphasis on migratory bird species. In recognition of the above responsi-bilities. It is the Corps of Engineers policy to encourage these agencies to actively manage or participate in the management of fish and wildlife resources at this project.

15-03. Coordination with USFWS and TPWD. A summary of specific details of the State's 1982 recommendations are contained in Chapter VI (Coordination), of this Master Plan. Consideration has been given to each recommendation of the fish and wildlife agencies and some are proposed for implementation later in this Chapter. Various institutional constraints prevented incorporation of several of TPWD's recommendations into this master plan. Coordination will continue, however, during project construction and the Master Plan will be supplemented as necessary.

15-04. Fish and Wildlife Resources of the Project

a) Lands. - A total of 43,606 acres would be acquired in fee title for project purposes. An additional 4,960 acres which would be required for flowage easement will be acquired under the joint acquisition policy of the Department of Army and Interior for total project acquisition of 48,566. The conservation pool at elevation 632.5 would inundate 29,350 acres. About 325 acres would be required for the dam, spillway, roads, and project buildings. Lands specifically designated for recreation facilities development would total 4,645 acres. The remaining project lands, totaling 14,246 acres, will be designated low-density recreation/ wildlife areas and will be made available for such pursuits. Additionally, 8,350 acres between the conservation pool (ele. 632.5 ft msl) and the summer pool (ele 621.0 ft msl) will be seasonally available for wildlife management and compatible low-density recreation. Plate XV-1 presents existing lands uses available for wildlife management and low-density recreation. The grassland/pasture consists primarily of bermudagrass pasture with very little native grasslands. The woodland category consists of both an upland post oak association and bottom-land wooded associations.

b) Waters. - Although the conservation pool is designed at surface elevation 632.5 with a surface area of 29,350 acres, actual

operation of the reservoir in system with Lewisville Lake would maintain a smaller pool. Average monthly and average annual pool elevations would be at about elevation 621.0 feet msl and less with a resulting pool surface area of about 21,000 acres - therefore, on the average, the lake fishery provided would be about 21,000 surface acres. The conservation pool of 29,350 acres would be reached about once in five years.

In addition to the surface acreage provided by the reservoir, Ray Roberts Lake has the potential to provide an excellent stream fishery. Facilities development along the Elm Fork downstream of the dam will provide fisherman access to about eight miles of flowing stream within the Elm Fork Channel. Water supply and any future hydropower releases will average greater than 130 cfs and the local sponsors have assured that a maintenance low-flow will be provided when releases are not being made for other purposes. The combined effect of high average flows, guaranteed maintenance flows, and good fisherman access should assure an excellent stream fishery.

15-05. Wildlife Management Plan.

a) General. The primary objective of the wildlife management plan is to make desirable species more available for human use whether it is for study, esthetics, hunting, or photography. This objective will be met by protecting existing habitat, improving low quality habitat, and developing new habitat. All project lands mentioned above which are not within specific park areas are available for wildlife management. The wildlife management plan will be oriented towards the principal wildlife species indigenous to the region. The principal game animals occurring on project lands include bobwhite quail, mourning dove, fox squirrel, cottontail, raccoon, and waterfowl. The following management measures will be used in implementation of the wildlife management plan.

b) Woody Plantings. - The wildlife management plan will be oriented primarily toward the principal wildlife species indigenous to be region. The principle sporting animals occurring on project lands include bobwhite quail, mourning dove, fox squirrel, cottontail, and raccoon. With management measures directed toward those species the habitat potential for numerous non-game animals will also be improved.

The original woody cover of the transition areas between the bottomlands and uplands has been greatly altered within the project area. Broad, flat expanses of what was formerly diverse transitional woodlands between the pecan/elm bottoms and the post oak uplands is now in primarily bermuda pasture. In order to increase the diversity of food and cover for native wildlife species some woody planting will be made in the edge between existing pastures and upland post oak communities. Such plantings will not only serve to diversify food and cover over the short term, they will also accelerate successional return of the ecotone between habitat types. The plots of woody plantings will be relatively small but will be located in a number of areas within the the project lands.

Woody plantings will help to increase the carrying capacity of project lands to accommodate wildlife species displaced by inundation. After establishment, (2 to 3 years) little to no maintenance should be required. Over the project life these plantings should serve as a seed source to diversify the edge between habitats and benefit all wildlife species which

are dependent upon that interspersion. Costs of woody plantings will be a project expense since the plantings are considered necessary to assist in maintaining wildlife populations of the project area at present levels. Proposed locations for the plantings are displayed on Plate XV-2. With a total area of 100 acres, initial costs of the plantings are estimated at $32,000 for the plants and $600/acre for planting for a total of $92,000. All maintenance costs and supplemental planting costs will be the responsibility of the managing entity.

Plantings may be either in rows or motts of 1 to 10 acres depending upon soils, slope, and configuration of adjacent habitats. Preliminary cost estimates we based upon planting in association with food plot plantings described below. Slopes should not exceed 20% and plantings should be made between December and March prior to impoundment. Woody species recommended for planting are presented below.

WOODY PLANTINGS

Shrub Lespedeza	Lespedeza bicolor
Red Mulberry	Morus robra
Western Hackberry	Celtis reticulata
Persimmon	Diasporos Virginiana
Black D' Arc	Maclura pomitera
Pecan (native)	Carya Illinoensis
Black Walnut	Juglans nigra
Sumac, Flame Leaf	Rhus Copallina
Texas Sophora	Sophora affinis
Hawthorne (native)	Craetaegus viridis or spatulata
Youpon	Ilex vomitoria
Skunkbush	Rnus aromatica
Multiflora Rose	Rose multiflora

VINES

Fox Grape	Vitis labrusca
Mustang Grape	Vitis Candicans
Passion Flower	Passiflora incarta
Virginia Creeper	Parthenocissus quinquefolia
Dewberry, Blackberry	Rubus spp.
American Bittersweet	Gelastrus scandens

c) Food Plots. - As is the case with the woody plantings, seeding and planting of forbs and grasses will be accomplished to protect and restore wildlife populations of the project area. Much of the project area at and above the conservation pool elevation of 632.5 is presently in bermuda pasture and is of low value to game species or wildlife in general. In order to increase the carrying capacity of at least a portion of these areas to accommodate wildlife displaced by inundation, plantings of grasses and forbs with high food value will be made. Such plantings will help to maintain wildlife populations of the project area at close to present levels and also provide hunting opportunities. Wildlife food plots will be oriented toward bobwhite quail and mourning dove but will benefit all wildlife. Proposed food plot locations are depicted on Plate XV-2 and are primarily in open bermuda pasture near the conservation pool or adjacent to existing woodlands. Species recommended for food plots are presented on page XV-4.

WILDLIFE FOOD PLOTS

Leguminous Forbs

Partridge pea	*Cassia fasciculata*
Lespedezas (Sericea, Korean, Common)	*Lespedeza* spp.
Sweetclover	*Melilotus* spp.
Clovers (White, Crimson, Red)	*Trifolium* spp.

Other Forbs

Engelmann Daisy	*Engelmannia pinnatifida*
Sunflowers (Common, Maximilian)	*Helianthus* spp.

Grasses

Bluestem's (Big, Little)	*Andropogon* spp.
Kleingrass	*Panicum coloratum*
Switchgrass	*Panicum virgatum*
Dallisgrass	*Paspalum dilatatum*
Plains Bristlegrass	*Setaria leucopila*
Indiangrass	*Sorghastrum nutans*

Initial plantings of wildlife plots are considered to be a measure which will assist in maintaining wildlife populations at present levels and will therefore be a one-time project cost. Plantings of grasses will be in the spring months and legumes will be planted in the fall. Seeds will be either broadcast or drilled in alternating strips of grasses, forbs, and legumes. Each foodplot will be ½ to one acre in size for a total of 150 acres, and grouped at intervals within grass plantings in open portions of large bermuda pastures. Configuration of food plot plantings will be of such a nature as to facilitate man's use of game species such as morning dove. Initial planting, in addition to providing food and cover, will provide a seed source for the adjacent pasture lands. Initial cost of establishing food plots and grass plantings on a total of 1,000 acres is estimated at $500,000. This total cost includes, seed, fertilizer, plowing, disking, and labor. There could be a recurring annual cost to the managing entity, however, if they elect to diversify the plots with annuals (crops) of value to wildlife. Potential crops of value to the wildlife food plots are presented below.

Cultivated Crops

Oats	*Avena sativa*
Barley	*Hordeum vulgare*
Proso Millet	*Panicum miliaceum*
Milo, grain sorghum	*Sorghum vulgare*
Corn	*Zea mays*
Wheat	*Triticum aestivum*
Browntop Millet	*Brachiaria ramosa*

d) Other Wildlife Management Measures. - The primary management measure on project lands, other than parks or lands needed for other project purposes, will be to protect and maintain existing habitat. The majority of higher value habitats now occurs in and adjacent to upland woods and adjacent to streams subject to frequent overflow, and along fence

XVI - COST ESTIMATES

16-01. General.

Cost estimate. The estimated total cost for the construction of the proposed recreational facilities is $37,547,200 excluding engineering and design and supervision and administration. The recreational facilities will be constructed on a cost sharing basis as prescribed in Public Law 89-72. The cost estimates are based on 1982 price levels and from an abstract of bids for the construction of similar recreational facilities at other Corps of Engineers' lake projects. The estimated total costs for the proposed facilities are shown on Tables XVI-1, XVI-2, XVI-3, and XVI-4.

Comparison of Present Estimate of Cost With Latest Approved Estimate

A comparison of the present estimate of cost with the latest approved cost estimate (PB-3, based on 1973 GDM) for FY 82 effective 1 Oct is as follows: the increase in cost is due to design changes in camping and picnic units, underestimation of utility costs, additional line items not identified in GDM (playgrounds, ballfields, maintenance area, and headquarters building), changes in unit quantities of restrooms and change shelters, and changes in total miles of trail.

Acct Nos.	Item	In Thousands of Dollars Total Development Current Est.	Latest Approved PB3	Difference
01	Project Lands (acquired for rec)	4,820.0	6,228.0	- 1,408.0
03	Clearing, revegetation, fencing	5,041.1	5,318.0	- 267.9
14	Recreation Development (initial)	19,020.9 1/	13,617.0	+ 5,403.9
30	Engineering & Design	1,578.8	1,180.0	+ 398.8
31	Supervision & Administration	1,388.6	1,104.0	+ 284.6
14	Recreation Development (future)	18,526.3 1/	8,662.0	+ 9,864.3
30	Engineering & Design	1,537.7	710.0	+ 827.7
31	Supervision & Administration	1,352.4	644.0	+ 708.4

Note:

1/ Includes Contingencies

TABLE XVI-1
SUMMARY OF COST ESTIMATES BY
COST ACCOUNT NUMBERS

FACILITIES AND DEVELOPMENT
(CORPS, DALLAS, DENTON & TEXAS PARKS AND WILDLIFE DEPT. (TPWD))

ACCT. NO.	INITIAL DEVELOPMENT	AMOUNT (x 1000)
01	Specific recreation lands (see Tables XVI-15 & 16)	4,802.0 1/
03	Clearing, fencing & revegetation (see Table XVI-14)	5,041.1 2/
14	Recreation development (see Table XV1-2)	19,020.9 2/ 3/
30	Engineering and design	1,578.8
31	Supervision and administration	1,388.6
	TOTAL	31,831.4
	FUTURE DEVELOPMENT	
14	Recreation development (see Table XVI-2)	18,526.3 2/
30	Engineering & design	1,537.7
31	Supervision & administration	1,352.4
	TOTAL	21,416.4
	INITIAL & FUTURE DEVELOPMENT	
01	Specific recreation lands	4,802.1 1/
03	Clearing & fencing	3,159.1
14	Recreation development	37,547.2 2/
30	Engineering & design	3,116.5
31	Supervision & administration	2,741.0
	TOTAL	51,365.9 2/ 3/
	HISTORICAL AND ARCHEOLOGICAL PRESERVATION	
18	Cultural resources preservation	928.0
30	Engineering & design	845.0
31	Supervision & administration	69.0
	TOTAL	1,842.0

NOTES
1 Includes relocation assistance & administration costs
2 Includes contingencies
3 Includes prelim. estimate of costs from TPWD.

TABLE XVI-2
RECREATION FACILITIES
(COST SHARING FACILITIES)

	ACCOUNT NUMBER			
INITIAL DEV.	14	30	31	TOTAL(x 1000)
Corps, Dallas & Denton	8,370.9	694.8	611.1	9,676.8
Corps & TPWD	10,650.0	884.0	777.5	12,311.5 2/
TOTAL	19,020.9 1/	1,578.8	1,388.6	21,988.3 2/
FUTURE DEV.				
Corps, Dallas & Denton	12,233.3	1,015.4	893.0	14,141.7
Corps & TPWD	6,293.0	522.3	459.4	7,274.7 2/
TOTAL	18,526.3 1/	1,537.7	1,352.4	21,416.4 2/
INITIAL & FUTURE DEV.				
Corps, Dallas & Denton, TPWD				
TOTAL	37,547.2 1/	3,116.5	2,741.0	43,404.7

TABLE XVI-3
TPWD - ISLE duBOIS PARK
(INFORMATION FROM EXHIBIT NO. 1)

INITIAL DEV.	DEV. ELIGIBLE FOR FED. COST SHARING	NON-FED COSTS	TOTAL(x 1000)
Isle duBois Park	9,260.9	2,246.8	11,507.7
Contingencies	1,389.1	337.0	1,726.1
Engineering & design	884.0	214.5	1,098.4
Supervision & administration	777.5	188.6	966.1
TOTAL	12,311.5 2/	2,986.9 3/	15,298.3 2/
FUTURE DEVELOPMENT			
Isle duBois Park	5,472.1	3,963.0	9,435.1
Contingencies	820.8	594.4	1,415.2
Engineering & design	522.3	328.9	851.2
Supervision & administration	459.4	289.3	748.7
TOTAL	7,274.6 2/	5,175.6 3/	12,450.2 2/

NOTES

1 Includes contingencies
2 Preliminary estimate of cost for recreation facilities in Isle deBois, submitted by TPWD (see Exhibit No. 1 page XVI 25 for notes on cost estimate.)
3 See Exhibit No. 1 for non-Fed cost items.

TABLE XVI-4

SUMMARY OF ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATIONAL FACILITIES

Item	Unit	Initial Planned development		Future Planned development		Account 14 Total planned development	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile	5.4	777,600	5.0	720,000	10.4	1,497,600
b. Paved (new Secondary)	Mile	3.2	387,200	8.3	1,004,300	11.5	1,391,500
c. Gravel	Mile	0.1	9,800			0.1	9,800
2. Parking areas							
a. Paved (new)	S.Y.	25,377	317,222	61,523	769,046	86,900	1,086,268
b. Gravel	S.Y.	1,121	8,408	666	4,996	1,787	13,404
3. Boat launching sites							
a. Boat ramps (concrete)	Lanes	20	458,400	2	42,000	22	500,400
b. Turnarounds and trailer parking (paved)	S.Y.	9,910	123,875			9,910	123,875
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	6	294,000	1	49,000	7	343,000
b. Masonry double unit (waterborne)	Each	5	441,000	9	793,800	14	1,234,800
c. Composting	Each	5	100,000			5	100,000
5. Water supply system							
a. Water wells (pressure type)	Each	1	40,000	1	40,000	2	80,000
b. Water connect to co-op line	L.F.			19,312	81,306	19,312	81,306
c. Waterline extension	L.F.	20,030	84,326	11,625	48,941	31,655	133,267
d. Drinking fountains	Each	9	9,000	23	23,000	32	32,000
6. Picnic and camping units							
a. Unit consists of one table, shelter fireplace, and trashcan.	Each	70	315,000	252	1,134,000	322	1,449,000
b. Picnic tables (without shelter)	Each	145	319,000	397	873,400	542	1,192,400
c. Screened shelter	Each	30	270,000	55	495,000	85	765,000
d. Primitive camp	Each	35	25,550	25	18,250	60	43,800

TABLE XVI-4 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
7. Group Shelters	Each	5	161,500	18	581,400	23	742,900
8. Site improvement							
a. Underbrushing and cleanup	L.S.	Job	91,900	Job	219,800	Job	311,700
b. Tree planting and seeding	L.S.	Job	451,870	Job	91,529	Job	543,399
9. Signs	L.S.	Job	22,900	Job	11,500	Job	34,400
10. Elec svc lines	L.S.	Job	297,350	Job	424,825	Job	722,175
11. Buoys	L.S.	Job	1,600	Job	1,200	Job	2,800
12. Beach improvement	L.S.	Job	80,000	Job	50,000	Job	130,000
13. Change shelter	Each	1	112,400	1	112,400	2	224,800
14. Sewerage absorption field	L.S.	Job	817,000	Job	903,000	Job	1,720,000
15. Foot bridges	Each	3	15,000			3	15,000
16. Service building (includes waterborne toilets, showers, and laundry facilities)	Each	3	357,000	13	1,547,000	16	1,904,000
17. Sanitary station	Each	2	9,000	1	4,500	3	13,500
18. Floating courtesy dock	Each	5	60,000			5	60,000
19. Trail							
a. Interpretative trail	Mile	1.0	4,500			1.0	4,500
b. Foot trail (4' wide)	Mile	6.25	28,125	.25	1,125	6.5	29,250
c. Surfaced trail (5' wide)	Mile	3.0	75,000	.5	12,500	3.5	87,500
d. Equistrian trail	Mile	3.7	16,650			3.7	16,650
20. Control station	Each	1	29,400	2	58,800	3	88,200
21. Control gate	Each	5	5,000	1	1,000	6	6,000

TABLE XVI-4 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
22. Miscellaneous							
a. Canoe launch	Each	1	12,500			1	12,500
b. Interpretive trail study	L.S.	Job	10,000			Job	10,000
c. Interpretive trail signage	L.S.	Job	10,000			Job	10,000
d. Softball & open play field	L.S.	Job	120,000			Job	120,000
e. Maintenance area	L.S.	Job	200,000	Job	200,000	Job	400,000
f. Headquarters complex	L.S.	Job	300,000	Job	300,000	Job	600,000
g. Playground	Each	1	10,000	2	20,000	3	30,000
Subtotal			7,279,076		10,637,618		17,916,694
Contingencies			1,091,861		1,595,643		2,687,504
Subtotal			8,370,937		12,233,261		20,604,198
Engineering & design			694,788		1,015,361		1,710,149
Supervision & admin			611,078		893,028		1,504,106
TOTAL			9,676,803		14,141,650		23,818,453

TABLE XVI-5

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATIONAL FACILITIES
CULP BRANCH PARK

Item	Unit	Initial Planned development Quantity	Cost	Future Planned development Quantity	Cost	Account 14 Total planned development Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile			0.5	72,000	0.5	72,000
2. Parking areas							
a. Paved (new)	S.Y			1,777	22,221	1,777	22,221
3. Toilets							
a. Masonry double unit (waterborne)	Each			1	88,200	1	88,200
4. Water supply system							
a. Water connect to Co-op line	L.F.			712	3,000	712	3,000
b. Waterline extension	L.F.			4,700	19,787	4,700	19,787
c. Drinking fountains	Each			1	1,000	1	1,000
5. Picnic and camping units							
a. Unit consists of: one table, shelter fireplace, and trashcan.	Each			60	270,000	60	270,000
6. Group shelters	Each			1	32,300	1	32,300
7. Site improvement							
a. Underbrushing and cleanup	L.S.			Job	18,000	Job	18,000
b. Tree planting and seeding	L.S.			Job	47,230	Job	47,230
8. Signs	L.S.			Job	3,800	Job	3,800
9. Elec svc lines	L.S.			Job	46,200	Job	46,200
10. Sewerage absorption field	L.S.			Job	43,000	Job	43,000
11. Control station	Each			1	29,400	1	29,400

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TABLE XVI-5 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
12. Control gate	Each			1	1,000	1	1,000
13. Miscellaneous							
a. Playground	L.S.			1	10,000	1	10,000
Subtotal					707,138		707,138
Contingencies					106,071		106,071
Subtotal					813,209		813,209
Engineering & design					67,496		67,496
Supervision & admin					59,364		59,364
TOTAL					940,069		940,069

TABLE XVI-6

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)
POND CREEK ACCESS AREA

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
1. Roads							
a. Paved (new primary)	Mile	0.7	100,800			0.7	100,800
2. Boat launching sites							
a. Boat ramps	Lanes	4	84,000			4	84,000
b. Turnarounds and trailer parking (paved)	S.Y.	1982	24,775			1982	24,775
3. Toilets							
a. Masonry double unit (concrete vault type)	Each	1	49,000			1	49,000
4. Signs	L.S.	Job	500			Job	500
5. Floating courtesy dock	Each	1	12,000			1	12,000
6. Control gate	Each	1	1,000			1	1,000
Subtotal			272,075				272,075
Contingencies			40,811				40,811
Subtotal			312,886				312,886
Engineering & design			25,970				25,970
Supervision & admin			22,841				22,841
TOTAL			361,697				361,697

TABLE XVI-7

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)
PECAN CREEK PARK

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Roads							
a. Paved (new primary)	Mile	0.5	72,000	0.2	28,800	0.7	100,800
2. Parking areas							
a. Paved (new)	S.Y.			444	5,550	444	5,550
3. Boat launching sites							
a. Boat ramps	Lanes	4	112,000			4	112,000
b. Turnarounds and trailer parking (paved)	S.Y.	1982	24,775			1982	24,775
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	1	49,000			1	49,000
5. Water supply system							
a. Waterline extension	L.F.			600	2,526	600	2,526
b. Drinking fountains	Each			1	1,000	1	1,000
6. Picnic and camping units							
a. Picnic tables (without shelters)	Each			10	45,000	10	45,000
7. Site improvement							
a. Underbrushing and cleanup	L.S.			JOB	3,000	JOB	3,000
b. Tree planting and seeding	L.S.			JOB	7,700	JOB	7,700
8. Signs	L.S.	JOB	3,100			JOB	3,100
9. Elec svc lines	L.S.	JOB	4,750			JOB	4,750

TABLE XVI-7 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
10. Buoys	L.S.	JOB	400			JOB	400
11. Floating courtesy dock	Each	1	12,000			1	12,000
12. Control gate	Each	1	1,000			1	1,000
13. Miscellaneous a. Playground	Each			1	10,000	1	10,000
Subtotals			279,025		103,576		382,601
Contingencies			41,854		15,536		57,390
Subtotal			320,879		119,112		439,991
Engineering & design			26,633		9,886		36,519
Supervision & admin			23,424		8,695		32,119
TOTAL			370,936		137,693		508,629

TABLE XVI-8

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
JOHNSON BRANCH PARK

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Roads							
a. Paved (new primary)	Mile	2.6	374,400	2.3	331,200	4.9	705,600
b. Paved (new secondary)	Mile	3.2	387,200	3.3	399,300	6.5	786,500
c. Gravel	Mile	0.1	9,800			0.1	9,800
2. Parking areas							
a. Paved (new)	S.Y.	25,377	317,222	25,800	322,500	51,177	639,722
b. Gravel	S.Y.	788	5,910	333	2,498	1,121	8,408
3. Boat launching sites							
a. Boat ramps (concrete)	Lanes	4	100,000	2	42,000	6	142,000
b. Turnarounds & trailer parking (concrete)	S.Y.	1982	24,775			1982	24,775
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	2	98,000	1	49,000	3	147,000
b. Masonry double unit (waterborne)	Each	5	441,000	2	176,400	7	617,400
c. Composting		4	80,000			4	80,000
5. Water supply system							
a. Water wells (pressure type)	Each	1	40,000			1	40,000
b. Waterline extension	L.F.	20,030	84,326	6,325	26,628	26,355	110,954
c. Drinking fountains	Each	9	9,000	8	8,000	17	17,000
6. Picnic and camping units							
a. Unit consists of table, fireplace, trashcan & shelter	Each	70	315,000	72	324,000	142	639,000
b. Picnic tables (without shelters)	Each	145	319,000	196	431,200	341	750,000
c. Screen shelters	Each	30	270,000			30	270,000
d. Primitive camping units	Each	35	25,550	25	18,250	60	43,800
7. Group shelters	Each	5	161,500	7	226,100	12	387,600

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TABLE XVI-8 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
8. Site improvement							
a. Underbrushing & cleanup	L.S.	JOB	91,900	JOB	89,000	JOB	180,900
b. Tree planting & seeding	L.S.	JOB	451,870	JOB	20,079	JOB	471,949
9. Signs	L.S.	JOB	11,900	JOB	3,800	JOB	15,700
10. Elec svc lines	L.S.	JOB	286,650	JOB	213,725	JOB	500,375
11. Buoys	L.S.	JOB	1,200			JOB	1,200
12. Beach improvement	L.S.	JOB	80,000			JOB	80,000
13. Change shelter	Each	1	112,400			1	112,400
14. Sewerage absorption field	L.S.	JOB	817,000	JOB	301,000	JOB	1,118,000
15. Foot bridges	Each	3	15,000			3	15,000
16. Service building (includes waterborne toilets, showers, & laundry facilities)	Each	3	357,000	6	714,000	9	1,071,000
17. Sanitary station	Each	2	9,000			2	9,000
18. Floating courtesy dock	Each	1	12,000			1	12,000
19. Trails							
a. Interpretive trail	Mile	1.0	4,500			1.0	4,500
b. Foot trail (4' wide)	Mile	5.0	22,500	.25	1,125	5.25	23,625
c. Surfaced trail (5' wide)	Mile	3.0	75,000	.5	12,500	3.5	87,500
20. Control station	Each	1	29,400			1	29,400
21. Control gate	Each	2	2,000			2	2,000

TABLE XVI-8 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
22. Miscellaneous							
a. Interpretive study	L.S.	JOB	10,000			JOB	10,000
b. Interpretive trail signage	L.S.	JOB	10,000			JOB	10,000
c. Ball field & multi-use courts	L.S.	JOB	120,000			JOB	120,000
d. Playground	L.S.	JOB	10,000			JOB	10,000
e. Maintenance area development	L.S.	JOB	200,000			JOB	200,000
f. Headquarters complex	L.S.	JOB	300,000			JOB	300,000
Subtotal			6,092,003		3,712,305		9,804,308
Contingencies			913,800		556,846		1,470,646
Subtotal			7,005,803		4,269,151		11,274,954
Engineering & design			581,482		354,340		935,822
Supervision & admin			511,424		311,648		823,072
TOTAL			8,098,709		4,935,139		13,033,848

TABLE XVI-9

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
BUCK CREEK PARK

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Roads							
a. Paved (new primary)	Mile	0.6	86,400			0.6	86,400
2. Parking areas							
a. Gravel	S.Y.			333	2,498	333	2,498
3. Boat launching sites							
a. Boat ramps (concrete)	Lanes	4	98,000			4	98,000
b. Turnarounds & trailer parking (paved)	S.Y.	1982	24,775			1982	24,775
4. Toilets							
a. Masonry double unit (concrete type vault)	Each	1	49,000			1	49,000
5. Picnic and camping units							
a. Picnic table (without shelter)	Each			6	13,200	6	13,200
6. Site improvement							
a. Underbrushing & cleanup	L.S.			JOB	1,800	JOB	1,800
b. Tree planting & seeding	L.S.			JOB	5,250	JOB	5,250
7. Signs	L.S.	JOB	3,100			JOB	3,100
8. Elec svc lines	L.S.	JOB	5,950			JOB	5,950
9. Floating courtesy dock	Each	1	12,000			1	12,000
10. Trails							
a. Foot trail (4' wide)	Mile	.25	1,125			.25	1,125
Subtotal			280,350		22,748		303,098
Contingencies			42,052		3,412		45,464
Subtotal			322,402		26,160		348,562
Engineering & design			26,759		2,171		28,930
Supervision & admin			23,535		1,910		25,445
TOTAL			372,696		30,241		402,937

TABLE XVI-10

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
JORDAN PARK

Item	Unit	Initial Planned development		Future Planned development		Account 14 Total Planned development	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile	1.0	144,000	2.0	288,000	3.0	432,000
b. Paved (new secondary)	Mile			5.0	605,000	5.0	605,000
2. Parking areas							
a. Paved (new)	S.Y.			33,502	418,775	33,502	418,775
3. Boat launching sites							
a. Boat Lanes (concrete)	Lanes	4	64,400			4	64,400
b. Turnarounds & trailer parking (paved)	S.Y.	1982	24,775			1982	
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	1	49,000			1	49,000
b. Masonry double unit (waterborne)	Each				529,200	6	529,200
c. Composting	Each	1	20,000			1	20,000
5. Water supply system							
a. Water wells (pressure type)	Each				40,000	1	40,000
b. Water connect to Co-op line	L.F.			18,600	78,306	18,600	78,306
c. Drinking fountains	Each			13	13,000	13	13,000
6. Picnic and camping units							
a. Unit consists of table, shelter, fireplace and trash can	Each			110	495,000	110	495,000
b. Picnic tables (without shelter)	Each			195	429,000	195	429,000
c. Screened shelter				55	495,000	55	495,000
7. Group shelters	Each			10	323,000	10	323,000

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TABLE XVI-10 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
8. Site improvement							
a. Underbrushing and cleanup	L.S.			JOB	108,000	JOB	108,000
b. Tree planting and seeding	L.S.			JOB	11,270	JOB	11,270
9. Signs	L.S.	JOB	3,800	JOB	3,900	JOB	7,700
10. Elec svc lines	L.S.			JOB	164,900	JOB	164,900
11. Buoys	L.S.			JOB	1,200	JOB	1,200
12. Beach improvement	L.S.			JOB	50,000	JOB	50,000
13. Change shelter	Each			1	112,400	1	112,400
14. Sewerage absorption field	L.S.			JOB	559,000	JOB	559,000
15. Service building (includes waterborne toilets, showers, and laundry facilities)	Each			7	833,000	7	833,000
16. Sanitary station	Each			1	4,500	1	4,500
17. Floating courtesy dock	Each	1	12,000			1	12,000
18. Trails							
a. Equestrian trail	Mile	3.7	16,650			3.7	16,650
19. Control station	Each			1	29,400	1	29,400
20. Control gate	Each	1	1,000			1	1,000
21. Miscellaneous							
a. Maintenance area	L.S.			JOB	200,000	JOB	200,000
b. Headquarters complex	L.S.			JOB	300,000	JOB	300,000
Subtotal			335,625		6,091,851		6,427,476
Contingencies			50,344		913,778		964,122
Subtotal			385,969		7,005,629		7,391,598
Engineering & design			32,035		581,467		613,502
Supervision & admin			28,176		511,411		539,587
TOTAL			446,180		8,098,507		8,544,687

TABLE XVI-11

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
WOLF ISLAND

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Signs	L.S.	JOB	500			JOB	500
2. Trails							
a. Foot trail (4' wide)		1.0	4,500			1.0	4,500
Subtotal			5,000				5,000
Contingencies			750				750
Subtotal			5,750				5,750
Engineering & design			477				477
Supervision & admin			420				420
TOTAL			6,647				6,647

TABLE XVI-12

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
CANOE LAUNCHING AREA

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Parking areas							
a. Gravel	S.Y.	333	2,498			333	2,498
2. Miscellaneous							
a. Canoe launch	L.S.	1	12,500			1	12,500
Subtotal			14,998				14,998
Contingencies			2,500				2,500
Subtotal			17,498				17,498
Engineering & design			1,452				1,452
Supervision & admin			1,277				1,277
TOTAL			20,227				20,227

TABLE XVI-13

ANNUAL FUNDS REQUIRED
FOR OPERATION AND MAINTENANCE

NON-FEDERAL COST

Recreational Facilities

Operation and maintenance and replacement of facilities (includes contract cleanup, mowing, grading, and maintenance of roads, repair of structures, nature areas, etc.).
From DTO dated Oct 1982 $1,492,000

TABLE XVI-14

CLEARING, FENCING, REVEGETATION, EROSION CONTROL

Acct. No.		Cost
03	Clearing	$ 700,000
03	Fencing, perimeter of Government land (200 miles)	2,500,000
03	Revegetation	
	Woody plantings (100 acres)	92,000 1/
	Food plots (150 acres)	75,000 1/
	Grass plantings (850 acres)	425,000 1/
	Subtotal	3,792,000
	Contingencies (15%)	568,800
	Subtotal	4,360,800
	Engineering & design	361,946
	Supervision & admin	318,338
	Total	$ 5,041,084

1 Includes labor

TABLE XVI-15

STATE OF TEXAS
01 LANDS AND DAMAGES

Item	Amount
Lands and damages, including contingencies	$ 1,770,000
Relocation assistance	115,000
Administrative costs	35,000
TOTAL	$ 1,920,000

Note: Does not include indirect cost or overhead.

TABLE XVI-18

ESTIMATED SEPARABLE RECREATION COST
CITIES OF DALLAS & DENTON
(1 Jan 82 prices)

Ray Roberts Lake

Acct No.	Feature	Initial Development	Future Development	Total
01	Land purchase (public use areas)	2,882,000[1]		2,882,000 2/
03	Reservoir (clearing public use areas)	500,000		500,000
14	Recreation facilities	8,370,900 2/	12,233,300 2/	20,604,200 2/
30	Engineering and design	694,800	1,015,400	1,710,200
31	Supervision and administration	611,100	893,000	1,504,100
	Subtotal recreation expenditures	13,058,800	14,141,700	27,200,500

I - PARTICIPATION BY LOCAL INTERESTS IN TOTAL DEVELOPMENT

	Percent	Initial Development	Future Development	Total
City of Dallas, Texas	74	9,663,512	10,464,858	20,128,370
City of Denton, Texas	26	3,395,288	3,676,842	7,072,130

II - REIMBURSEMENT BY LOCAL INTERESTS -
50 PERCENT OF DEVELOPMENT IN WHICH THEY PARTICIPATE

	Percent	Initial Development	Future Development	Total
City of Dallas, Texas	50	4,831,756 3/	5,232,429 3/	10,064,185 3/
City of Denton, Texas	50	1,697,644 3/	1,838,421 3/	3,536,065 3/
Total (Dallas & Denton)	100	6,529,400	7,070,850	13,600,250
Government		6,529,400	7,070,850	13,600,250
TOTAL		12,058,800	14,141,700	27,200,500

NOTES

1 Includes relocation assistance and administrative costs (see Table XVI-16).
2 Includes contigencies (see Table XVI-2).
3 To be reimbursed by the project sponsor.

EXHIBIT NO. 1

RAY ROBERTS LAKE STATE PARK
ISLE duBOIS UNIT
INITIAL DEVELOPMENT
6/82

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COSTS	
A. HEADQUARTERS COMPLEX		
Entrance Portal	$ 18,100	
Main Park Road - 20'		
Information Signs	10,000	
To Boat Launch Area J - 3 miles	375,000	
To Day-Use Area N -1.2 miles	150,000	
Headquarters/Visitor Center	191,340	
Parking - 20 Cars		
5 Cars w/Trailers	25,000	
Fee Collection Booth	1,600	
Trail Access - 1.2 miles	28,512	
Utilities	54,580	
TOTAL - AREA A	$ 854,402	
B. PARK RESIDENCE		
Residence	84,789	
Road 12' - .10 miles	10,000	
Utilities	3,800	
TOTAL - AREA B	$ 98,589	Non Fed Cost
C. INTERPRETIVE AREA		
Parking - 12 Cars	5,424	
Trailhead	2,600	
Trail - 5'	11,250	
Utilities	2,000	
TOTAL - AREA C	$ 21,274	
D. MAINTENANCE COMPLEX		
Park Residence	84,789	Non Fed Cost
Service/Maintenance Facility	195,500	
Water Treatment System & Distribution System	502,000	
Wastewater Treatment System & Collection System	352,000	
Boat Storage (120 ± Boat)	650,000	Non Fed Cost
Trailer Dump (Duplex)	16,000	
Road - 18 - .3 miles	33,000	
Road - 12' - .2 miles	20,000	
Pasture Fencing	5,000	
Utilities	82,000	
TOTAL - AREA D	$ 1,940,289	

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

SWFED-D

21 January 1983

SUBJECT: Ray Roberts Lake, Design Memorandum No. 8, Master Plan

Commander, Southwestern Division
ATTN: SWDPL

Submitted for review are nine copies of subject design memorandum. Copies are for distribution in accordance with SWD Supplement 1 to ER 1110-2-1150.

FOR THE COMMANDER:

S. FUJIWARA, P.E.
Chief, Engineering and Planning Division

1 Incl (9 cy)
as

(50 copies prepared)

TRINITY RIVER BASIN, TEXAS
Design Memorandum No. 8
Master Plan
For
Ray Roberts Lake
Elm Fork, Trinity River, Texas

This report, prepared in the Planning Branch of the Engineering and Planning Division, Fort Worth District, has been coordinated with the Real Estate Division and the Operations Division and is recommended for approval.

Michael B. Cottell 6 Jan 83
Chief, Real Estate Division

Willie J. Napier 7 Jan. 1983
Chief, Operations Division

TRININTY RIVER BASIN, TEXAS

DESIGN MEMORANDUM NO. 8

MASTER PLAN
FOR
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

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EXHIBIT

TRINITY RIVER BASIN, TEXAS
RAY ROBERTS (AUBREY) LAKE
ELM FORK, TRINITY RIVER, TEXAS

STATUS OF DESIGN MEMORANDA

Design Memo No.	Title	Date Submitted	SWD Approval	OCE Approval
1	Hydrology	9 Aug 72	25 Sep 72	11 Dec 72
	Supplement No. 1	6 Feb 73	22 Mar 73	Not Req'd
	Supplement No. 2	6 Sep 73	28 Sep 73	Not Req'd
	Supplement No. 3	19 Nov 75	6 Jan 76	Not Req'd
2	General	25 Oct 73	5 Dec 73	2 Apr 75
	Site Selection	Incorporated with GDM		
	Relocations Construction Area	Incorporated with GDM		
	Project Formulation Supplemental Information	25 Sep 74	11 Oct 74	2 Apr 75
	Supplement No. 1	22 Apr 82	21 May 82	Not Req'd
3	Availability of Materials	28 Jun 72	14 Jul 72	11 May 73
4	Lands for Construction Areas	21 Nov 73	10 Jan 74	17 Apr 74
4A	Lands for Lake Areas	24 May 74	6 May 75	Not Req'd
5	Embankment and Spillway	31 Jul 74	10 Oct 74	Not Req'd
5	Embankment and Spillway (Revised)	30 Jun 76	25 Aug 76	Not Req'd
6	Outlet Works	30 Sep 76	2 Dec 76	Not Req'd
	Supplement No. 1	16 Dec 81	2 Mar 82	Not Req'd
7	Project Buildings, Visitors' Overlook and Access Road	Oct 83*		
8	Master Plan	This Report		
9	Relocations - FM Rd. 455	30 Jun 76	3 Aug 76	Not Req'd
	Supplement No. 1	Dec 82*		
10	Relocations - FM Rd. "A"	10 Sep 82		
11	Relocations - FM Rd. 922	28 Apr 82	21 May 82	Not Req'd
	Supplement No. 1	14 Oct 82	5 Nov 82	Not Req'd
12	Relocations - U.S. Hwy 377	29 Jun 82	5 Aug 82	Not Req'd
13	Relocations - Mo Pac Railroad	26 Feb 82	5 Apr 82	Not Req'd
14	Relocations - Cooke County Electric Co-op, Community Public Service Company, and Grayson-Collin Electric Co-op	17 Mar 76	14 Apr 76	Not Req'd
16	Relocations - Denton County Electric Lines	Jun 84*		
17	Relocations - Arco Pipelines	22 Jul 82	11 Aug 82	Not Req'd
18	Relocations - Mountain Spring & Green Springs Water Lines	Sep 84*		
19	Relocations - Central & Valley View Telephone Lines	Oct 84*		

STATUS OF DESIGN MEMORANDA (CONT'D)

Design Memo No.	Title	Date Submitted	SWD Approval	OCE Approval
20	Relocations - General Telephone Lines	Oct 84*		
21	Clearing & S&D Ranges	Jun 83*		
22	Recreation Facilities	Jul 84*		
24	Cost Allocation Report	27 Jun 80	15 Jul 80	1 Aug 80
25	Relocation Enserch Gas Pipelines	30 Aug 82	15 Oct 82	Not Req'd
26	Relocation of Cemeteries	10 Dec 82		
29	Relocation Cooke, Grayson & Denton County Roads	8 Jun 82	12 Jul 82	Not Req'd
30	Relocation of Tioga Sewage Treatment Plant	Dec 83*		
31	Plugging Oil, Gas & Water Wells	Apr 84*		
32	Relocation FM Rd 423 at Lewisville Lake	Jul 84*		
33	Relocation - Santa Fe Railroad	Jun 84*		
34	Cultural Resources	**		

*Scheduled submission date
**To be scheduled

TRINITY RIVER BASIN, TEXAS

RAY ROBERTS (AUBREY) LAKE

PERTINENT DATA

Location: Ray Roberts (Aubrey) Lake dam site is at River Mile 60.0 on Elm Fork of the Trinity River, Denton County, between Sanger and Aubrey, Texas, 30 miles upstream from Lewisville Dam.

Purposes: Water supply, recreation, and fish and wildlife.

Authorization: River and Harbor Act approved 27 October 1965 (Public Law 89-298) in accordance with the plan of improvement in House Document 276 (89th Congress, 1st Session).

Drainage area: *

ELM FORK - TRINITY RIVER	Square Miles
Above mouth Elm Fork of Trinity	2,577
Above Lewisville Dam	1,660
Below Mouth Isle Du Bois Creek Aubrey Dam site	692
Above gage near Sanger	381
Above gage near Muenster	46

*Drainage areas shown in this report are either as published in Circular No. 63-01, "Drainage Areas of Texas Streams", prepared by the Texas Water Commission in cooperation with the U. S. Geological Survey dated February 1963, or adjusted to agree with areas as given in the circular.

Estimated annual runoff under existing conditions at Ray Roberts Lake for the period 1 January 1924 - 31 December 1968:

	Acre-feet	Inches
Maximum	662,700	17.96
Minimum	0	0
Average	173,600	4.70

Floods at Ray Roberts Dam site	Peak inflow (cfs)(1)
Sept 1950	38,900
Apr 1957	43,500
May 1958	43,100
Sept 1962	40,200
Apr 1966	38,800

(1) Estimated from gage records at Sanger (nr.) gage - Elm Fork and Pilot Point (nr.) gage - Isle Du Bois Creek.

Spillway:

Length at crest (net)	100
Type	Broadcrested
Control	None

Outlet works:

Flood control conduit:

Type	1 gate-controlled conduit
Dimension	13' diameter
Invert elevation	551.0 ft msl
Control	Two 6' x 13' service gates

Low-flow outlets (to discharge into stilling basin through separate 5' diameter conduit)

Intake dimensions	4' x 8'
Number	4
Control	One 4' x 8' manually operated slide gate at each intake to wet well and one manually operated service gate in wet well to control flow to a 3' x 7' conduit which is connected to a separate 5' diameter conduit (beneath the flood control conduit) continued to a bifurcation with a 4' diameter conduit with an outfall in the stilling basin.

Intake invert elevations:

Upper level	618.0
Upper middle level	603.0
Lower middle level	588.0
Lower level	574.5

Spillway design flood:

Duration of storm	48 hours
Total volume of rainfall	28.00 inches
Average infiltration rate	0.05 in/hr
Total volume of runoff	25.28 inches
Peak inflow to full pool	494,200 cfs
Maximum outflow (pool level 658.8)	
Spillway	14,500 cfs
Outlet Works	0
TOTAL	14,500 cfs

Ray Roberts Lake:

Feature	Elevation (ft. msl)	Area (acres)	Capacity * Acre-feet	Capacity * Equivalent runoff (inches)
Top of dam	665.0	68,500	-	-
Maximum design water surface	658.8	59,620	1,931,900	52.35
Spillway Crest	645.5	42,000	1,261,500	34.19
Top of flood-control pool	640.5	36,900	1,064,600	28.85
Top of conservation pool	632.5	29,350	799,600	21.67
Maximum tailwater	553.3	-	-	-
Streambed	524.0	-	-	-

* Includes 54,600 acre-feet of storage for estimated 100-year sediment deposition, with 50,400 acre-feet below elevation 632.5 and 4,200 acre-feet between elevation 632.5 and 640.5.
Note: Area-capacity data is 1985 condition.

Lewisville Lake with Ray Roberts Lake in System:

	Elevation (ft. msl)	Area (acres)	Capacity * Acre-feet	Capacity * Equivalent runoff (inches)**
Top of dam	560.0	-	-	-
Maximum design water surface	549.2	60,700	1,804,300	34.95
Top of flood control pool and spillway crest	532.0	39,080	954,500	18.49
Top of conservation pool	522.0	28,980	618,400	11.98
Maximum tailwater	471.5***	-	-	-
Streambed (1953 - original)	435.0	-	-	-

*Includes 73,800 acre-feet of storage for estimated sediment deposition by year 2085, with 63,400 acre-feet below 522.0 and 10,400 acre-feet between 522.0 and 532.0.
**Based on drainage area below Aubrey dam site of 968 square miles.
***At mouth of spillway discharge channel.

PROJECT STATUS

General

The authority for land acquisition and construction activities is based on an approved General Design Memorandum, approved Real Estate Memorandum, and approved water supply and recreation contracts. Presently, the General Design Memorandum, Real Estate Design Memorandum, and water supply and recreation contracts have been approved. Real Estate acquisition began in September 1980 and construction was initiated in September 1981.

The project local sponsors (cities of Dallas and Denton) have assumed the responsibility for recreation development at the Ray Roberts Lake project under the terms of the approved recreation contracts signed by the Secretary of the Army on 16 September 1980. The Texas Parks and Wildlife Department (TPWD) intends to assume a portion of the cities recreation responsibility and cost share with the Corps of Engineers for the lands and development of Isle duBois Park. They further intend to operate and maintain all additional parks to be developed by the Corps of Engineers and local sponsors and to manage all project lands (excluding the embankment) and water areas at Ray Roberts Lake. A recreation contract with the TPWD is currently being drafted.

I INTRODUCTION

Trinity River, Basin, Texas
Elm Fork, Trinity River, Texas
Design Memorandum No. 8

Master Plan
For
Ray Roberts Lake

I - INTRODUCTION

1-01 Project authorization - Congressional authority for construction of Ray Roberts Lake, (formerly Aubrey Lake), a unit in the comprehensive plan for the development of the Trinity River Basin is contained in Public Law 89-298 (89th Congress, 1st Session) approved 27 October 1965. This is in accordance with recommendations of the Chief of Engineers contained in House Document No. 276 of the same Congress.

1-02 Authority for advance planning - Authority to initiate advance planning on Ray Roberts Lake is contained in Public Works Appropriation Act of 1970 approved 11 December 1969 (Public Law 91-144) and Advance of Allotment C-57 dated 1 July 1970.

1-03 Application of public laws.

a. Federal Laws. The following laws provide for the development and management of Federal projects for various purposes according to the intent of the Congress:

(1) Public Law 78-534 (The Flood Control Act of 1944), as amended by the Flood Control Acts of 1946, 1954, 1960, and 1962, authorizes the Corps of Engineers to construct, maintain, and operate public park and recreational facilities at water resources development projects and to permit local interests to construct, maintain, and operate such facilities.

(2) Public Law 85-624 (The Fish and Wildlife Coordination Act of 1958) requires that any agency impounding, diverting, or controlling water consult with the United States Department of the Interior, Fish and Wildlife Service. The Department of the Interior would determine the possible damage resulting to wildlife resources and the means and measures to prevent the damage and to provide concurrently for the development and improvement of such wildlife resources.

(3) Public Law 86-717 (Conservation of Forest Lands) provides that reservoir area of projects for flood control, navigation, hydroelectric power development, and other related purposes owned in fee and under the jurisdiction of the Secretary of the Army and the Chief of Engineers shall be developed and maintained so as to encourage, promote,

and assure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation, and accepted conservation practices, and to increase the value of such areas for conservation, recreation, and other beneficial uses.

(4) Public Law 88-29, 28 May 1963, authorized the Secretary of the Interior to inventory and classify outdoor recreation needs and resources and to prepare a comprehensive outdoor recreation plan taking into consideration the plans of the various Federal agencies, States, and other political subdivisions. It also stated that Federal agencies undertaking recreational activities shall consult with the Secretary of the Interior concerning these activities and shall carry out such responsibilities in general conformance with the nationwide plan.

(5) Public Law 89-72 (The Federal Water Project Recreation Act of 1965) requires that full consideration be given to opportunities afforded by outdoor recreation and fish and wildlife resources. It further provides for non-Federal participation in the separable costs for recreation and fish and wildlife development, and the assumption of non-Federal responsibility for operation, maintenance, and replacement of these facilities. Similar provisions for recreational development at non-reservoir projects are established by Federal policy based on Public Law 89-72 under which this project is being developed.

(6) Public Law 89-655 (The National Historic Preservation Act of 1966) sets forth the Federal role in historic preservation and requires the Federal agency having jurisdiction over the proposed Federal undertaking in any State to take into account the effect of the undertaking on any historic district, site, building, structure, or subject included in the National Register, and to coordinate with the Advisory Council on Historic Preservation concerning these matters.

(7) Public Law 91-190 (The National Environmental Policy Act of 1969) sets forth a national policy for the protection and enhancement of the environment and requires that the environmental effects of each project be evaluated and presented in an environmental impact statement.

(8) Public Law 91-611 (The Flood Control Act of 1970) authorizes the project and establishes the requirement (Section 122) for evaluating the economic, social, and environmental impact of projects.

1-04 Project Purposes - The authorized purposes of this project are water supply, recreation, and fish and wildlife. The project consists of a rolled earth filled dam and reservoir with uncontrolled spillway on the Elm Fork of the Trinity River in Northern Denton County. Lands within the dam and reservoir site will be utilized for recreation purposes. The estimated annual benefits total $10.2 million for water supply, $6.2 million for recreation and $.75 million for fish and wildlife. Recreation and fish and wildlife benefits comprise 38% of the total project benefits.

1-05 Purpose of the Master Plan - The master plan is intended as a guide for the orderly development and management of all land and water areas of the project. The plan presents guidance for the development of initial and future recreation facilities and for the protection, conservation and enhancement of the site's environmental values.

1-06 Environmental Impact Statement - In accordance with Section 102 of NEPA, the final Environmental Statement for Ray Roberts Lake was completed and filed on 4 March 1974 with the CEQ. A supplement to the final Environmental Statement was filed on 18 September 1975.

1-07 Scope of this report - This design memorandum presents a description of the project. Described herein are the environmental and recreational resources of the project, the factors influencing and restricting resource management and development, and the methods and techniques for the development, improvement, and management of these resources. The plan of development integrates appropriate uses and allocations into a well balanced and flexible guide for the administration, development, and coordinated management of land and water resources and recreation facilities in the best interest of the public. The general concepts of optimum utilization of project resources for public use, provision of recreational facilities, and the proper stewardship of the overall project are also presented in this text.

II PROJECT DESCRIPTION

II - PROJECT DESCRIPTION

2-01 General - The Ray Roberts Lake Project is an important unit in the system of reservoirs in the Trinity Basin that includes Lakes Lewisville, Grapevine, Bardwell, Navarro Mills, Benbrook, Lavon and Lakeview, which is presently under construction. Roanoke and Tennessee Colony Lakes are authorized. The locations of the 9 reservoir units are shown on plate II-1. In combination with Lewisville Lake, Ray Roberts will provide additional conservation storage through an exchange of storage with the existing facility while the same degree of flood control provided by the Lewisville project will be maintained. Benefits accruing to Ray Roberts Lake will consist of water supply and recreation, including sport fishing and hunting. The area is served by Interstate Hwy 35, State Hwy 377 and 289, FM 372 and 455.

2-02 Location - The Ray Roberts Lake Project is located in Denton County at mile 60.0 on the Elm Fork, Trinity River, 30 miles upstream from the existing Lewisville Dam.

2-03 Climate - The Elm Fork watershed is located in a region where seasons moderate to mild winters and comparatively long hot summers. It is a temperate climate whose mean annual temperature is 65 degrees F and records 34.4 inches of rainfall in an average year. January, the coldest month, has an average daily temperature of 45 degrees while August will average 84 degrees F. Winds are generally southerly with an average velocity of 11 mph. Thunderstorms and frontal storms are common in this area. Tropical storms and tornadoes occur with some frequency but are generally limited to particular seasons of the year. Each type is capable of producing devastating amounts of precipitation with some of the worst occurring in the 1942, 1945, 1957, 1974, 1977, 1981, and 1982.

2-04 Operations structures - The dam will be rolled earthfill, with a length of 15,250 feet, a top width of 46 feet, and elevation of 141 feet above the streambed. The spillway will be an uncontrolled broadcrested type, 100 feet in length at the crest. The flood control outlet works will consist of a 13 foot diameter conduit with two 6 foot by 13 foot hydraulically operated gates at elevation 545.0 feet msl. The low flow intakes will discharge into a separate five foot diameter conduit and will consist of four gates at input elevations 618.0, 603.0, 588.0, and 574.5. The general embankment plan is shown on plate II-2.

2-05 Lake description - The lake will consist of a conservation pool and a flood control pool. The conservation pool will have a surface area of approximately 29,350 acres, at an elevation of 632.5 feet msl. The flood control pool extends from the top of this pool to 640.5 feet msl and would total 36,900 surface acres of water. A tabulation of the initial area and capacity data for the lake at river mile 60.0 is shown in table II-1.

