



Design Memorandum No. 11
Master Plan Update
For:

Sutton Lake

Elk River, West Virginia

FINAL

AUGUST, 1984



US Army Corps
of Engineers
Huntington District

CEORD-PD-R(CEORH-PD-R/14 Mar 89)(1105) 1st End Ms. Studer/3858
SUBJECT: Supplement No. 8, Design Memorandum No. 11, Master Plan,
Sutton Lake, Elk River, West Virginia

DA, Ohio River Division, Corps of Engineers, P.O. Box 1159,
Cincinnati, OH 45201-1159 26 April 1989

For Commander, Huntington District, ATTN: CEORH-PD-R

1. Based on ORD staff review and consultation between Ms. Hilda Studer, CEORD-PD-R, and Kevin Gross, CECW-ON, 25 Apr 89, the subject supplement is concurred in by both offices.
2. The following comments regarding the proposed rifle range pertain to the existing lease with the State.
 - a. The lease should be amended to specifically indicate that the State will be responsible for clean-up and decontamination of the site when it is no longer used for this purpose or when the lease expires or is terminated.
 - b. The lease should be examined to assure that provisions have been made for the State to provide liability insurance which will protect the U.S. in case of an accident or injury. Further, that the State has primary responsibility for the rifle range.

FOR THE COMMANDER:

Encl
nc


JIMMY F. BATES
Chief, Planning Division

CF: CECW-ON



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701-2070

REPLY TO
ATTENTION OF:

CEORH-PD-R

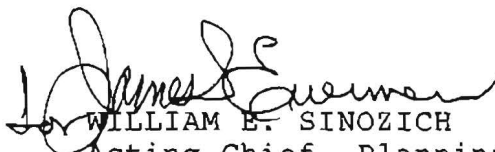
14 March 1989

MEMORANDUM FOR: Commander, Ohio River Division, ATTN: CEORD-PD-R

SUBJECT: Supplement No. 8, Design Memorandum No. 11, Master Plan, Sutton Lake, Elk River, West Virginia

Enclosed for your review for a 30-day period of optional comment is a copy of Supplement No. 8 in accordance with CECW-ON 1st Enc to the Letter Supplement to ER 1130-2-435, Preparation of Project Master Plans, dated 15 July 1988. This Supplement was approved at the District level on 1 September 1988 but was never transmitted to CEORD-PD-R or CECW-ON for the 30-day optional comment period.

Encl
as


WILLIAM E. SINOZICH

Acting Chief, Planning Division

cc: Commander, Headquarters
CECW-ON



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701

REPLY TO
ATTENTION OF:

CEORH-PD-R

1 SEP 1988

MEMORANDUM FOR: Commander, Huntington District

SUBJECT: Supplement No. 8, Design Memorandum No. 11, Master Plan Update, Sutton Lake, Elk River, West Virginia.

1. Authority:

a. ER 1130-2-435 dated 30 December 1987, subject: Preparation of Project Master Plans.

b. Letter, CEORD-PD-R, dated 15 July 1988, subject: Letter Supplement to ER 1130-2-435, Preparation of Project Master Plans.

2. The purpose of this Supplement is to request approval for the construction of a rifle range by the West Virginia Department of Natural Resources (WVDNR) to be located within the Elk River Public Hunting and Fishing Area. See enclosed map with site location. Costs for the construction and management would be borne by the WVDNR.

3. The site for the rifle range was selected by analyzing several possible locations. Consideration has been given to the topography of the area, appropriate safety zones, noise impacts on other areas, and construction costs. The selected site is located on the north side of Sutton Lake, in a cove area, about 800 feet from S.R. 15 (map enclosed). The south end of Sutton Airport is 900 feet north of the site. Noise produced by the facility would be mostly absorbed by the surrounding wooded hills. There are no residential areas nearby.

4. The proposed range will be constructed using the National Rifle Association guidelines for safety. A ridge behind the backstop area will contain any stray bullets or ricochets. An appropriate safety zone, with warning area, will be designated around the range.

CEORH-PD-R

SUBJECT: Supplement No. 8, Design Memorandum No. 11, Masster Plan Update,
Sutton Lake, Elk River, West Virginia

5. Construction of the range will consist of clearing and grubbing an area approximately 200 yards long and 50 yards wide for the shooting area. Improvements will be made to the existing access road including placement of 6 inches of stone surface. Six to eight shooting benches under a protective shelter will be constructed. Warning signs will be installed around the shooting range and safety zone. Disturbed areas will be reseeded with grass.


6. The range will be open to the public seven days a week from daylight until dark. It will not be supervised, but the Department of Natural Resources personnel will provide maintenance and trash pickup.

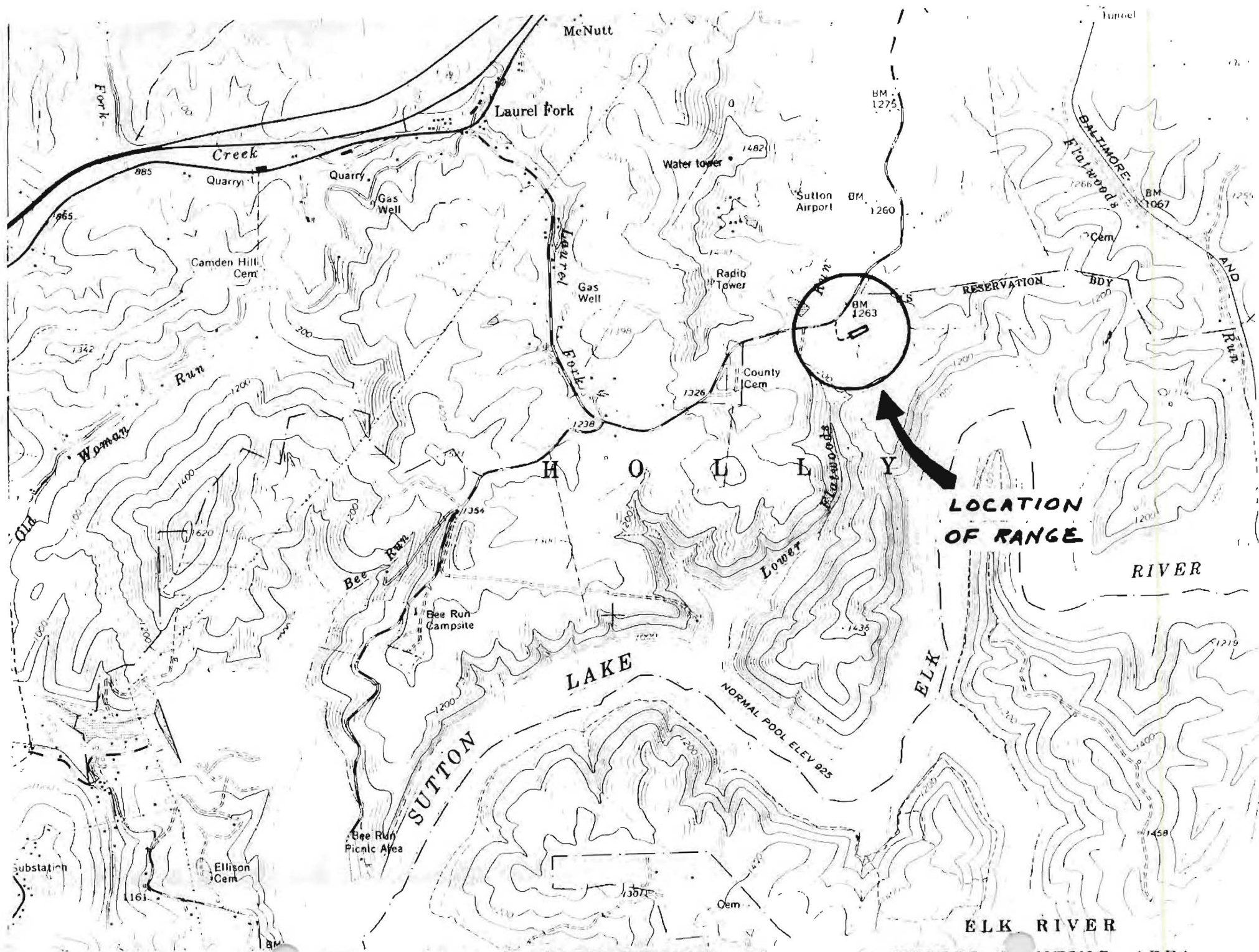
7. The proposed rifle range will promote safety for persons using the Elk River Hunting and Fishing Area by providing a developed area especially designed for shooters. Approval for the proposed rifle range is recommended.

Enclosure
as


WILLIAM E. SINOZICH
Acting Chief, Planning Division

APPROVED BY:


ROBERT D. BROWN, III
Colonel, Corps of Engineers
Commanding



SUTTON LAKE MASTER PLAN SUPPLEMENT NO. 8

PUBLIC MEETING AREA
AUGUST 1988

PD

CEORD-PD-R (CEORH-PD-R/29 Dec 87) (1105) 1st End Mr. Roth/pjh/684-3078
SUBJECT: Supplement No. 6, Design Memorandum No. 11, Master Plan Update,
Sutton Lake, Elk River, West Virginia

DA, Ohio River Division, Corps of Engineers, P.O. Box 1159, Cincinnati, OH
45201-1159 2 February 1988

FOR: Commander, Huntington District, ATTN: CEORH-PD-R

The proposed satellite marina facility for the subject project is approved.

FOR THE COMMANDER:

Encl wd

CF: CECW-ON

J E Steiner
JIMMY F. BATES
Chief, Planning Division





DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701-2070

REPLY TO
ATTENTION OF:

29 DEC 1987


CEORH-PD-R

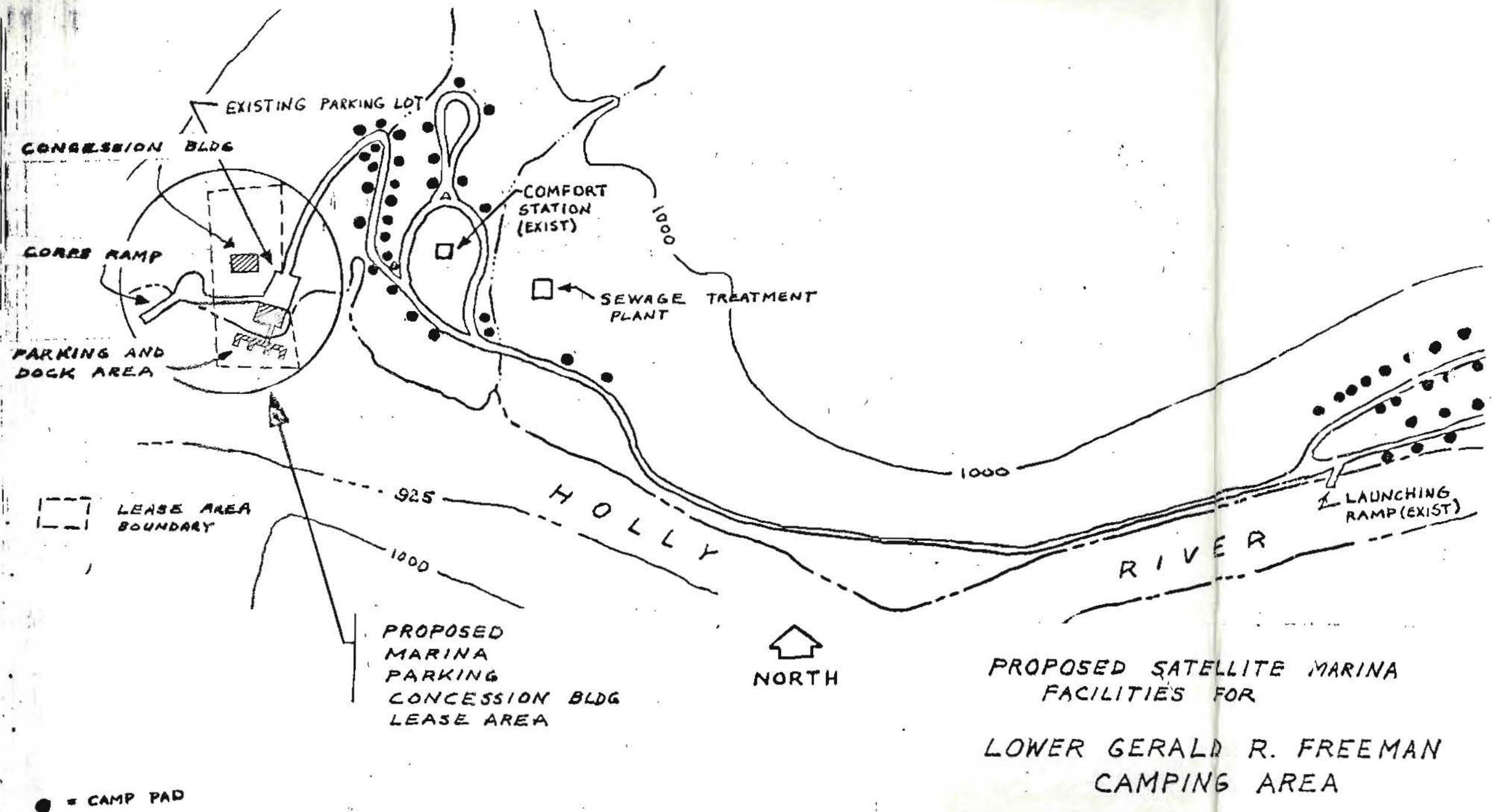
MEMORANDUM FOR: Cdr, USACE, Ohio River Division, ATTN: CEORD-PD-R, P.O. 1159, Cincinnati, OH 45201-1159

SUBJECT: Supplement No. 6, Design Memorandum No. 11, Master Plan Update, Sutton Lake, Elk River, West Virginia

1. Reference: enclosed site plan exhibit.
2. The purpose of this Supplement is to request approval for the construction of a small satellite marina and concession building to be located at the lower end of the Gerald R. Freeman Camping Area (formerly Kanawha Run). The owner of the Sutton Lake Marina which is located at Bee Run would build, maintain, and operate the additional marina which is permitted by the original concessionaire contract.
3. The lease area will consist of 3.6 acres of both land and water area located on the Holly River arm of the lake. In this area there will be a dock facility, 240-280 feet long, which will accommodate 20 boat rental slips for the use of campers or visiting boaters. An additional 12-space parking area adjacent to the Corps parking lot will be provided as well as a 24-foot by 32-foot concession building with a snack bar and game room. Several picnic units will be provided nearby. The Corps is presently building a launch ramp a short distance downstream, which was approved in Supplement No. 4, dated 2 April 1987.
4. The marina area will provide new boating, concession, and picnicking facilities not presently provided at the campground. The proposal would generate increased visitation and user fee revenues at the Freeman Camping Area which is located at a remote area of the project. Increased revenues would also be produced for the Marina concessionaire, enabling greater profits and improved marina services.
5. Approval for the proposed satellite marina facility is recommended.

Encl


ROBERT D. BROWN III, P.E.
Colonel, Corps of Engineers
Commanding



SCALE 1 INCH = 250 FT. APPROX.

SUTTON LAKE MASTER PLAN SUPPLEMENT NO. 6, DECEMBER 1967

GEORD-PD-R (CEORH-PD-R/11 Sep 87) (1105) 1st End

Mr. Roth/bb/684-3078

SUBJECT: Supplement No. 5, Design Memorandum No. 11, Master Plan Update,
Sutton Lake, Elk River, West Virginia


DA, Ohio River Division, Corps of Engineers, P.O. Box 1159, Cincinnati, OH
45201-1159 6 October 1987

FOR: Commander, Huntington District, ATTN: CEORH-PD-R

1. The proposed fishing pier is approved subject to the following comment.
2. Walking surfaces, guards and handrails should be designed to conform with the physically handicapped design criteria prescribed in EM-1110-1-103.

FOR THE COMMANDER:

Encl
nc


JIMMY F. BATES
Chief, Planning Division

CF CECW-OR (quint)



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701

REPLY TO
ATTENTION OF:
CEORH-PD-R

11 SEP 1987

MEMORANDUM FOR: Commander, Ohio River Division,
ATTN: CEORD-PD-R

SUBJECT: Supplement No. 5, Design Memorandum No. 11, Master Plan
Update, Sutton Lake, Elk River, West Virginia

1. Reference enclosed:

- a. Above Dam Area, Exhibit A.
- b. Side View of Fishing Pier, Exhibit B.
- c. Top View of Pier, Exhibit C.

2. The purpose of this Supplement is to request approval for the construction of a fishing pier on the south upstream abutment of the Sutton Dam. This popular day use area has an existing beach, paved parking, a 2-lane launch ramp, and picnic facilities. The pier will provide additional day use activities and will provide access to good fishing near the existing fish attractor (Exhibit A). A concrete ramp will be built parallel to the shoreline to provide handicap access to the pier. The materials for the pier will be donated by the local bass club and locally available scrap. Labor for the construction will be provided by members of the volunteer program.

3. The proposed fishing pier will be constructed by placing 5-inch or larger scrap steel well casing in the ground, embedded in concrete at 8-foot intervals to serve as support posts (Exhibit B and C). The posts will be braced by welding "X" braces made of scrap heavy gauge pipe. Saddles will be welded on top of each post and the deck frame will be bolted to the saddles. The decking will be treated 2-inch by 6-inch material 10 feet in length and will be installed diagonally. A wooden handrail and toe board will be constructed around the perimeter of the pier, on both sides of the steps, and along both sides of the ramp to comply with OSHA and handicap design standards. The pier will be constructed with bottom of the joints slightly above elevation 925 m.s.l. (upper limit of seasonal pool). All hardware will be galvanized and the steel uprights will be painted with rust inhibiting epoxy paint.

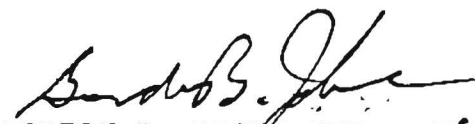
CEORH-PD-R

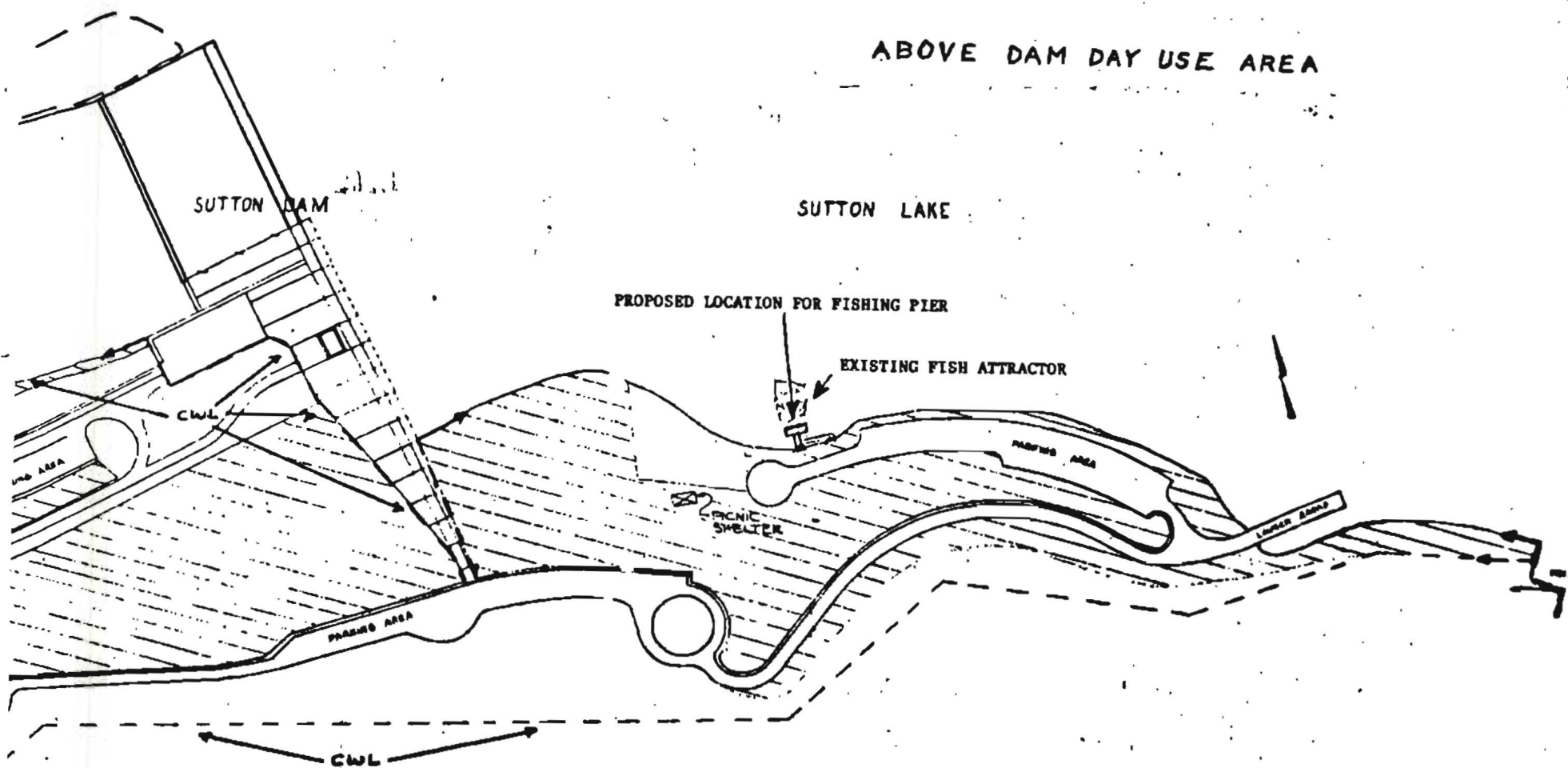
11 SEP 1987

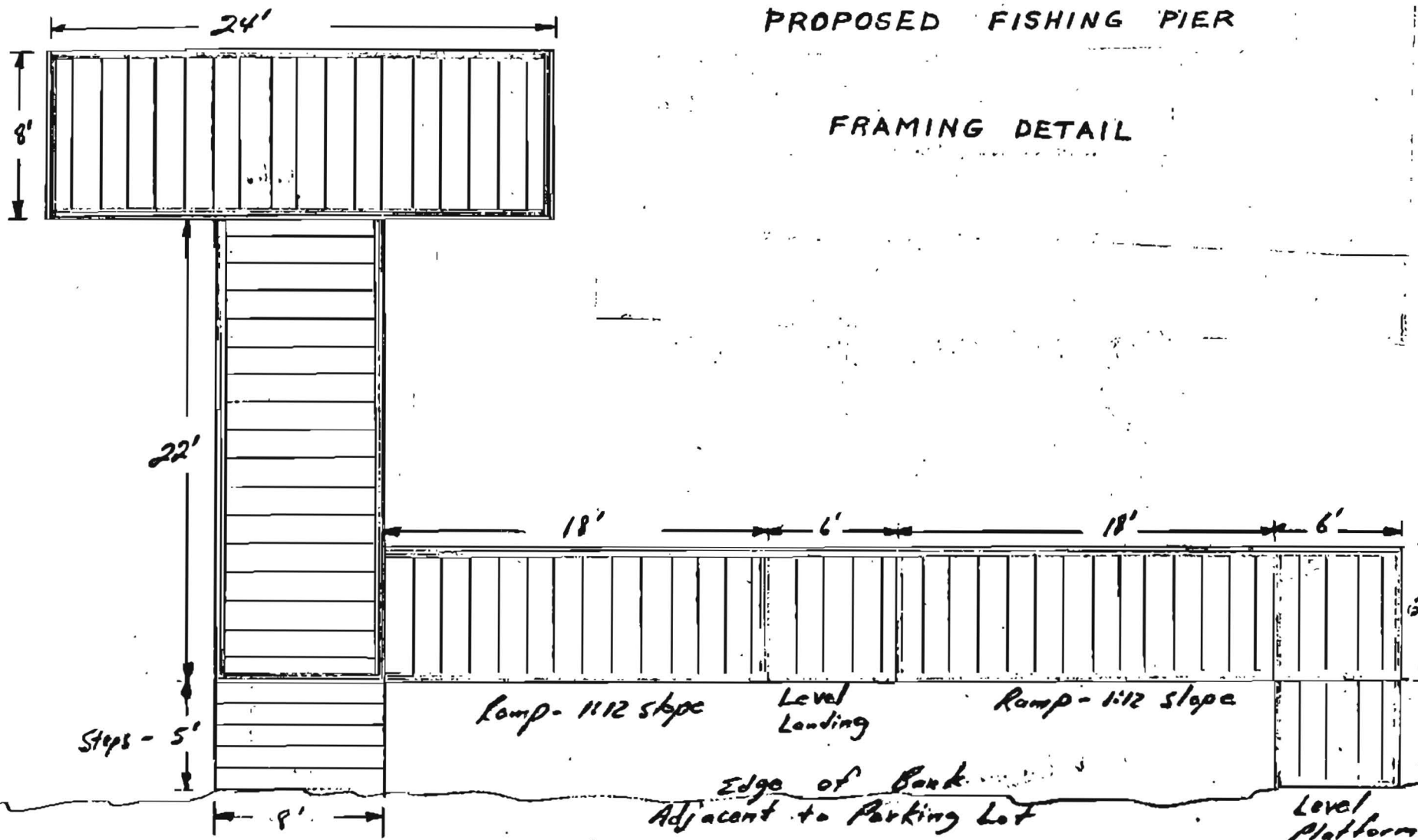
SUBJECT: Supplement No. 5, Design Memorandum No. 11, Master Plan Update, Sutton Lake, Elk River, West Virginia

4. The fishing pier is needed to provide the only handicapped access facility in the dam area, and would increase the safety of fishermen and the handicapped by providing stable footing as an alternative to the rip-raped bank area. The plans have been reviewed and approved by all appropriate district elements. Approval for the proposed fishing pier is recommended.

Encl

for 
ROBERT D. BROWN III *LTC, Acting*
Colonel, Corps of Engineers
Commanding

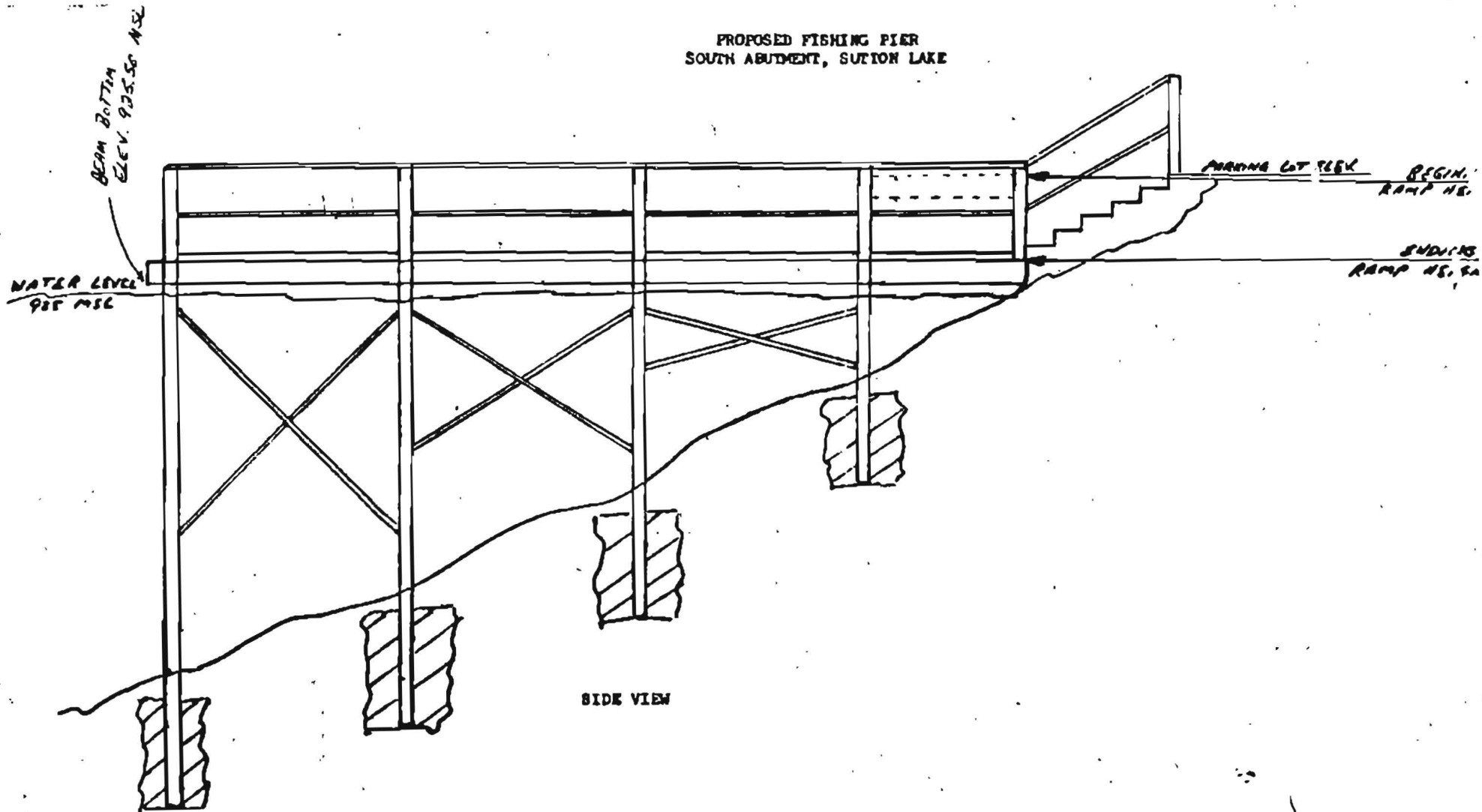




PROPOSED FISHING PIER

FRAMING DETAIL

PROPOSED FISHING PIER
SOUTH ABUTMENT, SUTTON LAKE



ORDPD-R (ORHPD-R/2 Apr 87) 1st End Mr. Roth/pjh/684-3078
SUBJECT: Supplement No. 4, Design Memorandum No. 11, Master Plan Update
Sutton Lake, Elk River, West Virginia

DA, Ohio River Division, Corps of Engineers, P.O. Box 1159, Cincinnati, OH
45201-1159 22 April 1987

TO: Commander, Huntington District, ATTN: ORHPD-R

The work proposed in the subject supplement is approved subject to the
comments in the enclosed review memorandum.

FOR THE COMMANDER:

2 Encl
Added 1 encl

CF: (quint)
DAEN-CWO-R


JIMMY F. BATES
Chief, Planning Division

Review Memorandum
Sutton Lake Master Plan Update
Supplement No. 4, DM No 11
Elk River, West Virginia

Design considerations contained in the basic letter should be consistent with those field tested design standards prescribed in EM 1110-2-410, Chapter 4, 31 December 1982, subject: Design of Recreation Areas and Facilities--Access and Circulation. Therefore, it is recommended that the following design changes be made prior to the construction of the additional launch ramp and associated facilities.

a. The lower limit of the ramp should be four feet below the 10 year drawdown.

b. The 57-foot long launching ramp should be 14 feet wide.

c. The circulation road should have an alignment that requires a definite turn at or just prior to its intersection with the ramp.

d. Warning signs should be used as appropriate. These signs should conform with the latest American National Standard Institute standards.



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701-2070

REPLY TO
ATTENTION OF:

ORHPD-R

2 APR 1967

SUBJECT: Supplement No. 4, Design Memorandum No. 11, Master Plan Update, Sutton Lake, Elk River, West Virginia

Commander, Ohio River Division
ATTN: ORDPD-R


1. Reference: enclosed site plan exhibit.
2. The purpose of this supplement is to request approval for the construction of an additional launch ramp to be located at the Gerald R. Freeman Campground on the Holly River branch of Sutton Lake.
3. Boat launching difficulties created by low lake water levels is a chronic problem at the Gerald R. Freeman Campground launch ramp. Low water periods typically coincide with peak visitation periods. The recurring nature of the situation has driven many campers and boaters away from this campground permanently. At the present launch ramp, a 2-foot drop in pool level from the buffer zone (elevation 922-925 feet) base elevation of 922 feet m.s.l. leaves the water too shallow for boat launching.
4. The proposed solution is to build a second launch ramp in considerably deeper water at the lower end of the campground, 2250 feet further downstream. A ramp in this location would permit boat launching down to elevation 917 feet m.s.l. or 5 feet below the base elevation of 922 feet. During normal water levels, both ramps could be used to accommodate boaters using the 158-site campground.
5. The launch ramp would be built with project personnel at a cost of approximately \$10,000, using SRUF funds. Dimensions of the 2-lane ramp would be 57 feet long, and 16 feet wide. A turnaround and roadway to the existing 12-space parking lot would also be provided.

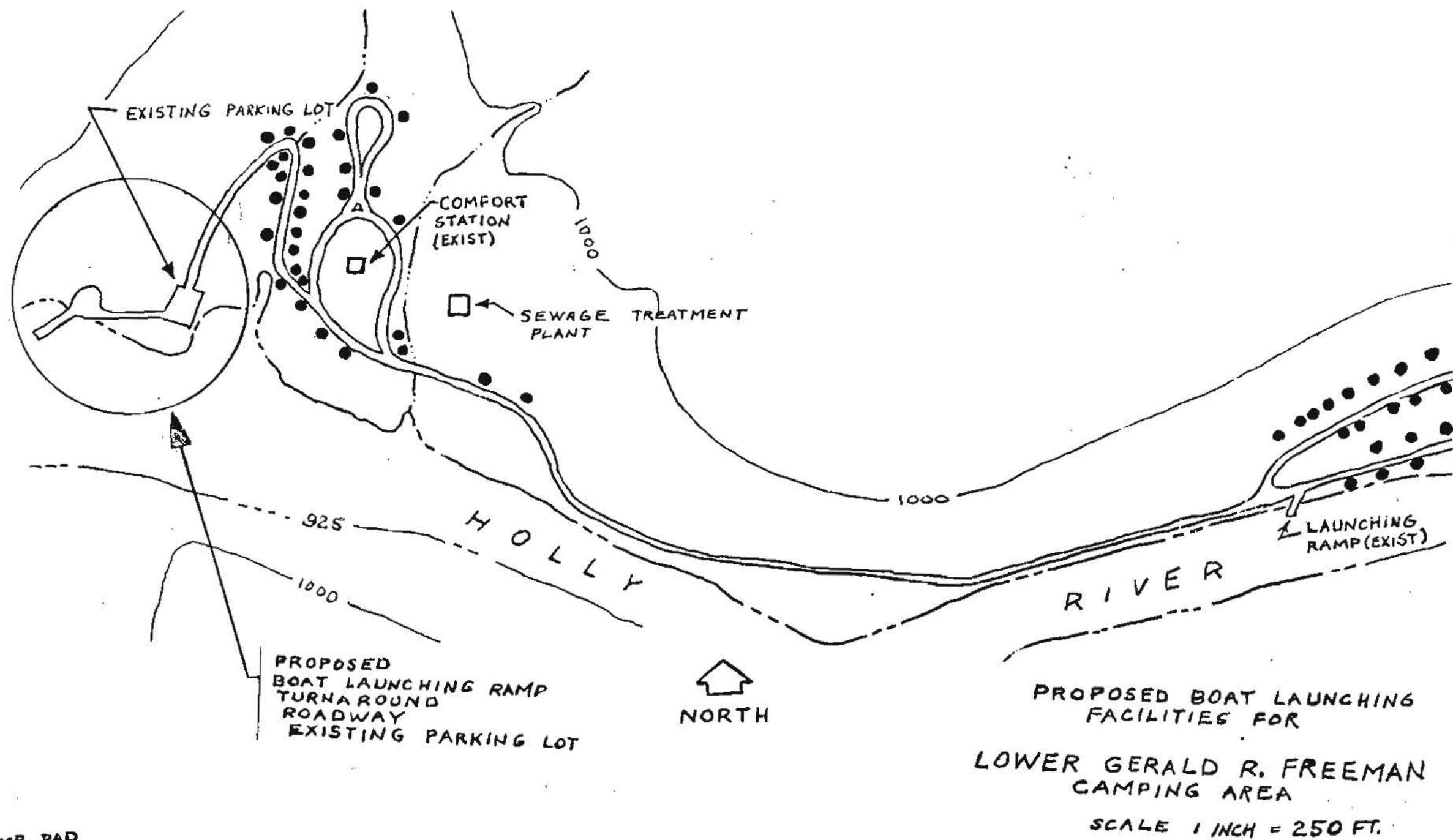
ORHPD-R

SUBJECT: Supplement No. 4, Design Memorandum No. 11, Master Plan
Update, Sutton Lake, Elk River, West Virginia

6. Construction of a second boat ramp would increase visitation to the campground, increase user fee collections, and improve operational efficiency. Approval for the proposed launch ramp is recommended so that construction can be completed before the 1987 recreation season.

Encl


ROBERT D. BROWN III
Colonel, Corps of Engineers
Commanding



ORDPD-R (ORHPD-R/13 Aug 86) 1st End
SUBJECT: Supplement No. 3, Design Memorandum No. 11, Master Plan Update,
Sutton Lake, Elk River, West Virginia

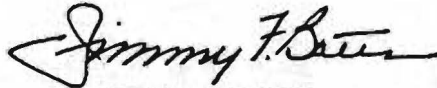
Mr. Roth/ga/684-3078

DA, Ohio River Division, Corps of Engineers, P.O. Box 1159, Cincinnati, OH
45201-1159 15 September 1986

TO: Commander, Huntington District, ATTN: ORHPD-R

The subject master plan supplement is approved.

FOR THE COMMANDER:



JIMMY F. BATES
Chief, Planning Division

wd all cys

CF:
DAEN-CWO-R



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701

REPLY TO
ATTENTION OF:

ORHPD-R

13 AUG 86

SUBJECT: Supplement No. 3, Design Memorandum No. 11, Master Plan
Update, Sutton Lake, Elk River, West Virginia

Commander, Ohio River Division
ATTN: ORDPD-R

1. References:

a. ORDR 1105-2-2, dated 6 May 1982, concerning facility
and/or land allocation changes.

b. Site plan view, Exhibit No. 1, enclosed.

c. Construction drawing, Exhibit No. 2, enclosed.

d. Typical cross section, Exhibit No. 3, enclosed.

2. The purpose of this Supplement is to request approval for the
construction of additional parking area for the users of dock
spaces at the Marina, located at Bee Run Day Use area.

3. The proposed parking lot would be constructed by the marina
owner at his own expense. At present, the marina concession has
140 dock spaces and the owner plans to request approval for the
addition of at least 60 spaces in 1987. Limited parking space
for dock space users is presently provided by a 200 x 70-foot
gravel surfaced lot adjacent to the marina. The proposed lot
will be of gravel surface, will extend the existing lot by 550
feet, and would maintain the 70-foot width for a total
construction area of about 1.25 acres. The new parking lot would
occupy unused land along the lake shore.

4. The construction would require fill on the lake side of up to
5 feet and a cut on the opposite side of about 10 feet to provide
a level surface. Cut and fill slopes would be 1.5 to 1 and
proper drainage would be provided. Elevation of the lot would be
at 938 feet, 16 feet above the seasonal pool level.

