



REPLY TO  
ATTENTION OF

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

1 I certify that the following electronic file, consisting of 214 pages, 12 exhibits, and appendices is a true, correct and complete copy of the original document.

John Preston

Acting Chief, Environmental Analysis Section

Dated: 23 July 2009

33 - Twelve Pole Creek WV Beech  
Fork Lake Master Plan Final  
Draft Design Memorandum No 11  
Dec 1988



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

REPLY TO  
ATTENTION OF:

CEORH-PD-R (1110-2-240a)

1 December 1995

MEMORANDUM FOR Commander, Huntington District

SUBJECT: Supplement No. 14, Master Plan, Design Memorandum  
No. 11, Beech Fork Lake, West Virginia

1. Authority: ER 1130-2-435, paragraph 7.b., Preparation of Project Master Plans, dated 30 December 1987.

2. The following Exhibits are enclosed:

- a. Beech Fork Lake project map.
- b. Topographic map of pond location.
- c. Plan view of pond.
- d. Cross section of dike.

3. The purpose of this Supplement is to request approval for the construction of a five acre fishing pond on the wildlife management area at Beech Fork Lake. West Virginia Division of Natural Resources will be responsible for the construction costs and future maintenance. The pond will be stocked with trout, bass, bluegills, and channel catfish to provide additional fishing opportunities for children and adults. Another benefit will be the increase of habitat for waterfowl and other aquatic animals.

4. The location is adjacent to Millers Fork Creek about 0.7 mile from the intersection of State Routes 17 and 22 (Exhibits A and B). Present land use at the site is two-thirds hayfield, and one third brush and scattered small trees around an old 0.15 acre pond. The dam for the pond is designed by the Natural Resource Conservation Service (NRCS) and will meet their specifications for small watershed impoundments. The construction will be inspected by NRCS.

5. The dam design consists of a dike on three sides about seven feet high on the landward side which will impound water from a 30 acre watershed. Soil from the pond area is used as fill for the dike. There will be a 18 inch diameter riser and outlet

SUBJECT: Supplement No. 14, Master Plan, Design Memorandum  
No. 11, Beech Fork Lake, West Virginia

to the creek to maintain a maximum water depth of six feet. An emergency spillway is built into the corner of the dike with an elevation one foot higher than the normal water depth. The slope of the dike on the pond side is one foot vertical to three feet horizontal which would allow easy access along the shore for fisherman (Exhibits C and D). The pond area is upstream of the seasonal pool and within the upper area of the flood pool. The maximum flood pool at elevation 614.5 feet will be on the side of the dike displacing a maximum of 30 acre feet of flood storage capacity. This would be an insignificant loss compared to the gross storage capacity of 37,500 acre feet.

6. A parking area with a gravel surface will be built adjacent to the dike and is accessed by an existing road from S.R. 22 to a gas pump station. The dike and all disturbed areas will be fertilized, mulched, and seeded with grass.

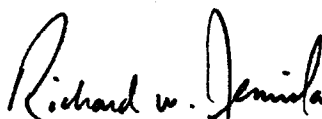
7. The pond will be considered a part of the wildlife area and will be open at all times. No restrooms or other recreation facilities will be provided. Enforcement of wildlife regulations at the pond will be the responsibility of the Wayne County conservation officers and the wildlife manager in charge of Beech Fork Lake. The maintenance/operations building for the wildlife area is located one mile from the pond on S.R. 17.

8. The fishing pond may be utilized by all anglers except for certain scheduled days when an organized Kid's Fishing Derby will be held. One or two events per year will probably be held in May, June, or July. The proposal has been reviewed by all concerned District elements. Approval is recommended.