According to the pool elevation probability and duration curves, as shown in plate II-4, pool elevation can be expected to vary about 23.5 feet in an average 5-year period. As indicated by the duration curve, the top

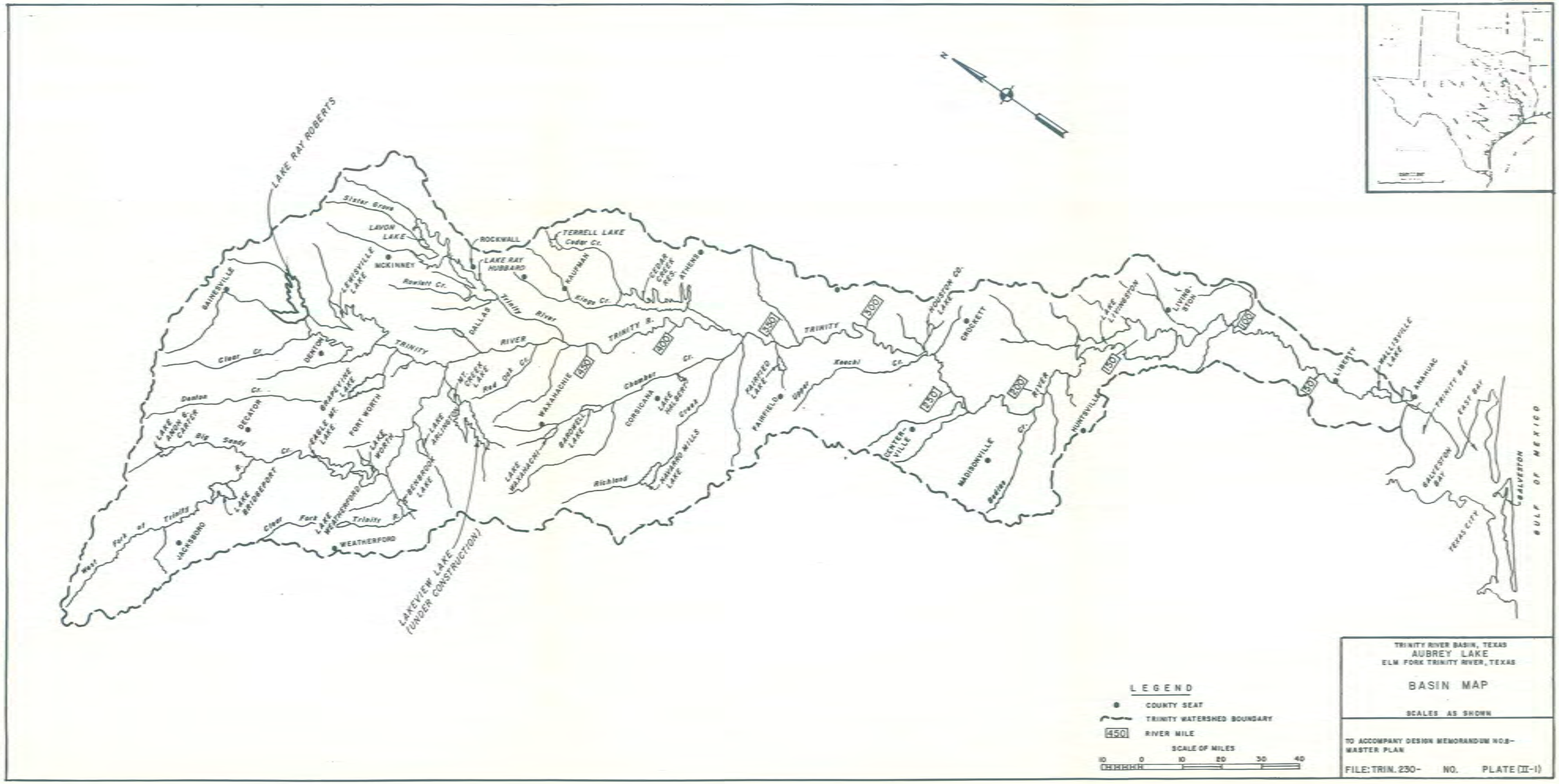
TABLE II-1
AREA AND CAPACITY DATA - 1985
RAY ROBERTS LAKE
River Mile 60.0
Drainage Area = 692 Square Miles

ELEV	0	1	2	3	4	5	6	7	8	9
					AREA IN ACRES					
530					0	5	10	15	20	
540	30	40	45	55	65	75	85	95	10	115
550	130	150	170	190	205	245	280	325	37	415
560	500	600	700	800	940	1,080	1,250	1,450	700	1,970
570	2,260	2,550	2,800	3,050	30300	3,550	3,770	4,000	4,230	4,440
580	4,640	4,890	5,120	5,350	5,600	5,850	6,120	6,400	6,670	7,000
590	7,290	7,540	7,810	8,100	8,400	8,710	9,040	9,380	9,700	10,080
600	10,460	10,820	11,220	11,600	12,000	12,520	12,820	13,240	13,680	14,090
610	14,530	15,000	15,440	15,900	16,400	16,840	17,360	17,860	18,400	18,900
620	20,460	21,000	21,700	22,400	23,100	23,700	24,400	25,200	25,800	26,600
630	27,300	28,100	28,900	29,800	30,700	31,700	32,600	33,600	34,500	35,500
640	36,500	37,300	38,300	39,300	40,400	41,500	42,500	43,600	44,900	46,200
650	47,400	48,700	50,000	51,400	52,800	54,200	55,600	57,000	58,500	59,900
660	61,300	62,700	64,200	65,600	67,000	68,500				
					CAPACITY IN ACRE-FEET					
530					0	2	10	22	40	60
540	90	125	170	220	280	350	430	520	620	730
550	850	990	1,150	1,330	1,530	1,750	2,015	2,320	2,665	3,060
560	3,515	4,065	4,715	5,465	6,335	7,345	8,510	9,860	11,440	13,270
570	15,390	17,790	20,470	23,390	26,570	29,990	33,650	37,540	41,660	45,990
580	50,530	55,300	60,300	65,530	71,010	76,740	82,720	88,980	95,520	102,350
590	109,500	116,900	124,600	132,500	140,800	149,300	158,200	167,400	177,000	186,900
600	197,100	207,800	218,800	230,200	242,000	254,300	266,900	280,000	293,400	307,300
610	321,600	336,400	351,600	367,300	383,400	400,000	434,800	452,900	452,900	471,500
620	491,200	511,900	533,300	555,300	578,100	601,500	625,500	650,300	675,800	702,000
630	729,000	756,700	785,200	814,500	844,800	576,000	908,100	941,200	975,300	1,010,300
640	1,046,300	1,083,200	1,121,000	1,159,800	1,199,600	1,240,600	1,282,600	1,325,600	1,369,900	1,415,400
650	1,462,200	1,510,300	1,559,600	1,610,300	1,662,400	1,715,900	1,770,800	1,827,100	1,884,900	1,944,100
660	2,004,700	2,066,700	2,130,100	2,195,000	2,261,300	2,329,100				

of conservation pool will be equaled or exceeded approximately 2 percent of the time. The average pool during the period June through August (prime recreation season) is about 11.5 feet below the top of conservation pool. The pool level should equal or exceed the 5-year flood frequency (elevation 632.5 feet msl) only 2 percent of the time.

2-06 Facilities requirement - Initial visitation was computed to be 3.5 million annual visits, assuming 1985 as the first year of operation. The estimated demand far exceeded the estimated optimum capacity of 7,000,000 which is expected to be reached by 2003. The average annual recreation days are computed to be 5,501,300 for general and 498,700 for fish and wildlife, for a total of 6,000,000. Recreational facility planning was, however, based on a reduced level of development as shown in Design Memorandum No. 24, Cost Allocation Report. In Supplement No. 1 to Design Memorandum No. 2, General, it was determined that six parks and two access areas would be required to satisfy the recreation needs for a computed design day load of nearly 60,000. These areas would provide boat ramps, campgrounds, picnic area, beaches, and sanitary facilities in sufficient quantity to accommodate the estimated public demand.

U.S. ARMY



LEGEND

- COUNTY SEAT
- TRINITY WATERSHED BOUNDARY
- 450 RIVER MILE

SCALE OF MILES

10 0 10 20 30 40

TRINITY RIVER BASIN, TEXAS
AUBREY LAKE
ELM FORK TRINITY RIVER, TEXAS

BASIN MAP

SCALES AS SHOWN

TO ACCOMPANY DESIGN MEMORANDUM NO.8-
MASTER PLAN

FILE: TRIN. 230- NO. PLATE (II-1)

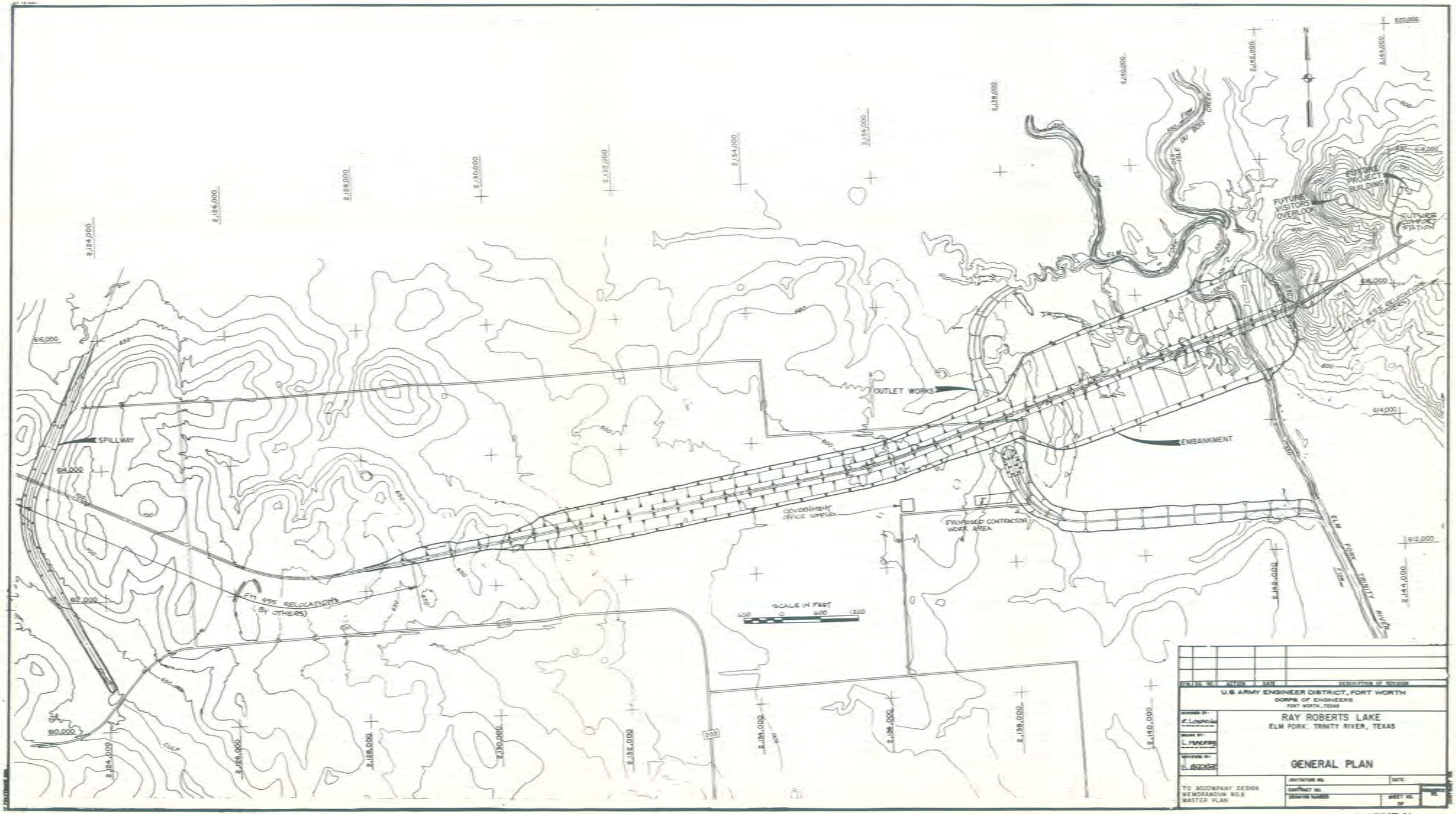

SPILLWAY
OUTLET WORKS
EMBANKMENT
FM 455 RELOCATIONS (BY OTHERS)
GOVERNMENT OFFICE COMPLEX
PROPOSED CONTRACTOR WORK AREA
FUTURE PROJECT BUILDING
FUTURE VISITORS OVERLOOK
FUTURE COMFORT STATION
ELM FORK TRINITY RIVER
SCALE IN FEET
400 0 600 1200
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
GENERAL PLAN
TO ACCOMPANY DESIGN MEMORANDUM NO.8 MASTER PLAN

PLATE (II-2)

AREA IN THOUSAND ACRES

55 50 45 40 35 30 25 20 15 10 5 0

TOP OF DAM – ELEV. 665.0

SPILLWAY CREST – ELEV. 645.5

TOP OF FLOOD CONTROL POOL – ELEV. 640.5

TOP OF CONSERVATION POOL – ELEV. 632.5

CAPACITY AFTER 100 YEARS OF SEDIMENTATION

INITIAL CAPACITY (1985)

INITIAL AREA (1985)

ELEVATION IN FEET M.S.L.

670 650 630 610 590 570 550 530

0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2

CAPACITY IN MILLION ACRE-FEET

NOTE:

DRAINAGE AREA = 692 SQUARE MILES.
ONE INCH OF RUNOFF = 36,906 ACRE-FEET.
ONE HUNDRED YEAR SEDIMENT DEPOSITION = 54,600 ACRE-FEET.

TRINITY RIVER BASIN, TEXAS
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

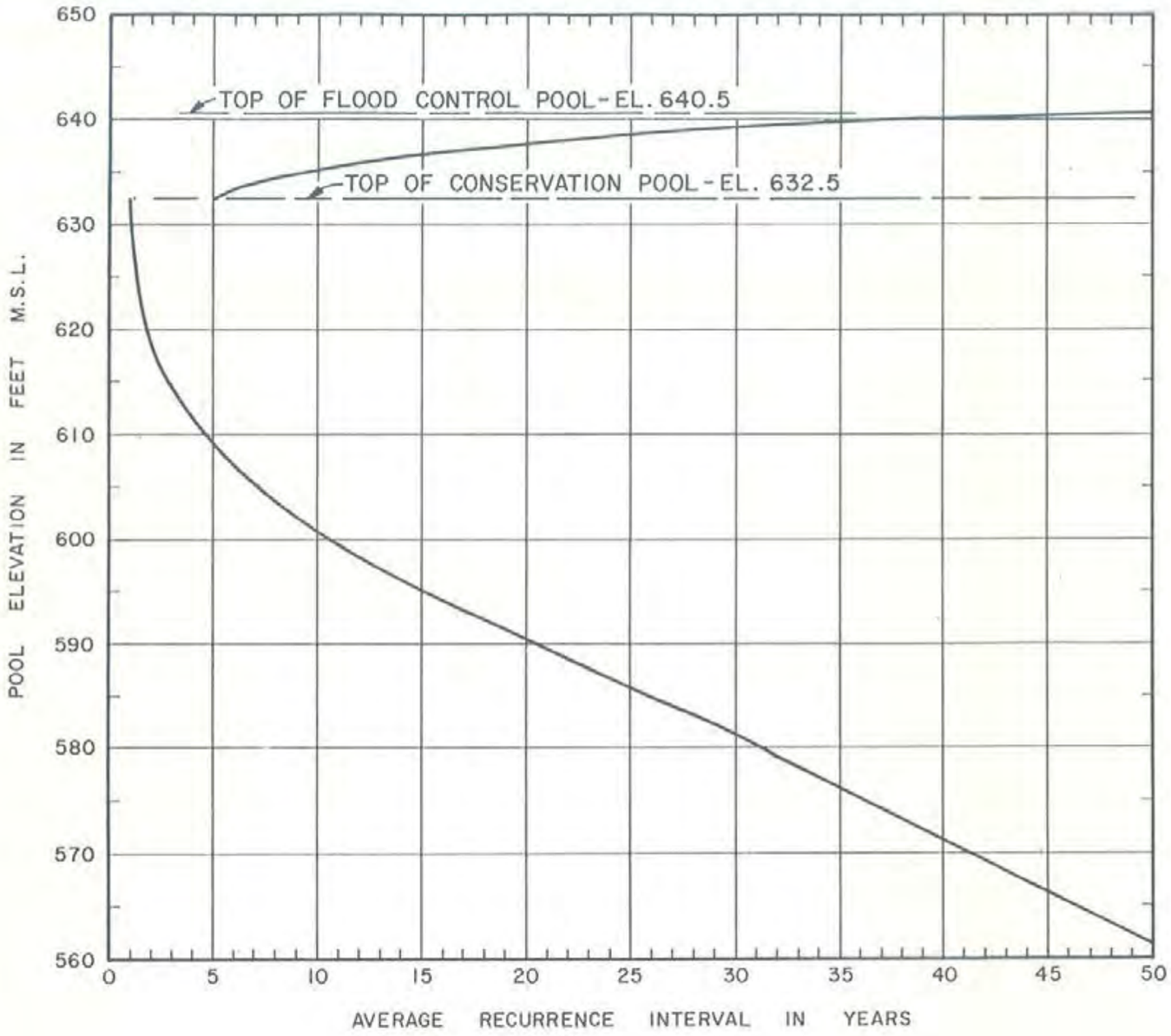
AREA AND CAPACITY CURVES

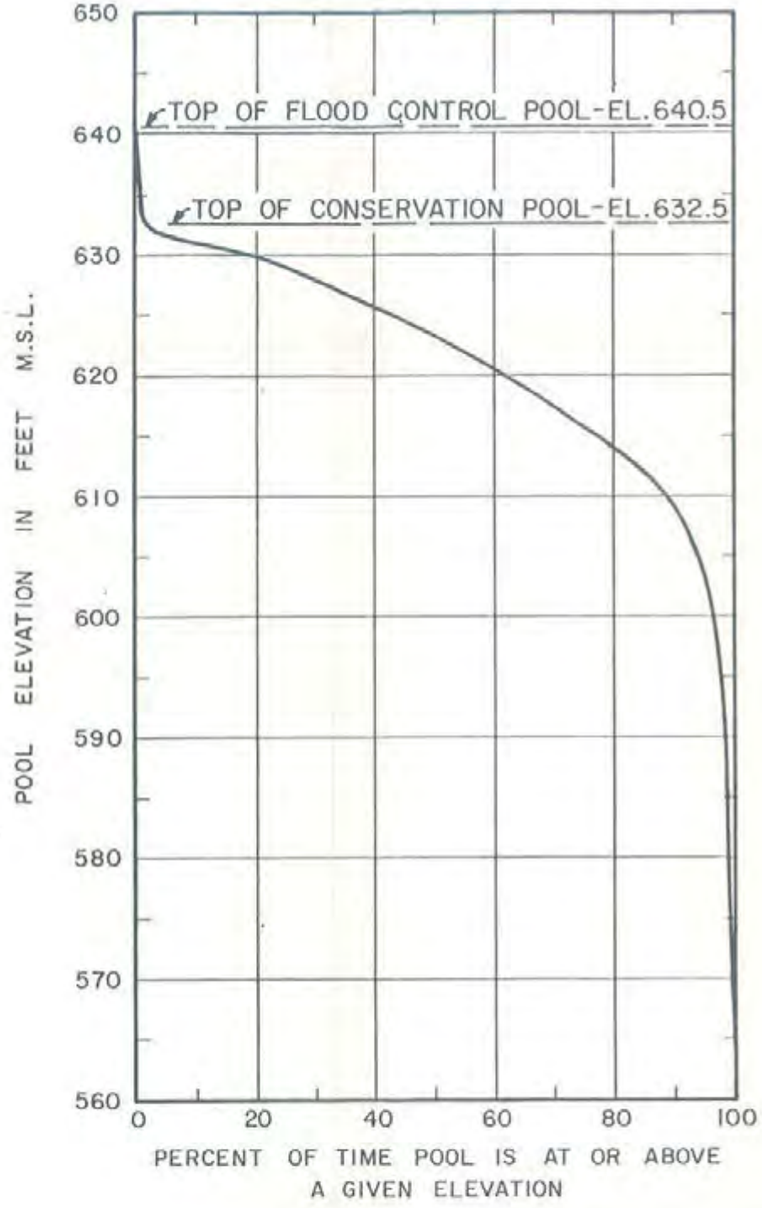
SCALES AS SHOWN

U.S. ARMY ENGINEER DISTRICT FORT WORTH

TO ACCOMPANY DESIGN MEMORANDUM NO. 8 - MASTER PLAN

PLATE II-3





NOTES:

Curves based on period of record 1 January 1924 to 30 September 1969.

Curves based on area-capacity data after 100 years of sedimentation.

TRINITY RIVER BASIN, TEXAS
AUBREY LAKE
ELM FORK TRINITY RIVER, TEXAS

POOL ELEVATION PROBABILITY AND DURATION CURVES

SCALES AS SHOWN

U.S ARMY ENGINEER DISTRICT, FORT WORTH OCT. 1974

TO ACCOMPANY DESIGN MEMORANDUM NO. 8- MASTER PLAN

PLATE (II-4)

III RECREATIONAL AND CULTURAL RESOURCES OF THE PROJECT

III. RECREATIONAL AND CULTURAL RESOURCES OF THE PROJECT

3-01. General. - The Ray Roberts Lake project is situated near the Dallas-Denton-Fort Worth metropolitan area, an area which has a projected growth rate above the national average. This location provides an excellent opportunity to develop close to the people, a lake project with a variety of outdoor recreational opportunities. The demand for recreational outlets is demonstrated by the usage of recreational facilities at existing projects in the area. The proposed project should materially enhance the recreational value of the area by providing a water-based recreational attraction. An understanding of the project resources is helpful in identifying potential problems and needs, and in formulating the solutions.

3-02. Archeological Resources - Prior to the most recent study, this section of the state had received only the most minimum of research attention. A reconnaissance of the lake area by Bousman and Verret in 1973 was the only published effort. A number of specific sites have been excavated or collected, but no records could be found. No synthesis of the local social history has been previously compiled.

In 1980, the Corps of Engineers contracted with Environment Consultants, Inc. of Dallas, TX to accomplish a cultural resources survey of the area to be affected by the project's construction. A number of research goals were to be accomplished: (1) develop a cultural-historical synthesis (2) identify synchronic settlement systems and diachronic settlement pattern change (3) reconstruct a demographic curve for both prehistoric and historic periods (4) identify types and periods of region exchange of goods (5) clarify the nature of the prehistoric social systems within the area, (6) identify regularities of early historic settlement and identify the origin of these early settlers. (7) identify patterns of historic landscape evolution in the area and reconstruct the early landscape and (8) identify the changing patterns of historic land use.

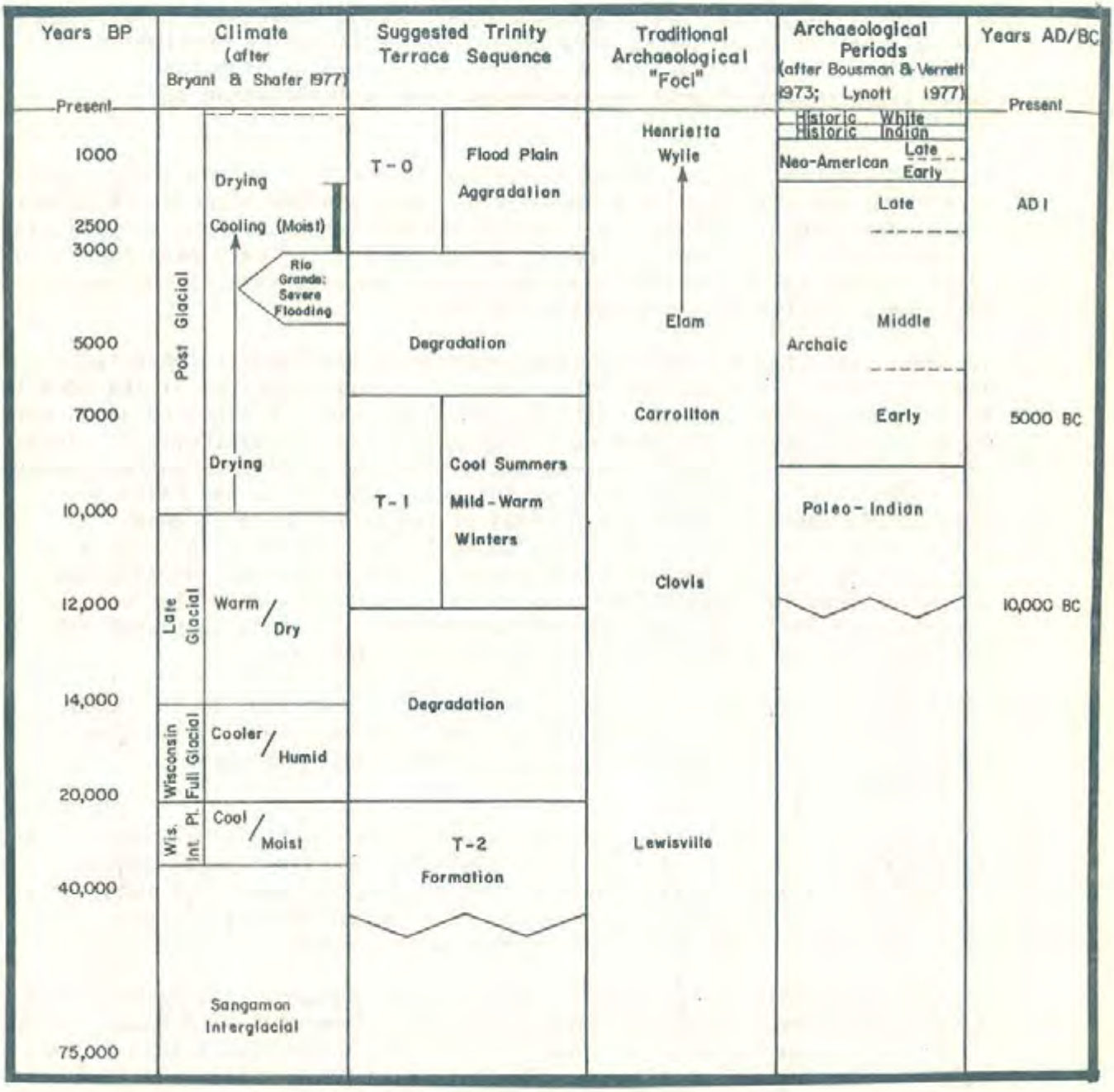
From the extensive archeological investigations conducted in the upper Trinity Watershed, and supplemented by the material found in the Ray Roberts area studies, a chronological sequence was developed. (See Table III-1)

The cultural resources survey of the Ray Roberts Lake area resulted in the locating and recording of a total of 355 sites of either archeological, historical, or architectural interest in the project area. Of these sites, 90 contained only prehistoric material, 238 contained only historic material, and 27 contained material from both periods.

Of the 117 sites with prehistoric material, 40 appear as single-component sites and 22 were initially evaluated as multi-component. 55 could not be classified at early stage of study. Of the 265 historical sites, 142 are solely archeological in nature. 102 contain standing structures with possible archeological materials, there are 5 bridge remains, 14 cemeteries, and 2 are structures with associated cemeteries.

Correlation of reconstructed north Texas climatic sequence and suggested Trinity terrace sequence with traditional archeological "Foci" and archeological periods.

TABLE III-1



In addition to defining archeological sites by appropriate dates, they are often classified by possible use or by identifying the major activity ongoing at the site. Smaller sites are generally associated with the procurement of food or raw materials. Lithic procurement sites may contain broken cobbles, possibly used to test the materials being collected. Food collecting or musseling stations contain those lithic materials needed for the task at hand. Hunting stations are often characterized by a number of tool types, including, but by no means limited to, projectile points, knives and scrapers. Some of these types of camps were repeated utilized, thus appearing in size to be used by many individuals for longer periods of time. Base camps would be generally larger, supporting the activities of larger numbers of individuals for longer periods of time.

3-03. Historical Resources - The most common type of historic site in the Ray Roberts Lake area consists of domestic agricultural sites, or their remains. These farmsteads almost invariably show evidence of permanent occupations; the remains of buildings such as homes and barns, and the presence of root or storm cellars and wells, as well as preponderance of domestic utensils all support this. A total of 200 sites contain historic components which seem to be the result of this type of occupation. Also, related to this type of occupation were less common site types such as isolated buildings and wells. All of these wells are located on the east side of the project and were originally lined with sandstone, although in several cases they appear to have been modified at a later time. In addition to domestic farmsteads and agricultural buildings, several sites were located which apparently functioned on a community level. This type of site includes cemeteries, townsites, bridges, industrial sites and isolated public buildings. There also appears a number of isolated dump sites, which appear to be the result of individual or communal patterns of trash disposal and were found in areas considered unsuitable for domestic occupation. For General locations of a sampling of significant cultural resources see plate III-1. Prior to the transference of any property, the area will be completely surveyed and any adverse effect to significant properties will be mitigated by methods agreed upon by the Corps of Engineers, the State Historic Preservation Officer, and the Advisory Counsel on Historic Preservation.

3-04. Geologic resources. - Mappable groups of lithologically similar formulations include, in descending stratigraphic sequence, Recent alluvium (Qal), Pleistocene terrace deposits (Qt), the Woodbine formation (KWG), the Grayson marl and Main Street limestone (KGY), the Pawpaw, Weno, and Denton formulations (KPWD), and the Fort Worth Limestone (KFU).

3-05. Soils. - The soil characteristics present vary from moderate to severe limitations for recreation development, engineering and land management. However, soil conditions within the area lend themselves to a variety of uses. The desired carrying capacity is based on the soil series, its ability to endure certain uses as determined by the Soil Conservation Service, the slope of the land, and a Soil Conservation Service interpretative report relating these aspects in a carrying capacity for each area. The project soils survey maps are shown on plate III-2. (For soil limitations see table III-2)

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal Filter Fields	Sewage Disposal Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
AUBREY Fine Sandy Loam 1	Severe: perme-ability	Slope: up to 7% slope Severe: over 7% slope perme-ability of substratum	Moderate: shrink swell corrosivity	Moderate: traffic supporting capacity shrink-swell	Slight	Slight	Slight: 0-2% slopes Moderate: 2-6% slopes Severe: 6-8% slopes	Slight	Openland: well suited Woodland: suited	Sandy Loam Site:2,500# - 4,000#* Excellent condition: major vegetation is little bluestem indiangrass, beaked panicum, big bluestem. purpletop, brownseed paspalum, post oak and blackjack oak.
BIROME Fine Sandy Loam 2	Moderate: perme-ability	Slope: slope slope Severe: over 7% slope perme-ability of substratum	Moderate: shrink-swell corrosivity	Moderate: traffic supporting capacity shrink-swell	Moderate:	Moderate:	Severe: 0-2% slopes Severe: 2-6% slopes Severe: 6-8% slopes	Moderate:	Openland: well suited Woodland: suited	Sandy Loam Site:2,500# - 4,000#* Excellent condition: major vegetation is little bluestem indiangrass, beaked panicum, big bluestem, purpletop, brownseed paspalum, post oak and blackjack oak.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Wayw	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
BUNYAN Fine Sandy Loam 3	Severe: perme-ability	0-2% slopes slight 2-5% slopes Moderate: slope	Severe: shrink-swell potential	Severe: traffic supporting capacity drainage	Severe: perme-ability	Moderate: wetness	Severe: perme-ability	Fine sandy loam: slight Loamy fine sand: Moderate: sandy texture	Openland & Woodland wildlife: well suited Wetland Wildlife: Unsuited	Fine sandy loam: 4,500# - 6,500#* Excellent condition: little blue-stem, indiangrass, purpletop. postoak, blackjack, oak. Loamy fine sand: 3,000# - 7,500#* Excellent conditions: little blue-stem, indiangrass, brown seed paspalum, postoak, blackjack oak.

TABLES III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

	SOIL RATINGS AND ADVERSE FEATURES AFFECTING:									
	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
CALLISBURG Fine Sandy Loam 4	Severe: perme-ability	Slope: up to 7% slope Severe: over 7% slope perme-ability of substratum	Moderate: traffic swell corrosivity	Moderatew: supporting capacity shrink-swell	Slight	Slight 0-2%	Slight: Moderate: 2-6% slopes Severe: 6-8% slopes	Slight	Openland: well suited Woodland: suited	Sandy Loam Site: 2,500# - 4,000#* Excellent condition: major vegetation is little bluestem, indiangrass, beaked panicum, big bluestem, purpletop, brownseed paspalum, post oak and blackjack oak.
CROCKETT Fine Sandy Loam 5	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: 7-10% slopes	Severe: shrink-swell potential corrosivity uncoated steel	Severe: shrink-swell potential traffic supporting capacity	Severe: perme-ability	Slight: 0-8% slopes Moderate: 8-10% slopes	Severe: perme-ability	Slight:	Openland: well suited Woodland: suited	Grayland Range Site: 4,000#-4,000#* Excellent Condition: little bluestem, big bluestem, indiangrass, Virginia wildrye, Florida paspalum, sideoats grama, Texas wintergrass, silver bluestem, plains lovegrass, perennial legumes, and forbs. Pasture Group: tight loamy upland - production potential is medium to high for improved bermuda grass, weeping lovegrass, Kleingrass, and bahiagrass. Medium to low potential for King Ranch and kleberg bluestem. Sloping Tight Loamy Upland: production potential is medium for improved bermudagrass and weeping lovegrass.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATING AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Contruction	Traffic Ways	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
CROSSTELL Fine Sandy Loam 6	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: 7-10% slopes	Severe: shrink-swell potential, corrosivity, uncoated steel	Severe: shrink-swell potential, traffic supporting capacity	Severe: peme-ability	Slight 0-8% slopes Moderate: 8-10% slopes	Severe perme-ability	Slight	Openland: well suited Woodland: suited	Sandy Loam: 3,500# - 6,500# * Excellent Condition: little blue-stem, indiangrass, big bluestem, Virginia wildrye, Florida paspalum sideoats grams, Texas wintergrass. silver bluestem, plains lovegrass. perennial legumes, and forbs, Pasture Group: tight, loamy upland. Production potential of medium to high for improved bermudagrass, weeping lovegrass, kleingrass, and bahiagrass. Medium to low potential for Kings Ranch bluestem and kleberg bluestem. Sloping, tight loamy upland production potential is medium for improved bermudagrass and weeping lovegrass.
DUFFAU Fine Sandy Loam 7	None to Slight	Moderate: Perm-ability 2-7% slopes	Moderate: Corrosivity 4-8%	Moderate: traffic supporting capacity	None to Slight	None to Slight	Slight: 0-2% 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, swtich-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.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTIN SELECTED USE, COOKE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Playgrounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
FRIO Silty clay 8	Severe: permeability	Slight: 0-2% slope Moderate: 2-5% slope slopes	Severe: shrink-swell potential corrosivity to uncoated steel	Severe: shrink-swell potential traffic supporting capacity	Severe: permeability, wetness	Moderate: wetness texture	Severe: permeability weetness	Moderate: wetness texture	Openland: well suited Woodland: suited	Clayey Bottomland: 5,000# - 10,000#* Excellent Conditions: Eastern gamagrass, Virginia wildrye, switchgrass, plumegrass, beaked panicum, purpletop, little bluestem, vine-mesquite, meadow dropseed, and stipa. Pasture Group: heavey, clayey bottomland. The production potential is high for such species as improved bermudagrass.
GADDY Fine Sandy Loam 9	Severe: permeability	Moderate: up to 7% slope Severe: over 7% slope permeability of substratum	Moderate: shrink-swell corrosivity	Moderate: traffic supporting capacity shrink-swell	Slight	Slight	Slight: 0-2% slopes Moderate: 2-6% slopes Severe: 6-8% slopes	Slight	Openland: well suited Woodland: suited	Sandy Loam Site:2,500# - 4,000# * Excellent condition: major vegetation is little bluestem, indiangrass, beaked panicum, big bluestem, purpletop, brownseed paspalum, post oak and blackjack oak.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

	SOIL RATINGS AND ADVERSE FEATURES AFFECTING:									
	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
GASIL Fine Sandy Loam 10	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: 7-10% slopes	Severe: shrink-swell potential, corrosivity, uncoated steel	Severe: shrink-swell potential, traffic supporting capacity	Severe: perme-ability	Slight: 0-8% slopes Moderate: 8-10% slopes	Severe: perme-ability	Slight	Openland: well suited Woodland: suited	Sandy Loam: 3,500# - 6,500# * Excellent Condition: little bluestem, Indiangrass, big bluestem, Virginia wildrye, Florida paspalum sideoats grama, Texas wintergrass. silver bluestem, plains lovegrass, perennial legumes, and forbs, Pasture Group: tight, loamy upland. Production potential of medium to high for improved bermudagrass, weeping lovegrass, kleingrass, and bahiagrass. Medium to low potential for Kings Ranch bluestem and kleberg bluestem. Sloping, tight loamy upland production potential is medium for improved bermudagrass and weeping lovegrass.
GLADEWATER Clay 11	Severe: perme-ability, depth to rock	Severe: Depth to rock	Severe: Very high shrink-swell	Severe: Depth to rock, very high shrink-swell	Severe: texture, very slow perme-ability	Severe: texture	Severe: texture very slow perme-ability	Severe: texture	Openland: Good Woodland: Good Wetland: Very poor	Redland: 3,500# - 5,500# * Excellent Condition: big bluestem, little bluestem, Indiangrass, plain lovegrass, Canada wildrye, sideoats grama, Texas wintergrass, hairy dropseed, silver and cane bluestem. Pasture Groups: Heavy Upland clay - High potential for improved bermuda grass or kleingrass.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
GOWEN Clay Loam 12	Severe: subject to flooding	Subject to flooding Severe: flooding protected Moderate: perme-ability	Severe: subject to flooding	Subject to flooding Severe: flooded more often than once in 5 years	Severe: subject to flooding Moderate: if pro-tected clay loam texture	Moderate: subject to flooding clay loam texture Slight: if pro-tected loam texture	Moderate: subject to flood-ing, clay loam texture Slight: if pro-tected loam texture	Moderate: subject to flooding clay loam texture Slight: if pro-tected loam texture	Openland: protected - well suited frequently flooded - suited Woodland: protected - well suited frequently flooded- well suited	Bottomland Site: 6,500# - 9,000# Excellent Condition: big bluestem, little bluestem, Indiangrass, switchgrass, Eastern gamagrass, per-ennial wildrye, pecan, and elm. Pasture and Hayland Group: friable clayey bottomland: adadted species include improved bermudagrass, kleingrass, and johnsongrass.
HEATON Loam Fine sand 13	Moderate: perme-ability	0-2% slopes slight 2-5% slopes Moderate: slope	Moderate: shrink-swell potential	Moderate: traffic supporting capacity drainage	Moderate: perme-ability	Moderate: wetness	Moderate: perme-ability	Fine sandy loam: slight Loamy fine sand: Moderate: sandy texture	Openland & Woodland wildlife: well suited Wetland Wildlife: Unsuited	Fine sandy loam: 3,000# - 6,000# * Excellent condition: little blue-stem, Indiangrass, purpletop, postoak, blackjack, oak. Loamy fine sand: 3,000# - 7,500# * Excellent conditions: little blue-stem, Indiangrass, brown seed paspalum, postoak, blackjack oak.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

	SOIL RATINGS AND ADVERSE FEATURES AFFECTING:									
	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
JUSTIN Fine Sandy Loam 14	Moderate: Perme-ability	Moderate perme-ability site material	Slight: 0-4% slopes Moderate: 4-5% slopes slope	Moderate: fair traffic supporting capacity	Slight: fine sandy loam Moderate: loam fine sandy texture	Slight: fine-sandy loam Moderate: loam fine sandy texture	Slight: 0-2% slopes Moderate: 2-5% slopes loam fine sandy texture 0-5% slopes	Slight fine sandy loam Moderate: loam fine sandy texture	Openland: well suited Woodland: well suited	Sandy Loam Site: 2,500# - 4,000# * Excellent Condition: little bluestem, Indiangrass, beaked panicum, big bluestem, pupletop, brownseed paspalum, post oak, and few scattered live oak trees.
KAUFMAN Clay 15	Severe: Very low perme-ability depth to water-table, flooding	Severe depth to water, flooding	Severe: Very high shrink-swell potential, flooding	Severe: low strength, very high shrink-swell potential	Severe: texture wetness, flooding	Severe: texture wetness, flooding	Severe: texture wetness, flooding	Severe: texture wetness, flooding	Openland Wildlife: Fair Woodland Wildlife: Good Wetland Wildlife: Poor	Clayey bottomland: 4,000# - 9,000# * Excellent condition: hardwoods and grasses such as switchgrass, redtop panicum, beaked panicum, switchcane and vine mesquite. Pasture Group: Very high potential for kleingrass - 75.
KONSIL Fine Sandy Loam 16	Severe: perme-ability	Slope: up to 7% slope Severe: over 7% slope perme-ability of substratum	Moderate: shrink-swell corrosivity	Moderate: traffic supporting capacity shrink-swell	Slight	Slight	Slight 0-2% slopes Moderate: 2-6% slopes Severe: 6-8% slopes	Slight	Openland: Well suited Woodland: suited	Sandy Loam Site: 2,500# - 4,000# * Excellent condition: major vegetation is little bluestem, Indiangrass, beaked panicum, big bluestem, purpletop, brownseed paspalum, post oak and blackjack oak.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-gounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
LINDY Loam 17	Severe: depth to bedrock	Severe: depth to bedrock	Severe: high shrink-swell potential	Severe: depth to bedrock	Moderate: perme-ability	Slight:	Moderate: perme-ability depth to bedrock	Slight:	Openland: well suited Brushland: well suited	Redland Site: 3,000# - 5,000# * Excellent Condition: little bluestem, Indiangrass, big bluestem, plains lovegrass, and Canada wildrye.
MABANK Fine Sandy Loam 18	Severe: Perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: 7-10% slopes	Severe: shrink-swell potential, corrosivity, uncoated steel	Severe: shrink-swell potential, traffic supporting capacity	Severe: perme-ability	Slight: 0-8% slopes Moderate: 8-10% slopes	Severe: perme-ability	Slight	Openland: well suited Woodland: suited	Sandy Loam 3,000 - 6,000 Excellent Condition: little bluestem, Indiangrass, big bluestem Virginia wildrye. Florida paspalu sideoats grama, Texas wintergrass silver bluestem, plains lovegrass perennial legumes, and forbs. Pasture Group: tight, loamy upland. Production potential of medium to high for improved bermudagrass, weeping lovegrass, kleingrass, and bahiagrass. Medium to low potential for Kings Ranch bluestem and kleberg bluestem.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

	SOIL RATINGS AND ADVERSE FEATURES AFFECTING:									
	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
MALOTERRE Stony Clay 19	Severe: bedrock within 15inches	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 15inches 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.
MEDLIN Clay 20	Severe: 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: 5,000# - 10,000# * Excellent Condition: Eastern gama-grass, Virginia wildrye, switch-grass, plumegrass, beaked panicum. purpletop, little bluestem, vine-mesquite, meadow dropseed, and stipa. Pasture Group: heavy, clayey bottom-land. The production potential is high for such species as improved bermudagrass.
NAVO Clay Loam	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe:	Severe: high shrink-swell high corrosivity uncoated	Severe: traffic supporting capacity high shrink-swell	Severe: perme-ability	Moderte: clay loam texture moderately well drained	Severe: perme-ability	Moderate: clay loam texture	Openland: well suited Woodland: suited	Grayland Site: 3,000# - 5,550# * Excellent Condition: big bluestem, little bluestem, switchgrass, in-diangrass, Florida paspalum, and sideoats grama. Pasture Group: Tight clayey upland; adapted to such species as improved bermudagrass, weeping lovegrass, and kleingrass.

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

	SOIL RATINGS AND ADVERSE FEATURES AFFECTING:									
	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
NORMANGEE Clay Loam 22	Severe: perme-ability	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: over 7% slopes	Severe: high shrink-swell high corrosivity uncoated steel	Severe: traffic supporting capacity high shrink-swell	Severe: perme-ability	Moderate: clay loam texture moderately well drained	Severe: perme-ability	Moderate: clay loam texture	Openland: well suited Woodland: suited	Grayland Site: 3,000# - 5,500# * Excellent Condition: big bluestem, little bluestem, switchgrass, indiangrass, Florida paspalum, and sideoatss grama. Pasture Group: Tight clayey upland; adapted to such species as improved bermudagrass, weeping lovegrass, and kleingrass.
PULEXAS Fine Sandy Loam 23	Moderate: perme-ability	0-2% slopes slight 2-5% slopes Moderate: slope	Severe: shrink-swell potential	Severe: traffic supporting capacity drainage	Moderate: perme-ability	Moderate: wetness	Moderate: perme-ability	Fine sandy loam: sdlight Loamy fine sand: Moderate: sandy texture	Openland & Woodland wildlife: well suited Wetland Wildlife: Unsited	Fine sandy loam: 2,000# - 4,500# * Excellent condition: little bluestem, Indiangrass, purpletop, postoak, blackjack, oak. Loamy fine sand: 3,000# - 7,500# * Excellent conditions: little bluestem, Indiangrass, brown seed paspalum, postoak, blackjack oak.
PURVES Clay Loam 24	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 bermudagrass, King Ranch bluestem, and kleiberg bluestem.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE,DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
SANGER Clay	Severe: perme-ability 15-20%y slopes	Slight: 0-2% slopes Moderate: 2-7% slopes Severe: 7-20% slopes	Severe: shrink-swell potential corrosivity 8-20% slopes	Severe: shrink-swell potential traffic supporting capacity	Severe: clay texture very slow perme-ability	Severe: clay texture texture	Severe: clay texture veryuslow perme-ability more than 6% slopes	Severe: clay texture texture	Openland: clays 0-15% slopes - suited; clays 15-20% slopes, stony and gravelly clays, suited Woodland: 0-15% slopes poorly suited 15-20% slopes stony and grav-elly clays, poorly suited	Rolling Blackland: 4,000# - 8,000# * Excellent condition: big bluestem, little bluestem, Indianagrass, switchgrass, sideoats grama, and forbs. Pasture Group: production potential high for improved bermudagrass or kleingrass with medium production of King Ranch bluestem and kleberg blue-stem.
SILIWA Fine Sandy Loam	Slight: 0-5% slopes Moderate: 5-8% slopes	Severe: perme-ability	Slight: 0-4% slopes	Slight: 0-6% slopes Moderate: 6-8% slopes	Slight:	Slight:	Slight: 0-2% slopes Moderate: 2-6% slopes Severe: 6-8% Slopes	Slight:	Openland: well suited Woodland: Well suited	Pasture and hayland: well suited, low fertility, production poten-tial medium to high

TABLE III 2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

	SOIL RATINGS AND ADVERSE FEATURES AFFECTING:									
	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
SILSTID Fine Sandy Loam	Moderate: perme-ability	0-2% slopes slight 2-5% slopes Moderate: slope	Severe: shrink-swell potential	Severe: traffic supporting capacity drainage	Moderate: perme-ability	Moderate: wetness	Moderate: perme-ability	Fine sandy loam: slight Loamy fine sand: Moderate: sandy texture	Openland & Woodland wildlife: well suited Wetland Wildlife: Unsuited	Fine sandy loam: 2,000# - 4,500#* Excellent condition: little blue-stem, Indiangrass, purpletop, postoak, blackjack, oak. Loamy fine sand: 3,000# - 7,500# * Excellent conditions: little blue-stem, Indiangrass, brown seed paspalum, postoak, blackjack oak.
SPECK Clay	Severe: Bedrock, perme-	Severe: Bedrock	Severe: Bedrock, corrosivity	Severe: Bedrock	Moder-ate: perme-texture	Moder-ate: texture	Severe: Bedrock	Moder-ate: texture	Openland Good Woodland: Wetland: Poor	Redland: 2,000# - 4,500# Excellent condition: little blue-stem, Indiangrass, sideoats grama, asture Group: Shallow Clayey - adapted species include improved bermudagrass, King Ranch bluestem, Kleberg bluestem.
TINN Clay	Severe: very slow perme-ability	Slight: 0-2% slopes Moderate: more than 2% slopes	Severe: Very shrink-swell high corrosivity	Severe: Very poor traffic 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:	ayey bottomland, 4,000 - 7,000 Excellent condition: big bluestem, little bluestem, Indiangrass, and switchgrass. Pasture Group, heavyyclayey upland, Adapted species are improved bermudagrass and kleingrass.

TABLE III-2

DEGREE OF LIMITATIONS AND MAJOR SOIL FEATURES AFFECTING SELECTED USE, COOKE, DENTON, AND GRAYSON COUNTIES

Soil Series	SOIL RATINGS AND ADVERSE FEATURES AFFECTING: Sewage Disposal: Filter Fields	Sewage Disposal: Lagoons	Construction	Traffic Ways	Camp Areas	Picnic Areas	Play-grounds	Paths & Trails	Wildlife Suitability	Range Sites, Production and Plants
WHITESBORO Loam	Severe: depth to bedrock	Severe: depth to bedrock	Severe: high shrink-swell potential	Severe: depth to bedrock	Moderate: perme-ability	Slight	Moderate: perme-ability depth to bedrock	Slight:	Openland: well suited Brushland: well suited	Redland Site: 3,000# - 5,000# * Excellent condition: little blue-stem, Indiangrass, big bluestem, plains lovegrass, and Canada wild-rye.
WILSON Silty Clay Loam	Severe: Very slow perme-ability	0-2% slopes slight 2-5% slopes-Moderate: slope swell potential	Low - pH 6.0-7.8 Moderate: pH 5.6-6.0 corrosivity (concrete) Service-High shrink-	Severe: Highshine swell potential	Severe: Very slow perme-ability wetness	Moderate: Wetness, clayey texture	Severe: Very slow perme-ability	Moderate: Wetness, clayey texture	Openland & Rangeland Wildlife: Good Wedland Wildlife: poor to very poor	Grassland - 3,000# - 5,000# * Excellent condition: Wide variety of grasses including little blue-stem, dropseeds, Indiangrass and sideoats grama. Pasture - Potential is medium to high for improved bermudagrass and kleingrass - 75.

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

None to slight; The soil has no limitation or no more than some limitation. The limitation is not serious and is easy to overcome.

Moderate: The soil has moderate limitation to use. The limitation needs to be recognized, but it can be overcome or corrected by means that in general are practical.

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.

3-06. Environmental scenic qualities. - The project area is characterized by quiet hardwood bottoms of ash, hackberry, cedar elm, pecan and cottonwood trees and rolling hills of bluestem grama and other perennial grasses. It is a region of plentiful sunshine averaging 141 clear days each year. The area is isolated from any sites of heavy industry and the air is constantly cleared by predominantly southerly breezes.

3-07. Vegetation. - Terrestrial communities possess their characteristic species, boundaries, and internal structures and are excluded from those habitats which are adapted to, related to, or contain excessive moisture.

Certain controls, resulting from or influenced by the soil rather than the climate, are very important to the vegetation within the area required for the Ray Roberts Lake project. These vegetative types are distinct and natural, externally distinguishable communities, each characterized by an assemblage of predominant species controlling the community. Therefore, recognition is given to the edaphic types present which influence the types of vegetation that they support.

The selected site for Ray Roberts Lake is located mainly in the physiographic subdivision of the East Cross Timbers and the Grand Prairie. The East Cross Timbers is underlain by a mixture of slightly acid sands, clays, and sandstone of the Woodbine formation. These reddish, sandy soils support an oak-hickory forest in which the principal aborescent dominance are post oak (Quercus stellata), blackjack oak (Quercus marilandica), Texas hickory (Carya texana), and winged elm (Ulmus alata). The chief understory in this sandy soil is little bluestem (Schizachyrium scoparium), although its abundance has suffered from the extreme grazing pressure in the area. Species of weedy assemblages, dominated mostly by herbs, include purple three-awn (Aristida purpurea), ragweed (Ambrosia artemesifolia), coralberry (Symphoricarpos orbiculatus),, and elderberry Sambuscus).

The bottomland vegetation along the Elm Fork consists primarily of a mesophytic forest of hardwoods. This plant community, which requires a high humidity microenvironment, is typified by a rich variety of tree species, i.e., cedar elm, hackberry, Bumelia, boxelder, ash, hickory, hawthorne, osage-orange, cottonwood and ash willow, Lippia, and creeper. The understory is dominated by broadleaf uniola, greenbrier, bleabane, tumblegrass, buffalobur, and croton.

3-08. Fisheries. - The U.S. Fish and Wildlife Service reports that the Elm Fork of the Trinity River comprise fair quality fish habitat. Principal fishes in the stream are channel and flathead catfishes, blue gill, gar, and carp. Intensive fishing occurs during white bass "runs" upstream from Lewisville Lake. Initially, Ray Roberts Lake will be productive of game fishes and intensive fishing is anticipated. Over a period of time nongame fishes would become abundant. Sport fishing success correspondingly would be reduced. The early surge of fishing activity would level off in response to the reduction in fishing success. This reduction in fishing success can be offset by good operational procedures and prudent fish management practices.

3-09. Wildlife. - Wildlife species in the project area include squirrel, cottontail, jackrabbit, raccoon, opossum, skunk, grey and red foxes, bobwhite, mourning dove, and waterfowl. There are no whitetailed deer or other big-game animals. Neither are there any known resident species of threatened wildlife as described in the Bureau of Sport Fisheries and Wildlife Publication No. 113, "Threatened Wildlife of the United States", although the southern bald eagle may occur temporarily.

The land use trend over the past 30 years has progressed from small grain farming to improved pasture. This trend has accelerated in the past ten years and has adversely affected the food and cover of resident wildlife, resulting in a marked decrease in the populations of these species.

Hunting is light on private land due to landowner's restrictions and also to low game populations. Much of this hunting is accomplished by landowners and their guests. On Federal land, greater opportunities for hunting will be available, but these opportunities are not expected to be adequate enough to meet the needs of the public.

Mourning doves, bobwhites, and rabbits will provide most of the uplandgame hunting at Ray Roberts Reservoir. Squirrel hunting will be limited to a few small pockets in some of the remote cover areas. Sport hunting of fur animals with dogs also will occur in a few isolated areas. Isolated coves and extensive shallow areas should make Ray Roberts Lake attractive to waterfowl.

3-10. Water resources. - The Elm Fork watershed above Ray Roberts Lake has a total drainage area of 692 square miles. Practically all flows from the drainage area are from surface runoff. There is little contribution from seepage or springs. The estimated average annual runoff at the Ray Roberts Dam site under 1985 conditions for the period January 1924 thru December 1979 is 4.94 inches.

3-11. Pictorial Essay. - The following series of photographs is a general representation of the overall resource of the Ray Roberts Lake project area. Subject photographs include high and low density use recreation areas, historical resources, grasslands and woody vegetation. Plate III-3 shows the general location and a brief description of each photograph.