ORHPD-R

2 August 1986

SUBJECT: Supplement No. 3, Design Memorandum No. 11, Master Plan
Update, Sutton Lake, Elk River, West Virginia

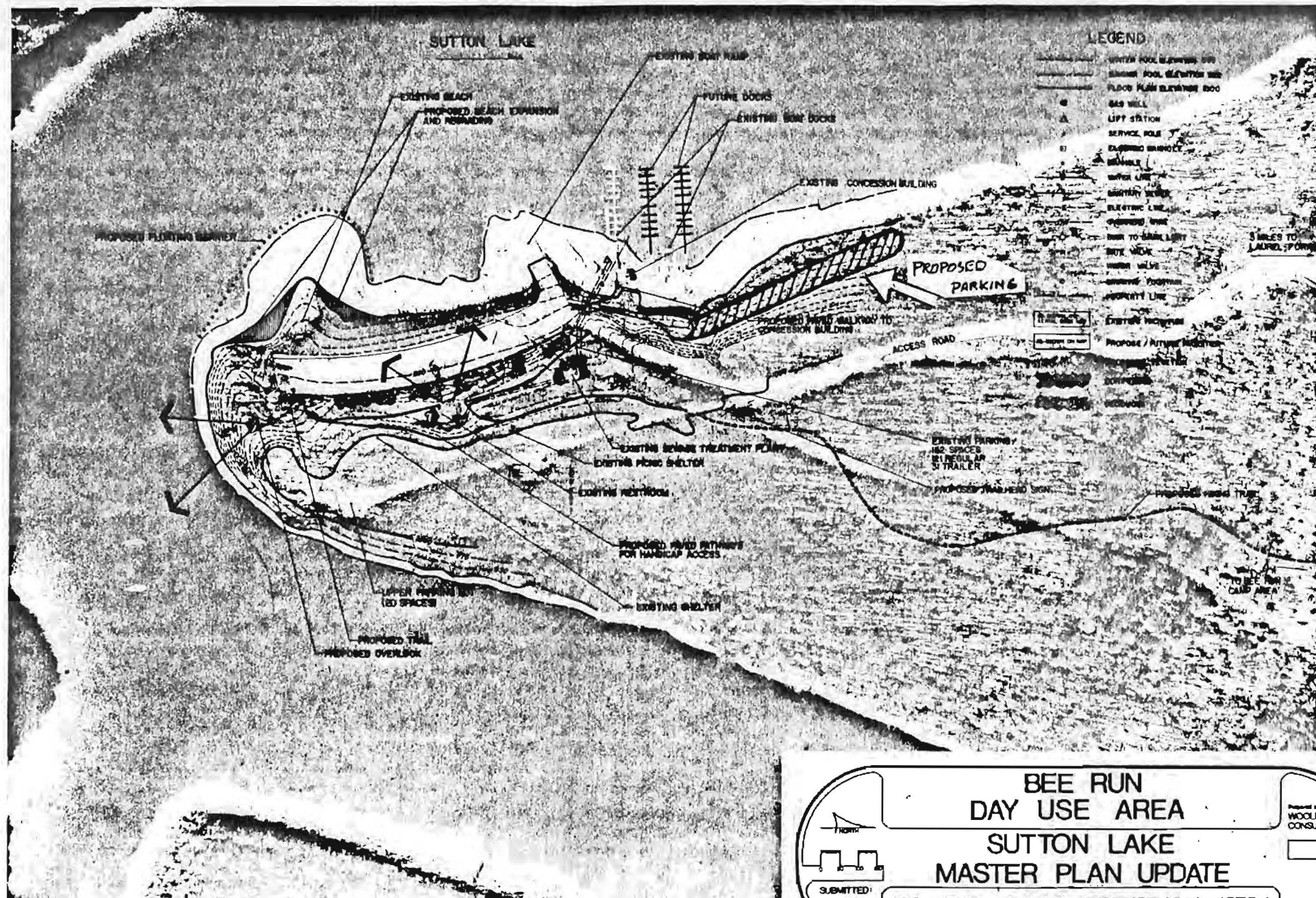
5. At present, the Bee Run paved parking lot of 152 spaces is being shared with day users and some of the dock space owners. The proposed lot would prevent overcrowding in the day use parking area which is primarily intended for boaters using the launch ramp, picnickers, and swimmers.

6. The parking lot plans have been reviewed by all appropriate District elements. Approval for the proposed additional parking is recommended.

3 Encl (8cys each)



ROBERT B. WILSON
Colonel, Corps of Engineers
Commanding



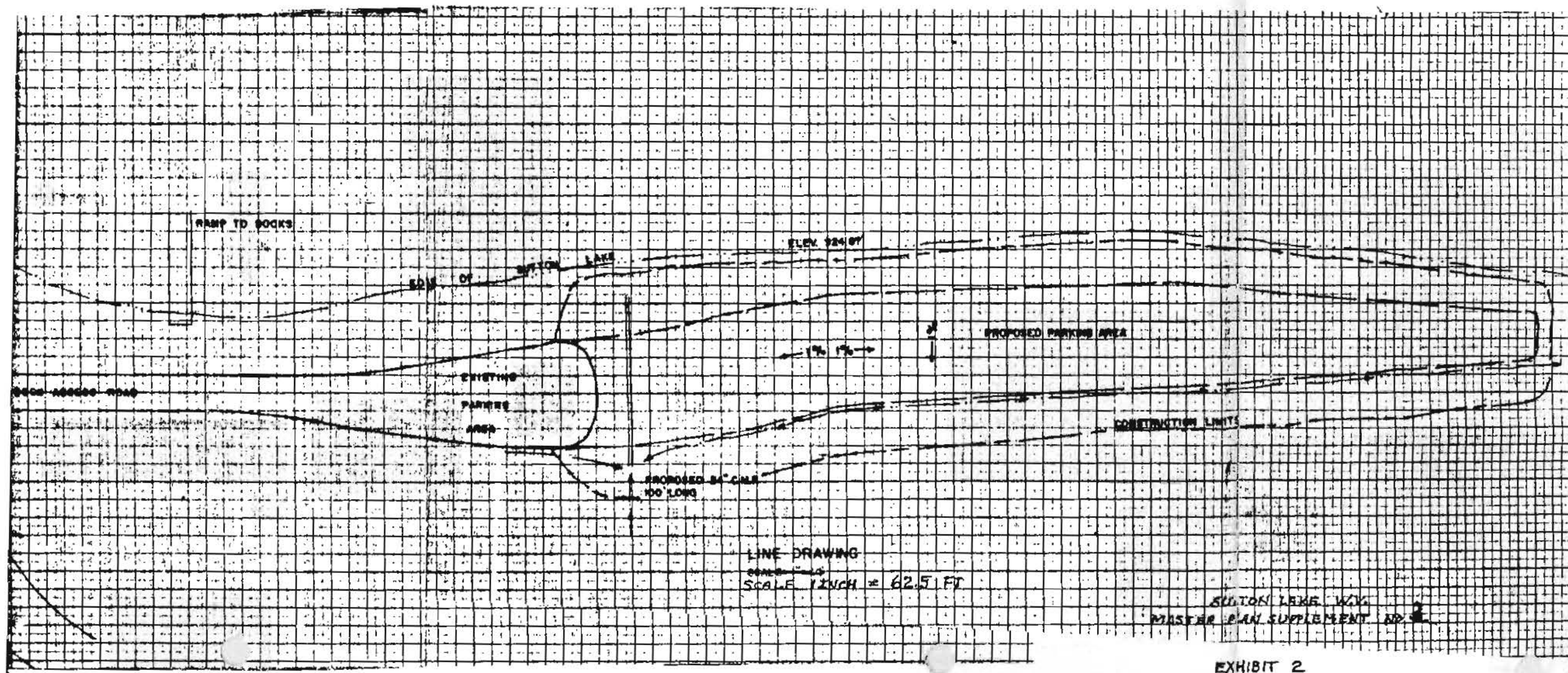
SUPPLEMENT NO. 3, AUGUST 1966

**BEE RUN
DAY USE AREA
SUTTON LAKE
MASTER PLAN UPDATE**

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by
WOOLPERT
CONSULTANTS

EXHIBIT NO.
I



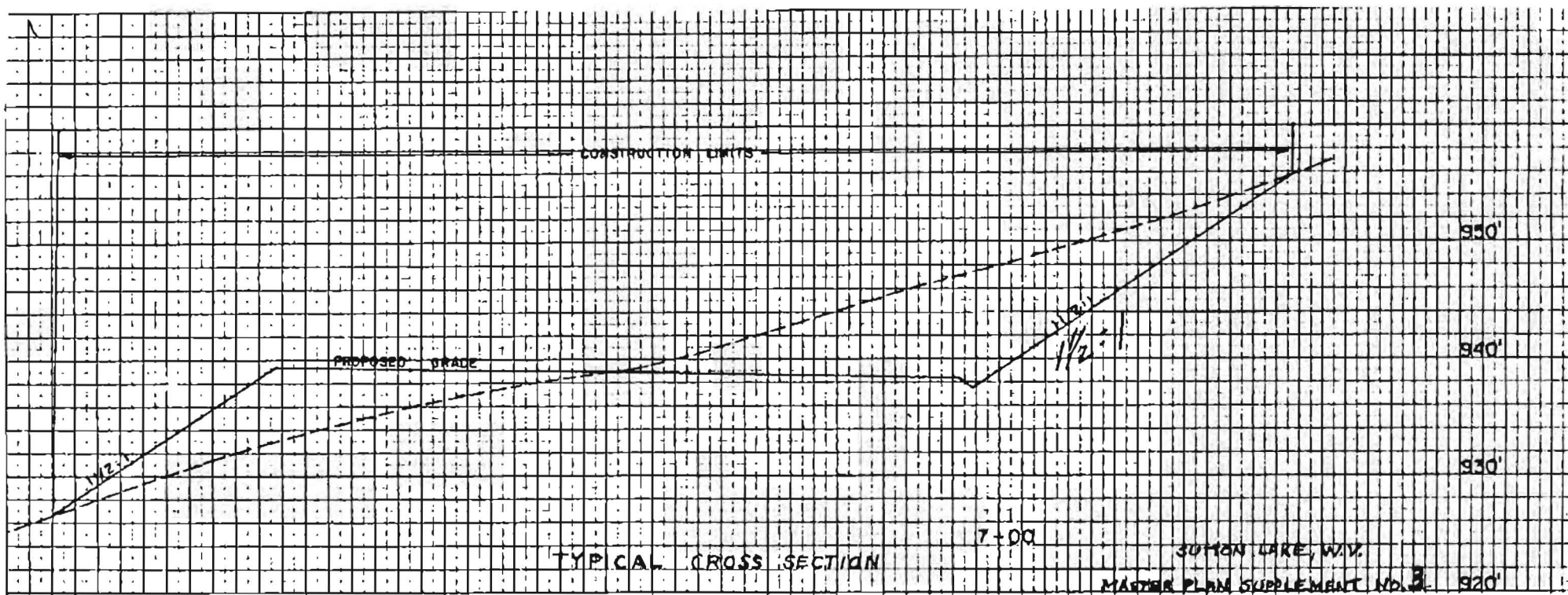


EXHIBIT 3



DEPARTMENT OF THE ARMY
HUNTINGTON DISTRICT, CORPS OF ENGINEERS
502 EIGHTH STREET
HUNTINGTON, WEST VIRGINIA 25701

REPLY TO
ATTENTION OF:
ORHPD-R

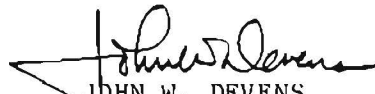
15 August 1984

SUBJECT: Design Memorandum 11, Updated Master Plan, Sutton Lake,
Elk River, West Virginia

Commander, Ohio River Division
ATTN: ORDPD-R

1. Inclosed for your review and approval are eight copies of Design Memorandum 11, Sutton Lake Master Plan Update, Elk River, West Virginia.
2. This document supersedes Design Memorandum 11, Master Land Use Plan, Sutton Reservoir, Elk River, West Virginia, dated January 1959, and its supplements. It has been prepared to guide the development, enhancement, and management of the project's recreational and fish and wildlife resources so as to provide maximum public use benefits within the bounds of appropriate Government responsibilities and authorities.
3. Population, visitation, and demand computations will be updated at the time specific construction is scheduled.
4. An Operational Management Plan, as authorized in ER 1130-2-400, will be prepared by the District's Operations Division when funds become available. This plan combines the former Project Resource Management Plan, Forest Management Plan, Fire Protection Plan, Fish and Wildlife Management Plan, Project Safety Plan and Lakeshore Management Plan.

1 Incl (8 copies)
as


JOHN W. DEVENS
Colonel, Corps of Engineers
Commanding

DESIGN MEMORANDUM NO. 11

MASTER PLAN UPDATE
FOR
SUTTON LAKE
ELK RIVER, WEST VIRGINIA

FINAL

AUGUST, 1984

This report prepared by:

WOOLPERT CONSULTANTS
2324 Stanley Avenue
Dayton, Ohio 45404

Under Contract No. DACW69-81-R-0055

SUTTON LAKE
ELK RIVER, WEST VIRGINIA

PREFACE

The most significant challenge facing the management of our natural resources in the years ahead will be the ability to successfully balance increasing recreational demands with ongoing environmental protection and conservation efforts. Public pressure on existing recreation facilities, especially those which are water-oriented, emphasizes the need for future outdoor recreational development to help disperse users over several locations and to satisfy potential project visitors. In addition, it becomes equally important to make optimum use of existing facilities within carefully defined resource constraints and management objectives.

This Master Plan Update is prepared as a guide to the continued development, enhancement, and management of Project lands under the authority of the Corps of Engineers at Sutton Lake. Every effort has been made to ensure that future recreational needs will be met within the natural and physical constraints afforded by the resource.

SUMMARY

It is the purpose of this Master Plan Update to review the current state of operations at Sutton Lake and to make recommendations which better assure that these resources are developed, managed, and environmentally protected within the best interests of the Project. Existing developmental practices and management guidelines were evaluated and updated to coincide with the preservation of the quality of the land base and water resources, as well as the various existing recreational facilities.

The plan for recreational development represents the product of a thorough on-site inspection of existing and proposed facilities; an analysis of proposed user recreation demands; the collection and synthesis of all pertinent cultural, historical, and ecological data; and coordination with other concerned agencies. The results of this research and evaluation effort became the basis for this Master Plan Update in which all Project water and land resources were allocated to best meet recreational needs while preserving the environmental integrity of Project lands.

Existing recreation facilities were evaluated as to their existing conditions and continued ability to provide recreational opportunities. Efforts are concentrated at improving or expanding existing sites which received a total of 713,154 recreation activity days in 1983.

This plan specifically recommends: the installation of 2 vehicular gates, improved shoreline fishing below the dam, additional landscaping, construction of a canoe launch, and construction of pedestrian walkways at the Dam Site Day Use Areas; construction of an overlook, additional landscaping, improvements to the beach, additional picnic facilities, pedestrian walkways and hiking trails at Bee Run Day-Use Area; additional landscaping and signage at the Bee Run Camping Area; the installation of a vehicular gate, realignment of a portion of the Lower Kanawha Camping Area; additional landscaping, signage, and upgrading the existing turn around at the Middle and Upper Kanawha Run Camping Area; the installation of a hiking trail and improvements to the northern entrance to the Mill Run Camping Area; and improving the parking and roadway, the installation of an entry sign, additional landscaping, redesigning a portion of the campground, constructing an amphitheater and installing a play area at Bakers Run Camping Area.

Costs to implement these proposals are \$591,600. This estimate does not include costs to expand the marina, which will be borne by the contractor.

This plan has been fully coordinated with federal, state, and legally recognized local entities having jurisdiction over lands within the region.

SUTTON LAKE
ELK RIVER, WEST VIRGINIA

PERTINENT DATA

1. Authority for Project: The Sutton Lake Project was authorized by the Flood Control Act of June 28, 1938, Public Law No. 761, Seventy-fifth Congress, third session.
2. Project Purposes: Reduction of flood damages on the Elk, Kanawha, and Ohio Rivers, recreation, conservation of fish and wildlife, and pollution abatement.
3. Location of Project: Sutton Lake lies in Braxton and Webster Counties, West Virginia. The dam is located on the Elk River one mile above the town of Sutton and 101 miles upstream from its confluence with the Kanawha River at Charleston.
4. Drainage Area: 537 square miles.
5. Reservoir Data:

<u>Pool</u>	<u>Surface Elevation (Ft. m.s.l.)</u>	<u>Surface Area (Acres)</u>	<u>Net Storage Capacity (Acre-Feet) (Inches)</u>	
Minimum				
Winter	895.0	870	29,140	1.02
Seasonal	922.0	1,440	59,700	2.08
Flood Control				
Summer	1,000.0	3,875	205,600	7.20
Winter	1,000.0	3,875	236,100	8.20

6. Dam and Appurtenances:

a. Reservoir:

Capacities and surface areas:	
Permanent conservation storage, acre-feet	29,140
Water-supply storage, acre-feet	59,700
Flood-control storage, acre-feet	
Winter	236,100
Summer	205,600
Total storage, acre-feet	265,270
Permanent conservation storage, inches of runoff:	1.02
Water-supply storage, inches of runoff:	2.10
Flood-control storage, inches of runoff:	
Winter	8.24
Summer	7.18
Total storage, inches of runoff:	9.26
Permanent conservation pool area, acres:	870
Seasonal pool area, acres:	1,440
Maximum flood-control pool area, acres:	3,875
Elevations (feet above mean sea level):	
Top of dam	1,017
Maximum water surface (spillway design flood)	1,010
Guide taking line	1,003
Top of spillway gates (closed position)	1,002
Top of flood-control pool	1,000
Seasonal pool (top of water-supply pool)	922
Permanent conservation pool	895
Flood plain at dam site	844
Stream channel at dam site	810
Design flood peak flow, c.f.s.	129,000
Maximum flow of record at dam site, c.f.s.	50,000

b. Dam:

Type:	Concrete gravity
Top length:	1,178'
Top elevation:	1,017' above m.s.l.
Top width:	20'
Maximum height above stream bed:	207'
Base width:	195'

c. Spillway:

Type:	Controlled, emptying into a bucket of 50' radius
Crest width, gross:	280'
Crest width, net:	240'
Crest elevation, feet m.s.l.:	972
Tainter gates, number:	6
Tainter gates, size:	40' long x 31' high
Spillway design flood, natural flow at dam site, c.f.s.:	223,500
Spillway design flood, maximum inflow, c.f.s.:	247,000
Spillway design flood, maximum outflow, c.f.s.:	222,240
Maximum surcharge, feet (above flood-control pool):	10

d. Outlet Works:

Type:	Slide gate controlled sluices and valve controlled low-flow valve through spillway section.
Number of flood control sluice gates:	5
Size of flood-control sluice gates:	5' 8" wide x 10' high
Invert elevation, upstream, feet m.s.l.:	825
Capacity of flood-control sluices at maximum flood-control pool (elev. 1,000), c.f.s.:	23,900
Number of low-flow valves:	1
Size, inches in diameter:	36
Invert elevation, upstream, feet m.s.l.:	837
Capacity of valve at seasonal pool (elev. 925); c.f.s.:	388
High level intake system utilizing gate 3 with invert at elevation:	910'

7. Land Acquisition:

a. Fee:	13,154 acres
b. Easement:	208 acres

8. Relocations:

a. Highways:	
New construction:	12.7 miles
Improved existing:	14.5 miles
b. Highway Bridges:	
Constructed by Government:	3
c. Railroads:	8.7 miles
Bridges:	5 miles
Tunnels:	1
d. Utilities:	
Power Lines:	4.5 miles
Telephone and Telegraph Lines:	14.2 miles
Gas Lines:	0.8 miles
e. Cemeteries:	700 graves (18 cemeteries)

9. Land Clearing:

Town Lots:	41 acres
Cultivated lands:	681 acres
Pasture lands:	349 acres
Woodlands:	1,842 acres

10. Recreation facilities:

<u>Facility</u>	<u>Existing</u>	<u>Projected Needs</u>	
		<u>5-Year Plan</u>	<u>Future (2020)</u>
Camping Units	293	276	406
Picnic Tables	366	145	213
Boat Launch Lanes	8	14*	21*
Swimming (sq. ft.)	10,000	27,800	41,000

* Not recommended for construction. See Chapter 5.

11. Dates:

Construction on project initiated:	October, 1949
Construction on dam initiated:	November, 1956
Dam closure:	April, 1959
Construction on project completed:	January, 1961

SUTTON LAKE
ELK RIVER, WEST VIRGINIA
DESIGN MEMORANDUM NO. 11

MASTER PLAN UPDATE

FINAL

August, 1984

TABLE OF CONTENTS

	PAGE
Preface	I
Summary	II
Pertinent Data	IV
Table of Contents	VIII
List of Tables	XII
List of Photographs	XIV
List of Figures	XV
List of Appendices	XVI
List of Exhibits	XVII

CHAPTER 1 - INTRODUCTION

1-01 Project Authorization	1
1-02 Project Purpose	1
1-03 Purpose of the Master Plan Update	2
1-04 Previous Pertinent Design Memoranda	2
1-05 Partial List of Applicable Public Laws	4
1-06 Scope of the Report	5

CHAPTER 2 - PROJECT DESCRIPTION

2-01 Location	7
2-02 Project Data	7
2-03 Reservoir Operation	12
2-04 Existing and Projected Visitation	14

CHAPTER 3 - OPERATING PROJECT STATUS

3-01 Project Development & Operation Chronology	17
3-02 Expenditures	18
3-03 Private Recreational Investment	18

TABLE OF CONTENTS (Continued)

	PAGE
 CHAPTER 4 - RECREATIONAL & ENVIRONMENTAL RESOURCES OF THE PROJECT AREA	
4-01 Physiography and Geology	21
4-02 Archeology	22
4-03 History	23
4-04 Ecology	24
4-05 Environmental and Scenic Qualities	28
4-06 Recreation	29
 CHAPTER 5 - FACTORS INFLUENCING & CONSTRAINING RESOURCE DEVELOPMENT & MANAGEMENT	
5-01 General	33
5-02 Demographic Factors	33
5-03 Topography, Geology, and Soils	39
5-04 Accessibility	41
5-05 Market Area	41
5-06 Marina Concessions	44
5-07 Reservoir Plan of Operation	45
5-08 Siting of Road, Cemetery, and Utility Relocation	46
5-09 Water Quality of Pool and Tailwater	46
5-10 Adaptability of Spillway and Other Project Structures	47
5-11 Pre-Project Exploitation of Minerals and Timbers	48
5-12 Project Visitation	48
5-13 Application of Public Law 89-72	61
5-14 Environmental and Ecological Features	61
 CHAPTER 6 - COORDINATION WITH OTHER AGENCIES	
6-01 General	65
6-02 Federal Agencies	65
6-03 State Agencies	66
6-04 Regional and Local Agencies	66
6-05 Comments	67

TABLE OF CONTENTS (Continued)

PAGE

CHAPTER 7 - PHYSICAL PLAN OF DEVELOPMENT

7-01 Introduction	73
7-02 Resource Use Objectives	73
7-03 Land Use Plan	74
7-04 Water Use Plan	76
7-05 Project Structures	78
7-06 Recreation Area Plans	80
7-07 Overlooks	103
7-08 Trails	103
7-09 Interpretive Program	105
7-10 Schedule of Development	105
7-11 Cost Estimates	106
7-12 Cost Increase or Decrease	106

CHAPTER 8 - FACILITY LOAD & OTHER DESIGN CRITERIA

8-01 Introduction	107
8-02 Siting	108
8-03 Site Preparation and Landscaping	108
8-04 Roads	109
8-05 Parking Areas	118
8-06 Picnic Areas	123
8-07 Playgrounds	124
8-08 Swimming Beach	125
8-09 Overlook Landings	126
8-10 Campsites	131
8-11 Site Structures	132
8-12 Boating Facilities	134
8-13 Hiking Trails	135
8-14 Pedestrian Circulation	140
8-15 Shoreline Fishing Habitat Development	145

CHAPTER 9 - SPECIAL PROBLEMS

9-01 Introduction	149
9-02 Operations and Maintenance	149
9-03 Environmental Considerations	151

CHAPTER 10 - PROJECT RESOURCE MANAGEMENT

10-01 Resource Management Plan	153
--------------------------------------	-----

TABLE OF CONTENTS (Continued)

	PAGE
 CHAPTER 11 - FOREST MANAGEMENT	
11-01 Forest Management Plan	155
 CHAPTER 12 - FIRE PROTECTION	
12-01 Fire Protection Plan	159
 CHAPTER 13 - FISH AND WILDLIFE MANAGEMENT	
13-01 Fish and Wildlife Management Plan	161
 CHAPTER 14 - PROJECT SAFETY	
14-01 Project Safety Plan	163
 CHAPTER 15 - LAKESHORE MANAGEMENT	
15-01 Lakeshore Management Plan	167
 CHAPTER 16 - COST ESTIMATES	
16-01 Summary of Estimated Cost	169
16-02 Facility Cost	169
16-03 Allocation of Cost	169
 CHAPTER 17 - CONCLUSIONS	
17-01 Master Plan Update Conclusions	185
 CHAPTER 18 - RECOMMENDATIONS	
18-01 Master Plan Update Recommendations	187

APPENDICES

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
1-1	Previously Issued and Scheduled Design Memoranda	3
2-1	Reservoir Area and Capacity	13
2-2	Frequency and Duration of Flooding	14
3-1	Expenditure of Funds at Sutton Lake	19
5-1	Distance from Sutton Lake to Major Population Centers	42
5-2	Water Related Public Outdoor Recreation Areas Near Sutton Lake	43
5-3	Estimates of Recreational Use: Historic and Projected	50
5-4	Annual Rate of Increase for Recreational Activities	51
5-5	Total Projected Visitation on Peak Summer Weekend Day	52
5-6	Participation Rates	53
5-7	Projected Activity Demand	54
5-8	Average Group Size and Turnover Rates	55
5-9	Summary of Major Facility Needs	57
7-1	Land Allocation Categories (Total Fee Acres)	74

LIST OF TABLES (Continued)

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
16-1	Summary of Estimated Costs for Recreational Facilities by Recreation Area	171
16-2	Cost Estimate for Dam Site Day-Use Area	172
16-3	Cost Estimate for Bee Run Day-Use Area	174
16-4	Cost Estimate for Bee Run Camping Area	177
16-5	Cost Estimate for Lower Kanawha Run Camping Area	178
16-6	Cost Estimates for Middle and Upper Kanawha Run Camping Areas	180
16-7	Cost Estimates for Mill Creek Camping Area	181
16-8	Cost Estimates for Bakers Run Camping Area	182

LIST OF PHOTOGRAPHS

Picture No.	Topic	Page
4- 1	Pristine Stream at Sutton Lake	27
7- 1	Northern Face of Sutton Dam Structure	79
7- 2	Lack of Vegetation at Lower Dam Day-Use Area	82
7- 3	Aerial View of Lower Dam Day-Use Area	82
7- 4	Existing Restroom Facilities at Below Dam Areas	83
7- 5	Typical Shelter in Day-Use Area at Below Dam Area	83
7- 6	Picnic Shelter at Above Dam Day-Use Area	85
7- 7	Boat Ramp and Docking Facilities at Bee Run Day-Use Area	88
7- 8	Hillside Location of Restrooms at Bee Run	88
7- 9	Picnic Shelter Overlooking Bee Run Beach	90
7-10	Bee Run Restrooms	90
7-11	Middle Kanawha Run Comfort Station	92
7-12	Scenic Stream at Kanawha Run Campgrounds	94
7-13	Campground Facilities at Middle Kanawha Run	95
7-14	Kanawha Run Entrance Facilities	97
7-15	Stone Wall at Kanawha Run	97
7-16	Stone Gabions at Mills Creek	98
7-17	Brock Run Campground Entrance Drive	102
7-18	View of Lake From Brock Run	102

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
8- 1	Access Road	113
8- 2	Maintenance Road	115
8- 3	Circulation Road	115
8- 4	Typical 90' Angle Parking Lot	119
8- 5	45' Angle Car and Boat Trailer Parking Lot	121
8- 6	Overlook - Plan View	127
8- 7	Overlook - Section/Elevation	129
8- 8	Hiking Trail	137
8- 9	Bituminous Concrete Pedestrian Walkway	137
8-10	Handicapped Ramp - Elevation	143
8-11	Handicapped Ramp - Section	143
8-12	Shoreline Fishing Habitat Development	147

LIST OF APPENDICES

<u>Appendix No.</u>	<u>Title</u>
A.	Project Resource Management Plan
B.	Forest Management Plan
E.	Project Safety Plan
H.	Master List of Species
I.	Statements of Other Agencies

LIST OF EXHIBITS

Exhibit No.	Title
1	Location Map
2	Vicinity Map
3	Real Estate Map
4	Vegetation Map
5	Land Use Map
6	Water Use Map
7	Dam Site Day-Use Areas
8	Bee Run Day-Use Area
9	Bee Run Camping Area
10	Lower Kanawha Run Camping Area
11	Middle and Upper Kanawha Run Camping Areas
12	Mill Creek Camping Area
13	Bakers Run Camping Area

CHAPTER 1

INTRODUCTION

CHAPTER 1
INTRODUCTION

1-01. Project Authorization.

The Project was authorized by the Flood Control Act of 28 June 1938, pursuant to Public Law 761, Seventy-fifth Congress, third session.

1-02. Project Purpose.

Sutton Lake is operated for the reduction of flood damages on the Elk, Kanwaha, and Ohio Rivers; recreation, conservation of fish and wildlife, and pollution abatement.

The town of Gassaway, West Virginia, through Noah Corporation, has applied for a license to construct a hydroelectric generating facility at the dam. Their proposal recommends using run-of-reservoir with the establishment of a buffer pool between elevation 922 and 925 in summer and 895 and 902 in winter.

At the time of this writing the license has not been approved due to construction and environmental concerns expressed by the Corps of Engineers, the West Virginia Department of Natural Resources, and other agencies.

1-03. Purpose of the Master Plan Update.

In accordance with ER 1120-2-400, the Master Plan Update establishes the policies, objectives, and programs for the preservation, enhancement, development, maintenance, administration, and management of all project resources and presents the resources, facilities, and opportunities that are available for public enjoyment. The plan includes recommendations as to the optimum location and design of recreation facilities, taking a variety of elements into consideration including the environment, economic feasibility, projected demand, and future operation and management.

1-04. Previous Pertinent Design Memoranda.

The following list of previously issued Design Memoranda pertains to Sutton Lake: (See next page):

Table 1-1

PREVIOUSLY ISSUED AND SCHEDULED DESIGN MEMORANDA

DM No.	Title	Approval Date
1	Report-Sutton Dam Concrete Aggregate	August 2, 1965
2	Report on Necessity for Utility Relocation of the Chesapeake and Potomac Telephone Company of West Virginia	March 23, 1956
3	Plan of Cemetery Relocations (Part I)	June, 1957
4	Report on Necessity for Relocation of the Monongahela Power Company's Facilities Located in and Adjacent to the Construction Area	October, 1956
5	Real Estate Purchase of Lands in Lieu of Relocation of Secondary SR 15/1	November, 1956
6	Seasonal Storage	November 6, 1956
7	Report on Necessity for Relocation and Abandonment of the Hope Natural Gas Company's Facilities Located in and Adjacent to the Construction Area of the Dam Structure	November, 1956
8	Report on the Necessity for Relocation of the Monongahela Power Company's Facilities located in the Upper Reaches of Sutton Reservoir Project, Elk River, West Virginia	April, 1957
9	Report on the Necessity for Relocation of Telephone and Telegraph Facilities owned by the Western Union Telegraph Company located in Sutton Reservoir Project, Elk River, West Virginia	July, 1957
10	Supplemental Report on Necessity for Highway Relocations, Sutton Reservoir Project, Elk River, West Virginia	February, 1958
11	Master Land Use Plan, Sutton Reservoir, Elk River, West Virginia	January, 1959

1-05. Partial List of Applicable Public Laws.

a. Flood Control Act of 1944 (Public Law 78-534). The Department of the Army is authorized to provide for recreational use of the lakes under its control by Section 4 of the Flood Control Act, approved 22 December 1944; as amended by Section 4 of the Flood Control Act, approved 24 July 1946; as further amended by Section 209 of the Flood Control Act, approved 3 September 1954; and as further amended by Section 207 of the Flood Control Act of 1962, approved 23 October 1962.

b. Fish and Wildlife Coordination Act of 1958 (Public Law 85-624, as amended). This Act provides that fish and wildlife conservation shall receive equal consideration with other Project purposes and be coordinated with other features of water resources development programs.

c. Federal Water Project Recreation Act of 1965 (Public Law 89-72). Although Sutton Lake was authorized prior to enactment of this legislation, the provisions of the law have been administratively applied. Briefly, this Act requires sharing of financial responsibilities in joint Federal/non-Federal development and enhancement of recreation and fish and wildlife resources of Federal Water projects with no more than half of the cost being borne by the Federal government. It reaffirms the additional policy of the U.S. Army Corps of Engineers to encourage non-federal participation in the administration of recreational opportunities provided at

Corps projects by entering into Leases which permit state and local development and administration of recreational areas.

Therefore, any proposed development of new areas or expansion of existing areas or areas presently under outgrant at Sutton Lake are subject to cost-sharing with a qualified non-Federal entity. It is anticipated that the State of West Virginia and Braxton County may be the primary (non-Federal) cost-sharing entities.

1-06. Scope of the Report.

This Master Plan Update has been developed to provide for the continued management and development of the resources available at Sutton Lake. The land and water resources of the Project, including existing and potential public use areas, have been carefully studied and analyzed to determine their potential and capability for meeting present and future demands. This analysis has resulted in an updated plan that will assure the continued wise and orderly, but limited development and upgrading of Sutton Lake in providing recreational opportunities for public enjoyment, as well as proper management and utilization of all resources.

CHAPTER 2

PROJECT DESCRIPTION

CHAPTER 2

PROJECT DESCRIPTION

2-01. Location.

Sutton Lake is located on the Elk River, a tributary of the Kanawha River, in Braxton and Webster Counties, West Virginia. The dam is located one mile above Sutton (population 1,192¹), seat of Braxton County, and 101 miles above the mouth of the Elk River at Charleston (63,968²). Sutton Lake controls the runoff from a drainage area of 537 square miles or 35 percent of the Elk River Watershed. Construction of the dam began in 1949 and was completed in 1961, after being delayed by the Korean War. The relative project location and the Kanawha River watershed are shown on Exhibits 1 and 2.

2-02. Project Data.

a. Hydrologic and Climatic Summary. The climate of Braxton County and the Sutton Lake watershed is temperate with prevailing continental westerly winds influenced often by southerly winds from the Gulf of Mexico. The area's climatic conditions are a direct result of its location on the western edge of the Allegheny Highlands. Prevailing westerly air masses must rise to pass over the higher elevations to the east. This in turn causes increased precipitation and lowered temperatures. Night and early morning fog is common in the stream valleys while the higher elevations may experience fog at any time. Summer rainfall occurs mostly through thunder-

storms which, on occasion, are well developed and drop sufficient precipitation to cause local flooding. The frequent passage of weather fronts through the watershed causes rapid changes in wind direction and weather conditions, especially during the cooler months. Precipitation during this period is the direct result of frontal air movement and usually results in longer, more uniform periods of precipitation. Mean annual precipitation at Sutton Lake (elevation 820 m.s.l.) is 48 inches. Further east, at Webster Springs, precipitation averages 52 inches, while at Pickens (elevation 2760 m.s.l.) on the eastern edge of the watershed, an average of 65 inches of precipitation falls annually. Snowfall makes up about 16 percent of the total precipitation at Pickens and decreases to 8 percent of the total at Sutton Lake. The mean annual temperature is 55°F at Sutton Lake, 54°F at Webster Springs and 49°F at Pickens. Weather conditions in the watershed can vary considerably within a relatively small area due to the extremely rugged terrain.

b. Shoreline Length and General Character. Sutton Lake has a shoreline of approximately 40 miles at seasonal pool. At the seasonal pool elevation the maximum depth of the lake is approximately 112 feet near the dam site. The entire reservoir lies in a series of narrow, winding, mountain valleys; characterized by steep river banks, having a maximum width of only one-half mile.



4

Scale: 1 inch = 1 mile

Submitted: _____

LOCATION MAP

SUTTON LAKE

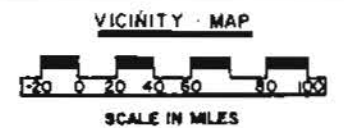
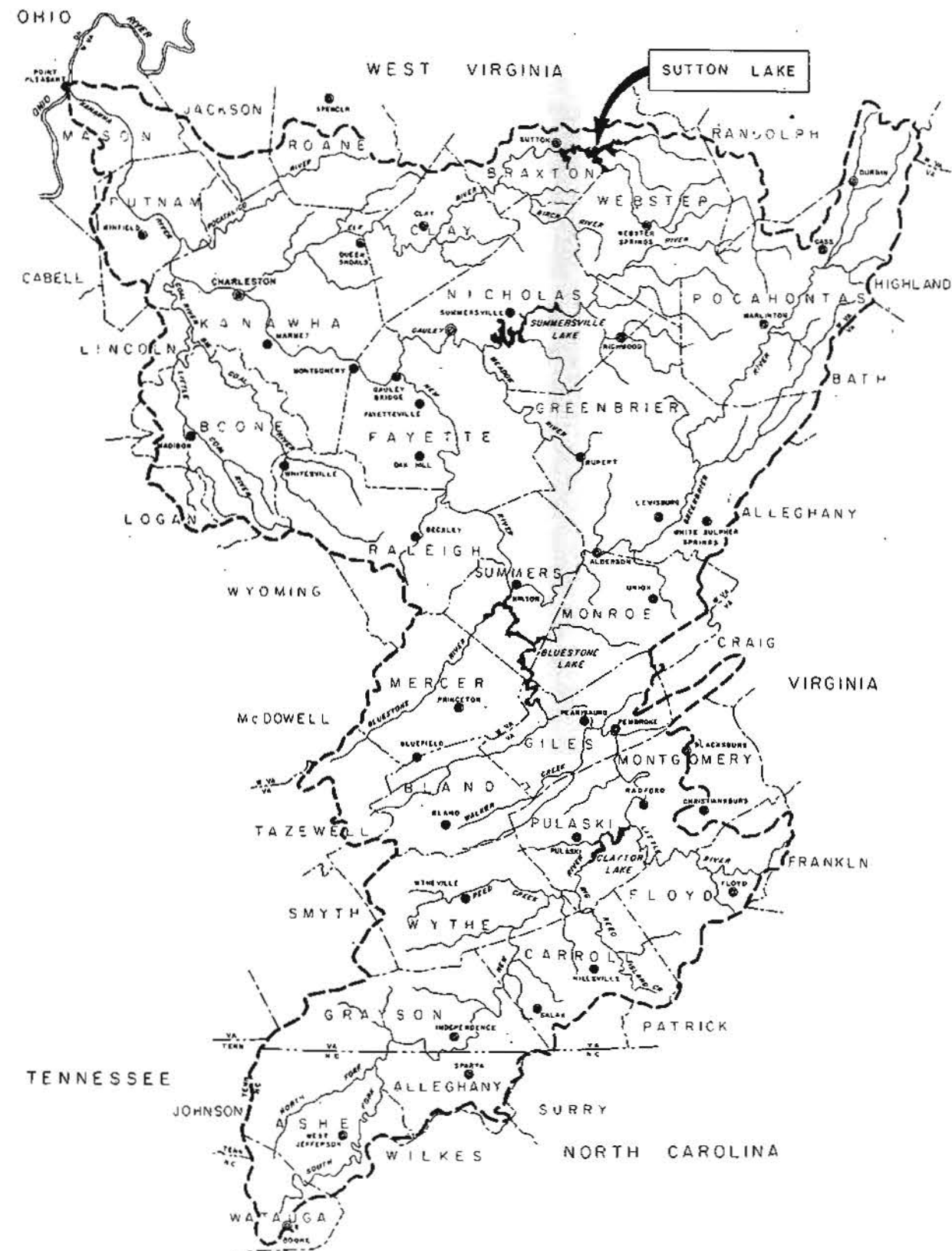
MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON

CORPS OF ENGINEERS

HUNTINGTON WEST VIRGINIA

1



- LEGEND
- DRAINAGE AREA BOUNDARY
 - COUNTY BOUNDARY
 - STATE BOUNDARY
 - TOWNS OR COMMUNITIES

0 5 10 15

SUBMITTED:

KANAWHA RIVER BASIN

SUTTON LAKE

MASTER PLAN UPDATE

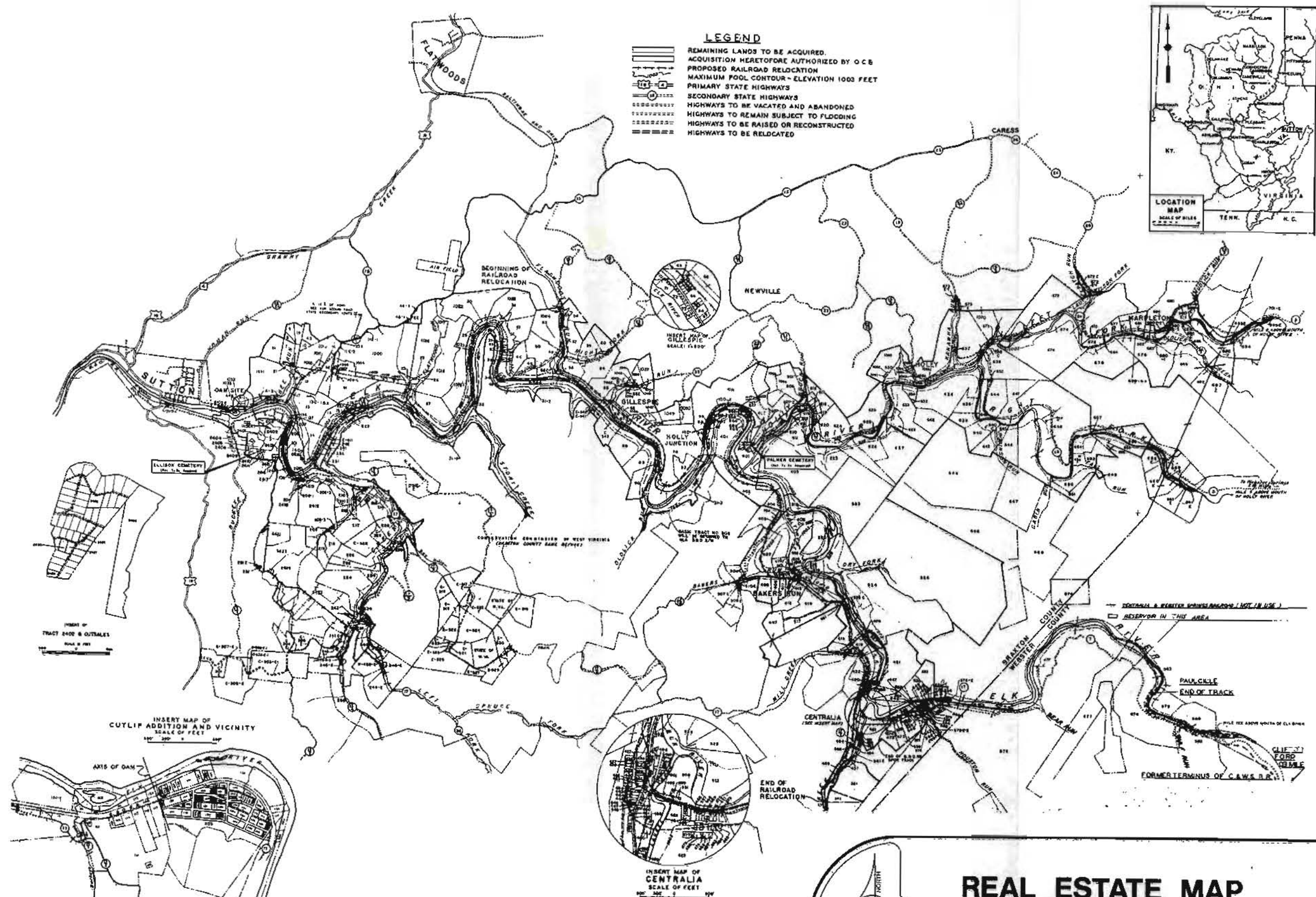
U.S. ARMY ENGINEER DISTRICT, HUNTINGTON

CORPS OF ENGINEERS

HUNTINGTON, WEST VIRGINIA

DESIGNED BY
WOOLPERT CONSULTANTS

EXHIBIT
2



REAL ESTATE MAP

SUTTON LAKE

MASTER PLAN UPDATE

SUBMITTED:

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON

CORPS OF ENGINEERS

HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT CONSULTANTS

EXHIBIT NO.