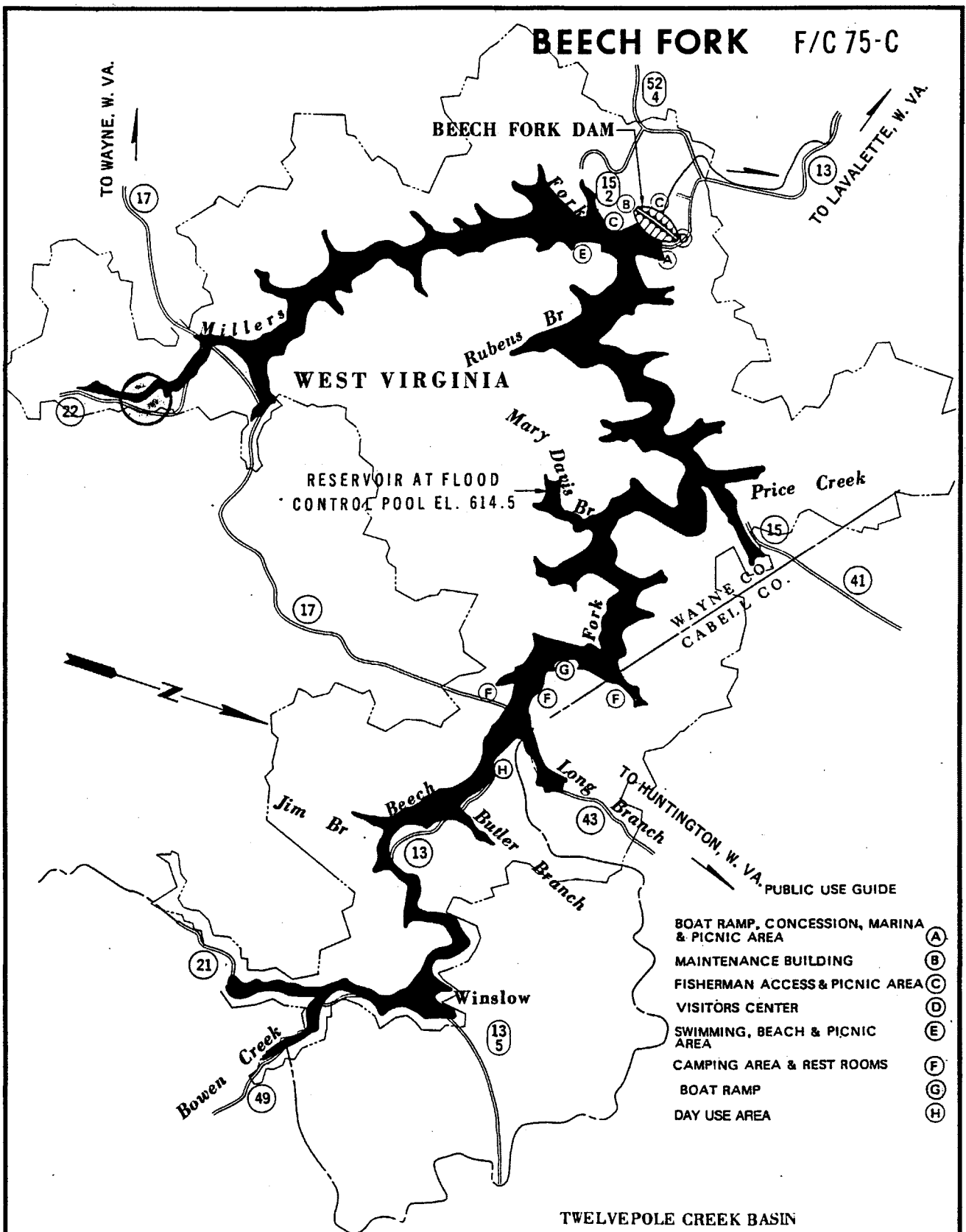
4 Encls  
as

  
JAMES S. EVERMAN  
Chief, Planning Division

APPROVED BY:

  
RICHARD W. JEMIOLA  
Colonel, Corps of Engineers  
Commanding

# BEECH FORK F/C 75-C



TWELVEPOLE CREEK BASIN  
BEECH FORK  
BEECH FORK LAKE



DICKSON JUNC. U.S. 521.6 MI.