1
CULP BRANCH PARK

2
PECAN CREEK PARK

3
JOHNSON BRANCH PARK

4
JOHNSON BRANCH
PARK

5
JOHNSON BRANCH
PARK

6
JOHNSON BRANCH
PARK

7
BUCK CREEK PARK

8
JORDAN PARK

9
JORDAN PARK

10
JORDAN PARK

11
ISLE DU BOIS PARK

12
ISLE DU BOIS PARK

13
ABANDONED ELM FORK BRIDGE

14
ELM FORK

15
EARLY FARM

16
FIELDSTONE HOUSE

17
ST. JAMES CHURCH

18
HAMMONS HOUSE

19
COASTAL BERMUDA
PASTURE

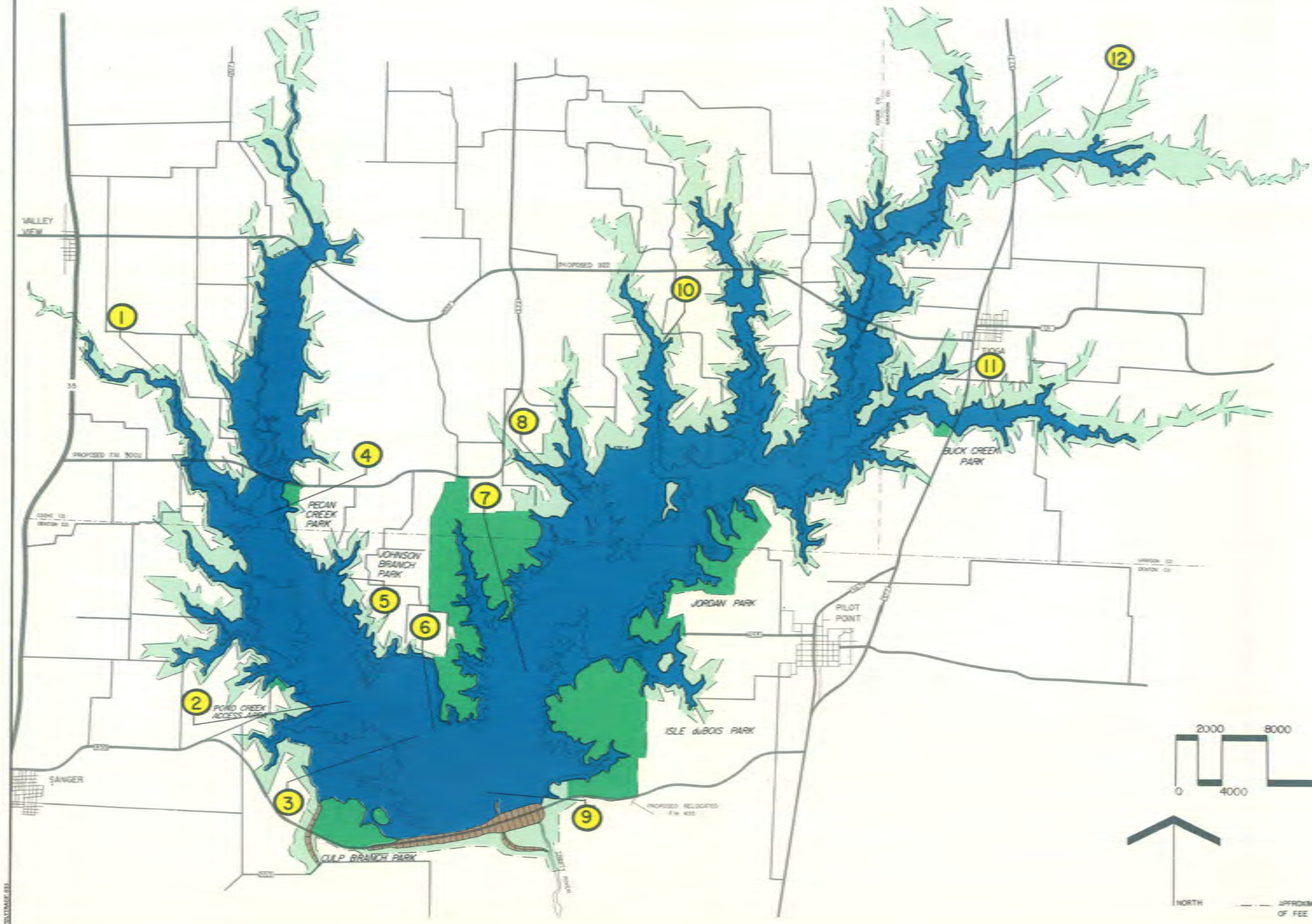
20
WOODED PASTURE

21
WOODED PASTURE

22
WOODED PASTURE

23
COASTAL BERMUDA
PASTURE

24
OIL WELL \ CROPLAND



KEY

1. TURN OF THE CENTURY WATER POWERED MILL
2. PREHISTORIC ARCHEOLOGICAL SITE
3. ABANDONED TOWN OF COSNER (VAUGHANTOWN)
4. ROCK-FACED ELIZABETHAN REVIVAL HOUSE
5. HAMMONS HOUSE
6. PREHISTORIC ARCHEOLOGICAL SITES
7. PREHISTORIC BURIAL SITE
8. CUMBERLAND HOUSE
9. TURN OF THE CENTURY HESTER HOMESTEAD
10. PREHISTORIC ARCHEOLOGICAL SITE
11. HISTORIC ARCHEOLOGICAL SITE
12. NEO-AMERICAN CAMP SITE

2000 8000
0 4000 16000 ft

NORTH

APPROXIMATE LIMITS OF FEE ACQUISITION

SYM	NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

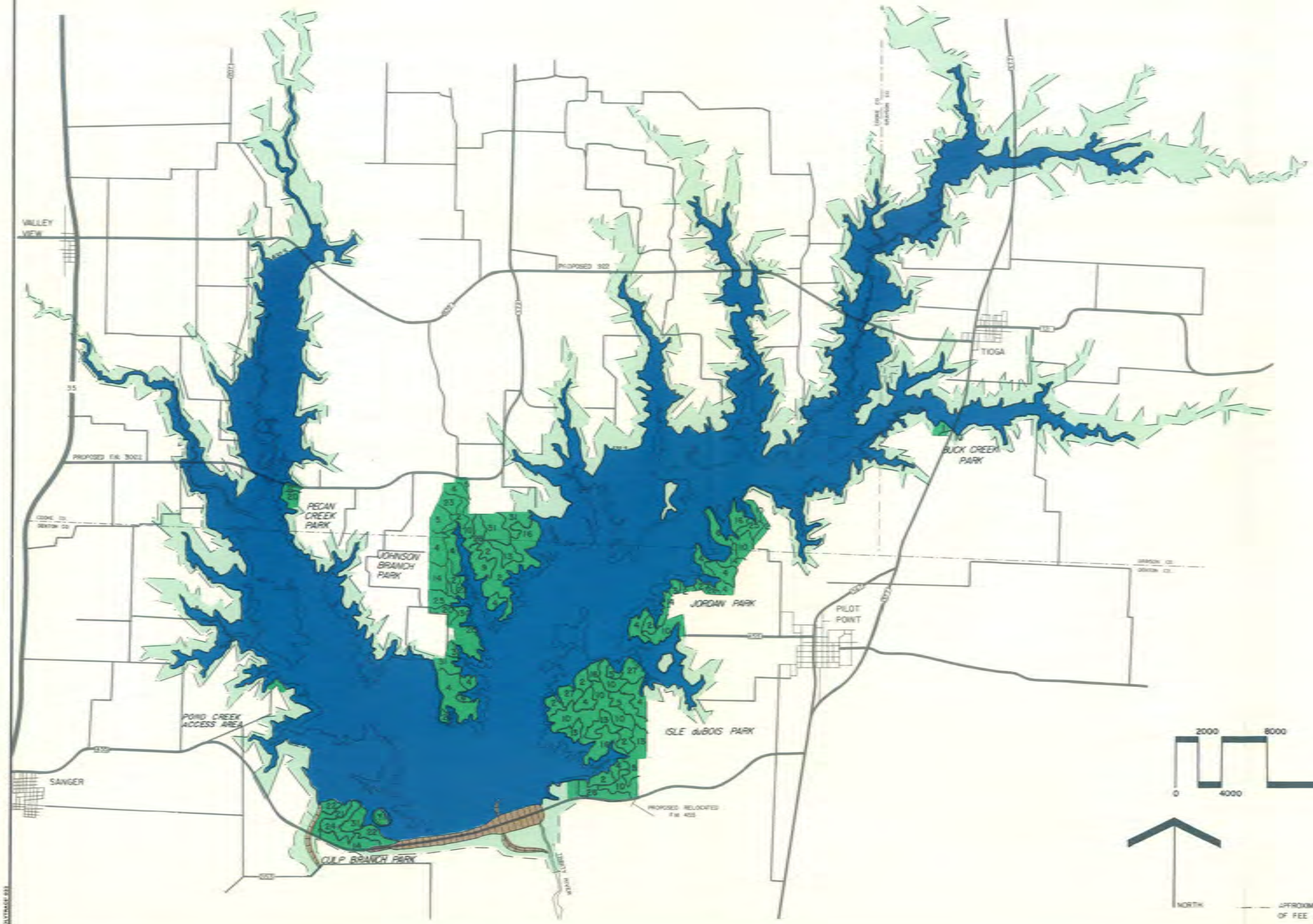
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

SIGNIFICANT CULTURAL RESOURCES

TO ACCOMPANY DESIGN MEMORANDUM NO 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 1 OF 1
SEQUENCE NO. III-3



KEY
SOIL TYPE

1.	AUBREY	– FINE SANDY LOAM
2.	BIROME	– FINE SANDY LOAM
3.	BUNYAN	– FINE SANDY LOAM
4.	CALLISBURG	– FINE SANDY LOAM
5.	CROCKETT	– FINE SANDY LOAM
6.	CROSSTELL	– FINE SANDY LOAM
7.	DUFFAU	– FINE SANDY LOAM
8.	FRIO	– SILTY CLAY
9.	GADDY	– FINE SANDY LOAM
10.	GASIL	– FINE SANDY LOAM
11.	GLADEWATER	– CLAY
12.	GOWEN	– CLAY LOAM
13.	HEATON	– LOAM FINE SAND
14.	JUSTIN	– FINE SANDY LOAM
15.	KAUFMAN	– CLAY
16.	KONSIL	– FINE SANDY LOAM
17.	LINDY	– LOAM
18.	MABANK	– FINE SANDY LOAM
19.	MALOTERRE	– STONY CLAY
20.	MEDLIN	– CLAY
21.	NAVO	– CLAY LOAM
22.	NORMANGEE	– CLAY LOAM
23.	PULEXAS	– FINE SANDY LOAM
24.	PURVES	– CLAY LOAM
25.	SANGER	– CLAY
26.	SILAWA	– FINE SANDY LOAM
27.	SILSTID	– FINE SANDY LOAM
28.	SPECK	– CLAY
29.	TINN	– CLAY
30.	WHITESBORO	– LOAM
31.	WILSON	– SILTY CLAY LOAM

2000 8000
0 4000 16000 ft

NORTH

APPROXIMATE LIMITS OF FEE ACQUISITION

REVISION NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

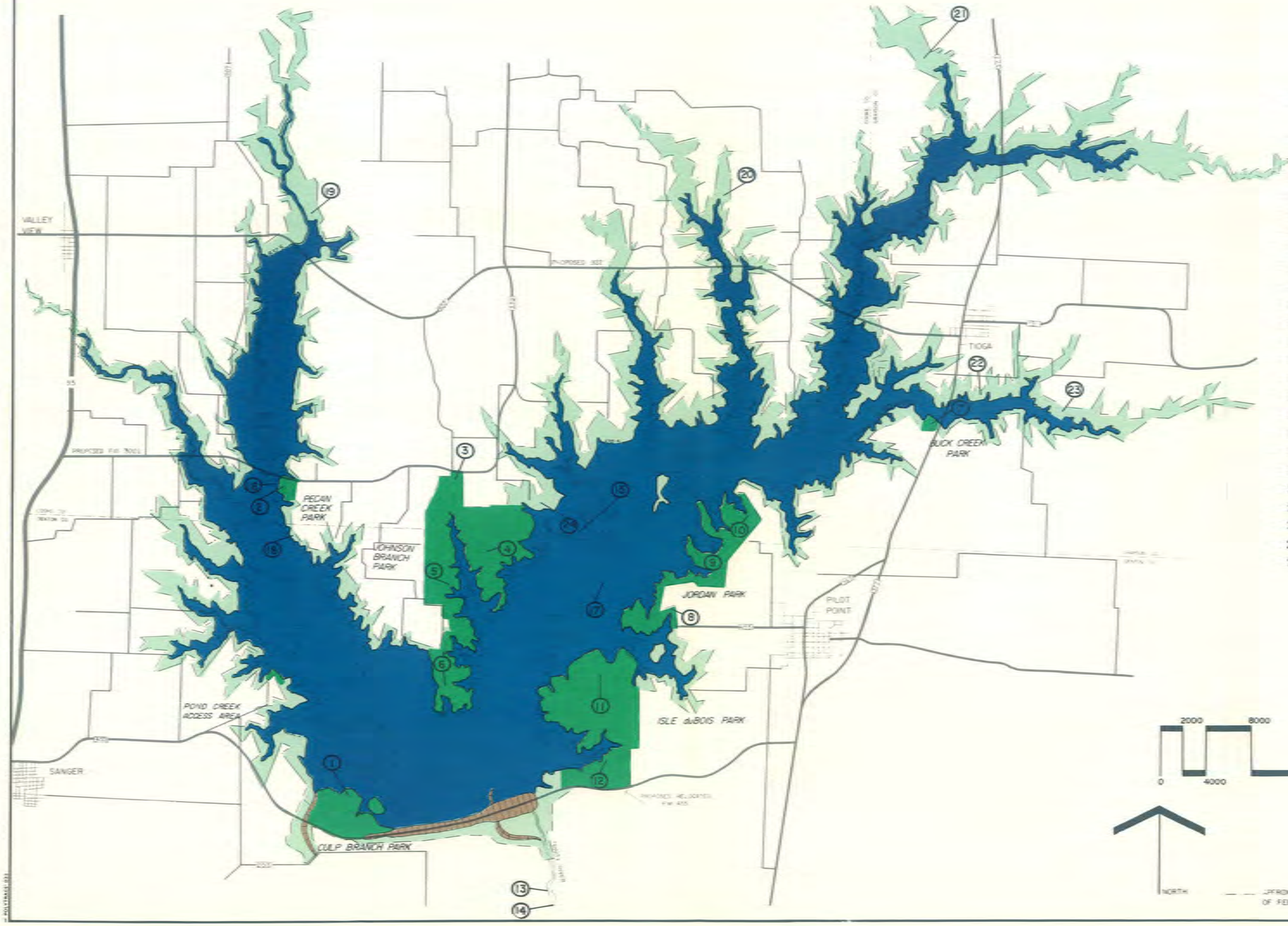
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: P. HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

SOILS MAP

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO. | DATE
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 of 1 | SEQUENCE NO. II-2



KEY

1	CULP BRANCH PARK
2	PECAN CREEK PARK
3	JOHNSON BRANCH PARK
4	JOHNSON BRANCH PARK
5	JOHNSON BRANCH PARK
6	JOHNSON BRANCH PARK
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16	FIELDSTONE HOUSE
17	ST. JAMES CHURCH
18	HAMMONS HOUSE
19	COASTAL BERMUDA PASTURE
20	WOODED PASTURE
21	WOODED PASTURE
22	WOODED PASTURE
23	COASTAL BERMUDA PASTURE
24	OIL WELL \ CROPLAND

2000 8000

0 4000 16000 ft.

NORTH

APPROXIMATE LIMITS OF FEE ACQUISITION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

PICTORIAL KEY

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

III-3

IV FACTORS INFLUENCING AND RESTRICTING RESOURCE DEVELOPMENT AND MANAGEMENT

IV - FACTORS INFLUENCING AND RESTRICTING RESOURCE DEVELOPMENT AND MANAGEMENT

4-01. General. - The aim of the master plan is to balance the development of recreation facilities and the available project lands to ensure the wise use of the project's resources in the best interest of the public. The formulation of this plan requires the determination, as far as possible, of project resources and the factors influencing and restricting their development and management. The interrelationship between the factors discussed in this chapter and the project resources discussed in Chapter III is vital in determining the recreational-use potential, the extent of project resource use, and the plans for resource development. Although various factors may be operative in particular situations, the factors presented in this chapter seem to be operative in general and to signify the greatest impact upon the development and management of project resources. The state of Texas and the cities of Dallas and Denton who will cost share in the development of the project and who will administer, operate, and maintain the parks and project lands around Ray Roberts Lake have had a major and continuing input in the development of the project.

4-02. Day-use zone of origin. Experience at completed lake projects in the Fort Worth District and at similar projects elsewhere suggests that the primary recreational use of these projects falls within the day-use category. The term "day-use zone of origin" refers to a 2-hour or 100-mile driving range which will allow driving to the project, participating in recreational activities, and returning home the same day. Therefore, an irregular area with a boundary approximately 100 road miles from the project was evaluated. It was determined from the evaluation that the "day-use market area" (the geographical area from which over 80 percent of the day-users originate) would be within 50 road miles of the project. Consequently, the examination of the factors influencing and restricting resource development and management was centered primarily around the project and the surrounding day-use market area.

4-03. Effect of Socio-economic Factors.

a. Existing population characteristics - The existing population of the day use area is a mixture of urban and rural. The present large populations are located in the nearby Dallas-Fort Worth metroplex and urban centers of Denton. The once rural towns of Sanger, Pilot Point, Tioga, and Aubrey are rapidly being converted into residential bedroom communities servicing the Dallas, Fort Worth, and Denton metroplex centers. Eighty percent or more of the day use visitation will be from Dallas, Tarrant, Cooke, Montague, Wise, Denton, and Collin counties. The 1985 population from these counties total 3,013,591. Approximately 80% of the total population is found in urban areas. Population data for the market area are shown by county in table IV-1 and by major cities in table IV-2.

TABLE IV-1

Market Area Population Data by Counties

County	Total[1] Population 1975	Total[2] Population 1985	Percentage Change from 1975 to 1985
Collin	105,705	188,045	+78
Cooke	25,564	29,828	+17
Dallas	1,441,935	1,683,975	+17
Denton	109,380	185,263	+69
Montague	16,368	18,355	+12
Tarrant	788,599	929,750	+18
Wise	23,131	30,038	+30
TOTAL	2,510,685	3,013,591	

1 Texas Almanac, 1982-1983 (Interpolated)
2 Interpolated from Texas Almanac, 1982-1983 and OBERS

TABLE IV-2

Population Data for Cities in the Market Area
Texas Almanac

City	County	Total Population 1970	Total Population 1980	Percent Change
Arlington	Tarrant	89,723	160,123	78.5
Bowie	Montague	5,185	5,610	8.2
Bridgeport	Wise	3,614	3,737	3.4
Dallas	Dallas	844,401	904,078	7.1
Denton	Denton	39,874	48,063	20.5
Euless	Tarrant	19,316	24,002	24.2
Fort Worth	Tarrant	393,476	385,141	- 2.1
Gainesville	Cooke	13,830	14,081	1.8
Garland	Dallas	81,437	138,857	70.5
Grand Prairie	Dallas	50,904	71,462	40.4
Grapevine	Tarrant	7,023	11,801	68.0
Hurst	Tarrant	27,215	31,420	15.4
Irving	Dallas	97,260	109,943	13.0
Lewisville	Denton	9,264	24,273	162.0
Mesquite	Dallas	55,131	67,053	21.6
McKinney	Collin	15,193	16,249	7.0
Plano	Collin	17,872	72,331	304.7
Richardson	Dallas	48,582	72,496	49.2

Source: Texas Almanac, 1982-1983

b. Projected population. - Population growth in the market area is expented to make notable gains through 2020. The population growth was projected only through the year 2020 because the project will reach its carrying capacity before that year and there was no need to project any further. The population now is distributed in Dallas, Fort Worth, and Denton. This distribution pattern will be maintained in the future with a steady population increase predicted. The major population pattern change will be around the immediate vicinity of the lake. The lake will receive an influx of population for residency. At present, there are large numbers of residential developments occurring around the lake, especially in the towns of Sanger, Pilot Point, Tioga, and Aubrey. Most of these residences are being purchased by the Denton-Dallas area residents. There is a steady demand for second homes, retirement homes, and even primary residences from which people may commute to the Denton-Dallas area. This demand will be multiplied with the completion of Ray Roberts Lake. Current projected population data for the years 1985 through 2020 are shown in table IV-3.

TABLE IV-3

Projected Population in Market Area
(Series E Prime Projections)

	DECADE POPULATION				
County	1985	1990	2000	2010	2020
Collin	188,045	231,600	335,300	429,200	523,200
Cooke	29,828	32,000	36,100	40,400	44,600
Dallas	1,683,975	1,811,400	2,028,200	2,270,100	2,505,700
Denton	185,263	227,400	320,700	408,700	496,800
Montague	18,355	19,300	21,500	23,600	25,600
Tarrant	929,750	998,700	1,092,900	1,176,900	1,250,900
Wise	30,038	33,500	42,100	49,300	56,400
TOTAL	3,013,591	3,353,900	3,878,800	4,398,200	4,903,200

Source: 1985 data from Texas Almanac, 1982-83 (Interpolated). Projections furnished by SWD.

c. Growth patterns. - The recreation market area immediately surrounding the project is composed of small communities which provide centers for commerce. The fast growing Denton, Dallas, and Fort Worth metropolitan areas are located approximately 14, 43, and 51 miles, respectively, from the project site, with excellent transportation connections. Since the 1950's, the general trend has been a movement away from the rural areas to the metropolitan areas. Generally, the small farm and ranch units are being absorbed into large units involving large investments which tends to establish a more stable economic agricultural base.

d. General Economy. - The general economy of the proposed Ray Roberts Lake area and its watershed is comprised of the usual wholesale and retail business activities, a number of industrial enterprises, and several large educational institutions. In 1980 livestock and crop production amounts to over $257 million in the seven county study area. Due to the proximity of Lake Texoma and Lewisville and Grapevine Lakes, income in the project area derived from supporting recreational activities at those lakes is increasing. Job opportunities in the Dallas-Fort Worth metropolitan area are also available as sources of income for residents in this area.

e. Income. - Incomes are increasing. Per capita incomes for BEA Area 125 (Dallas-Fort Worth) have increased from about $2385 in 1960, to $5680 in 1978. The trends are clearly upward and are expected to continue. The projected per capita income for the BEA Area 125 is as follows:

TABLE IV-4

Projected Per Capita Incomes for BEA

1985[1]	1990	2000	2010[1]	2020[1]
$6,994	$7,918	$9,800	$12,720	$15,259

1 Interpolated value

Source: Derived from 1980 OBERS, BEA regional projections.

Along with changes in average incomes, there are shifts in distribution of income which make it economically possible for more people to engage in different kinds of outdoor activity. A greater proportion of this higher income will be discretionary, a larger proportion for outdoor recreation than is true today. Finally, disposable income is increasing proportionately to obligated income, which further expands the opportunity for recreational pursuits.

f. Leisure time. - The average workweek has declined considerably. In 1900, the average workweek was about 60 hours. Today the workweek has declined to about 40 hours. The net result has been increased leisure time. Although it is anticipated that there will be a continued gradual decline in the average workweek, leisure time will be most significantly changed by the recent trend to shift to a four-day workweek and later to a possible three-day workweek. This trend is expected to occur during the life of the project. With a larger block of leisure time available each week, it is expected that increased recreation participation will occur.

g. Travel. - The population is becoming more mobile. The enjoyment of almost every kind of outdoor recreation involves some travel. First, the kind of transportation facilities available determines travel time and, therefore, the amount of outdoor recreation that most people can enjoy. Second, transportation affects outdoor recreation in terms of monetary cost. Third, transportation facilities influence the character of the recreation experience. There have been significant changes in the

amount of travel per person and in the mode of transportation over the past 50 years. At the time, there have been improvements in comfort and convenience. The excellent highway system traversing and paralleling the proposed lake area greatly enhances the area for potential recreational use. Although the full impact of a fuel shortage is not known at this time, it is anticipated that recreation use will intensify at areas close to urban centers, and more rural areas will receive less use but the users will stay longer. In the future, public transportation should become increasingly important in influencing mass mobility. With the unpredictability of future fuel supply levels and economic conditions, it has become important to provide recreational opportunities close to metro areas.

4-04. Changing trends in recreation. - Beginning in the late 1950's and continuing through the present, a trend in outdoor recreation activities has been established that continues to grow every year. Camping, which used to be the activity of only a few rugged individuals and organizations such as the Boy Scouts, has become one of the major outdoor recreation activities in the United States. The improvements in camping equipment, self-contained campers and motor homes, and high-cost motel, hotel, and restaurants have all contributed to this trend.

Developing along with the camping trend, but beginning earlier, is the outdoor activity of recreational boating. In the last few years, a new trend of bass fishing in the southern states has been established and continues to grow. Although it has always been a popular sport, new innovations by the tackle and boating industries have promoted the activity to a point that the pursuit of this one species of fish is a billion dollar industry in itself. An average bass fishing "rig" in the southern states costs in excess of $2,000 and consists of a custom built boat, motor of 40 to 125 horsepower, foot-operated trolling motor, and a fish locator. Tackle boxes can contain upward of 50 plugs that average more than $1.00 each. Rods and reels, two or more per individual, cost upward of $20 each. An increase in the number of large sail boats has also developed within the past decade, often being the most dominate craft at marina sites.

4-05. Need for project recreation. - The following information is based on data from the Texas Outdoor Recreation Demand Survey which was one of several surveys conducted in preparation of the Texas Outdoor Recreation Plan, TORP. The Ray Roberts Lake recreation market area overlaps State planning regions 3, 4, and 22. The lake itself is in planning region 4.

Table IV-5 represents selected use activities which were extracted from the 1980 TORP report for the Ray Roberts Lake Market Area.

TABLE IV-5

PROJECTED RECREATION NEEDS IN PORTIONS OF REGIONS 3, 4, and 22

ACTIVITY	RESOURCE OR FACILITY	IN URBAN AREAS			RURAL AREAS			REGIONAL TOTALS		
		1980	1985	2000	1980	1985	2000	1980	1985	2000
B+F+S	FRESHWATER BOAT LANES.....	194	258	507						
B+F+S	FRESHWATER BOAT SHIPS AND STALLS	853	1,214	2,613	5,953	7,269	12,542	6,806	8,483	15,155
B+F+S	SUITABLE SURFACE ACRES OF LAKES.	2,763	4,789	12,672	*	*	*	2,763	4,789	12,672
CAMPING	SITES.....	---	---	---	6,312	8,660	18,482	6,312	8,660	18,482
C+K+R.....	MILES OF DESIGNATED STREAMS.....	---	---	---	340	422	768	640	422	768
CHILD' PLAY	ACRES OF PLAYGROUNDS.....	301	344	471	125	170	369	426	514	840
FISHING.....	LINEAR YDS. OF FRESHWATER P+B+M	103	104	241	8,684	9,996	15,039	8,787	10,100	15,280
HORSEBACK RIDING...	MILES OF TRAILS.....	40	54	114	62	84	178	102	138	292
PICNICING.....	TABLES.....	36	43	1,855	6,721	8,299	14,732	6,757	8,343	16,587
SWIMMING.....	SQUARE YARDS OF FRESHWATER (1,000s)	525	655	1,162	3,303	4,337	8,733	3,828	4,992	9,895
W+H+NS.....	MILES OF TRAILS	---	---	---	151	193	3,335	151	193	3,335

SOURCE: Comprehensive Planning Branch, Parks Division, Texas Parks and Wildlife Department.

ABBREVIATION: B+F+S = Pleasure Boating, Boat Fishing, and Water Skiing; C+K+R = Canoeing, Kayaking, and Rafting; P+B+M = Piers, Barges, and Marinas; W+H+NS = Walking, Hiking, and Nature Study; W+NS+B - Walking, Hiking, Nature Study, and Bicyling.

Dashes indicate needs are not projected for the facility or resource.

Asterisks indicate no needs exist based on a regional analysis of supply and demand; however, needs may exist locally within the region due to inadequate distribution of existing facilities.

Statewide outdoor recreation demand by activity as reported by the 1980 TORP, is presented in Table IV-6. The five most popular activities statewide in 1985 are projected to be:

- Bicycling (210 million activity days)
- Swimming (170 " " ")
- Walking for pleasure (148 " " ")
- Fishing (89 " " ")
- Child's Play (78 " " ")

The five activities projected to be the most popular in 2000 are bicycling, walking for pleasure, swimming, fishing, and picnicking, respectively. Although these will be the most popular activities, all activities are projected to increase in participation.

TABLE IV-6

Recreation Demand by Activity
(in millions of Annual Activity Days)

Activity	In Urban Areas			In Rural Areas			Statewide		
	1980	1985	2000	1980	1985	2000	1980	1985	2000
Archery.....	---	---	---	1	1	3	1	1	3
Baseball....	17	23	41	2	3	6	19	26	47
Basketball..	19	21	27	---	---	---	19	21	27
Bicycling...	132	181	387	22	29	62	154	210	449
Boating.....	6	7	12	41	48	76	47	55	88
Camping.....	---	---	---	25	31	57	25	31	57
C+K+R.....	---	---	---	1	2	3	1	2	3
Child's Play	60	67	87	8	11	22	68	78	109
Fishing.....	14	16	23	65	73	105	79	89	128
Football....	7	20	26	---	---	---	7	20	26
Golf.....	18	20	29	2	2	3	20	22	32
Hiking.....	1	1	2	4	5	10	5	6	12
Horseback R.	6	8	15	6	8	18	12	16	33
Hunting.....	---	---	---	17	19	30	17	19	30
Motorcycling	10	15	35	4	6	15	14	21	50
Nature Study	2	3	5	4	5	10	6	8	15
Picnicking	29	34	49	33	39	65	62	73	114
Skiing.....	2	3	5	6	7	12	8	10	17
Soccer.....	14	19	51	---	---	---	14	19	51
Softball....	20	25	45	3	3	7	23	28	52
Sport Shoot.	---	---	---	1	2	4	1	2	4
Swimming....	96	109	151	49	62	122	145	171	273
Tennis.....	11	12	19	---	---	---	11	12	19
Walking.....	107	136	258	10	12	23	117	148	281

ABREVIATIONS: C+K+R - Canoeing, Kayaking, and Rafting.

NOTE: Dashes indicate the activity occurs predominately in urban or rural areas only; therefore, no demand is shown for camping in urban areas, basketball in rural areas, etc.

4-06. Interstate demand situations. - There may be substantial camping and overnight visitation, since Interstate Highway 35 passes relatively near the lake, and it is a short drive to Dallas from the lake. This makes a logical stopover point for visitors after entering Texas.

4-07. Accessibility.

a. Roads. - Interstate Highway 35 paralleling the lake to the west is the major regional route and connecting link between the

Dallas-Fort Worth area and Oklahoma City, Oklahoma. U. S. Highway 377 crosses the upper reaches of the lake to the east. State Highway 289 and U. S. Highway 75 parallel the lake to the east. Access to the lake is exceptionally good because of the abundance of existing improved and unimproved county roads and the relocated roads as shown on plate VII-4.

b. Railroads. - The lake area is served by the Atchison, Topeka, Santa Fe, Missouri Pacific and the Texas and Pacific Railroads.

c. Air. - The project area is served by a municipal airport in Denton, Texas.

4-08. Existing and prospective alternative water-oriented recreation resources. Major recreation attractions within a 25 mile radius of the project are shown on plate IV-1.

TABLE IV-7

DATA ON PARKS AND LAKES IN THE MARKET AREA

Name	County	Administering Agency	Project Purpose	Surface Acres
Lewisville Lake	Denton	Corps of Engrs	M-FC-IN-R	23,280
Grapevine	Tarrant	Corps of Engrs	M-FC-IN-R	7,380
Lavon Lake	Collin	Corps of Engrs	M-FC-IN	21,400
Eagle Mountain Lake	Tarrant Wise	Tarrant Count WC&ID NO. 1	M-IN-IR	8,500
Lake Worth	Tarrant	City of Fort Worth	M	3,267
Mountain Creek Lake	Dallas	Dallas P&L Co.	IN	2,940
Lake Ray Hubbard	Collin Dallas Kaufman Rockwall	City of Dallas	M	22,745
Lake Texoma	Grayson Cooke (in Texas) Bryan Marshall Love (in Okla)	Corps of Engrs	P-FC-C-R	89,000
Lake Bridgeport	Wise Jack	Tarrant County WC&ID No. 1	M-IN-FC-R	10,360
Amon Carter Lake	Montague	City of Bowie	M-IR	1,540
Lake Nocona	Montague	Montague Count Water Sup Dist	M-IN-MI	1,470
Moss Lake	Cooke	City of Gainesville	M	1,125
Lakeview Lake (Proposed)	Dallas Tarrant	Corps of Engrs	M-FC-R-FW	7,470
Roanoke Lake	Denton	Corps of Engrs	FC	None

Legend:

C - Conservation
FC - Flood Control
R - Recreation
P - Power
M - Municipal
IR - Irrigation
IN - Industrial
MI - Mining, Including Oil Production
FW - Fish & Wildlife

4-09. Water quality of pool. - The overall quality of the water impoundment by Ray Roberts Lake should be well within U. S. Public Health Service criteria for surface water sources of public water supply. New and improved waste treatment facilities within the upper Elm Fork Basin should substantially increase the quality of inflow. The water quality will be suitable for a variety of outdoor recreational activities.

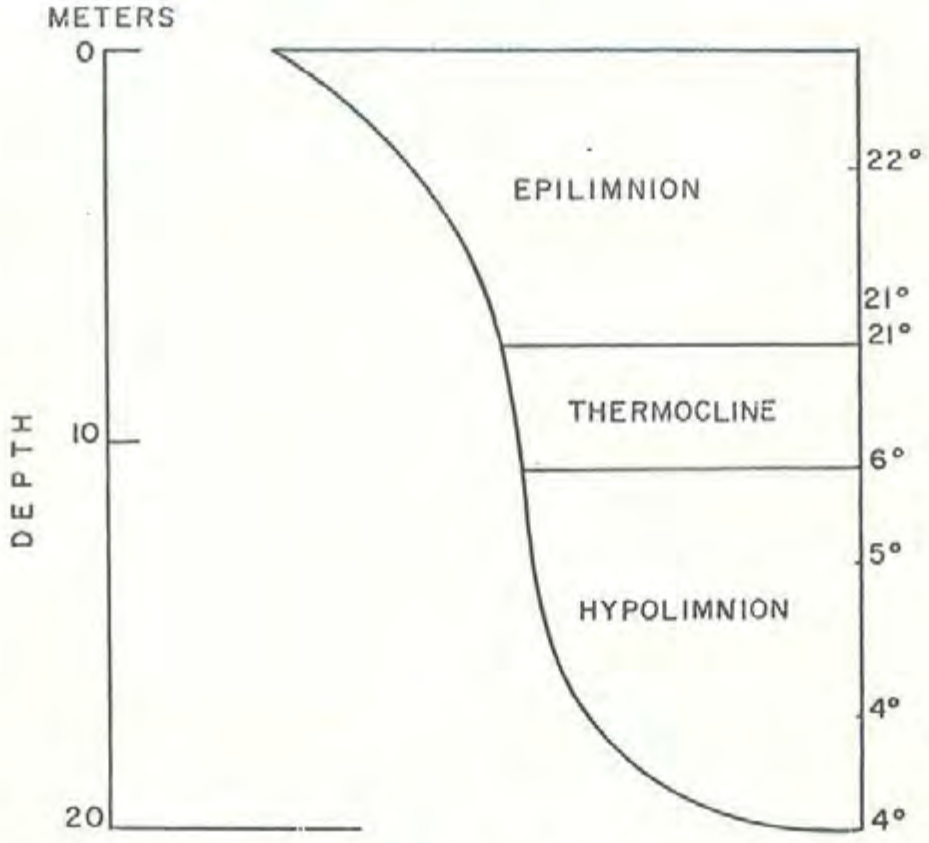
4-10. Thermal stratification. - The thermal stratification condition of Ray Roberts Lake is shown in figure IV-1. The outlet works at Ray Roberts Dam will have the capability of releasing water from the epilimnion, the hypolimnion, or combining releases from both layers. Therefore, the thermal stratification of the lake is not expected to cause adverse environmental effects downstream and will not have a significant impact upon recreation.

4-11. Pool fluctuations. - The top of conservation pool will be equalled or exceeded only about 2% of the time. The average pool elevation during the prime recreation season is about 11.5 feet below the top of conservation pool and will be equalled or exceeded about 60 percent of the time. The five year drawdown level will be equalled or exceeded about 90 percent of the time. The five year flood level, which for all practicle purposes is equal to the top of conservation pool, will be equaled or exceeded only about 2 percent of the time.

4-12 Lake regulation. - The Corps of Engineers will be responsible for release of floodwater from the project. The flood control plan of operation is dependent upon the regulated release rate of the lake on downstream channel capacities from other lakes on the Trinity River. Ray Roberts Lake would be operated for flood control as a unit in a system which includes Benbrook, Grapevine Lewisville, Lavon, Navarro Mills, and Bardwell Lakes. The cities of Dallas and Denton, jointly, will direct the releases from the water supply pool.

Figure IV-1

Summer Thermal Stratification



Numbers at right represent the temperature conditions from the surface to bottom, expressed in degrees Centigrade. Various detailed values used, such as depths, temperature decline in the thermocline, and temperature distribution, differ in different lakes, but the essential features in this seasonal cycle remain the same.

Note: 4.0° Centigrade = 29.2° Fahrenheit
22.0° Centigrade = 71.6° Fahrenheit

KEY

RIVER RECREATION
1 RED RIVER
2 ELM FORK
3 WEST FORK

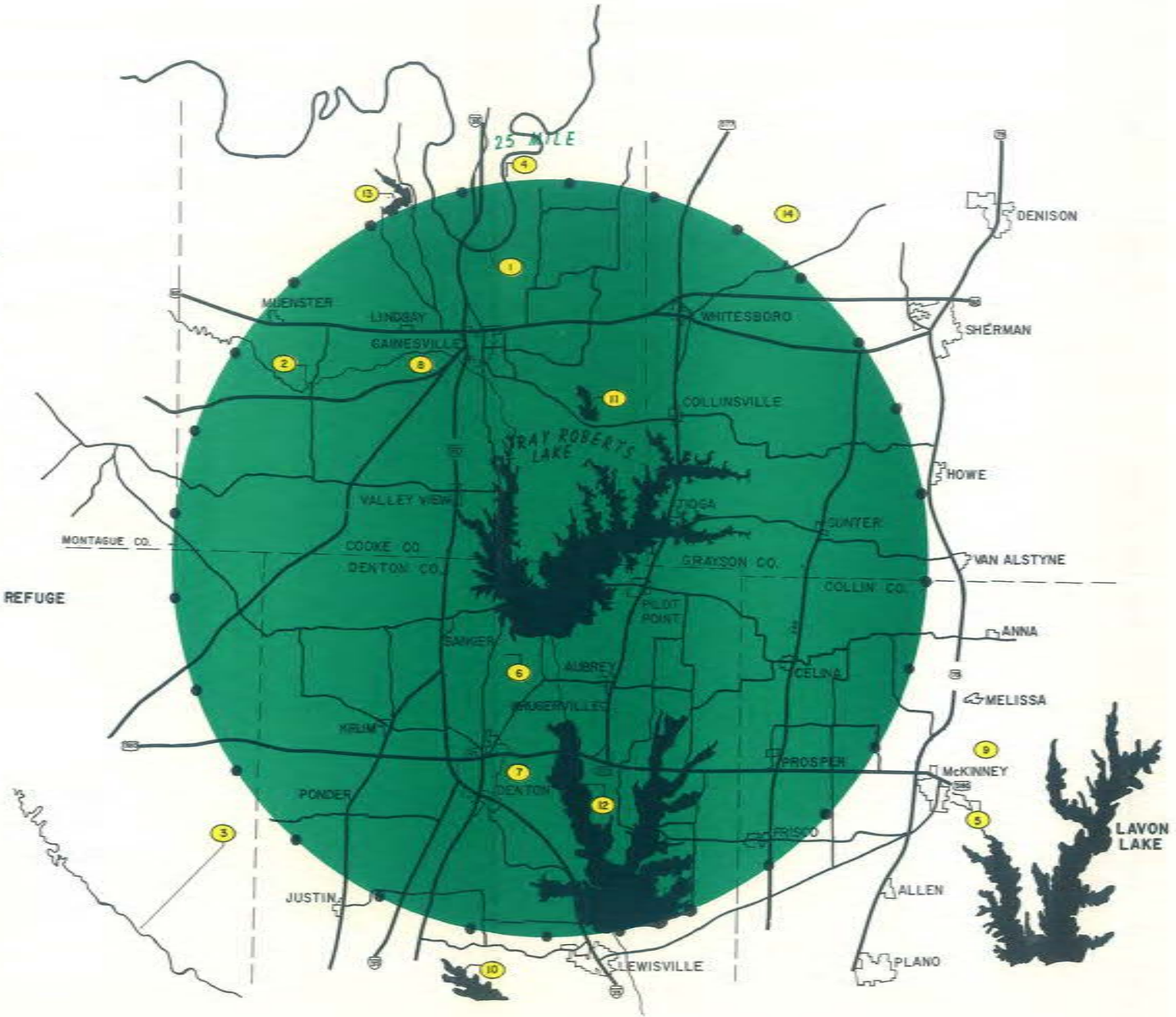
TRAILWAYS
4 LAKE TEXOMA HIKING TRAIL

NATURAL AREAS
5 WILSON CREEK BOTTOMS
6 UPPER ELM-FORK

MAJOR PARK SYSTEMS
7 DENTON
8 GAINESVILLE
9 MCKINNEY

LAKES
10 GRAPEVINE LAKE
11 LAKE KIOWA
12 LEWISVILLE LAKE
13 MOSS LAKE

WILDLIFE REFUGES
14 HAGERMAN NATL. WILDLIFE REFUGE



STATUS NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
MAJOR RECREATIONAL ATTRACTIONS

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO.
CONTRACT NO.
DRAWING NUMBER
DATE: JUNE 1982
SHEET NO. 1 OF 1
RESOURCE NO. IV-1

V OUTDOOR RECREATION NEEDS AND ATTENDANCE

V - OUTDOOR RECREATION NEEDS AND FACILITIES

5-01. General. - The methodology used for predicting recreation needs follows the instructions presented in ER 1120-2-403, dated 26 March 1970. The procedure utilizes the "similar project" concept for recreation prediction. This technique involves using recreation information from existing projects of the same approximate size and character.

5-02. Day-use market area evaluation.

a. Projected population of the day-use market area. - the population within the day-use market area (the geographic area within 50 road miles of the project) was projected from the base year 1985 through the year 2020. These projections were based on the current Series E population projections. A summary of the current projected populations by decade for the years 1985 through 2020 are shown in table V-1.

Table V-1

PROJECTED POPULATION IN THE MARKET AREA
(Series E projections)

Decade	Population
1985	3,013,591
1990	3,353,900
2000	3,878,800
2010	4,398,200
2020	4,903,200

b. Selection of initial per capita use rate. - In order to minimize the chance of an erroneous attendance based on a unique situation, recreation use data from similar projects were pooled to derive a per capita use curve. The selection of an initial per capita use curve for this project was made by adjusting and revising the per capita use curve to more nearly fit the prospective project. From the initial per capita use curve, a per capita use rate was found for each zone of influence (table V-2).

Table V-2

PER CAPITA USE RATES FOR DAY-USE MARKET AREA

Zone	Per capita use rates
I (0-10 miles)	5.1
II (11-20 miles)	2.7
III (21-30 miles)	1.5
IV (31-40 miles)	.8
V (41-50 miles)	.5

c. Estimating total initial recreation needs. - After the per capita use rates were found for each zone of influence, the per capita use rates for each county in each zone were determined. The principal city of each county was used as a proxy for the population

centroid of the county. The road-mile distance from the centroid to the project was then calculated. The per capita rate multiplied by the county population gives the expected recreation attendance from that county. This process is repeated for all counties within the market area, and the sum of these figures give the initial recreation (day-use) for the base year 1985 from within the market area. It has been found that the initial recreation needs from within the market area will constitute about 90 percent of the total recreation attendance, with 10 percent originating from outside the market area. From the project survey data, overnight use is estimated to be 15 percent of the total use. The total projected recreational needs (base year 1985) has been estimated to be 3,550,699 annual recreation days.

d. Projection of potential recreation needs. - An important part of the recreation analysis of the proposed project is the estimation of potential future recreation use. Although there are many factors that may affect future recreation attendance projections, there are essentially two basic items to be considered: (1) anticipated increase in future per capita rates, and (2) population projections. Because present recreation participation rates on existing projects are increasing and are predicted to continue increasing the initial per capita use rate must be adjusted to reflect the anticipated increase in per capita rates by decade. The initial per capita rates were adjusted by the factors presented in table V-3.

Table V-3

ADJUSTMENT FACTORS FOR PER CAPITA USE RATES

1985 - 1.00
1990 - 1.17
2000 - 1.33
2010 - 1.48
2020 - 1.62

Then the adjusted per capita use rates were applied to the population projections to arrive at the projected unsatisfied recreation needs. The total projected recreation needs by decade is shown in table V-4.

Table V-4

PROJECTED UNSATISFIED RECREATION NEEDS

1985	1990	2000	2010	2020
3,550,699	5,035,745	5,967,105	8,988,316	11,435,554

5-03. Attendance. - On the basis of experience at other projects, it is obvious that the Ray Roberts Lake project would not have the capacity to accomodate all the unmet needs of the area without resource deterioration. Accordingly, it was necessary to establish an estimate of optimum capacity in order that facilities, requirements, and benefits might be based on use that could be accommodated on a continuing basis. The optimum capacity of this project for the recreational activities anticipated is esti-

mated to be 7,000,000 recreation-days. This estimate was based on an analysis of project capabilities and water available, types of development proposed, and other resources involved. Also, on the basis of projections cited above, it was determined that the optimum capacity would be reached before the year 2000. The initial and average annual use were computed to be 3,500,000 and 6,000,000 recreation days, respectively. Table V-5 presents the methodology used to determine the optimum capacity.

Table V-5

Calculations:

21,000 water acres* : 5.5 acres/boat = 3,818 boats on lake at one time.

3,818 x 3 (1/3 boats active) = 11,454 boats (total boats).

11,454 x 3 persons/boat - 34,362 persons lake at one time.

34,362 x 2 (2:1 ratio of the number of land users compared to the number of water users) = 68,724 design day load.

68,724 x 26 weekend days = 1,786,824 summer weekend users : .42 summer weekend visitation rate = 4,254,343 summer visitation : .60 summer visitation rate = 7,090,572 optimum use. Rounded to 7,000,000.

*The water acres represent the average surface acreage during the prime recreation season.

5-04. Level of recreation development. - The local sponsors, cities of Denton and Dallas, requested a level of recreation development less than the optimum plan presented in the authorizing document. The level of development selected is presented in Design Memorandum No. 24, Cost Allocation Report, approved August 1, 1980. Table V-6 shows the projected visition for optimum development in comparison to the current plan.

TABLE V-6

Visitation	Optimum Plan	Current Plan
Initial	3,500,000	3,100,000
Average Annual	6,000,000	5,333,000
Optimum	7,000,000	6,000,000

5-05. Recreation facilities analysis. - The recreation facilities analysis in tables V-7 and V-8 was used to determine the basic recreation facilities for the initial and optimum stages of development.

5-06. Supporting recreation facilities. - Supporting facilities such as sanitary facilities, trash receptacles, and change shelters were determined through an analysis of the needs of the recreation layout. The design criteria presented in EM 1110-2-400 as well as the guidelines presented in Chapter IX will serve as guidelines in planning for these facilities.

TABLE V-7

RECREATION FACILITIES ANALYSIS

Design day load: 30,050

Project: Ray Roberts Lake

Total Annual attendance: 3,100,000 (initial)

Design day load

3,100,000 total annual attendance x .42 visits during summer months x .60 which occurs on weekends = 781,200 total number of weekend users.

Total number of weekend users : 26 weekend days = 30,046 design day load.

Picnicking

Design day load x .15 of total are picnickers = number of picnickers.

No. of picnickers x .40 of picnickers requireing facilities = number of picnickers requiring facilities.

No. of picnickers requiring facilities : turnover rate of 2 : 3 persons per vehicle = 301 picnic units required.

Camping

Design day load x .15 of total are campers = number of campers.

No. of campers : load factor of 5 = 915 camping units required.

Boat ramps

Design day load + load factor of 3 = number of vehicles.
No. of vehicles x .20 of vehicles with boats = number of boats.
No. of boats : 60 launchings per day = 33 boat launching ramps required.

Beaches

Design day load x .30 swimmers = number of swimmers.
No. of swimmers x .60 swimmers on beach = number of beach users.
No. of beach users : turnover rate of 3 = number of users on beach at any one time.
No. of users on beach at same time x 50 square feel of beach per person = 2.3 acres of land area requied for sand beach.

No. of swimmers x .30 are swimmers in water = number of swimmers in water.
No. of swimmers in water : turnover rate = number of swimmers in water at any one time.
No. of swimmers in the water at any one time x 100 square feet of water surface per user = 2.1 acres surface required.

10% of swimmers need no additional land.

TABLE V-8

RECREATION FACILITIES ANALYSIS

Design day load: 58,150

Project: Ray Roberts Lake

Total annual attendance: 6,000,000 (optimum)

Design day load

6,000,000 total annual attendance x .42 visits during summer months x .60 which occurs on weekends - 1,512,000 total number of weekend users. Total number of weekend users ÷ 26 weekend days = 58,154 design day load.

Picnicking

Design day load x .50 of total are picnickers - number of picnickers. No. of picnickers x .40 of picnickers requiring facilities = number of picnickers requiring facilities. No. of picnickers requiring facilities ÷ turnover rate of 2 : 3 persons per vehicle = 582 picnic units required.

Camping

Design day load x .15 of total are campers - number of campers. No. of campers ÷ load factor of 5 = 1,745 camping units required.

Boat ramps

Design day load ÷ load factor of 3 = number of vehicles. No. of vehicles x .20 of vehicles with boats = number of boats. No. of boats ÷ 60 launching per day = boat launching ramps required.

Beaches

Design day load x .30 swimmers = number of swimmers. No. of swimmers x .60 swimmers on beach = number of beach users. No. of beach users ÷ turnover rate of 3 = number of users on beach at any one time. No. of users on beach at same time x 50 square feel of beach per person = 4.67 acres of land area requied for sand beach.

No. of swimmers x .30 are swimmers in water = number of swimmers in water. No. of swimmers in water ÷ turnover rate = number of swimmers in water at any one time. No. of swimmers in the water at any one time x 100 square feet of water surface per user = 4.00 acres surface required.

10% of swimmers need no additional land.

VI COORDINATION

6-01. General. - During the development of this master plan, every effort was made to evaluate, and when practical, incorporate the ideas of other State & Federal agencies and the general public regarding the overall development of the project. Both solicited and and non-solicited viewpoints were drawn upon in the development of the master plan document.

6-02.- History of Project Coordination Prior to the development of the Master Plan

a. During 1956 and 1957, the Trinity River Authority held public hearings in each of the 17 counties within its jurisdiction. The public expressed desires for improvements in flood control, water conservation and quality, fish and wildlife, and recreation. In this plan, adopted in 1958 and modified slightly in 1960, the Trinity River Authority proposed the construction of Aubrey Lake.

c. In December 1961, the Corps of Engineers, Fort Worth District, held a public hearing to present its preliminary plan and to obtain the public's views and desires. This plan, which was submitted in 1962 and authorized in 1965, provided for the construction of Aubrey Lake.

d. In July 1966, the Texas Water Development Board held a public meeting in Arlington, Texas, concerning the Trinity plan. As a part of their comprehensive development of the state, they proposed the construction of a lake in the same vicinity as Aubrey Lake.

e. On 30 April 1971, the Corps of Engineers, Fort Worth District, held a public meeting in Denton, Texas, to obtain the public's views and desires for the purpose of gathering data to make a final decision on the site location for the dam at Aubrey Lake.

f. On 18 August 1972, a coordination meeting was held in Denton, Texas, for the purpose of discussing the location of the proposed public-use areas and the cost-sharing requirements under Public Law 89-72 (21). Representatives of the Corps of Engineers, the Texas Paks and Wildlife Department, and the cities of Denton and Dallas were present.

g. On 27 October 1972, a public meeting was held by the Corps of Engineers, Fort Worth District, in the Civic Center Community Building in Denton, Texas. The meeting was held to inform the nearly 400 attendees of the latest details concerning the Aubrey project, to present results of environmental studies, and to explain the alternative actions studied.

h. In letters dated October 9 & 12, 1973 the cities of Denton and Dallas provided continued assuances that they were financially able

and willing to coorporate in the design and construction of the Aubrey Project.

i. In October 1980 the Corps of Engineers held a public meeting in Denton, Texas concerning the proposed plan of land acquisition for Aubrey Lake.

6-03. - Summary of project coordination since the initiation of the Master Plan.

a. The cities of Dallas and Denton sponsored and held a public meeting on 13 May 1981 in Denton, Texas, to collect public input for recreation development at Ray Roberts Lake (formerly Aubrey Lake). This early stage meeting provided the public with a forum to make suggestions and recommendations regarding the recreation development for the lake. The information was then provided to the Corps of Engineers and Texas Parks and Wildlife Department for developing the master plan for recreation development. A survey questionaire which listed a broad range of recreational activities was completed by meeting participants to help determine trends in recreation facility preferences. The same questionaire was printed in the Denton Record Chronicle and was used in the analysis. A synopsis of the public meeting, along with a talley of the questionaire responses is presented on pages VI-8 thru VI-15.

b. A second questionaire of a more limited scope was distributed as part of a petition against the development of a marina in Johnson Branch Park. This was conducted independently of the Corps or its project sponsors. The methods of distributing this petition are unknown. A sample form letter and talley of results are shown on page VI-15.

c. U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department.

The district requested the cooperation of these agencies in appraising the fish and wildlife potentialities of the project pursuant to this request. A field reconnaissance was made with representatives from these agencies and the Corps of Engineers in March 1982. Reports were submitted by the Texas Parks and Wildlife Department which recommended pre and postimpoundment development recommendations for fish and wildlife management. The recommendations were conducted through the U.S. Fish and Wildlife Service and presented on pages VI-18 thru VI-31.

d. Recreation sponsors. - Many discussions have taken place with the Corps, cities of Dallas and Denton, and Texas Parks & Wildlife involving park boundary realignment, cost sharing of recreation facility development, & recreation facility design responsibilities.

The amount of correspondance which has been generated as a result of these discussions is too numerous to include in this section, however, a summary of the current recreation development and management intentions of the cities of Dallas and Denton and TPWD are as follows:

6-04. Summary of Fish and Wildlife Coordination. - Coordination with U.S. Fish and Wildlife Service and Texas Parks and Wildlife Department in their Section 2 (b) Coordination Act Report of June 1973, the U. S. Fish and Wildlife Service made several recommendations to optimize fish and wildlife resources of the project. In May 1975, because of project changes the Service submitted another report containing the following recommendations.

1. Project funds in the amount of $15,000 annually be made available to the Fish and Wildlife Service for funding of a fishery study of five years duration to be undertaken by the Texas Parks and Wildlife Department in cooperation with the Corps of Engineers and the interested State and Federal agencies, beginning one year prior to the impoundment of Ray Roberts Lake.

2. When project lands are acquired, the Texas Parks and Wildlife Department and the U. S. Fish and Wildlife Service be notified so that farm ponds and floodwater retarding structures located at or within the conservation pool may be investigated as to their suitability for use as nursery ponds.

3. The numerous ponds and floodwater retaining structures located between the guide take line and the conservation pool be left intact.

4. Four fish nursery coves be developed at existing floodwater retarding structures suitable for this purpose.

5. Four seining areas be constructed within the conservation pool.

6. Impoundment of Ray Roberts Lake be initiated in the fall of the year to permit early spring stocking of gamefishes.

7. To increase sport fishing use at Ray Roberts Lake, 12 access areas of three acres each, providing parking space, boat launching ramps, and sanitary and drinking water facilities, be developed around the middle and upper portions of the reservoir.

8. Access facilities to be inundated at Lewisville Lake be fully replaced above the new conservation pool elevation.

9. A zoning plan to minimize conflicts and promote safety for water-oriented recreationists be developed for both Lewisville and Ray Roberts Lakes by the Corps of Engineers in cooperation with the Texas Parks and Wildlife Department, the Fish and Wildlife Service, and other interested agencies.

10. The operational plan for the release of conservation storage water to supply downstream demands be programmed so as to provide for continuous flows in the Elm Fork between Ray Roberts Dam and the headwaters of Lewisville Lake. A minimum continuous release of 15 second-feet December 1 - February 14; 140 second-feet February 15 - May 31; and 25 second-feet June 1 - November 30 be provided for. The release of water in excess of flows recommended for minimum releases be programmed so as to provide additional flows over weekend or holiday periods.

11. Three access areas having facilities similar to those listed in Recommendation No. 7, except for boat-launching ramps, be provided below the dam; one in the tailwater vicinity and one each at the two major road crossings.

12. To compensate for loss of sport hunting opportunities and to provide for the maintenance of a productive natural habitat, approximately 12,500 acres of project lands acquired in fee title be designated as natural areas and made available to the Texas Parks and Wildlife Department under the terms of a General Plan as provided in Section 3, of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended ; 16 U.S.C. 661 et seq).

Initial development costs of $29,450 and annual maintenance and replacement costs of $14,630 should be borne by the project.

13. In conjunction with Recommendation No. 12 and in order to provide lands of suitable dimensions for effective management, those lands currently scheduled as flowage easement areas (approximately 4,960 acres) be purchased in fee simple and made available to the Department under the terms of a General Plan.

14. The duration of inundation of lands within the floodpool be kept to a minimum with 30 days as a maximum storage period. To assure attainment of this flood storage goal, with the probability that necessary releases would cause overbank flooding downstream, that portion of the downstream subject to flooding, estimated to be less than 2,000 acres, should be acquired in fee simple. These lands should then be designated as a natural area and made available to the Texas Parks and Wildlife Department under the terms of a General Plan.

6.05 Late Stage Coordination.

In January 1982 the Fort Worth District requested that the U. S. Fish and Wildlife Service provide updated recommendations for further consideration in preparation of this Master Plan. Formal response by the Service with the assistance and cooperation of the Texas Parks and Wildlife Department in March 1982, in addition to their previous recommendations, provided the following:

Wildlife

1. All project lands be fenced to regulate access and prevent uncontrolled livestock grazing on wildlife areas.

2. Low water retaining structures be developed at selected locations within the reservoir basin. These structures, constructed of gated earthen embankments, would permit water level manipulations in shallow-water areas for management of waterfowl.

3. Shrubs valuable as wildlife food and cover to be planted in strips or motts along fence rows, edges of pastures or fields, drainageways, etc. These plantings should comprise at least 100 acres of project lands.

4. Perimeter lands currently in bermudagrass pasture be disked in strips in order to promote the growth of native forbs valuable as wildlife food.

5. Plant food plots of one-fourth to one-half acre in size near woody cover on select project lands. The total amount of food plots and disked areas should include a minimum of 300 acres.

Fisheries

1. The maintenance of existing farm ponds and flood control structures within the summer (621 ft. msl) and conservation pools (632.5 ft msl) to use as one time nursery ponds and serve as structure following impoundment.

2. The need to develop and effectively manage a minimum of 70 acres of permanent nursery ponds above the project's conservation pool elevation.