3

Lands which are well suited for recreation development are generally located in the narrow valleys formed by the small streams that flow into the lake. These areas provide slopes and soils that can withstand intensive recreation development.

c. Project Structures (Operational). Sutton dam is a concrete gravity type structure having an overall length of 1,178 feet, consisting of 280 feet of spillway section and 898 feet of non-overflow section. The dam is about 207 feet high with the top at elevation 1,017. Top width is 20 feet and maximum base width is 195 feet. The Definite Project Report called for a gated spillway in the channel section of the dam with a bucket of 50 feet radius, crest elevation of 967, overall length of 252 feet and 6 tainter gates, each 34 feet long and 33 feet high. Due to economic and construction considerations, however, the plans were revised to provide for a gated spillway with crest at elevation 972, overall length of 280 feet and 6 tainter gates, each 40 feet long and 31 feet high. The tainter gates are electrically operated. Five conduits, 5'-8" wide by 10'-0" high, each equipped with a hydraulically operated sluice gate, are provided through the spillway section. One 36-inch diameter valve-controlled sluice for low-flow control is also provided through the spillway section. One emergency bulkhead, 11'-2.5" wide by 19'-0.5" high, is available for the conduits.

In 1979 and 1980, a high level discharge facility was added to the Dam. By drawing water from the upper levels of the water and mixing it with low-level discharges, temperature and turbidity problems of the past will be minimized.

Existing operational structures are shown on Exhibit 7. Pertinent engineering data for the Project have been summarized on pages iv through vii of this plan report.

d. Real Estate Acquisition. The principal document authorizing acquisition of land at Sutton was the revised version of Appendix V of the Definite Project Report (DPR). That report authorized the purchase of 8,520 acres of fee lands together with all coal, oil and gas interests below elevation 1,003, plus coal within a 200-foot barrier. The Real Estate Appendix to the DPR was preceded by two reports authorizing the purchase of land, viz., "Lands Required for Sealing Abandoned Mine at Dam Site" (36 acres) and "Lands Required for Relocation of Section 1 of the B&O Railroad" (1,700 acres). The three reports listed above include a total of 10,256 acres of fee lands, which amount was considered adequate for the project prior to the 1962 policy change. Pursuant to ENGCV-OM multiple letter, dated 24 August 1962, subject: "Acquisition of Supplemental Reservoir

Lands," the project land requirements were reviewed. By virtue of OCE 6th Indorsement, dated 16 December 1962, on Huntington District Letter, dated February 1962, subject: "Acquisition of Supplemental Reservoir Lands," this office was authorized to acquire an additional 2,350 acres of fee lands, including minerals, "to protect the full recreational potential created by the project and to make that potential available for development and use by the public over the life of the project."

Design Memorandum No. 5, Real Estate, "Purchase of Lands in Lieu of Relocation of Secondary Route 15/1," approved a 300-acre acquisition of 12 tracts because of a loss of access.

All acreage acquired in excess of basic requirements is presently utilized for low density recreation, including forest reserve and fish and wildlife management. These uses are fully compatible and in compliance with the joint policies of the Department of the Interior and the Department of the Army governing the acquisition of land for reservoir projects. These policies provide for the acquisition of lands necessary for the realization of optimal values of all purposes including additional lands to assure the full realization of optimal present and future outdoor recreational and fish and wildlife potentials. These additional correlative purposes contemplate that the United States own in fee a continuous area of land around the reservoir to insure ready access along the shore.

Additional information concerning real estate acquisition can be found in the latest District Utilization Inspection Report.

2-03. Lake Operation.

a. Pool Elevations. Three major pool elevations have been provided for in the design of Sutton Lake to help control floods and to augment stream flows during critically dry periods. The flood control pool is located at elevation 1,000 feet m.s.l. A seasonal pool is maintained at elevation 922 feet m.s.l. during the summer months and a minimum pool has been established at elevation 895 feet m.s.l.

b. Storage Capacity. The maximum flood control pool provides a net storage capacity of 205,600 acre-feet when the lake is at seasonal pool elevation. During the winter, the flood control pool provides for 236,100 acre-feet of net storage. See Table 2-1.

Lands which are well suited for recreation development are generally located in the narrow valleys formed by the small streams that flow into the lake. These areas provide slopes and soils that can withstand intensive recreation development.

c. Project Structures (Operational). Sutton dam is a concrete gravity type structure having an overall length of 1,178 feet, consisting of 280 feet of spillway section and 898 feet of non-overflow section. The dam is about 207 feet high with the top at elevation 1,017. Top width is 20 feet and maximum base width is 195 feet. The Definite Project Report called for a gated spillway in the channel section of the dam with a bucket of 50 feet radius, crest elevation of 967, overall length of 252 feet and 6 tainter gates, each 34 feet long and 33 feet high. Due to economic and construction considerations, however, the plans were revised to provide for a gated spillway with crest at elevation 972, overall length of 280 feet and 6 tainter gates, each 40 feet long and 31 feet high. The tainter gates are electrically operated. Five conduits, 5'-8" wide by 10'-0" high, each equipped with a hydraulically operated sluice gate, are provided through the spillway section. One 36-inch diameter valve-controlled sluice for low-flow control is also provided through the spillway section. One emergency bulkhead, 11'-2.5" wide by 19'-0.5" high, is available for the conduits.

In 1979 and 1980, a high level discharge facility was added to the Dam. By drawing water from the upper levels of the water and mixing it with low-level discharges, temperature and turbidity problems of the past will be minimized.

Existing operational structures are shown on Exhibit 7. Pertinent engineering data for the Project have been summarized on pages iv through vii of this plan report.

d. Real Estate Acquisition. The principal document authorizing acquisition of land at Sutton was the revised version of Appendix V of the Definite Project Report (DPR). That report authorized the purchase of 8,520 acres of fee lands together with all coal, oil and gas interests below elevation 1,003, plus coal within a 200-foot barrier. The Real Estate Appendix to the DPR was preceded by two reports authorizing the purchase of land, viz., "Lands Required for Sealing Abandoned Mine at Dam Site" (36 acres) and "Lands Required for Relocation of Section 1 of the B&O Railroad" (1,700 acres). The three reports listed above include a total of 10,256 acres of fee lands, which amount was considered adequate for the project prior to the 1962 policy change. Pursuant to ENGCW-OM multiple letter, dated 24 August 1962, subject: "Acquisition of Supplemental Reservoir

Lands," the project land requirements were reviewed. By virtue of OCE 6th Indorsement, dated 16 December 1962, on Huntington District letter, dated February 1962, subject: "Acquisition of Supplemental Reservoir Lands," this office was authorized to acquire an additional 2,350 acres of fee lands, including minerals, "to protect the full recreational potential created by the project and to make that potential available for development and use by the public over the life of the project."

Design Memorandum No. 5, Real Estate, "Purchase of Lands in Lieu of Relocation of Secondary Route 15/1," approved a 300-acre acquisition of 12 tracts because of a loss of access.

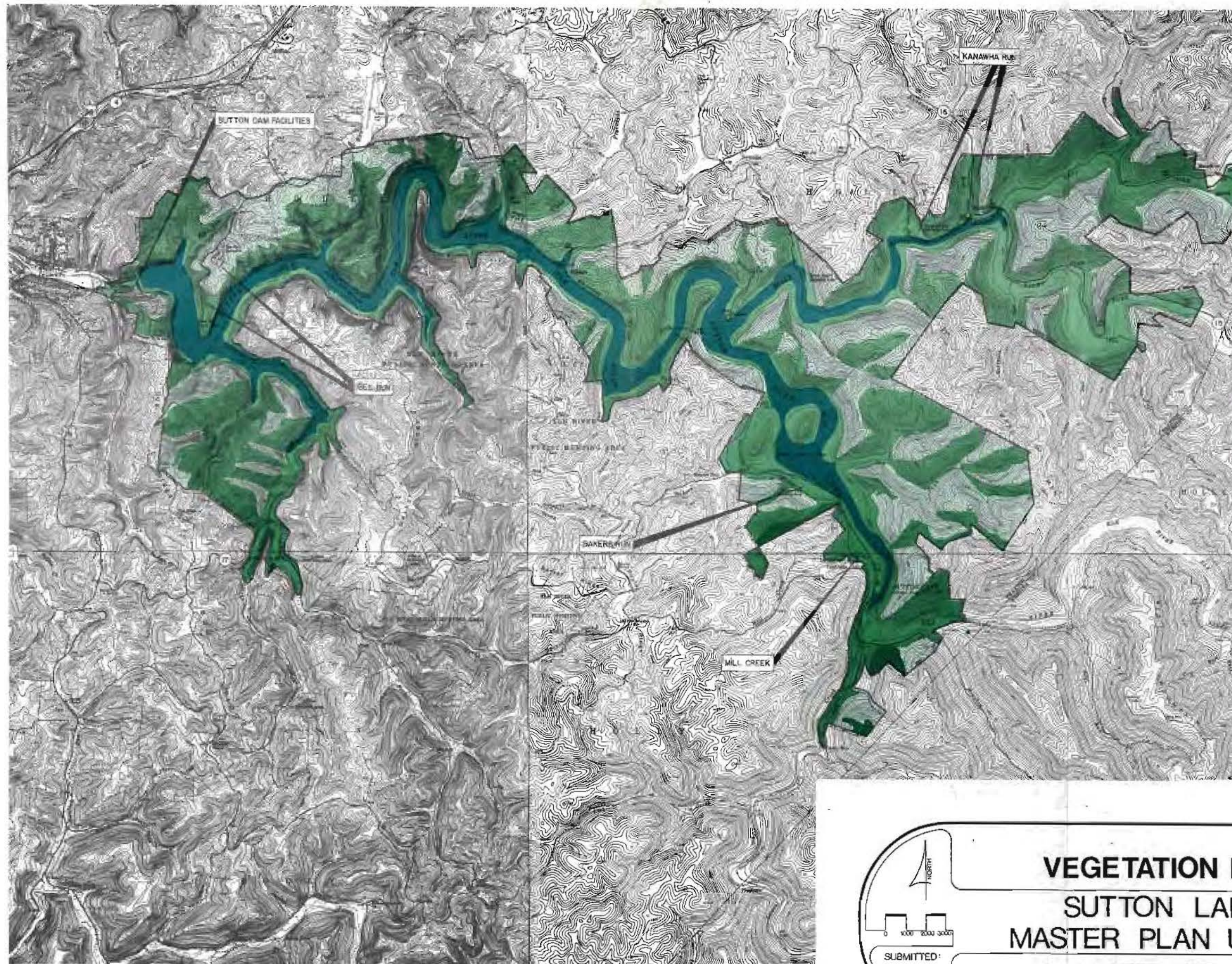
All acreage acquired in excess of basic requirements is presently utilized for low density recreation, including forest reserve and fish and wildlife management. These uses are fully compatible and in compliance with the joint policies of the Department of the Interior and the Department of the Army governing the acquisition of land for reservoir projects. These policies provide for the acquisition of lands necessary for the realization of optimal values of all purposes including additional lands to assure the full realization of optimal present and future outdoor recreational and fish and wildlife potentials. These additional correlative purposes contemplate that the United States own in fee a continuous area of land around the reservoir to insure ready access along the shore.

Additional information concerning real estate acquisition can be found in the latest District Utilization Inspection Report.

2-03. Lake Operation.

a. Pool Elevations. Three major pool elevations have been provided for in the design of Sutton Lake to help control floods and to augment stream flows during critically dry periods. The flood control pool is located at elevation 1,000 feet m.s.l. A seasonal pool is maintained at elevation 922 feet m.s.l. during the summer months and a minimum pool has been established at elevation 895 feet m.s.l.

b. Storage Capacity. The maximum flood control pool provides a net storage capacity of 205,600 acre-feet when the lake is at seasonal pool elevation. During the winter, the flood control pool provides for 236,100 acre-feet of net storage. See Table 2-1.



LEGEND

- OAK-HICKORY WHITE OAK
- OAK-HICKORY RED OAK
- MESIC

- SEASONAL POOL, EL. 922 M.S.L.
- MAXIMUM FLOOD CONTROL POOL, EL. 1000 M.S.L.
- U.S. HIGHWAY
- WEST VIRGINIA SECONDARY ROUTE
- U.S. GOVERNMENT PROPERTY LINE (FOR PROJECT)

SOURCE OF TOPOGRAPHY: UNITED STATES GEOLOGICAL SURVEY 7.5 MINUTE QUADRANGLE MAPS

SUBMITTED:

VEGETATION MAP

SUTTON LAKE

MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT
CONSULTANTS

EXHIBIT NO.
4

Table 2-1

LAKE AREA AND CAPACITY

Surface Elevation (Ft. m.s.l.)	Surface Area (acres)	Net Capacity (acre-feet)
895.0	870	29,140
922.0	1,440	59,700
1000.0 summer	3,875	205,600
1000.0 winter	3,875	236,100

c. Flooding. The majority of the flooding affecting the Project occurs during the spring months. Flooding of the land above seasonal pool elevation is possible but infrequent. The probable frequency and duration of flooding for the lake is shown in Table 2-2.

Table 2-2

FREQUENCY AND DURATION OF FLOODING

Exceedence Interval (Years)	Pool Elevation (Feet m.s.l.)	Average No. of Days per Year
5	964.0	2.0
10	973.0	0.9
50	985.0	0.1
100	989.0	<0.1
Flood Control Pool	1000.0	

d. Drawdowns and Low-Flow Augmentation. Lowering the elevation of the lake is necessary to help dilute downstream pollution, enhance downstream fisheries, and allow for the containment and gradual release of seasonal flood waters. The seasonal pool is maintained from 1 April through 1 October.

2-04. Existing and Projected Visitation

a. Existing Visitation. The average recreational visitation from 1977⁵¹ through 1983 has been 749,075 visitor days. During this same time period, there has been a slight decline in annual attendance. In 1981, 775,369 visitor days were recorded; 758,703 visitor days were recorded in 1982; and 713,154 in 1983.

b. Projected Visitation. Attendance is expected to increase and reach an annual projected visitation of 838,641 by 1985 and to continue to rise to 1,144,705 by the year 2020. Details of and the basis for these projections are contained in Chapter 5 of this report.

List of References.

1. U.S. Bureau of the Census, 1980.
2. Ibid.

CHAPTER 3

OPERATING PROJECT STATUS

CHAPTER 3

OPERATING PROJECT STATUS

3-01. Project Development and Operation Chronology

a. General. Sutton Lake was authorized by the Flood Control Act of 28 June 1938 and the Federal Water Pollution Control Act, Amendments of 1961. The Project is included in the comprehensive flood control plan for the Ohio River Basin.

Construction on the Project started on 24 October 1949, and was completed in January 1961. Since completion of the Project, a number of recreation areas have been developed around the lake. The Corps of Engineers has developed facilities for camping, picnicking, boating, sightseeing, and other related activities. Approved water supply and sanitary facilities have also been provided. A concession lease agreement has been arranged to provide a marina on the lake. Additional facilities have been planned and will be constructed as demand for various recreation activities increases and cost share partners are obtained.

A list of previously issued design memoranda appears on page 2 of this report and serves as a chronology of existing data on Sutton Lake.

b. Real Estate. A real estate tract map for Sutton Lake is included in this report as Exhibit 3. Real Estate Design Memoranda No. 5 gives detailed descriptions of some of the acreage and previous ownership of some of the acquired tracts.

3-02. Expenditures.

The estimate of funds spent on construction at Sutton Lake through December, 1983 is \$34,154,400. A breakdown of these expenditures is contained in Table 3-1.

3-03. Private Recreational Investment.

The Bee Run marina, a leased concession, is operated by a private individual. This operation is subject to the terms in the lease agreement between the marina owner and the Corps of Engineers. The marina is discussed in more detail in Chapter 5 of this Master Plan.

Table 3-1

EXPENDITURE OF FUNDS AT SUTTON LAKE*

Real Estate	\$ 2,256,200.00
Relocations	\$ 7,036,400.00
Clearing	\$ 415,500.00
Dam Construction	\$19,839,100.00
Recreation Facilities	\$ 505,900.00
Buildings, Grounds, and Utilities	\$ 107,000.00
Permanent Equipment	\$ 136,500.00
Engineering and Design	\$ 1,633,100.00
Supervision and Administration	\$ 2,022,300.00
Other	\$ 202,400.00
Total	<hr/> \$34,154,400.00

* All figures have been rounded off to the nearest \$100.00.

Source: Army Corps of Engineers, Huntington District Office.

CHAPTER 4

RECREATIONAL AND ENVIRONMENTAL
RESOURCES OF THE PROJECT AREA

CHAPTER 4

RECREATIONAL AND ENVIRONMENTAL RESOURCES OF THE PROJECT AREA

4-01. Physiography and Geology.

a. General. Sutton Lake, as well as the entire Elk River Basin, lies within the eastern portion of the Appalachian Plateau physiographic province. The area is characterized by a mature sandstone plateau which has been deeply dissected by several small streams, resulting in ridges and hills with evenly elevated crests predominating over narrow and deep "V"-shaped valleys.

b. Structural Geology. Most of the bedrock exposed along the lake's shoreline is Kanawha sandstone. The Allegheny and Conemaugh layers lie above the Kanawha layer and consist of shale, siltstone, sandstone, and coal. These sedimentary bedrock layers are of Carboniferous age, having been deposited during the Pennsylvanian Period about 300 million years ago.¹

No faulting of consequence is known to have occurred in the area.² There are no caverns in Braxton County, and there are few drift mines in the Sutton Lake vicinity.³

There are no appreciable reserves of oil or natural gas within the Sutton Lake area. The active gas and oil fields in Braxton County are primarily located in the northern half of the County.

About 468 million tons of the total indicated coal reserves in Braxton County (568 million tons) are available by deep mining. The remaining 100 million tons are available by surface mining. Underground mining accounted for the total 11,268 tons of coal mined in Braxton County in 1974.⁴

No other minerals of importance are known to exist in the area.

c. Appalachian Geosyncline. The Elk River Basin lies on the eastern portion of the Appalachian geosyncline. The rocks of the Appalachian Plateau have been down-folded into this geosyncline and dip to the northwest at a rate of 150 to 200 feet per mile.⁵

4-02. Archeology.

The Sutton Lake property has not been systematically surveyed for archeological sites, although two mounds are reported to be in this area. Sutton (1967) noted that there is a large mound on Kanawha Run, but this mound could not be found during a survey conducted in 1960 by E.V.

McMichael.⁶ The second archeological site consists of an ancient Indian camp site in the midst of some remains from the Town of Palmer, located at the mouth of the Holly River. This site is normally underwater all year. The investigation of this site was performed in November, 1979, when water levels were drained to stream level so that repairs could be made to the dam. Indian artifacts are occasionally found along streams in the Sutton Lake area, since stream banks and terraces were common places for ancient people to camp. A more complete archeological survey performed on the nearby Burnsville Lake property suggests that, except for scattered burial mounds, archeological sites usually consist of seasonal camp or bivouac remains from about 8500 B.C. up to the time of initial contact with white settlers.

Test excavations will be conducted at the Indian camp site in the old Town of Palmer to determine if intact subsurface features exist and if the site qualifies for placement on the National Register of Historic Places. An attempt will be made to locate the mound on Kanawha Run during a complete survey of the Sutton Lake area's cultural resources.

4-03. History.

The first permanent white settlers in Braxton County (established by a Virginia Act of Assembly, January 15, 1836), brothers Benjamin and Jeremiah

Carpenter and their wives, built homesteads on the Elk River approximately one mile upstream of the mouth of the Holly River around 1790. This site became the Town of Palmer, which was inundated by Sutton Lake. Palmer was known as a lumber town (Sutton, 1967).

The Village of Sutton, established as Suttonville by an Act of Assembly in 1826, was named for John D. Sutton of Alexandria, Virginia, an early Braxton County pioneer. Another former village within the Sutton Lake area was Slabtown, which was located at the mouth of Flatwoods Run and Hyer, along Flatwoods Run about one mile upstream from Sutton (Sutton, 1967). These and any unrecorded sites will be surveyed during a complete survey of the cultural resources within the Sutton Lake area.

4-04. Ecology.

a. Vegetation. Sutton Lake lies within the Eastern Deciduous Forest Province. The mixed Mesophytic Forest Section is dominant at Sutton Lake on the lower parts of north-facing slopes and in moist coves. Typical canopy tree species include Beech, Tulip-poplar, Basswood, Sugar Maple, Sweet Buckeye, Red Oak, White Oak, and Hemlock. Understory trees include flowering Dogwood, Magnolia, Sourwood, Striped Maple, Red Bud, American Hornbeam, Eastern Hop-Hornbeam, Holly and Serviceberry. The remaining forested area consists of Oak-Hickory Forest. The most common tree species

are Mockernut Hickory, White Oak, Red Oak, Bitternut Hickory, Chestnut Oak, Black Oak, Scarlet Oak, Blackgum, American Beech, Virginia Pine, Pitch Pine, and Shortleaf Pine.

Approximately 88.6% of Braxton County is forest land. Most of the original forest has been lumbered and is presently being replaced by second and third growth timber.⁷

The 11,725 acres of land licensed by the West Virginia Department of Natural Resources is the largest contiguous tract of woodland bordering Sutton Lake.

Herbs common to the area include Greenbrier, Grape, Buffalo Nut, Witch-hazel, Maple-Leaf Viburnum, Virginia Creeper, and Poison Ivy. Most noteworthy for their recreational value are the spring and summer wildflowers. These include various Violets, Trilliums, Lady Slippers, Spring Beauties, Baneberry, and Dogstooth Violets. Ferns are also quite common in the area.⁸

b. Insect and Disease Vectors. At this time, there are no known insect or disease outbreaks in the Project Area.

c. Fish and Wildlife. The West Virginia Department of Natural Resources licensed 11,725 of the total 13,154 acres of Federal government property at Sutton Lake. This leased land is managed as part of the Elk River Public Hunting Area, which is south of Sutton Lake.⁹

Except for periodic disturbance by hunting and other recreational activities, this part of the Elk River Public Hunting Area, which is managed to favor wildlife game species, is the most significant natural area in the vicinity of Sutton Lake.

Common terrestrial game species include Whitetail Deer, Cottontail Rabbit, Ruffed Grouse, Turkey, Mourning Dove, and Gray and Fox Squirrels. Non-game wildlife includes such species as warblers, hawks, groundhogs and skunks. The Osprey and Bald Eagle have been reported in this area. Also known to inhabit the Elk River Basin are 6 turtle, 6 lizard, 21 snake, 28 salamander, and 13 amphibian species.¹⁰

A partial list of sport fish in Sutton Lake include Largemouth Bass, Walleye, White Crappie, Black Crappie, Bluegill, and Channel Catfish. The tailwater fishery below the dam includes Walleye, Smallmouth Bass, Muskellunge, and Rainbow Trout. Aquatic plants within the lake consist primarily of unicellular phytoplankton.¹¹



PICTURE 4-1

Pristine stream channels typical of this picture are in abundance within the boundaries of the Project

Populations of rare, threatened, or endangered plant and animal species have not been reported in the Sutton Lake vicinity.¹² The lack of any records of State or Federally protected species (Endangered Species Act of 1973) does not, however, rule out their presence in such a large area of natural habitat.

4-05. Environmental and Scenic Qualities.

a. Topography. The topography of the area is hilly to mountainous, with steep slopes and narrow valleys. Slopes vary from 25% to 40%, and local relief varies from 400 to 900 feet. Ridges range from 1,500 to 2,000 feet above mean sea level. A number of small streams forming intricate patterns drain a 1,536 square mile area, which includes the 537 square mile Sutton Lake watershed.

b. Soils. The three major soils in the Sutton Lake area are residual soils belonging to the Gilpin, Dekalb, and Buchanan series.¹³ These soils have good drainage but poor fertility ratings. Moderate (12%-18%) to

Relative stream channel typical of this picture are in abundance within the boundaries of the project

severe (18%-50%) slopes are the major limitations. These soils are most suitable for grassland or woodland over the predominantly steep slopes (25%-40%).

Most of the shallow soil is derived from the abundant sandstone bedrock layer. Soil cover on the steep slopes is primarily sandy and porous, as well as shallow with resultant rock outcroppings in many areas.¹⁴

c. Landscape Considerations. Forested hills dominate the landscape of the reservoir area. The inundation of these lands bordering the reservoir and the fluctuation of water levels in Sutton Lake have produced a barren stony shoreline. Turbidity is a problem at Sutton Lake after runoff from the upstream mined or timber-harvested lands drain into the reservoir. Sport fishing in the lake and in the tailwater is adversely affected by increased turbidity, partially because of the poor appearance of turbid water to the sport fishermen.¹⁵

4-06. Recreation.

Recreation facilities have been provided at Sutton Lake for camping, picnicking, boating, swimming, fishing, hunting, hiking, children's recreation, and sightseeing. Camping facilities are located at the terminus

of the seasonal pool of the lake, elevated only slightly above the normal seasonal pool. This was due to both the scarcity of developable land and access roads, and resulted in several roads and campsites being inundated at higher than normal pool elevations. A five feet increase in Lake elevation has the potential to affect 76 of the 293 campsites at Sutton Lake.

List of References.

1. West Virginia Geological and Economic Survey, 1968.
2. U.S. Geological Survey, 1941.
3. Davies, 1965; U.S. Geological Survey, 1967.
4. U.S. Army Corps of Engineers, 1978; Cardwell, 1981.
5. U.S. Army Corps of Engineers, 1941.
6. West Virginia Archeological Survey Site Record, 1960.
7. McCulloch and Lessing, 1980; U.S. Army Corps of Engineers, 1978.
8. U.S. Army Corps of Engineers, 1978; U.S. Department of the Interior, 1979.
9. U.S. Army Corps of Engineers, 1978.
10. Ibid.
11. Ibid.
12. West Virginia Department of Natural Resources, 1982.
13. Soil Conservation Service, 1979.
14. U.S. Army Corps of Engineers, 1978.
15. Ibid.

CHAPTER 5

**FACTORS INFLUENCING AND CONSTRAINING
RESOURCE DEVELOPMENT AND MANAGEMENT**

CHAPTER 5

FACTORS INFLUENCING AND CONSTRAINING RESOURCE DEVELOPMENT AND MANAGEMENT

5-01. General.

The purpose of this Chapter is to evaluate the resource characteristics described in the previous Chapter in light of the way that they influence or constrain the development and preservation of Sutton Lake and its associated recreation facilities.

5-02. Demographic Factors.

a. Population and Growth Trends. Sutton Lake is located entirely within the Holly Magisterial District of Braxton County. The population of Holly Magisterial District was 2,220 persons in 1980.¹ This enumeration represents a 14% increase in population over a ten-year period, as the 1970 Census showed the District's population was 1,848.

The population of Braxton County also increased over this decade. The 1980 population of 13,894 persons² represented a 9.7% increase over the 1970 population of 12,666.³

The nearby Village of Sutton gained 161 persons between 1970 and 1980, reaching a total population of 1,192 persons⁴ and representing a population increase of 15% since the 1970 Census.

According to the Area Regional Development Council, most of Braxton County's population growth has taken place outside of incorporated municipal areas. Between 1970 and 1980, incorporated areas of Braxton County increased in population by 7.9%, while the population of unincorporated areas increased by 10.1%.⁵ The Council also reported that development has generally followed transportation routes, which tend to follow the level valley terraces and ridges.

County population forecasts have been developed by the West Virginia Department of Health (1981) for the State of West Virginia. These projections are based upon each county's 1980 census information and the latest available data on births and deaths in each county. Their projections indicate that the population of Braxton County is expected to increase by 9.3%, to reach a total population of 15,190 by the year 1990. By 1998, the population is projected to increase to a total of 16,229 persons, which denotes a 16.8% increase over the number of Braxton County residents in 1980. These projections anticipate only a slight increase in total population, which is mainly due to Braxton County's having the seventh lowest rate of in-migration in the State of West Virginia (out of 55 counties).

Based on the County's average population over the 1970 to 1980 decade (13,280 persons), there were 14.8 births per 1,000 persons or 1,968 births. Likewise, there were 11.9 deaths per 1,000 Braxton County residents, or 1,580 deaths.⁶ This factor also contributes to the modest projected increase in population for the County since these mortality rates were utilized in the population projection methodology.

In 1980, the median age of Braxton County residents was 32.3 years; 6.9% of the population was under five years of age, 22.0% were 5 to 17 years of age, 55.5% were between the ages of 18 and 64, and 15.7% were 65 years of age or older.⁷

The 1980 Census data revealed that the total number of housing units in the County increased by 18.1% or 857 units over the 1970 to 1980 decade. Within Holly Magisterial District, the number of housing units also grew by an additional 289 units, representing a 23.1% increase over the number of housing units in 1970. The total number of housing units in Braxton County in 1980 was 5,583.⁸

b. Income. Per capita income in Braxton County is much lower than the State's average. In 1979, the average per capita income in Braxton County was \$4,832 compared to the Statewide average of \$7,402.⁹ Among the 55

counties in the State, Braxton County ranked fifty-second in average per capita income; and personal income, when measured in constant dollars, actually decreased between 1970 and 1975.

c. Economy and Major Industries. Economic conditions are depressed in Braxton County, which historically has one of the highest unemployment rates in Appalachia.¹⁰ The most current unemployment statistics available for Braxton County show that the average unemployment rate was 14.7% in December of 1981.¹¹ During the same month, the unemployment rate for the State was 7.8%, and 8.3% for the United States. Braxton County's highest unemployment rate in 1981 occurred in April, when the rate reached 23.2%. In 1981, the County had the highest unemployment rate Statewide for 8 months out of the year. The average unemployment rate for the entire year of 1981 was 16.8% in Braxton County, 8.0% in West Virginia, and 7.5% in the United States.

In 1979, the labor force was distributed as follows: agriculture, 1%; manufacturing, 9%; government, 31%; mining, 3%; construction, 6%; transportation and utilities, 8%; and other trades and services, 42%.¹²

Braxton County's economic environment is partly due to its geographic location, lack of employment opportunities, and lack of a diversified economy.

d. Land Use. Braxton County is almost entirely rural in nature. Of the 329,391 acres of land that comprise Braxton County, only 1.1% is considered to be urban or built-up land.¹³ Forest land is the most predominant land use comprising 88.6% of the County's total land area. Agricultural land covers 9.9% of the County, and the remaining 0.4% of the land area consists of water (0.16%), wetlands (0.21%), and barren land (0.06%).

Of the built-up land within the County, 40% is residential; 5% is commercial; 6% is industrial; and 49% is associated with transportation, communication, and utility uses.¹⁴

e. Climate. The climate of the Sutton Lake area is a mild version of the continental climate, which is characterized by seasonal and daily extremes in weather. Winter is the time of highest stream flows, and the lowest stream flows usually occur during late summer and autumn. The following are average weather conditions from 1941 to 1970, recorded in Charleston, West Virginia.¹⁵

Annual normal precipitation: 40.75 inches

Annual mean number of days with precipitation of 0.01 inches or more: 149 days

Annual average total snowfall: 29.1 inches

Annual average wind speed and direction: 6.5 mph, from southwest

Normal daily mean temperature: 55.2° Fahrenheit

More than one-half of the annual average precipitation occurs during the six-month period between April and September. Summer rainfall is primarily in the form of short, intense thunderstorms or moderate showers in connection with low pressure centers that pass north of the Elk River Basin.¹⁶

The area's climatic conditions are a direct result of its location on the western edge of the Allegheny Highlands, where prevailing westerly air masses must rise to pass over the higher elevations to the east.¹⁷ This has the effect of lowering temperatures and increasing precipitation. The rugged terrain can also cause weather conditions to vary considerably within a relatively small area.¹⁸

f. Summary. The area's population continues to increase, although at a slow rate; and the rural character of the local area has remained intact during recent years. Although the County's rate of in-migration and natural increase are relatively low, the total population is expected to

continue to increase through the year 1998. By examining past population trends it may be expected that the Holly Magisterial District will increase in population at a slightly faster rate than the County as a whole.

The County's unemployment rate is dramatically higher than that of the State or the Nation (more than twice as high in 1981), and as might be expected, per capita income is only slightly more than one-half that of the State. There is little opportunity for employment due to the lack of a diversified economy, which is partly due to the County's geographic location.

5-03. Topography, Geology, and Soils.

a. Topography. The general topography of the area is a limiting factor in the provision of recreation facilities at Sutton Lake. Because of the steep slopes and rocky terrain characteristic of the area, rapid stormwater runoff is common. The combination of steep relief, unstable soils, and intense storms contribute to highly turbid sediment-laden runoff. Flooding is common, and as previously mentioned, the lake's pool level sometimes rises high enough to flood both campsites and access roads.

The sediment-laden runoff that enters the lake also limits the fish carrying capacity of the lake, as well as that of the Elk River. Turbidity is causing no significant water quality problem, however, since this runoff enters the lake and remains in the bottom zone until it is passed through the outlet sluices of the dam.¹⁹

b. Geology. The sedimentary bedrock that is found throughout the lake area is soft and easily weathered. For this reason, development that exposes the bedrock can lead to rockslides. This bedrock is also relatively impermeable, which further promotes the problem of rapid stormwater runoff.

c. Soils. The major limiting properties of the Sutton Lake soils are their instability, shallow depth, and steep slopes. Upland soils are primarily residual sandy clays of shallow depth. These shallow soils are prone to drought and do not readily support plant cover. They can also increase costs and cause difficulty in the construction of underground facilities such as water and sewer systems. Soil creep, mud flows, and landslides are fairly common on steep slopes, and when disturbed, the soil becomes highly unstable.²⁰ These unstable soils contribute to the sediment-laden runoff that frequently invades the lake. But while the resulting turbidity levels are high, the volume of soil particles is small, as evidenced by the minimal amount of sediment deposited in the lake.²¹

5-04. Accessibility.

Access to and from Interstate Route 79 is available adjacent to the northwest portion of the Village of Sutton. Access from the East is more limited. State Routes 15 and 20 link Sutton Lake to U.S. Route 250. Charleston, West Virginia is the nearest metropolitan area, and can be reached via Interstate Route 79.

The existing road network serving Sutton Reservoir is shown on Exhibit 3. Access to the existing recreation areas is on paved surfaces.

5-05. Market Area.

a. Geographic Location and Distance to Major Population Centers. Major population centers served by Sutton Lake include the Charleston, West Virginia metropolitan area. Smaller cities and towns constitute the primary users of the lake, and portions of nearby counties (Webster, Nicholas, Upshur, Lewis, Clay, and Gilmer Counties, West Virginia) are also served.

Table 5-1 denotes distances between nearby populated areas and Sutton Lake. (See next page)

Table 5-1

DISTANCES FROM SUTTON LAKE TO MAJOR POPULATION CENTERS

City (1980 Population)*	Approximate Road Miles
Sutton (1,192)	2
Gassaway (1,225)	6
Summersville (2,972)	34
Weston (6,250)	38
Glenville (2,155)	38
Clay (940)	42
Buckhannon (6,820)	48
Richwood (3,568)	54

*1980 U.S. Census of the Population

b. Length of Recreation Season. The normal length of the area's recreation season, as determined by monthly visitation, is six months, beginning May 1 and extending through the end of September. Recreation activities during April and May consist primarily of fishing. During the peak months of June, July and August, family recreation vacations are the primary use. Visitation begins to decline during September, when fishing, along with hunting and sight seeing, become the primary activities.

c. Related Recreation Areas. There are several water-oriented recreation areas near Sutton Lake. These facilities are shown in Table 5-2. Competitive recreation facilities are identified in Section 5-06 (b) of this Chapter.

Table 5-2

WATER RELATED PUBLIC OUTDOOR RECREATION AREAS NEAR SUTTON LAKE

Name	Approximate Road Miles From Sutton Lake	Acres of Water	Location
Burnsville Lake	22	968	Braxton County, WV
Summersville Lake	36	2,790	Nicholas County, WV
Bluestone Lake	100	2,040	Summers County, WV
Tygart Lake	80	1,750	Taylor County, WV
Stonewall Jackson Lake (Under Con- struction)	45	2,650	Lewis County, WV
Stone Coal Lake	45	550	Upshur & Lewis Counties, WV
Big Ditch Lake	30	55	Webster County, WV
Teter Creek Lake	85	35	Barbour County, WV

d. Overall Demand Within the Area. The Statewide Comprehensive Outdoor Recreation Plan for West Virginia has identified the most popular outdoor activities according to various community attitude surveys which were distributed randomly throughout the State. The results showed swimming, picnicking, camping, boating, sports, and playfield activities as the most popular outdoor activities.