PARKING

000  
FEET

Miller's

Fork

S. R. 22

BM

MILLERS FORK  
KIDS FISHING POND  
LOCATION MAP

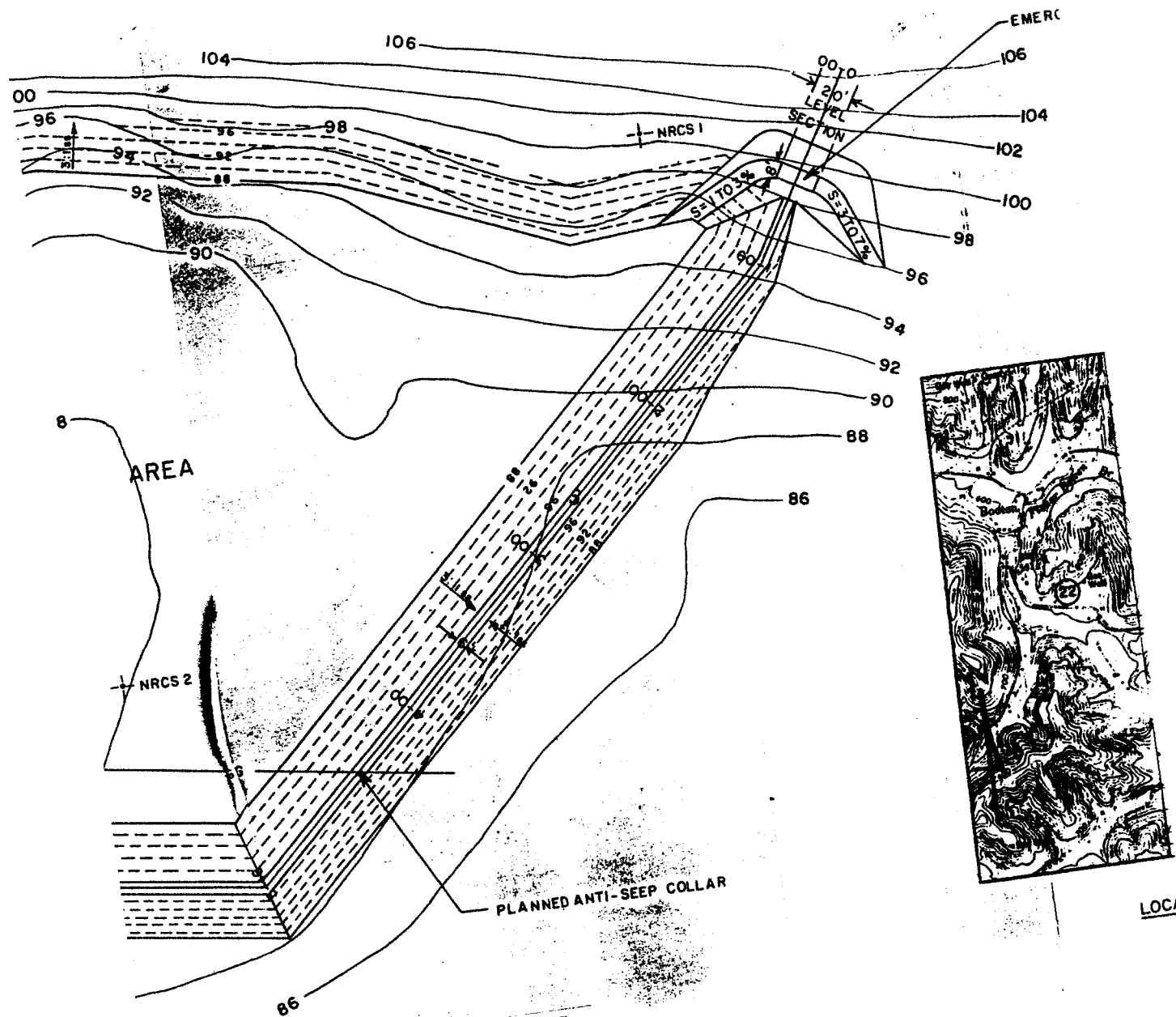
WINSLOW QUAD  
(LOWER LEFT CORNER)