3. A timber clearing plan for the basin which will optimize fisheries production, while allowing multiple use of the reservoir surface area.

4. Creation of fish attractors throughout the reservoir basin.

5. Development of sufficient access for anglers and boaters in both the reservoir and tailrace.

Consideration has been given to each recommendation of the fish and wildlife agencies and some are proposed for implementation later in this Chapter. Various institutional constraints prevented incorporation of several of TPWD's recommendations into this master plan. Coordination will continue, however, during project construction and the Master Plan will be supplemented as necessary.

Recreation cost sharing contracts have been signed by the cities of Dallas and Denton obligating them to cost share with the Federal Government for recreation development at the Ray Roberts Lake project. They are further obligated to operate, maintain and replace such development.

The TPWD has expressed a desire to assume a portion of Dallas and Denton's responsibility and enter into a cost sharing agreement with the Corps of Engineers for land and development costs for recreation facility development at Isle duBois Park. TPWD would also be responsible for 100% of the operation, maintenance, and replacement of those facilities. The Parks Division of TPWD further proposes to manage all remaining developed park areas to be cost shared by the Corps and cities of Dallas and Denton for parks and recreation purposes under a lease agreement from the Corps of Engineers. The Wildlife Division of TPWD proposes to manage the remaining intermittent lands, guide-take lands, and joint acquisition lands, (exclusive of the embankment) for wildlife purposes under a license from the Corps. Management of the lake surface by

the Texas Parks and Wildlife Department would include appropriate management activities by the Parks, Inland Fisheries, Wildlife and Enforcement divisions of TPWD. These real estate instruments will be consumated after the contract is entered into.

Letters of intent were furnished to the Corps by TPWD relative to the above discussions. The letters are presented on pages VI-16 and VI-17.

6-06. Coordination to be accomplished.

a. The approved master plan will be sent to interested Federal, State, and local Governmental agencies for review and comment.

b. Wastewater treatment design and other pollution abatement plans will be coordinated with the Environmental Protection Agency up completion of the feature design memorandum on recreation facilities.

6-07. Comments received since initiation of the Master Plan. - To facilitate finding certain comments of particular agencies, organizations, or individuals, a cross index is presented in Table VI-1.

TABLE VI-1

Coordinating Entities

ANNOUNCEMENT OF PUBLIC MEETING

Recreation Facility Planning
Ray Roberts Lake
Elm Fork, Trinity River, Texas

The cities of Dallas and Denton will provide interested parties the opportunity to supply their input on the types of recreational facilities and opportunities they want developed at Ray Roberts Lake (formerly Aubrey Lake).

Representatives from the cities of Dallas and Denton and the Texas Parks and Wildlife Department will be present to receive comments and explain proposed recreational development to date.

The meeting will be held at the Denton Civic Center, 215 E. McKinney St., Denton, Texas, at 7:00 p.m., on 13 May 1981.

Project Information

Ray Roberts Lake is being constructed by the Fort Worth District of the Army Corps of Engineers, with the cities of Dallas and Denton acting as cost sharing sponsors.

Project location is on the Elm Fork of the Trinity River, approximately 10 miles north of Denton, Texas.

The lake will have a surface area of 29,350 acres at top of conservation pool, elevation 632.5. Flood pool surface area will be 36,900 acres at elevation 640.5. Construction at Ray Roberts Lake began September of 1980 and is scheduled for completion in September of 1986.

If you, or anyone you know, is interested in the recreational development at Ray Roberts Lake, please plan to attend the meeting.

TOM TAYLOR
Director, Water Utilities
City of Dallas

CHRIS HARTUNG
City Manager
City of Denton

MINUTES
PUBLIC HEARING

Wednesday, May 13, 1981

7:00 P. M.

Denton Civic Center

Welcome by Chris Hatung, City Manager, & introduction of Richard Stuart, Mayor

Richard Stuart

Chris Hartung

Introduced: Tom Taylor
Tom Anderson
Mike Taylor

Mike Herring--State of Texas Paks and Wildlife
Showed slides of:
headquarters, camping sites, provisions for water & electricity, tent camping areas, screened shelters, cabins, picnic areas, (drive in & walk in) rest rooms, concessions or park stores (rental equipment), interpretation trails, park trails, boat ramps-docks, storage, piers, fish cleaning shelters, swim areas.

Chris Hartung-
Now we come to the most important part of this meeting. We are going to open the floor now and request that you keep in mind a few guidelines. We are going to ask you to come forward, present your comments, and please limit them to five minutes. And also, we ask that if you have not turned in a form, please do so before you leave.

Walter Gray:
My name is Walter Gray and one of the questions that came to my mind in looking at the map, is - is there any chance of putting the parks closer to the Interstate? In looking at the accessibility of the parks proposed site, and taking into consideration any intervening opportunities of some one coming from Dallas to Denton, I was wondering why the parksites were not put closer to the highway?

Chris Hartung:
We might point out that there is a connecting roadway that does not show on this map which will cut across north of Sanger to just north and south of Branch Park (Culp) so it would have direct access from Interstate 35.

Tom Taylor;
Let me also say that the location of the parks is dependent upon the topography and the access to the water. The areas that have been selected provide the best areas for development and water access, based on the fluctuation of the lake.

The_____ shown here, this particular arm is a little bit flatte and will probably fluctuate the shore line more than ths arm over here. Also, this part has more vegetation in the form of trees.

(Squire Haskins)
What I would like to know is what kind of control, and what kind of police service can we expect out of the parks service? We know that vandalism in the park is one of the biggest headaches down at Lewisville. Will there be anybody available to come and answer disturbances in the park? What kind of provisions does the state have for this?

Chris Hartung:
Could I please ask you to identify yourself for the records?

Squire Haskins:
My name is Haskins. Squire Haskins.

Mike Herring:
I was talking to Mr. Haskins a little bit earlier this evening. In our state parks we have residents. We usually have at least two residents; there is someone there twenty four hours a day. This resident is the person who lives there and this is his home. He lives there as well as the parks ranger. Our parks have personnel in most state parks--I would like to think that one of these parks, and possibly all of them would have at least one commissioned peace officer. Our staff would include possibly 5 employees, 8 am to 5 pm, 7 days a week. The parks will close at 10 pm. The park is closed to people who are just looking for something to do at night. Both our personnel and our game wardens would be involved, and there would be water station personnel stationed at the lake.

J. C. Foster:
Did I understand correctly that Isle of du Bois would definitely be a state park?

Chris Hartung:
That park was designated as a state park 3 or 4 years ago.

Kenneth Alexander:
I am Kenneth Alexander from Cooke County and the City of Gainesville. If Bois d'arc is a state park, what happens to the other parks---how will they be maintained as far as police protection, and whatever, if it is not a state park?

Tom Taylor:
That is what we were discussing earlier--that we are currently negotiating with the State of Texas for the state to take over administration of all 3 of the parks or whatever they want to do. The basic responsibility is all of these facilities likes with the cities of Dallas and Denton. If we are not able to work out an agreement with the State of Texas, then Dallas and Denton wil be responsible for the recreation facilities in those other parks.

Kenneth Alexander:
Would there be a possibility that the City of Gainesville could lease some of the adjacent property to make a park of their own?

Chris Hartung:
Lease Corp Land?

K. Alexander:
Yes Sir.

Chris Hartung:
I would think so. Would some one from the Corps of Engineers care to comment? (with the consent of a local sponsor)

_____
We would be happy to talk to someone from the City of Gainesville.

Kenneth Alexander:
They are at this time looking for new park land and that is a possibility. Can you explain why you didn't have more accomodations for more people on the west side?

Chris Hartung:
We are still talking about that. As we said earlier the original plan was six smaller sites. Having six smaller sites versus three larger sites makes the administration, police protection, sanitation and everything more difficult, and so we have been thinking about limiting the number of parks. That is one of the things we would like to hear from you tonight, and get your comments on this. Mr. Taylor--

Tom Taylor:
As we have explained earlier, the three sites appear to have the greatest extension and much more traffic sites---three sites appear to have greater potential.

D. Lynch:
I am Dwayne Lynch. I notice where the Culp Branch Park was originally proposed--they've still got it outlined in green--there are lots of expensive homes back there--that cost millions of dollars to acquire. I can't see the Government of the City of Dallas or Denton Spending all of that money for buying those expensive homes where the Culp Branch Park was originally planned.

Tom Taylor:
Let me refer that to the Corps man. Culp Branch area was one of the original sites.

_____:
That area would be reduced if the park was not built there. No more land will be taken than is necessary for the dam and for the lake itself.

D. Lynch:
What about the green area?

_____:
That area might be reduced if the park is not constructed there. Thay is why this may is not necessarily correct.

D. Lynch:
Along this proposed route changing Farm Road 455, I noticed they-ve got a buffer zone on the south side of it which I think is not necessary. It is in green to the south side.

W. Barton
I definitely think that there ought to be at least one or two recreation facilities, either a concession area or parks, or a private club on the west side of the lake providing the most direct route from the City of Dallas and the City of

Denton. Each one of these two loctions are on the south side and the east side of the lake, and I believe the fastest access out of Dallas and out of Denton to the lake would be to the west side, and not to the east side of the lake. True, there are trees by also there is nothing wrong with rolling grassy hills with nice facilities overlooking the lake and having a good view. I know people are going to get on the lake, and they are not just going to hibernate along the shore line along these park areas. They are going to cover that lake and there will be times when they get caught out in stormy weather, and if they have got to go all the way back across the lake and take a chance on saving someones life, and if you have camp sites on the west side it would be a little closer facility to get to--to seek haven from the storm. There are a lot of storms, and they come out of the west and out of the north, and I know the fishermen and the sportsmen and the duck hunters and what-have-you, are going to be all over this lake. Besides that, I think that Sanger & Valley View, and all the little towns up and down the highway should have close access to the great facilities. My next point is all of the development here seems like it is leaning toward a bureaucratic, Government controlled, Government operated system and I would be against that. I would be for private enterprise. I think the Government should provide access to the property, and provide utilities such as water and electricity, and then lease these areas out to private developers and entrepreneurs. There are quite a few around the country that do this, and that would provide business opportunities to the private citizen to take advantage of, rather than putting the Government in the business of recreation. I would strongly urge that they be looked at in favor of a Government regulated system. I do know that some remote areas on lakes are not frequented by the citizens of Dallas that the State operates. I am not sure what the largest park system is on a lake that the State operates. Could someone help me on that? Perhaps someone at Parks & Wildlife Department.

T. Taylor
What is the largest lake area & park we now have that the State operates?

Mike Herring
In operation?

W. Barton:
That's in operation. You have 111 I understand.

Mike Herring:
Most of our sites run 500 to 1,000 acres.

W. Barton
So these are much larger park facilities than we have on this? In other words--

T. Taylor:
Let me address that. In total we are looking at the three parks, and you are looking at around 2,900 acres in all three of them together. Each individual site when you look at it--when we look at it by itself, is not any bigger than what the State is already answering. I might also mention that as far as concession areas in managing parks--that is something that is not new to the City of Dallas anyway, and I think the Parks & Wildlife has some concession areas in some of the parks. I know in the City of Dallas, we have several facilities that we have leased out to private individuals and we get a certain % of the concession fee that comes in, so I think that is something that we could look at..

W. Barton:
I would certainly appreciate your taking a closer look at that type of development as apposed to state operation. One thing I found at the lake is that there are some nice parks operated by the State, but, it seems to me it limits the access to the lake and to the recreation use. It makes it more like-downtown, you've got to pay for things--you get all these things that are real nice, but it is not the wilderness,--it is not the great outdoors. A lot of people like to get away from downtown and get out to where there is grass, trees, water,-instead of a nice Government-built lodge facility like Russia would have in the communist country. I am strictly for the free enterprise system and I think it will work if the Government and the enterprise system will get together. The free enterprise system and the enterpreneur ought to get together--to pay money, rent money, lease money, or whatever to the city. It would be o.k. to the city --some of them to pay for the maintenance of the roads and the sanitary facilities and whatever patrols that might be provided. Of course, the game warden, patrol, and their salaries would be paid out of the licensing for fishing money and so forth,--but I think it will work. Of course, the city needs to minister and set up rules and regulations and perhaps control the specification on what is built, and take bids from private enterprise, private developers, private people on what they propose to put into the area in the way of development, and the city is to set the standards and set the minimum requirements, and let the private business and the private entrepreneur get on with the process of taking some risks and getting involved and providing some incentive for the developing and so forth.

T. Taylor:
I think that is something we can certainly look at. It is not beyond what we are considering. I would like to say that as an urban parks planner of a large city vs. Parks and Wildlife Department, I think probably you get more wilderness and more rural life park development out of Parks and Wildlife than you would out of the City of Dallas or the City of Denton because usually wilderness areas are, if I am not mistaken, part of the Parks and Wildlife system of developing parks, and I am sure that should Parks and Wildlife take one or all of the parks, or whatever, it would get areas that would be designated as natural areas for back packing and things of that sort. Areas would not be fully developed and it wouldn't be an urban type set-up.

W. Barton:
I'll get back to my first point and then I'll conclude. Obviously without any commercial development on the west side and without any parks it would be a very private place. It would make excellent sites for nice, expensive homes by well to do people. There is nothing wrong with that, but I think the citizens of Dallas and Denton and the State who are giving up some of this land and, after all, at least the citizens of Dallas and Denton will be paying for the construction for use of the water, that they ought to have some access to this west side and I hope that you consider them in making this final termination of where these parks are, and not just say--well, let's reserve this for private development, all private land, and just have a solid row of, very nice expensive homes on the sest side of--going right up to Government land, and not public land between private land other than maybe where a road goes up to it now and stops dead end.

T. Taylor:
I understand there will be public land completely surrounding the lake.

W. Barton:
Yes, I know, but this private land surrounding public land except where there might be an existing country road, or state road, will no longer be in use. It would just dead end at the lake and the county closes that down and the State closes that down you can't drive to the lake. You would hav to get permission and so I would hope that you would consider that and make it tool likely.

T. Taylor:
Also, for clarification-there will be boat ramps and additional access points to the lake other than the parks.

W. Barton:
Is that right? O.K.

T. Taylor:
So there will be some things like that in different areas and I am sure some of those anyway will be on the west.

W. Barton:
Alright. Thank you very much.

T. Taylor:
Thank you. Mr. Hartung asked me to mention one feature of the lake will be used for water supply. That is the principal purpose. The lake level will fluctuate, and that has to be taken into account--location of park sites and the kind of use that the various park sites will be put to--how steep the land is, how close the water will be under different conditions that exist, flat areas of the lake when the lake if low, if it will be long way to the water-all that sort of think will be considered in selection of the type of recreation that we use.

T. Taylor:

J. Davis:

C. Hartung:
Are there any other questions or comments that you would like to enter into the records? We thank you very much for coming out tonight.

Questionaire Used to Determine
Recreation Facility Preferences for
Ray Roberts Lake

FACILITY	DESIRABLE	NOT DESIRABLE	NO PREFERENCE
Picnic Sites	87.1%	1.6%	11.3%
Swimming Beaches	82.3%	6.5%	11.3%
Tent Campsites (W/Water Only)	75.8%	11.3%	12.9%
Hiking Trails	74.2%	8.1%	17.7%
Fishing Piers	69.4%	9.7%	20.97%
Playgrounds	67.7%	11.3%	20.97%
Primitive Camping Sites	64.5%	6.5%	29.0%
Park Store	64.5%	20.97%	14.5%
Marinas (Boat Slips & Stalls)	61.3%	19.4%	19.4%
Trailer Campsites (w/Wtr & electric)	58.1%	30.6%	11.3%
Group Pavillions (for picnicking)	56.5%	22.6%	20.97%
Screened Shelters	54.8%	25.8%	19.4%
Horseback Riding (Trail Only)	45.2%	24.2%	30.6%
Group Camps	40.3%	38.7%	20.97%
Cabins	40.3%	32.3%	27.4%
Lodges	38.7%	33.9%	29.0%
Boat Storage	35.5%	37.1%	27.4%
Golf Course	33.9%	43.5%	22.6%
Horseback Riding (Concessionaire)	33.9%	38.7%	29.0%
Tennis Courts	32.3%	43.5%	24.2%
Baseball Fields	27.4%	46.8%	25.8%
Swimming Pool	25.8%	48.4%	25.8%

Area Surveyed - Denton, Texas

Number Surveyed - 62

Survey prepared by the Texas Parks and Wildlife Department
and sponsored by the Cities of Dallas and Denton, Texas

May 3, 1982

Colonel Donald J. Palladino
U.S. Army Engineer District
P.O. Box 17300
Fort Worth, TX 76102

Dear Colonel Palladino:

I have become aware of the plan of the Corps of Engineers to build another marina with a paved road leading to it in the middle of a planned much needed wilderness area, called Johnson Branch Park, on the new Ray Roberts Lake.

I would like to voice my objection to the marina, paved roads, picnic tables, etc. A wilderness area for the North Texas and Metroplex area is much more needed as there isn't one for hundreds of miles that I know of; but there are marinas, and picnic areas, many, many of them in this area. Let's have a wilderness area that is just that - with no motorized vehicles in the middle or even edge of this much needed type of area.

Thank you,

_____NAME

_____ADDRESS

_____CITY & ZIP CODE

My occupation is_____but one of my favorite leisure time activieies, if the area were available is:

	Percentage Desirable	No Preference
* Just getting away	66.6	33.4
* Riding - Horseback	50.3	49.7
* Hiking	49.4	50.6
** Fishing	40.8	59.2
** Bicycling	38.8	61.2
* Camping - Primitive	37.7	62.3
* Camping - Recreational	35.8	64.2
* Backpacking	34.3	65.7
* Nature Study	30.7	69.3
** Sailing	30.6	69.4
** Canoeing	26.5	73.5
** Row Boating	6.1	93.9

* Number surveyed 332
** Number Surveyed 49

Petition and Survey prepared & sponsored by Sammie J. Estes, Pilot Point, Texas.

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4200 Smith School Road
Austin, Texas 78744

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Dallas

WM. M. WHELESS, III
Houston

January 12, 1982

Colonel Donald J. Palladino
District Engineer
Department of the Army
Fort Worth District
Corps of Engineers
P. O. Box 17300
Fort Worth, Texas 76102

Dear Colonel Palladino:

In a letter dated September 12, 1975, the Parks and Wildlife Department expressed its interest, subject to the availability of funds, to assume cost sharing responsibility for the Isle du Bois Park site on the proposed Lake Ray Roberts.

For the past year, the Texas Parks and Wildlife Department, the Corps of Engineers and the Cities of Dallas and Denton have renewed discussions concerning the recreational program and responsibilities for the Lake Ray Roberts project.

This letter is to reiterate the Department's intent to cost share on the Isle du Bois site and to further set out and clarify the extent of our participation in the remainder of the project. At this time the Texas Parks and Wildlife Department intends to assume total operational and maintenance responsibility for four major park sites, three access areas, and associated project lands, exclusive of Corps' administration facilities. Cost sharing responsibilities for all development exclusive of Isle du Bois will be borne by the local sponsors. Recreational site planning for the park areas will be accomplished by the Texas Parks and Wildlife Department, while design and construction responsibilities will be determined at a later date.

Should any additional clarification of our position be needed, please let me know.

Sincerely,

Charles D. Travis
Executive Director

CDT:MWH:mk

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Houston

CHARLES D. TRAVIS
EXECUTIVE DIRECTOR

4200 Smith School Road
Austin, Texas 78744

June 7, 1982

Colonel Donald J. Palladino
Commander, Fort Worth District
Corps of Engineers
Post Office Box 17300
Fort Worth, Texas 76102

Dear Colonel Palladino:

Reference is made to my letter of January 12, 1982, expressing the Department's interest in assuming operational and maintenance responsibility for all project lands at Lake Ray Roberts, exclusive of Corps' administration facilities. More specifically, I would like to express this Department's interest in accepting transfer of approximately 20,000 acres of project lands to be administered for the purposes of wildlife management. I would also like to request that such transfer be accomplished through a General Plan and License Agreement separate from the Plan and License required for our proposed Park facilities. This arrangement will allow greater flexibility in the management responsibilities of both the Parks and Wildlife Divisions.

I have been advised that your agency is considering wildlife management recommendations proposed by this Department including installation of subimpoundments to create additional wetland areas. My staff has determined that construction of these subimpoundments will significantly increase the potential of the lake and surrounding vicinity for waterfowl and other wildlife. This should greatly increase benefits associated with wildlife-oriented recreation.

Although this letter may be considered a statement of intent, formal acceptance of any Lake Ray Roberts Project Lands for wildlife management or park purposes will be subject to approval by the Texas Parks and Wildlife Commission.

Sincerely,

Charles D. Travis
Executive Director

CDT:RGF:mk

cc: Mr. Jerome Johnson
U.S. Fish & Wildlife Service
Fort Worth Field Office

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
9A33 Fritz Lanham Building
819 Taylor Street
Fort Worth, Texas 76102

April 26, 1982

Colonel Donald J. Palladino
District Engineer
Corps of Engineers, U.S. Army
P.O. Box 17300
Fort Worth, Texas 76102

Dear Colonel Palladino:

Please find enclosed the recommendations of the Texas Parks and Wildlife Department regarding fishery management aspects at proposed Ray Roberts Reservoir, Texas. We have coordinated with the Department in the development of these recommendations and concur in their findings. These management recommendations were requested by your Environmental Resources Section staff to assist in the preparation of the project Master Plan.

Significant points covered in the fishery management recommendations include:

1. the maintenance of existing farm ponds and flood control structures within the summer (621 ft. msl) and conservation pools (632.5 ft. msl) to use as one-time nursery ponds and serve as structure following impoundment;

2. the need to develop and effectively manage a minimum of 70 acres of permanent nursery ponds above the project's conservation pool elevation;

3. a timber clearing plan for the basin which will optimize fisheries production, while allowing multiple use of the reservoir surface area;

4. the creation of fish attractors throughout the reservoir basin; and

5. the development of sufficent access for anglers and boaters in both the reservoir and tailrace. We believe it is especially important that provisions be made for access and recreation utilization of the Elm

Fork Trinity River between Ray Roberts Dam and Lake Lewisville. Minimum instream flows should enhance the fishery in this section of the river as well as make it more attractive to other recreationists.

Please contact the Department's Inland Fisheries management personnel for assistance during future planning or development of detailed fisheries management features. Also let us know if we can be of assistance. The opportunity to provide this information for the Ray Roberts Reservoir Master Plan is appreciated.

Sincerely,

Jerome L. Johnson

Jerome L. Johnson
Field Supervisor

Enclosure

cc: Area Manager, Area I, U.S. Fish and Wildlife Service, Austin, Texas
Resource Protection Branch, Texas Parks and Wildlife Department, Austin, Texas
Bruce Hysmith, Texas Parks and Wildlife Department, Denison, Texas

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Dallas

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Houston

Lake Texoma Fisheries Station
Route 4, Box 157
Denison, Texas 75020
April 8, 1982

Mr. Jerry Johnson, Field Supervisor
U. S. Fish and Wildlife Service
819 Taylor, Room 9433
Fort Worth, Texas 76102

Dear Mr. Johnson:

The enclosed material contains our recommendations regarding pre- and postimpoundment development for fishery resources in proposed Lake Ray Roberts. Please present our recommendations as part of the Master Plan for Lake Ray Roberts.

We appreciate your cooperation in this effort.

Sincerely,

Bruce Hysmith

Bruce Hysmith
District Management Supervisor - Inland Fisheries
District II-A

Encl. - 1

cc: Roger McCabe, TPWD, Waco
Bob Bounds, TPWD, Austin

FISHERIES MANAGEMENT PLAN

Lake Ray Roberts

1. As controlling authority, the Corps of Engineers (COE) should assume the basic responsibility for implementing fishery management plans developed by the Texas Parks and Wildlife Department (TPWD) in cooperation with the U. S. Fish and Wildlife Service (USFWS). TPWD is responsible for enhancing, managing, and protecting fish and wildlife resources in Texas and as such should be responsible for providing basic criteria for fisheries management in Lake Ray Roberts.

2. Fish and wildlife should be a project purpose and as such should receive a share of capital costs as per other features. We recommend a minimum of 4% of the total capital costs (current capital costs for the Lake Ray Roberts project are estimated as $286,100,000.00) for these features (based on COE tentatively selected plan, Report on the Restudy of Lake Texoma, Tulsa, OK District).

   Capital costs for fish and wildlife should include, but not be limited to:

   a. Habitat enhancement.
   b. Nursery pond development.
   c. Rotenone (fish toxicant) for preimpoundment activities.

3. Current project funds include an allocation identified as Resource Management Fund. These monies are used for both fish and wildlife management projects. We recommend the annual Resource Management Fund for Lake Ray Roberts be established to provide a minimum of 5% of the annual operations budget (estimated annual OM budget = $530,500.00) for fisheries management features (based on the COE tentatively selected plan, Report on the Restudy of Lake Texoma, Tulsa, OK District).

   These features should include, but not be limited to:

   a. Habitat enhancement.
   b. Operation and maintenance of nursery ponds.
   c. Fisherman information.
   d. Special studies.
   e. Maintenance of boat trails, signs, and buoys over fish structure.
   f. Seeding exposed mud flats during periods of low lake level.

4. Farm ponds and flood control structures located within the recreation pool (621 ft. msl) be left intact for use as one-time nursery ponds prior to impoundment. Present fish populations in these ponds will be eliminated by applications of rotenone and restocked with selected species prior to inundation.

5. Farm ponds and flood control structures located between recreation pool (621 ft. msl) and conservation pool (632.5 ft. msl) be left intact for use as one-time (optional) nursery ponds prior to impoundment. Present fish populations in these ponds will be eliminated by applications of rotenone and restocked with selected species prior to impoundment. They would also provide excellent fishery habitat when the lake was at conservation pool.

6. Selected farm ponds and flood control structures located between conservation pool (632.5 ft. msl) and the guide take line be developed as permanent nursery ponds. Candidate ponds are shown on the enclosed map (Fig. 1; S_1 through S_{10}).

Based on fish production potential and stocking requirements for Lake Ray Roberts (29,350 ac), the nursery pond complex should contain 70 surface acres of water. Three ponds at 20, 10, and 5 surface acres be developed in the Elm Fork Trinity River Arm from Sites 1 through 4. Three ponds at 20, 10, and 5 surface acres be developed in the Isle du Bois Creek Arm from Sites 5 through 10.

Site location criteria and pond development should include (Keith 1969):

a. Location so as to facilitate draining directly into the adjacent lake. May require construction of a canal to connect the pond drain with the lake, especially at low lake levels.

b. Suitable drainage area to pond volume. This required 10 acres drainage per acre-foot of pond volume (Soil Conservation Service, personal communication). The drainage basin and pond size should balance expected runoff so as to prevent uncontrolled overflow of the nursery pond. Pumping should only be required in emergency situations.

c. Economical construction site.

d. Adequate allweather access to the site.

e. Containing no private ponds in the watershed. If farm ponds are located within the watershed, full control over the ponds should be obtained.

f. If existing structures meet the basic criteria they should be developed to the appropriate size. Existing structures must be drained, bottoms cleaned and reshaped to facilitate complete and efficient draining, and shorelines sloped to 3:1. Average depth should be 6, 5, and 4 feet in 20, 10, and 5 acre ponds, respectively. In addition, screened overflows and drain control structures must be installed. Drain structures should allow for complete draining within a 3-5 day period and be constructed according to the most efficient fish hatchery pond design. To allow the option of recovering pond raised fish or stocking directly into the lake, a fish recovery basin should be constructed below each pond (between pond drain and lake). Drain structure controls should contain a locking device to prevent unscheduled draining. TPWD personnel to participate in the design of these structures.

g. Each site should be contained within a security fence to prevent theft and vandalism.

In addition the following equipment will be required to manage and maintain the above nursery ponds.

a. One 50 hp tractor with the following accessories:

1) Six-foot brush hog mower.
2) Disc.
3) Scraper box.
4) Seed and fertilizer spreader.

b. Low-boy trailer to haul above tractor and equipment.

c. High volume portable water pump for emergency situations.

7. In general, standing timber within the lake basin that would not present a hazard to navigation at recreation pool (621 ft. msl) should not be cut. In the multiple use zone (MUZ; Fig. 1) only standing timber that interferes with boating, water skiing, and swimming should be cut. Coves in the MUZ that contain standing timber should not be cleared. These timbered coves provide excellent fish habitat.

   Timber that must be cleared should be stacked and anchored in strategic locations (Fig. 1) for fish attractors. The exact sites to be identified as work progresses.

   In the area designated for fishing (Fig. 1), all standing timber, with the exception of nursery pond sites and the boat lane in the upper Isle du Bois Creek Arm, should remain.

8. Sufficient access should be provided to anglers (boat and bank) at strategic points around the lake. Boat ramps should be provided at all parks (See Fig. 1). These ramps should be lighted with suitable parking spaces and boat docking piers. The Farm-to-Market-Road (FM) 372 road bed should be left intact so it can be used as an unimproved boat ramp on the north (near Bloomfield) and the south (near Isle du Bois Park) sides of the lake. FM 922 and FM 455 should also be left intact where possible. Fishing piers should be built at Isle du Bois Park, Johnson Branch Park, and Culp Branch Park. These should be lighted and have a fish cleaning station near each pier. A boat lane should be cut through standing timber where needed, and the channel should be marked with permanent markers in the upper reaches of the lake (See Fig. 1).

9. Adequate access and facilities for anglers should be provided in the tailrace below Lake Ray Roberts Dam. In addition, shoreline easements along that portion of the Elm Fork Trinity River between Lake Ray Roberts Dam and headwaters of Lake Lewisville be secured for future consideration as a recreation area. We understand that a minimum flow agreement between the Cities of Dallas and Denton, Texas, and the United States of America has already been signed.

10. In addition to naturally occurring native species, Lake Ray Roberts will be managed for Florida strain largemouth bass. Initial fisheries enhancement will utilize existing farm ponds and lakes within the lake basin as one time nursery ponds. After conservation pool is reached, fish populations (forage and game fish) will be supplemented as necessary through nursery pond production. Certainly we feel the use of nursery ponds will increase our effectiveness in managing the fishery at Lake Ray Roberts. The facilities would allow for replacing a lost or small year class of fish, introducing new species, stocking of catchable size fishes, and supplementing or augmenting forage fishes. Nursery ponds have proven their effectiveness in improving fisheries on several impoundments in Arkansas (Keith 1969). Since recreation provides 49% of the benefits to the Lake Ray Roberts Project, fisheries management should be a priority feature.

11. We recognize comments and/or recommendations in this document will be used in formulating a Fish and Wildlife Management Plan as part of the Master Plan for Lake Ray Roberts. Since our comments and/or recommendations at this time are somewhat general in scope, we request the opportunity to participate in future planning and development of specific fisheries management features.

Submitted by:

Bruce Hysmith and John Moczygemba

Bruce Hysmith
District Management Supervisor
Inland Fisheries - District II-A

John Moczygemba
Assistant District Management Supervisor
Inland Fisheries - District II-A

LITERATURE CITED

Keith, W. E. 1969. Preliminary results in the use of a nursery pond as a tool in fishery management. Proceedings of the Annual Conference, Southeastern Association of Game and Fish Commissioners, 23:501-511.

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
9A33 Fritz Lanham Building
819 Taylor Street
Fort Worth, Texas 76102

March 19, 1982

Colonel Donald J. Palladino
District Engineer
Corps of Engineers, U.S. Army
P.O. Box 17300
Fort Worth, TX 76102

Dear Colonel Palladino:

This letter provides preliminary recommendations of the U.S. Fish and Wildlife Service (FWS) and the Texas Parks and Wildlife Department (TPWD) for wildlife management at Ray Roberts Reservoir, Texas. Our input was requested by your Environmental Resources Section for the preparation of the project master plan. Separate recommendations will be provided on the fisheries management aspects of Ray Roberts Reservoir within the near future.

The TPWD's wildlife management recommendations are attached for your reference. It is our agencies' opinion that management activities at Ray Roberts should emphasize the development and maintenance of project lands for waterfowl, upland game, and nongame species. The general recommendations provided by TPWD and the measures identified in our Fish and Wildlife Coordination Act report, dated May 14, 1975, should be utilized in developing your master plan document. We are unable, however, to identify specific management features or locations at this time due to the lack of detailed project-related maps and operational information made available to us. A comprehensive wildlife management plan should be formulated when more specific operational plans are developed by your agency.

In the interim, we request that the following features be incorporated into the master plan in order to mitigate adverse project effects on wildlife.

1. All project lands be fenced to regulate access and prevent uncontrolled livestock grazing of wildlife areas.

2. Low water retaining structures be developed at select locations within the reservoir basin. These structures, constructed of gated, earthen embankments, would permit water level manipulations in shallow-water areas for the management of waterfowl.

3. Shrubs valuable as wildlife food and cover be planted in strips or motts along fence rows, edges of pastures or fields, drainageways, etc. These plantings should comprise at least 100 acres of project lands.

4. Perimeter reservoir lands currently in bermudagrass pasture be disked in strips in order to promote the growth of native forbs valuable as wildlife food.

5. Plant food plots of one-fourth to one-half acre in size near woody cover on select project lands. The total amount of food plots and disked areas should include a minimum of 300 acres.

The wildlife management features recommended by TPWD and FWS should be undertaken as initial development costs of the project. These features are necessary to partially offset the adverse impacts of Ray Roberts Reservoir on wildlife resources, since no lands were purchased at the project specifically for wildlife mitigation. It should also be noted that a significant portion of the project's benefits, approximately 49%, were attributable to recreation and fish and wildlife. These benefits will not be realized unless appropriate fish and wildlife management and utilization practices are undertaken.

We believe that the Corps of Engineers should commit to the initial development of wildlife management features at Ray Roberts Reservoir as a condition to offering the project to TPWD for management under the terms of a general plan and license. We also recommend that annual operation and maintenance costs be made available to the State as a condition for accepting project management responsibility.

We appreciate the opportunity to provide this input for your master planning activities. Please let us know if we can be of further assistance.

Sincerely,

Jerome L. Johnson
Field Supervisor

attachment as

cc: Area Manager, FWS, Austin, TX (w/o attachment)
Roy Frye, TPWD, Austin, TX (w/o attachment)

TEXAS
PARKS AND WILDLIFE DEPARTMENT

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Dallas

WM. M. WHELESS, III
Houston

February 26, 1982

Mr. Jerome Johnson
U. S. Fish and Wildlife Service
9A33 Fritz Lanham Bldg.
819 Taylor Street
Fort Worth, Texas 76102

Dear Mr. Johnson:

Enclosed please find wildlife management recommendations for Lake Ray Roberts as requested by the Corps during a field trip on February 10, 1982. Additional field trips would probably be required to provide more detailed site specific information. Hopefully this information will suffice for now. I presently have no further knowledge concerning negotiations between the Parks Division and the Corps, but will keep abreast of the situation.

Please advise if additional assistance is needed.

Sincerely,

Roy D. Frye

Roy Frye
Wildlife Resource Planning

RF:cm

Enclosures

WILDLIFE MANAGEMENT RECOMMENDATIONS

Lake Ray Roberts and Perimeter Lands

The following wildlife management recommendations are provided as per request by the Corps of Engineers for consideration in development of a master plan for Lake Ray Roberts in Denton, Cook and Grayson Counties. Increasing the quality of remaining available wildlife habitat should be a significant component of the master plan in view of the absence of any significant wildlife mitigatory measures associated with reservoir construction and realization of anticipated fish and wildlife recreational benefits used to assist justification of the project. These recommendations are general in nature. Specific management treatments should be applied according to a comprehensive wildlife management plan.

WATERFOWL

Due to close proximity to cropland areas and its general location within the migration corridor to the coast, Lake Ray Roberts will probably attract a presently unknown number of waterfowl. Implementation of several management features would increase waterfowl use of the lake.

A plot of the projected conservation pool level (blue) and projected average [1/] lake level (red) on the attached topograhic map shows generally where large areas of exposed lake bed would be expected to occur during a drawdown. These areas have been designated as rectangular zones on the map. Exposure of these areas during summer months will allow vegetation growth to occur

[1/] Based on a projected lake level ranging between 621 and 625 MSL occurring approximately 50 percent of the time.

creating a waterfowl food source. Increased lake levels and subsequent flooding of these areas during fall and winter months to a depth of three feet or less will create a feeding condition preferred by ducks. The attractivity of these areas to waterfowl would be significantly enhanced with introduced plantings of domestic grains including grain sorghum and millet that would be flooded with shallow water during fall and winter months. Application of supplemental food plantings should be planned according to site specific locations determined from water level history after impoundment. Construction of earth-fill embankments with gates strategically located along minor drainages or depressions within the rectangular zones would retain water that would otherwise be absent during prolonged drawdowns. This would insure that vegetation would remain flooded during the fall and winter even though the lake level would be lower. Construction of the low water retaining structures would be necessary before impoundment and should be considered as an initial development cost.

Water levels of Lake Ray Roberts should be adjusted at the proper times to insure the continued growth of plants valuable to waterfowl. The reduction of pool levels in the spring and summer and raising of pool levels in fall and winter should be very slow and gradual. Refilling of the impoundment should be controlled so that new growth is never completely inundated.

Waterfowl hunting should be allowed in anticipation of significant public recreational demand near the Ft. Worth-Dallas metropolitan area. However, hunting pressure should be carefully monitored and controlled. If significant numbers of waterfowl are ultimately attracted to the lake, a portion of the lake may need to be closed to hunting to provide a refuge for the

birds to feed and rest and to prevent hunting "burn-out." Preliminary examinations indicate that if significant populations of waterfowl begin to use the lake, and if the Isle du Bois Creek Arm of the lake is open to hunting, the Elm Creek Arm may need to be closed. Continued monitoring of hunting pressure will detemine whether other control measures are needed.

UPLAND GAME

Field reconnaissance and examination of aerial photos have indicated that while small tracts of woody cover will be available to wildlife, a substantial portion of the perimeter lands comprise tame pasture consisting primarily of bermuda grass. Although the consociation will probably revert back to native grasses overtime, present wildlife potential is extremely low unless such areas can be broken up by the addition of vegetative plantings to provide for food and cover.

Those areas which are circled on the attached topographic map represent candidate areas where such plantings should occur. They represent only generalized areas as determined by examination of the projected conservation pool, estimated perimeter boundary and attached aerial photography. Specific site locations would be determined after additional field examinations were conducted. The following treatments are recommended.

1. Introduction of multiflora rose, wild olive, wild plum or sumac along fence rows or edges of grass fields.
2. Discing of edges of burmuda grass fields to promote growth of native forbs beneficial as wildlife foods.

Both 1 and 2 should be performed on small strips and accounting for a total treatment area of approximately 100 acres.

3. Provide for food plantings of one-fourth to one-half acre in size accounting for a total of 300 acres. Plantings should be located within the candidate areas and located in close proximity to woody cover. Suggested grains include sorghum and millet.
4. Carefully monitor and control grazing pressure to select for growth of native plants.
5. Allow public hunting on the lake and associated perimeter lands. Prohibition of hunting on the Elm Fork Arm would be determined according to waterfowl hunting restrictions.

North Texas
State
University

Denton, Texas
76203

Facilities Planning
and Utilization

April 22, 1982

Mr. Roger Hamilton
Chief of Environmental Resourses
U.S. Corps of Engineers
Federal Building, 819 Taylor
Fort Worth, Texas 76102

Dear Mr. Hamilton:

Enclosed is the proposal for outdoor recreational facilities for North Texas State University. We appreciate the opportunity to present this proposal and believe it would enhance the public use of Lake Ray Roberts.

Our proposal would allow the University to teach a number of courses which can not be taught now for lack of facilities. In addition, we also propose to expand our organized club sports, mini course programs, and research efforts with the use of the facilities at Lake Ray Roberts

I appreciate the encourgement and consideration you have given to this concept. The acceptance of our proposal would add a unique demension to Lake Ray Roberts and provide an instructional capability in outdoor and water recreation not otherwise available.

I look forward to working with you.

Yours truly,

Larry Luce

Larry Luce Ph.D.
Facilities Planner

attachment

Box 13276, N.T. Station • (817) 788-2395 or 788-2397

A Proposal for an NTSU Facility at

Lake Ray Roberts

Lake Ray Roberts will be only 12 miles north of Denton and presents the first realistic opportunity for NTSU to develop an operational center associated with water sports and outdoor activities. The control of waterfront property on Lake Ray Roberts either through ownership or long term lease would allow the university to:

1. Have a controlled area for existing biological research programs in aquatic entomology, limnology, and fisheries.
2. Develop mini courses which are open to the general public in water sports such as water sking, sailing, canoeing, bait casting, scuba diving, and water safety.
3. Develop a recreational sports program for faculty, staff, students, and area residents in water sports.
4. Enlarge the club sports program to include water sports (club sports complete in intercollegiate meets).
5. Develop academic courses within the academic curriculum in water sports such as water sking, sailing, etc. as part of the physical education program.

If an amount of land in conjunction with the water front area can also be secured, additional programs can be developed or expanded:

1. Expand academic courses in outdoor recreation including facilities management, camping and leadership, and activities programming.

2. Establish outdoor recreation mini courses such as backpacking and camping.
3. Facilitate research programs in ecology, wildlife, and certain plant studies, as well as expansion of the environmental impact and analysis programs at the Institute of Applied Sciences.
4. Establish an outdoor biology laboratory for class instruction in various plant and animal studies. This area would also serve as a wildlife refuge.

Ideally, the water frontage would be in a cove that would offer some shelter to docking facilities. The area would not need to be excessively large, but the access route from Denton would be important.

The natural habitat land would be maintained without roads in the interior. Road access to one place on the perimeter only would be desirable. While it would be convenient to have this area located adjacent to the water front area, it is not necessary. There would be no real limit on the upper limit of the size of the area, but a lower limit would have to be somewhere in the 20-30 acres size. No structures would be built with the possible exception of observation blinds and nesting boxes. Access would be restricted to preserve the natural habitat.

TEXAS WOMAN'S UNIVERSITY

DENTON, TEXAS 76204

OFFICE OF THE PRESIDENT

17 December 1974

Mr. L. E. "Bud" Horseman
U. S. Army Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102

Dear Mr. Horseman:

This letter is written to record the interest of the Texas Woman's University in land on the Johnson Branch at the planned Aubrey Reservoir. The University is interested in the land for educational, therapeutic recreation, and recreational purposes within the purview of our academic, research, and services programs. Because of the needs of the University in these areas, we respectfully request consideration of the interest herein, expressed when assignments of the Johnson Branch lands are made.

Thank you very much.

Sincerely yours,

John A. Guinn
President

JAG/bs

cc: Mr. Bob Swofford
Parks and Recreation
City of Denton
Denton, Texas 76201

MEMORANDUM OF AGREEMENT

Between the

City of Dallas, Texas
and
City of Denton, Texas

and the

United States of America

Statement of Purpose

The Aubrey Lake, located on the Elm Fork of the Trinity River, is part of a dual lake system with Lewisville Lake located downstream. The dual lake system provides an opportunity to operate the water supply system to satisfy water supply requirements for the cities of Dallas and Denton, Texas, while concurrently satisfying the secondary purpose of maintaining the stream's natural riparian qualities from Aubrey Dam to Lewisville Lake. This Agreement entered into by and between the United States of America (hereinafter called the "Government") represented by the District Engineer, Fort Worth District, Corps of Engineers, and the city of Dallas, Texas, and the city of Denton, Texas, (hereinafter called the "Cities") is to maintain minimum designated streamflows through water supply operation in the Elm Fork of the Trinity River from Aubrey Dam to Lewisville Lake to maintain the stream's environmental quality.

A. What the Cities Will Do

1. The Cities will endeavor to request releases of water impounded in the Aubrey Lake in such a manner and of such volume that there will be a continuous minimum outpouring through the conduit into the Elm Fork of the Trinity in accordance with the following seasonal schedule:

a. Once deliberate impoundment has begun in Aubrey Lake until the lake is half full, the minimum conservation storage release by the Cities will be determined by the following minimum monthly release formula:

$$\text{Minimum Monthly Release} = \frac{\text{(Monthly rate per following table)} \times \text{(Maximum obtained storage)}}{\text{Half full storage}}$$

After the lake reaches half full, and thereafter, the minimum release will average 15 cfs (10 mgd), apportioned to monthly rates as follows:

Month	CFS	MGD
Jan	12	8
Feb	18	12
Mar	30	19
Apr	25	16
May	39	25
Jun	22	14
Jul	6	4
Aug	3	2
Sep	5	3

Month	CFS	MGD
Oct	6	4
Nov	7	5
Dec	7	5

b. In case of an extreme drought such that the total storage in both Aubrey and Lewisville Lakes becomes depleted to about 300,000 acre feet, with a small part of this storage being in Aubrey Lake, the Cities retain the right to release all the water remaining in Aubrey Lake into Lewisville Lake. After all the water is released from Aubrey Lake, as long as the drought continues, the natural flow of the channel, at Aubrey Dam, will not be impounded in Aubrey Lake, but will be permitted to flow freely down the channel to Lewisville Lake.

B. What the Government Will Do

1. The Government will endeavor to operate the release facilities of Aubrey Lake in such a manner that the minimum releases of conservation water, as set forth in Section A above, will be of such volume and in such manner that not less than the agreed to minimum flows will be continuous in nature, rather than sporadic or slugged.

2. The Government will also endeavor to release any water impounded in the flood control pool of Aubrey Lake at such rates of increase and decrease that will conform to the natural hydrograph for comparable flows. The volumes that will be released will be in accordance with the project design.

C. Further Understanding

This Memorandum of Agreement will be effective when signed and will become a part of the Water Control Manual. This Memorandum of Agreement will be in effect for the life of the dual lake system unless terminated or modified in writing by all parties. Review of the terms of this Memorandum of Agreement may be made at any time by mutual consent of the parties hereto or by either party after 60 days notice of its desire for review.

THE CITIES:

BY: _____
Director, Dallas Water Utilities

DATE: Oct. 7, 1980

BY: _____
City Manager, Denton

DATE: Oct 14, 1980

THE UNITED STATES OF AMERICA:

BY: _____
DONALD J. PALLADINO, Colonel, CE
District Engineer
Corps of Engineers

DATE: 17 November 1980.

ATTEST: The authority for signing of this Memorandum of Agreement by the designated officials is provided by Section 2-51 of the Dallas City Code.

BY: Robert D Stovall
City Secretary, Dallas

DATE: Oct. 7, 1980

ATTEST: The signing of this Memorandum of Agreement by the designated officials is authorized by the city code of ordinances.

BY: Brooks Holt
City Secretary, Denton

DATE: October 14, 1980

VII LAND AND WATER USE PLAN OF DEVELOPMENT

VII - LAND AND WATER USE PLAN OF DEVELOPMENT

7-01. General. - The basic concept behind the land and water use plan of development is the integration of authorized uses of the project land and water areas into a balanced development plan for the best use of all project resources in the best interest of the public throughout the life of the project. The intent is to present a plan of development which is flexible enough to meet the present and future needs of the project in consonance with the land capabilities and the esthetics of the project. The objectives of this plan are to: (1) present a complete zoning and land use allocation plan which offers specific recommendations for the ultimate use and possible interim use to which all land and water should be dedicated; (2) to serve as a resource management guide for the comprehensive use of all project land and water areas through planned use of designated areas; and (3) to present the concept and objectives for the management of all project resources.

7-02. Land use allocations plan. - ER 1120-2-400 requires all lands at civil works water resource projects to be designated for a specific purpose in accordance with a land use allocation plan. The basic objective of the land use allocation plan is to provide stewardship of the project lands and its resources through prudent land use designation and management. Project lands were allocated for specific purposes only after considerable research was conducted to determine their highest and best use. It has been necessary to allocate certain lands for both interim and ultimate use. Land areas will be marked according to designated use as indicated on the land use allocation plan with appropriate signs wherever necessary for proper land management and administration. Table VII-1 presents a summary of the land use acreages. The land use allocation plan showing various designated land uses is present in plate VII-1. Descriptions of each of the allocated land areas follow:

a. Project operations. - Lands are acquired and allocated to provide for safe, efficient project operation for those authorized purposes other than recreation, and fish and wildlife. Agricultural use of these lands will be permitted only on an interim basis when not in conflict with the designated use.

b. Recreation: High use - Certain lands acquired for both project operations and specific recreation are allocated for ultimate use as developed public use areas for intensive recreational activities by the visiting public, including areas for concessions and quasi-public development. Fishing will be permitted except in restricted areas such as beach areas. No agricultural uses are permitted on these lands except on an interim basis for maintenance of open space and scenic values.

c. Recreation - low use - Certain lands acquired for both project operational needs and specific recreation are allocated for the purposes of multiple low-density recreation activities. Activities which will be suited to this land classification are: primitive camping, nature study, horseback riding, & hiking. These lands may also provide suitable habitat for the propagation and preservation of native species of wildlife.

d. Recreation - interim low use. - This land use classification will be used initially for the same general activities as listed under the recreation - low use catagory. However, the ultimate and best use of these lands is for the future development of high use recreational activities. If additional recreation facility development is determined to be needed, the design of such development will be done in such a manner as to be compatible, as much as is possible, with the existing low use activities. Both low use and interim low use lands could be made available on a short term interim lease basis to TPWD (Wildlife Division) for public hunting purposes prior to recreation development and park openings. Any arrangements to allow hunting on these lands would be looked at on a case-by-case basis before granting any such lease.

e. Wildlife Management - These lands will be acquired for project operational needs and allocated for the purposes of wildlife management. These lands will also be available for low-density recreation activities such as hiking, nature study, fishing access, and in some cases hunting activities.

TABLE VII-1

LAND USE ACREAGES

LAND USE ALLOCATIONS	ACRES
PROJECT OPERATIONS	325
RECREATION - HIGH USE	2,460
RECREATION - LOW USE	1,510
RECREATION - INTERIM LOW USE	675
WILDLIFE MANAGEMENT	14,246
TOTAL LANDS ABOVE EL.632.5	19,216
CONSERVATION POOL	29,350
TOTAL PROJECT LANDS	48,566

7-03. Water use plan. - Water areas are zoned to minimize safety hazards while allowing maximum utilization of all the water areas available. Exclusive use activities such as private boathouses or yacht clubs will not be allowed. Due to the frequent and prolonged drawdowns, the water areas will be marked with buoys according to corresponding uses, restrictions, and rules as indicated on the water use planning plate. The water use map is shown on plate VII-2. A description of these areas is presented below.

a. Swimming. - All authorized swimming areas will be identified by project signs and buoys. Only swimming and related activities are to be allowed in these areas. No boating or fishing will be permitted.

b. Skiing and high-speed boating areas. - Only cleared areas having sufficiently deep water and the necessary space will be designated and managed as a water skiing and high-speed boating area. Due to drawdowns, the averge size of the conservation pool during the summer recreation season will be 21,000 surface acres. Optimum water skiing and high-speed boating areas will be in the deep water section of the lake as shown on plate VII-2.

No effort will be made to restrict this area from other boating activities; however, appropriately marked signs and buoys will be placed to properly identify the area.

c. Low-speed Boating Areas. - Areas designated as low-speed boating areas will include shallow water and areas in proximity to beaches, boat docks, marinas, and ramps. Skiing will not be allowed in these areas. Appropriately marked buoys will be placed limiting the speed of watercraft to a no wake speed.

d. Uncleared areas. - Uncleared (timbered) areas exist where surface and subsurface debris create a hazard to any type of boating activity. No effort will be made to restrict these areas from public use; however, they will be marked to alert the public. A recommended clearing plan which is subject to revision is presented on plate XV-2.

e. Shallow areas. - Areas that are intermittent with shallow and deep water will be managed as shallow water areas in the interests of public safety. Floats advising the public of these areas will be maintained at the entrance or perimeter of the areas, as conditions warrant.

f. Restricted areas. - To insure visitor safety, the water area within 300 radial feet of the outlet and intake structures will be restricted from public use. Project personnel will classify any additional areas requiring extra safety restrictions. Buoys will be installed to indicate restricted areas.

7-04. Collateral and interim use. -

a. Agricultural leases. - It is anticipated that agricultural leases for grazing, hay production and/or crop production may be employed as a means to compliment project purposes of recreation and wildlife management. The primary objective in the administration of a leasing program should be to optimize the benefits to the public from operation of the project.

b. Nonprofit groups and private clubs. - The recreational needs of nonprofit groups and private clubs will be accommodated as per the administering agencies' regulations on a nonexclusive, first-come-first-served, or short-term reservation basis. There is a large group-use area in Johnson Branch Park which has been planned. (Plates, VIII-7 & 8). Groups requiring additonal recreation facilities can be assigned to a specific location within the high-use recreation areas.

c. Easements. - All outgrants, including easements for roads and utility lines, will be processed on an individual basis. The policy

of attempting to have private roads and utility lines located on non-Government land will be adhered to as much as possible. Lands will be acquired in flowage easement to allow for possible inundation, and no buildings for human habitation will be constructed on these lands. The written consent of the District Engineer or his authorized representative shall be obtained for the type and location of any structure and for appurtenances thereto now existing or to be erected or constructed on flowage easement lands.

7-05. Hunting restrictions. - Consideration will be given to the U. S. Fish and Wildlife Service and Texas Parks and Wildlife Departments recommendations to provide for hunting and other wildlife oriented activities at Ray Roberts Lake. Although the need to supply hunting opportunities does exist within the project area, any decision to allow such activities must be looked at on a case by case basis. There would be a number of considerations which would have to be addressed before allowing any hunting activities:

a. Cooperation and endorsement of local sponsors.

b. Safety and noise considerations

c. Possible need for variance to local laws in the event of annexation of project lands by surrounding cities.

d. Proper management and maintenance of hunting areas.

Final approval, for the incorporation of hunting areas on project lands and water areas would be by the Corps of Engineers. For further discussions on this subject see Chapter XV, Fish and Wildlife Plan.

7-06. Fishing. - Fishing in accordance with State laws and regulations will be permitted for all fish species on all water areas except in swimming areas and other restricted use areas shown on the water use map.