5-06. Marina Concessions.

a. Location and Description. The marina, located at Bee Run Day Use Area is the only commercial concession at Sutton Lake. The concession has been in operation since 1965.

Facilities at Bee Run Marina include a manager's headquarters, and 125 boat slips which are usually filled to capacity. Boat rentals (4 pontoons and 9 fishing boats), marine fuel, and snack bar concessions are also provided.

b. Locations and Characteristics of Competitive Facilities. There are several other marina facilities located near the Bee Run Marina. These are included among those facilities listed in Table 5-2, and the competitive facilities are briefly described below.

(1). Burnsville Lake. Located about 22 miles north of Sutton Lake is Burnsville Lake, a recently constructed 968 acre (summer pool) lake which offers recreation facilities for boating, camping, hunting, a marina, swimming, and day use. Historic renovation of Civil War era buildings with a future interpretive program is planned. An operations office and a visitor's center are also proposed for future development.

(2). Summersville Lake. Located about 48 miles south of Sutton Lake, Summersville Lake has a seasonal pool of 2,790 acres and offers recreational facilities which include boating, a marina, fishing, hunting, a swimming beach, camping, and a day-use area.

(3). Bluestone Lake. Located near Hinton, West Virginia, Bluestone Lake offers recreational opportunities for camping, picnicking, boating, a marina, fishing, hunting, and swimming. Drive-in and boat-in campsites are available.

(4). Tygart Lake. Located near Grafton, West Virginia, Tygart Lake is a component of a State Park which provides lodge and cabin facilities. Several boat launching ramps and a public marina are available for fishing and waterskiing activities. Two swimming beaches, camping, and hunting facilities are available to the visitors of this park.

(5). Stonewall Jackson Lake. Currently under construction near Weston, this lake will provide facilities for fishing, hunting, boating, camping, and day use.

5-07. Reservoir Plan of Operation.

Beginning around 1 April each year, excess water flows are retained to establish a seasonal summer pool at an elevation of 922 feet above mean sea level (m.s.l.). Flows are generally sufficient to permit the establishment of a seasonal pool by 15 April. The lake is maintained at 922 feet above m.s.l. until about 1 October, subject to temporary increases to reduce

flood flows and releases for low flow augmentation. The lake is then lowered to the minimum winter pool between 1 October and 30 November; and from 1 December until 31 March, a minimum pool is maintained at an elevation of 895 feet above m.s.l. The primary purpose for maintaining a minimum pool from 1 December until 31 March is for conservation of the lake's aquatic life during winter months. The flood control pool elevation is 1,000 feet above mean sea level.

5-08. Siting of Road, Cemetery, and Utility Relocation.

During the initial construction of the Project, the relocation of many existing site improvements was necessary. These relocations consisted of relocating 8.7 miles of single track of the Baltimore and Ohio Railroad, including 5 bridges; 14.2 miles of telephone and telegraph lines; 4.5 miles of power lines; 0.8 miles of gas pipe line, and 18 cemeteries having a total of 700 graves.

5-09. Water Quality of Pool and Tailwater.

As previously mentioned, turbidity is a periodic problem in Sutton Lake. The U.S. Army Corps of Engineers (1978) notes that rainstorms result in a flow of turbid water entering Sutton Lake from the various tributaries and traveling the length of the reservoir at various speeds according to the depth of the lake. This results in a more prolonged flow of turbid

waters because the deeper, turbid currents reach Sutton Dam after the peak flow of turbid surface waters (upper layer of stratified lake water). The installation of the high level discharge facility is helping to minimize this problem.

Measurements of water quality reported by the U.S. Geological Survey (1976) for the Elk River near the Village of Sutton (1973 to 1974) indicate good overall water quality when compared to U.S. EPA Water Quality Standards (1976).

There are several domestic wells recorded for the area surrounding Sutton Lake. Groundwater yields of 1 to 20 gallons per minute are available from the aquifer within the jointed or fractured shale and sandstone bedrock layers. Depth to the top of this aquifer varies from about 10 to 130 feet.²²

5-10. Adaptability of Spillway and Other Project Structures.

The project operations area at Sutton Lake is currently fully developed. The spillway is an integral part of the dam structure and does not lend itself to special uses.

5-11. Pre-project Exploitation of Minerals and Timber.

No substantial exploitation of resources has occurred that would affect the use and enjoyment of the Project.

5-12. Project Visitation.

a. General. An analysis of past visitation at Sutton Lake may be used to determine future recreation needs and priorities. Visitation estimates have been obtained by periodically surveying recreation activity use and traffic entering the Project area. These surveys are designed to account for seasonal, weekend and weekday use, and recreation area use.

b. Procedures for Determining Visitation. The product of vehicles actually entering the facility for recreation purposes, times the average number of persons per vehicle equals the approximate number of visitors. A further breakdown by activity is then applied to this number in order to arrive at an estimate of use for each activity. Visitor use estimates for 1981, 1982, and 1983 are shown in Table 5-3.

By averaging activity use estimates taken in 1981, 1982, and 1983, a base condition was created from which to project estimates of future use.

Estimates were made for the years 1985, 1990, 2000, and 2020 and are also shown in Table 5-3. They were derived by using a straight-line interpolation of Bureau of Outdoor Recreation data (now a part of the National Park Service) and the West Virginia and Virginia State Comprehensive Outdoor Recreation Plan. Annual rates of increase for recreation activities are given in Table 5-4.

Table 5-3

ESTIMATES OF RECREATIONAL USE:
HISTORIC AND PROJECTED

HISTORIC											
Year	Camp	Picnic	Boat	Fish	Hunt	Sight See	Water Ski	Swim	Other	Activity Days	Recreation Days
1981	64,919	92,012	34,811	81,077	5,248	432,918	7,568	56,386	430	775,369	670,231
1982	70,098	58,734	34,898	83,853	4,616	437,974	8,088	59,691	751	758,703	661,968
1983	61,825	50,117	29,862	70,110	4,331	431,689	6,034	55,178	4,008	713,154	658,718
AVG. BASE CONDITION	65,614	66,954	33,190	78,347	4,732	434,194	7,230	57,083	1,730	749,075	663,639
PROJECTED											
1985	66,933	67,854	34,308	79,653	4,827	441,431	7,400	58,230	1,765	838,641	762,401
1990	70,347	70,157	37,270	83,014	5,073	460,057	7,844	61,200	1,855	879,499	796,817
2000	77,707	75,003	43,983	90,167	5,604	499,700	8,811	67,603	2,049	957,690	870,627
2020	94,817	85,719	61,255	106,376	6,838	589,529	11,119	82,488	2,500	1,444,705	1,040,641

Note: A visit by one individual to a recreation site, area, or project for recreation purposes during all or any portion of a 24-hour day is a recreation day. Each activity the individual participates in is counted as an activity day. The average ratio of activity days to recreation days at Sutton Lake for 1978, 1979, and 1980 was 1.1. This ratio was used to calculate recreation days for 1978, 1979, and 1980, and the projected years 1985, 1990, 2000, and 2020.

Source: Based on data obtained from Outdoor Recreation in America: An Economic Analysis, Appendix A of the 1973 Nationwide Plan for Outdoor Recreation prepared by the U.S. Department of the Interior, Bureau of Outdoor Recreation.

Table 5-4

ANNUAL RATE OF INCREASE
FOR RECREATION ACTIVITIES

Activity	Rate of Increase* Per Year
Camping	1.00
Picnicking	0.67
Boating	1.67
Fishing	0.83
Hunting	1.00
Sightseeing	0.83
Water Skiing	1.17
Swimming	1.00
Other	1.00

*Rates of increase were derived from Outdoor Recreation in America: An Economic Analysis, Appendix A of the 1973 Nationwide Plan for Outdoor Recreation prepared by the U.S. Department of the Interior, Bureau of Outdoor Recreation.

c. Design Load and Facility Needs. The design load is defined as the projected visitation which will occur on an average weekend day during the peak month of the recreation season. To calculate the design load for an average weekend day in 1985, the following methodology was used:

$$DL = \frac{D \times \%PM \times \%WE}{N}$$

Where: DL = Design Load
 D = Demand (actual attendance from Table 5-3)
 %PM = Percent of Demand Occurring in a Peak Month (16%)**
 %WE = Percent of Peak Month Use Occurring on Weekends (68%)*
 N = Number of Peak (weekend) Days in a Month (8)

*Compiled from the West Virginia Statewide Comprehensive Outdoor Recreation Plan.

**Adjusted to 33% for hunting.

Therefore: $\frac{838,641 \times .16 \times .68}{8} = 11,405$ (Total maximum project visitation during an average weekend day in 1985)

The complete list of projected peak summer weekend visitation is displayed in Table 5-5.

Table 5-5

TOTAL PROJECTED VISITATION
ON PEAK SUMMER WEEKEND DAY

Year	Projected Visitation	Visitors on Peak Summer Weekend Day
Base Year 1983	749,075	10,187
1985	838,641	11,405
1990	876,499	11,920
2000	957,690	13,025
2020	1,144,705	15,568

The Design Load is utilized to calculate day loads for individual activities. In order to establish the activity design loads, participation rates must be established. Table 5-6 lists the participation rates for Sutton Lake.

Table 5-6

PARTICIPATION RATES

Activity	Percent
of Participation	
Camping	10.0
Picnicking	10.5
Boating	4.9
Fishing	12.0
Hunting	1.0
Sightseeing	62.7
Water Skiing	1.3
Swimming	10.1
Other	0.1
TOTAL	112.6*

*A total percentage greater than 100 percent indicates that visitors often engage in more than one activity while at the lake.

Table 5-7 illustrates the design load for each activity based upon projected annual total use. These figures were calculated by computing the product of design load and the individual participation rates.

Table 5-7

PROJECTED ACTIVITY DEMAND

Activity	Participation Rate	x	Design Load				=	Projected Activity Demand			
			1985	1990	2000	2020		1985	1990	2000	2020
Camping	.100		11,405	11,920	13,025	15,568		1,140	1,192	1,302	1,557
Picnicking	.105		11,405	11,920	13,025	15,568		1,197	1,252	1,368	1,635
Boating	.049		11,405	11,920	13,025	15,568		559	584	638	763
Fishing	.120		11,405	11,920	13,025	15,568		1,369	1,430	1,563	1,868
Hunting	.01		59,166	61,837	67,565	80,759		591	618	675	808
Sightseeing	.627		11,405	11,920	13,025	15,568		7,151	7,474	8,167	9,761
Swimming	.101		11,405	11,920	13,025	15,568		1,152	1,204	1,315	1,572

At this point, the total number of facility units needed to meet projected demand can be calculated through a formula based on maximum one-day use, average group size, and turnover rates. The average group size and turnover rates for Sutton Lake are presented in Table 5-8.

Table 5-8

AVERAGE GROUP SIZE AND TURNOVER RATES

Activity	Average Group Size	Turnover Rate
Camping	4	1
Picnicking	4	2
Boating	4	40 launches per day
Fishing	3	40 launches per day
Hunting	1	2
Sightseeing	4	5
Swimming	4	2

The formula used to calculate facility needs for maximum one-day use is as follows:

$$FN = \frac{D}{XG \times TR}$$

Where: FN = Facility Needs
D = Demand (as shown in Table 5-7)
XG = Average Group Size (as shown in Table 5-8)
TR = Turnover Rates (as shown in Table 5-8)

The results of this formula, along with a list of existing facilities, are shown in Table 5-9. By subtracting the projected demand from the existing supply, the quantity of needs or surplus can be determined.

d. Capabilities and Recommendations. As can be seen from the information shown in Table 5-9, the Project is deficient in picnic tables, boat launching lanes and square feet of swimming beach. Before recommending additional facilities, however, a comparison must be made between projected visitation and capacities of the Project. The result of this comparison identifies problem areas or discrepancies between facility supply and demand, and resource capacity. Future facility development at Sutton Lake will be determined on the basis of (1) what the project resources can support; (2) relative demand (which is reflected in the participation rates for various recreation activities); and (3) State projections of regional recreation needs. The visitation projections calculated previously will not be used as sole determinants for the number of facilities to be provided.

(1). Maximum Practical Use. Maximum Practical Use (M.P.U.) is defined as an estimate of annual recreational use which is proportional to a level of water surface acreage. For this reason, M.P.U. is dependent on the amount of water-oriented recreation, expressed as a function of an upper bound on the number of boats which the lake can support, given

Table 5-9

SUMMARY OF MAJOR FACILITY NEEDS (FN)

Facility Type:	Camping Units	Picnic Tables	Boat Launch ¹ (Lanes)	Swimming ² (Sq. Feet)	Hunting (Acres)	Sightseeing (Parking Spaces)						
Existing Supply:	293	73	8	10,000	11,725	549						
Year	FN*	Need (-) Surplus (+)	FN	Need (-) Surplus (+)	FN	Need (-) Surplus (+)	FN	Need (-) Surplus (+)	FN	Need (-) Surplus (+)	FN	Need (-) Surplus (+)
1985	285	+ 8	150	-77	9	- 1	28,800	-18,800	5,024	+6,701	358	+191
1990	298	- 5	156	-83	10	- 2	30,100	-20,100	5,253	+6,472	374	+175
2000	325	- 32	171	-98	10	- 2	32,900	-22,900	5,738	+5,987	408	+141
2020	389	- 96	204	-100	13	- 5	39,300	-29,300	6,868	+4,857	488	+ 61

*FN = Facility Needs

1. Includes lanes needed for boating and fishing. Assumes 50% of fishing occurs from a boat.
2. Parking spaces were converted to square feet of swimming beach by multiplying the number of parking spaces by 4 persons per vehicle x 50 square feet per person.

a density factor. Attainment of this upper bound proportionately inhibits other non-water-oriented activities. Therefore, to compute M.P.U., it is necessary to identify the upper bound of boaters and to apply the resulting figure to an upper bound of the facility design-day load, which is further projected as an estimate of maximum annual attendance.

The following methodology is utilized to compute the Maximum Practical Use:

1. Identify upper bound boaters which the lake will support.
2. Apply to upper bound one facility design-day load (which is an estimate of maximum annual attendance).

1. Upper Bound on Boaters = B max.

$B \text{ max.} = (S \times R_b) \times (W/w)$
 S = Average size of party (4 persons)
 R_b = Turnover Rate (1)
 W = Total water surface acres at summer pool (1,440)
 w = Area requirement (acres) per boat (4)

$B \text{ max.} = (4 \times 1) \times (1,440/4)$
 $= 4 \times 360$
 $= 1,440 \text{ persons (or occasions)}$

2. Facility Design - Day Load Upper Bound = L max.

$$L \text{ max.} = B \text{ max.} / (pb + pf)$$

pb = proportion of visitation pleasure boating
including water skiing

pf = proportion of visitation fishing

$$\begin{aligned} L \text{ max.} &= 1,440 / (.062 + .12) \\ &= 1,440 / .182 \\ &= 7,912 \end{aligned}$$

3. Maximum Practical Use - M.P.U.

$$M.P.U. = (L \text{ max.} \times D) / (P \times E)$$

D = Average # weekend days in peak month (8)

P = Average proportion in peak month (percent demand
occurring in peak month)

E = Proportion (WE) (percent peak month use occurring
on weekends)

$$\begin{aligned} M.P.U. &= (7,912 \times 8) / (.16 \times .68) \\ &= 63,296 / .1088 \\ &= 581,765 \text{ occasions} \end{aligned}$$

It is apparent (based on a projected annual attendance of 838,641 in 1985) that the M.P.U. will be exceeded, since the Maximum Practical Use is less than the water-related annual use expected. However, due to the large land base of the Project and the Project's ability to accommodate existing use (775,369 visitors in base year), it is felt that a Maximum Practical Use of 838,641 in 1985 is not entirely unrealistic. Areas existing or proposed for the Project have and will be able to support intensive use.

(2). Lake Capacity. In order to compare the ability of Sutton Lake to accommodate the maximum number of boating occasions identified previously, it is necessary to perform one additional calculation. If it is assumed that a minimum of five acres of water is provided for each boat, and that 100% of the lake is available for boating (based on summer pool), the lake capacity may be determined as follows:

Where:
$$\frac{\text{Surface Acres} \times \text{Average Group} \times \text{Turnover} \times \text{Constant}^*}{\text{Acres/Boat}}$$

$$\frac{1,440 \times 4 \times 1 \times 73.53}{4} = 105,883$$

Therefore: The lake capacity is 105,883 annual occasions.

Facility capacity for launch (8 lanes) = 94,118 annual occasions;

(8 x 4 x 40 x 73.53 = 94,118 annual occasions)

Although the lake capacity is 105,883 annual occasions, visitation is anticipated to be 838,641 in 1985. At a 12.2% boating participation rate, the expected boating occasions are 102,314 (includes boats at marina). This rate about equals the lake capacity. Construction of additional boat ramps to satisfy expected future demand is not recommended. It is felt that the addition of the boat ramps will degrade the lake and will lessen user

* (Constant = $\frac{\text{No. of Weekend Days in Month}}{\%PM \times \%WE} = \frac{8}{.16 \times .68} = 73.53$)

satisfaction. Additional need for boating and boat ramps may be satisfied with the completion of Burnsville Lake and Stonewall Jackson Lake. Additional swimming beach is recommended if topography is suitable. It should be noted, however, that some of the demand for swimming may be satisfied upon completion of the beach at Burnsville Lake, located less than 25 miles from Sutton Lake.

5-13. Application of Public Law 89-72.

As stated previously, the Federal Water Project Recreation Act of 1965 (Public Law 89-72) has been applied administratively to this Project and requires a 50%/50% non-Federal cost-sharing partner for the development, enhancement, and management of new recreation and fish and wildlife resources.

5-14. Environmental and Ecological Features.

a. General. Optimal development and management of Sutton Lake is dependent upon the recognition of the unique environmental features offering both potential for development, as well as potential limitations to the successful use of the area. Since these features have been discussed in a previous Section of this Chapter, the most significant features and their effects on constraining development are discussed below.

b. Topography. The severely dissected terrain and steep slopes place considerable restriction on further development potential at Sutton Lake.

c. Water Quality. Overall water quality is good, but the potential for acid drainage problems is possible because of existing coal mine operations upstream from the Project.

d. Fish and Wildlife. Major wildlife management areas currently existing within the Project need to be maintained and any proposed improvements must be sensitive to this factor.

e. Soil Types. Major soil limitations are instability and shallow depth to bedrock. Shallow soils in upland areas are drought-prone and do not readily support plant material.

f. Vegetation. The heavily forested areas of the Project provide wildlife habitat, erosion control, and slope stabilization as well as aesthetic benefits. Care must be exercised to minimize the impact of development on vegetation.

List of References.

1. U.S. Bureau of the Census, 1980.
2. Ibid.
3. U.S. Bureau of the Census, 1970.
4. U.S. Bureau of the Census, 1980.
5. Region VII Planning and Development Council, 1981.
6. West Virginia Department of Health, 1981.
7. West Virginia State Census Data Center, 1982.
8. U.S. Bureau of the Census, 1980.
9. U.S. Department of Commerce, 1981.
10. Regional VII Planning and Development Council, 1981.
11. West Virginia Department of Employment Security, 1981.
12. U.S. Department of Commerce, 1981.
13. McCulloch and Lessing, 1980.
14. Ibid.
15. National Oceanic and Atmospheric Administration, 1977.
16. U.S. Army Corps of Engineers, 1978.
17. Ibid.
18. Ibid.
19. Ibid.
20. Ibid.
21. Ibid.
22. U.S. Geological Survey, 1976.

CHAPTER 6

COORDINATION WITH OTHER AGENCIES

CHAPTER 6

COORDINATION WITH OTHER AGENCIES

6-01. General.

Direct coordination with Federal, State, and local agencies, as well as citizen interest groups has been an ongoing process in the preparation of this Master Plan Update for Sutton Lake. To elicit comments and suggestions from concerned agencies and groups copies of this master plan were distributed to the following agencies so that their ideas could be incorporated into the final report. Letters received from the various agencies are attached to this Master Plan Update as Appendix I and a summary of the coordination comments received are provided in this chapter. The asterisk indicates those agencies that submitted comments.

6-02. Federal Agencies.

- a. Soil Conservation Service
- b. Appalachian Regional Commission
- *c. Federal Energy and Regulatory Commission
- *d. Environmental Protection Agency
- e. U.S. Fish and Wildlife Service
- *f. U.S. Forest Service
- g. National Park Service

6-03. State Agencies.

- a. West Virginia Pollution Control Commission
- b. West Virginia State Attorney General,
Environmental Protection Division
- *c. State of West Virginia Department of Culture and History
- d. State of West Virginia Library Commission
- e. State of West Virginia Department of Mines
- *f. State of West Virginia Department of Natural Resources.

The major interest of this agency involves the locations of proposed construction and its affect upon future and existing wildlife development and wildlife populations. Coordination with this agency has resulted in modifications to final proposed improvements so that their implementation would not have detrimental affects upon existing wildlife habitats.

6-04. Regional and Local Agencies.

- a. Region Seven Planning and Development Council.
- b. Braxton County Commission.
- c. Office of the Mayor, Sutton, West Virginia.

6-05. Comments

This section addresses the major comments received in the review of this document. Additional written comments of those that responded are found in Appendix F and have been incorporated into the text where appropriate.

U.S. Environmental Protection Agency

Comment: The extent of coal reserves is noted, but their ownership and plans for exploitation are not. Since acid mine drainage carries severe implication's for fishing and wildlife uses, as well as for contact recreation, we feel extensive overburden geochemistry should be considered.

Response: The potential for acid mine drainage into the lake is always one of our concerns. At Sutton Lake, as at other Corps lakes, our management authority is limited to those areas on Government property. Since all mining within the watershed is off Government lands we can only monitor water quality and request that the State Department of Natural Resources or EPA require mining and drilling operators to conform to acceptable standards and procedures.

A full survey of coal reserves for the water shed, including ownership and extraction time table, although important, is beyond the scope of this master plan.

Comment: It is mentioned that Braxton County has no serious fault zones, but complete structural geological information is not presented.

Response: A more complete survey of project geology is found in the Definite Project Report for Sutton Lake, a copy of which may be obtained through this office.

West Virginia Department of Natural Resources

Comment: It is recommended that the Corps re-evaluate methods used and estimates derived concerning present and projected hunter use.

Response: Estimates for hunter use have been recalculated for the project. These new estimates are based on the standard of one hunter per 17 acres and considers the short hunting season. These calculations also assume that 50 percent of the hunters on the project are not counted in the overall visitation.

Comment : This department recommends that the Corp consider federal cost sharing with the W.R.D. for placement of fish attractors in the lake.

Response: Representatives of the Corps have contacted the Water Resources Division and have expressed our willingness to pursue this endeavor. When the state transmits a Letter of Intent to cost share for this work, the Corps will prepare the necessary documents and cost estimate. Since this project will require an exception to the current cost share procedure the Corps will supplement this master plan at a later date.

Comment: The "recreation season" as defined does not include the majority of the hunting season and excludes fall and winter fishing.

Response: "Recreation season" is a nationally accepted term which refers to a project's or activities season of highest visitation. At Sutton Lake, the season extends from the beginning of May to the end of September. Visitor use, however, is recorded year round so that winter and fall fishing and hunting are included in the projects total yearly visitation.

Comment: Hunter participation rates were apparently based on surveys conducted during the summer. Estimates should be derived from seasonally adjusted data.

Response: Hunter participation rates are based on percentages of actual project visitation. We determine this to be more accurate since we are projecting actual use and not state or regional trends. We agree that visitation figures are only as good as sampling methods. Hunter use has been retallied based on the assumption that 50 percent of the hunters were not counted in the overall project visitation.

Comment: Determination of lake boating capacity is apparently based solely on boating recreation. Fisherman can and do tolerate more crowding. Launching facilities are often crowded on certain weekends due to high fisherman numbers. Increased launching facilities may be necessary in the future to accommodate this use.

Response: Determination of lake boating capacity is based on interpolation of boating standards displayed in the West Virginia SCORP, Ohio SCORP, Kentucky SCORP, and on information presented in the Recreation Carrying Capacity Handbook by the Urban Research and Development Corporation. Design standards presented in these documents varies considerably. In the past the Corps has used 1 boat per 5 acres as its design standard. This standard was a median for fishing from a boat, open boating, and water skiing. Further analysis of visitation at Sutton Lake would indicate that 1 boat per 4 acres may be more representative. The text has been changed accordingly.

Comment: This department understands that safety zones are necessary near intensive recreation areas, but the report indicates that hunting will not be permitted in areas zoned in this manner. Much of the area delineated recreation intensive is now hunted. It is recommended that zones remain open to hunting except where there is danger to public safety.

Response: Corps regulations prohibit hunting in recreation areas. Posting of these areas is determined by easily identifiable topographic features, for example tops of ridges. We highly recommend that extreme caution be used in permitting hunting adjacent to recreation areas.

Comment: This agency does not concur with the reduction of the number of parking spaces in the parking lot below the dam.

Response: The parking lot concept as presented in the final draft has been revised and the 90 degree parking retained. However in an effort to soften the visual impacts of the large expanse of paving, provide shade, and a much needed overhead plane, this plan recommends removing the asphalt in 5 parking spaces and planting trees.

Comment: A severe safety problem exists in the tailwater due to the large size of rip rap used for bank stabilization. The Corps is urged to undertake measures to increase the comfort and safety of fisherman at this location.

Response: The Corps is aware of this problem and will make every effort to correct it as funds become available.

Comment: It is a contention of this department that the boat launching ramp at the former Brock Run Site also be counted as "credit" and be relocated at another site at full Federal expense. The Corps should consider its relocation at the tailwater.

Response: The boat ramp at the former Brock Run area is a primitive ramp constructed of randomly placed rubble and will not be counted as credit.

Comment: Construction of a fisherman access trail in the area above the dam is not recommended due to relatively poor fishing conditions. A better location for fisherman access would be in the Kanawha/Brock Run Area.

Response: This proposal has been deleted. After discussions with representatives of the Department of Natural Resources, it is recommended that, when funds become available, a trail be constructed along the old railroad bed from Bakers Run to an area opposite the confluence of the Holly River.

CHAPTER 7

PHYSICAL PLAN OF DEVELOPMENT

CHAPTER 7
PHYSICAL PLAN OF DEVELOPMENT

7-01. Introduction.

The purpose of Chapter 7 is to formulate a physical plan of development based on the natural, cultural and economic data delineated in Chapters 4 and 5. These objectives were then used to determine the facilities to be provided resulting in a physical plan for Sutton Lake which reflects the projected needs for the identified user groups. By initiating a planning process, the analysis of this data provided for the identification of Resource Use Objectives.

7-02. Resource Use Objectives.

Resource Use Objectives were developed in accordance with ER 1105-2-167 which establishes guidelines for developing project Resource Use Objectives. The following Resource Use Objectives have been identified for Sutton Lake.

Objective 1. To provide an upgrading of existing facilities for the purpose of increasing the quality of the users' recreational experience.

Objective 2. To provide increased opportunities for swimming, given the projected demand for this activity.

Objective 3. To improve recreational opportunities within the capability of the responsible agency(s) to perform adequate operation and maintenance.

Objective 4. To improve the scenic and aesthetic quality of existing recreational facilities.

Objective 5. To provide increased opportunities for shoreline fishing.

Objective 6. To minimize the expansion of recreational facilities based upon visitor demand projections.

Objective 7. To conserve and upgrade the natural resources of the project through the use of a coordinated land management program.

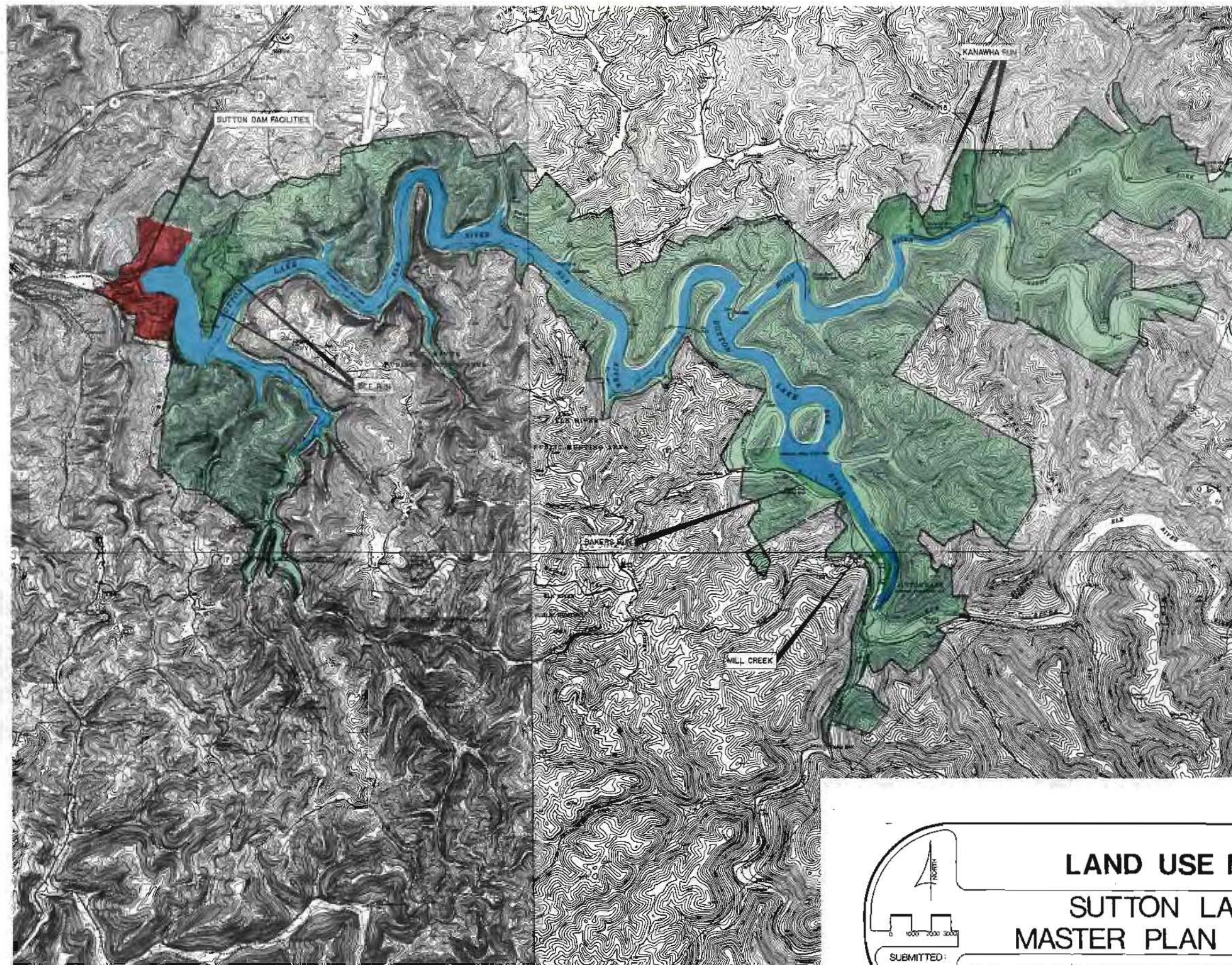
7-03. Land Use Plan.

The physical plan for the development of Project Lands was formulated following the evaluation of factors discussed in Chapters 4 and 5 of this report. Land allocations are in accordance with categories set forth in ER 1120-2-400. Each allocation of land is defined and its application discussed below. The areas designated are illustrated in Exhibit 5.

Table 7-1

LAND ALLOCATION CATEGORIES
(Total Fee Acres)

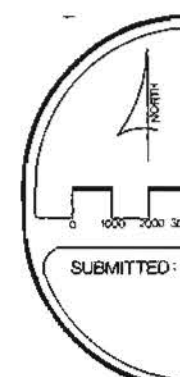
Project Operations	148.5 acres
Operations: Recreation-Intensive Use	156 acres
Operations: Recreation-Low Density Use	1,124.5 acres
Operations: Fish and Wildlife Management	11,725 acres
TOTAL ACRES ABOVE SEASONAL POOL	13,154 acres



LEGEND

- PROJECT OPERATIONS
- OPERATIONS-RECREATION INTENSIVE
- OPERATIONS-WILDLIFE MANAGEMENT
- SEASONAL POOL, EL. 922 M.S.L.
- MAXIMUM FLOOD CONTROL POOL, EL. 1000 M.S.L.
- U.S. HIGHWAY
- WEST VIRGINIA SECONDARY ROUTE
- U.S. GOVERNMENT PROPERTY LINE (FOR PROJECT)

SOURCE OF TOPOGRAPHY: UNITED STATES GEOLOGICAL SURVEY 7.5 MINUTE QUADRANGLE MAPS.



SUBMITTED:

LAND USE MAP SUTTON LAKE MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT
CONSULTANTS

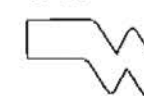


EXHIBIT NO.
5

a. Project Operations. Lands in this category are allocated to provide for the safe, efficient operation of the Project for authorized purposes other than recreation and fish and wildlife management. These lands include the dam, intake and outlet structure, spillway, personnel quarters, maintenance facilities, and storage yards.

b. Operations: Recreation-Intensive Use. Recreation-Intensive Use areas are those which are allocated for the intensive development of both passive and active recreational activities. As such these targeted areas will draw the greatest concentrations of people and so will require high levels of development and facilities. Representative uses which take place on Recreation-Intensive Use areas include camping, picnicking, overlooks for interpretive activities and reflection, boating, fishing, swimming, sport fields, and play areas. Development may include concession and quasi-public facilities in addition to those facilities operated and maintained by public agencies. Agricultural uses are permitted on an interim basis only. Current intensive use areas proposed for improvements in the Sutton Lake Master Plan Update include the Dam Site Day-Use Area; Bee Run Day-Use and Camping Areas; Lower, Middle, and Upper Kanawha Run Camping Areas, Mill Creek Camping Area, and Bakers Run Camping Area.

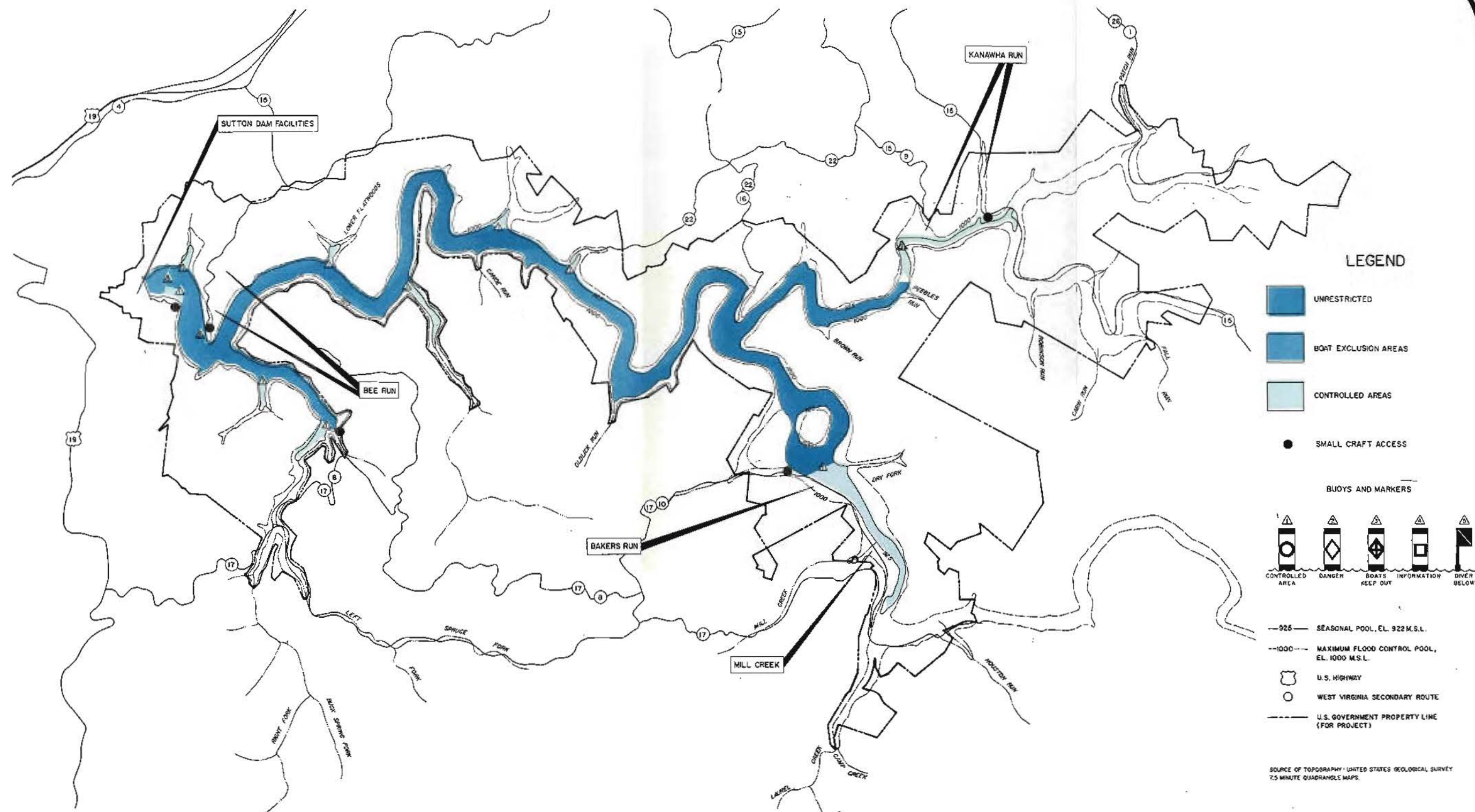
c. Operations: Recreation - Low Density Use. Lands allocated to the low density recreation category function as areas of limited development po-

tential that support occasional passive use. While it is not within the best interest of the resource to intensify these areas or promote visitor usage, they do provide places for picnicking and hunting away from high density areas. Factors limiting further development may include, steep topography, shallow soils, limited access, general configuration or unwarranted dispersal of activities. By their very nature, these areas serve as excellent buffers between high density recreation areas. Because activities, which are appropriate in this category, are basically the same as those encouraged in wildlife management areas, they have been combined on the Land Use Plan depicted in Exhibit 5.

d. Operations and Wildlife Management. Wildlife areas include those allocated as habitat for fish and wildlife or for their propagation. These lands are continuously available for passive recreational programs such as ecological workshops and forums, as well as for nature and hiking trails. Lands were selected on the basis of known locations of particular species, habitat variety, and management potential in terms of topography, soils, vegetation, and size consideration.

7-04. Water Use Plan.

A plan for allocation of project waters was formulated in accordance with ER 1165-2-400. The water use plan is shown on Exhibit 6. The various categories of water use are defined and their application is discussed below.