□ - POND

□ - PARKING AREA

--- - WATERSHED BOUNDARY

EXHIBIT B



LOCA

NOVEMBER 1995

EXHIBIT C

PSW INLET  
(Check Type to be used)

- ☒ Pipe Drop Inlet  
(WV-ENG-12)  
☐ Concrete Box Drop  
Inlet (WV-ENG-14)  
☐ Drop Inlet  
w/Canopy or Hood  
(WV-ENG-15)

STANDPIPE

Length = 5 Ft.  
Dis. Perforations = 30 in.  
No. Vertical rows of Perforations 4  
Spacing of Perforations = 5 in. (c.c.)  
Stagger perforations in rows  
so perforations are not aligned  
around the pipe circumference.

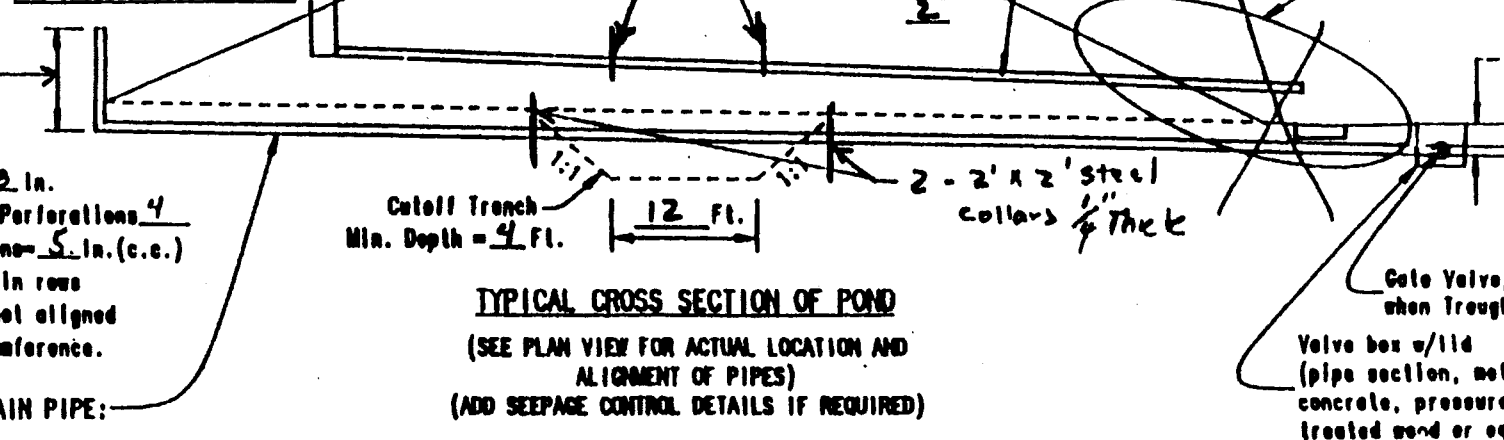
WATER SUPPLY OR DRAIN PIPE:

Diameter = 1 1/4 in.  
Length = 85 Ft.  
Material: Galv. ASTM A-130  
Gauge, Wall Thickness, Schedule or GDR = 40  
(Cross-out Designations not used)