7-07. Management of environmental and recreational resources. -

a. General. - The concept underlying the management of project resources is to conserve, improve, and manage the resources for their best use and proper stewardship for the benefit of the general public. The intent of this section is to present the objectives for management of each project resource management techniques available. This will include but not be limited to controlling soil erosion, enhancing the vegetative cover for erosion control, providing wildlife habitat, increasing forage production, and providing for high quality public use. Specific management plans for the various resources will be developed by the project office following an on-site survey; they will be submitted as an appendix to the master plan.

b. Archeological and historical. - The objectives of an archeological and historical management program is to salvage and preserve the archeological and historical resources associated with the project. During the development of the program, the Corps of Engineers will seek

cooperation from the National Park Service, State universities, and State and county historical societies and commissions. In addition, the Corps of Engineers will exert every effort to develop an archeological and historical program agreeable to all cooperating agencies so that the maximum benefits can be obtained.

c. Scenic. - In developing the scenic resources, the purpose is to provide sensory pleasure to the majority of the visitors. Since a water resource project of this type greatly modifies the environment the primary objective will be to minimize the impact of the project on the environment by protecting existing resources. In addition, a landscaping and beautification program will be initiated to harmonize facility development with its environs; it will be designed to emulate as far as practical the esthetically pleasing "natural" environment presently existing within the project area.

d. Soils. - The primary objectives in developing a soil resource management program will be conservation, improvement, and enhancement. Improvement and development of the soil resources will be accomplished by controlling erosion on graded and disturbed areas, stabilizing gullies, and establishing and maintaining desirable vegetative cover.

e. Vegetation. - The basic objective of a vegetative management program is to provide stewardship of the land and resources through protection, improvement, and management of vegetative cover. This will be accomplished by planting, maintaining, and improving desirable trees and grasses. During the early stages of development of the project, cultivated crops will be replaced with desirable woody plantings, and grasses. It is essential that this revegetation and tree planting be initiated as soon as is practical to prevent further deterioration of the resources. During clearing operations, esthetically desirable and water tolerant trees at the 632.5 contour will be left. These trees will be selected by district personnel to remain after clearing. Areas above the upper clearing contour containing adequate tree and grass cover will not be disturbed. Due to the probable lengthy period of time which will be required to fill the reservior and the low percentage of time at which the reservoir will be at elevation 632.5 (2% of the time) selected trees between elevations 621 and 632.5 will be flagged by TPWD personnel and excluded from normal reservoir clearing. These trees will be located adjacent to park areas. Once prolonged inundation occurs, removal of all dead trees will be the responsibility of the Texas Parks and Wildlife Department.

f. Fisheries. - A fisheries management program will be provided for the purpose of conservation of species and derivation of maximum benefit from the fisheries resources. In managing the fisheries resources, the primary objective will be to increase the quality and quantity of the desirable game fish population. Such a program includes but is not limited to methods of controlling rough fish populations, the construction of nursery coves to raise and stock game fish, and bouying known areas of fish concentration points to facilitate their harvest by anglers. Although the responsibility of the fisheries resource is essentially that of the Texas Park and Wildlife Department, the Corps of

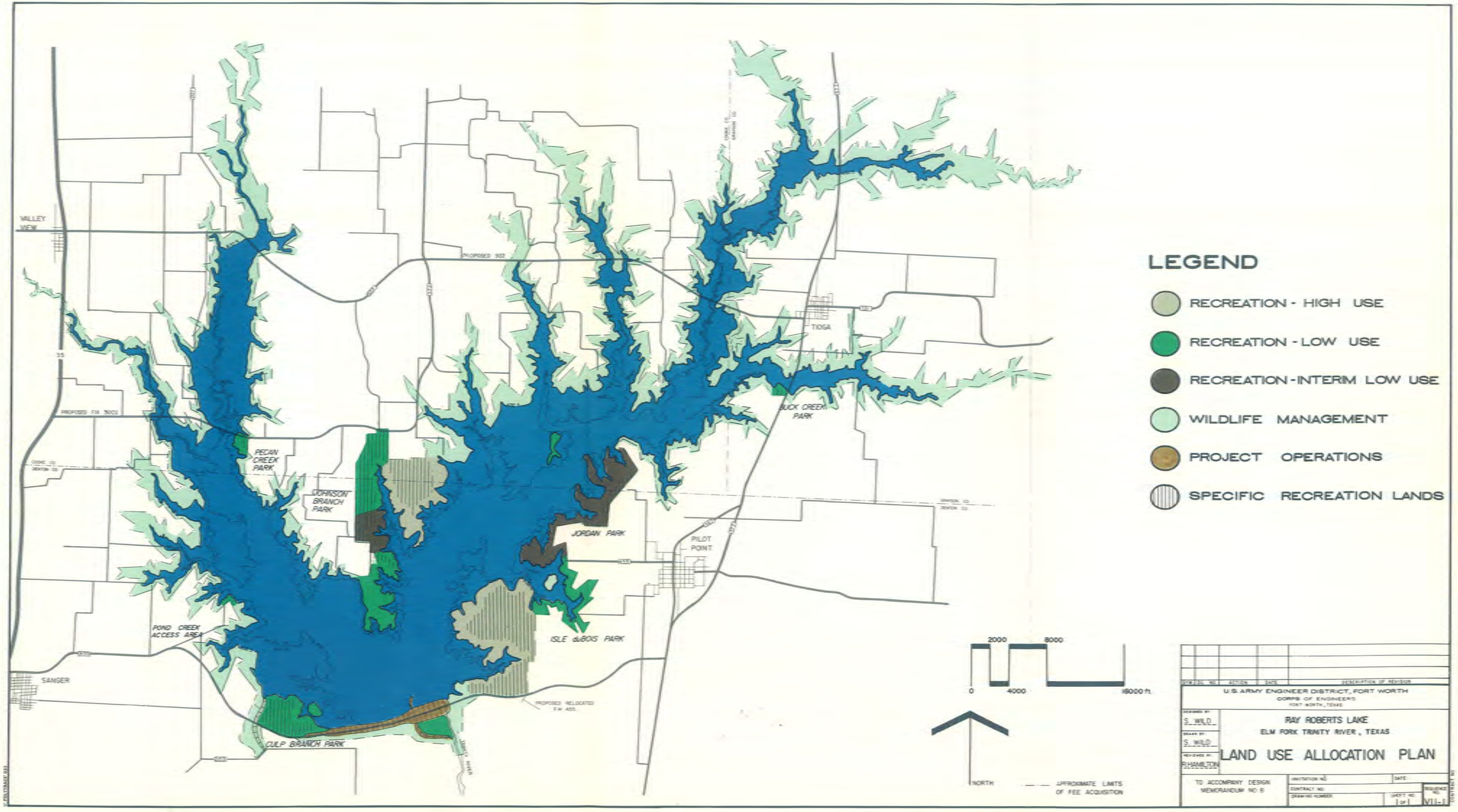
Engineers will supply all possible aid and assistance to insure an adequate fisheries program.

g. Wildlife. - In order to obtain the greatest benefit from the wildlife resources, a scientifically based wildlife management program will be provided. The fundamental objective in managing this resource will be to attract the greatest variety of wildlife species and to maintain game populations consistent with the carrying capacity. This objective can be accomplished by providing plants which will supply both food and cover and create an edge effect. Every effort will be employed to protect endangered wildlife species.

h. Water. - The ultimate objective of managing the water resources will be to maintain the highest water quality possible. This can be accomplished by coordinating water management with the other resources management programs to prevent soil erosion, contamination by pollutants, and other factors influencing water quality. In addition, an appropriate water level regulation program will be necessary to optimize the multiple-use concept of this project. This program must be flexible enough to handle the assigned water storage and flood control responsibilites and still provide a water resource that will accentuate the other multiple-uses associated with the project.

7-08. Turfing and landscaping the public use areas. - Landscape planting including trees, shrubs, vines, perennials, annuals, and turf establishment will be an integral component in the design of the recreation sites, areas, and facilities. The objectives of the beautification program include, but are not limited to harmonizing development with the surrounding environment, provision of shade, reduction of undesirable wind, noise, dust, and erosion, and enhancement of structures. Each public use area has been analyzed to determine what natural resources are available, which should be preserved, and how recreational facilities should be blended with the surroundings to best complement the area. In keeping with sound landscape architectural principles, the primary consideration should be to develop a planting plan which is simple, functional, esthetically pleasing, and economical to maintain. Plant species will be limited to those proven hardy and tolerant of specific site conditions. Generally, plantings will be naturalistic and will avoid arboretum patterns. A landscape plan and implementation for all park areas will be the responsibility of the Texas Parks and Wildlife Department. This will be accomplished after the completion of construction for each park and will be subject to the review and approval of the Corps of Engineers.

7-09. Seaplane operations - Title 36 has been amended to allow seaplanes to land on Corps of Engineers lakes except in restricted areas established by the District Engineer. A final decision has not been made on seaplane landings at Ray Roberts Lake. A decision will be made once the project is operational.



SYMBOL	NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON

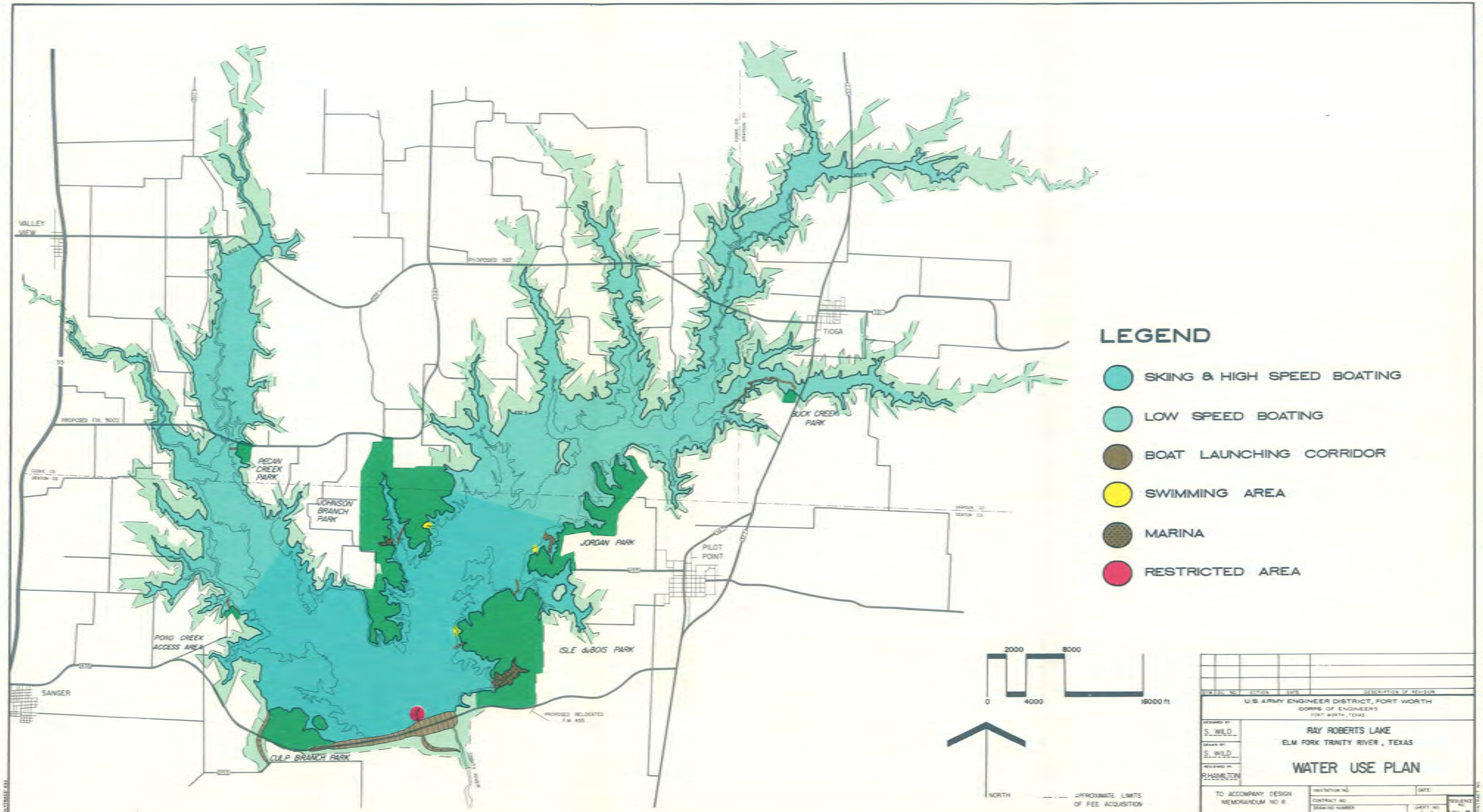
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

LAND USE ALLOCATION PLAN

TO ACCOMPANY DESIGN MEMORANDUM NO. 6

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 of 1 | SEQUENCE NO. VII-1

CONTRACT NO.



REVISION NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

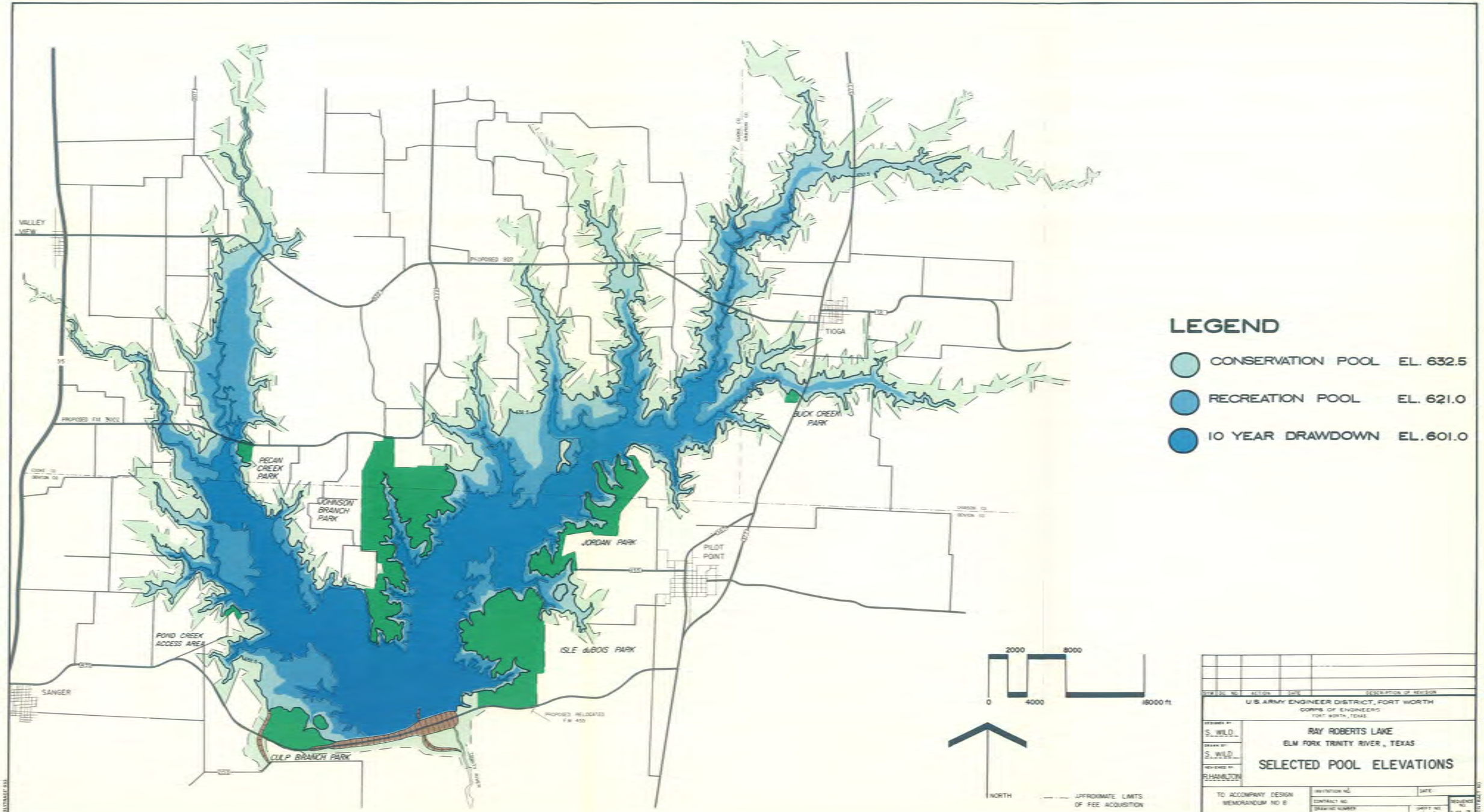
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

WATER USE PLAN

TO ACCOMPANY DESIGN MEMORANDUM NO 6

INITIATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 of 1 | SEQUENCE NO. MII-2



SYM	NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
RECOMMENDED BY: R.HAMILTON

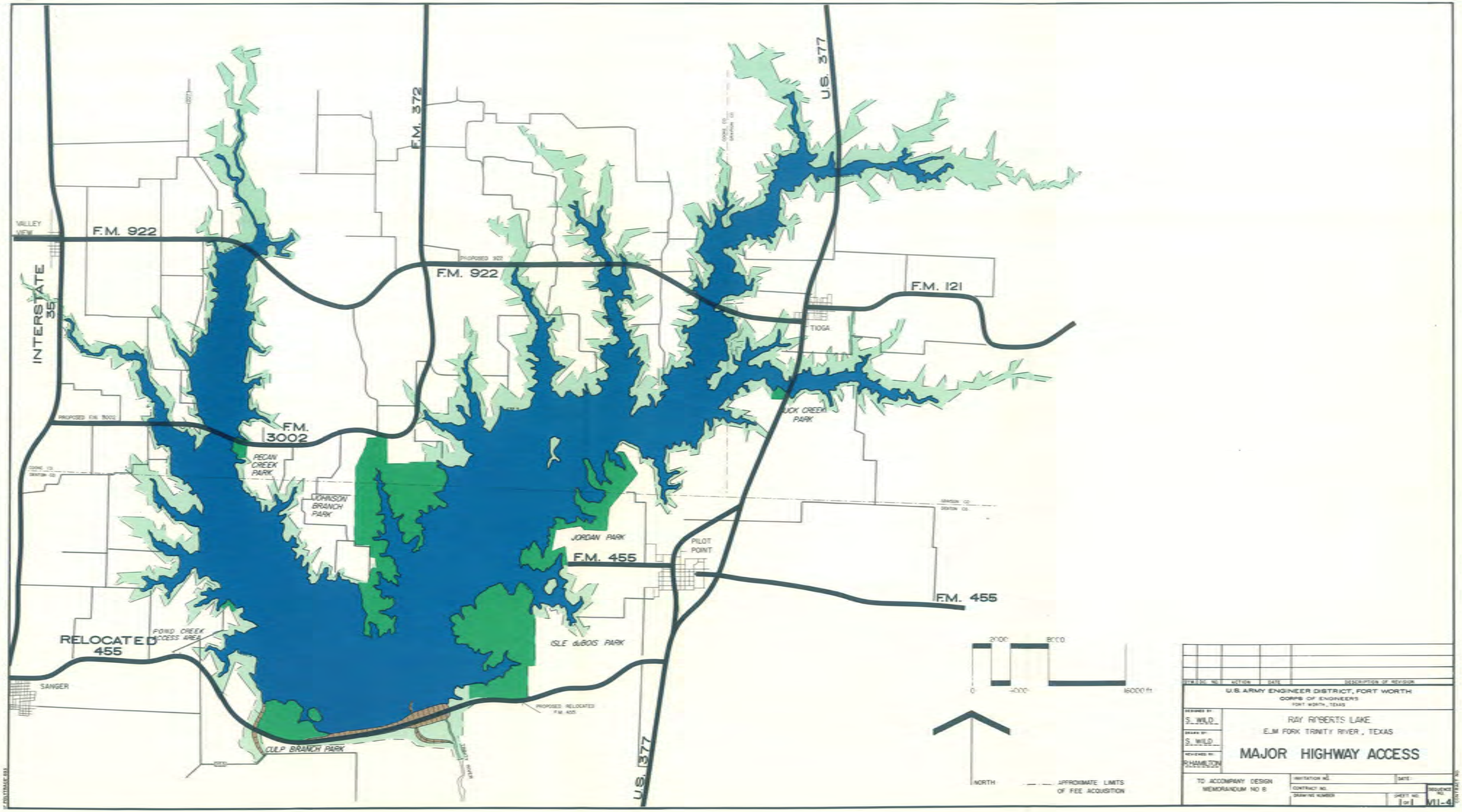
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

SELECTED POOL ELEVATIONS

TO ACCOMPANY DESIGN MEMORANDUM NO 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 of 1

REVISED NO. VII-3


F.M. 372
U.S. 377
VALLEY VIEW
F.M. 922
INTERSTATE 35
PROPOSED 922
F.M. 922
F.M. 121
TIOGA
PROPOSED F.M. 3002
F.M. 3002
PECAN CREEK PARK
JOHNSON BRANCH PARK
JOCK CREEK PARK
JORDAN PARK
PILOT POINT
F.M. 455
F.M. 455
RELOCATED 455
POND CREEK ACCESS AREA
ISLE duBOIS PARK
SANGER
PROPOSED RELOCATED F.M. 455
CULP BRANCH PARK
U.S. 377
2000'
8000'
0
4000'
16000 ft
NORTH
APPROXIMATE LIMITS OF FEE ACQUISITION
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS
MAJOR HIGHWAY ACCESS
TO ACCOMPANY DESIGN MEMORANDUM NO 8
MI-4

VIII RECREATION PLAN OF DEVELOPMENT

VIII- RECREATION PLAN OF DEVELOPMENT

8-01. General. The purpose of the recreation plan of development is to delineate the areas selected for public use, to determine the type of use to which they should be put, and to present a conceptual plan of how the selected public use areas could be developed and managed. This plan is intended to serve as a guide for recreation development while being flexible enough to meet the changing conditions and future variations in public demands. All public use areas and associted facilities will be located on land under the jurisdiction of the Corps of Engineers.

8-02. Basis for selection of public use areas. The preliminary selection of the public use areas is described in Design Memorandum No 2. The location of the sites selected for public use are shown on Plate VIII-1. Several variables analyzed in the selection of these areas include, but are not limited to the following:

a. Access to existing roads;
b. Topography of the area;
c. Existing vegetation in the area;
d. The existence of scenic areas;
e. Availability of shoreline access for recreational activities;
f. Degree of shelter for boats; and
g. Water depths for swimming beaches and boat ramps.

8-03. Recreation use allocation plan. The intent of this section is to present a balanced recreation plan that offers the greatest variety of outdoor recreation experiences within the limits of the recreation resource and its authorized purposes. Experience at completed projects in the Fort Worth District and at similar projects elsewhere indicated a significant demand for land managed for the specific role of shaping public understanding of the environment. While some may consider areas under-utilized when all available acreage is not designed for optimum high-density use, it is considered that a higher quality experience is obtained when conditions are less crowded. Certain types of outdoor recreation activities, such as hiking, bird watching, nature study, and primitive camping can only be experienced in areas receiving relatively light use. Portions of Johnson Branch, Jordan, and Isle duBois Parks will be suited to these types of activities.

8-04. Management of the public use areas.

a. Recreation: low-use parks. - Management of the low-density parks will be designed to protect, maintain, and enhance existing environmental and recreational values. The primary objective will be to provide opportunities for outdoor recreation activities, such as hiking, nature study, photography, and primitive camping. To achieve this objective, it will be necessary to take the following action:

(1) All camping areas will be sited in the field by district personnel and project sponsors. Attention will be focused on the proper distribution and use of the area to protect the natural resources and to enhance the recreational experience.

(2) A carrying capacity will be determined and implemented for each primitive camping area. The carrying capacity is the ability of a site to absorb outside influence and still retain its quality.

(3) The "fallow campground" concept, which requires camping areas to be rested from use periodically, should be employed.

(4) Simple comfort stations will be provided for recreation users. These toilets will be designed and located so that they are in harmony with their surroundings, and easily operated and maintained.

(5) Motorized land travel, except that required by project personnel to protect and maintain the parks, will be prohibited.

(6) Cleaning contracts will be initiated when the parks are in use.

b. Recreation: high-use parks: The management of high use parks shall give primary emphasis to providing the optimum number of recreation facilities for the continued enjoyment and maximum sustained use by the visiting public, consistent with the carrying capacity and the esthetic and biological values. This requires a balanced approach to facility development which must take into consideration both the recreational and environmental goals in order to achieve equilibrium between conservation of the natural environment and development for public use.

8-05. Schedule of recreation facility development. - The following schedule respresents the current anticipated completion dates for the construction of recreation facilities at Ray Roberts Lake:

	Completion date
Isle duBois Park	FY 1987
All remaining park areas	FY 1989

8-06. Design criteria for recreation facilities. - Engineering design of the recreation facilities will be in accordance with Texas Parks and Wildlife Department Facility Guidelines unless exceeded by Corps criteria outlined in ER 1110-2-400, "Design of Recreation Sites, Areas, and Facilities," EM 1110-2-400, "Recreation Facilities Planning and Design Criteras.".

8-07. Recreation facility plan of development. - This section translates the land and water use plan into specifics for actual facility development and cost as required for the life of the project. Proposals for facilities and associated site layout for the initial public use development will serve as the basis for preparation of plans and specifications. Table VIII-1 presents pertinent acreage data for each of the seven public use areas.

TABLE VIII-1

ACRES AVAILABLE IN PUBLIC USE AREAS

Public Use Areas	Project lands	Specific Rec. Lands	Total
Culp Branch Park	230	201	431
Pecan Creek Park	31	17	48
Johnson Branch Park	759	755	1,514
Buck Creek Park	5	6	11
Jordan Park	407	70	477
Isle duBois Park	525	872	1,397
Pond Creek Access Area	20	0	20
TOTAL	1,977	1,921	3,898

8-08. Hiking trails. - Since many areas within the project are well suited for nature study, plant and animal photography, and primitive camping, a system of hiking and nature trails are planned to provide access to these areas. The proposed locations of the hiking trails are shown on Plate VIII-1. The final location of the hiking trails will be determined by district and project personnel in the field.

8-09. Marinas. - Sites suitable for the development of marina facilities (both wet and dry storage) have been located in Isle duBois and Johnson Branch Parks. The size and scope of the marinas will vary according to the requirements of the area and the physical limitations of each specific site location. A boat storage capacity of 200 is generally considered the minimum size for which a reasonable economic return can be realized. This can be accomplished with a combination of wet and dry storage facilities. Initial development plans do not call for the implementation of any wet storage marina facilities in either Isle duBois or Johnson Branch Parks, however, both sites as identified on plate VII-2 could be used for such use if future demands warrant marina development. Initial development of approximately 120 dry storage boat stalls in Isle duBois Park are planned. Consideration will be given to additional marina concessions if demand for additional boat storage facilities is determined, and a suitable site is selected. If during preimpoundment construction activities the need exists for random fill excavation, consideration should be given to locate such excavation in an area which could ultimately be used as a marina site.

8-10. Administration and Maintenance Building. - A site has been selected for the administration and maintenance building on the east abutment, approximately 1,600 feet from the start of the main embankment. In light of the present intent of the Texas Parks and Wildlife Department to operate and maintain all park areas and project lands, except for the embankment area, the need for a Corps of Engineers administration and maintenance building has been questioned. On 1 October 1982, Southwestern Division approved a value engineering submittal suggesting the deletion of the administrative and maintenance building at Ray Roberts Lake. As a result of this any Corps operations at Ray Roberts Lake will be conducted out of the Lewisville Lake project offices.

Administration and maintenance buildings for park operations will be located in the Isle duBois and Johnson Branch Parks and will be staffed by Texas Parks and Wildlife Department personnel.

8-11. Visitors Overlook. - The visitors overlook facility will be located approximately 1,600 ft. northeast of the embankment. It will overlook the reservoir, outlet works tower, and embankment. Public toilet facilities will be nearby. The parking area for the overlook facility is to be located a short distance from the structure to encourage visitors to leave their automobiles to fully utilize the facilities.

8-12. Public Use Areas and Facility Development. - An analysis of the physical characteristics of the land adjacent to the project was made to identify appropriate uses of each site. The purpose of the analysis was to insure a rational mix and distribution of uses that best related to existing physical features, public user access, and potential economic return. The location of the parks is shown on Plate VIII-1.

a. Culp Branch Park (Plate VIII-2) - 431 Acres. - Culp Branch Park is located on the west end of the embankment, adjacent the spillway and relocated F.M. 455. Positive attributes include excellent accessibility from F.M. 455, and good physical size and views. However, such limiting factors as lack of tree cover, adverse subjectibility to lake level drawdowns, and a general lack of land form diversity will limit development to a relativily small day-use facility. Initial development will consist of picnic sites, group picnic shelter, playground, and parking and restroom facilities. Future development will consist of additional picnic sites and parking facilities. Access will be fee controlled.

b. Pond Creek Access Area (Plate VIII-1)- 20 Acres. - This area will be developed with a four lane boat launching ramp and vault toilet. Access will be provided by an existing county road. (Free access)

c. Pecan Creek Park (Plate VIII-3) 48 Acres. - Access to this park will be provided by relocated Road 3002, just off of Interstate 35. Initial development will be limited to a four lane boat launching ramp and vault toilet. Future development will consist of picnic sites, playground, and parking facilities. Access will be free.

d. Johnson Branch Park (Plates VIII 4 thru 12) 1514 Acres. - Access to Johnson Branch Park will be served by relocated road FM 3002. The park will have both high and low-use recreational areas. High use areas will be located primarily within the eastern portion of the park. Initial and future development for this area will consist of multi-use camping, screened shelters, picnic and group picnic areas, along with circulation roads, parking areas, waterborne toilets, swimming beach, trails, and four lane boat ramps. Plans for the development of a historical working farm complex to be developed by the Texas Parks and Wildlife Department are also being considered. Low use recreational areas will be located within the western portions of the park. Planned facility development will include hiking and interpretive trails, primitive camping areas, and vault toilets. The southern portion of the park will be set aside as a multi-use area for large group activities.

Access will be by existing county roads, however will be controlled by park personnel on a reservation basis. Uses for this area might include Boy Scout Jamborees, general group gatherings, hiking, and nature study. Facility development will be limited to parking, bulk water station, and vault toilets. Future development along the western portion of the park will consist of circulation roads, multi-use and group camping areas, and sanitary facilities. Should the need for additional boat storage facilities be needed on the project, a well suited cove within this area of the park (Plate VIII-10) has been selected for such use. Johnson Branch Park should provide a quality recreation experience for a broad range of recreational preferences. Access will be fee controlled.

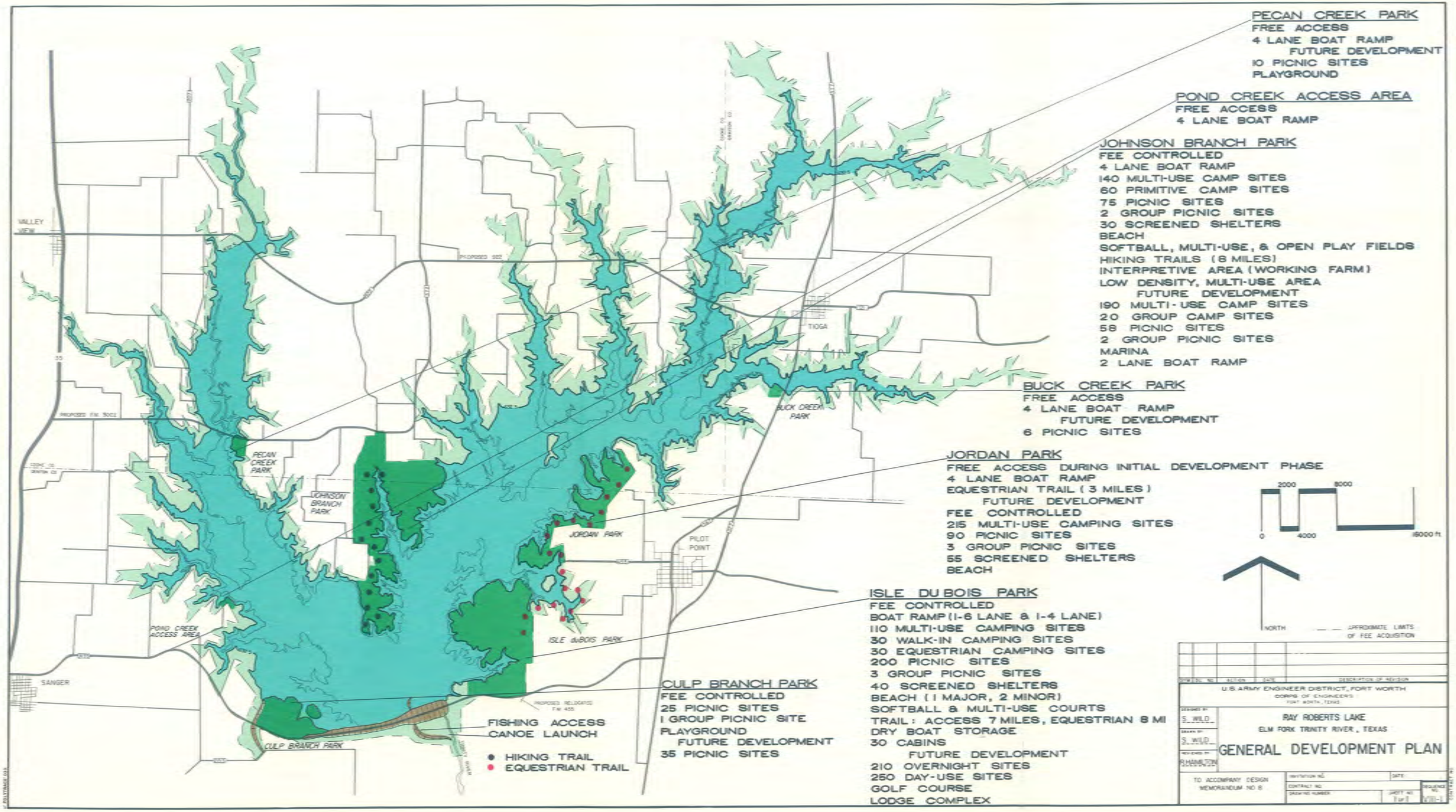
e. Buck Creek Park (Plate VIII-13) 11 Acres. - Access to this area will be provided by U. S. Highway 377. Initial development will be limited to a four lane boat launching ramp and sanitary facilities. There is a good variety of topography and vegetation which gives the potential for future development of day-use facilities. Access will be free.

f. Jordan Park (Plates VIII-14 thru 17) 477 Acres. - Access to Jordan Park will be from the existing F.M. 455 west of Pilot Point. Due to the areas outstanding land form, it will be suited for a variety of day and overnight uses. Initial development will be limited to a four lane boat ramp, vault toilets, and horseback riding. A staging area for horseback riders will be located in Isle duBois Park, where the trail will originate. Vehicular control measures will be implemented at this point to restrict off-road vehicles from entering the area. Future development will consist of circulation roads, parking areas, waterborne toilets, swimming beaches, camping and picnic sites, along with other facilities shown on plates VIII-15 thru 17. Access for initial development will be free.

g. Isle duBois Park (Plate VIII-18) 1397 Acres. - Isle duBois Park will be developed initially as a high-use recreational area with such facilities as camping and picnic sites, cabins, swimming beaches, boat ramps, marina, waterborne toilets, circulation roads, and other facilities as shown on plate VIII-18. The park is located east of the embankment with access from relocated F.M. 455. This will be a fee controlled park.

h. Wolf Island (Plate VIII-19) 50 Acres. - This island is located within the eastern arm of the lake. Access will be by boat only. Development will be limited to a short hiking trail and overlook. Recreational uses could consist of picnicking, hiking, and nature study.

i. Area Below Embankment (Plate VIII-20) - Portions of the area immediately below the embankment are proposed for low-density day-use activities. Recreational opportunities to be provided in this area will include a fishing access platform along the stilling basin with accompaning parking and sanitary facilities. A canoe launch facility will also be provided along the natural river of the Elm Fork. The canoe launch will serve as fishing, canoeing, and general recreation access to the Elm Fork River.



PECAN CREEK PARK
FREE ACCESS
4 LANE BOAT RAMP
FUTURE DEVELOPMENT
10 PICNIC SITES
PLAYGROUND

POND CREEK ACCESS AREA
FREE ACCESS
4 LANE BOAT RAMP

JOHNSON BRANCH PARK
FEE CONTROLLED
4 LANE BOAT RAMP
140 MULTI-USE CAMP SITES
60 PRIMITIVE CAMP SITES
75 PICNIC SITES
2 GROUP PICNIC SITES
30 SCREENED SHELTERS
BEACH
SOFTBALL, MULTI-USE, & OPEN PLAY FIELDS
HIKING TRAILS (8 MILES)
INTERPRETIVE AREA (WORKING FARM)
LOW DENSITY, MULTI-USE AREA
FUTURE DEVELOPMENT
190 MULTI-USE CAMP SITES
20 GROUP CAMP SITES
58 PICNIC SITES
2 GROUP PICNIC SITES
MARINA
2 LANE BOAT RAMP

BUCK CREEK PARK
FREE ACCESS
4 LANE BOAT RAMP
FUTURE DEVELOPMENT
6 PICNIC SITES

JORDAN PARK
FREE ACCESS DURING INITIAL DEVELOPMENT PHASE
4 LANE BOAT RAMP
EQUESTRIAN TRAIL (3 MILES)
FUTURE DEVELOPMENT
FEE CONTROLLED
215 MULTI-USE CAMPING SITES
90 PICNIC SITES
3 GROUP PICNIC SITES
55 SCREENED SHELTERS
BEACH

ISLE DU BOIS PARK
FEE CONTROLLED
BOAT RAMP (1-6 LANE & 1-4 LANE)
110 MULTI-USE CAMPING SITES
30 WALK-IN CAMPING SITES
30 EQUESTRIAN CAMPING SITES
200 PICNIC SITES
3 GROUP PICNIC SITES
40 SCREENED SHELTERS
BEACH (1 MAJOR, 2 MINOR)
SOFTBALL & MULTI-USE COURTS
TRAIL: ACCESS 7 MILES, EQUESTRIAN 8 MI
DRY BOAT STORAGE
30 CABINS
FUTURE DEVELOPMENT
210 OVERNIGHT SITES
250 DAY-USE SITES
GOLF COURSE
LODGE COMPLEX

CULP BRANCH PARK
FEE CONTROLLED
25 PICNIC SITES
1 GROUP PICNIC SITE
PLAYGROUND
FUTURE DEVELOPMENT
35 PICNIC SITES

2000 8000
0 4000 16000 ft.

NORTH — — APPROXIMATE LIMITS OF FEE ACQUISITION

SUBMITTED NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

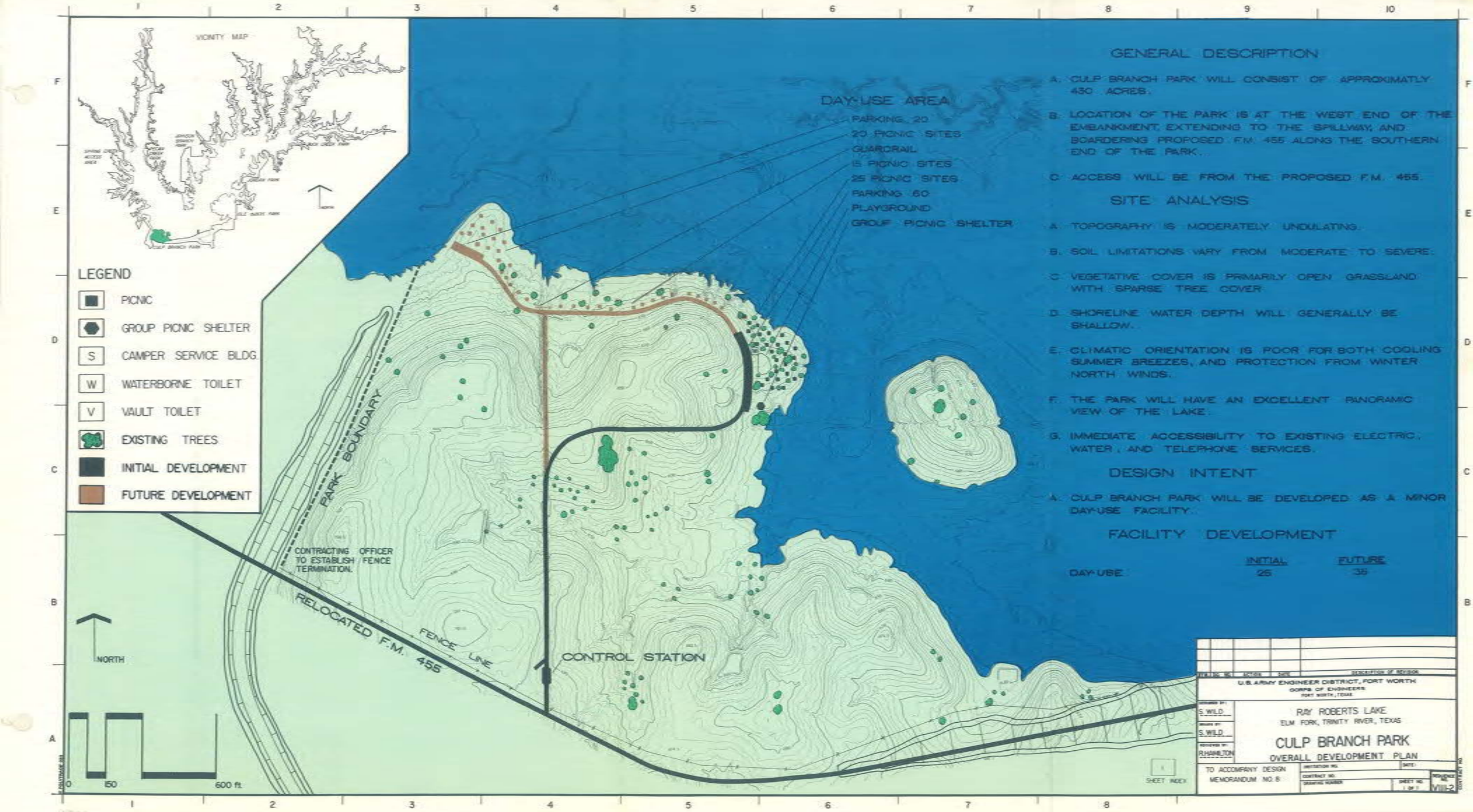
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
RECOMMENDED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

GENERAL DEVELOPMENT PLAN

TO ACCOMPANY DESIGN MEMORANDUM NO 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 of 1 | SEQUENCE NO. 4701-1


VICINITY MAP
LEGEND
PICNIC
GROUP PICNIC SHELTER
CAMPER SERVICE BLDG.
WATERBORNE TOILET
VAULT TOILET
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
DAY-USE AREA
PARKING 20
20 PICNIC SITES
GUARDRAIL
15 PICNIC SITES
25 PICNIC SITES
PARKING 60
PLAYGROUND
GROUP PICNIC SHELTER
PARK BOUNDARY
CONTRACTING OFFICER TO ESTABLISH FENCE TERMINATION.
RELOCATED F.M. 455
FENCE LINE
CONTROL STATION
NORTH
0
150
600 ft.
GENERAL DESCRIPTION
A. CULP BRANCH PARK WILL CONSIST OF APPROXIMATLY 430 ACRES.
B. LOCATION OF THE PARK IS AT THE WEST END OF THE EMBANKMENT, EXTENDING TO THE SPILLWAY, AND BOARDERING PROPOSED F.M. 455 ALONG THE SOUTHERN END OF THE PARK.
C. ACCESS WILL BE FROM THE PROPOSED F.M. 455.
SITE ANALYSIS
A. TOPOGRAPHY IS MODERATELY UNDULATING.
B. SOIL LIMITATIONS VARY FROM MODERATE TO SEVERE.
C. VEGETATIVE COVER IS PRIMARILY OPEN GRASSLAND WITH SPARSE TREE COVER.
D. SHORELINE WATER DEPTH WILL GENERALLY BE SHALLOW.
E. CLIMATIC ORIENTATION IS POOR FOR BOTH COOLING SUMMER BREEZES, AND PROTECTION FROM WINTER NORTH WINDS.
F. THE PARK WILL HAVE AN EXCELLENT PANORAMIC VIEW OF THE LAKE.
G. IMMEDIATE ACCESSIBILITY TO EXISTING ELECTRIC, WATER, AND TELEPHONE SERVICES.
DESIGN INTENT
A. CULP BRANCH PARK WILL BE DEVELOPED AS A MINOR DAY-USE FACILITY.
FACILITY DEVELOPMENT
DAY-USE: INITIAL 25, FUTURE 35
SHEET INDEX
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
RECOMMENDED BY: R. HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
CULP BRANCH PARK
OVERALL DEVELOPMENT PLAN
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 1 OF 1
DRAWING NO. WIL-2

GENERAL DESCRIPTION

A. PECAN CREEK PARK WILL CONSIST OF APPROXIMATLY 48 ACRES.

B. LOCATION IS APPROXIMATLY MIDWAY ON THE WESTERN ARM OF THE LAKE.

C. ACCESS WILL BE FROM THE PROPOSED ROAD RELOCATION, F.M. 3002.

SITE ANALYSIS

A. TOPOGRAPHY IS FLAT TO MODERATELY UNDULATING.

B. SOIL LIMITATIONS ARE SEVERE.

C. VEGETATIVE COVER IS PRIMARILY OPEN PASTURE WITH SPARSE TREE COVER.

D. SHORELINE WATER DEPTH IS GENERALLY GOOD.

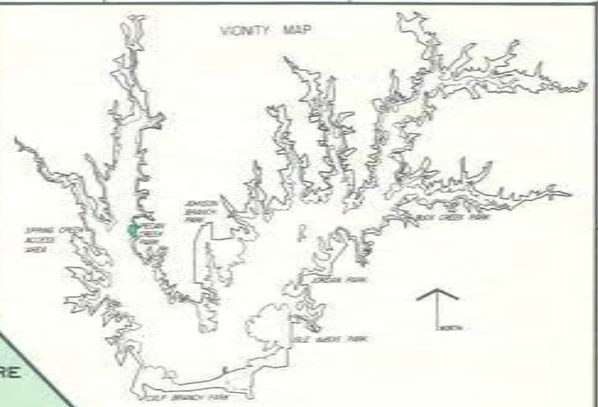
E. CLIMATIC ORIENTATION IS FAIR FOR THE SITING OF BOAT RAMPS AND GENERAL DAY-USE ACTIVITIES.

F. IMMEDIATE ACCESSIBILITY TO EXISTING ELECTRIC, WATER, AND TELEPHONE SERVICES.

DESIGN INTENT

A. PECAN CREEK PARK IS BEING DESIGNED AS A MINOR DAY-USE FACILITY WITH FREE ACCESS.

VICINITY MAP



LEGEND

- PICNIC
- GROUP PICNIC SHELTER
- S — CAMPER SERVICE BLDG.
- W — WATERBORNE TOILET
- V — VAULT TOILET
- EXISTING TREES
- INITIAL DEVELOPMENT
- FUTURE DEVELOPMENT

NORTH 0 100 200 400 800 ft.

RELOCATED F.M. 3002

DAY-USE AREA
BOAT RAMP (4 LANE)
COURTESY DOCK
PARKING 50
10 PICNIC SITES
PLAYGROUND
PARKING 20

AREA

PROJECT BOUNARY

PICNIC FACILITIES (FUTURE)

PICNIC AREA NO.	TABLES	SHELTERS	STOVES	TRASH CANS
1	10	10	10	10

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
SUPERVISED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

PECAN CREEK PARK

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO.
CONTRACT NO.
DRAWING NUMBER
DATE:
SHEET NO. 1 of 1
PROJECT NO. MIL-3
CONTRACT NO.

LOW DENSITY RECREATION
PRIMITIVE CAMPING
DRY BOAT STORAGE (FUTURE)
MARINA (FUTURE)
MULT-USE CAMPING (FUTURE)
TRAIL HEAD
GROUP CAMPING (FUTURE)
DAY-USE
PICNIC
GROUP PICNIC
BALLFIELD, MULTI-USE COURTS
BEACH
BOAT RAMP
INTERPRETIVE AREA
MULTI-USE CAMPING
GROUP PICNIC
MULTI-USE CAMPING
NATURE STUDY TRAIL

RESIDENCE
TRAIL HEAD
MULTI-USE CAMPING (FUTURE)
MAINTENANCE
MULTI-USE CAMPING (FUTURE)
MULTI-USE CAMPING
SCREENED SHELTERS
MULTI-USE CAMPING (FUTURE)

NORTH

GENERAL DESCRIPTION

A. JOHNSON BRANCH PARK WILL CONSIST OF APPROXIMATELY 1500 ACRES.

B. LOCATION IS ON THE EAST AND WEST SIDE OF THE JOHNSON CREEK ARM OF THE LAKE.

C. ACCESS WILL BE FROM THE PROPOSED ROAD RELOCATION, F.M. 3002

SITE ANALYSIS

A. TOPOGRAPHY VARIES FROM EXCESSIVILY STEEP TO MODERATELY UNDULATING.

B. SOIL LIMITATIONS VARY FROM MODERATE TO SEVERE.

C. VEGETATIVE COVER RANGES FROM DENSELY WOODED TO MODERATELY WOODED AND OPEN AREAS.

D. SHORELINE WATER DEPTH IS GOOD IN ALL AREAS EXCEPT THE NORTHWEST PORTION OF THE PARK WHERE NORMAL SUMMER DRAWDOWN WILL EXPOSE SUBSTANTIAL PORTIONS OF LAKE BOTTOM.

E. CLIMATIC ORIENTATION IS GOOD FOR THE DEVELOPMENT OF BOAT RAMPS, MARINAS, AND BEACHES.

F. IMMEDIATE ACCESSIBILITY TO EXISTING ELECTRIC, WATER, AND TELEPHONE SERVICES.

DESIGN INTENT

A. JOHNSON BRANCH PARK WILL BE DEVELOPED AS A MAJOR OVERNIGHT AND DAY-USE FACILITY.

FACILITY DEVELOPMENT

	INITIAL	FUTURE
DAY-USE	121	74
OVERNIGHT	200	210

0 800 3200 ft.

INITIAL DEVELOPMENT

FUTURE DEVELOPMENT

SYMBOL NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

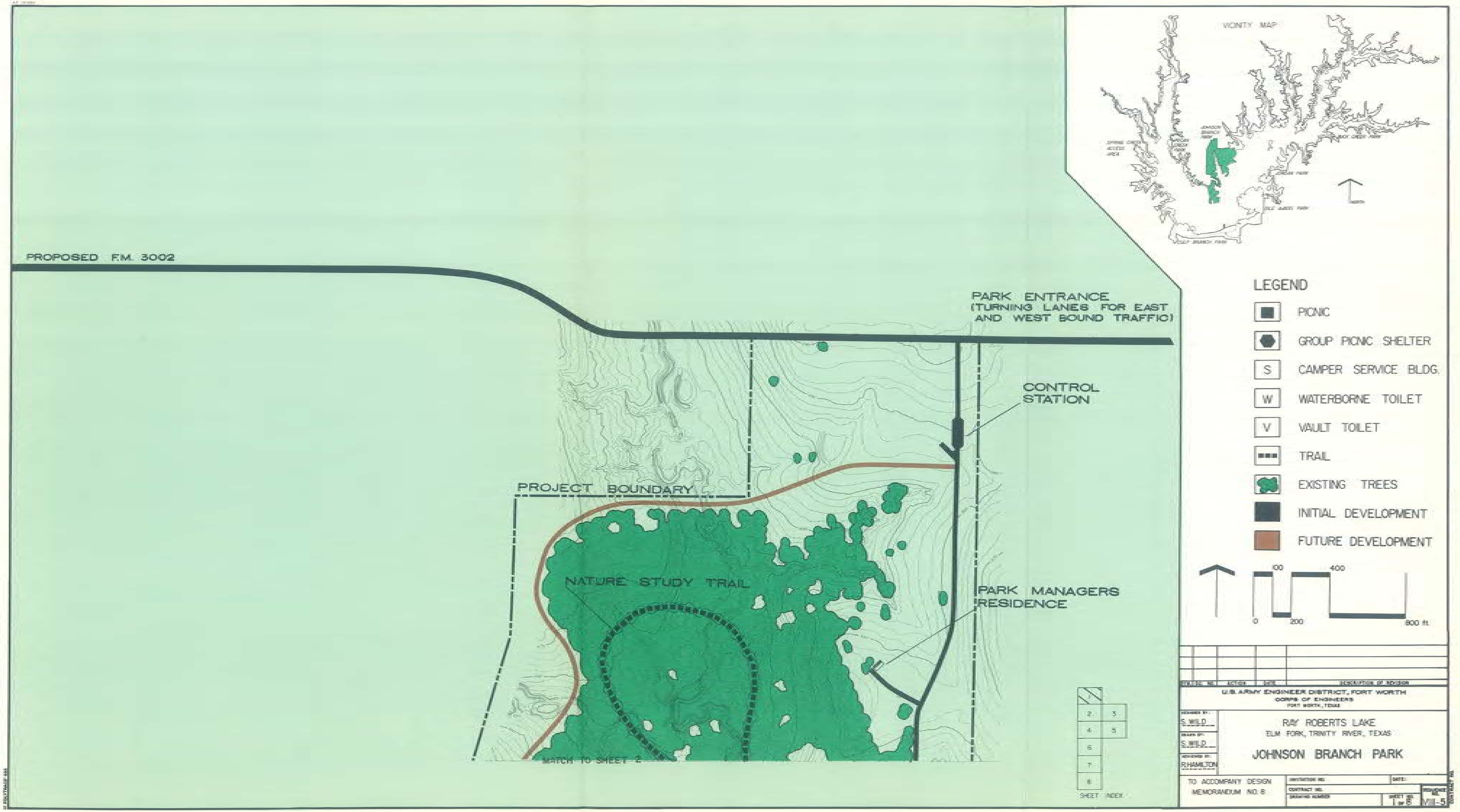
DESIGNED BY S. WILD
DRAWN BY S. WILD
REVIEWED BY R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

JOHNSON BRANCH PARK
OVERALL DEVELOPMENT PLAN

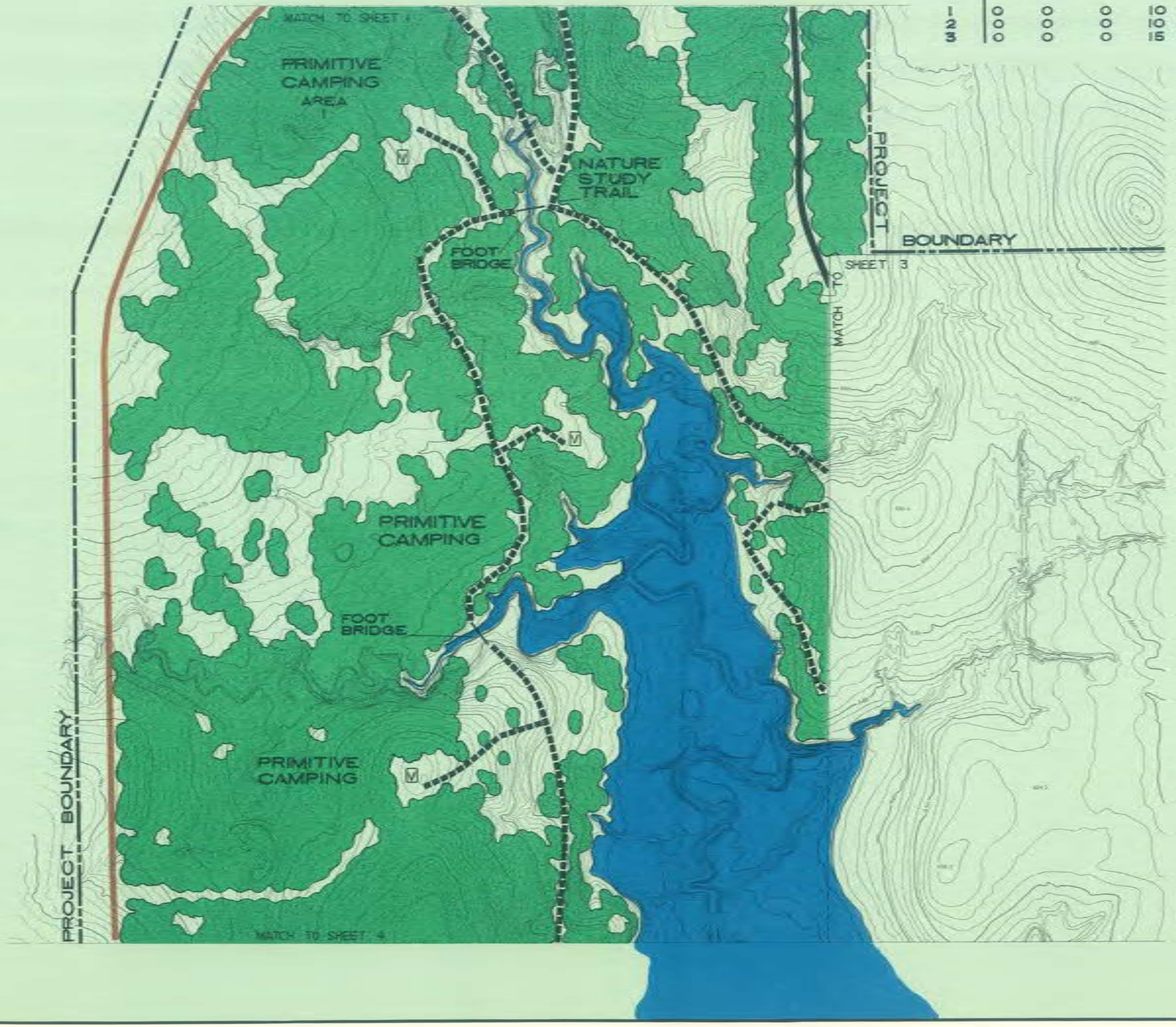
TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO. | DATE
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 OF 1 | DRAWING NO. MII-4


VICINITY MAP
PROPOSED F.M. 3002
PARK ENTRANCE
(TURNING LANES FOR EAST AND WEST BOUND TRAFFIC)
CONTROL STATION
PROJECT BOUNDARY
NATURE STUDY TRAIL
PARK MANAGERS RESIDENCE
MATCH TO SHEET 2
LEGEND
PICNIC
GROUP PICNIC SHELTER
S CAMPER SERVICE BLDG.
W WATERBORNE TOILET
V VAULT TOILET
TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
0 100 200 400 800 ft.
SHEET INDEX
1 2 3 4 5 6 7 8
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
S. WILD
S. WILD
R. HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JOHNSON BRANCH PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
1 of 8
VIII-5

CAMPING FACILITIES

CAMPING AREA NO.	TABLES	SHELTERS	STOVES	PIT GRILLS	TRASH CANS
1	0	0	0	10	0
2	0	0	0	10	0
3	0	0	0	15	0



LEGEND

- PICNIC
- GROUP PICNIC SHELTER
- S — CAMPER SERVICE BLDG
- W — WATERBORNE TOILET
- V — VAULT TOILET
- TRAIL
- EXISTING TREES
- INITIAL DEVELOPMENT
- FUTURE DEVELOPMENT

NORTH

100 400

0 200 800 ft.