WATER USE PLAN

SUTTON LAKE

MASTER PLAN UPDATE

SUBMITTED:

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON

CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT CONSULTANTS

EXHIBIT NO.
6

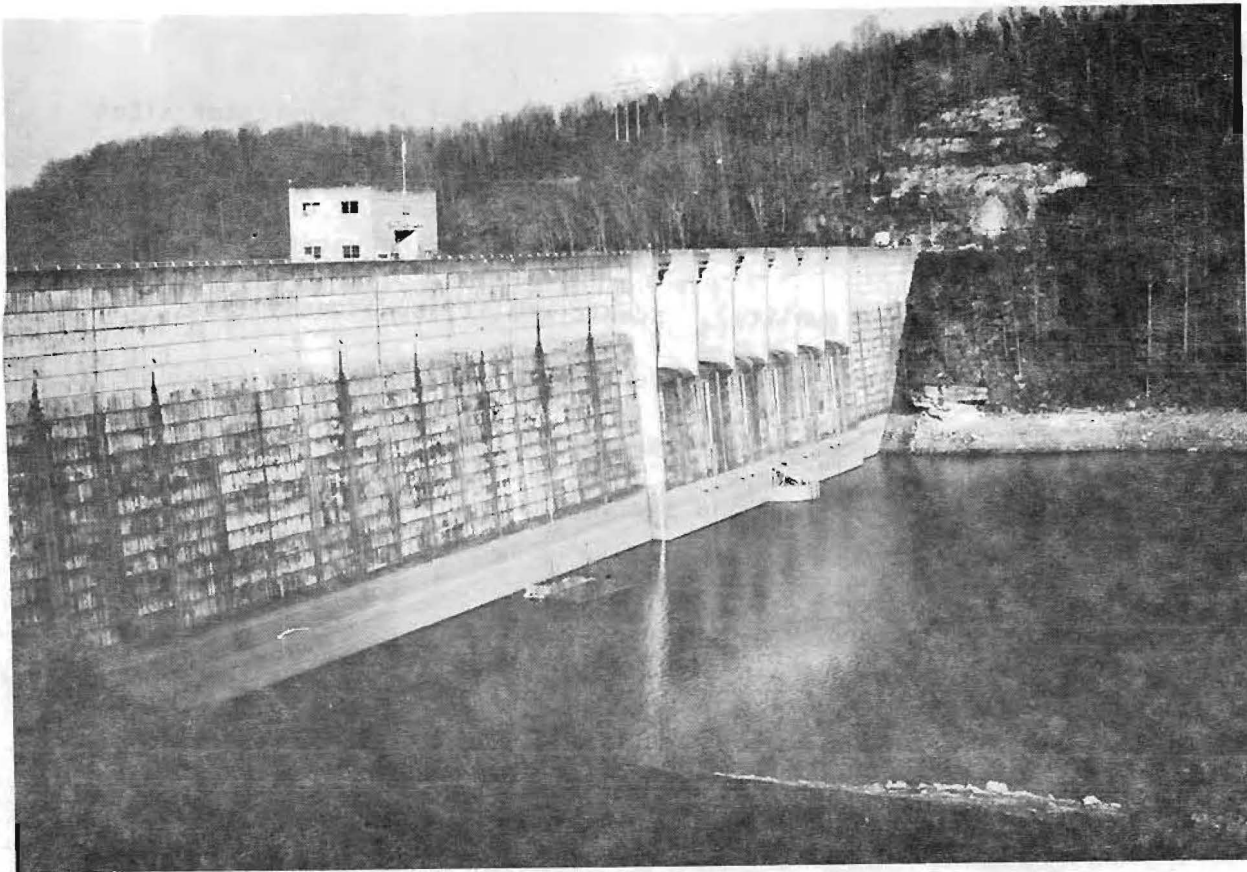
a. Unrestricted Water. Unrestricted waters are those which are allocated to meet the needs of water-related activities which require relatively large areas for safe and efficient operations. All water-oriented activities are permitted in these areas, except SCUBA and skin diving. At Sutton Lake, the main body of water from the restricted zone above the dam to the mouth of Dry Fork Creek and 2000 feet upstream of the mouth of Peebles Run Creek, has been allocated as unrestricted water. All tributary coves in this area are no wake zones.

b. Boat Exclusion Areas. Boat Exclusion areas are those which have been deemed off-limits to all boating activity and are clearly marked as such with buoyed markers. At Sutton Lake these areas include the operational structures above the dam and at the beach at Bee Run Day-Use Area.

c. Controlled Areas. Controlled Areas include No-Wake Zones. No wake zones have been designated to limit speeds in small coves, shallow areas, or other potentially unsafe situations where high speeds may create safety or environmental problems. At Sutton Lake, no-wake zones are located at all creek mouths, immediately above the Boat Exclusion Area at the dam, to the south of Dry Fork Creek, and to the east of Peebles Run Creek. SCUBA and skin diving are usually permitted in no-wake zones.

7-05. Project Structures.

Sutton Dam is a concrete gravity structure having an overall length of 1,178 feet and a height of 207 feet (elevation 1,017 feet). The dam is 20 feet wide at the crown, tapering from a maximum base width of 195 feet. The 280 feet spillway has a crest elevation of 972 feet and is comprised of 6 electrically operated tainter gates, which are 40 feet long by 31 feet high. Along the base of the spillway are 5 conduits, 5'8" wide by 10 feet high, each equipped with a hydraulically operated sluice gate and one 36 inch diameter valve-controlled sluice gate for low-flow control. One emergency bulkhead (11'-2.5" wide by 19'-0.5" high) is available for the conduits. A high level discharge facility draws water from the upper levels of the water mixing it with the level discharges. Located at the top of the dam, on the southern abutment, is the administration tower housing the operation's office and visitors' lounge.



PICTURE 7-1

Northern face of the Dam structure. In this view, taken in late November, the pool level has dropped approximately 20-25 feet.

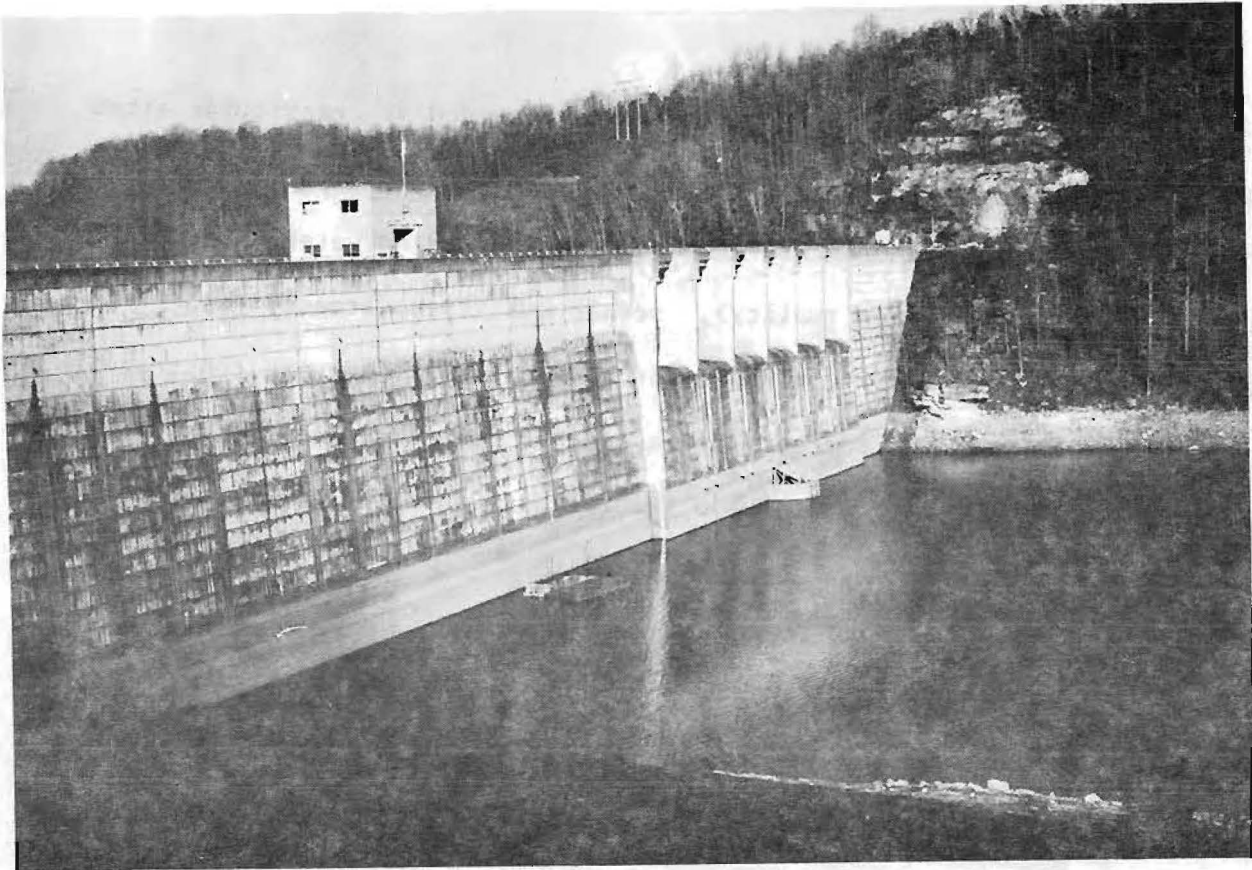
A maintenance garage and utility building are located 1,100 feet below the Dam adjacent to the access road to the tailwater. Two residences provided for the resident manager and ranger lie approximately 250 feet behind the utility building, but are adequately separated by over 100 feet of embankment elevation.

7-06. Recreation Area Plans.

Selection of the type of facilities to be provided at particular sites was based on a number of factors such as anticipated need, topographic and ecological character, land/water relationships (including water depth, wind and wave action, and water quality), scenic qualities, access, and relationship to and compatibility with adjacent land uses. A severe constraint in the development of the recreational areas has been the lack of developable land due to steep topography and the lack of vehicular access to those areas.

Table 5-9 indicates existing facility use and projected future needs for the entire Project. These demand estimates were used as a general guide along with the other factors mentioned above, in the distribution of proposed facilities among the various sites.

Additional analysis generated during the planning process to aid in site development proposals are included Table 5-4 which projects anticipated growth per annum for each of the recreational activities; Table 5-5 which projects total Project visitation for 1985, 1990, 2000, and 2020; Table 5-6 which shows participation rates for each activity; Table 5-7 which projects future activity demands for those recreational activities



PICTURE 7-1

Northern face of the Dam structure. In this view, taken in late November, the pool level has dropped approximately 20-25 feet.

A maintenance garage and utility building are located 1,100 feet below the Dam adjacent to the access road to the tailwater. Two residences provided for the resident manager and ranger lie approximately 250 feet behind the utility building, but are adequately separated by over 100 feet of embankment elevation.

7-06. Recreation Area Plans.

Selection of the type of facilities to be provided at particular sites was based on a number of factors such as anticipated need, topographic and ecological character, land/water relationships (including water depth, wind and wave action, and water quality), scenic qualities, access, and relationship to and compatibility with adjacent land uses. A severe constraint in the development of the recreational areas has been the lack of developable land due to steep topography and the lack of vehicular access to those areas.

Table 5-9 indicates existing facility use and projected future needs for the entire Project. These demand estimates were used as a general guide along with the other factors mentioned above, in the distribution of proposed facilities among the various sites.

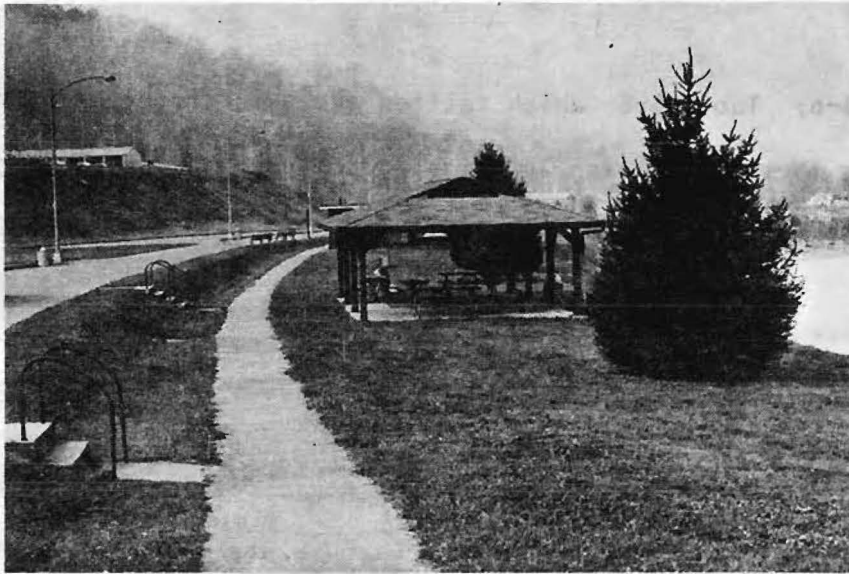
Additional analysis generated during the planning process to aid in site development proposals are included Table 5-4 which projects anticipated growth per annum for each of the recreational activities; Table 5-5 which projects total Project visitation for 1985, 1990, 2000, and 2020; Table 5-6 which shows participation rates for each activity; Table 5-7 which projects future activity demands for those recreational activities

listed in Table 5-6; Table 5-8 which tallies average projected turnover rates per 24 hour period for each activity; and Table 5-9 which projects the net surplus or deficit of facilities for the years 1985, 1990, 2000, and 2020.

Sutton Lake has, at the present time, eight developed areas. These include the Dam Site Day-Use Area; Bee Run Day-Use Area; Bee Run Camping Area; Lower, Middle, and Upper Kanawha Run Camping Areas; Mill Creek Camping Area; and Baker's Run Camping Area. Brock Run Camping Area has been closed and dismantled due to its operational and maintenance problems. The following descriptions of these recreational areas outline all of the existing and proposed facilities to be provided on the sites and some of the major reasons for the various recommendations.

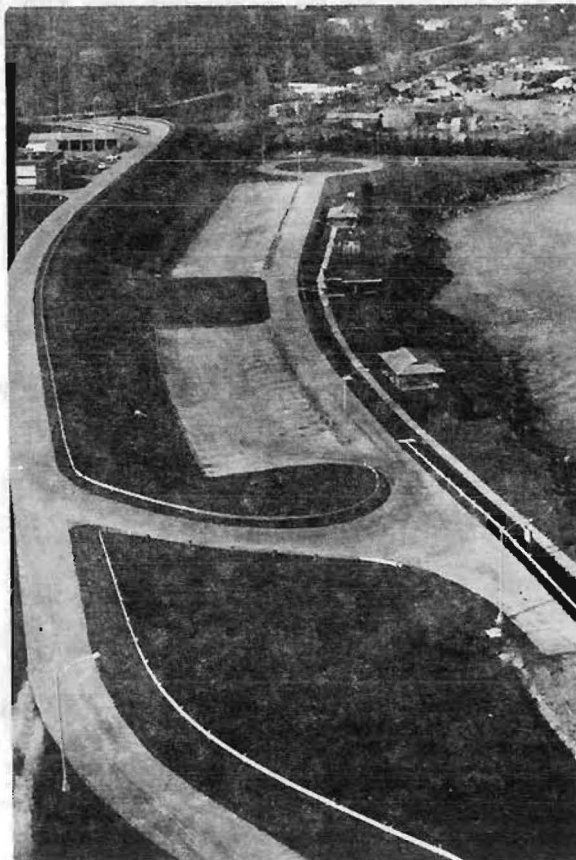
a. Dam Site Day Use Area (Exhibit 7). This site is located above and below Sutton Dam on the southern bank of the Elk River and consists of approximately 7 acres. Of this, 4 acres are below the Dam and 3 acres are above the Dam.

Access is provided by a 2-lane paved road which forks just inside the park entrance. The north fork continues past the maintenance and utility buildings to the picnic areas below the dam. The right fork provides a



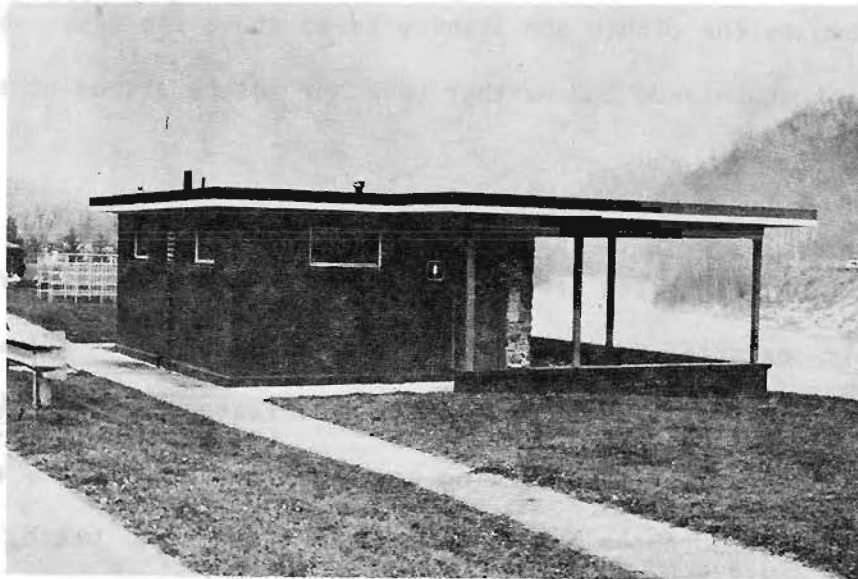
PICTURE 7-2

Lack of vegetation
is in evidence in
this view of the
Below Dam Day-Use
Area



PICTURE 7-3

Aerial view of
the Below Dam Day-
Use Area



PICTURE 7-4

Existing restroom facilities at the Below Dam Day-Use Area



PICTURE 7-5

Typical shelter Area at Below Dam Day-Use Area

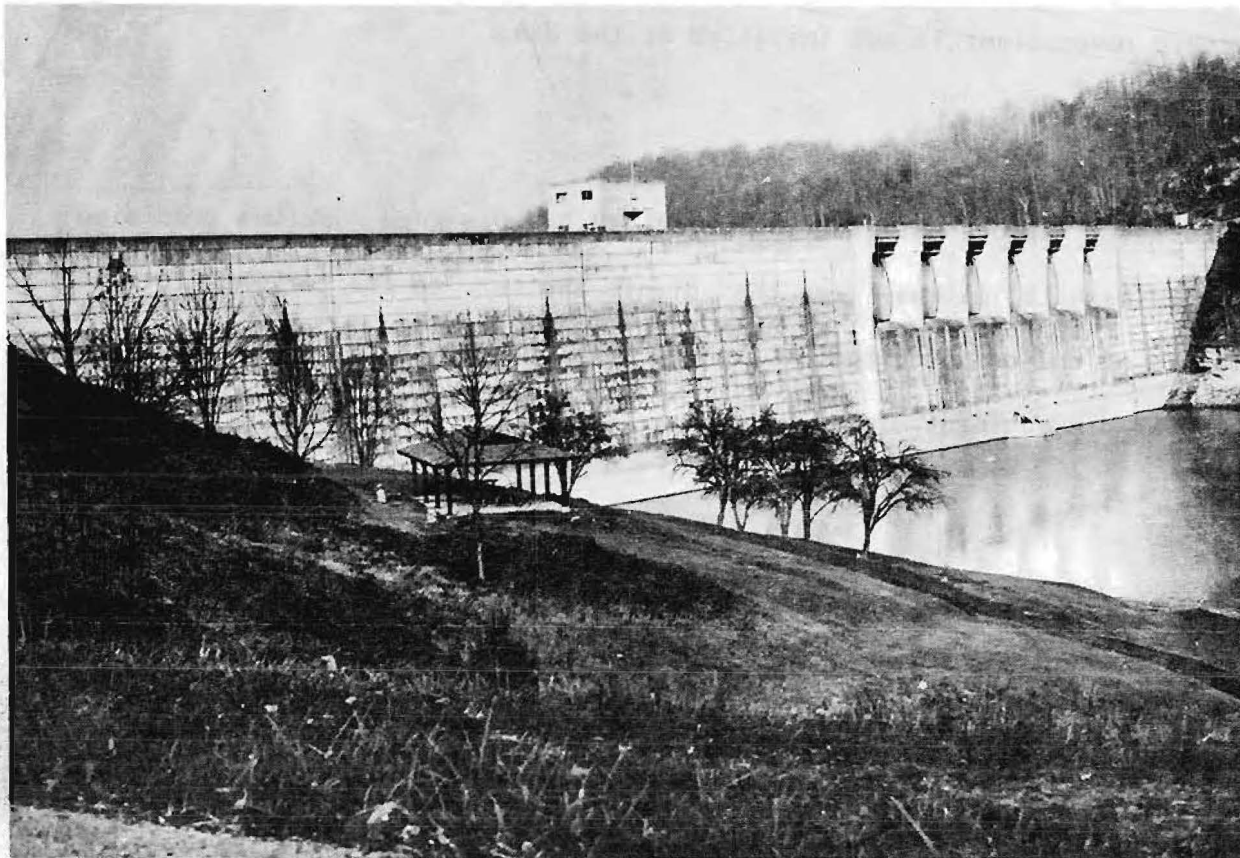
variety of scenic views as it climbs up the bank around the Dam and then winds back down to the picnic and fishing areas above the Dam. Both areas are fairly flat grasslands and neither have any mature stands of trees.

Facilities at both sites are directed toward picnic and fishing activities and their existing facilities include the following. Below the Dam, there are 2 picnic shelters, 11 picnic units, 1 restroom, 2 drinking fountains, a playground, 151 paved parking spaces, a bulletin board, and a sewage treatment plant. Above the Dam there is a swimming beach, 1 picnic shelter, 4 picnic tables, 87 paved parking spaces, 15 stone-base parking spaces, a two-lane paved boat launching ramp, and 3 dusk to dawn lights.

Proposed improvements for these day use areas are largely directed to increasing the functional and aesthetic qualities of the sites rather than adding new facilities. The construction of a gate just to the east of the lower parking lot entrance will keep visitors from inadvertently driving to the base of the Dam. This plan recommends removing the asphalt from five parking spaces to plant trees. This proposal will help reduce the varied impacts of the existing expanse of asphalt and provide a needed overhead plane.

2-5 317714

Typical Shelter Area at Below the Dam



PICTURE 7-6

Hillside location of picnic shelter is dwarfed by northern face of Dam

Facility improvements for the Below Dam Day-Use Area include the construction of a launch platform for canoes and kayaks to the north of the existing restroom. A wood deck and walkway will connect the platform with the parking lot. The canoe/kayak launch will only be feasible if a hydro-electric power plant is not installed at the dam.

Facility improvements for the Upper Dam Day-Use Area include providing a paved asphalt walkway from the picnic shelter to the parking lot and removal of the existing benches behind the guardrail just to the west of the south dam abutment.

Lastly, it has been recommended that planting be used in both areas to screen the maintenance and utility buildings; help secure the bank between the access road and the lower parking lot from erosion; beautify the views of the site from the river by planting up around the existing picnic shelters, restrooms and parking lots; and highlight both the site and parking lot entrances.

b. Bee Run Day-Use Area (Exhibit 8). Bee Run is located approximately three miles from Laurel Fork via State Route 15 and two miles of paved park access road. The 11 acre site sits atop a ridge around which the Lake flows on its way to the dam. On the western side of this peninsula sits a protected outwash which presently serves as one of the park's two beaches. Immediately to the north of the beach is a boat concession with 125 boat moorings and a marine waste disposal unit; a 3-lane paved boat launching ramp is located south of the boat concession.

Other existing site features include 2 picnic shelters, 58 picnic units, one restroom with hot water, a drinking fountain, a playground, 2 parking areas with a total of 172 parking spaces of which 31 are for car and trailer, and a sewage treatment plant. The site is presently served by a paved access road which forks 500 feet above the entrance to the parking lot. A small paved parking lot is located at the terminus of that road. The upper or east fork extends to the edge of the bluff overlooking the lake and is primarily used by picnickers.

With Bee Run being one of the most intensive day-use facilities at Sutton Lake, the greatest amount of capital improvements have been proposed for this facility. Bee Run is presently a water-active facility and improvements at the water's edge include redevelopment of the beach.



PICTURE 7-7

View of existing boat ramp and docking facilities at Bee Run Day Use-Area



PICTURE 7-8

Hillside location of existing restroom facilities at Bee Run Day Use-Area

Beach proposals include expanding the grass area to accommodate more bathers, as shown on Exhibit 8, by infilling, regrading and seeding. A seasonal floating barrier is proposed to be placed around the swimming area to separate boating activities from swimmers. A paved walkway from the concession building is also proposed to connect the concession building with the existing parking lot.

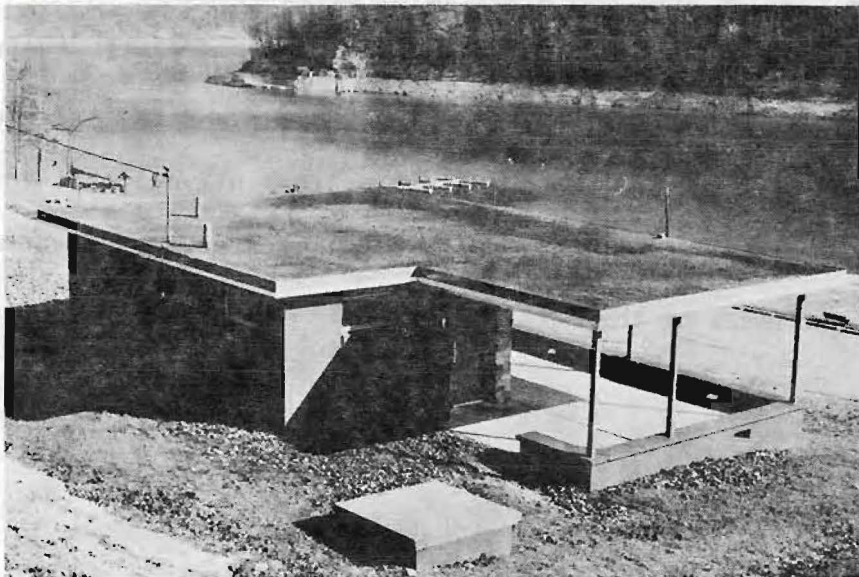
If, and when the marina concessionaire expands facilities, the recommended locations for an additional 80 slips are shown on Exhibit 8.

An overlook is proposed to take advantage of views at the southern edge of the site. Other site improvements include a hiking trail from the site to the Bee Run Camping Area and a system of paved pathways which will provide access usable by handicapped from the proposed trail to the beach parking lot, proposed picnic shelters, overlook, and the restrooms. A trailhead sign is proposed to be placed at the hiking trail to Bee Run Camping area. Proposed plantings are to screen the sewage treatment plant and soften the affects of the parking lot.



PICTURE 7-9

Existing picnic shelter overlooking Bee Run beach



PICTURE 7-10

Existing restroom facilities at Bee Run beach

c. Bee Run Camping Area (Exhibit 9). The camping area at Bee Run is approximately 1 mile north of Bee Run Day-Use Area and occupies about 2 acres. The facility is rustic in character having 12 trailer campsites and 2 vault restrooms. It satisfies the requirement to provide a free camping area.

Expansion of this area is seen to be detrimental to the existing qualities of the facility. Site improvements consist of providing an entry sign and using planting masses to accentuate the facility's entrance, to screen the existing dump site, and to provide planting buffers between the individual campsites. A walking trail is proposed to link the campsite with the beach launch ramp and marina area. It is also recommended that a signage map be placed at the trailhead at the southern boundary of the existing development.

d. Kanawha Run Camping Areas (Exhibits 10 and 11). The three camping areas which comprise Kanawha Run are located along the north bank of the Holly River and are accessible from State Route 15 approximately 14 miles from Sutton and 19 miles from Webster Springs. Combined, these 3 areas represent 50 acres of river bottom land. Expansion is limited by the steep, heavily forested terrain surrounding the campgrounds. Redesign of facilities within the existing development boundaries, however, is proposed for each of the 3 areas. The Lower Kanawha Run will be discussed first followed by the Upper and Middle Kanawha Run areas which will be combined here, as well as in the cost estimate.

(1). Lower Kanawha Run Camping Area (Exhibit 10). The lower campsites are located approximately 0.4 miles down river from the Upper and Middle Run campsites which must be traversed to gain access to lower Kanawha Run. Presently, there are 34 trailer and 8 tent campsites at Lower Kanawha Run. Other facilities include 3 guest parking spaces, 1 waterborne restroom, one well, a playground, 5 fountains, 4 dusk-to-dawn lights, and a sewage treatment plant.



PICTURE 7-11

Existing Comfort Station at the Middle Kanawha Run Camping Area

Proposed improvements at Lower Kanawha Run recommend the redesign of existing facilities rather than the installation of new facilities. To improve circulation, the circle in the northeast corner of the site is to be removed and replaced by 200 feet of new roadway in order to close the loop in the middle of the site. Of the 35 existing campsites, five, at the riverside portion of the loop, are to be removed and 13 new campsites are to be installed, (see Exhibit 10 for new site locations) resulting in a net increase of 8 campsites. In addition, the 3 campsites situated up-river from the rest of the camp are to be upgraded. The playground area is to be redeveloped and the entire site is to be reforested to provide shade and privacy for campers. Plants are also to be used to screen the existing sewage treatment plant.

(2). Middle and Upper Kanawha Run Camping Area (Exhibit 11). The Middle and Upper Kanawha Run Camping Areas lie on either side of Kanawha Run. The areas have a controlled access point about a half mile north of the river where there is an attendant building and vehicular turnaround. Just to the south of the attendant building, the paved access road forks to continue down both sides of Kanawha Run; the western fork going to the Middle Kanawha Run, and the eastern fork leading to the Upper Kanawha Run.

Together, the 2 areas have a total of 109 trailer campsites serviced by 2 waterborne restrooms; a washhouse complete with restroom



PICTURE 7-12

Scenic stream channel affords visitors a dramatic
entry view at Kanawha Run Camping Areas

facilities, 20 showers, and 4 laundry tubs; and 2 trailer dumping stations. Other camp facilities include a well house, a 20,000 gallon water storage tank, a playground, amphitheater, bulletin board, 10 fountains, 7 dusk-to-dawn lights, and 31 parking spaces. To the west of Middle Kanawha Run CampArea is a two-lane launching ramp and 21 car and trailer parking spaces.



PICTURE 7-13

View of existing campground facilities at the
Middle Kanawha recreational site

Improvements proposed for Middle and Upper Kanawha Run consist of upgrading the vehicular turnaround to the north of the attendant building, erecting an entry sign on the southwest corner of the Route 15 and access road intersection, and removing the 2 campsites just to the south of the attendant building. The Camping Areas' proposed improvements consist of providing 2 open play areas (see Exhibit 11 for locations) and planting deciduous trees around the individual campsites to provide shade and privacy. Plantings are also proposed behind the amphitheater and for screening the existing wells and sewage treatment plants.



PICTURE 7-13

View of existing campground facilities at the Middle Kanawha Recreation Site



PICTURE 7-14

Entrance facilities at Kanawha Run Camping Areas



PICTURE 7-15

Stone wall over vehicular culvert integrates structure into the landscape

e. Mill Creek Camping Area (Exhibit 12). Mill Creek is a 30 acre site nestled between the west bank of the Elk River and Route 17 about a mile north of Centralia. Development consists of 53 trailer campsites, 1 water-borne restroom, 4 drinking fountains, one playground, and 4 dusk-to-dawn lights. There is also a mechanical well, a trailer waste disposal unit, and a sewage treatment plant. Access is from Route 17, with an entrance booth and gate located about 150 feet above the campgrounds. The attendant gate also controls access to the Bakers Run Camping Area which is a mile north of Mill Creek.



PICTURE 7-16

Stone gabions at Mill Creek blend into rocky lake bed during winter drawdown

Site improvements consist of regrading and reseeding the northern entrance to reduce erosion problems and the future installation of a hiking trail from Mill Creek to Bakers Run. A sign is to be placed at the trail-head located at the southern edge of the Camping Area to depict route, mileage, and expected hiking time.

f. Bakers Run Camping Area (Exhibit 13). Bakers Run is located a mile north of Mill Creek along the west bank of the Elk River. Primary access is from the continuation of the Mill Creek access road. Access is also available from Route 17/10, a rough gravel road servicing the homes located off Government land in Bakers Run. This road allows unauthorized access through the Bakers Run and Mill Creek Camping areas to Centralia. Past attempts to barricade this road have been opposed by local residents. It is the District opinion that public relations can be served if this road remains open.

One alternative is to construct a by-pass road around the campground. Preliminary investigations indicate the only available location would be to place it adjacent to the railroad. Should management problems increase this option should be explored in greater detail.

Seventy-one trailer campsites are currently at Bakers Run with 63 paved parking spaces, a 1-lane paved launching ramp, 4 water fountains and 4

dusk-to-dawn lights. Utilities servicing the facility include two water-borne restrooms with hot water, a well, one 20,000 gallon water tank, 1 washhouse and restroom with 18 shower stalls and 4 laundry tubs, 1 trailer waste disposal station, and a sewage treatment plant.

The proposed redevelopment at Bakers Run, like that for Lower Kanawha Run, is largely one of improving the existing circulation pattern and reorganizing the lay-out of the campsites. Currently, the eastern portion of the site consists of 3 roads which parallel the Elk River. The road which is closest to the river has campsites only along the river side. The new entrance improvements to this area entail removing the middle drive and relocating the displaced campsites along the park side of the river road and along the Route 17 side of the road furthest from the river. The vacated central area is then to be reforested with deciduous trees to create a campground congenial with the surrounding landscape. A new entrance is proposed to facilitate improved access and minimize vehicular and pedestrian circulation (see Exhibit 13 for location).

The remainder of the site is to be redesigned by altering the circular drive and providing a roadway which will connect the top of the existing circle with the road closest to the river. The campsites on the eastern half of the circle will be removed and the area redesigned as an open play

area and amphitheater. Trees are to be planted to buffer the camping areas from the playground and the parking lot serving the boat ramp to the west. Total site redevelopment will consist of removing 28 campsites and constructing 31 new ones.

g. Brock Run Camping Area. The former Brock Run Camping Area lies about a mile south of Newville on the east bank of the Holly River. Access to this heavily forested 12 acre site is over a very rugged stretch of secondary (dirt) road (22/11). The original facilities included 22 campsites, 2 vault toilets, a septic tank and a one lane crushed stone boat launching ramp. Because of the isolated location of this area, its management became a major problem and as a result, it has been closed and all facilities removed.

This master plan recommends that the 22 dismantled campsites be counted as "credit" and be relocated to other campgrounds on the Project at full Federal expense.



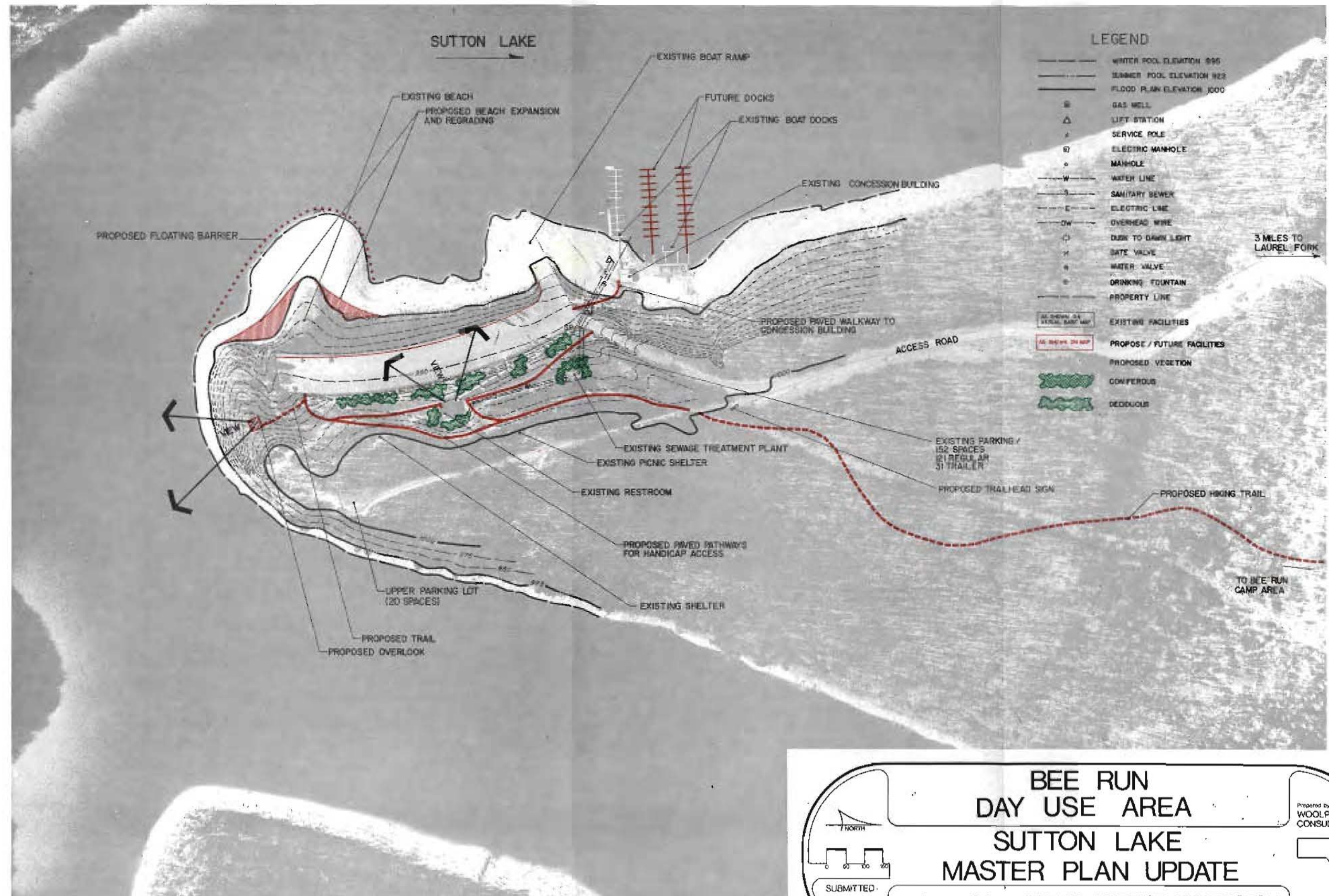
PICTURE 7-17

Remoteness of Brock Run Camping Area
is shown in this view from entry road.



PICTURE 7-18

View of the Lake from Brock Run Camping Area



**BEE RUN
DAY USE AREA
SUTTON LAKE
MASTER PLAN UPDATE**

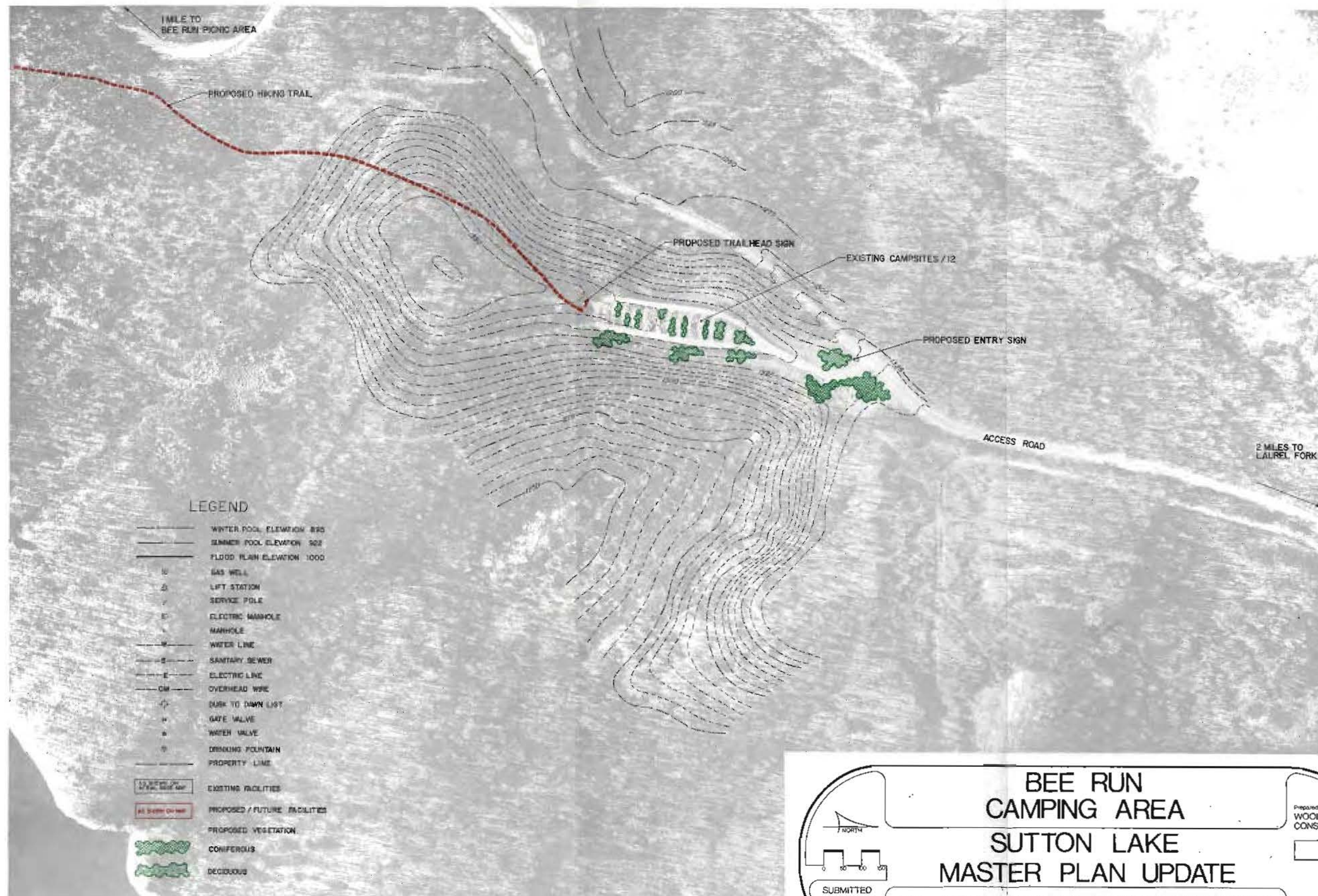
U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by
**WOOLPERT
CONSULTANTS**

EXHIBIT NO.
8

Submitted

Submitted



7 NORTH

0 50 100

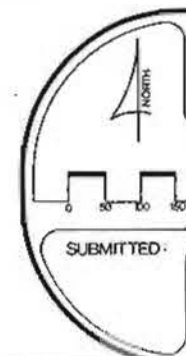
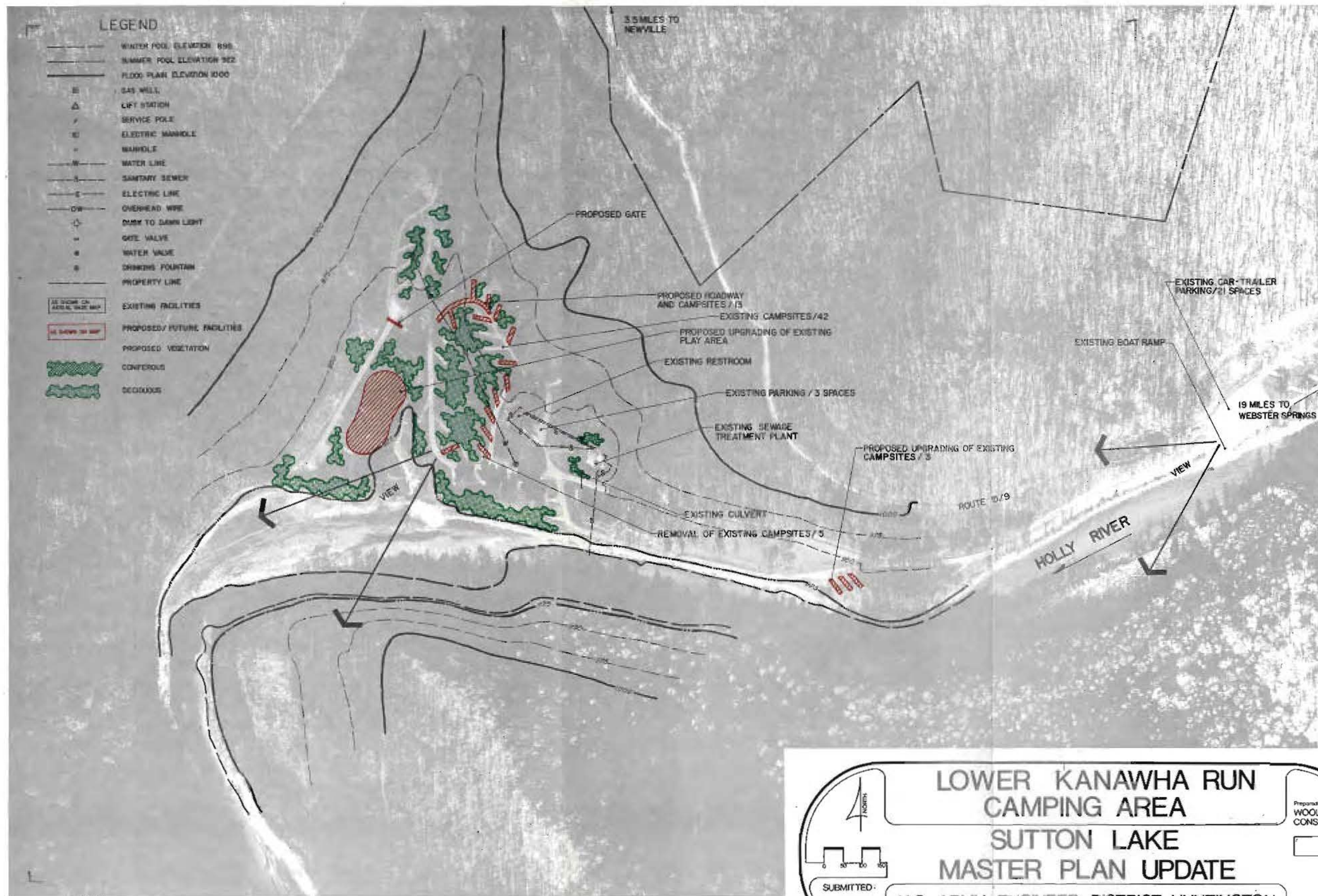
SUBMITTED

BEE RUN CAMPING AREA SUTTON LAKE MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT
CONSULTANTS

EXHIBIT NO
9



LOWER KANAWHA RUN CAMPING AREA SUTTON LAKE MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT
CONSULTANTS

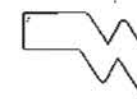
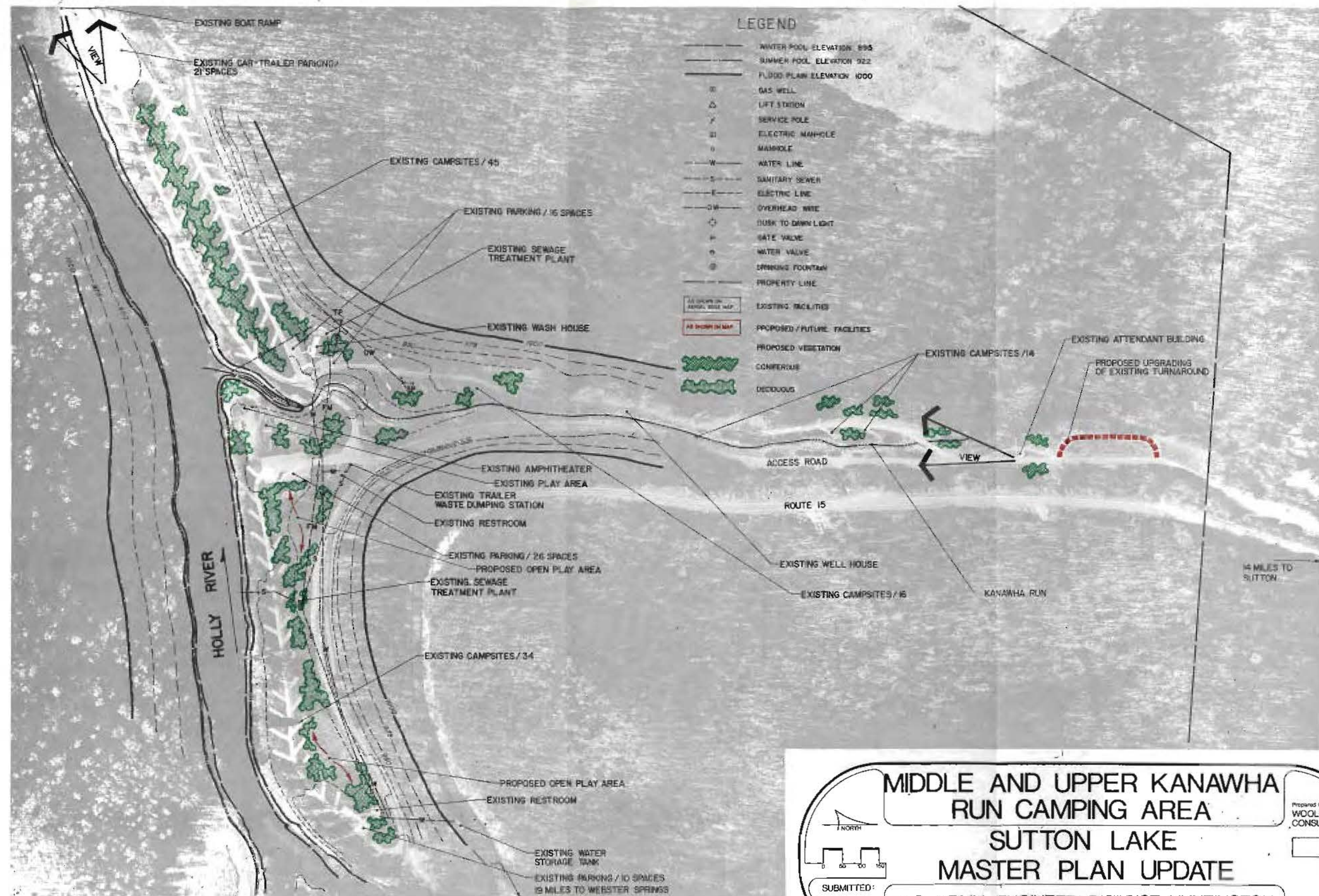


EXHIBIT NO.
10

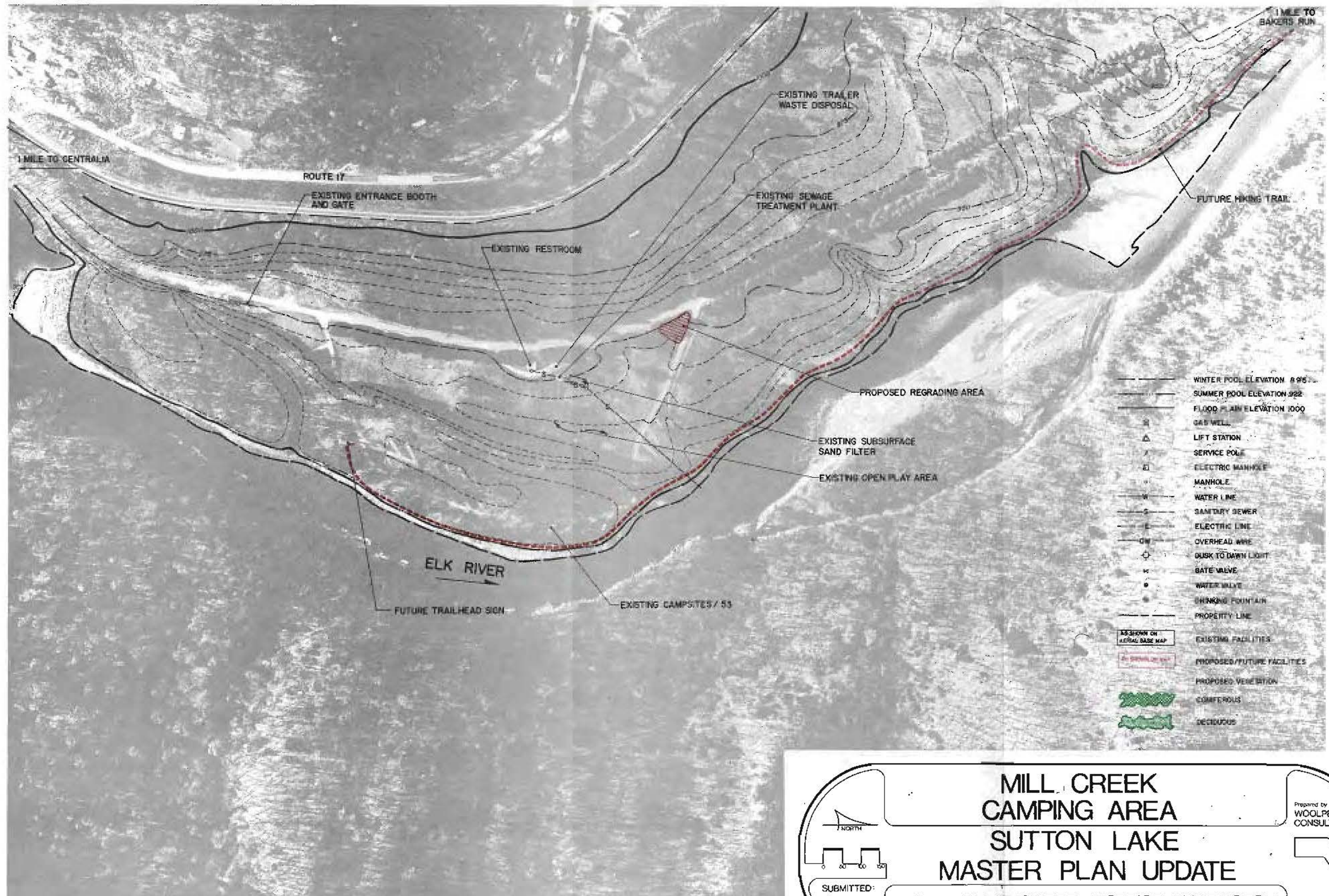


MIDDLE AND UPPER KANAWHA RUN CAMPING AREA SUTTON LAKE MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT
CONSULTANTS

EXHIBIT NO.
11

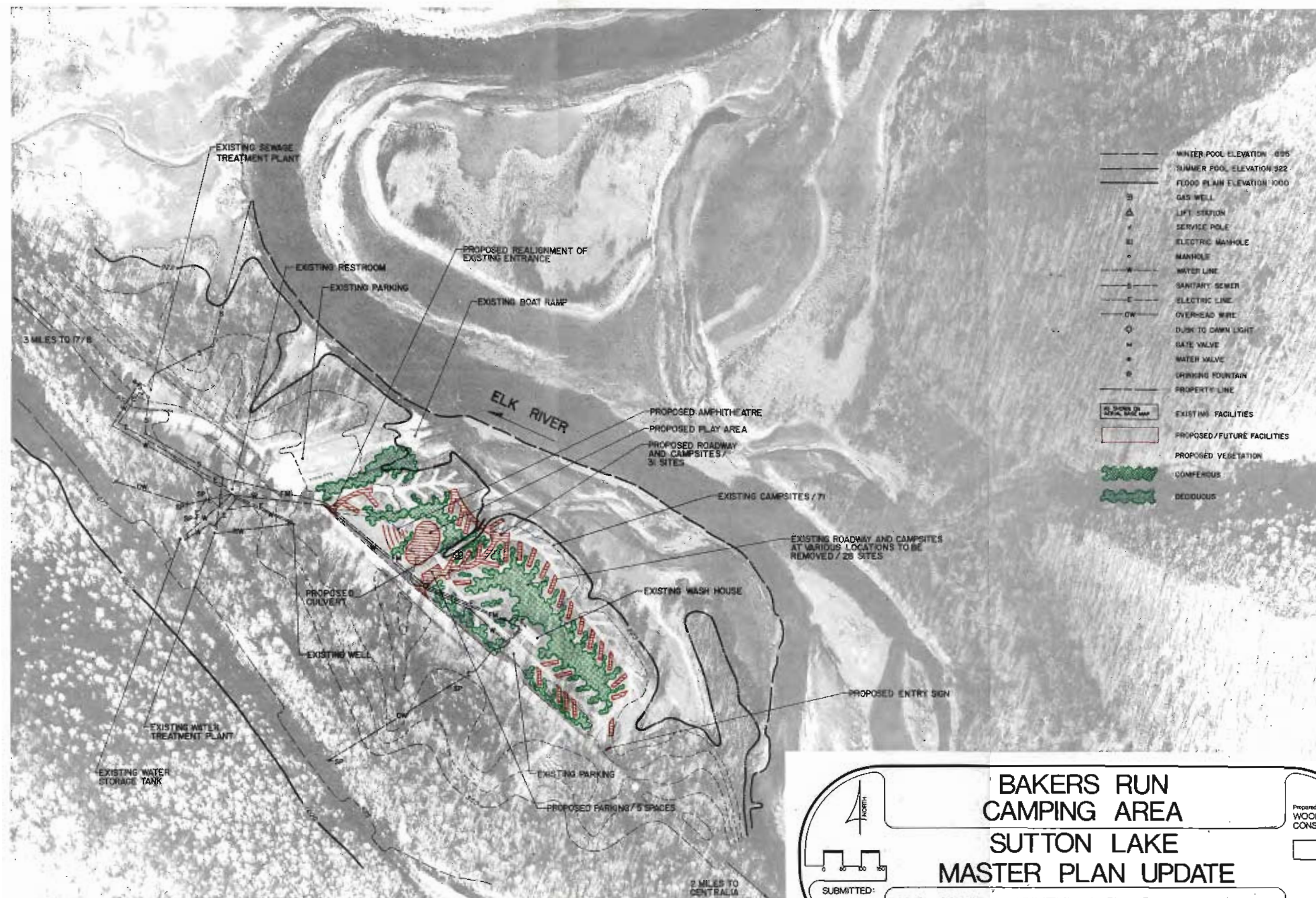


MILL CREEK CAMPING AREA SUTTON LAKE MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by
WOOLPERT
CONSULTANTS

EXHIBIT NO
12



BAKERS RUN
CAMPING AREA
SUTTON LAKE
MASTER PLAN UPDATE

U.S. ARMY ENGINEER DISTRICT, HUNTINGTON
CORPS OF ENGINEERS
HUNTINGTON, WEST VIRGINIA

Prepared by:
WOOLPERT
CONSULTANTS

EXHIBIT NO.
13

Submitted:

Submitted:

7-07. Overlooks.

Overlooks are presently limited to the picnic shelter above Sutton Dam and the pedestrian access on the Dam. Both provide excellent views of the Dam, intake structures, spillway, and the lake.

An additional pedestrian overlook (see Figure 8-8 and 8-9) is proposed for the southern tip of Bee Run Day-Use Area (see Exhibit 8) and will provide views of the lake and the surrounding foothills.

7-08. Trails.

Presently there are no formally developed trails at Sutton Lake. As part of this Master Plan Update, however, trails are an important addition to the overall recreational development strategy. Trails are proposed in order to provide diversified recreational opportunities to the public and to increase the public's appreciation and enjoyment of the Project and its resources.

Three types of trails are suggested for development around Sutton Lake. These include fishing access trails, hiking trails, and paved handicapped access trails. Design criteria, as well as sketches of typical design details, are found in Chapter 8. In the cost estimate analysis (Chapter 16), all major trail development, with the exception of the future hiking

trail proposed to connect Mill Creek and Bakers Run, is shown as part of the 5-year plan, with the understanding that trails will be constructed in response to actual demand.

a. Fishing Access Trails. These trails provide fishing access to shore-line fishing areas for those who may not own a boat. The trails are natural in appearance and character and are laid out in such a manner as to offer a range of different fishing locations along the shore. The only proposed fishing trail at the Project is located along the old railroad bed from Bakers Run to an area opposite the confluence of the Holly River.

b. Hiking Trails. These trails generally provide a route between two points of interest or connect two or more recreation areas. Hiking trails often feature natural or cultural features but are not interpretive in either planning or scope. They may also serve as hunting access trails.

Proposed hiking trails at Sutton Lake consist of the 1.0 mile trail from the beach at Bee Run Day Use Area to the Bee Run Camping Area (Exhibits 8 and 9), and the 1.2 mile trail which connects the Mill Creek camping Area and the Bakers Run Camping Area (Exhibits 12 and 13).

c. Handicapped Access Trails. These trails provide to handicapped park visitors maximum mobility with a minimum of assistance and effort. Unlike the previously discussed trail systems, these pathways are paved and have grades of less than 8%. Handrails are also provided where appropriate. (See Chapter 8 for typical design details.) Trails for the handicapped are proposed for the Bee Run area and, as seen on Exhibit 8, provide access to the restrooms, boat concession area, parking lot, and the proposed picnic shelter.

7-09. Interpretive Program.

An existing area within the Project operations building is currently designated as a visitors' lounge. The lounge is used by Project personnel to display interpretive materials designed to provide visitors with an overall picture of the cultural, historical, archeological, and geological history of the Sutton Lake area.

7-10. Schedule of Development.

The recreation facility development at Sutton Lake for the most part, meets or exceeds existing visitor demand for this area. A summary of the existing and projected facility needs for the Sutton Project are shown in Table 5-9.

7-11. Cost Estimates.

An itemized cost analysis for proposed and future development is presented in Chapter 16. All prices were ascertained from previous bid tabulations supplied by the Corps of Engineers and Means 1982 Cost Estimating Catalogue. The degree of development for various recreational facilities was determined according to projected needs and site capability, and are comparable to those at similar Corps of Engineers projects in the Huntington District.

7-12. Cost Increase or Decrease.

Recreation development concepts have changed considerably since the origination of the Sutton Lake Master Plan. Construction costs for all types of recreation facilities have increased considerably. These increased costs should be taken into consideration when implementation of the Plan occurs.

CHAPTER 8

FACILITY LOAD AND OTHER DESIGN CRITERIA

CHAPTER 8

FACILITY LOAD AND OTHER DESIGN CRITERIA

8-01. Introduction.

The existing recreational facilities at Sutton Lake are accommodating the demand for most types of recreational activities. One recreational facility presently lacking within the Project, however, is hiking. Studies show an increasing demand for new facilities that would support such an activity.

In this Chapter, the presented design criteria relate more to proposed and future site improvements or small-scale new construction rather than to construction of major new facilities.

The design of all proposed and future improvements to Sutton Lake will be in accordance with current Corps of Engineers standards and specifications as outlined in ER 1110-2-400, "Design of Recreation Sites, Areas and Facilities" and in EM 1110-2-400 "Recreation Planning and Design Criteria". The facilities in this Master Plan Update will require further detailed construction drawings before implementation is possible. To assure that the proposed facilities are integrated into the existing design scheme of the Project, an intensive on-site investigation should be made.

8-02. Siting.

a. General. There will be no significant siting criteria, since the major portion of the proposed Plan for Development involves the improvement of existing recreational facilities. Only the most adaptable land will be used in the siting of new facilities. Forced siting will be avoided unless the efficient use of land requires minor modifications of existing land forms. Major cuts and fills will be used only when an alternative construction site is not available.

b. Elevation. All major structures and sanitary sewage and water systems (except "closed systems") will be placed above the flood control pool (elevation 1,000 m.s.l.). When it is impractical to meet this standard, structures will be placed above the 5-year flood elevation (964 m.s.l.). If neither of the above standards can be met, the structure shall be designed to be floodproof.

8-03. Site Preparation and Landscaping.

a. General. The site preparation (including excavation, clearing, and landscape planting) for the various buildings, camping areas, and day-use areas will vary according to individual site conditions such as slope, vegetation, surrounding uses, bedrock, geology, and soils characteristics.

All grading and earth work will be done in accordance with all state and local ordinances and will follow established guidelines for erosion control. Particular emphasis will be placed on the protection of vegetation during all site construction operations.

b. Landscape Planting. Landscape planting will be used to provide proper screening from undesirable adjacent uses; reduce dust, wind, and erosion and enhance the aesthetic qualities of the site and buildings. The landscape plantings will reflect the natural vegetation found in the Project Area.

The development of a detailed planting plan at the Master Plan level is impractical due to the variety of environmental conditions found within each recreational area. Therefore, only mass areas of plantings are shown on the site plans. When actual site planning begins, consideration will be given to selecting tree species that occur naturally within the Project Area.

8-04. Roads.

a. General. No major new roadways are proposed for the Project. There are recreation areas, however, that will require substantial modification

to existing roadways. These areas are Baker's Run Camping Area, Lower Kanawha Camping Area, and Middle and Upper Kanawha Camping Area. These improvement projects are designed to meet the increased demand for camping facilities in the area and also to alleviate congestion problems. All new construction and improvements are based on matching existing project roadways. All construction should meet the criteria given below.

b. Location/Proposed Improvement.

(1). Dam Site Day-Use Area. Gates are to be installed at the Dam access road that connects the Dam and the Dam Day-Use Area and at the east end of the access road to prohibit vehicles from entering the Lower Dam Area.

(2). Lower Kanawha Run Camping Area. Gate construction is to be undertaken at the head of the access road leading to the play area. Removal of the existing turnaround is also recommended.

(4). Middle and Upper Kanawha Run Camping Area. The vehicular turnaround north of the attendant building is to be upgraded.

(5). Bakers Run Camping Area. Vehicular circulation within the camping area is to be improved by eliminating an existing interior campground road and by providing additional access points from the Project circulation road.

c. Alignment. All new roadway construction should have a curvilinear alignment. Intersection with project roads should provide adequate sight distances and queuing of cars.

d. Pavement Width. The width of new and improved roadways should match existing roadway widths. All construction shall be based upon the following classification system:

<u>Name</u>	<u>Surface</u>	<u>Pavement Width</u>	<u>Berm</u>	<u>See Figure</u>
Access Road	Asphalt	20'	4'	8-1
Circulation Road	Gravel	18'	2	8-3
Maintenance Road	Gravel	10'	-	8-2

e. Roadway Surface.

(1). Access Roads. All access roads will be constructed with a compacted subgrade with an 8" compacted aggregate base, a prime coat, a 1" bituminous concrete base course, and a 1-1/2" bituminous concrete wearing course. The edge of the roadway surface will have a 45° bevel.

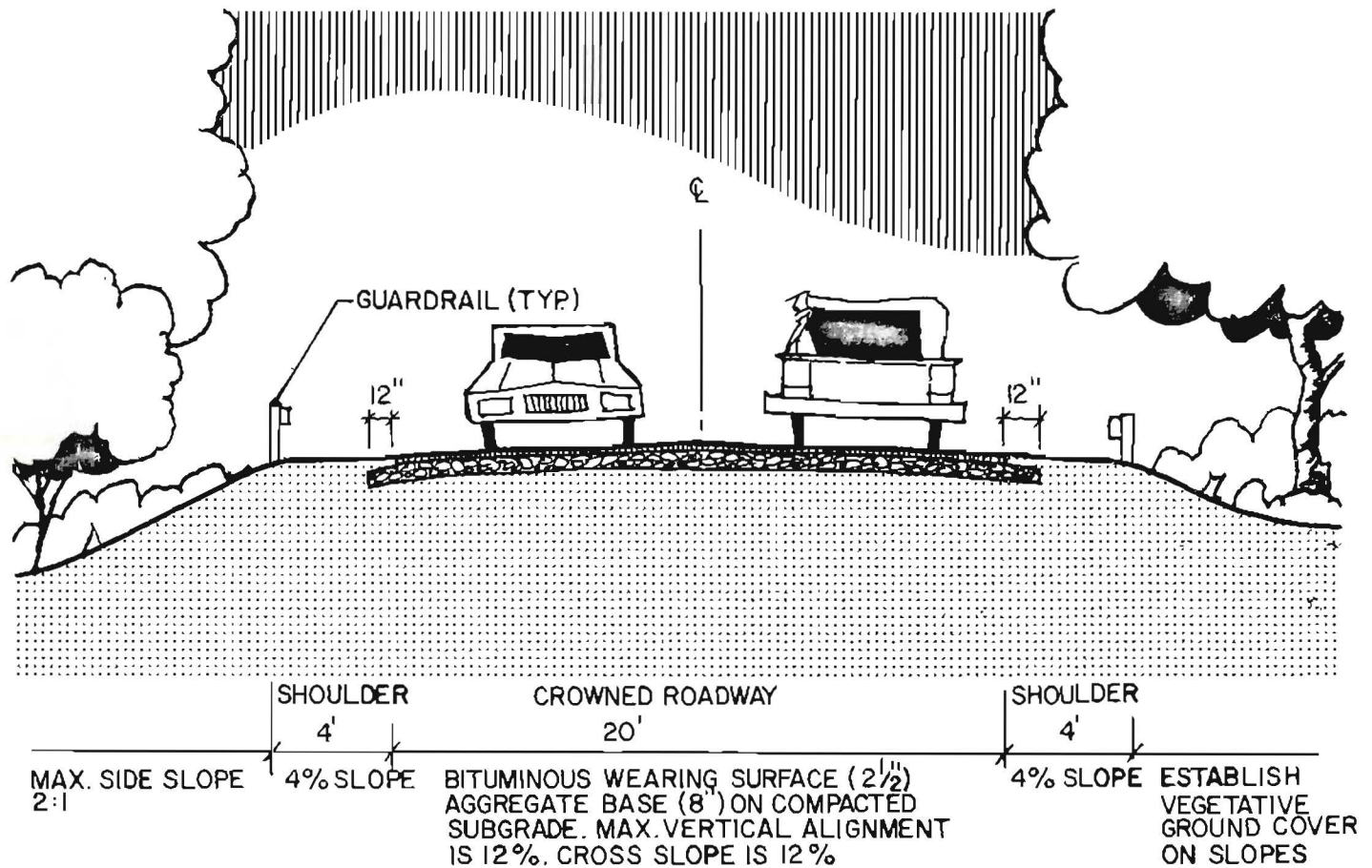


FIGURE 8-1
ACCESS ROAD

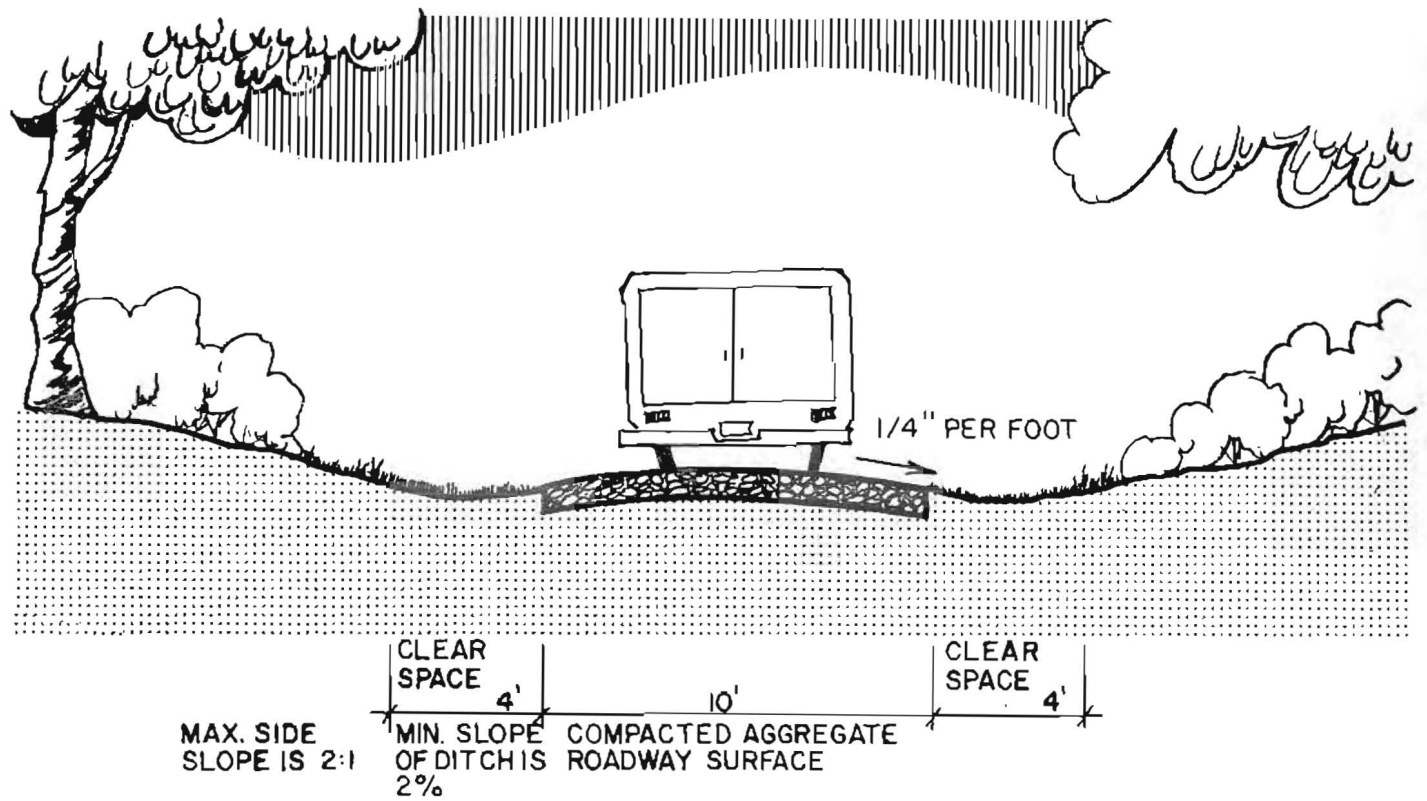


FIGURE 8-3
MAINTENANCE ROAD

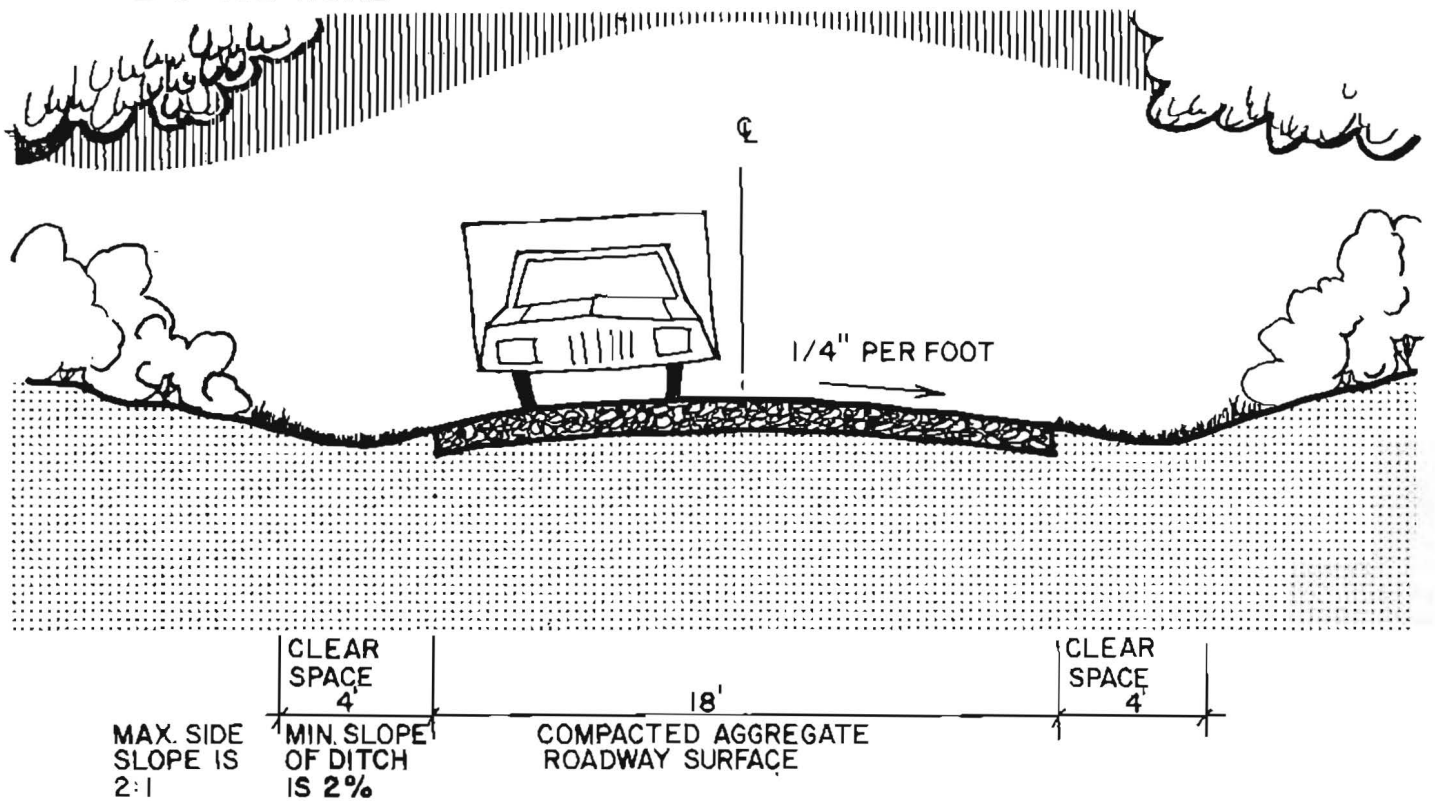


FIGURE 8-2
CIRCULATION ROAD

(2). Circulation Roads. All proposed circulation roads are either improvements to or extensions of existing roadways, and will be constructed with an 8" compacted aggregate on a compacted subgrade.

(3). Service Roads. All service roads will be constructed of an 8" compacted aggregate on a compacted subgrade.

f. Drainage System.

(1). All roadway subgrade preparations should provide for positive drainage.

(2). Roadside ditches should be provided where necessary to provide positive drainage away from roadway surface. The minimum gradient of swales should be lined with grass or other native ground covers.

g. Guardrails. Guardrails will be placed along the outside edge of the berm of roadways where side slopes or embankments are greater than proposed. Guardrails shall be constructed according to state highway safety standards and specifications.

h. Striping. Pavement striping and centerline will be used on all bituminous concrete roadway surfaces.

8-05. Parking Areas.