1		
2		3
4		5
6		
7		
8		

SHEET INDEX

SYMBOL NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

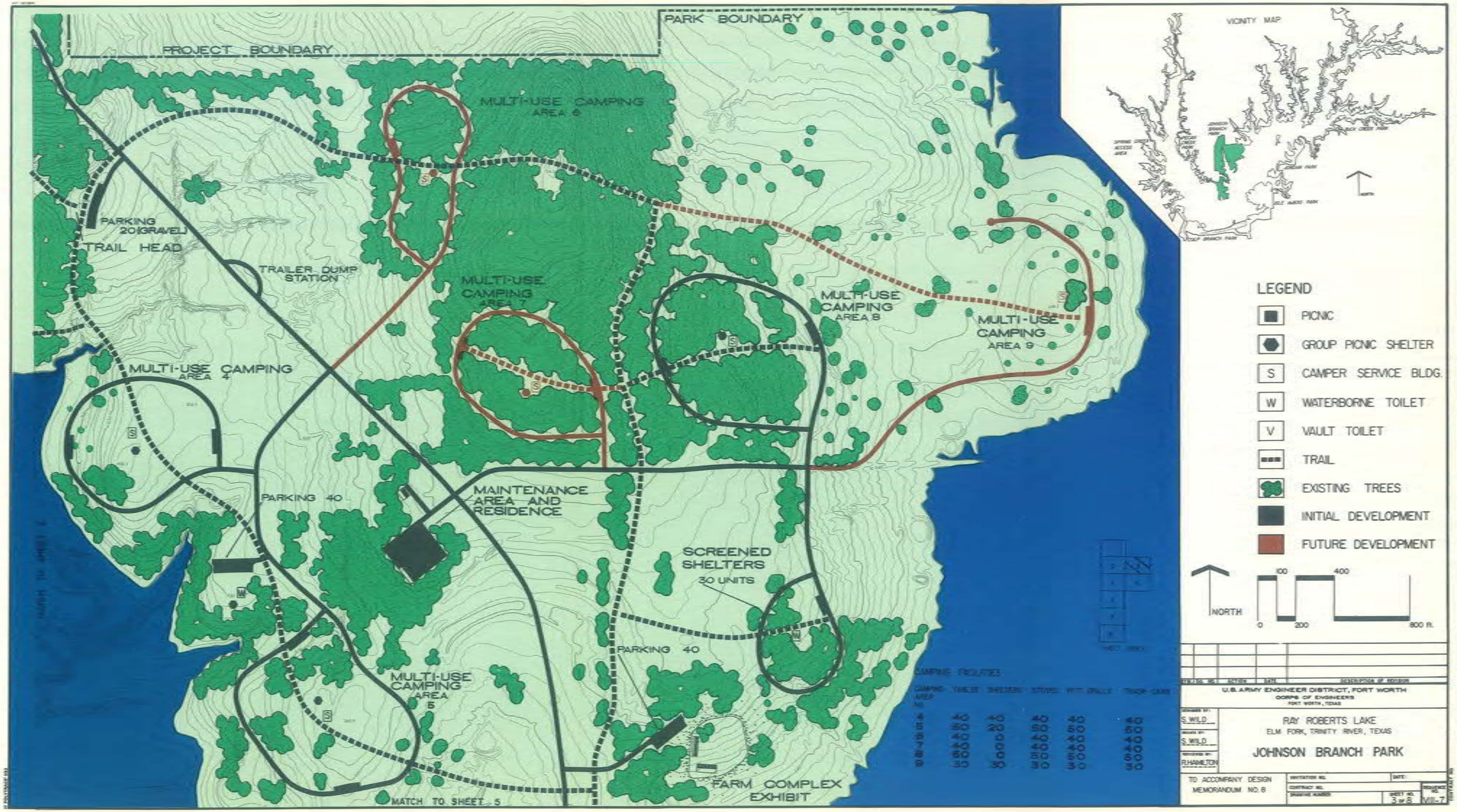
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON

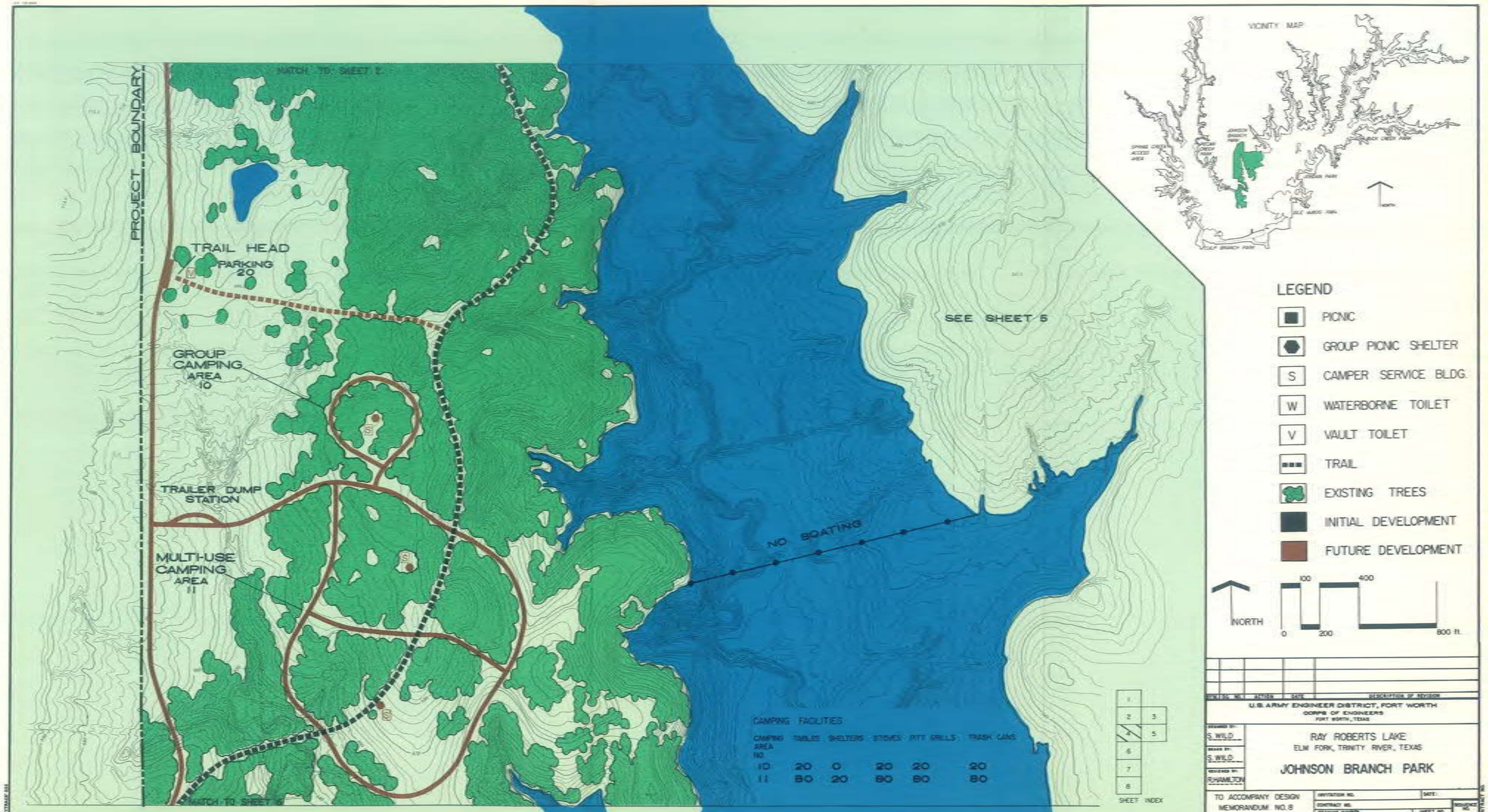
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

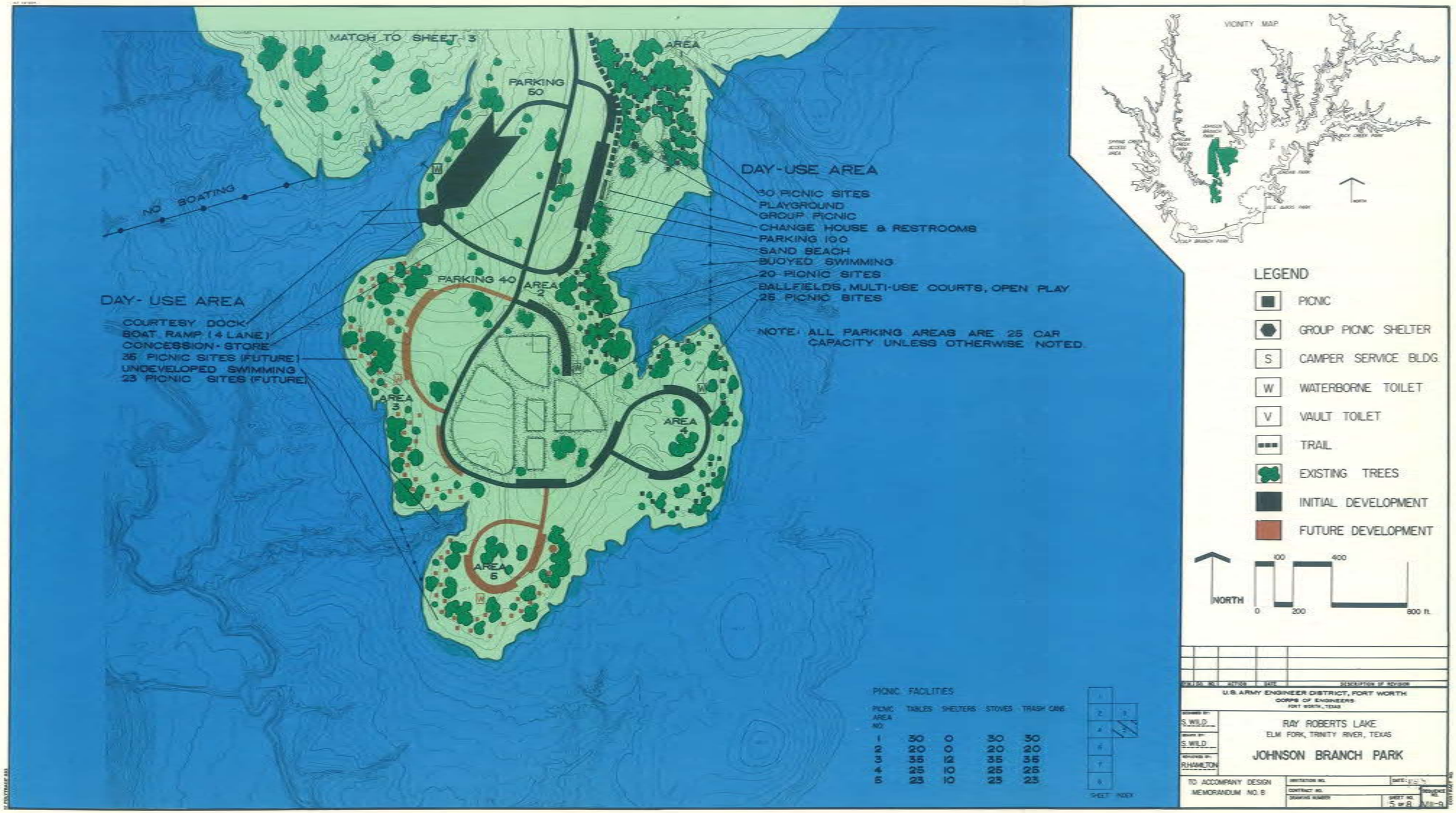
JOHNSON BRANCH PARK

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INITIATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 2 OF 8 | PROJECT NO. WII-6


PROJECT BOUNDARY
PARK BOUNDARY
MULTI-USE CAMPING AREA 6
PARKING 20 (GRAVEL)
TRAIL HEAD
TRAILER DUMP STATION
MULTI-USE CAMPING AREA 7
MULTI-USE CAMPING AREA 8
MULTI-USE CAMPING AREA 9
MULTI-USE CAMPING AREA 4
PARKING 40
MAINTENANCE AREA AND RESIDENCE
SCREENED SHELTERS 30 UNITS
PARKING 40
MULTI-USE CAMPING AREA 5
FARM COMPLEX EXHIBIT
MATCH TO SHEET 5
VICINITY MAP
LEGEND
PICNIC
GROUP PICNIC SHELTER
CAMPER SERVICE BLDG.
WATERBORNE TOILET
VAULT TOILET
TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
NORTH
100
400
0
200
800 ft.
CAMPING FACILITIES
AREA NO.
TABLES
SHELTERS
STOVES
PIT GRILLS
TRASH CANS
4 40 40 40 40 40
5 50 20 50 50 50
6 40 0 40 40 40
7 40 0 40 40 40
8 50 0 50 50 50
9 30 30 30 30 30
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
TRACED BY:
CHECKED BY: R. HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JOHNSON BRANCH PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 3 OF 8
PROJECT NO. VII-7


MATCH TO SHEET 7
PROJECT BOUNDARY
TRAIL HEAD
PARKING
20
GROUP
CAMPING
AREA
10
TRAILER DUMP
STATION
MULTI-USE
CAMPING
AREA
11
MATCH TO SHEET 6
SEE SHEET 5
NO BOATING
CAMPING FACILITIES
CAMPING AREA NO
TABLES
SHELTERS
STOVES
PIT GRILLS
TRASH CANS
10 20 0 20 20 20
11 80 20 80 80 80
SHEET INDEX
VICINITY MAP
LEGEND
PICNIC
GROUP PICNIC SHELTER
CAMPER SERVICE BLDG.
WATERBORNE TOILET
VAULT TOILET
TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
NORTH
100
400
0
200
800 ft.
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JOHNSON BRANCH PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
SHEET NO. 4 OF 8



PICNIC FACILITIES

PICNIC AREA NO.	TABLES	SHELTERS	STOVES	TRASH CANS
1	30	0	30	30
2	20	0	20	20
3	35	12	35	35
4	25	10	25	25
5	23	10	23	23

SHEET INDEX

INITIAL	NO.	ACTION	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

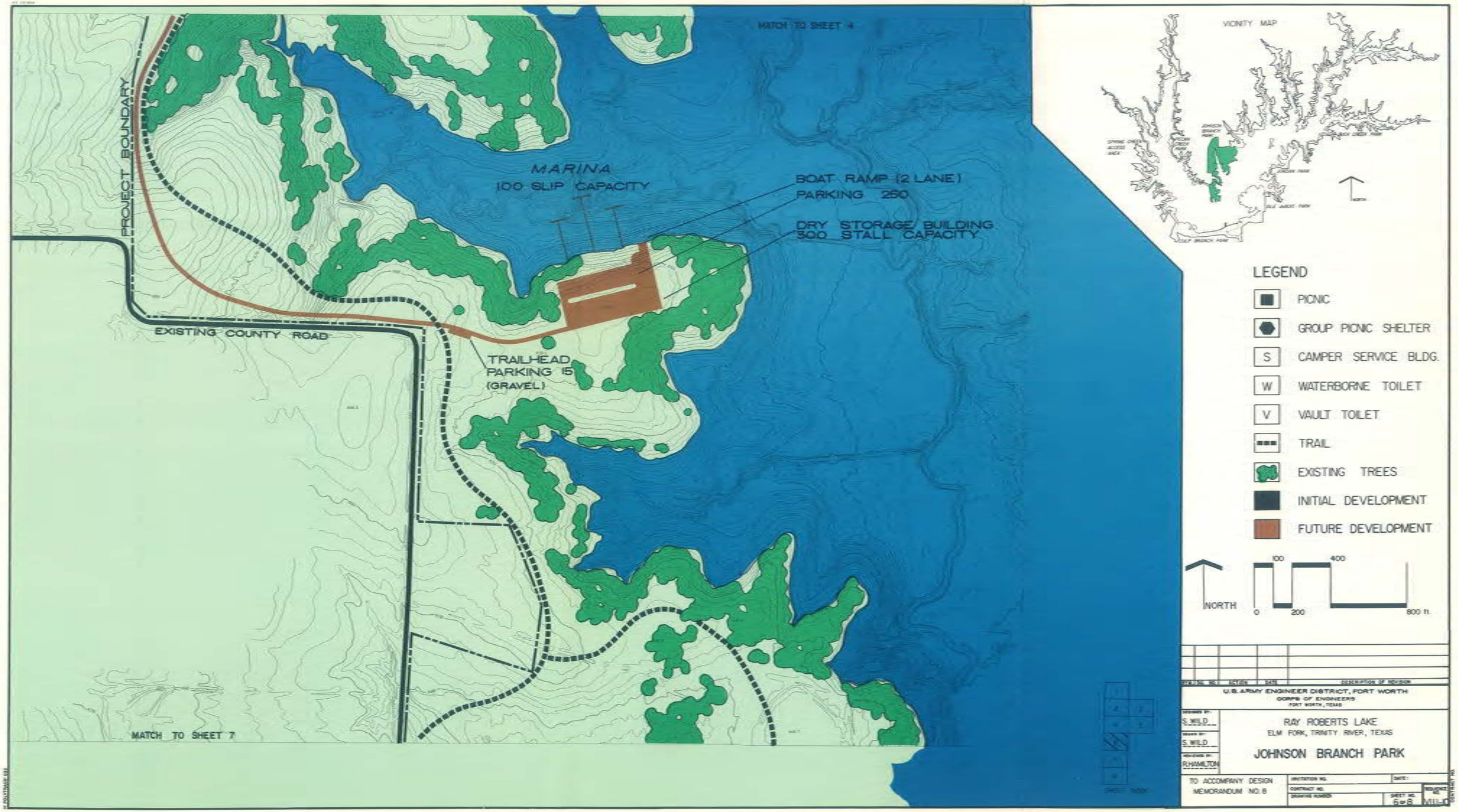
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON

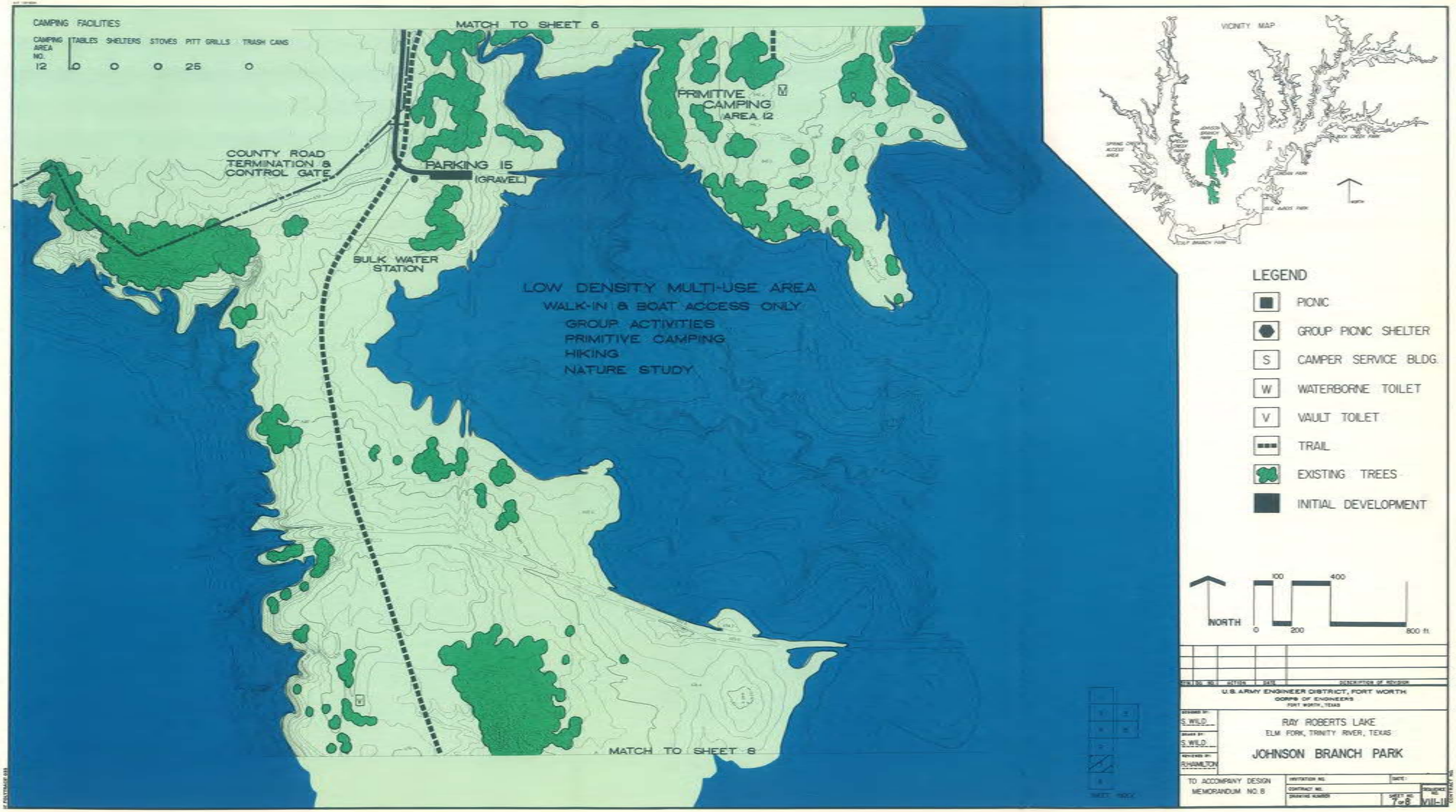
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

JOHNSON BRANCH PARK

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INITIATION NO.
CONTRACT NO.
DRAWING NUMBER
DATE:
SHEET NO. 5 OF 8
REVISION NO. VIII-9


MATCH TO SHEET 4
PROJECT BOUNDARY
MARINA
100 SLIP CAPACITY
BOAT RAMP (2 LANE)
PARKING 250
DRY STORAGE BUILDING
300 STALL CAPACITY
EXISTING COUNTY ROAD
TRAILHEAD
PARKING 15
(GRAVEL)
MATCH TO SHEET 7
VICINITY MAP
LEGEND
PICNIC
GROUP PICNIC SHELTER
S CAMPER SERVICE BLDG.
W WATERBORNE TOILET
V VAULT TOILET
TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
NORTH
100
400
0
200
800 ft.
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R.HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JOHNSON BRANCH PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 6 of 8
MII-D


CAMPING FACILITIES
CAMPING AREA NO. | TABLES | SHELTERS | STOVES | PIT GRILLS | TRASH CANS
12 | 0 | 0 | 0 | 25 | 0
MATCH TO SHEET 6
PRIMITIVE CAMPING AREA 12
COUNTY ROAD TERMINATION & CONTROL GATE
PARKING 15 (GRAVEL)
BULK WATER STATION
LOW DENSITY MULTI-USE AREA
WALK-IN & BOAT ACCESS ONLY
GROUP ACTIVITIES
PRIMITIVE CAMPING
HIKING
NATURE STUDY
MATCH TO SHEET 8
VICINITY MAP
LEGEND
PICNIC
GROUP PICNIC SHELTER
CAMPER SERVICE BLDG.
WATERBORNE TOILET
VAULT TOILET
TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
NORTH
0
100
200
400
800 ft.
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JOHNSON BRANCH PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
SHEET NO. 7 of 8
VII-11

LOW DENSITY MULTI-USE AREA
WALK-IN & BOAT ACCESS ONLY
GROUP ACTIVITIES
PRIMITIVE CAMPING
HIKING
NATURE STUDY

LEGEND

- PICNIC
- GROUP PICNIC SHELTER
- S — CAMPER SERVICE BLDG.
- W — WATERBORNE TOILET
- V — VAULT TOILET
- TRAIL
- EXISTING TREES
- INITIAL DEVELOPMENT

NORTH

0 100 200 400 800 ft.

REVISION NO.	INITIAL	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

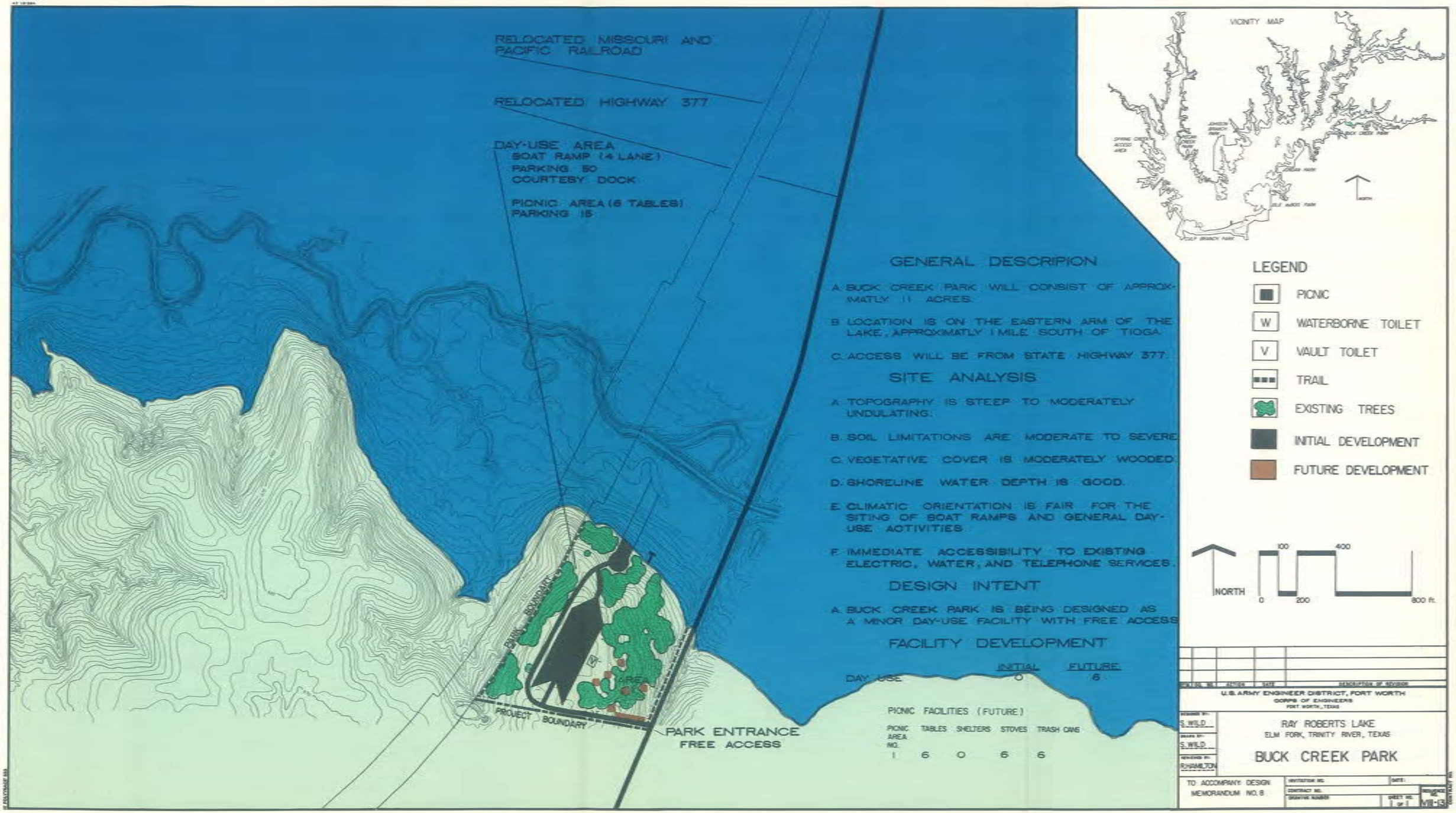
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
SUBMITTED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

JOHNSON BRANCH PARK

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 8 of 8 | DRAWING NO. MR-12


RELOCATED MISSOURI AND PACIFIC RAILROAD
RELOCATED HIGHWAY 377
DAY-USE AREA
BOAT RAMP (4 LANE)
PARKING 50
COURTESY DOCK
PICNIC AREA (6 TABLES)
PARKING 15
PROJECT BOUNDARY
PARK ENTRANCE
FREE ACCESS
VICINITY MAP
NORTH
GENERAL DESCRIPION
A. BUCK CREEK PARK WILL CONSIST OF APPROXIMATLY 11 ACRES.
B. LOCATION IS ON THE EASTERN ARM OF THE LAKE, APPROXIMATLY 1 MILE SOUTH OF TIOGA.
C. ACCESS WILL BE FROM STATE HIGHWAY 377.
SITE ANALYSIS
A. TOPOGRAPHY IS STEEP TO MODERATELY UNDULATING.
B. SOIL LIMITATIONS ARE MODERATE TO SEVERE.
C. VEGETATIVE COVER IS MODERATELY WOODED.
D. SHORELINE WATER DEPTH IS GOOD.
E. CLIMATIC ORIENTATION IS FAIR FOR THE SITING OF BOAT RAMPS AND GENERAL DAY-USE ACTIVITIES.
F. IMMEDIATE ACCESSIBILITY TO EXISTING ELECTRIC, WATER, AND TELEPHONE SERVICES.
DESIGN INTENT
A. BUCK CREEK PARK IS BEING DESIGNED AS A MINOR DAY-USE FACILITY WITH FREE ACCESS.
FACILITY DEVELOPMENT
INITIAL FUTURE
DAY USE 0 6
PICNIC FACILITIES (FUTURE)
PICNIC AREA NO. TABLES SHELTERS STOVES TRASH CANS
1 6 0 6 6
LEGEND
PICNIC
W WATERBORNE TOILET
V VAULT TOILET
TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
NORTH
0 100 200 400 800 ft.
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
SUPERVISED BY: R. HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
BUCK CREEK PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
CONTRACT NO.
DRAWING NUMBER
DATE:
SHEET NO. 1 OF 1
PROJECT NO. MR-13

GENERAL DESCRIPTION

A. JORDAN PARK WILL CONSIST OF APPROXIMATLY 475 ACRES.

B. LOCATION IS APPROXIMATLY MIDWAY ON THE EAST SHORE OF THE ISLE DU BOIS ARM OF THE LAKE.

C. ACCESS WILL BE FROM THE EXISTING F.M. 455, WEST OF PILOT POINT.

SITE ANALYSIS

A. TOPOGRAPHY VARIES FROM RELATIVELY FLAT TO MODERATELY UNDULATING.

B. SOIL LIMITATIONS VARY FROM MODERATE TO SEVERE.

C. VEGETATIVE COVER RANGES FROM DENSELY WOODED TO MODERATELY WOODED AND OPEN AREAS.

D. SHORELINE WATER DEPTH DURING NORMAL SUMMER DRAWDOWN CONDITIONS WILL HAVE A MINIMAL EFFECT ON WATER RELATED RECREATION ACTIVITIES.

E. CLIMATIC ORIENTATION IS GOOD FOR THE DEVELOPMENT OF BOAT RAMPS, BEACHES, AND GENERAL RECREATION FACILITIES.

F. ACCESSIBILITY TO EXISTING ELECTRIC, WATER, AND TELEPHONE SERVICES.

DESIGN INTENT

A. JORDAN PARK WILL BE DEVELOPED INITIALLY AS A LOW DENSITY RECREATION\WILDLIFE MANAGEMENT AREA. FUTURE DEVELOPMENT WILL CONSIST OF OVERNIGHT AND DAY-USE FACILITY DEVELOPMENT.

FACILITY DEVELOPMENT

	INITIAL	FUTURE
DAY-USE	NONE	169
OVERNIGHT	NONE	215

0 300 600 1200 24000 ft.

INITIAL DEVELOPMENT

FUTURE DEVELOPMENT

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

JORDAN PARK
OVERALL DEVELOPMENT PLAN

TO ACCOMPANY DESIGN MEMORANDUM NO. 6

SHEET NO. 1 OF

VIII-

CAMPING FACILITIES

CAMPING AREA NO	TABLES	WATERS	STOVES	PIT GRILLS	TRASH CANS
1	50	50	50	50	50
2	30	30	30	30	30
3	35	35	35	35	35
4	40	40	40	40	40

UNIMPROVED SWIMMING AREA (BUOYED)

EXISTING EMBANKMENT TO BE REINFORCED

CEDAR FENCE

EXISTING EMBANKMENT TO REMAIN

MULTIUSE CAMPING AREA 3

TRAILHEAD PARKING

MULTIUSE CAMPING AREA 4

MULTIUSE CAMPING AREA 1

GROUP CAMPING AREA 2

GATED SERVICE ROAD

MATCH TO SHEET 2

NOTE: ALL PARKING AREAS ARE 15 CAR CAPACITY UNLESS OTHERWISE NOTED.

LEGEND

- PICNIC
- GROUP PICNIC SHELTER
- S CAMPER SERVICE BLDG
- W WATERBORNE TOILET
- V VAULT TOILET
- EQUESTRIAN TRAIL
- EXISTING TREES
- INITIAL DEVELOPMENT
- FUTURE DEVELOPMENT

NORTH

0 100 200 400 800 ft.

SHEET INDEX

REVISION NO.	INITIALS	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

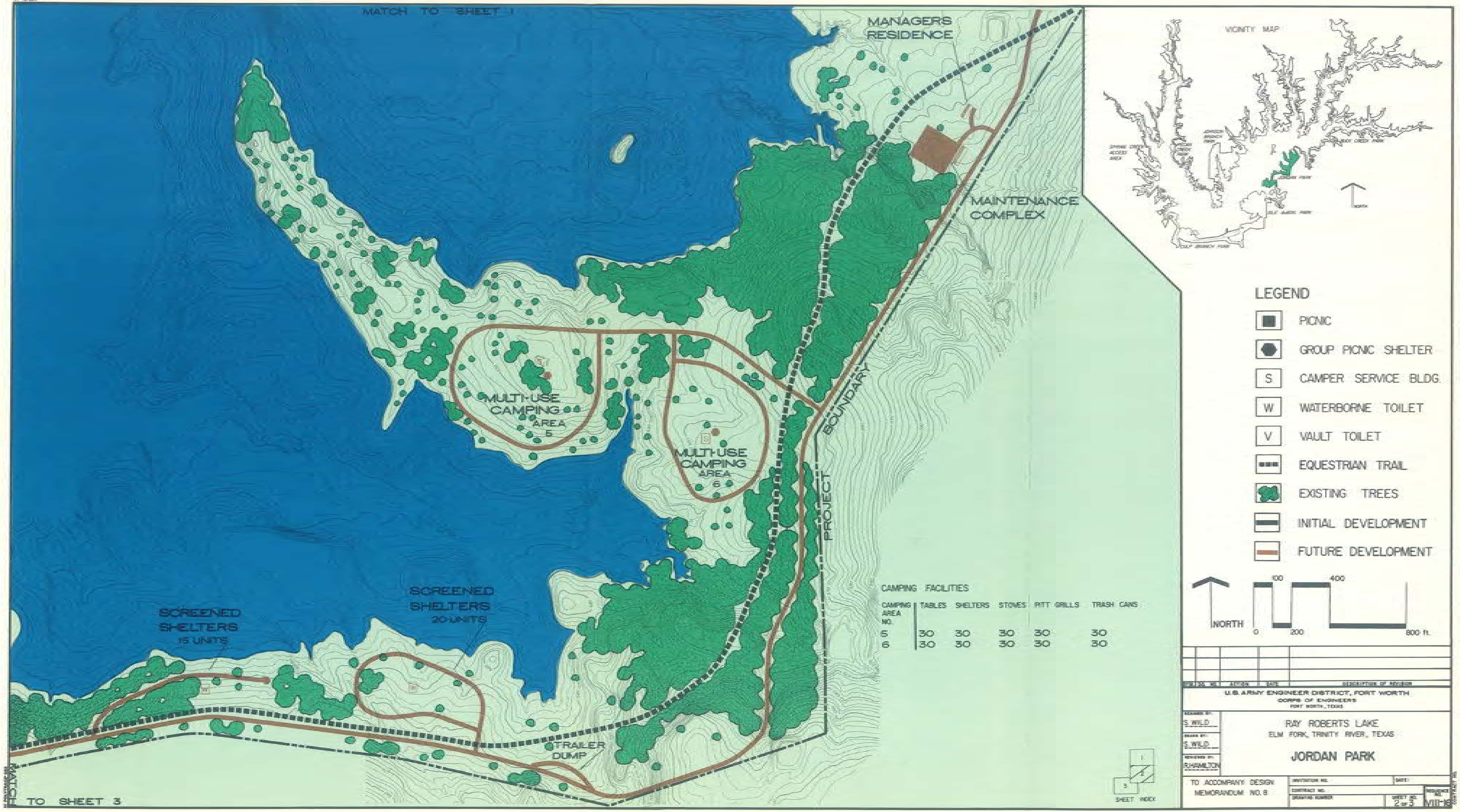
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

JORDAN PARK

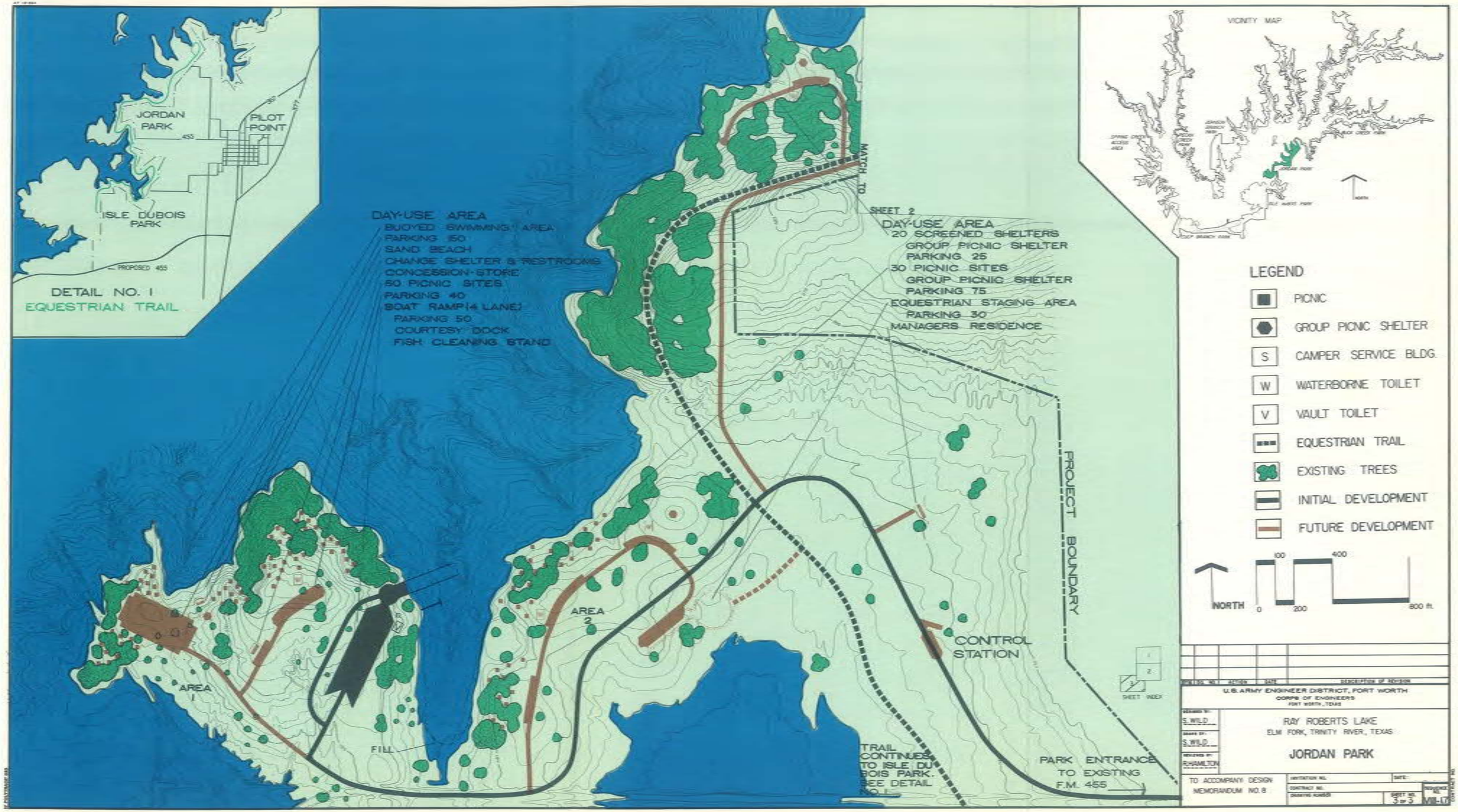
TO ACCOMPANY DESIGN MEMORANDUM NO. 8

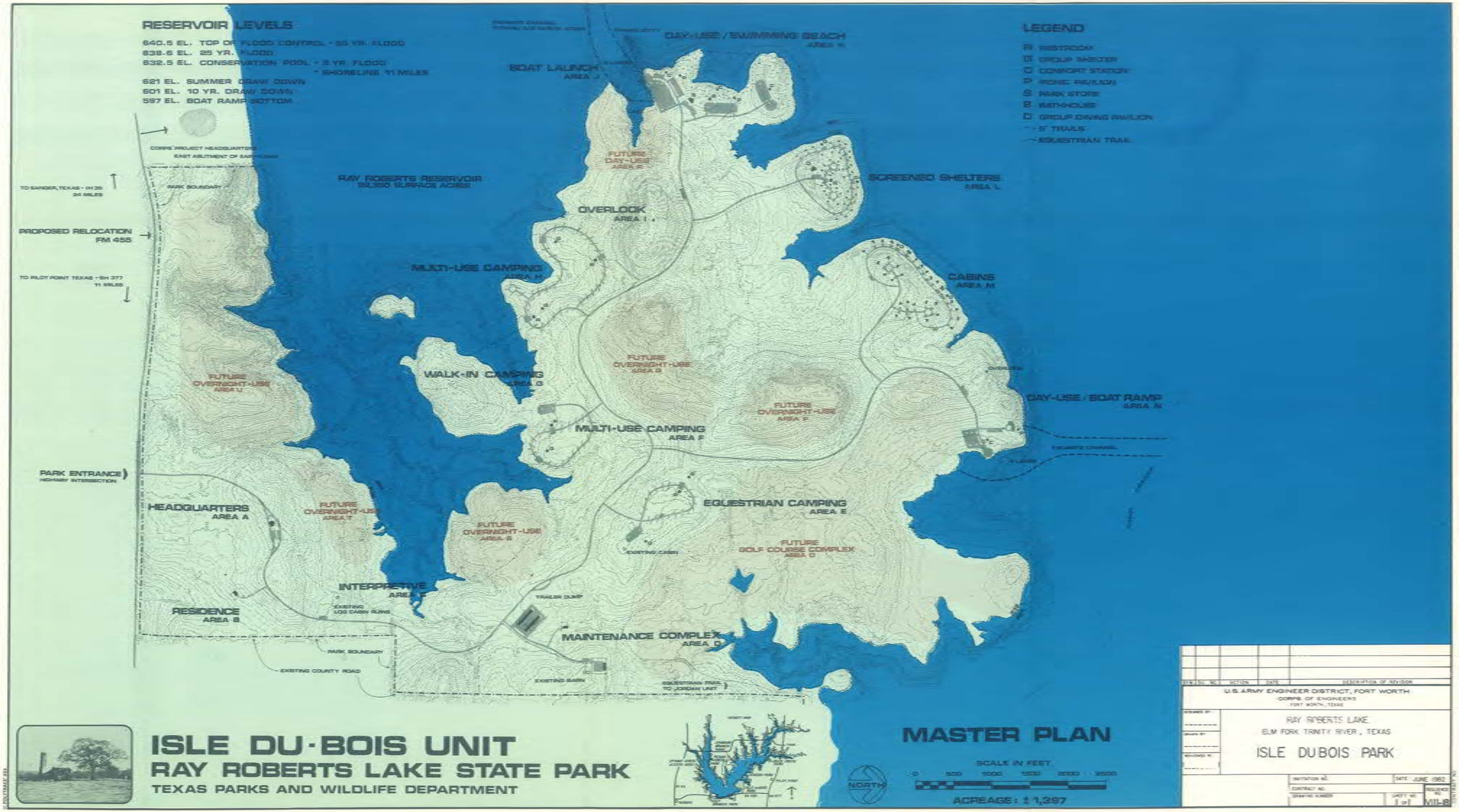
INVITATION NO.
CONTRACT NO.
DRAWING NUMBER
DATE:
SHEET NO. 1 of 3
PROJECT NO.


MATCH TO SHEET 1
MANAGERS RESIDENCE
MAINTENANCE COMPLEX
MULTI-USE CAMPING AREA 5
MULTI-USE CAMPING AREA 6
PROJECT BOUNDARY
SCREENED SHELTERS 20 UNITS
SCREENED SHELTERS 15 UNITS
TRAILER DUMP
TO SHEET 3
MATCH
VICINITY MAP
JORDAN PARK
NORTH
LEGEND
PICNIC
GROUP PICNIC SHELTER
S CAMPER SERVICE BLDG.
W WATERBORNE TOILET
V VAULT TOILET
EQUESTRIAN TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
NORTH
0 100 200 400 800 ft.
SHEET INDEX
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
S. WILD
S. WILD
R.HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JORDAN PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 2 OF 3
VIII-16

CAMPING FACILITIES

CAMPING AREA NO.	TABLES	SHELTERS	STOVES	PITT GRILLS	TRASH CANS
5	30	30	30	30	30
6	30	30	30	30	30


JORDAN PARK
PILOT POINT
ISLE DUBOIS PARK
PROPOSED 455
DETAIL NO. 1
EQUESTRIAN TRAIL
DAY-USE AREA
BUOYED SWIMMING AREA
PARKING 150
SAND BEACH
CHANGE SHELTER & RESTROOMS
CONCESSION-STORE
50 PICNIC SITES
PARKING 40
BOAT RAMP (4 LANE)
PARKING 50
COURTESY DOCK
FISH CLEANING STAND
MATCH TO SHEET 2
DAY-USE AREA
20 SCREENED SHELTERS
GROUP PICNIC SHELTER
PARKING 25
30 PICNIC SITES
GROUP PICNIC SHELTER
PARKING 75
EQUESTRIAN STAGING AREA
PARKING 30
MANAGERS RESIDENCE
PROJECT BOUNDARY
CONTROL STATION
AREA 1
AREA 2
FILL
TRAIL CONTINUES TO ISLE DU BOIS PARK. SEE DETAIL NO. 1
PARK ENTRANCE TO EXISTING F.M. 455
SHEET INDEX
VICINITY MAP
LEGEND
PICNIC
GROUP PICNIC SHELTER
S CAMPER SERVICE BLDG.
W WATERBORNE TOILET
V VAULT TOILET
EQUESTRIAN TRAIL
EXISTING TREES
INITIAL DEVELOPMENT
FUTURE DEVELOPMENT
NORTH
0
100
200
400
800 ft.
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
VERIFIED BY: R. HAMILTON
RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS
JORDAN PARK
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
DATE:
CONTRACT NO.
DRAWING NUMBER
SHEET NO. 3 OF 3
MR-17



ISLE DU·BOIS UNIT
RAY ROBERTS LAKE STATE PARK
TEXAS PARKS AND WILDLIFE DEPARTMENT

MASTER PLAN

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

ISLE DU BOIS PARK

DATE JUNE 1982

MII-8

VICINITY MAP

LEGEND

- PICNIC
- GROUP PICNIC SHELTER
- S — CAMPER SERVICE BLDG.
- W — WATERBORNE TOILET
- V — VAULT TOILET
- TRAIL
- EXISTING TREES

NORTH

REVISED NO.	APPROVAL	DATE	DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

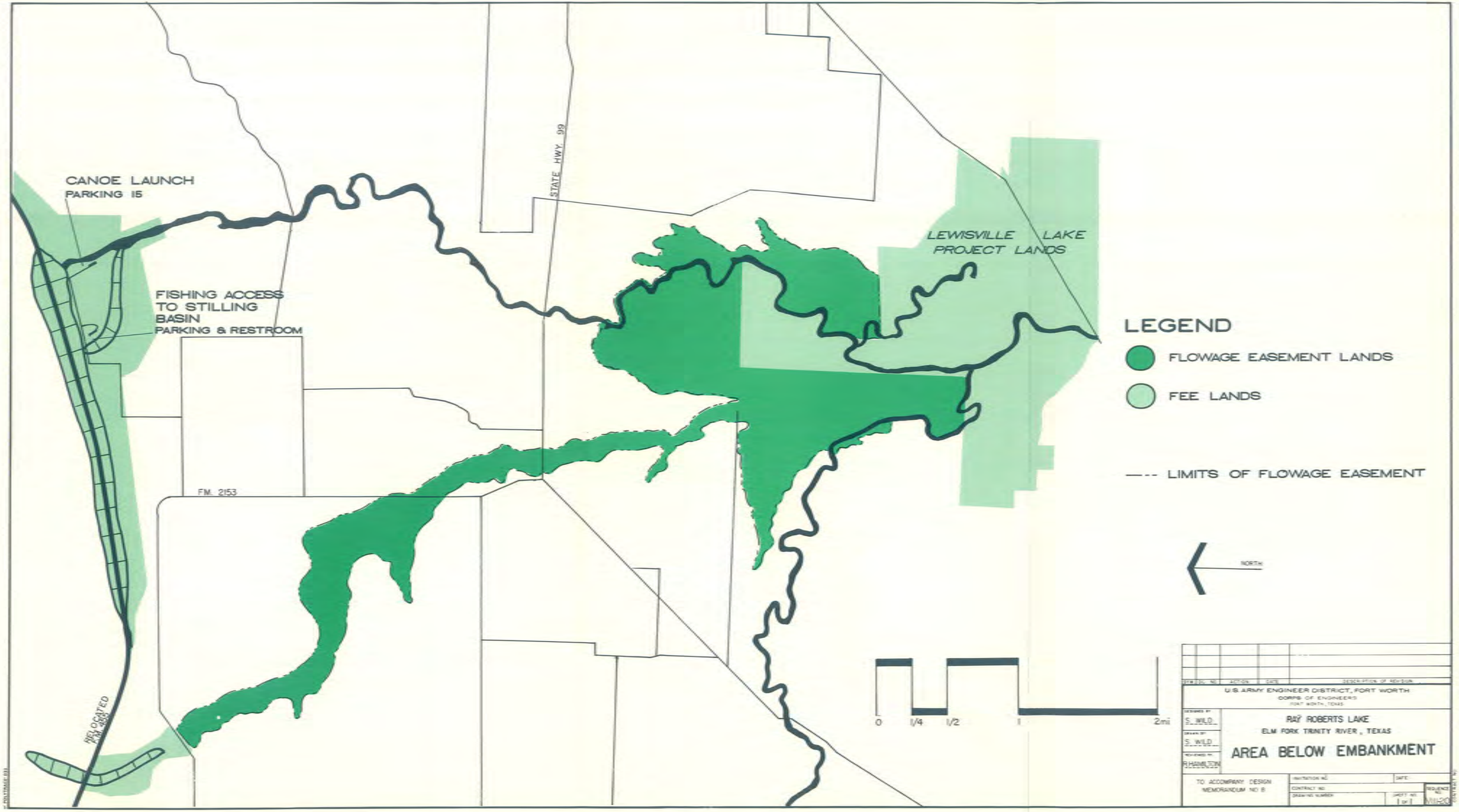
DESIGNED BY: S. WILD
DRAWN BY: S. WILD
REVIEWED BY: R. HAMILTON

RAY ROBERTS LAKE
ELM FORK, TRINITY RIVER, TEXAS

WOLF ISLAND

TO ACCOMPANY DESIGN MEMORANDUM NO. 8

INVITATION NO. | DATE:
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 OF 1 | DRAWING NO. VIII-15



REVISED NO. | ACTION | DATE | DESCRIPTION OF REVISION

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY S. WILD
DRAWN BY S. WILD
REVIEWED BY R.HAMILTON

RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS

AREA BELOW EMBANKMENT

TO ACCOMPANY DESIGN MEMORANDUM NO 8

INITIATION NO. | DATE
CONTRACT NO.
DRAWING NUMBER | SHEET NO. 1 OF 1 | SEQUENCE NO. | MM-20

IX FACILITY LOAD AND OTHER DESIGN CRITERIA

IX - FACILITY LOAD AND OTHER DESIGN CRITERIA

9-01. General. - The purpose of establishing design criteria is to provide guidelines for insuring that the public is provided with a safe, high quality recreation development that will enhance their outdoor experience and minimize the damage to the environment. Because each project has different site characteristics, design criteria that are appropriate in one situation may not apply to another. Therefore, determination of design criteria and facility load has been based on analysis of each situation in regard to its particular requirements and characteristics. Engineering design of the recreation facilities will be in accordance with Texas Parks and Wildlife Department Recreation Facility Guidelines unless exceeded by Corps criteria outlined in ER 1110-2-400, 1120-2-400, 1130-2-400, 1165-2-400; EM 110-2-400; & TM 5-822-2.

At the time of the preparation of the master plan document, the intent of all concerned parties was to have the Corps of Engineers prepare plans and specifications and administer construction of all park areas at the project, with review by the cities of Dallas and Denton and the Texas Parks and Wildlife Department. Should the Texas Parks and Wildlife Department choose to do their own design and construction, then the Corps reserves the right to review and approve all plans and specs prior to construction. In either case, during the construction phase TPWD will provide construction management and review personnel to assist in the inspection of all recreational construction activities.

9-02. Architectural theme. All facilities for public use, including those constructed by concessionaires, will follow a common design theme for continuity and unity. The theme for Ray Roberts Lake will be one of functional utility and esthetic harmony with the area. The architecture which has been introduced into this natural environment is a simplistic statement of function, structure, and geometry to compliment rather than compete with the site. The architectural elements comprise a minute portion of the bigger picture of this very large natural setting. For that reason, it was felt that the natural setting would provide the excitement of and introduction to the site and the architectural elements would function in a supportive capacity. An architectural theme has been established in DM No. 6, Appendix 1, however, the Texas Parks and Wildlife Department has requested that they be given the opportunity to alter the theme established in this DM. Any changes made to the architectural theme for recreation facilities will be handled by a supplement to DM No 6, and will be subject to approval by the Corps and the projects' local sponsors.

9-03. Siting. - All facilities have been sited to take advantage of natural vegetation, topography, and other environmental features. Purely functional structures such as comfort stations have been sited for maximum convenience without being physically and visually obtrusive, while other structures such as overlooks, and pavillions have been designed and sited to take advantage of views and to become visual and physical focals. Siting and general alignment of major structures, roads and facilities have been developed based upon

desirable design criteria and preliminary field siting. More detailed surveys will be required for certain areas prior to preparation of plans and specifications. Changes in road alignments and siting of facilities may be necessary to preserve vegetation, wildlife, archeological and environmental features. Due to the terrain and vegetation, trails are schematic and will require further study and evaluation during preparation of the Feature Design Memorandum for recreation facilities. Actual alignment of trails will be sited in the field to insure maximum advantage of views, vegetation, and topographic features, and to provide a varied recreational experience. Such field work will be accomplished by Corps and Texas Parks & Wildlife Department personnel.