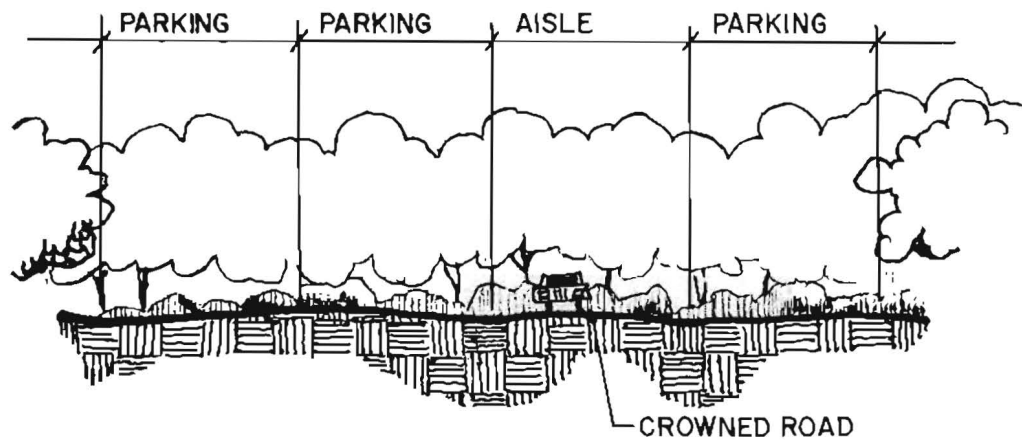
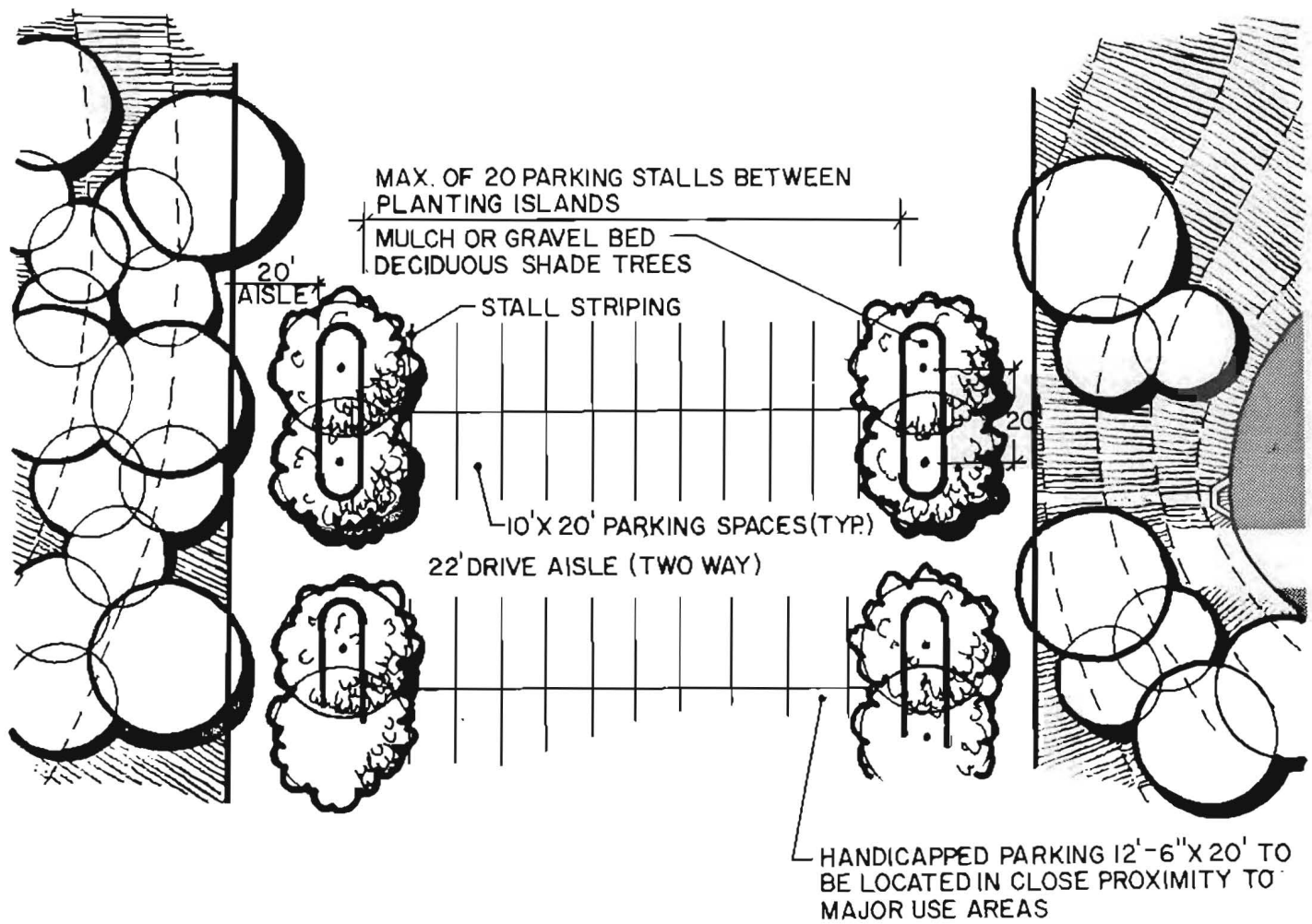
a. General. The only proposed parking lot improvements involves the Below Dam Day Use Area where planted traffic islands will be installed in existing lots to soften the large expanse of asphalt paving.

b. Dimensions. The proposed parking areas are based on the following standard parking dimensions:

Type	Width	Length	See Figure
Car	10'	20'	8-4
Car with Trailer	10'	40'	8-5

c. Surface Treatment. All proposed or future parking areas will be paved with 2-1/2" bituminous concrete on 8" of compacted aggregate base.

d. Storm Drainage. Swales and interceptor ditches should be used to provide for positive drainage of surface water on parking areas minimizing the use of culverts. Curbing should be used only where needed to control vehicular traffic or problem drainage areas.



CROSS SECTION OF PARKING LOT SHOWING TYPICAL CROWNING

FIGURE 8-4
TYPICAL 90° ANGLE PARKING LOT

e. Pavement Striping. All proposed bituminous surface shall be striped according to the dimensions given in 8-05 (b).

8-06. Picnic Areas.

a. Facilities. To assure continuity of design, all proposed facilities should match those that exist.

(1). Picnic Shelters. All proposed open air shelters should be on a rectangular concrete or gravel pad.

(2). Picnic Units. A picnic unit consists of two tables, 1 grill, and 1 refuse container. These units will be placed as required by user demand.

b. Siting. All proposed shelters should be located adjacent to open play areas. Canopy trees should be planted adjacent to shelters to provide additional shade.

8-07. Playgrounds.

a. General. Only one new play area is proposed in the Project. The site is located at Bakers Run and the proposed design should provide a creative and adventuresome experience for the children. Proposed playground improvements are to be undertaken at the Lower Kanawha Camping Area. The improvements should help to make an interesting and imaginative play area.

b. Facilities.

(1). Lower Kanawha Run Camping Area Improvements.

- (a). Relocate Playground Apparatus
- (b). New Creative Play Apparatus
- (c). Soft Surface - Sand/shredded tan bark
- (d). Edging Material - Wood.

(2). Bakers Run New Construction.

- (a). New Creative Play Apparatus
- (b). Soft Surface - Sand/shredded tan bark
- (c). New Supplementary Play Equipment
- (d). Edging Material - Wood.

c. Design Criteria.

(1). Grassy open areas should be preserved adjacent to playgrounds to provide ample opportunities for free play activities.

(2). Playground should be landscaped to provide shade and to define the play area.

8-08. Swimming Beach.

a. General. Expansion of the swimming beach facilities at Sutton Lake is proposed to meet the projected demand. Only one site has been targeted for swimming beach improvements.

b. Location/Facility Improvement. The expansion of the existing beach area at Bee Run is proposed. A system of pedestrian paths is also recommended to accommodate user demand.

c. Design Capacity. The size of the beach will be 50 square feet of sand per participant and 30 square feet of water for each participant or as

determined by existing limitations of the site. A breakdown of user activity on swimming beaches is as follows: About 60% of the total number of participants are on the beach, 30% in the water, and 10% at other facilities such as the bathhouse, concession, or parking lot.

d. Facilities.

- | | | |
|-----------------------|---|---------------------------------------|
| (1). Buoys | - | Warning and swimming area markers. |
| (2). Piling Barrier | - | Separates boating and swimming areas. |
| (3). Sunbathing Area | - | Seeded lawn. |
| (4). Beach Shoreline | - | Sand fill. |
| (5). Refuse Container | - | Standard. |

8-09. Overlook Landings.

a. General. All proposed improvements aimed at enhancing scenic viewing are directed toward the pedestrian experience.

b. Location. One location has been chosen for a scenic viewing area. The landing is proposed to be located at Bee Run at the southern portion of the site overlooking the water. The improvements are to include a hard surfaced flat viewing platform, a stone seating wall, an information kiosk, and selective clearing and landscaping to enhance the character of the facility.

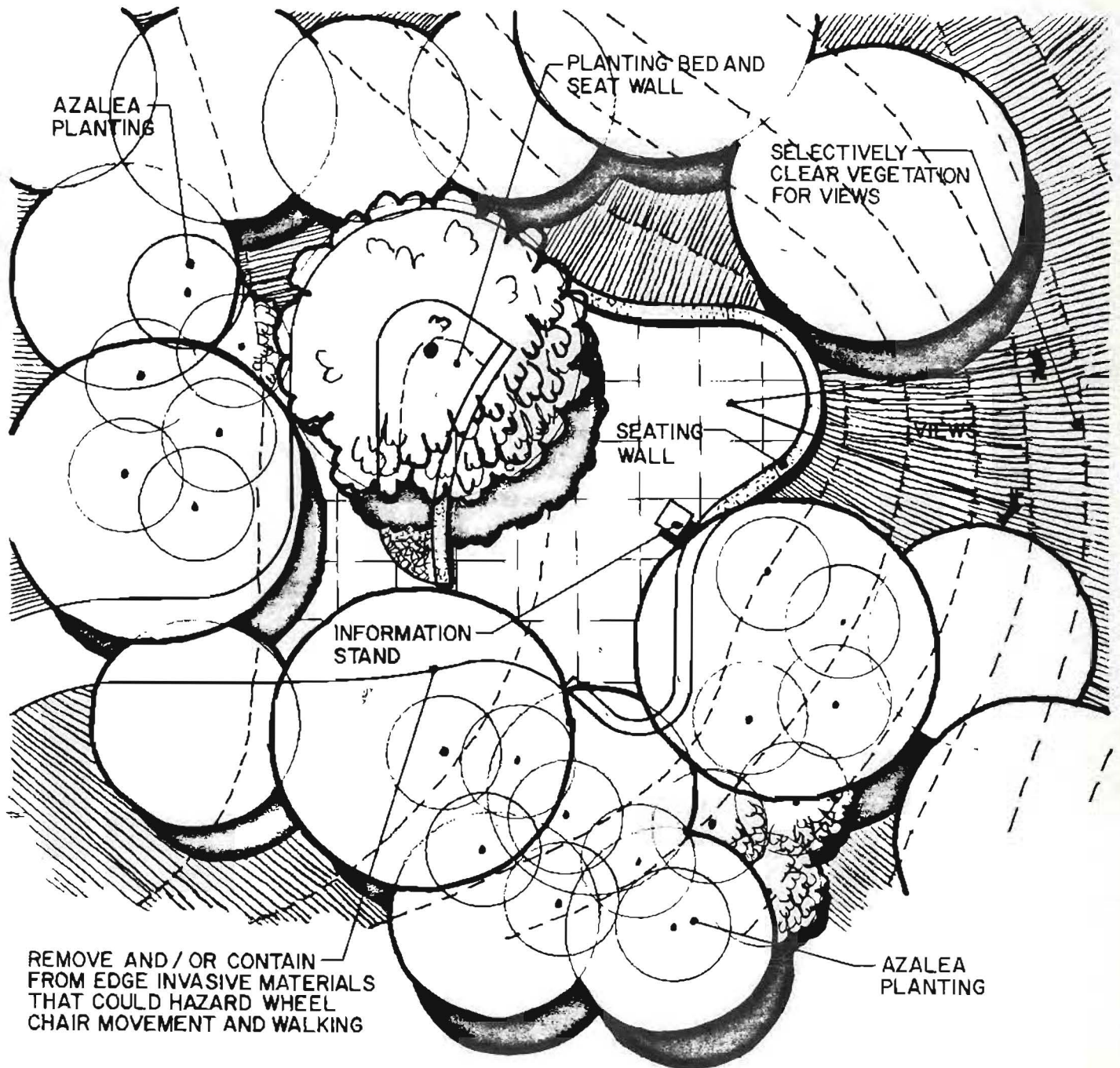


FIGURE 8-6
TYPICAL OVERLOOK - PLAN VIEW

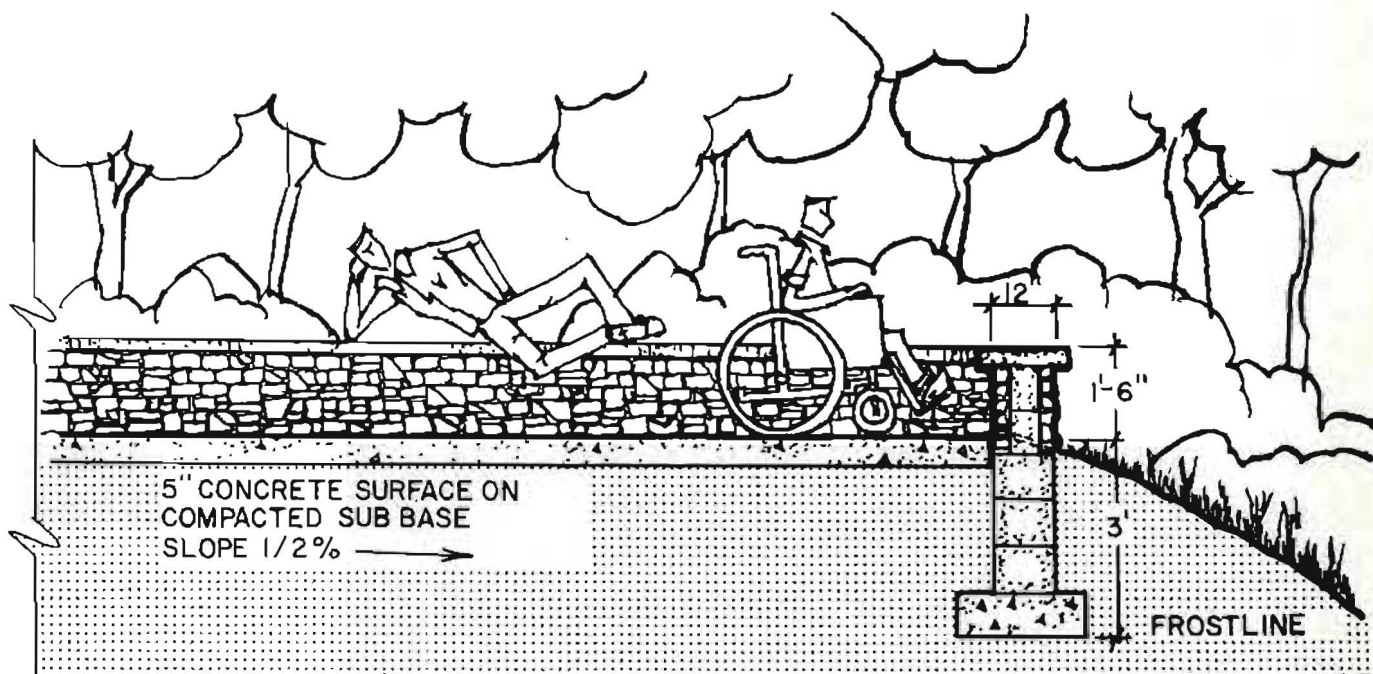
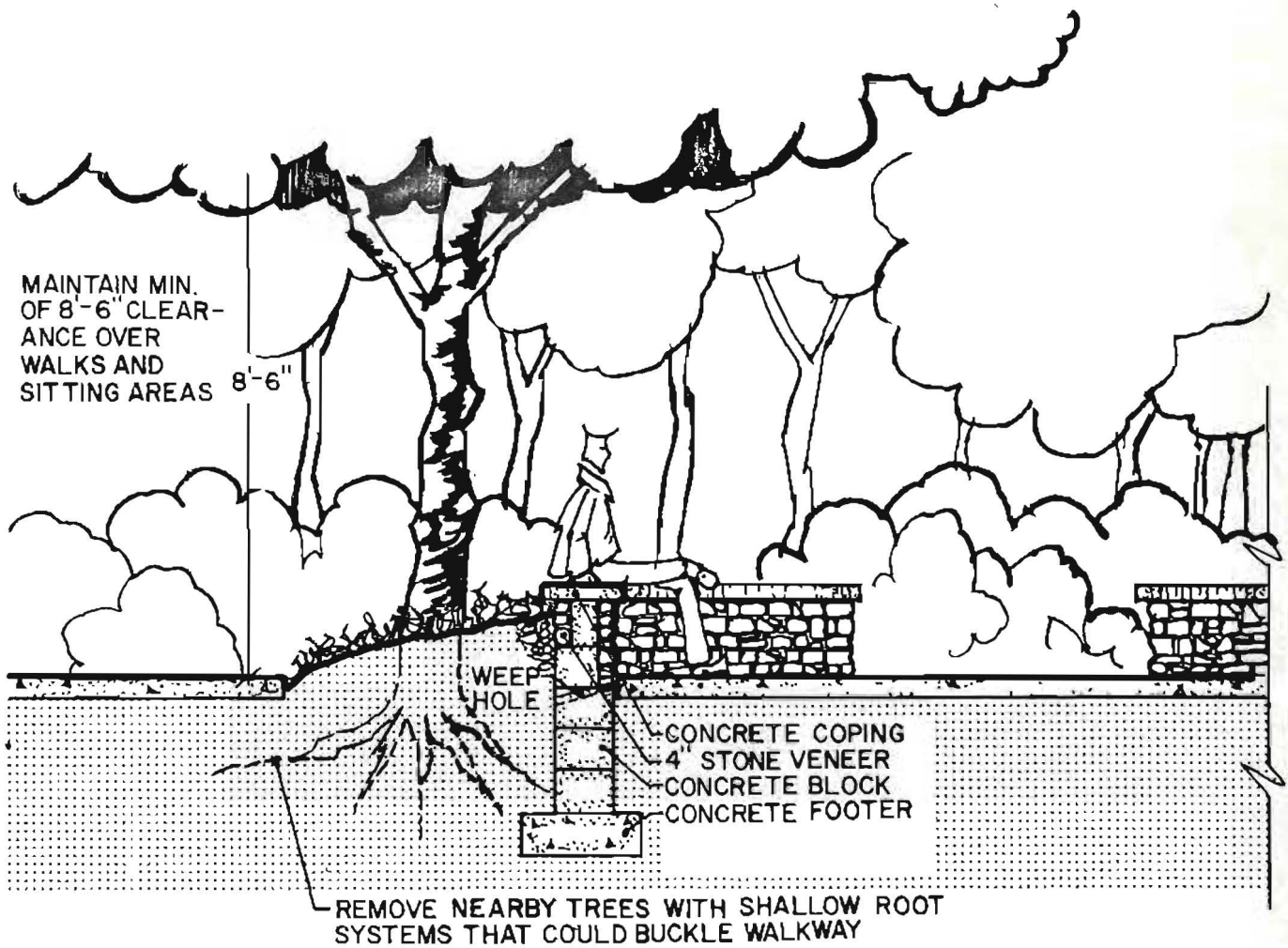


FIGURE 8-7
TYPICAL OVERLOOK - SECTION/ELEVATION

c. Design Criteria.

(1). Overlook Landing. Structure design and choice of materials should be harmonious with existing site structures. Materials found naturally within the area are preferred to those that are exotic or highly architectural in nature.

(2). Information Kiosk. This element should be located in a highly visible and central area of the landing.

(3). Seating. To be provided as an integral part of the overlook structure or as a separate element as appropriate. Height of the seating element should be between 16" and 18". A flat, smooth surface should be provided as the seat surface.

(4). Landscaping. Proposed plant materials should enhance the visual and olfactory experience of the user. Naturally occurring ornamentals should be sited to help integrate the facility into the landscape, while enhancing the potential for scenic views of the lake and other vistas.

8-10. Campsites.

a. General. There are no new campgrounds proposed for the Project. To facilitate the siting of a proposed roadway and play area in the Lower Kanawha Camping Area, however, some existing camp sites will be relocated.

The only other improvements to camping areas will be to provide better signage and to introduce plant materials to delineate individual camp sites, provide shade, and enhance the visual quality of the camping environment.

b. Facilities. Each camp site should include the following elements:

- (1). (1) 15' x 15' flat clearing,
- (2). (1) metal fire ring,
- (3). (1) refuse container per two (2) camp units, and *
- (4). (1) parking space per camp space.

* The Corps is experimenting with a dumpster system at Kanawha Run and Baker Run/Mill Creek instead of refuse containers at each site.

8-11. Site Structures.

a. General. The addition of support structures at various recreational sites represents a major part of all proposed improvements. All proposed structures will need to have detailed design drawings prepared and will be based upon the following design criteria:

- (1). Structures will be designed for minimum maintenance and operational expenses.
- (2). Structures will be constructed of materials that are resistant to vandalism.
- (3). The function of the structure including its internal functions will be easily discernable for efficient public use.

(4). The design of all proposed structures will be consistent with the design theme existing at Sutton Lake.

(5). Where possible, natural lighting and ventilation will be optimized to reduce operations and to enhance the appearance of the structure.

(6). Any structures to be constructed within probable flood zones will be constructed to withstand the affects of flooding.

(7). All structures will be designed to be accessible by the handicapped and the elderly.

(8). Materials selected for structure construction will be natural in character such as rock and wood.

b. Facilities.

(1). Amphitheater. An open air amphitheater is proposed for the Bakers Run Camping Area. The amphitheater will be designed to accommodate approximately 75 people and terraced into the existing slope. The materials used in the construction should be wood ties, which should be waterproofed to resist decay.

8-12. Boating Facilities.

a. General. The existing facilities at Sutton Lake presently meet the demand for small launch facilities. The only proposed improvement is the construction of a canoe launch at the Below Dam Day-Use Area. The marine at the Bee Run Site Plan Area has been designated to receive future boating facility additions. These additions to the existing docking facilities shall be implemented on a demand basis as determined by the concessionaire and the Project Engineer. All future and proposed additions should meet the following design criteria.

b. Facilities.

(1). Boat Dock Area. Two new bays are proposed for future use at the Bee Run Marina. The new docks will be consistent with the Area's existing facilities. Each dock will accommodate two boats. Flotation will be provided by styrofoam or other similar material. Metal barrels will not be permitted.

(2). Canoe Launch Area. A permanent floating wood canoe launch is proposed for the Below Dam Day-Use Area on the Elk River. The dock will be securely attached to the shore and be capable of fluctuating with the pool elevation. Flotation will be provided by styrofoam or other similar materials. Metal barrels will not be permitted. As mentioned previously, the construction of this facility and its location depends on whether hydroelectric power is added to the dam.

8-13. Hiking Trails.

a. General. Hiking trails should be used where they enhance the public enjoyment of the environment and the utilization of fish and wildlife resources. Presently, there are no designated trails in the Project. Major trail development is proposed to connect the Bee Run Day-Use Area with the Bee Run Camping Area. Future trail development is planned to connect the Mill Creek Camping Area with the Bakers Run Camping Area.

b. Siting. All trails should be designed and constructed to be sensitive to existing conditions. Factors to consider in siting of trails include:

- (1). Trail Alignment,
- (2). Topography/Terrain,
- (3). Vegetation,
- (5). Points of Visual Interest,
- (6). Dangerous Conditions, and
- (7). Final Destinations.

The following final design criteria should be followed in all trail developments.

- (1). All trail construction should be planned to produce the least disturbance to the natural environment.
- (2). Ground covers or native rock materials should be placed where trail construction will cause erosion problems.

(3). Trail alignment should be routed around major trees or rocks to avoid unnecessary disturbance of the existing environment.

(4). Trails should provide a variety of sensual experiences along its route. Interaction with different habitat types should be planned in trail design and construction.

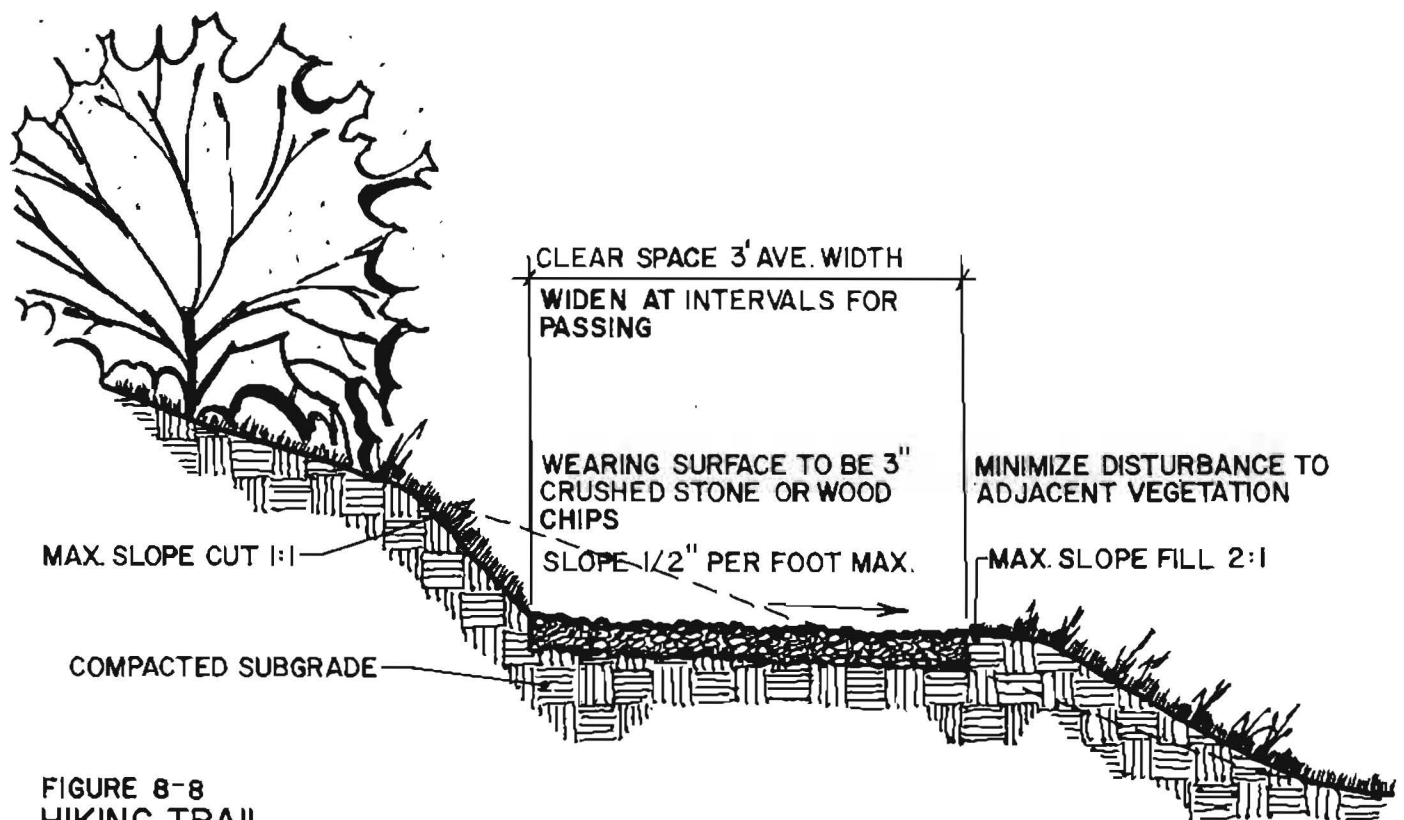


FIGURE 8-8
HIKING TRAIL

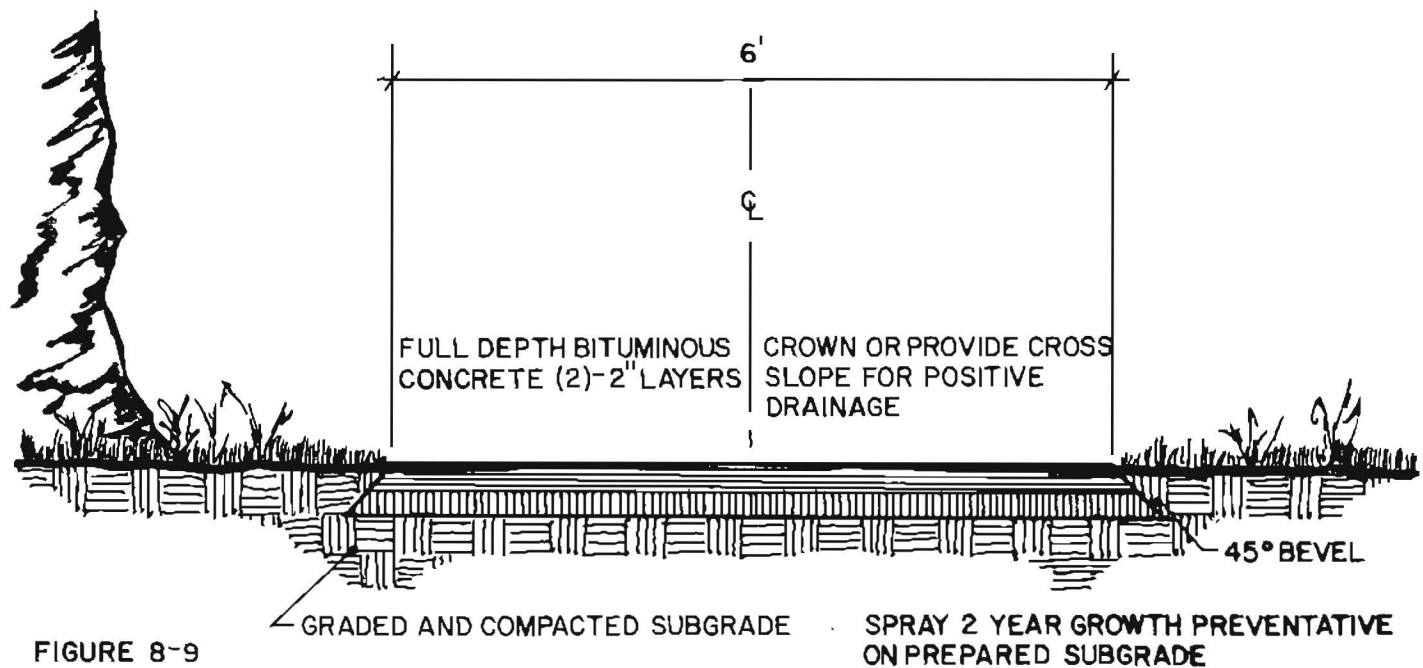


FIGURE 8-9
BITUMINOUS CONCRETE PEDESTRIAN WALKWAY

- (5). Handrails should be provided where appropriate.
- (6). Abrupt changes in direction or grade should be avoided.
- (7). A designated parking area should be provided at the terminus or trailhead of each trail.
- (8). All trails should include adequate signage and mapping.

c. Facilities.

(1). Trail Surface. Natural materials will be used wherever feasible to reduce the cost of construction and to provide continuity with the environment. Bituminous concrete material will be limited to handicapped trails only. All other trails will be surfaced with wood chips, gravel, or other natural surfacing materials.

(2). Signage. To promote efficient use of the trails, adequate signage is necessary to inform, direct, and regulate the use of the facility. Signage should be provided at critical points along the path of the trail. These points include all trailheads, intersections, points of interest, and at locations where a direction is not readily discernable. In addition, at points along the trail, maps should be provided to show trail network, location, and mileage indicators.

(3). Handrails. At dangerous locations and steep changes of grade, handrails should be provided to protect the safety and welfare of the public. Handrails will be designed and constructed to support a minimum of 250 pounds.

8-14. Pedestrian Circulation.

a. General. Improved pedestrian access is a major component of the plan for development. Walkways are proposed to provide better access to existing recreational facilities and to open up new undeveloped areas for development. All proposed walkway improvements occur at either the Bee Run Day-Use Area or the Upper and Lower Dam Day-Use Areas.

b. Design Criteria. All proposed walkways will be designed and constructed according to the following standards.

(1). Surface Material. All walkways proposed in this section will be surfaced with full depth bituminous concrete. Full depth walkway construction will consist of a compacted base, a 2" leveling course of bituminous concrete, and a 2" wearing course of bituminous concrete.

(2). Siting. Pedestrian circulation will take the form of walkways where the grade is less than eight percent. From eight percent to twelve percent, circulation will take the form of ramps. Above twelve

percent, stairs will be used. All proposed walkways will be curvilinear in their alignment. The width of walkways will be 4' and 6' as determined necessary by pedestrian demand.

(3). Stairs. Stairs will be provided wherever the grades are greater than twelve percent. When stairs are required, not less than two risers should be used. The optimal tread to riser relationship should be 2 risers plus one tread = 27 inches. Handrails should be provided adjacent to stairs where no other natural handhold is available or where more than 3 risers are used. A flat landing area at the top and the bottom of the flight of stairs should be provided. The design of stairs throughout a recreational area will be consistent in riser and tread relationships.

(4). Ramps. Ramps will be used to provide pedestrian circulation where grades are between eight and twelve percent. Where handicapped access is desired, the maximum length of ramps will be 30' with landings provided at the top and the bottom. These landings should not be less than 6' in length. Handrails should be used on at least one side of all ramps and on two sides where situations demand. All ramps will be surfaced with non-slip bituminous concrete.

(5). Handrails. Handrails should be used on all ramps and stairs to provide for safety. The design and construction of handrails should support a minimum of 250 pounds. The height of handrails will be 42" with midrails provided for handicapped use.

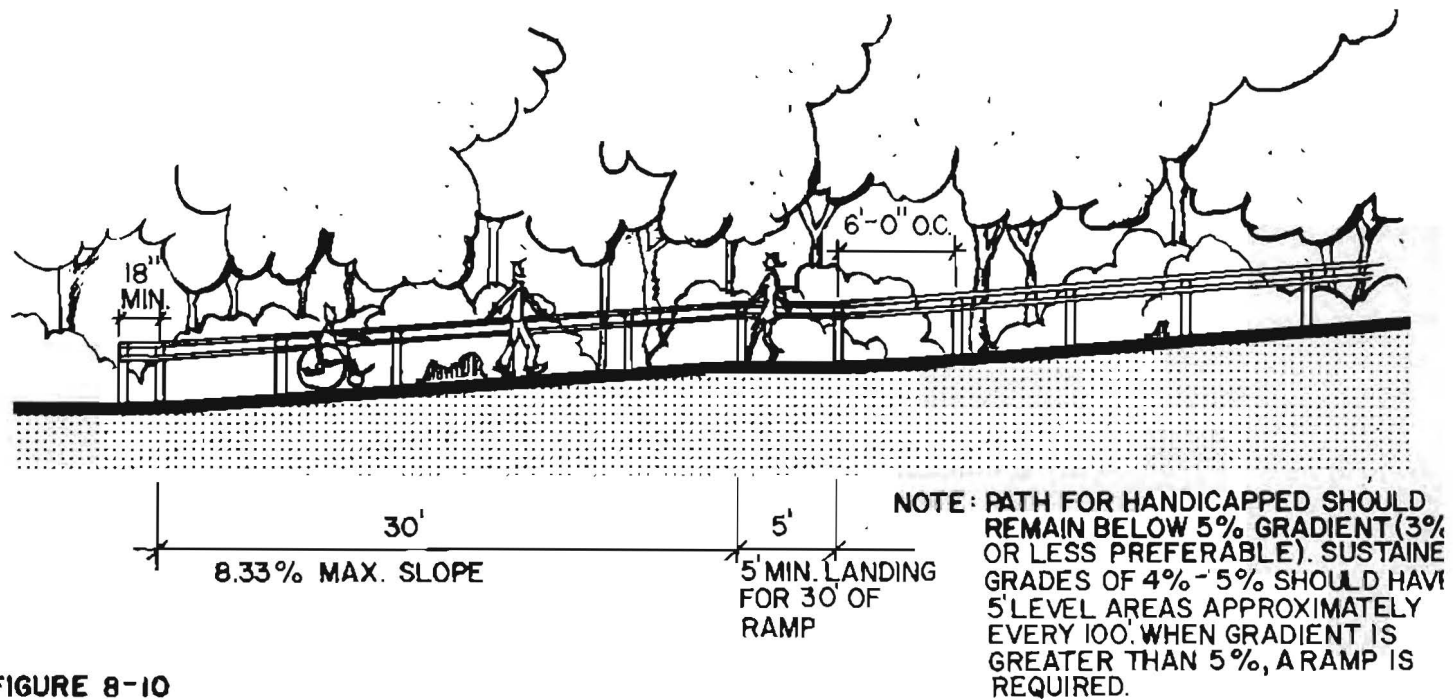


FIGURE 8-10
HANDICAPPED RAMP - ELEVATION

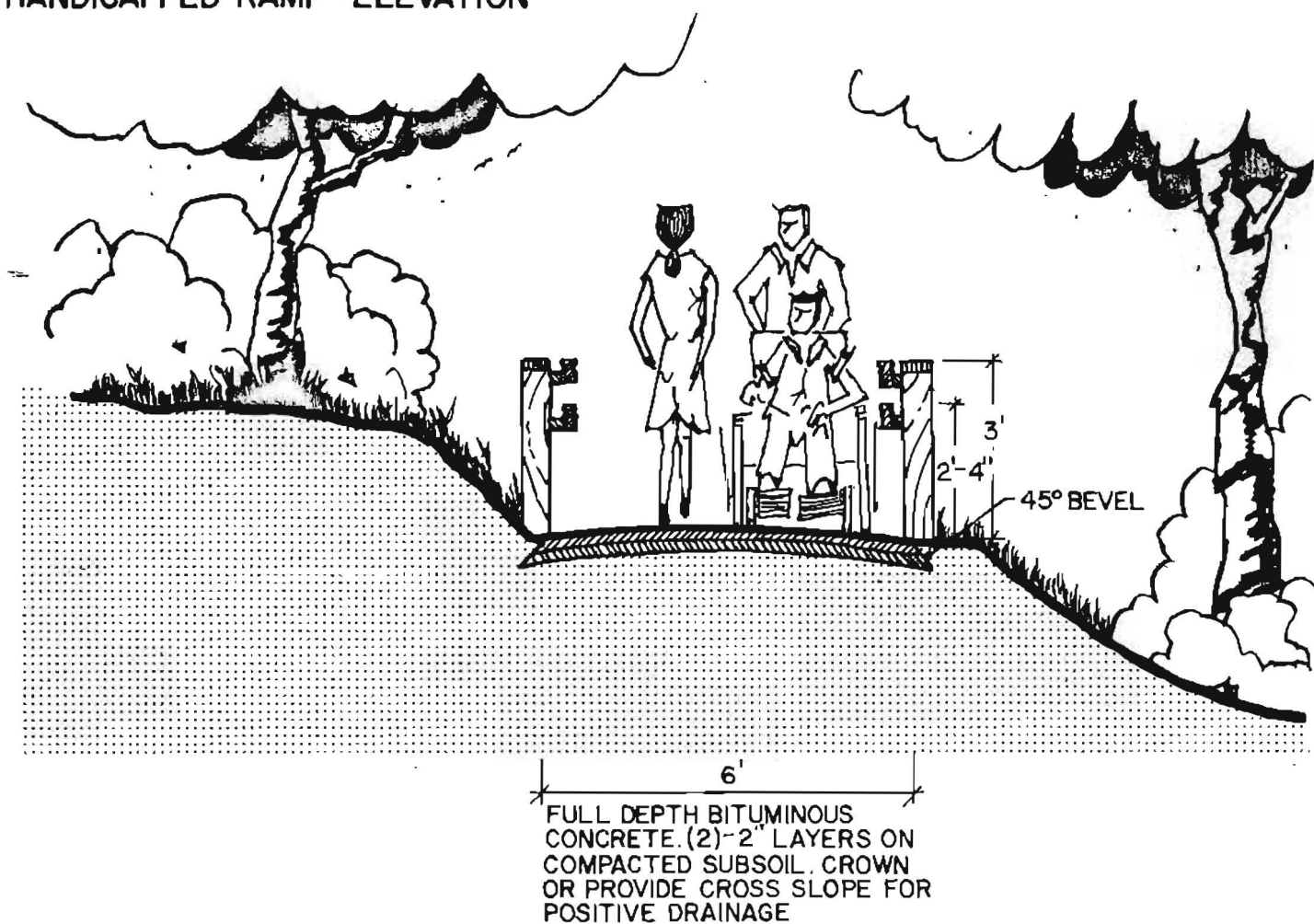


FIGURE 8-11
HANDICAPPED RAMP - SECTION

(6). Drainage. The design and construction of all pedestrian circulation walkways, ramps, and stairs will provide for positive drainage. All walkways will be crowned or sloped to shed surface water away from the structure.

(7). Handicapped Provisions. The following criteria should be considered to provide to the handicapped person maximum mobility with a minimum of assistance and effort.

(a). On long grades of 3 to 8 percent, level platforms should be provided no less than 30 feet apart and at all changes in direction.

(b). Contrasting shoulder material in texture and color should be provided.

(c). Handrails should be provided where appropriate.

(d). Abrupt changes in direction and grade should be avoided.

8-15. Shoreline Fishing Habitat Development.

a. General. The introduction of vegetation and other fish-attracting elements will help to develop fish habitat areas at the Dam Site. Also included in the development of the fish habitat areas is the implementation of an access walkway and natural seating elements such as large rocks and logs. (See Figure 8-11 for a depiction of this development.)

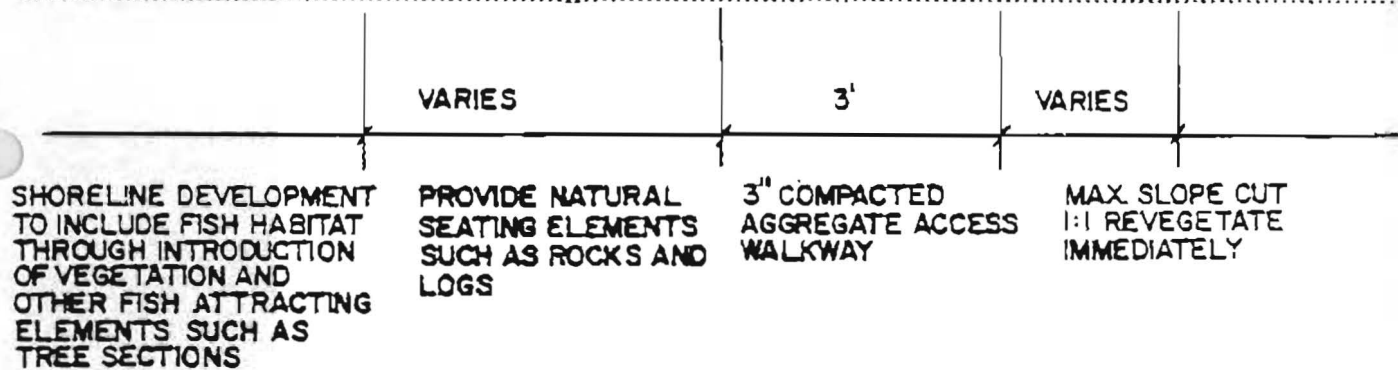
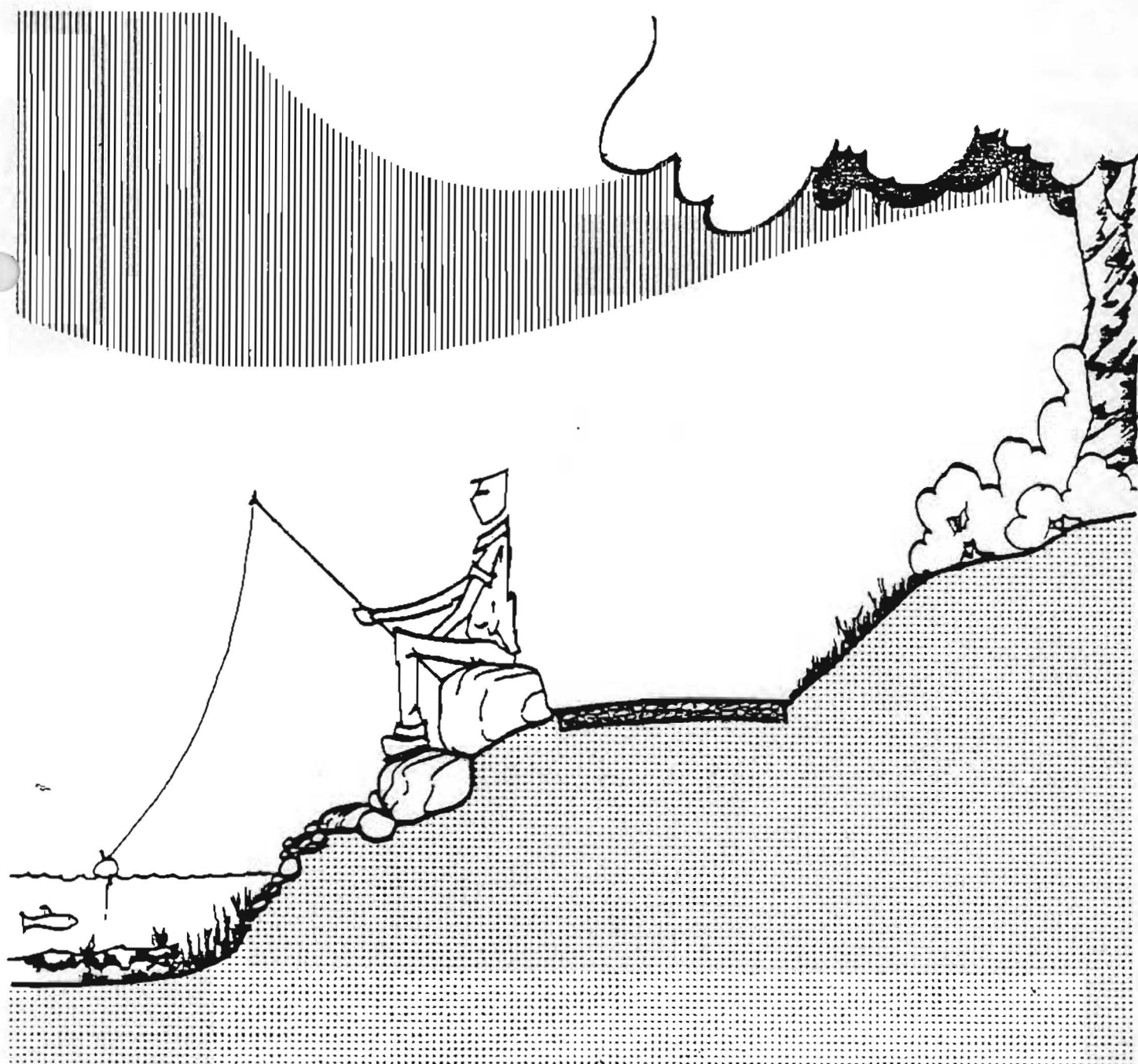


FIGURE 8-12
SHORELINE FISHING HABITAT DEVELOPMENT

CHAPTER 9

SPECIAL PROBLEMS

CHAPTER 9
SPECIAL PROBLEMS

9-01. Introduction.

In this era of budget cuts, many government agencies are finding themselves forced into reducing their staff and thereby limiting the scope of services which they can provide. At Sutton Lake, these reductions are directly responsible for eliminating the majority of the proposed developments of new recreational facilities, as well as postponing many necessary capital improvements.

9-02. Operations and Maintenance.

Due primarily to fiscal policy decisions beyond the control of the Corps of Engineers, personnel needed to perform necessary duties at the project have been drastically reduced. Currently, planning and development objectives are not financially feasible, so the Corps has begun to concern itself with maintaining the status quo of existing facilities. Yet, even this has begun to be a budgetary burden as maintenance and operations problems begin to present themselves within the Project. Future funding will dictate whether additional areas will need to be consolidated or closed.

a. Brock Run. Brock Run was an uncontrolled campground (fees are not collected from visitors wishing to use the facility), providing 22 camp sites, portable toilets, and one drinking fountain. Sites were undesignated and visitors camped at random locations. Access into the area was over a steep one-lane dirt road which at times required a 4-wheel drive vehicle to traverse. Its primitive nature and rustic setting made Brock Run ideal for those visitors who enjoy this type of camping experience. Unfortunately, since it is located 15 miles from the project headquarters and could not be properly managed, severe overcrowding and total disregard of park rules had become a frequent problem.

Reported infractions included the discovery by rangers on a number of occasions of more than double the allowable campers on the site, including one occurrence where rangers found 110 campers. A separate incident involved the worst fire in the history of Project which required a significant effort by the Corps and State fire fighters to control. Another common practice among Project visitors had been the dumping of trailer wastes along the access road as they left the facility. Due to these management problems, Brock Run Camping Area was closed in 1982.

Since Brock Run has been closed, there is no economic justification for providing any additional site improvements. The 22 campsites lost at this site will be relocated to other camping areas on the project at a later date.

9-03. Environmental Considerations.

a. Mining Operations. A continued threat to the water quality and subsequent fishing habitats at Sutton Lake are the Mining Operations which presently exist and/or lie abandoned just outside the Project boundaries.

Mining activities should be monitored in this area to help control any mining operations which could potentially degrade the lake. Reports of potential or existing problems should be made to the State of West Virginia's Water Control Board, Department of Health, Department of Natural Resources, and the Department of Mines as well as to the Federal Environmental Protection Agency.

CHAPTER 10

PROJECT RESOURCE MANAGEMENT

CHAPTER 10

PROJECT RESOURCE MANAGEMENT

10-01. Resource Management Plan.

The Resource Manager for the Sutton Lake Project has prepared (April, 1980), in conformance with ER 1130-2-400, a Project Resource Management Plan. He is also responsible for the overall coordination of this plan with the appropriate managing agencies of the State of West Virginia on this Project. The Project Resource Management Plan was completed and appears under separate cover as Appendix A to this Master Plan Update.

The Project Resource Management Plan provides for the maximum benefits of water quality, flood control, general recreation, fish and wildlife recreation, and redevelopment. All general and fish and wildlife recreational development require cost sharing by a non-Federal agency. The West Virginia Department of Natural Resources has assumed operation and management of 11,725 acres of this Project devoted to general and fish and wildlife and forest management while the Corps of Engineers operates and maintains the 148.5 acres necessary for Project operations and 156 acres of existing recreational facilities. Nineteen additional acres are managed by either state or private agencies.

The aforementioned land allocations are presented on the Land Use Plan, Exhibit 5. The Resource Management Plan will also describe and discuss the land acquisition policy, maintenance facilities, storage facilities, administration, pest control, education, and interpretation.

The Corps of Engineers will be concerned with public relations in general and will initiate, coordinate, and reconcile activities relative to management policies, regulations, and relations with concerned agencies. The Corps of Engineers will also concern itself with lake regulation, operation, and maintenance of the area containing the dam and appurtenances; and checking on compliance with the terms of outgrant instruments. Field personnel will be concerned with direct maintenance, management, and supervision of the lake program. Coordination with the planning function of the District Engineer, Huntington District, will be maintained where field changes and plan alterations become necessary to insure the wisest use of, and least disturbance to, the resources concerned.

The Project staff will consist of one Resource Manager (GS-11), one Maintenance Mechanic Leader (WL-9), one Maintenance Mechanic (WG-9), one Electrician (WG-10), two Park Rangers (GS-9), seasonal employees (WG-5) as needed, and one part-time Clerk-Typist (GS-5). The operations and maintenance cost for year 1982 is \$650,000.00.

CHAPTER 11

FOREST MANAGEMENT

CHAPTER 11

FOREST MANAGEMENT

11-01. Forest Management Plan.

A Forest Management Plan was prepared by the Huntington District's Operation Division and approved in 1973. Since that time, the West Virginia Department of Natural Resources has been granted a license to manage almost all of the Project's forest resources so a Corp's written plan is not required. However, it is highly recommended that the West Virginia Department of Natural Resources prepare a Forest Management Plan discussing the topics that appear in this chapter.

The objectives of the Forest Management Plan are to initiate a program to (1) increase and enhance the value of Project lands for timber, recreation, fish and wildlife, and watershed protection; (2) to promote natural ecological conditions; and (3) to maintain a mature vigorous forest stand typical of the area. Management practices such as thinning, pruning, and release cutting for stand improvement appropriate to commercial production forestry will be avoided when the preservation of natural conditions are of primary importance. Consideration will be given to establishing and maintaining a diversity of plant species of various ages, however, to minimize the possibility of complete Loss by natural causes.

The Forest Management Plan will describe the history of the existing forest lands as to species, types, and age class in order to maintain data records justifying the best management policies on specific areas. See Chapter 4, for general information on physical and soil constraints, ecological resources, and characteristics of the Project area. The Plan will also indicate special problem areas such as forests subject to flooding, significant biological or scientific stands, public use areas, and logged areas which occur on Project lands.

Planning for timber disposal and forest products generated incidental to construction or development will also be covered in the Plan.

All planned reforestation, clearing, or landscaping should be fully discussed in this plan. In areas of intense public use, plantings should be installed at the earliest possible date after a scientific inventory of the existing soils and timber resources is completed.

Leasees or licensees will coordinate all cutting, clearing, or planting programs on a continuing basis with the District Engineer to assure conformance with accepted forestry practice, compatibility with approved site plans, and prevention of conflict with the overall public interest.

Planning and managing by sustained yield forestry programs, as directed by PL 86-717, will also be addressed in this Plan. People have stated that the requirements of this law are not being carried out on District projects. This Master Plan Update recommends that forested project lands, whether licensed, leased, or Corps operated, be reevaluated and sustained yield forestry programs initiated were practical.

Personnel and fiscal requirements necessary to implement the Forest Management Plan will be furnished by the appropriate managing agency of the State of West Virginia.

The annual work plan will consider the following activities related to the management of forest land:

- (a) The assignment of priorities for land treatment;
- (b) The scheduling of work and maintenance of records of completed work;
- (c) The maintenance of records of land disposal and acquisition; and
- (d) The maintenance of records of forest fire occurrence.

CHAPTER 12

FIRE PROTECTION

CHAPTER 12

FIRE PROTECTION

12-01. Fire Protection Plan.

A Plan for grassland and forest fire protection, pre-suppression, and suppression functions was prepared by the District and approved in 1975.

CHAPTER 13

FISH AND WILDLIFE MANAGEMENT

CHAPTER 13

FISH AND WILDLIFE MANAGEMENT

13-01. Fish and Wildlife Management Plan.

A Fish and Wildlife Management Plan is no longer required since these management responsibilities have been out granted to the West Virginia Department of Natural Resources.

CHAPTER 14

PROJECT SAFETY

CHAPTER 14

PROJECT SAFETY

14-01. Project Safety Plan.

A Project Safety Plan was approved February, 1981 to ensure maximum safety to public visitors and staff on the Project. This Plan was prepared by the Resource Manager and coordinated with the appropriate managing agencies of the State of West Virginia under the guidelines of ER 1130-2-400, Appendix A, and with the District Safety Office. The Project Safety Plan appears under separate cover as Appendix E of this Master Plan Update.

This plan addressed the following items of information:

- (1) A statement of first aid training requirements for all resident Project personnel.
- (2) A comprehensive traffic safety plan wherein provisions are detailed for traffic surveillance and control. This traffic plan also includes a program of traffic sign maintenance and any special measures to be instituted during periods of peak holiday traffic.
- (3) A water safety plan that defines an ongoing water safety educational program and covers such measures as talks before local civic

groups and student bodies about safe boating and swimming practices will be prepared. The distribution of safety literature and the placement and display of posters will also be covered by this Safety Plan. In addition to these general safety concerns, this Plan will also identify any restricted areas on Sutton Lake, indicate speeds permitted on this body of water, and identify no-wake zones. The specifics of this Plan will be co-operatively defined by the appropriate county, state, and federal agencies involved, particularly those responsible for the enforcement of these boating regulations.

(4) An emergency assistance plan will be included wherein policies are outlined pertaining to the public display of official bulletin boards so that emergency assistance information can be posted for Project visitors. As a minimum, such information will include the telephone numbers of local emergency assistance squads, police, hospitals, and the directions to the nearest public telephone. Also included in this plan will be specific procedures to be followed in the event of a fatal accident.

(5) An employee safety plan for all Project resident personnel will also be included in the Project Safety Plan. This plan will be coordinated with the appropriate county, state, and federal agencies involved in the Sutton Lake Project.

Modern safety equipment will be available in all appropriate staff vehicles and at strategic points within the Project. Coordination and cooperation with local communities will assure use of available high quality medical facilities if and when necessary.

All Government owned vehicles, boats, trailers, and equipment are subject to safety inspection by the appropriate governmental agency officials and by the Project staff.

Proper design of structures and facilities will add significantly to the safety of and safe practices by personnel and visitors. This will include provisions for safe efficient equipment and supplies.

CHAPTER 15

LAKESHORE MANAGEMENT

CHAPTER 15

LAKESHORE MANAGEMENT

15-01. Lakeshore Management Plan.

A Lakeshore Management Plan will not be prepared for Sutton Lake since there are no private facilities on the Lake and no commitments for such development have been made.

CHAPTER 16

COST ESTIMATES

CHAPTER 16

COST ESTIMATES

16-01. Summary of Estimated Cost.

The estimated total cost of construction for proposed recreational facilities at Sutton Lake is \$591,600.00. The estimated cost of future facilities at the project is \$254,700.00. Of this cost for future facilities \$240,000.00 are estimated costs for expanding the maring at Bee Run Day Use area and would be incurred by the concessionaire. These figures reflect the basic costs for proposed and future development plus the engineering and design, contingency, administrative, and supervision fees that will occur in the implementation of this program.

16-02. Facility Cost.

All cost estimates shown are based on August 1982 price levels. Unit prices are derived from (1) bid tabulations supplied by C.O.E. for recently completed projects; (2) Means 1982 Cost Estimating Catalogue; and (3) bid tabulations from recently completed projects done by Woolpert Consultants as of June, 1982.

16-03. Allocation of Cost.

Table 16-1 provides a summary of total estimated costs for proposed and future recreational facilities by recreation area. These figures

Table 16-1

SUTTON LAKE AND RESERVOIR
SUMMARY OF ESTIMATED COSTS FOR
RECREATIONAL FACILITIES BY RECREATION AREA

Recreational Area	Proposed	Future
Dam Site Day-Use Areas	\$125,600.00	
Bee Run Day-Use Area	\$130,500.00	\$240,000.00 ⁺
Bee Run Camping Area	\$ 12,400.00	
Lower Kanawha Run	\$100,300.00	
Middle and Upper Kanawha Run Camping Areas	\$ 51,700.00	
Mill Creek Camping Area	\$ 1,300.00	\$ 14,700.00
Bakers Run Camping Area	\$169,800.00	
Total Estimated Cost For Recreation Facilities*	\$591,600.00	\$254,700.00

*Includes: 25% Contingency, 10% Engineering and Design, and 10% Supervision and Administration. All cost estimates are based on August, 1982 price levels.

⁺Cost To Be Incurred By Concessionaire

Table 16-2

COST ESTIMATES
DAM SITE DAY-USE AREAS

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	LANDSCAPE PLANTING (includes materials and installation)					
a.	Coniferous Trees	Each	\$ 125.00	71	\$ 8,875.00	
b.	Deciduous Trees	Each	\$ 150.00	136	\$ 20,400.00	
2.	INSTALL VEHICULAR GATES					
a.	38' Gate	Each	\$ 3,000.00	1	\$ 3,000.00	
b.	28' Gate	Each	\$ 2,500.00	1	\$ 2,500.00	
3.	IMPROVE SHORELINE FISHING	Lin.Ft.	\$ 3.00	540	\$ 1,620.00	
4.	CONSTRUCT WALKWAY (Bituminous Concrete)	Sq.Yds.	\$ 12.00	89	\$ 1,068.00	

Table 16-2 (Continued)

COST ESTIMATES
DAM SITE DAY-USE AREAS

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
5.	REMOVAL OF EXISTING PARK BENCHES	Each	\$ 25.00	4	\$ 100.00	
6.	CONSTRUCT CANOE LAUNCH PLATFORM	Lump Sum	\$ 20,000.00	1	\$ 20,000.00	
7.	CONSTRUCT STAIRED WALK- WAY TO CANOE LAUNCH PLATFORM	Lump Sum	\$ 20,000.00	1	\$ 20,000.00	
SUB TOTAL					\$ 77,563.00	
Contingency					\$ 19,000.000	
Engineering and Design					\$ 14,500.00	
Supervision and Administration					\$ 14,500.00	
TOTAL					\$ 125,600.00	

Table 16-3

COST ESTIMATES
BEE RUN DAY-USE AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	LANDSCAPE PLANTING (includes materials and installation)					
a.	Coniferous Trees	Each	\$ 125.00	8	\$ 1,000.00	
b.	Deciduous Trees	Each	\$ 150.00	25	\$ 3,750.00	
2.	CONSTRUCT OVERLOOK LANDING	Lump Sum	\$ 14,000.00	1	\$ 14,000.00	
3.	IMPROVE EXISTING BEACH Timber edge					
a.	Topsoil	Cu.Yds.	\$ 11.00	655	\$ 7,205.00	
b.	Fill	Cu.Yds.	\$ 7.00	3,000	\$ 21,000.00	

Table 16-3 (Continued)

COST ESTIMATES
BEE RUN DAY-USE AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
c.	Seeding	Sq.Yds.	\$ 0.40	2,500	\$ 1,000.00	
d.	Swimming Safety Line	Lin.Ft.	\$ 2.00	800	\$ 1,600.00	
5.	CONSTRUCT BOAT SLIPS	Each	\$ 2,000.00	80		\$ 160,000.00*
6.	CONSTRUCT WALKWAY PAVEMENT (6' Wide) (Bituminous Concrete)	Sq.Yds.	\$ 12.00	1,400	\$ 16,800.00	
7.	PICNIC FACILITIES					
a.	Picnic Tables	Each	\$ 250.00	14	\$ 3,500.00	
b.	Grills					
	Individual	Each	\$ 170.00	5	\$ 850.00	
	Group Use	Each	\$ 390.00	1	\$ 390.00	
c.	Trash Receptacles	Each	\$ 75.00	5	\$ 375.00	

*Cost to be incurred by concessionaire.

Table 16-3 (Continued)

COST ESTIMATES
BEE RUN DAY-USE AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
8.	HIKING TRAILS	Lin.Ft.	\$ 3.00	5,000	\$ 15,000.00	
9.	INSTALL SIGN					
	A. Trailhead	Each	\$ 150.00	1	\$ 150.00	
SUB TOTAL					\$ 86,620.00	\$160,000.00*
Contingency					\$ 21,900.00	\$ 40,000.00*
Engineering and Design					\$ 11,000.00	\$ 20,000.00*
Supervision and Administration					\$ 11,000.00	\$ 20,000.00*
TOTAL					\$130,500.00	\$240,000.00*

*Costs to be incurred by concessionaire.

Table 16-4

COST ESTIMATES
BEE RUN CAMPING AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	LANDSCAPE PLANTING (includes materials and installation)					
a.	Coniferous Tree	Each	\$ 125.00	24	\$ 3,000.00	
b.	Deciduous Tree	Each	\$ 150.00	29	\$ 4,350.00	
2.	INSTALL SIGNS					
a.	Site Identification	Each	\$ 800.00	1	\$ 800.00	
b.	Trail Head	Each	\$ 150.00	1	\$ 150.00	
SUB TOTAL					\$ 8,300.00	
Contingency					\$ 2,100.00	
Engineering and Design					\$ 1,000.00	
Supervision and Administration					\$ 1,000.00	
TOTAL					\$ 12,400.00	

Table 16-5

COST ESTIMATES
LOWER KANAWHA RUN CAMPING AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	LANDSCAPE PLANTING (includes materials and installation)					
a.	Coniferous Tree	Each	\$ 125.00	8	\$ 1,000.00	
b.	Deciduous Tree	Each	\$ 150.00	131	\$ 19,650.00	
2.	INSTALL VEHICULAR GATE					
	28' Gate	Each	\$ 2,500.00	1	\$ 2,500.00	
3.	IMPROVE CAMPSITES					
a.	Pavement Removal	Sq.Yds.	\$ 2.00	445	\$ 890.00	
b.	New Asphalt Pavement	Sq.Yds.	\$ 12.00	889	\$ 10,668.00	
c.	Picnic Tables	Each	\$ 380.00	5	\$ 1,900.00	
d.	Fire Ring	Each	\$ 150.00	5	\$ 750.00	
e.	Trash Receptacle	Each	\$ 160.00	2	\$ 320.00	
f.	Parking Blocks	Each	\$ 35.00	8	\$ 280.00	
g.	Seeding	Sq.Yds.	\$ 0.40	1400	\$ 560.00	
h.	Site Grading	Sq.Yds.	\$ 3.00	390	\$ 1,170.00	

Table 16-5 (Continued)

COST ESTIMATES
LOWER KANAWHA CAMPING AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
4.	CONSTRUCT ROADWAY (Bituminous Concrete)	Sq.Yds.	\$ 14.00	222	\$ 3,108.00	
5.	CONSTRUCT PLAY AREA (includes all site preparation, new play apparatus, surface material, and edging)	Lump Sum	\$ 24,000.00	1	\$ 24,000.00	
SUB TOTAL					\$ 66,796.00	
Contingency					\$ 16,704.00	
Engineering and Design					\$ 8,400.00	
Supervision and Administration					\$ 8,400.00	
TOTAL					\$ 100,300.00	

Table 16-6

COST ESTIMATES
MIDDLE AND UPPER KANAWHA RUN

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	LANDSCAPE PLANTING (includes materials and installation)					
a.	Coniferous Tree	Each	\$ 125.00	27	\$ 3,375.00	
d.	Deciduous Tree	Each	\$ 150.00	154	\$ 23,100.00	
2.	INSTALL SIGNS					
a.	Entry Sign	Each	\$ 2,000.00	1	\$ 2,000.00	
3.	UPGRADE EXISTING TURNAROUND	Sq.Yds.	\$ 14.00	430	\$ 6,020.00	
SUB TOTAL					\$ 34,495.00	
Contingency					\$ 8,605.00	
Engineering and Design					\$ 4,300.00	
Supervision and Administration					\$ 4,300.00	
TOTAL					\$ 51,700.00	

Table 16-7

COST ESTIMATES
MILL CREEK CAMPING AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	INSTALL SIGN					
	Trailhead Sign	Each	\$ 150.00	1		\$ 150.00
2.	HIKING TRAIL	Sq.Yds.	\$ 9.00	1,070		\$ 9,630.00
3.	NORTHERN ENTRANCE IMPROVEMENTS					
	a. Site grading	Lump Sum	\$ 700.00	1	\$ 700.00	
	b. Seeding	Sq.Yds.	\$ 0.40	355	\$ 142.00	
SUB TOTAL					\$ 842.00	\$ 9,780.00
Contingency					\$ 218.00	\$ 2,420.00
Engineering and Design					\$ 120.00	\$ 1,250.00
Supervision and Administration					\$ 120.00	\$ 1,250.00
TOTAL					\$ 1,300.00	\$ 14,700.00

Table 16-8

COST ESTIMATES
BAKERS RUN CAMPING AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
1.	LANDSCAPE PLANTING (includes materials and installation)					
	Deciduous Trees	Each	\$ 150.00	141	\$ 21,150.00	
2.	INSTALL SIGN					
	Entry Sign	Each	\$ 2,000.00	1	\$ 2,000.00	
3.	IMPROVE PARKING					
a.	Bituminous Concrete (5 Spaces)	Sq.Yds.	\$ 14.00	112	\$ 1,568.00	
b.	Striping	Lin.Ft.	\$ 0.40	80	\$ 32.00	
c.	Precast Concrete Bumper Blocks	Each	\$ 35.00	5	\$ 175.00	
4.	IMPROVE ROADWAY					
a.	Pavement Removal	Sq.Yds.	\$ 2.00	1,900	\$ 3,800.00	
b.	Bituminous Concrete	Sq.Yds.	\$ 14.00	1,450	\$ 20,300.00	
c.	Site Grading	Cu.Yds.	\$ 3.00	1,200	\$ 3,600.00	
d.	Seeding	Sq.Yds.	\$ 0.40	3,500	\$ 1,400.00	
e.	Culvert Installation	Lin.Ft.	\$ 22.00	40	\$ 880.00	

Table 16-8 (Continued)

COST ESTIMATES
BAKERS RUN CAMPING AREA

Item	Description	Unit	Unit Price	Quantity	Total Cost	
					Proposed	Future
5.	IMPROVE CAMPSITES					
a.	Pavement Removal	Sq.Yds.	\$ 2.00	1,556	\$ 3,112.00	
b.	Bituminous Concrete	Sq.Yds.	\$ 14.00	1,722	\$ 24,108.00	
c.	Picnic Tables	Each	\$ 380.00	3	\$ 1,140.00	
d.	Fire Ring	Each	\$ 150.00	3	\$ 450.00	
e.	Trash Receptacle	Each	\$ 160.00	2	\$ 320.00	
f.	Parking Blocks	Each	\$ 35.00	3	\$ 105.00	
6.	CONSTRUCT AMPHITHEATER (includes all site preparation)	Lump Sum	\$ 5,000.00	1	\$ 5,000.00	
7.	CONSTRUCT PLAY AREA (includes all site preparation, new play apparatus, surface material, and edging)	Lump Sum	\$ 24,000.00	1	\$ 24,000.00	
SUB TOTAL					\$113,140.00	
25% Contingency					\$ 28,360.00	
10% Engineering and Design					\$ 14,150.00	
10% Supervision					\$ 14,150.00	
TOTAL					\$169,800.00	

CHAPTER 17

CONCLUSIONS

CHAPTER 17

CONCLUSIONS

17-01. Master Plan Update Conclusions.

This Master Plan Update establishes a course of action to be followed in the further development and management of Sutton Lake. It should be emphasized that this is not a rigid Master Plan, but rather a set of performance guidelines which should set the tone for future planning efforts.

CHAPTER 18

RECOMMENDATIONS

CHAPTER 18

RECOMMENDATIONS

18-01. Master Plan Update Recommendations.

It is recommended that: (1) this Master Plan Update be approved and used to guide the present and future development, use, and management of Sutton Lake; and (2) further detailed design plans be prepared to ensure continuity of design between proposed and existing recreational facilities.

APPENDICES

INDEX TO APPENDICES

1. Appendix A - Project Resource Management Plan, prepared in April, 1980 and bound separately
2. Appendix B - Fish and Wildlife Management Plan, available through the West Virginia Department of Natural Resources
3. Appendix E - Project Safety Plan, approved February, 1981 and bound separately
4. Appendix H - Master List of Species, available through West Virginia Department of Natural Resources and Corps of Engineers.
5. Appendix I - Comments from other agencies

Appendix I

Comments From Other Agencies



DEC 09 1983

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

Mr. Donald W. Herndon, Chief
Planning Division Huntington Dist.
Army Corps of Engineers
502 Eight St.
Huntington, W. VA 25701

Dear Mr. Herndon:

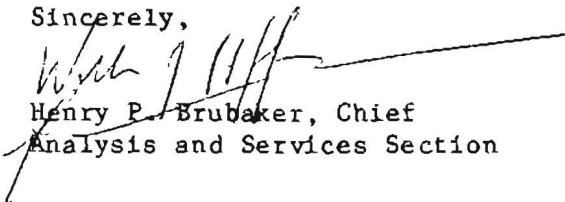
We have completed our review of the Final Master Plan Update for the Sutton Lake facility and submit these comments for your consideration. Even though we are a little concerned about the assignment of responsibilities for project management to other agencies, we appreciate the position taken by the Corps. Our main concern is the potential for acid mine drainage to destroy many of the uses of the lake. We do not feel sufficient pre-plan investigation has been carried out in this regard.

The potential for acid mine drainage is mentioned on page 129 and in several other places in the document. The following questions should be answered prior to plan implementation.

1. The extent of coal reserves is noted, but their ownership and plans for exploitation are not.
2. Since acid mine drainage carries severe implications for fishing and wildlife uses as well as for contact recreation, we feel extensive overburden geochemistry should be considered. Such studies should be carried out in those areas where it is known that geohydrology is a substantial contributor to the Elk River drainage sources. EPA has a preferred method for such studies and will be happy to supply technical references.
3. It is mentioned that Braxton County has no serious fault zones, but complete structural geological information is not presented. The report does mention that the greatest portion of mineable reserves are retrievable only through deep mining methods. Mining seriously disturbs the dynamic equilibrium of local geology and disrupts ground water patterns by causing cracking and faulting where none existed before. For this reason, the Corps should attempt to determine reserves and their potential for acid mine drainage vis-a-vis structural geology and ground water patterns.

For any questions and further information, please contact Bob Davis on FTS 597-4388. We have rated this document ER-2 in EPA's rating system.

Sincerely,


Henry P. Brubaker, Chief
Analysis and Services Section

FEDERAL ENERGY REGULATORY COMMISSION
NEW YORK REGIONAL OFFICE
26 FEDERAL PLAZA, ROOM 2207
NEW YORK, NEW YORK 10278

December 1, 1983

Mr. Donald W. Herndon
Chief, Planning Division
Department of the Army
Huntington District, Corps of Engineers
502 Eighth Street
Huntington, West Virginia

Re: Design Memorandum No. 11
Master Plan Update for Sutton Lake
Elk River, West Virginia

Dear Mr. Herndon:

We have reviewed the Corps' Design Memorandum on the above subject matter transmitted with your letter of November 14, 1983.

At this time, we have no comments to offer on the master plan as such. For your information, the licensing actions to date on the proposal to construct a hydroelectric plant at Sutton Dam are as follows. On July 22, 1981, a preliminary permit was issued by FERC to the Town of Gassaway, West Virginia, for a period of two years. On January 10, 1983, the Town of Gassaway then filed an application for a major license for the construction of a powerhouse containing two units with a total rated capacity of 12,000 kW and associated appurtenances. FERC issued a public notice of the application for this project, designated as Project No. 3344-WV, on February 24, 1983. The West Virginia Department of Natural Resources filed a motion to intervene in the licensing process, stating that their interests would be affected by the proposed hydroelectric installation if such a project was granted a license by the Commission. The public notice granting late intervention to the State was issued by FERC on June 13, 1983. The above matter is currently in the process of being resolved by affected parties. In view of the above, the "on-line" date of 1986, cited on page 1 of the referenced report is not likely.

We appreciate the opportunity to comment on this matter and hope that the foregoing is satisfactory to your present needs.

Sincerely,

James D. Hebson

James D. Hebson
Regional Engineer



United States
Department of
Agriculture

Forest
Service

Northeastern Area
State & Private
Forestry

370 Reed Road
Broomall, PA 19008

Reply to: 3510

Date: December 9, 1983

Mr. Donald W. Herndon
Chief, Planning Division
Environmental Planning Branch
502 Eighth Street
Huntington, West Virginia 25701

Dear Mr. Herndon:

We have reviewed your Final Draft Master Plan Update for Sutton Lake, Elk River, West Virginia and find it complete and adequate.

Chapter II, Forest Management is a fairly detailed treatment of needs and objectives perceived by your District. Your St. Louis District has been involved in a Vegetational Management Program for the Clarence Cannon Reservoir with the Missouri Conservation Department. The results of this cooperative venture were highly satisfactory. You may want to contact the St. Louis office for particulars.

We thank you for the opportunity to review and comment on the Master Plan. If we may be of assistance in future projects, please call on us.

Sincerely,

STEPHEN E. McDONALD
Staff Director
Forest Management Staff
Resource Management



DEPARTMENT OF CULTURE AND HISTORY

STATE OF WEST VIRGINIA
JOHN D. ROCKEFELLER IV, GOVERNOR

NORMAN L. FAGAN, COMMISSIONER

December 7, 1983

Mr. Donald W. Herndon
Chief, Planning Division
US Army Corps of Engineers
502 Eighth Street
Huntington, WV 25701

Dear Mr. Herndon:

RE: Final Draft, Master Plan Update
Sutton Lake, Braxton & Webster Counties, WV

We have reviewed your Final Draft Mast Plan Update of November 14, 1983, in which you bring to our attention the proposed master plan for development of recreational facilities at the Sutton Lake, Braxton and Webster Counties, West Virginia.

The information we currently possess in our inventory indicates that the properties should not affect any historic or archaeological properties now known to us. This reflects an in-office review and not a systematic field survey and evaluation of the subject area.

Thank you for the opportunity to respond on this matter. If we may be of further assistance, please contact our office.

Sincerely,


Rodney S. Collins
Director
Historic Preservation Unit

RSC:kfs;apw



STATE OF WEST VIRGINIA
DEPARTMENT OF NATURAL RESOURCES
CHARLESTON 25305

JOHN D. ROCKEFELLER IV
Governor

February 14, 1984

WILLIS H. HERTIG, JR.
Director

RONALD R. POTESTA
Deputy Director

Mr. Donald W. Herndon
Chief, Planning Division
Huntington District, Corps of Engineers
502 Eighth Street
Huntington, West Virginia 25701

Dear Mr. Herndon:

The West Virginia Department of Natural Resources has reviewed the Corps of Engineers' (COE) final draft of Design Memorandum No. 11, Master Plan Update for Sutton Lake, Elk River, West Virginia, and offers the following comments.

General

It is a recommendation of this department's Wildlife Resources Division (WRD) that the COE re-evaluate methods used and estimates derived concerning present and projected hunter use.

Land clearing prior to flooding of Sutton Lake resulted in removal of virtually all timber. Submerged timber is now routinely left in place prior to flooding new reservoirs. Fish attractant structures placed in Sutton Lake by the WRD have produced positive results. Problems encountered include both cost and the necessity of refurbishing due to winter drawdown. This department recommends that the COE consider federal cost-sharing with the WRD for such a program.

Specific

Page 24, Par. 2, Sent. 2 -- The latter portion of this sentence is incorrect and should be deleted.

Page 24, Par. 3 and Par. 4 -- Bobwhite quail are no longer considered common in the area and listings of sport fish for both the reservoir and river are incomplete.

Page 39, Par. 1 -- The "recreation season" as defined here does not include the majority of the hunting season and excludes fall and winter fishing.

Mr. Donald W. Herndon
Page Two
February 14, 1984

✓ Page 40, Table 5-2 -- Stonecoal, Big Ditch and Stonewall Jackson Lakes should be added to this table.

✓ Page 41, Par. 3 -- Stonecoal, Big Ditch and Stonewall Jackson Lakes should be included in this discussion.

✓ Page 41, Par. 4 -- Hunting and fishing recreation should be included in discussions of Burnsville Lake.

✓ Page 42, Par. 1 -- Hunting and fishing recreation should be included in discussions of Summersville Lake.

✓ Page 45, Par. 2 -- It is not clear from this discussion how hunting and fishing visitation was determined.

✓ Page 47, Table 5-3 -- The 1978 estimated hunting use appears low. It is doubtful that a 10-fold increase in use occurred in 1 year.

✓ Page 48, Table 5-4 -- WRD hunter use mail questionnaire surveys indicate a much higher rate of increase for hunting.

✓ Page 50, Table 5-6 -- Hunter participation rates apparently were based on surveys conducted during summer (non-hunting months). Estimates should be derived from seasonally adjusted data.

✓ Page 51, Table 5-7 -- See preceding comment.

✓ Page 54, Table 5-9 -- Parking spaces are a poor determinant for hunter needs. Hunter parking is rarely in parking spaces associated with developed recreation areas.

Page 57, (2) Lake Capacity -- Determination of lake boating capacity is apparently based solely on boating recreation. Fisherman can and do tolerate more crowding. Launching facilities are often crowded on certain weekends (e.g., May) due to high fishermen numbers. Increased launching facilities may be necessary in the future to accomodate this use.

Page 65, b. Operations: Recreation-Intensive Use -- This department understands that safety zones are necessary near intensive recreation areas, but this paragraph indicates that hunting will not be permitted in areas zones in this manner. Much of the area delineated recreation-intensive (particularly that near Been Run) is now hunted. It is recommended that zones remain open to hunting except when there is danger to public safety.

Page 67, Par. 1 -- It should be noted that all tributary coves in this area are "no-wake zones."

✓ Exhibit 7 -- This exhibit requires revision as the proposed playground is in place.

Mr. Donald W. Herndon
Page Three
February 14, 1984

Page 74, Par. 3 -- This department does not concur with the reduction of the number of parking spaces.

Page 76, Par. 1 -- The COE should proceed with the launching ramp described in this paragraph. If hydropower is installed, mitigative measures would involve replacement of the ramp.

A severe safety problem exists in this vicinity due to the large size of the riprap used for bank stabilization. The COE is urged to undertake measures to increase the comfort and safety of fishermen at this location.

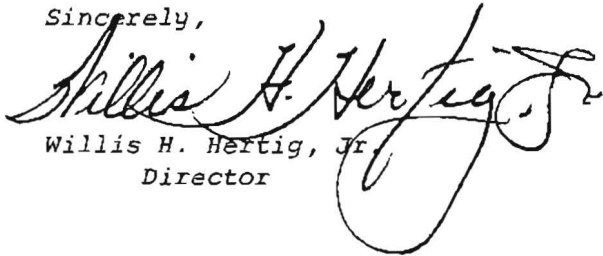
Page 76, Par. 2 -- Construction of the fisherman access trail proposed here is not recommended. The area may be easily fished under present conditions and is an area of relatively poor fishing success due to shoreline conditions. Construction of the launching ramp and safety improvements in the tailwater area (mentioned above) are of higher priority. A better location for a fisherman access trail would be between Kanawha and Brock Runs.

Page 81, Par. 1 -- This department is of the opinion that a fee is now charged for camping in this area.

Page 91, Par. 3 -- It is a contention of this department that the boat launching ramp should also be counted as "credit" and be relocated at another site at full federal expense. The COE should consider its relocation at the tailwaters.

The opportunity to review this document is appreciated. Please contact H. G. Woodrum, Environmental Analysis, should you have any questions.

Sincerely,



Willis H. Hertig, Jr.
Director

WHH/hws

cc: Division of Wildlife Resources