9-04. Water system. - Water service will be connected to existing municipal transmission mains wherever possible. At this time however, this appears only possible in Culp Branch Park. Distribution and service lines will be sized to accommodate the facilities and anticipated ultimate use. If municipal water is not available at the time of construction, potable water in each public use area will be provided from water wells. All facilities for water supply and public use will be coordinated with the Texas State Department of Health according to their general type and location. These facilities should be designed in accordance with EM 1110-2-4201 and should meet the standards required by Federal, State, and local laws. Arrangements will be made with the cities of Dallas and Denton for the withdrawal of water from the reservoir by TPWD for potable water or irrigation purposes.

9-05. Sewage treatment and disposal. - At present, biological sewage treatment plants are proposed to process the sewage generated by the waterborne toilets, service buildings, change shelters, and sanitary dump stations. Other elements included in this treatment system will be lift stations, manholes, collector lines, effluent discharge lines, and electric service lines. At the time of construction, the various systems will be investigated to develop a concept for sewage treatment facilities based upon the best available, practicable, and economical treatment and disposal system that meets Federal, State, and local requirements. Specific guidance is presented in applicable portions of TM-5-814-3, in the USPHS manual, "Septic Tank Practices," and in the Texas State Department of Health manual, "Rules and Regulations Public Waterworks Projects." Reference should also be made to the Federal Water Pollution Control Act of 1972 (Public Law 92-500).

9-06. Electric supply. - Lighting will be provided for personal safety, security of property, and aesthetic enhancement. A minimal outdoor lighting system will be installed to provide a low level of illumination in keeping with the natural, rural nature of the park and will be used to focus on primary destinations and to reinforce circulation systems. The lake area will be served by the Denton County Electric Cooperative, Inc. and Community Public Service Company. The power lines can be extended as required for project needs. All power lines in all major recreation sites will be placed underground unless special conditions make such an installation impracticable. The design and construction of any electrical facility will conform to the companies' standards and will comply with Government codes.

9-07. Roads - Existing State and County roads which provide access to the various park sites will be used whenever practicable. In addition, the State and County will be encouraged to continually improve existing roads that provide access to the project. Circulation roads will be constructed to provide 2-way transportation within park boundaries. Those roads will be paved (except where noted ('gravel') and shall be 20 feet wide with 2 foot shoulders. Loop roads as found in camping and picnic areas will be 2-way, 18 feet wide and have 2 foot shoulders. Maximum design speeds on the major access roads will vary from 25 to 30 mph and on loop roads will vary from 15 to 20 mph; variations are due to road conditions, type of use, and potential hazards. All roads will be aligned to save the greatest amount of existing vegetation and to minimize scarring of the land while providing for the maximum sight distance. Surface runoff will be adequately controlled by grade, ditches, and drainage structures; flume downdrains will be used to guard against the formation of tunnels or channels. Culverts or bridges will control cross drainage. They will be located as required and sized in accordance with current Texas culvert practices. Barriers will be installed to prevent vehicles from going off the travelway and will generally be constructed of natural materials such as large rocks, timber, and logs. Cut and fill slopes will be rounded where this will not destroy existing vegetation or rock formations, or create drainage problems. Additional guidance for the planning and design criteria of access park and service roads is presented in ER 1110-2-400.

9-08. Parking.

a. Parking systems. - Two different systems of parking will be used at the project. Parking areas for boat launching ramps, restrooms, swimming beaches, and marinas will employ large numbers of concentrated parking spaces due to the anticipated public use. Occasional plantings will interrupt the broad expanse of paving. The second system will use single parking spaces which are skewed parallel or perpendicular to circulation and loop roads.

b. Parking spaces. - The parking areas will be sited in such a manner as to be in harmony with the environment as much as possible. In addition, parking areas will be designed to avoid vehicular backing onto heavily traveled access roads. The minimum parking space for automobiles will be 10 feet by 20 feet. Car-trailer spaces will be 12 feet by 60 feet for 90-degree head-in parking and 12 feet by 60 feet for 45 degree parking with 25-foot access lanes. A car-trailer parking space of 12 feet by 60 feet will be provided for each "stub-out" type camping site. Camping loop roads which are not heavily tree covered will have a double stub-out for every fifth camping space. (See Figure IX-1) Loop roads which are heavily wooded will be provided with off-road head-in parking spaces of five car capacity each, as shown on plan drawings. These areas will not have any double stub-outs. This procedure is felt to have a reduced impact on the amount of tree removal required within each camping site location. All parking areas will be paved unless otherwise noted 'gravel'.

9-09. Boat launching ramps and courtesy docks. - Boat launching ramps will be 14 feet wide or multiples thereof, with the length governed by the slope of the land and estimated water level fluctuations. The upper and lower vertical limits and the slope of the ramps will be in accordance with paragraph 3a of Appendix A of EM 1110-2-400 wherever practicable. Boat ramps will be constructed of concrete according to approved plans and will be located so as to minimize hazards to boating operations. Ramps will be provided with riprap protection as required. Boat ramps will be designed in such a manner as to require deliberate maneuvering to access the ramp from the road. This is done to reduce the hazard of accidental entry into the lake. Courtesy docks will be provided at all boat launching ramps whenever possible. Due to the anticipated severity of lake level drawdown, special design considerations may have to be given to courtesy docks at certain boat ramp locations. A TPWD designed, tract-rail dock system will be considered as a solution to the extreme drawdown conditions. The minumum design capacity requirement for a courtesy dock is an expected 60 boat launchings per normal weekend day.

9-10. Marinas.- Marina sites have been located in Isle duBois and Johnson Branch Parks on a future development, or as needed basis. All marinas should be no less than 200 boat storage capacity. Because of the expected high fluctuations in lake levels and its effect of reducing the boat storage capacity, it will be necessary to consider alternate means of boat storage services. One such alternative would be dry storage facilities. Traditionally, dry storage facilities have had a high potential of becoming 'eye-sores' due to the often chaotic and unkept manner in which they are often operated. To minimize the potential for such operations, it is suggested that dry storage facilities be contained within a large building in which boats are stacked in individual stalls. Boats can then be removed by a forklift and placed in the water by means of a rail launching system. This type of dry storage operation could be used in conjunction with a relatively small wet-slip storage facility to meet the boat storage demands of the project and also be large enough to enable a reasonable economic return. Dry storage facilities will be sited in Isle duBois Park as part of initial development plans.

9-11. Camping units. - Camping facilities for an initial design day load of 30,050 will be provided. All initial camping sites will be located in Johnson Branch and Isle duBois Parks. Water and sanitary facilities will be provided for within close proximity of each site. Primitive camping sites will be provided with composting type toilets only. The types of camping facilities to be provided are discussed below.

a. Multi-use camping. - Multi-use camping sites are intended for use by visitors with travel trailers, recreation vehicles, pop-up trailers, pick-up campers or tents. These sites will include a paved pull-through loop or back-in parking. On camping loop roads, pull-through and back-in stalls can be mixed, but back-in stalls should be carefully planned and designed to facilitate ease of backing a trailer from the blind right side. Both pull-through and back-in stalls should be orientated so as to have the picnic table and accompanying

TYPICAL DOUBLE STUB-OUT

FIGURE IX-1

facilities on the passenger side of the vehicle and orientated away from the road. Sites should be no closer to each other than 100 ft. on center. A cleared, level, well-drained area at least 12' by 18' in size should be provided and designated at each multi-use site to be used as a tent pad. If such an area does not exist, the site should be modified or a tent pad constructed. The angle the parking pad makes with the road should generally be between 40° and 60° or as close to this range as site conditions permit. In locations where site conditions will not allow for a 60 foot parking pad, a parking area for side-by-side parking should be substituted. If there is no natural shade provided to a given camping site, a shelter should be constructed over the picnic table. All campsites will have a picnic table over a concrete pad, waist high barbeque stove, electrical and water hook-ups, pitt grill, & trash can. Each camping loop, will have a restroom with showers and a group shelter. All sites, where feasible, will meet handicapped design criteria. See Chapter XI on Special Problems and Considerations.

b. Hike-in or Primitive Campsites. - These sites are intended for use by park visitors with portable camping equipment. Primitive campsites can vary considerably from park to park, depending on such factors as the intent, resource and funding available. Parking shall be provided for the primitive sites, generally in the form of a parking lot for the overall camping area. The location of the lot in relation to the camping area or areas will vary.

A user capacity will be specified for each camping area and this will be enforced by park personnel. The parking lot will be sized to serve only the number of people that can be accommodated on the trail and in the camping areas. This can be varied during different seasons. Campers and trail users will be required to carry in their own water and carry out their own trash. Camping areas in remote locations, will have provisions made for composting type toilet facilities. The distance from the facility to the camping area will vary with the ease of access for maintenance, however, with site conditions such as environmental sensitivity, topography, vegetation and nearby resources. A higher density can be tolerated if the focus is on a nearby attractive resource and not on the camping experience, as long as the carrying capacity of the site is not exceeded. In other areas, especially where there is only sparse understory vegetation, a lower density may be necessary.

9-12. Picnic Units. - Initial facility development is based on a design day load of 30,050. Each picnic site will consist of a table (steel frame with wood top & benches) on a concrete pad, a waist high barbecue stove, trash can, and shelters where needed. Picnic units will generally be clustered along the shoreline, no closer than 50 feet apart, whenever possible. Each picnic cluster will be serviced by a centrally located restroom and parking facility. Restroom facilities should be located so that they are generally no more than 600 feet from the picnic sites.

9-13. Group shelters. - Group shelters will be located in both day-use and over-night camping areas. Within day-use areas the group

shelters will generally be entermixed within picnic sites. Restroom and drinking water facilities should not be any more than 150 feet from the shelter. Unless otherwise noted on plan drawings, all shelters will be of an eight table capacity. Group shelters within camping areas will be centrally located within the camping loop. All shelters will consist of a concrete pad, large barbecue stove, and trash receptacles. Shelters within camping areas will be equipped with electric outlets and lighting.

9-14. Swimming areas. - Swimming areas will be provided at most public use areas. Permanent restrooms with change shelters will be provided at locations above the 5-year flood pool. Isle duBois and Johnson Branch Parks will have formal beach areas complete with food concessions, change houses, sheltered picnic sites, grassed beaches with landscaped surroundings, playgrounds, and buoyed swimming areas. Buoys will be placed to delineate swimming areas. Beaches shall be graded to a maximum of 15% slope, 5 to 10% is ideal. Excavation of the Johnson Branch, Jordan, and Isle duBois Park beach will be required to insure safe & continual summer swimming.

9-15. Playground facilities. - Playground lots will be considered at some of the large campgrounds and next to formal beaches. Equipment will be constructed of durable woods and materials which are native to the are or blend with the surrounding landscape. Playground equipment will be designed for durability and safety, and will be vandal-resistant.

9-16. Trails and pathways. - Trails and pathways will be designed to provide maximum circulation efficiency and visitor convenience and to protect the aesthetic and ecological qualities of the area. Switchbacks will be avoided wherever possible. Directional signs will be provided at trail junctions and trail markers will be provided as required on longer trails. Earthwork will be minimized, as will clearing of the natural vegetation except where required for fire reduction. Drainage will be provided. Water bars and ditches will be used where necessary to divert periodic rainflows which would otherwise flow down the trails causing erosion problems. Bollards will be removable to permit passage of fire fighting equipment. The basic types of trails and the pathways which will be used are described below:

a. Hiking and backpacking trails. - These trails offer the user a natural hiking experience and usually provide foot access to primitive campsites, remote bank fishing, and generally scenic areas. Traffic on these trails is usually low volume and the trails should be located so that their construction and use create minimum environmental impact. These trails will be constructed to provide a clear tread width of two to four feet and an eight foot high clearance. Judgement should however be used by the contracting officer not to destroy unique or aesthetic vegetation in any attempt to meet such clearances. Selective clearing of trees and vegetation may be required to create the best views possible for overlook areas. Trail base shall be existing natural material when desirable. Other surface types allowable are soil, turf, crushed limestone or crushed iron ore (3" crowned and

packed), crushed granite (3" crowned and packed), wood chips (crowned and packed), stabilized earth (crowned and packed), or gravel, assuming they are visually compatible with the surrounding environment. If pea gravel is used, it should only be in amounts that can be packed into existing surface.

b. Nature/interpretive trails. - These trails provide the user with opportunities to walk and study interesting or unusual natural features at their leisure. The trails are generally short-to-moderate in length and will have informational stops to explain points of interest. Trails will generally follow a short, closed loop design, beginning and ending at approximately the same location. They will be cleared and graded to a width of five feet, with an eight foot high clearance. Sustained grade to be under ten percent. The interpretive trail at Johnson Branch Park will be approximately one mile in length. The trail layout will be accomplished by Corps and project sponsor personnel. Monies will be set aside for the contracting of an interpretive study and writing of a script. See Figure IX-2.

c. Pathways. - Within intensively used recreation areas, pathways will be constructed to concentrate foot traffic in specific areas. This will reduce trampling of the natural vegetation and will provide efficient circulation routes. Pathways will lead from the parking lots to picnic areas and beaches. They will also connect campsites with restrooms. Pathways will be 5 feet wide with a stabilized aggregate or asphalt surface.

d. Equestrian trails. - Equestrain trails can be expected to cause environmental problems such as increased erosion and destruction of vegetation. These impacts should be carefully considered when locating and designing facilities. In most cases, equestrian trails are incompatible with any of the other trail types discussed and should be designed so as not to conflict with them.

The surface of equestrian trails shall be formed of compacted materials, resistant to normal use and erosion, usable when wet and not dusty when dry. If possible, use of existing natural material or grass is preferred. Erosion control and stabilization shall be given a high priority in the design and construction of these trails and vegetation growth should be encouraged as much as possible to stabilize all areas adjacent to the trail not receiving direct foot traffic.

Where not restricted by space or conflicting uses, designated trails should not be used. This will incourage horseback riders to utilize more of the available lands, resulting in an improvement in the overall recreation experience and reducing the potential for serious errosion which is often the result of heavily used trails. The majority of Jordan Park is well suited for the undesignated trail concept. Although plate VII-14 shows a designated trail throughout Jordan Park this should be viewed as conceptual in nature with project personnel field siting the trail where necessary.

Although no maximum trail length is specified, a trail 8 to 20 miles long is desirable. Rest areas are generally recommended every 5

to 10 miles or at major vistas or scenic areas, but located so as not to result in degradation of the scenic resource or adjacent areas.

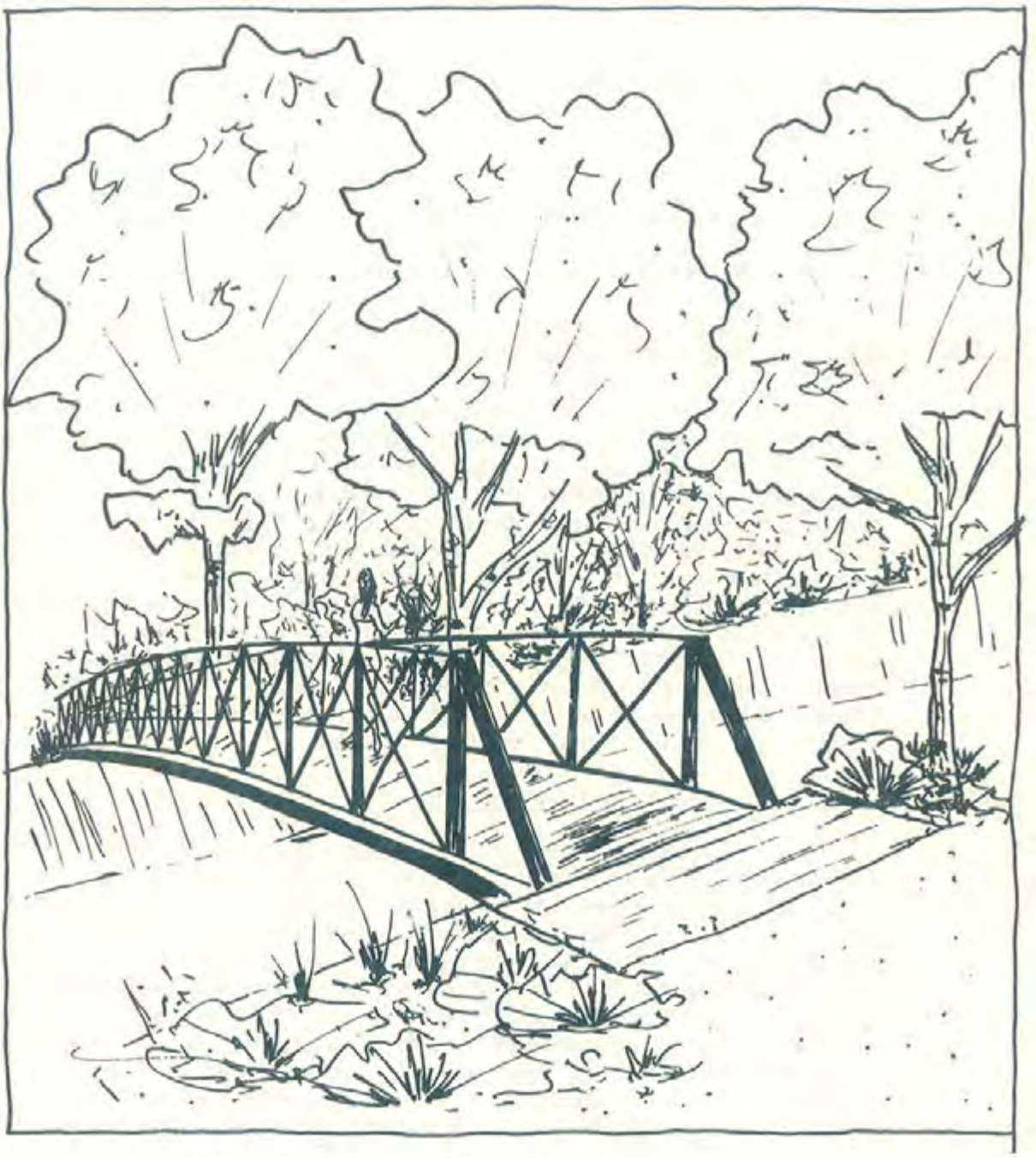
9-17. Trail bridges. - Foot bridges will be required in several of the recreation areas. They will be either custom built or prefabricated. They will be a clear span design with all metal framework to lessen maintenance. See figure IX-3.

9-18. Bicycle access and paths. Statewide outdoor recreation demand by activity as reported in the 1980 Texas Outdoor Recreation Plan, ranks bicycling as the most popular of all outdoor recreation activities during the year 1985 thru 2000. Due to the current and projected popularity of bicycling, efforts should be taken to provide paved bicycle paths within park areas and to incourage the adaptation of existing and proposed relocated roads within the project area to facilitate safe and convenient bicycle travel. The TPWD currently has plans to construct a paved bicycle path within Isle duBois Park which will originate at the park entrance and loop within the park (approximately 3 miles), providing access to most day and overnight use areas. Such paths should be a 6 foot paved section 1 foot shoulders (with a 2% cross slope within a 8 foot graded area). State and county roads around the project area, particularly relocated roads, could be easily adapted with proper signage and lane markings to facilitate bicycle travel as most of the major road relocations (FM 455, 922, & 3002) will have 8 foot paved shoulders. Such adaptation will require cooperation from the State Highway Department. As the project progresses towards completion and when local demands for bicycle access are better know, contact with the State Highway Department should be made to arrange for bicycle traffic on appropriate roads around the project area.

9-19. Grading and landscaping.

a. Grading criteria. Facilities will be located so as to minimize the grading required. Grading will be undertaken only where necessary to: (1) provide acceptable grades for vehicular and pedestrian circulation, (2) provide reasonably level parking areas, (3) provide boat launches and formal swimming beaches, and (4) to provide level foundation for restrooms, concession buildings, and other permanent structures. Where necessary, alignments and grades will be selected to save the maximum number of existing trees. Grading criteria for each of these uses is described under the individual design criteria sections. Grading will also be used in certain locations to create berms for privacy and to screen out undesirable views and noises.

b. Planting criteria. - Planting has been primarily considered on a large scale. Mass tree plantings will be made in several of the camping areas with sparse tree cover. Activity areas such as campgrounds, beaches, and picnic areas will be buffered from parking lots and roads by mass plantings of primarily native trees. Wherever possible, facilities have been sited to take advantage of existing vegetation for screening or aesthetic purposes. Trees will be saved to the maximum extent possible. Trees will be preserved in parking lots by use of tree wells (above grade), meeting the existing grade



TYPICAL BRIDGE FOR TRAIL CROSSING

FIGURE IX-2

with the paved surface, or leaving unpaved islands around the trees. Major native tree species used in mass plantings will be post oak, cedar elm, eastern red cedar, red bud, and roughleaf dogwood for upland areas. Trees for areas near the reservoir would include green ash, red oak, american elm, eastern cottonwood, and eastern red cedar. Turf for parking areas, playgrounds, and landscaping of buildings will consist of species of grass which are drought tolerant, traffic resistant, and blend with the natural surroundings. Indian grass, little bluestem, bushy bluestem, and buffalo grass are well suited for these purposes.

9-20. Signs and interpretive guidance. - The objectives of a sign and interpretive guidance program at Ray Roberts Lake will be to provide appropriate signs, markers, and displays for the proper protection and administration of the project resources and to guide, inform, educate, and protect the visiting public. Recognition will be given to each agency who was responsible for the construction of each given park area. Signs, markers, and displays needed to accomplish these objectives will be developed and placed in accordance with instructions outlined in EM 1110-2-400, ER 1110-2-400, ER 1130-2-400, Handbook on Signs issued by the Southwestern Division, Corps of Engineers, and TPWD signing procedures. All construction and implementation of park signage other than entrance portal and Corps & local sponsor recognitiion signs will be the responsibility of TPWD. Concepts for signs are displayed in DM No. 7 (Revised).

a. Interpretive signs. - Low, unobtrusive, and approximately 2 feet high, interpretive signs will have plaques varying in size with the type and amount of information to be conveyed. The sign plaque will be placed at a 45° angle from vertical. Interpretive signs will be located primarily along hiking trails where the major purpose of the trail is hiking, but an occasional interpretive plaque would be helpful in describing a view, rock outcrop, or other natural features. Interpretive concepts, methods and signs will be designed and developed by the Texas Parks and Wildlife Department.

X SPECIAL PROBLEMS AND CONSIDERATIONS

X - SPECIAL PROBLEMS AND CONSIDERATIONS

10-01. General. - Anticipated problems and features requiring special consideration because of their direct relationship to successful operation of the recreation and resources management program are discussed below.

10-02. Environmental protection. - The following measures will be undertaken in accordance with EM 1110-2-38 and Draft Specification CE-1300 to aid in the preservation of the environment.

a. Access roads. - To avoid additional landscape scars the limits of roadway clearing will not exceed 10 feet beyond the toe of fills or the top of cut back slopes. In other than solid rock, the harsh appearance of roadway will be subdued by rounding off the tops of excavated slopes. All downed trees, loose rock, rubble, and other debris created by construction activities will be cleared from the area.

b. Recreation facilities and construction. - During construction of the recreational facilities, all construction activity will be kept within the established limits of the construction area. Any area scarred by construction activities will be regraded to approximate natural topography and will be revegetated to blend with the surrounding landscape.

10-03. Beautification. - Beautification will be considered in facility design, in relocations, in excavation and spoil areas, and in clearing, landscaping, and planting plans. The criteria covering most of the beautification requirements are found in ER 1110-2-400, ER 1130-2-400, ER 1165-2-2, ER 1165-2-400, and EM 1110-2-400.

10-04. General appearance standards. - Standards of appearance for all Government buildings, project structures, signs, and other facilities will be established, with all facilities required to be kept in first class repair. Public appraisal of Corps project areas is often based on the appearance and adequacy of project facilities. Continuing study, appraisal, updating, and maintenance of all project structures and facilities are critical functions of project administration.

10-05. Boundary surveys and monumentation. - Boundary lines will be surveyed and monumented as soon as possible in accordance with the provisions of ER 1120-2-400 and EP 405-1-830. Early completion of boundary monumentation is essential to control encroachments of Government property. These boundary line markers should be checked periodically by field personnel to ascertain if any changes have been made to the location of markers or boundary lines either by accident or impropriety. Boundaries and markers should be readily distinguishable at all times.

10-06. Fencing. - In order to achieve economic management and smooth administration of project lands, the boundary of the project

will be fenced. The project boundary will be fenced to prevent encroachments, disputes over boundary lines, and trespassing by free-ranging livestock and related damaged or degradation of natural and developed resources. It will also be done to help control access by funneling vehicles to established entries and roadways. This, in turn, should help prevent off-road vehicle traffic. By effecting control of people and livestock, the fence will reduce administration problems and the costs associated with investigating and reporting encroachments.

10-07. Special provisions for the handicapped. - Provisions for physically handicapped persons will be made in accordance with ER 1110-2-102, particularly in regard to site grading, sidewalks, parking areas, ramps, and toilet facilities.

10-08. Civil disturbances. - The reservoir manager and his staff should be constantly aware of any signs of potential disturbance. ER 1120-2-31120-2-313,, SWDR 1130-2-4, and SWDR 130-2-7 provide guidance on this subject.

XI ADMINISTRATION AND MANAGEMENT

11-01. General - The concept behind the management of both created and natural project resources is to provide continued enjoyment and maximum sustained use by the public of the lands, waters, and associated recreational resources consistent with their carrying capacity and their esthetic and biological values. In accordance with this concept, the policies regarding the administration and management of the project have been formulated to make the majority of the lake and the Government-owned land available to the visiting public to the fullest extent compatible with an orderly and planned development. These policies control the administration, management, and development of the project for its authorized purposes. They will be based on legislation enacted by Federal, State, and local governmental agencies, and experience gained in the operation and development of simular projects and public parks.

11-02. Operation and maintenance - The Cities of Dallas and Denton shall be responsible for operation, maintenance, and replacement, without cost to the Government, of all facilities developed to support project recreation opportunities. The Texas Parks and Wildlife Department intends to assume a portion of the cities responsibility and cost share with the Corps of Engineers for lands and development of Isle duBois Park. They further intend to operate and maintain all additional parks to be developed by the Corps and Cities of Dallas and Denton and to manage all project lands and water areas (excluding the embankment). A recreation contract with the TPWD is currently being drafted to reflect this situation. The State shall maintain all project lands, waters, and facilities in a manner satisfactory to the Corps and pursuant to the provisions of the lease which will subsequently be entered into, with the exception of lands required for operation of the project structures. The Corps retains the right to review and approve all operation and management policies. A reservoir management plan will be prepared by TPWD and submitted to the Corps before entering into a lease agreement with the State for lands at the Ray Roberts Lake Project.

It is the present intent of TPWD to divide O & M responsibilities among appropriate Divisions within TPWD, i.e. parks, wildlife, fisheries, & law enforcement. It is anticipated that O&M responsibilities within developed park areas will be administered by TPWD Parks Division, and all remaining project lands would be administered by TPWD Wildlife Division, including undeveloped and low use recreational areas on an interim basis. The following is a partial list of O&M responsibilities which would be required of TPWD in their management of the project.

1. Maintain and replace boundary line fencing, gates & locks.
2. Maintain fire lanes.
3. Respond to fires and control or make agreement to pay for fire protection.
4. Maintain signs.
5. Enforce rules and regulations for land and natural resources.
6. Control litter, dumping, ect.
7. Control off-road vehicles.
8. Control illegal grazing, farming & haying.
9. Prevent firewood cutting.
10. Prevent theft of topsoil
11. Prevent theft of sod, trees, & wild plants.
12. Prevent or replace stolen fence posts & wire.
13. Water safety enforcement.

14. Control of hunting or prohibition of it.
15. Manage lakeshore according to Corps general requirements.
16. Archeologic and historic preservation.
17. General law enforcement.

11-03. Staffing - Sound and efficient management requires that the staffing and organization at each project should provide for expertise in disciplines necessary for light construction, maintenance of facilities, and effective administration and management of the project and its related resources. Government personnel and equipment requirements, as supplied by the Corps of Engineers Operations Division are presented in tables XI-1 & 2. Texas Parks and Wildlife Department Administration personnel requirements are presented in Table XI-3.

TABLE XI-1

OPERATIONS AND MAINTENANCE COSTS

1. Personnel (Field)	
Project Manager, GS-12 (1/3d)	$ 20,000
Assistant Manager, GS-11 (1/3d)	17,000
Park Ranger, GS-09	39,000
Park Technician, GS-07	33,000
Reservoir Maintenance Worker Foremen, WS-07 (1/5th)	7,000
Reservoir Maintenance Worker, WG-08 (Two)	54,000
Laborers, Temporary, 6 months, WG-05 (Two)	21,000
Project Clerk, GS-05 (1/3d)	9,000
Clerk, Typist, GS-04 (1/3d)	8,000
	$208,000
2. Other Costs	
Utilities	$ 16,000
Transportation	14,000
Materials and Supplies	20,000
Participation with Other Government Agencies	30,000
Contracts, Cleanup, Mowing, and Maintenance	140,000
Hydrological Studies	35,000
SWD Control Center	10,000
Updating Master Plan	10,000
Embankment Instrumentation and Periodic Inspection	15,000
3. Real Estate Management Costs	40,000
4. Operations Division	55,000
	$385,000
5. Total Personnel and Other Costs	593,000
6. District Overhead (23.08%)	137,000
7. Total Estimated Cost	730,000

NOTE: Operations, Maintenance, and Equipment Cost shown on Table XI-1 and XI-2 are at 100% Federal cost.

TABLE XI-2

PROPOSED OPERATION AND MAINTENANCE EQUIPMENT

Quantity	Item	1st Cost ($000)
1	VHF Radio Base Station	$ 7.0
3	VHF Mobile Units	4.0
2	Mobile Unit, Law Enforcement Net	3.0
1	Patrol and Work Boat	17.0
1	Motor Grader	25.0
1	Crawler Tractor w/Dozer	35.0
1	Trailer, Tilt Deck	10.0
1	Industrial Tractor w/Loader	28.0
1	Flatbed Truck w/winch and dump bed	20.0
1	Air Compressor - 150 CFM	12.0
1	Generator Set	10.0
1	Welder	6.0
1	Six Inch Pump	6.0
Misc small tools and equipment		25.0
		$208.0
	+ Contingencies	32.0
	TOTAL	$240.0

TABLE XI-3

TEXAS PARKS AND WILDLIFE
(STATE COST)

ADMINISTRATION PERSONNEL

2 Park Supervisors
17 Park Rangers
2 Clerks
13 Seasonal Workers
Wildlife Management - 1 man year
Fisheries Management - 1 man year
Law Enforcement - 1 man year

11-04. Administration and management. - Guidance for the administration and management of specific project responsibilities is presented in the following paragraphs. All management and administrative actions which relate to the purposes for which the Texas Parks and Wildlife Department have entered into a property lease will be administered by the TPWD with approval by the Corps of Engineers, and when appropriate, the cities of Dallas and Denton. All management and administrative actions taken by the Corps of Engineers and/or the cities of Dallas and Denton which effect either directly or indirectly the purposes for which TPWD have entered into a property lease will be coordinated with TPWD before any action is taken.

a. Public use area. - The public use areas will be administered by the State, under a plan agreed to by the State, cities, and the Fort Worth District. Corps guidance is contained in ER 1130-2-400, ER 1105-2-835, EP 405-1-2, and SWDR 1130-2-7.

b. Nonprofit organizations. - Requests have been made by North Texas State University and Texas Woman's University for project lands to be set aside for outdoor classroom use. No such lands have been designated as of yet for this use, however, consideration will be given to these, or similar interests when a proposal for specific lands and management plans are received.

c. Marina sites and services. - Concession leases will be granted in a fair and impartial manner. The concession prices to be charged for commodities and service will be subject to the approval of the District Engineer.

d. Park and recreation grants. - All applications received for park and recreation grants will be reviewed for compliance with the master plan of development, consistency with planned project development, and compliance with the requirements of EP 405-1-2. The Project Operations Manual, SWDR 1130-2-7, contains additional information on awarding park and recreation outgrants.

e. Access by adjacent property owners. - Owners of lands adjacent to the project will be allowed reasonable access to the lake in accordance with SWDR 1130-2-7 dated 25 September 1968. This does not mean that the adjacent owners are conveyed any right to Government-owned lands, nor does it mean that these owners have any private rights for lease thereof for access or recreational purposes. Consents to tie into Government-owned roads located on land on which the Government owns only a road easement will be obtained in accordance with SWDR 405-2-9 dated 20 April 1965. Consents to tie into Government-owned roads located on fee-owned land will require the approval of the Secretary of the Army, who must find that the grant will not be against public interest.

f. Land and water zoning. - The land and water areas of the project have been zoned to insure safety, and protect property and the resources of the project. All zoned areas will be clearly and appropriately designated with approved signs and/or buoys. Temporary zoning for special events of short duration may be permitted after approval by the reservoir manager. SWDR 1130-2-7 contains detailed instructions regarding zoning of land and water areas.

g. Fishing and hunting. - Fishing and hunting on Government-owned lands and water will be in accordance with applicable Federal, State and local laws; enforcement will be the responsibility of Federal and State agencies. In addition, fishing and hunting will be in accordance with the project land and water zoning plan. Reservoir managers should refer to SWDR 1130-2-100 and Title 36 for guidance.

h. Interim use. - Lands not required for immediate or near-future use for public use, fish and wildlife, and project operations may be leased for nonprofit group activities and grazing purposes, may be designated for hunting, or may be left idle for soil restoration through native plant succession. Grazing will be used as a management tool.

i. Archeological and historical. - Any further investigations concerning the archeological and historical resources of the project will be administered under the authority of Public Law 93-291 and EP 405-1-2.

j. Protection of biological resources of project lands and waters. - A biological management program is planned for the purpose of deriving maximum benefits from the project resources, while still preserving them for future generations. The Corps of Engineers will solicit the assistance of and coordinate the efforts of the US Public Health Service, the Texas Parks and Wildlife Department, and the Texas Department of Health in the implementation of this program.

k. Shoreline erosion - It will be the responsibility of the Texas Parks and Wildlife Department to control any shoreline erosion problems within park areas which might ultimately threaten recreation facility development, boundary fencing, or recreational use areas. Shoreline erosion outside of park areas will be controlled with the assistance of the Corps of Engineers in the event that such erosion threatens to undermine boundary fencing.

11-05. Visitor and facility protection.

a. Law enforcement. - Enforcement of civil and criminal laws at the reservoir will remain the responsibility of duly constituted offices of Federal, State, and local governmental agencies. The Corps of Engineers, through field personnel, will cooperate fully with all law enforcement 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 covers refuse dumping and the provisions of Title 36 only. The policy of the Corps of Engineers regarding law enforcement is contained in ER 190-2-3.

b. Pest control. - Insecticides, herbicides, and other chemicals may be used to control insects, weeds, and other pests which may be harmful to the health and safety of the public or detrimental to the natural features of the project when they cannot be controlled by other methods. The use of biological or mechanical control other than chemical pesticides is encouraged where practicable and where such methods will not prove harmful to the ecosystems. All spraying and control activities will be coordinated through the Fort Worth District biologist and local and county health officials. ER 1130-2-232 (Pest Control Program for Civil Works Projects) and instructions on the labels will be followed when using and handling all pesticides, insecticides and other chemicals.

c. Pollution control. - The control of air and water pollution and solid waste disposal shall be in accordance with Executive Order No. 11507 on Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities, and the Executive Order dated 23 December 1970 entitled Administration of Refuse Act Permit Program. All project personnel will maintain constant vigilance for sources of pollution to the reservoir and its stream tributaries. Guidance for this program is contained in ER 1165-2-116. Additional pollution control will be administered in accordance with ER 1130-2-400, EP 405-1-2, and the Operation and Maintenance Manual.

11-06. Health and safety.

a. Safety. - A comprehensive safety program will be developed for all project land and water areas. Chapter XIII presents general guidance for the safety program until such time as a project safety plan can be added to the master plan as an appendix.

b. Health and sanitation. - The development and use of the reservoir are planned for the public interest and the utmost consideration has been given to the maintenance of high standards of public health and safety. The State health laws, rules, and regulations are applicable to all facilities constructed and provided at the project. Commercial operators and licensees are also required to abide by the State health laws, rules, and regulations. Disposal of waste, trash, and debris will not be permitted on Government land without authorization, and then only in accordance with State laws and at designated locations.

c. Solid waste disposal. - All feasible solutions to solid waste disposal should be given thorough consideration, and studies should include discussions with the responsible local health officials. Solid waste disposal may be by contract with off-project sanitary collectors when such a method is economically and administratively feasible. Where practicable, arrangements should be made for disposal of solid wastes on nonproject lands. Where this is not feasible, disposal will be accomplished on the project by means of land fill in isolated areas or by incineration.

11-07. Boating.

a. General. - All boating activities will be in accordance with applicable State laws or acts covering boats, boating, and water safety, and SWDR 1130-2-7. Boaters will be required to comply with such laws and regulations. These boating laws and regulations will be posted at launching ramps, public use areas and the project office.

b. Mooring policy. - The mooring policy will be in accordance with the instructions presented in ER 1130-2-333 and SWDR 1130-2-7. In accordance with paragraph 17 of ER 1120-2-400 power boats should be accommodated in conjunction with the operation of any marina concession.

XII FIRE PROTECTION

XII - FIRE PROTECTION

12-01. General. - The primary responsibility for the preparation, administration, and implementation of the fire protection plan will be that of the reservoir manager and his staff. The fire protection plan should be prepared according to ER 1130-2-400. It should be finalized and submitted for approval by higher authority as soon as practicable, but no later than 3 years after the project becomes operational. The objectives of the plan are to prevent, detect, and suppress all fires that may occur on the project lands, or on adjacent lands from which they will spread to project lands.

12-02. Cooperative agreements. - This plan will include or provide for cooperative agreements with State, County, and local agencies for mutual assistance in fire detection and suppression, training of personnel, procedures in case of fire, and provision for necessary equipment and tools to be readily available for prompt suppression activities.

12-3. Training. A training program for field personnel will be established when the project becomes operational. This training program will cover methods of fire prevention, safety characteristics and behavior, methods of attack, use of hand tools, and use of power equipment.

12-04. Equipment. - Each Corps vehicle will carry fire tools at all times, with additional tools available at the project building. Power equipment specifically designed for suppression will be stored at the project building. All tools and equipment shall be checked and serviced at regular intervals to ensure serviceability.

12-05. Suppression and prevention. - A public information program will be initiated to aid in the detection and reporting of fires. News releases, signs, and other means will gain the support of the general public, and will give information on how and where to report fires. High fire danger periods are broadcast daily by the area radio stations. During these times Corps employees will periodically check high risk areas. The park manager will be responsible for the organization of firefighting crews. This will assure that every employee will have a specific duty during a fire. The place and telephone number for reporting fires during nonduty hours. The primary means of communication between park manager and firefighting crews will be by radio. Hand-carried radios will be of assistance on large fires and on those fires not accessible to vehicular mounted radios. Fire prevention signs with information about fire safety and reporting fires will be placed at the entrance to public use areas. Additional signs throughout the areas at places such as water wells, picnicking and camping sites, and stenciled fire prevention slogans on refuse containers will assist in promoting fire prevention. Any leases or contracts for use of project lands will contain fire prevention and suppression clauses.

XIII PROJECT SAFETY PLAN

XIII - PROJECT SAFETY PLAN

13-01. General. - The objective in developing a project safety plan is to identify common hazards and unsafe conditions in the major phases of project operations in accordance with ER 1130-2-400. Application of the regulations is mandatory to all missions under the command of the Chief of Engineers.

13-02. Coordination. - A detailed project safety plan will be developed by the reservoir manager as soon as possible and will be added to the master plan as an appendix. It will be coordinated with the Texas Parks and Wildlife Department and the U.S. Coast Guard.

13-03. Implementation. - Project personnel will be instructed on a continuing basis regarding safe practices, safety equipment use, and safety requirements relating to employees and visitors. Specific safety requirements will be emphasized as they relate to office and shop facilities, public use structures, sanitary systems, potable water facilities, insect and poisonous plant control, and roads and trails. Emergency equipment and instructions for its use will be located for convenient and efficient use.

XIV LAKESHORE MANAGEMENT PLAN

XIV - LAKESHORE MANAGEMENT PLAN

It is the policy of the Corps of Engineers to manage and protect the shorelines of all lakes under its jurisdiction to properly establish and maintain acceptable fish and wildlife habitat, aesthetic quality and natural environmental conditions and to promote the safe and healthful use of these shorelines for recreational purposes by all of the American people.

A Lakeshore Management Plan is not required for new Corps lakes such as Ray Roberts, however it is Corps policy that private exclusive uses will not be permitted on new lakes. Boat owners will be encouraged to moor their boats at commercial marinas, utilize dry storage facilities off project lands or trailer their boats to public launching ramps which are provided by the Corps.

XV FISH AND WILDLIFE, VEGETATIVE MANAGEMENT PLAN

XV - FISH AND WILDLIFE, VEGETATIVE MANAGEMENT PLAN

15-01. General. The intent of this section is to present a conceptual plan for developing and managing fish and wildlife resources of the project. This plan will serve as a guide until more detailed management plans are developed. The broad objective of the fish and wild-life management plan is to conserve, maintain, or enhance fish and wildlife habitat on project lands in order to produce the greatest dividend for the benefit of the general public. Implementation of this plan will aid in achieving the goals of the Fish and Wildlife Coordination Act (PL 85-624).

15-02. Aministration of the Fish and Wildlife Management Plan. The Fort Worth District of the Corps of Engineers will assume the basic responsibility for developing and implementing a fish and wildlife management plan in consultation with the fish and wildlife agencies. The responsibility for managing resident fish and wildlife species is essentially that of the Texas Parks and Wildlife Department. The U.S. Fish and Wildlife Service also assumes a responsibility for management of those resources with particular emphasis on migratory bird species. In recognition of the above responsi-bilities. It is the Corps of Engineers policy to encourage these agencies to actively manage or participate in the management of fish and wildlife resources at this project.

15-03. Coordination with USFWS and TPWD. A summary of specific details of the State's 1982 recommendations are contained in Chapter VI (Coordination), of this Master Plan. Consideration has been given to each recommendation of the fish and wildlife agencies and some are proposed for implementation later in this Chapter. Various institutional constraints prevented incorporation of several of TPWD's recommendations into this master plan. Coordination will continue, however, during project construction and the Master Plan will be supplemented as necessary.

15-04. Fish and Wildlife Resources of the Project

a) Lands. - A total of 43,606 acres would be acquired in fee title for project purposes. An additional 4,960 acres which would be required for flowage easement will be acquired under the joint acquisition policy of the Department of Army and Interior for total project acquisition of 48,566. The conservation pool at elevation 632.5 would inundate 29,350 acres. About 325 acres would be required for the dam, spillway, roads, and project buildings. Lands specifically designated for recreation facilities development would total 4,645 acres. The remaining project lands, totaling 14,246 acres, will be designated low-density recreation/ wildlife areas and will be made available for such pursuits. Additionally, 8,350 acres between the conservation pool (ele. 632.5 ft msl) and the summer pool (ele 621.0 ft msl) will be seasonally available for wildlife management and compatible low-density recreation. Plate XV-1 presents existing lands uses available for wildlife management and low-density recreation. The grassland/pasture consists primarily of bermudagrass pasture with very little native grasslands. The woodland category consists of both an upland post oak association and bottom-land wooded associations.

b) Waters. - Although the conservation pool is designed at surface elevation 632.5 with a surface area of 29,350 acres, actual

operation of the reservoir in system with Lewisville Lake would maintain a smaller pool. Average monthly and average annual pool elevations would be at about elevation 621.0 feet msl and less with a resulting pool surface area of about 21,000 acres - therefore, on the average, the lake fishery provided would be about 21,000 surface acres. The conservation pool of 29,350 acres would be reached about once in five years.

In addition to the surface acreage provided by the reservoir, Ray Roberts Lake has the potential to provide an excellent stream fishery. Facilities development along the Elm Fork downstream of the dam will provide fisherman access to about eight miles of flowing stream within the Elm Fork Channel. Hydropower and water supply releases will average greater than 130 cfs and the local sponsors have assured that a maintenance low-flow will be provided when releases are not being made for other purposes. The combined effect of high average flows, guaranteed maintenance flows, and good fisherman access should assure an excellent stream fishery.

15-05. Wildlife Management Plan.

a) General. The primary objective of the wildlife management plan is to make desirable species more available for human use whether it is for study, esthetics, hunting, or photography. This objective will be met by protecting existing habitat, improving low quality habitat, and developing new habitat. All project lands mentioned above which are not within specific park areas are available for wildlife management. The wildlife management plan will be oriented towards the principal wildlife species indigenous to the region. The principal game animals occurring on project lands include bobwhite quail, mourning dove, fox squirrel, cottontail, raccoon, and waterfowl. The following management measures will be used in implementation of the wildlife management plan.

b) Woody Plantings. - The wildlife management plan will be oriented primarily toward the principal wildlife species indigenous to be region. The principle sporting animals occurring on project lands include bobwhite quail, mourning dove, fox squirrel, cottontail, and raccoon. With management measures directed toward those species the habitat potential for numerous non-game animals will also be improved.

The original woody cover of the transition areas between the bottomlands and uplands has been greatly altered within the project area. Broad, flat expanses of what was formerly diverse transitional woodlands between the pecan/elm bottoms and the post oak uplands is now in primarily bermuda pasture. In order to increase the diversity of food and cover for native wildlife species some woody planting will be made in the edge between existing pastures and upland post oak communities. Such plantings will not only serve to diversify food and cover over the short term, they will also accelerate successional return of the ecotone between habitat types. The plots of woody plantings will be relatively small but will be located in a number of areas within the the project lands.

Woody plantings will help to increase the carrying capacity of project lands to accommodate wildlife species displaced by inundation. After establishment,(2 to 3 years) little to no maintenance should be required. Over the project life these plantings should serve as a seed source to

diversify the edge between habitats and benefit all wildlife species which are dependent upon that interspersion. Costs of woody plantings will be a project expense since the plantings are considered necessary to assist in maintaining wildlife populations of the project area at present levels. Proposed locations for the plantings are displayed on Plate XV-2. With a total area of 100 acres, initial costs of the plantings are estimated at $32,000 for the plants and $600/acre for planting for a total of $92,000. All maintenance costs and supplemental planting costs will be the responsibility of the managing entity.

Plantings may be either in rows or motts of 1 to 10 acres depending upon soils, slope, and configuration of adjacent habitats. Preliminary cost estimates we based upon planting in association with food plot plantings described below. Slopes should not exceed 20% and plantings should be made between December and March prior to impoundment. Woody species recommended for planting are presented below.

WOODY PLANTINGS

Shrub Lespedeza	Lespedeza bicolor
Sassafras	Sassafras albidum
Flowering Dogwood	Cornus florida
Rough Leaf Dogwood	Cornus drummondii
Russian Olive	Elaeagnus angustifolia
Autumn Olive	Elaeagnus umbellata
Yaupon	Ilex vomitoria
Wild Plum	Prunus americana
Wild Cherry	Prunus virginiana
Skunkbush, Fiagrant Sumac	Rhus aromatica
Multiflora Rose	Rosa multiflora
Black locust	Robinia pseudoacacia

VINES

Virginia Creeper	Parthenocissus quinquefolia
Dewberry, Blackberry	Rubus spp.
Japanese Honeysuckle	Lonicera japonica
American Bittersweet	Celastrus scandens

c) Food Plots. - As is the case with the woody plantings, seeding and planting of forbs and grasses will be accomplished to protect and restore wildlife populations of the project area. Much of the project area at and above the conservation pool elevation of 632.5 is presently in bermuda pasture and is of low value to game species or wildlife in general. In order to increase the carrying capacity of at least a portion of these areas to accommodate wildlife displaced by inundation, plantings of grasses and forbs with high food value will be made. Such plantings will help to maintain wildlife populations of the project area at close to present levels and also provide hunting opportunities. Wildlife food plots will be oriented toward bobwhite quail and mourning dove but will benefit all wildlife. Proposed food plot locations are depicted on Plate XV-2 and are primarily in open bermuda pasture near the conservation pool or adjacent to existing woodlands. Species recommended for food plots are presented below.

WILDLIFE FOOD PLOTS

Leguminous Forbs

Partridge pea	Cassia fasciculata
Lespedezas (Sericea, Korean, Common)	Lespedeza spp.
Sweetclover	Melilotus spp.
Clovers (White, Crimson, Red)	Trifolium spp.

Other Forbs

Engelmann Daisy	Engelmannia pinnatifida
Sunflowers (Common, Maximilian)	Helianthus spp.

Grasses

Bluestem's (Big, Little)	Andropogon spp.
Kleingrass	Panicum coloratum
Switchgrass	Panicum virgatum
Dallisgrass	Paspalum dilatatum
Plains Bristlegrass	Setaria leucopila
Indiangrass	Sorghastrum nutans

Initial plantings of wildlife plots are considered to be a measure which will assist in maintaining wildlife populations at present levels and will therefore be a one-time project cost. Plantings of grasses will be in the spring months and legumes will be planted in the fall. Seeds will be either broadcast or drilled in alternating strips of grasses, forbs, and legumes. Each foodplot will be ½ to one acre in size for a total of 150 acres, and grouped at intervals within grass plantings in open portions of large bermuda pastures. Initial planting, in addition to providing food and cover, will provide a seed source for the adjacent pasture lands. Initial cost of establishing food plots and grass plantings on a total of 1,000 acres is estimated at $500,000. This total cost includes, seed, fertilizer, plowing, disking, and labor. There could be a recurring annual cost to the managing entity, however, if they elect to diversify the plots with annuals (crops) of value to wildlife. Potential crops of value to the wildlife food plots are presented below.

Cultivated Crops

Oats	Avena sativa
Barley	Hordeum vulgare
Proso Millet	Panicum miliaceum
Milo, grain sorghum	Sorghum vulgare
Corn	Zea mays
Wheat	Triticum aestivum
Browntop Millet	Brachiaria ramosa

d) Other Wildlife Management Measures. - The primary management measure on project lands, other than parks or lands needed for other project purposes, will be to protect and maintain existing habitat. The majority of higher value habitats now occurs in and adjacent to upland woods and adjacent to streams subject to frequent overflow, and along fence

rows. These areas will serve as the framework for the habitat improvement program. Existing woody cover will also be preserved around removed buildings and farm ponds. The vegetative resource will be protected from vehicular traffic and unauthorized grazing by means of perimeter fencing and vehicle control barriers at access points.

There are certain areas where large expanses of bermuda pasture will be the dominant habitat type on project lands above the conservation pool. In order to accelerate natural succession and increase wildlife diversity of those areas, initial strip disking will be accomplished at irregular intervals. Disking will allow for establishment of native grasses and forbs from adjacent seed sources. Such disking need not be extensive to achieve an initial increase in diversity of the bermuda pastures and to speed the succession toward native grasses.

It is anticipated that vegetative management measures will be required in the future on areas that will revert to native grasses to reduce thatch buildup, restore grass vigor, and open areas to improve wildlife habitat. Planning for a future grazing program through use of short-term leases should be undertaken by the managing entity. A grazing program may require the gradual establishment of cross fences to set up feasible grazing allotments. Such cross fencing could also serve to facilitate a hunting management program.

In conjunction with or as an alternative to a grazing program, a rotational plan on selected areas for disking and prescribed burning should be established to provide reestablishment of preclimax grasses and forbs for wildlife use that otherwise would be crowded out under controlled conditions. Only areas with deep soils and less than 1 percent slopes should be disked and only as necessary to provide benefits to wildlife. Strips at least 15 feet wide and following the contours should be disked every other year or in the third year. Strips that are not disked should be burned off when undesirable weeds accumulate or whenever grass densities and litter pose a fire hazard. All burns should be completed before March to prevent weakening established grasses and destroying new growth. Haying of permanent vegetation, where marketable, and removal of litter may also be used as a management tool. Fire break will also be maintained.

15.06 Recommended Fisheries Management Plan.

a) General. - The primary objective of the fisheries management plan is to develop and administer a fisheries program in such a manner as to conserve, maintain, and enhance the fishery resource. The Corps of Engineers can accomplish this objective by encouraging, assisting, and cooperating with the Texas Parks and Wildlife Department which has the responsibility for management of the game or sport fish fishery consisting of native species such as largemouth bass, white bass, crappie, and channel and flathead catfishes. Stockings and introductions of such species as the Florida strain of the largemouth bass, walleye, striped bass, white/striped bass, and forage fishes (primarily threadfin shad) are often used as management tools by the Texas Parks and Wildlife Department. Short of actual population manipulations, however, there are a number of management measures in which the Corps can provide active cooperation and assistance. These management measures are identified below.

b) Protection of Existing Habitat - Emphasis will be given to protection of existing habitat such a flooded trees and shrubs, shoreline grasses, and beneficial emergent aquatic vegetation. A clearing plan for the reservoir will be provided in a separate design memorandum which will be coordinated with the U. S. Fish and Wildlife Service and the Texas Parks and Wildlife Department. As input to this Master Plan, the State agency has provided their recommendation of areas to remain uncleared. The suggested limits of clearing are indicated on Table XV-2 with slightly more clearing than TPWD (Fisheries Division) recommended in order to allow for boater safety and access to developed park areas.

c) Artificial Habitat Construction - In those areas of the reservoir cleared for operations and safety reasons, vegetation will be used to create artificial habitats. Downed timber and brush will be lashed and anchored with cable at strategic locations within the cleared zone to provide fish shelters. These shelters or attractors will provide cover and a base of primary production for forage and predator species. Shelters will be constructed so that their highest points are at least five feet below the average summer drawdown elevation. Anchored buoys will be used to mark the structures for location by considered and included in the preparation of the clearing design memorandum as an alternative to burning or other disposal methods.

Over the life of the project it may be the desire of the Texas Parks and Wildlife Department to supplement the attractors that are constructed during clearing or to provide additional attractors. Although brush shelters are generally more effective in shallow waters, it will be necessary to place new shelters at depths above 15 to 25 feet below the 632.5 elevation due to frequent drawdowns. The Corps will provide assistance in siting and when possible, in placement of additional fish attractors.

d) Permanent Rearing Facilities - The Texas Parks and Wildlife Department has requested that the Corps construct permanent rearing facilities on project lands of major arms of the reservoir. Traditionally, construction of such facilities has been considered to constitute a lake fishery enhancement measure requiring Federal and local cost sharing. TPWD has additionally expressed a potential willingness to cost share on at least one permanent rearing facility if it were to be located within Isle duBois Park. No formal commitment or intent has yet been provided by the state.

An alternative to the enhancement cost sharing (separable fish and wildlife cost) of fishery rearing facilities is available. It is possible to create rearing facilities from borrow areas associated with other project purposes as a joint cost. The drawback of this option, however, is that it is dependent upon the requirements of other project features. There will be numerous road relocations associated with the project which will require fill material for approach ramps. There is the potential that some of the borrow areas for material will be located above the 632.5 elevation and that with minor modification, those areas could be converted to permanent fisheries rearing facilities. Design memorandums for road relocations are well underway and availability of suitable sites appears limited. Ideally, the borrow area should be above the 632.5 contour and of

such a size that it could impound approximately 20 surface acres with a fairly uniform depth and average depth of at least six feet. This configuration would allow for gravity flow to the lake through a conduit sufficiently large to drain the facilities within one week, preferably 3 to 5 days. Continued efforts will be made through preparation of detailed plans and specifications and construction of relocation roads to identify barrow areas suitable for conversion to permanent fisheries rearing facilities. Coordination will continue with the Texas Parks and Wildlife Department on their recommendation to convert existing SCS structures to permanent fisheries rearing facilities.

e) Other Fishery Management Measures. - It will be the policy of the Fort Worth District during real estate acquisition and project construction to leave all stock tanks intact for appropriate use by the Texas Parks and Wildlife Department. Water bodies that will be inundated by the conservation pool may be stocked and used as temporary rearing facilities prior to impoundment. Water bodies between the conservation pool and the summer pool will also have the potential, although less reliable, to be used as temporary or quasi-permanent rearing facilities.

No special provisions will be made for seining areas because existing pastureland when inundated will be adequate for seining. Plate XV-1 indicates location of pasturelands adjacent to and continuing into the pool which will provide adequate seining areas. Certain of these areas will be marked prior to impoundment so that they may be located after impoundment. The Texas Parks and Wildlife Department may desire to clear seining areas in other selected areas prior to impoundment.

The Texas Parks and Wildlife Department in July 1982, requested that the Corps investigate the possibility of a minor design alteration of the outlet works to accommodate a fish hatchery below Ray Roberts Dam. The Department presently has a hatchery located below Lewisville Dam which is small, outdated, and expensive to operate. A new facility below Ray Roberts would require about 100 acres of project lands. With water rights or use already permitted, the State would assume all construction and operation costs of the new facility and would phase out the old facility. Coordination will continue in this regard.

Recommendations of the U. S. Fish and Wildlife Service in the past have included the recommendation that the Corps provide funding of a fishery study of Ray Roberts Lake. Considering the fact that the lake will have relatively large seasonal fluctuations with high spring and winter pools, with low summer pools, fisheries studies could be highly valuable in defining the effects of drawdowns as a management measure. Additionally, information gained from a lake fishery study would be invaluable to the Texas Parks and Wildlife Department in their operation and management of any permanent rearing facilities and the potential downstream hatchery. To these ends and in response to a 28 June 1982 letter from the Office of the Chief of Engineers stating that such studies are consistent with policy, funding will be budgeted by the Corps for a 10 year period beginning the first year after deliberate impoundment. A proposal for conduct of the study will be requested from the Inland Fisheries Division of the Texas Parks and Wildlife Department. If the State cannot conduct the study, proposals will be sought from Universities or consulting firms.

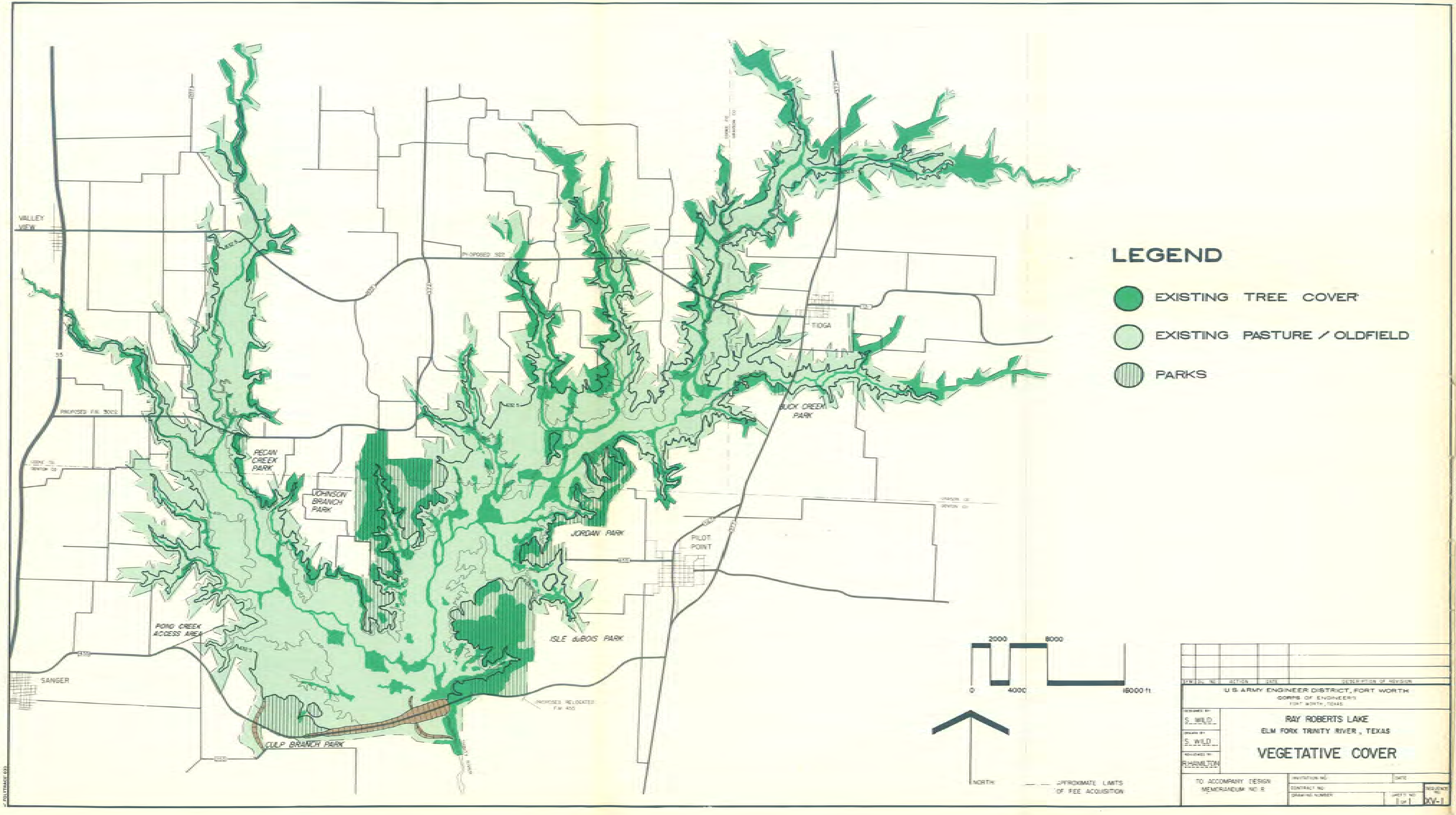
f) Downstream Fisheries. - The Elm Fork of the Trinity River under existing conditions provides a good stream fishery which is a recreational asset to the Dallas/Fort Worth Metroplex. With Ray Roberts Lake in place and with higher average releases for water supply purposes, the fishery stands to be greatly enhanced. Discharges averaging about 130 cfs and greater, with guarantees of minimum discharges during critical periods, should provide good habitat for sport species in the river, especially for species which make spawning runs such as white bass. Access provided by the facilities at the trailrace will enhance fisherman use of the stream resource. Additional stream fisheries enhancement could be obtained through a stocking program just below the dam. This could be easily realized if the fish hatchery proposed by the Texas Parks and Wildlife Department becomes a reality.

15-07 - Management by the Texas Parks and Wildlife Department.

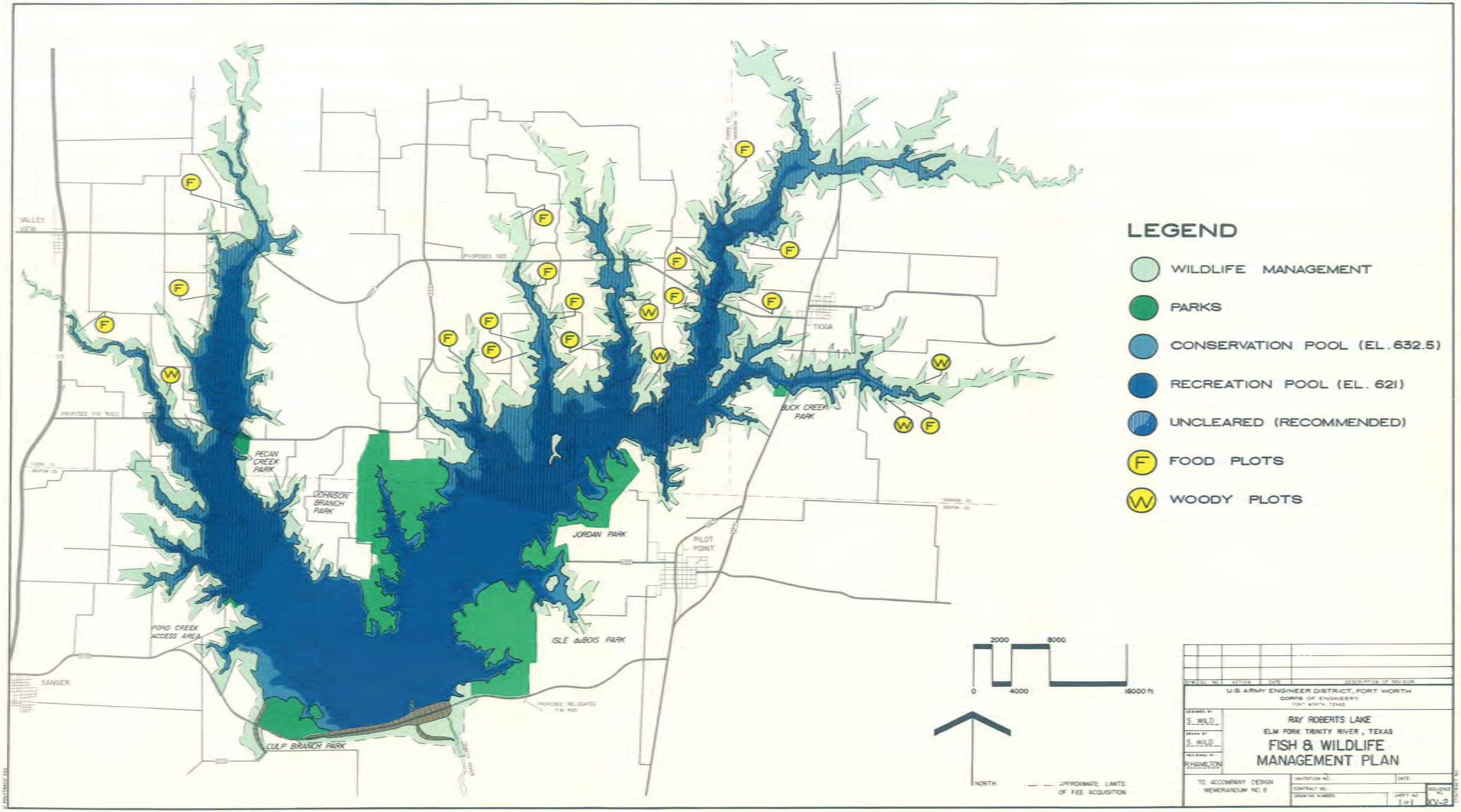
By letter dated June 7, 1982 the Texas Parks and Wildlife Department expressed its interest in assuming operational and maintenance responsibility for all project lands at Ray Roberts, exclusive of Corps' administration facilities. More specifically, the Department requested the transfer of all project lands to be managed for wildlife management through a General Plan and License Agreement separate from the Plan and License required for proposed Park facilities. It is the position of the Department that such an arrangement will allow greater flexibility in the management responsibilities of both the Parks and Wildlife Divisions. Strong support was also expressed by the Department for Corps consideration of their wildlife management recommendations including the creation of wetland areas.

Although the Texas Parks and Wildlife Department has formally expressed an interest in management of all wildlife lands at Ray Roberts Lake, approval of the Texas Parks and Wildlife Commission will be required prior to actual acceptance of responsibilities. Additionally, a General Plan and License must be prepared and approved by both agencies. Prior to preparation of the General Plan, the Department will prepare a Detailed Master Plan which presents the long range goals and objectives and general procedures to be employed by the Department in the management of wildlife lands and resources of the project. After approval of the General Plan and granting of the License the Department will, on a continuing basis, prepare an Annual Operation Report. The annual report of the State agency will present cost estimates, man-hour requirements, and detailed management recommendations which will be used for budgetary purposes and as an operational guide.

Continued efforts will be made during project construction to incorporate additional recommendations of the Texas Parks and Wildlife Department into the overall fish and wildlife management plan. Features which will continue to be evaluated and coordinated for potential cost sharing included creation of sub-impoundment type wetlands, conversion of existing SCS structures to permanent fisheries rearing facilities, and hatchery facilities downstream of Ray Roberts Dam. If institutional constraints to implementation of these features can be overcome, they will be included in a supplement to this Master Plan.



LEGEND
EXISTING TREE COVER
EXISTING PASTURE / OLDFIELD
PARKS
VALLEY VIEW
SANGER
TIOGA
PILOT POINT
PROPOSED 1922
PROPOSED F.M. 3002
PECAN CREEK PARK
JOHNSON BRANCH PARK
JORDAN PARK
BUCK CREEK PARK
ISLE duBOIS PARK
POND CREEK ACCESS AREA
CULP BRANCH PARK
PROPOSED RELOCATED F.M. 455
0
2000
4000
8000
16000 ft.
NORTH
APPROXIMATE LIMITS OF FEE ACQUISITION
ACTION
DATE
DESCRIPTION OF REVISION
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
S. WILD
S. WILD
R.HAMILTON
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS
VEGETATIVE COVER
TO ACCOMPANY DESIGN MEMORANDUM NO. 8
INVITATION NO.
DATE
CONTRACT NO.
DRAWING NUMBER
SHEET NO.
1 of 1
XV-1


LEGEND
WILDLIFE MANAGEMENT
PARKS
CONSERVATION POOL (EL. 632.5)
RECREATION POOL (EL. 621)
UNCLEARED (RECOMMENDED)
F FOOD PLOTS
W WOODY PLOTS
VALLEY VIEW
TIOGA
PILOT POINT
SANGER
PECAN CREEK PARK
JOHNSON BRANCH PARK
JORDAN PARK
BUCK CREEK PARK
POND CREEK ACCESS AREA
ISLE duBOIS PARK
CULP BRANCH PARK
PROPOSED S20
PROPOSED F.M. 3002
PROPOSED RELOCATED F.M. 455
2000
8000
0
4000
16000 ft
NORTH
APPROXIMATE LIMITS OF FEE ACQUISITION
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
RAY ROBERTS LAKE
ELM FORK TRINITY RIVER, TEXAS
FISH & WILDLIFE MANAGEMENT PLAN
S. WILD
S. WILD
R.HAMILTON
TO ACCOMPANY DESIGN MEMORANDUM NO 8
SHEET NO. 1 OF 1
SEQUENCE NO. 30V-2

XVI COST ESTIMATES

XVI - COST ESTIMATES

16-01. General.

Cost estimate. The estimated total cost for the construction of the proposed recreational facilities is $43,883,600 excluding engineering and design and supervision and administration. The recreational facilities will be constructed on a cost sharing basis as prescribed in Public Law 89-72. The cost estimates are based on 1982 price levels and from an abstract of bids for the construction of similar recreational facilities at other Corps of Engineers' lake projects. The estimated total costs for the proposed facilities are shown on Tables XVI-1, XVI-2, XVI-3, and XVI-4.

Comparison of Present Estimate of Cost With Latest Approved Estimate

A comparison of the present estimate of cost with the latest approved cost estimate (PB-3) for FY 82 effective 1 Oct is as follows: the increase in cost is due to higher price levels and changes in unit quantities.

Acct Nos.	Item	In Thousands of Dollars Total Development Current Est.	Latest Approved PB3	Difference
01	Project Lands (acquired for rec)	4,820.0	6,228.0	- 1,408.0
03	Clearing, revegetation, fencing	5,041.1	5,318.0	- 267.9
14	Recreation Development (initial)	22,553.8 1/	13,617.0	+ 9,128.7
30	Engineering & Design	1,872.0	1,180.0	+ 707.5
31	Supervision & Administration	1,646.4	1,104.0	+ 556.6
14	Recreation Development (future)	21,330.0 1/	8,662.0	+ 12,323
30	Engineering & Design	1,770.4	710.0	+ 1,031.3
31	Supervision & Administration	1,557.1	644.0	+ 887.4

Note:

1/ Includes Contingencies

TABLE XVI-1
SUMMARY OF COST ESTIMATES BY
COST ACCOUNT NUMBERS

FACILITIES AND DEVELOPMENT
(CORPS, DALLAS, DENTON & TEXAS PARKS AND WILDLIFE DEPT. (TPWD))

ACCT. NO.	INITIAL DEVELOPMENT	AMOUNT (x 1000)
01	Specific recreation lands (see Tables XVI-15 & 16)	4,802.0 1/
03	Clearing, fencing & revegetation (see Table XVI-14)	5,041.1 2/
14	Recreation development (see Table XVI-2)	22,553.8 2/ 3/
30	Engineering and design	1,872.0
31	Supervision and administration	1,646.4
	TOTAL	35,915.3
	FUTURE DEVELOPMENT	
14	Recreation development (see Table XVI-2)	21,330.0 2/
30	Engineering & design	1,770.4
31	Supervision & administration	1,557.1
	TOTAL	24,657.5
	INITIAL & FUTURE DEVELOPMENT	
01	Specific recreation lands	4,802.1 1/
03	Clearing & fencing	3,159.1
14	Recreation development	43,883.8 2/
30	Engineering & design	3,642.4
31	Supervision & administration	3,203.5
	TOTAL	58,690.9 2/ 3/
	HISTORICAL AND ARCHEOLOGICAL PRESERVATION	
18	Cultural resources preservation	928.0
30	Engineering & design	845.0
31	Supervision & administration	69.0
	TOTAL	1,842.0

NOTES
1 Includes relocation assistance & administration costs
2 Includes contingencies
3 Includes prelim. estimate of costs from TPWD.

TABLE XVI-2
RECREATION FACILITIES
(COST SHARING FACILITIES)

	ACCOUNT NUMBER			
INITIAL DEV.	14	30	31	TOTAL(x 1000)
Corps, Dallas & Denton	11,903.8	988.0	869.0	13,760.8
Corps & TPWD	10,650.0	884.0	777.5	12,311.5 2/
TOTAL	22,553.8 1/	1,872.0	1,646.5	26,072.3
FUTURE DEV.				
Corps, Dallas & Denton	15,036.8	1,248.1	1,097.7	17,382.6
Corps & TPWD	6,293.0	522.3	459.4	7,274.7 2/
TOTAL	21,329.8 1/	1,770.4	1,557.1	24,657.3 2/
INITIAL & FUTURE DEV.				
Corps, Dallas & Denton, TPWD				
TOTAL	43,883.6 1/	3,642.4	3,203.6	50,729.6

TABLE XVI-3
TPWD - ISLE duBOIS PARK
(INFORMATION FROM EXHIBIT NO. 1)

INITIAL DEV.	DEV. ELIGIBLE FOR FED. COST SHARING	NON-FED COSTS	TOTAL(x 1000)
Isle duBois Park	9,260.9	2,246.8	11,507.7
Contingencies	1,389.1	337.0	1,726.1
Engineering & design	884.0	214.5	1,098.4
Supervision & administration	777.5	188.6	966.1
TOTAL	12,311.5 2/	2,986.9 3/	15,298.3 2/
FUTURE DEVELOPMENT			
Isle duBois Park	5,472.1	3,963.0	9,435.1
Contingencies	820.8	594.4	1,415.2
Engineering & design	522.3	328.9	851.2
Supervision & administration	459.4	289.3	748.7
TOTAL	7,274.6 2/	5,175.6 3/	12,450.2 2/

NOTES

1 Includes contingencies

2 Preliminary estimate of cost for recreation facilities in Isle deBois, submitted by TPWD (see Exhibit No. 1 page XVI 25 for notes on cost estimate.)

3 See Exhibit No. 1 for non-Fed cost items.

TABLE XVI-4

SUMMARY OF ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATIONAL FACILITIES

Item	Unit	Initial Planned development		Future Planned development		Account 14 Total planned development	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile	10.8	2,214,000	8.7	1,783,500	19.5	3,997,500
b. Paved (new Secondary)	Mile	3.2	560,000	6.4	1,120,000	9.6	1,680,000
c. Gravel	Mile	0.1	13,000			0.1	13,000
2. Parking areas							
a. Paved (new)	S.Y.	26,710	333,888	60,190	752,380	86,900	1,086,268
b. Gravel	S.Y.	1,171	8,335	666	4,997	1,777	13,332
3. Boat launching sites							
a. Boat ramps (concrete)	Lanes	20	710,200	2	42,000	22	752,200
b. Turnarounds and trailer parking (paved)	S.Y.	9,910	123,875			9,910	123,875
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	11	539,000	1	49,000	12	588,000
b. Masonry double unit (waterborne)	Each	6	529,200	8	705,600	14	1,234,800
5. Water supply system							
a. Water wells (pressure type)	Each	1	40,000	1	40,000	2	80,000
b. Water connect to co-op line	L.F.	712	3,000	18,600	78,306	19,312	81,306
c. Waterline extension	L.F.	24,730	104,113	6,925	29,154	31,655	133,267
d. Drinking fountains	Each	10	10,000	22	22,000	32	32,000
6. Picnic and camping units							
a. Unit consists of one table, shelter fireplace, and trashcan.	Each	95	731,500	217	1,670,900	312	2,402,400
b. Picnic tables (without shelter)	Each	145	696,000	407	1,953,600	552	2,649,600
c. Screened shelter	Each	30	270,000	55	495,000	85	765,000
d. Primitive camp	Each	35	25,550	25	18,250	60	43,800

TABLE XVI-4 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
7. Group Shelters	Each	6	193,800	17	549,100	23	742,900
8. Site improvement							
a. Underbrushing and cleanup	L.S.	Job	102,400	Job	209,300	Job	311,700
b. Tree planting and seeding	L.S.	Job	499,100	Job	44,299	Job	543,399
9. Signs	L.S.	Job	26,200	Job	8,200	Job	34,400
10. Elec svc lines	L.S.	Job	343,550	Job	378,625	Job	722,175
11. Buoys	L.S.	Job	1,600	Job	1,200	Job	2,800
12. Beach improvement	L.S.	Job	80,000	Job	50,000	Job	130,000
13. Change shelter	Each	1	112,400	1	112,400	2	224,800
14. Sewerage absorption field	L.S.	Job	860,000	Job	860,000	Job	1,720,000
15. Foot bridges	Each	3	15,000			3	15,000
16. Service building (includes waterborne toilets, showers, and laundry facilities)	Each	3	357,000	13	1,547,000	16	1,904,000
17. Sanitary station	Each	2	9,000	1	4,500	3	13,500
18. Floating courtesy dock	Each	5	60,000			5	60,000
19. Trail							
a. Interpretative trail	Mile	2.3	10,450			2.3	10,450
b. Foot trail (4' wide)	Mile	10.7	48,150	1.5	6,750	13.9	54,900
20. Control station	Each	2	58,800	1	29,400	3	88,200
21. Control gate	Each	7	7,000			7	7,000

TABLE XVI-4 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
22. Miscellaneous							
a. Canoe launch	Each	1	12,500			1	12,500
b. Interpretive trail study	L.S.	Job	10,000			Job	10,000
c. Interpretive trail signage	L.S.	Job	2,500			Job	2,500
d. Softball & open play field	L.S.	Job	120,000			Job	120,000
e. Maintenance area	L.S.	Job	200,000	Job	200,000	Job	400,000
f. Headquarters complex	L.S.	Job	300,000	Job	300,000	Job	600,000
g. Playground	Each	Job	10,000	Job	10,000	Job	20,000
Subtotal			10,351,111		13,075,461		23,426,572
Contingencies			1,552,667		1,961,319		3,513,986
Subtotal			11,903,778		15,036,780		26,940,558
Engineering & design			988,014		1,248,052		2,236,066
Supervision & admin			868,976		1,097,685		1,966,661
TOTAL			13,760,768		17,382,517		31,143,285

TABLE XVI-5

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATIONAL FACILITIES
CULP BRANCH PARK

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
1. Roads							
a. Paved (new primary)	Mile	0.9	184,500	0.5	102,500	1.4	287,000
2. Parking areas							
a. Paved (new)	S.Y	1,333	16,666	444	5,555	1,777	22,221
3. Toilets							
a. Masonry double unit (waterborne)	Each	1	88,200			1	88,200
4. Water supply system							
a. Water connect to Co-op line	L.F.	Job	3,000			Job	3,000
b. Waterline extension	L.F.	4,700	19,787			4,700	19,787
c. Drinking fountains	Each	1	1,000			1	1,000
5. Picnic and camping units							
a. Unit consists of: one table, shelter fireplace, and trashcan.	Each	25	192,500	35	269,500	60	462,000
6. Group shelters	Each	1	32,300			1	32,300
7. Site improvement							
a. Underbrushing and cleanup	L.S.	Job	10,500	Job	7,500	Job	18,000
b. Tree planting and seeding	L.S.	Job	47,230			Job	47,230
8. Signs	L.S.	Job	3,300	Job	500	Job	3,800
9. Elec svc lines	L.S.	Job	46,200			Job	46,200
10. Sewerage absorption field	L.S.	Job	43,000			Job	43,000
1. Control station	Each	1	29,400			1	29,400

TABLE XVI-5 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
12. Control gate	Each	1	1,000			1	1,000
13. Miscellaneous							
a. Playground	L.S.	Job	10,000			1	10,000
Subtotal			728,583		385,555		1,114,138
Contingencies			109,287		57,833		167,120
Subtotal			837,870		443,388		1,281,258
Engineering & design			69,543		36,801		106,344
Supervision & admin			61,165		32,367		93,532
TOTAL			968,578		512,556		1,481,134

TABLE XVI-6

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)
POND CREEK ACCESS AREA

Item	Unit	Initial Planned development		Future Planned development		Account 14 Total planned development	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile	0.7	143,500			0.7	143,500
2. Boat launching sites							
a. Boat ramps	Lanes	4	84,000			4	84,000
b. Turnarounds and trailer parking (paved)	S.Y.	1982	24,775			1982	24,775
3. Toilets							
a. Masonry double unit (concrete vault type)	Each	1	49,000			1	49,000
4. Signs	L.S.	Job	500			Job	500
5. Floating courtesy dock	Each	1	12,000			1	12,000
6. Control gate	Each	1	1,000			1	1,000
Subtotal			314,775				314,775
Contingencies			47,216				47,216
Subtotal			361,991				361,991
Engineering & design			30,045				30,045
Supervision & admin			26,425				26,425
TOTAL			418,461				418,461

TABLE XVI-7

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)
PECAN CREEK PARK

Item	Unit	Initial Planned development		Future Planned development		Account 14 Total Planned development	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile	0.5	102,500	0.2	41,000	0.7	143,500
2. Parking areas							
a. Paved (new)	S.Y.			444	5,550	444	5,550
3. Boat launching sites							
a. Boat ramps	Lanes	4	112,000			4	112,000
b. Turnarounds and trailer parking (paved)	S.Y.	1982	24,775			1982	24,775
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	1	49,000			1	49,000
5. Water supply system							
a. Waterline extension	L.F.			600	2,526	600	2,526
b. Drinking fountains	Each			1	1,000	1	1,000
6. Picnic and camping units							
a. Picnic tables (without shelters)	Each			10	48,000	10	48,000
7. Site improvement							
a. Underbrushing and cleanup	L.S.			JOB	3,000	JOB	3,000
b. Tree planting and seeding	L.S.			JOB	7,700	JOB	7,700
8. Signs	L.S.	JOB	3,100			JOB	3,100
9. Elec svc lines	L.S.	JOB	4,750			JOB	4,750

TABLE XVI-7 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
10. Buoys	L.S.	JOB	400			JOB	400
11. Floating courtesy dock	Each	1	12,000			1	12,000
12. Control gate	Each	1	1,000			1	1,000
13. Miscellaneous							
a. Playground	L.S.			JOB	10,000	JOB	10,000
Subtotals			309,525		118,776		428,301
Contingencies			46,429		17,816		64,245
Subtotal			355,954		136,592		492,546
Engineering & design			29,544		11,337		40,881
Supervision & admin			25,985		9,971		35,956
TOTAL			411,483		157,900		569,383

TABLE XVI-8

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
JOHNSON BRANCH PARK

Item	Unit	Initial Planned development		Future Planned development		Account 14 Total Planned development	
		Quantity	Cost	Quantity	Cost	Quantity	Cost
1. Roads							
a. Paved (new primary)	Mile	6.2	1,271,000	2.3	471,500	8.5	1,742,500
b. Paved (new secondary)	Mile	3.2	560,000	3.3	577,500	6.5	1,137,500
c. Gravel	Mile	0.1	13,000			0.1	13,000
2. Parking areas							
a. Paved (new)	S.Y.	25,377	317,222	25,800	322,500	51,177	639,722
b. Gravel	S.Y.	788	5,835	333	2,500	1,111	8,335
3. Boat launching sites							
a. Boat ramps (concrete)	Lanes	4	351,800	2	42,000	6	393,800
b. Turnarounds & trailer parking (concrete)	S.Y.	1982	24,775			1982	24,775
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	6	294,000	1	49,000	7	343,000
b. Masonry double unit (waterborne)	Each	5	441,000	2	176,400	7	617,400
5. Water supply system							
a. Water wells (pressure type)	Each	1	40,000			1	40,000
b. Waterline extension	L.F.	20,030	84,326	6,325	26,628	26,355	110,954
c. Drinking fountains	Each	9	9,000	8	8,000	17	17,000
6. Picnic and camping units							
a. One unit consists of one table, one fireplace, & one trashcan.	Each	70	539,000	72	554,400	142	1,093,400
b. Picnic tables (without shelters)	Each	145	696,000	196	940,800	341	1,636,800
c. Screen shelters	Each	30	270,000			30	270,000
d. Primitive camping units	Each	35	25,550	25	18,250	60	43,800
7. Group shelters	Each	5	161,500	7	226,100	12	387,600

TABLE XVI-8 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
8. Site improvement							
a. Underbrushing & cleanup	L.S.	JOB	91,900	JOB	89,000	JOB	180,900
b. Tree planting & seeding	L.S.	JOB	451,870	JOB	20,079	JOB	471,949
9. Signs	L.S.	JOB	11,900	JOB	3,800	JOB	15,700
10. Elec svc lines	L.S.	JOB	286,650	JOB	213,725	JOB	500,375
11. Buoys	L.S.	JOB	1,200			JOB	1,200
12. Beach improvement	L.S.	JOB	80,000			JOB	80,000
13. Change shelter	Each	1	112,400			1	112,400
14. Sewerage	L.S.	JOB	817,000	JOB	301,000	JOB	1,118,000
15. Foot bridges	Each	3	15,000			3	15,000
16. Service building (includes waterborne toilets, showers, & laundry facilities)	Each	3	357,000	6	714,000	9	1,071,000
17. Sanitary station	Each	2	9,000			2	9,000
18. Floating courtesy dock	Each	1	12,000			1	12,000
19. Trails							
a. Interpretive trail	Mile	1.0	4,500			1.0	4,500
b. Foot trail (4' wide)	Mile	7.0	31,500	1.5	6,750	8.5	38,250
20. Control station	Each	1	29,400			2	2,000
21. Control gate	Each	2	2,000			2	2,000

TABLE XVI-8 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total planned development Quantity	Account 14 Total planned development Cost
22. Miscellaneous							
a. Interpretive study	L.S.	JOB	10,000			JOB	10,000
b. Interpretive signage	L.S.	JOB	10,000			JOB	10,000
c. Ball field & multi-use courts	L.S.	JOB	120,000			JOB	120,000
d. Maintenance area development	L.S.	JOB	200,000			JOB	200,000
e. Headquarters complex	L.S.	JOB	300,000			JOB	300,000
Subtotal			8,049,828		4,763,932		12,813,760
Contingencies			1,207,474		714,590		1,922,064
Subtotal			9,257,302		5,478,522		14,735,824
Engineering & design			768,356		454,717		1,223,073
Supervision & admin			675,783		399,932		1,075,715
TOTAL			10,701,441		6,333,171		17,034,612

TABLE XVI-9

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
BUCK CREEK PARK

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Roads							
a. Paved (new primary)	Mile	0.6	123,000			0.6	123,000
2. Parking areas							
a. Gravel	S.Y.			333	2,497	333	2,497
3. Boat launching sites							
a. Boat ramps (concrete)	Lanes	4	98,000			4	98,000
b. Turnarounds & trailer parking (paved)	S.Y.	1982	24,775			1982	245,775
4. Toilets							
a. Masonry double unit (concrete type vault)	Each	1	49,000			1	49,000
5. Picnic and camping units							
a. Picnic table (without shelter)	Each			6	28,800	6	28,800
6. Site improvement							
a. Underbrushing & cleanup	L.S.			JOB	1,800	JOB	1,800
b. Tree planting & seeding	L.S.			JOB	5,250	JOB	5,250
7. Signs	L.S.	JOB	3,100			JOB	3,100
8. Elec svc lines	L.S.	JOB	5,950			JOB	5,950
9. Floating courtesy dock	Each	1	12,000			1	12,000
10. Trails							
a. Foot trail (4' wide)	Mile	0.3	1,000			1	1,000
Subtotal			317,825		38,347		356,172
Contingencies			47,674		5,752		53,426
Subtotal			365,499		44,099		409,598
Engineering & design			30,336		3,660		33,996
Supervision & admin			26,681		3,219		29,900
TOTAL			422,516		50,978		473,494

TABLE XVI-10

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
JORDAN PARK

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Roads							
a. Paved (new primary)	Mile	1.9	389,500	5.7	1,168,500	7.6	1,558,000
b. Paved (new secondary)	Mile			3.1	542,500	3.1	542,500
2. Parking areas							
a. Paved (new)	S.Y.			33,502	418,775	33,502	418,775
3. Boat launching sites							
a. Boat Lanes (concrete)	Lanes	4	64,400			4	64,400
b. Turnarounds & trailer parking (paved)	S.Y.	1982	24,775			1982	
4. Toilets							
a. Masonry double unit (concrete vault type)	Each	2	98,000			2	98,000
b. Masonry double unit (waterborne)	Each				529,200	6	529,200
5. Water supply system							
a. Water wells (pressure type)	Each				40,000	1	40,000
b. Water connect to Co-op line	L.F.			18,600	78,306	18,600	78,306
c. Drinking fountains	Each			13	13,000	13	13,000
6. Picnic and camping units							
a. Unit consists of table, shelter, fireplace and trash can	Each			110	847,000	110	847,000
b. Picnic tables (without shelter)	Each			195	936,000	195	936,000
c. Screened shelter				55	495,000	55	495,000
7. Group shelters	Each			10	323,000	10	323,000

TABLE XVI-10 (continued)

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
8. Site improvement							
a. Underbrushing and cleanup	L.S.			JOB	108,000	JOB	108,000
b. Tree planting and seeding	L.S.			JOB	11,270	JOB	11,720
9. Signs	L.S.	JOB	3,800	JOB	3,900	JOB	7,700
10. Elec svc lines	L.S.			JOB	164,900	JOB	164,900
11. Buoys	L.S.			JOB	1,200	JOB	1,200
12. Beach improvement	L.S.			JOB	50,000	JOB	50,000
13. Change shelter	Each			1	112,400	1	112,400
14. Sewerage absorption field	L.S.			JOB	559,000	JOB	559,000
15. Service building (includes waterborne toilets, showers, and laundry facilities)	Each			7	833,000	7	833,000
16. Sanitary station	Each			1	4,500	1	4,500
17. Floating courtesy dock	Each	1	12,000			1	12,000
18. Trails							
a. Equestrian trail	Mile	3.7	16,650			3.7	16,650
19. Control station	Each			1	29,400	1	29,400
20. Control gate	Each	1	1,000			1	1,000
21. Miscellaneous							
a. Maintenance area	L.S.			JOB	200,000	JOB	200,000
b. Headquarters complex	L.S.			JOB	300,000	JOB	300,000
Subtotal			610,125		7,768,851		8,378,976
Contingencies			9,152		1,165,328		1,256,846
Subtotal			619,277		8,934,179		9,635,822
Engineering & design			51,400		741,537		799,773
Supervision & admin			45,207		652,195		703,415
TOTAL			715,884		10,327,911		11,139,010

TABLE XVI-11

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
WOLF ISLAND

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Signs	L.S.	JOB	500			JOB	500
2. Trails							
a. Foot trail (4' wide)		1.1	4,950			1.1	4,950
Subtotal			5,450				5,450
Contingencies			800				800
Subtotal			6,250				6,250
Engineering & design			520				520
Supervision & admin			430				430
TOTAL			7,200				7,200

TABLE XVI-12

ESTIMATE OF COST
PUBLIC USE AND RESERVOIR DEVELOPMENT
(CORPS, DALLAS & DENTON)

RECREATION FACILITIES
CANOE LAUNCHING AREA

Item	Unit	Initial Planned development Quantity	Initial Planned development Cost	Future Planned development Quantity	Future Planned development Cost	Account 14 Total Planned development Quantity	Account 14 Total Planned development Cost
1. Parking areas							
a. Gravel		333	2,500			333	2,500
2. Miscellaneous							
a. Canoe launch	L.S.	1	12,500			1	12,500
Subtotal			15,000				15,000
Contingencies			2,250				2,250
Subtotal			17,250				17,250
Engineering & design			1,430				1,430
Supervision & admin			1,260				1,260
TOTAL			19,940				19,940

TABLE XVI-13

ANNUAL FUNDS REQUIRED
FOR OPERATION AND MAINTENANCE

NON-FEDERAL COST

Recreational Facilities

Operation and maintenance and replacement of facilities (includes contract cleanup, mowing, grading, and maintenance of roads, repair of structures, nature areas, etc.).
From DTO dated Oct 1982 $1,492,000

TABLE XVI-14

CLEARING, FENCING, REVEGETATION, EROSION CONTROL

Acct. No.		Cost
03	Clearing	$ 700,000
03	Fencing, perimeter of Government land (200 miles)	2,500,000
03	Revegetation	
	Woody plantings (100 acres)	92,000 1/
	Food plots (150 acres)	75,000 1/
	Grass plantings (850 acres)	425,000 1/
	Subtotal	3,792,000
	Contingencies (15%)	568,800
	Subtotal	4,360,800
	Engineering & design	361,946
	Supervision & admin	318,338
	Total	$ 5,041,084

1 Includes labor

TABLE XVI-15

STATE OF TEXAS
01 LANDS AND DAMAGES

Item	Amount
Lands and damages, including contingencies	$ 1,770,000
Relocation assistance	115,000
Administrative costs	35,000
TOTAL	$ 1,920,000

Note: Does not include indirect cost or overhead.

TABLE XVI-16

DALLAS AND DENTON
01 LANDS AND DAMAGES

Item	Amount
Lands and damages, including contingencies	$ 2,711,000
Relocation assistance	132,000
Administrative costs	39,000
TOTAL	$ 2,882,000

Note:

Does not include indirect cost or overhead

TABLE XVI-17

ESTIMATED SEPARABLE RECREATION COST
TEXAS PARKS AND WILDLIFE DEPARTMENT
(Jan 82 prices)

Acct No.	Feature	Initial Development	Future Development	Total
01	Land purchase (public use areas)	1,920,000 1/		1,920,000 1/
03	Reservoir (clearing public use areas)	200,000		200,000
14	Recreation facilities	10,650,000 2/	6,293,000	16,943,000 2/
30	Engineering and design	884,000	522,300	1,406,300
31	Supervision and administration	777,500	459,400	1,236,900
	Total recreation expenditures	14,431,500	7,274,700	21,706,200

I - PARTICIPATION IN DEVELOPMENT

	Percent	Initial Development	Future Development	Total
The Government	50	7,215,750	3,637,350	10,853,100
The State of Texas	50	7,215,750 3/	3,637,350	10,853,100 3/
Total	100	14,431,500	7,274,700	21,706,200

NOTES

1 Includes relocation assistance and administrative costs (see Table XVI-15).

2 Includes contingencies (see Table XVI-3).

3 To be reimbursed by the State of Texas.

TABLE XVI-18

ESTIMATED SEPARABLE RECREATION COST
CITIES OF DALLAS & DENTON
(1 Jan 82 prices)

Ray Roberts Lake

Acct No.	Feature	Initial Development	Future Development	Total
01	Land purchase (public use areas)	2,882,000[1]		2,882,000 1/
03	Reservoir (clearing public use areas)	500,000		500,000
14	Recreation facilities	11,903,800 2/	15,036,800	26,940,600 2/
30	Engineering and design	988,000	1,248,100	2,236,100
31	Supervision and administration	869,000	1,097,700	1,966,700
	Subtotal recreation expenditures	17,142,800	17,382,600	34,525,400

I - PARTICIPATION BY LOCAL INTERESTS IN TOTAL DEVELOPMENT

	Percent	Initial Development	Future Development	Total
City of Dallas, Texas	74	12,685,670	12,863,120	25,548,790
City of Denton, Texas	26	4,457,130	4,519,480	8,976,610

II - REIMBURSEMENT BY LOCAL INTERESTS -
50 PERCENT OF DEVELOPMENT IN WHICH THEY PARTICIPATE

	Percent	Initial Development	Future Development	Total
City of Dallas, Texas	50	6,342,835 3/	6,431,560	12,774,395 3/
City of Denton, Texas	50	2,228,565 3/	2,259,740	4,488,305 3/
Total (Dallas & Denton)	100	8,571,400	8,691,300	17,262,700
Government		8,571,400	8,691,300	17,262,700
TOTAL		17,142,800	17,382,600	34,525,400

NOTES

1 Includes relocation assistance and administrative costs (see Table XVI-16).
2 Includes contigencies (see Table XVI-2).
3 To be reimbursed by the project sponsor.

EXHIBIT NO. 1

RAY ROBERTS LAKE STATE PARK
ISLE duBOIS UNIT
INITIAL DEVELOPMENT
6/82

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COSTS	
A. HEADQUARTERS COMPLEX		
Entrance Portal	$ 18,100	
Main Park Road - 20'		
Information Signs	10,000	
To Boat Launch Area J - 3 miles	375,000	
To Day-Use Area N -1.2 miles	150,000	
Headquarters/Visitor Center	191,340	
Parking - 20 Cars		
5 Cars w/Trailers	25,000	
Fee Collection Booth	1,600	
Trail Access - 1.2 miles	28,512	
Utilities	54,580	
TOTAL - AREA A	$ 854,402	
B. PARK RESIDENCE		
Residence	84,789	
Road 12' - .10 miles	10,000	
Utilities	3,800	
TOTAL - AREA B	$ 98,589	Non Fed Cost
C. INTERPRETIVE AREA		
Parking - 12 Cars	5,424	
Trailhead	2,600	
Trail - 5'	11,250	
Utilities	2,000	
TOTAL - AREA C	$ 21,274	
D. MAINTENANCE COMPLEX		
Park Residence	84,789	Non Fed Cost
Service/Maintenance Facility	195,500	
Water Treatment System & Distribution System	502,000	
Wastewater Treatment System & Collection System	352,000	
Boat Storage (120 ± Boat)	650,000	Non Fed Cost
Trailer Dump (Duplex)	16,000	
Road - 18 - .3 miles	33,000	
Road - 12' - .2 miles	20,000	
Pasture Fencing	5,000	
Utilities	82,000	
TOTAL - AREA D	$ 1,940,289	

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COSTS
E. EQUESTRIAN CAMPING AREA	
30 Multi-Use (Sites) (100' OC) & Tethering Areas	163,560
1 Restroom - 4 showers	85,000
1 Group Shade Shelter	35,500
Road - 18' - .5 miles	55,000
Parking - 18 Cars	8,136
Trail Access - .5 miles	11,880
1 Playground	5,000
Utilities	60,000
Equestrian Trail (Markers) - 8 miles	8,000
Equestrian Staging Area	5,000
Day-Use Equestrian Staging Area (Overflow for Camping)	6,000
Parking - 20 cars w/horse trailers	49,500
1 Group Shelter	35,500
Utilities	3,000
TOTAL - AREA E	$ 531,076
F. MULTI-USE CAMPING AREA	
40 Multi-Use Sites (100' OC)	178,080
1 Restroom - 6 Showers	104,500
1 Group Shade Shelter	34,500
Road - 18' - .6 miles	66,000
Parking - 24 Cars	10,848
Trail Access - .7 miles	11,250
1 Playground	5,000
Utilities	38,000
TOTAL - AREA F	$ 448,178
G. WALK-IN CAMPING AREA	
15 Walk-in Sites (Table - Tent Pad - Grill)	20,700
15 Walk-in Sites (Tent Designation only)	4,500
Trailhead	2,600
Road - 18' - .10 miles	11,000
Parking - 25 Cars	11,300
- 10 Cars w/Trailers	8,250
Trail - 1.2 miles	10,000
Toilet Facilities (Clivus Multrum) Duplex	20,000
Utilities	10,000
TOTAL - AREA G	$ 98,350

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COSTS	
H. MULTI-USE CAMPING AREA		
70 Multi-Use Camping Sites (100' OC)	311,640	
2 Restrooms - 4 Showers	170,000	
2 Group Shade Shelters	71,000	
Road - 18' - .9 miles	99,000	
Parking - 38 Cars	17,176	
Trail Access - 1.2 miles	28,512	
2 Playgrounds	10,000	
2 Non-Developed Swimming Beaches	24,400	
Utilities	112,000	
TOTAL - AREA H	$ 843,728	
I. OVERLOOK		
Overlook Structure	38,000	
Parking - 16 Cars	7,232	
Trail - 5' - .3 miles	7,128	
Utilities	2,000	
TOTAL - AREA I	$ 54,360	
J. BOAT LAUNCH AREA		
6 Boat Ramp w/Docks & Channelization	180,000	
Fishing Jetty - 600 LF +	70,000	
Bait/Tackle Concession	45,000	Non Fed Cost
1 Comfort Station w/Rinse Showers	86,000	
1 Fish Cleaning Station	13,400	
Parking - 100 Cars w/Boat Trailers	118,500	
- 20 Cars	9,040	
- Driving Lands - 24'	99,999	
Trail Access - 5' - .3 miles	7,128	
Utilities	58,000	
TOTAL - AREA J	$ 687,067	
K. DAY-USE/SWIMMING BEACH AREA		
High Density		
Developed Swimming Beach	250,000	
180 Picnic Sites w/Shade Shelters	701,000	
2 Picnic Pavilions	88,880	
1 Comfort Station w/Concession & Rinsing Showers	101,000	
1 Comfort Station w/Rinse Showers	86,000	
1 Major Playground	20,000	
Road - 20' - .22 miles	27,500	
Parking - 280 Cars - 56 Cars w/Trailers or Buses	165,872	
- Driving Lanes - 24'	120,000	
Park Store - (Groceries, Rental, Gasoline, Bait, etc.)	160,000	Non Fed Cost

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COSTS	
K. DAY-USE/SWIMMING BEACH AREA (continued)		
Parking - 16 Cars, 3 Cars w/Trailers	30,000	
Bathhouse	137,500	
Trail Access - 5' - 1 mile	23,760	
Ball Field & Multi-Use Play Court	120,000	
Utilities	122,000	
TOTAL - AREA K	$ 2,150,512	
L. SCREENED SHELTER AREA		
40 Screened Shelter Sites (100' OC)	417,680	
1 Restroom - 6 Showers	104,500	
2 Group Shade Shelters	72,000	
1 Group Dining Pavilion	118,500	
1 Playground	5,000	
Road - 18' - .43 miles	47,300	
- 12' - .5 miles	50,000	
Parking - 30 Cars	13,560	
Trail Access - .6 miles	14,256	
Non-Developed Swimming Beach	15,000	
Utilities	100,000	
TOTAL - AREA L	$ 943,540	
M. CABIN AREA		
Cabins - 18-1 Bedroom	712,080	Non Fed Cost
- 10-2 Bedroom	485,880	Non Fed Cost
- 2-4 Bedroom	193,800	Non Fed Cost
2 Group Shade Shelters	72,000	
Road - 18' - .6 miles	66,000	
Road - 12' - .6 miles	60,000	
Parking - 80 Cars	36,160	
Playground	5,000	
Trail Access - 1.3 miles	30,888	
Non-Developed Swimming Beach	15,000	
Utilities	137,000	
TOTAL - AREA M	$ 1,813,808	

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COSTS
N. DAY-USE/BOAT RAMP AREA	
Medium Density	
20 Picnic Sites	39,000
1 Picnic Pavilion	37,000
1 Comfort Station w/Rinse Showers	86,000
1 Playground	8,000
Road - 18' - .15 miles	16,500
Parking - 46 Cars	20,792
Swimming Beach	15,000
Trail Access - 1.2 miles	28,512
4 Boat Ramps w/Docks & Channelization	125,000
Parking - 40 Cars w/Boat Trailers	33,000
- Driving Lanes - 24'	60,000
Overlook Structure	15,000
Parking - 16 Cars	7,232
Trail Access	3,000
1 Fish Cleaning Station	13,400
Utilities	57,000
TOTAL - AREA N	$ 564,436
MISCELLANEOUS	
Electrical Transmission	
U.G. Primary	85,000
Debris Removal	50,000
Boundary Markers	3,000
Road Barrier Gates	34,000
Shade Shelters (20% of Total Campsites)	60,000
Shoreline Stabilization	225,000
TOTAL - MISCELLANEOUS	$ 457,000
PRELIMINARY ESTIMATE CONSTRUCTION COST TOTAL - INITIAL DEVELOPMENT RAY ROBERTS LAKE STATE PARK - ISLE duBOIS UNIT	$11,507,649
NON-FEDERAL COST ITEMS	2,246,760
DEVELOPMENT TO BE COST SHARED	$ 9,260,889

RAY ROBERTS LAKE STATE PARK
ISLE duBOIS UNIT
FUTURE DEVELOPMENT
6/82

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COST	
A. HEADQUARTERS COMPLEX		
Late Arrival Parking - 10 Cars	$ 4,520	
- 15 Cars w/Trailers	12,375	
Road - 18' - .3 Miles	33,000	
Utilities	15,000	
TOTAL - AREA A	$ 64,895	
N. DAY-USE/BOAT RAMP AREA		
(Expanded Existing Facilities in Area N)		
80 Picnic Sites	311,500	
1 Picnic Pavilion	51,000	
1 Comfort Station w/Rinse Showers	86,000	
1 Playground	10,000	
Road - 18' - .6 Miles	66,000	
Parking -146 Cars	65,992	
Trail Access - .3 Miles	6,750	
Boat Ramp		
Expand Parking - 20 Cars w/Boat Trailers	16,500	
- Driving Lanes - 24'	30,000	
Utilities	85,000	
TOTAL - AREA N	$ 728,742	
O. GOLF COURSE COMPLEX		
Club House	250,000	
Maintenance & Storage Bldg.	150,000	
Golf Course - 18 Hole & Driving Range	1,600,000	
Parking - 110 Cars	49,720	
- Driving Lanes - 24'	80,000	
Subtotal	$ 2,129,720	Non Fed Cost
Lodge Complex Associated w/Club House		
50 Rooms w/Dining Facilities, etc.	1,500,000	
Swimming Pool	180,000	
Multi-Use Courts	45,000	
Parking - 75 Cars	33,900	
- 15 Cars w/Trailers or Buses	12,375	
- Driving Lanes - 24'	60,000	
Subtotal	$ 1,831,275	Non Fed Cost

PROPOSED FACILITIES BY AREA		PRELIMINARY ESTIMATED CONSTRUCTION COST
Lake Shore Improvements		
Dock Facilities - 40 Boats		$ 100,000
Swimming Beach		40,000
30 Picnic Sites		116,800
1 Picnic Pavilion		37,000
Playground		5,000
Utilities		250,000
	Subtotal	$ 548,800
	TOTAL - AREA O	$ 4,509,795
P. SCREENED SHELTER AREA		
40 Screened Shelter Sites (100' OC)		417,680
1 Restroom - 6 Showers		104,500
2 Group Shade Shelters		72,000
1 Playground		5,000
Road - 18' - .6 Miles		66,000
Parking - 30 Cars		13,560
Trail Access - .5 Miles		11,250
Utilities		100,000
	TOTAL - AREA P	$ 789,990
Q. MULTI-USE CAMPING AREA		
50 Multi-Use Sites (100'OC)		222,600
1 Restroom - 6 Showers		104,500
2 Group Shade Shelters		72,000
1 Playground		5,000
Road - 18' - .7 Miles		77,000
Parking - 30 Cars		13,560
Trail Access - .5 Miles		11,250
Utilities		52,000
	TOTAL - AREA Q	$ 557,910
R. DAY-USE AREA		
Medium Density		
100 Picnic Sites		389,450
1 Picnic Pavilion		51,000
2 Comfort Stations w/Rinse Showers		172,000
1 Playground		20,000
Road - 18' - .30 Miles		37,500
Parking - 130 Cars		58,760
- 20 Cars w/Trailers or Buses		16,500
- Driving Lanes - 24'		60,000
Swimming Beach		30,000
Trail Access - .6 Miles		13,500
Utilities		95,000
	TOTAL - AREA R	$ 943,710

PROPOSED FACILITIES BY AREA	PRELIMINARY ESTIMATED CONSTRUCTION COST
S. MULTI-USE CAMPING AREA	
70 Multi-Use Sites (100' OC)	$ 311,640
2 Restrooms - 4 Showers	170,000
2 Group Shade Shelters	71,000
Road - 18' - 1 Mile	110,000
Parking - 32 Cars	14,464
Trail Access - .5 Miles	11,250
2 Playgrounds	10,000
1 Non-Developed Swimming Beach	15,000
Utilities	112,000
TOTAL - AREA S	$ 825,354
T. MULTI-USE CAMPING AREA	
60 Multi-Use Sites (100' OC)	267,120
2 Restrooms - 4 Showers	170,000
2 Group Shade Shelters	71,000
Road - 18' - .9 Miles	99,000
Parking - 26 Cars	11,752
Trail Access - .6 Miles	13,500
2 Playgrounds	10,000
1 Non-Developed Swimming Beach	15,000
Utilities	98,000
TOTAL - AREA T	$ 755,372
U. WALK-IN CAMPING AREA	
15 Walk-In Sites (Table-Tent Pad-Grill)	20,700
15 Walk-In Sites (Tent Designation Only)	4,500
Trail Head	2,600
Road - 18' -.10 Miles	11,000
Parking - 25 Cars	11,300
- 10 Cars w/Trailers	8,250
Trail - 1.6 Miles	38,016
Toilet Facilities (Clivus Multrum) 2-Duples	40,000
Utilities	10,000
TOTAL - AREA U	$ 146,366
MISCELLANEOUS	
Information Signs	6,000
Road Barrier Gates	17,000
Shade Shelters (20% of Total Campsites)	88,000
TOTAL - MISCELLANEOUS	$ 111,000
PRELIMINARY ESTIMATE CONSTRUCTION COST TOTAL - FUTURE DEVELOPMENT RAY ROBERTS LAKE STATE PARK - ISLE duBOIS UNIT	$ 9,433,134
NON-FEDERAL COST ITEMS	3,960,995
DEVELOPMENT TO BE COST SHARED	5,472,139

RAY ROBERTS LAKE STATE PARK
ISLE duBOIS UNIT
CONSTRUCTION COST SUMMARY
6/82

	PRELIMINARY ESTIMATED CONSTRUCTION COST
INITIAL DEVELOPMENT	$ 11,507,649
FUTURE DEVELOPMENT	4,925,339
GOLF COURSE COMPLEX	4,509,795
PROJECTED CONSTRUCTION COST	$ 20,940,783[1]
INITIAL TO BE COST SHARED	9,260,889
CONTINGENCIES	1,389,133
SUBTOTAL	$ 10,650,022
E&D	883,952
S&A	777,452
TOTAL INITIAL	$ 12,311,426
FUTURE TO BE COST SHARED	5,472,139
CONTINGENCIES	820,821
SUBTOTAL	$ 6,292,960
E&D	522,316
S&A	459,386
TOTAL FUTURE	$ 7,274,662
TOTAL INITIAL	12,311,426
TOTAL DEVELOPMENT ELIGIBLE FOR COST SHARING	$ 19,586,088

NOTES

1 Does not include contingecies, engineering & design, supervision and administration.

XVII CONCLUSIONS AND RECOMENDATIONS

XVII - CONCLUSIONS AND RECOMMENDATIONS

17-01.- Conclusions.

a. It is believed that by implementing this master plan, the natural and created resources of the project can be maintained and adequately developed to meet the project's optimum usage within the scope of the authorized purposes.

b. It is believed that this master plan is in compliance with the Corps resource management of objectives of providing a planned development program which will provide continued enjoyment and maximum sustained use by the public of the lands, water, and associated recreational resources consistent with their carrying capacity and their esthetic and biological values. The plan is flexible and will allow adjustments to be made in relation to future public needs.

17-02. Recommendations. It is recommended that the master plan for Ray Roberts Lake involving development for public use and land management by approved as proposed herein.