ESTIMATED QUANTITIES

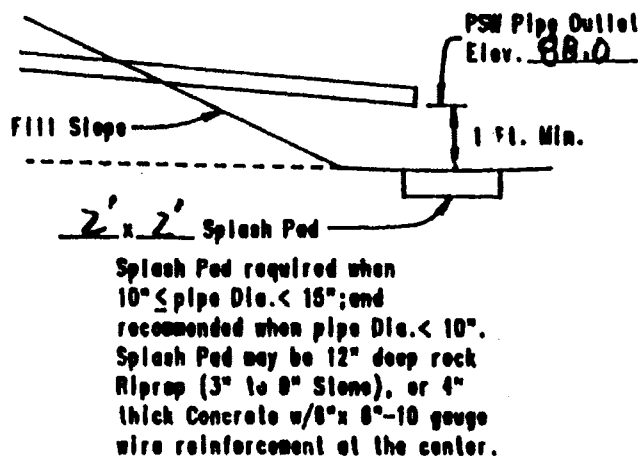
ITEM	UNIT	QUANTITY
Earth Fill - Embankment	Cu.Yd.	16,269
PSW Pipe	Ft.	70 Ft.
Water Supply or Drain Pipe	Ft.	85 Ft.
Fence	Rod	-
Riprap	Ton	0.3
Concrete	Cu.Yd.	-
	Rate/Ac.	
Fertilizer <u>10-20-20</u>	500/lb.	Lb. 1325
Lime	2/100	Ton 9.3
Mulch	2/100	Ton 5.3
Seed (Type <u>Orchard</u> )	10/lb. Ac.	Lb. 24.5
<u>Red Top</u>	3/lb. Ac.	8.0
<u>Lespedeza clover</u>	2/lb. Ac.	5.3

Top of Constructed Fill Elev. (Varies)  
(See E Profile)  
Emergency Spillway Elev. 95.0  
PSW Inlet Elev. 94.0



TYPICAL CROSS SECTION OF POND

(SEE PLAN VIEW FOR ACTUAL LOCATION AND  
ALIGNMENT OF PIPES)  
(ADD SEEPAGE CONTROL DETAILS IF REQUIRED)



DETAIL A  
PSW OUTLET

(For Ponds with PSW Pipes less than 15" Dia.)

NOTE: When the PSW Pipe Dia. > 15".  
(See WV-ENG-16 or WV-ENG-17)

PSW PIPE:

Diameter = 1 1/4 in.  
Length = 70 Ft.  
Material = CMA ASTM A-76  
Gauge, Wall Thickness, Schedule or S  
(Cross-out Designations not used)

UTILITY NOTIFICATION

"The Soil Conservation Service makes  
notification as to the existence or not  
any utilities at the construction of  
these construction drawings are those  
which have been identified. It is the  
liability of the landowner or operator  
contractors to secure themselves the  
exists or damage will occur to utility

FARM POND WITH DRO

Job Approval Class: III  
Cooperator: DNR - Wild Life  
Address: Wayne County La  
Designed By: J. Anderson



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

REPLY TO  
ATTENTION OF:

April 8, 1991

CEORH-PD-B (1110-2-240a)

MEMORANDUM FOR Commander, Huntington District

SUBJECT: Supplement No. 11, Design Memorandum No. 11, Master Plan, Beech Fork Lake, Twelvepole Creek, West Virginia.


1. Authority: ER 1130-2-435, Preparation of Project Master Plans, dated 30 December, 1987. One copy of this approved supplement will be submitted concurrently to CEORD-CO-OE and CECW-ON for 30 day review for comment.
2. Exhibit enclosed: Map of dam area.
3. The purpose of this Supplement is to request approval for the construction of a deck at Stowers Branch beach. The deck will be of pressure treated pine approximately 13 x 33 feet in size and located back from the beach in a partially wooded area. The deck will be available for reservation and will provide groups, families, and organizations with a place to meet and enjoy the beach area. Space on the deck will accommodate 4 or 5 picnic tables, and will provide a level platform in this mostly sloping area.
4. Special Recreation User Fee Funds (SRUF) will be utilized to construct the deck at a estimated cost of \$3,000. It is proposed to reserve the deck for a fee of \$20.00 per day. Cost recovery would take place over a 3 or 4 year period assuming the deck is reserved 45 days per year.

CEORH-PD-B (1110-2-240a)

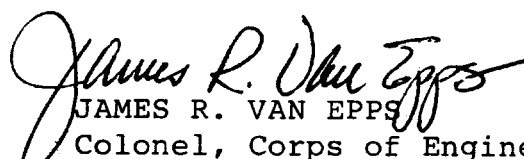
SUBJECT: Supplement No. 11, Design Memorandum No. 11, Master Plan, Beech Fork Lake, Twelvepole Creek, West Virginia

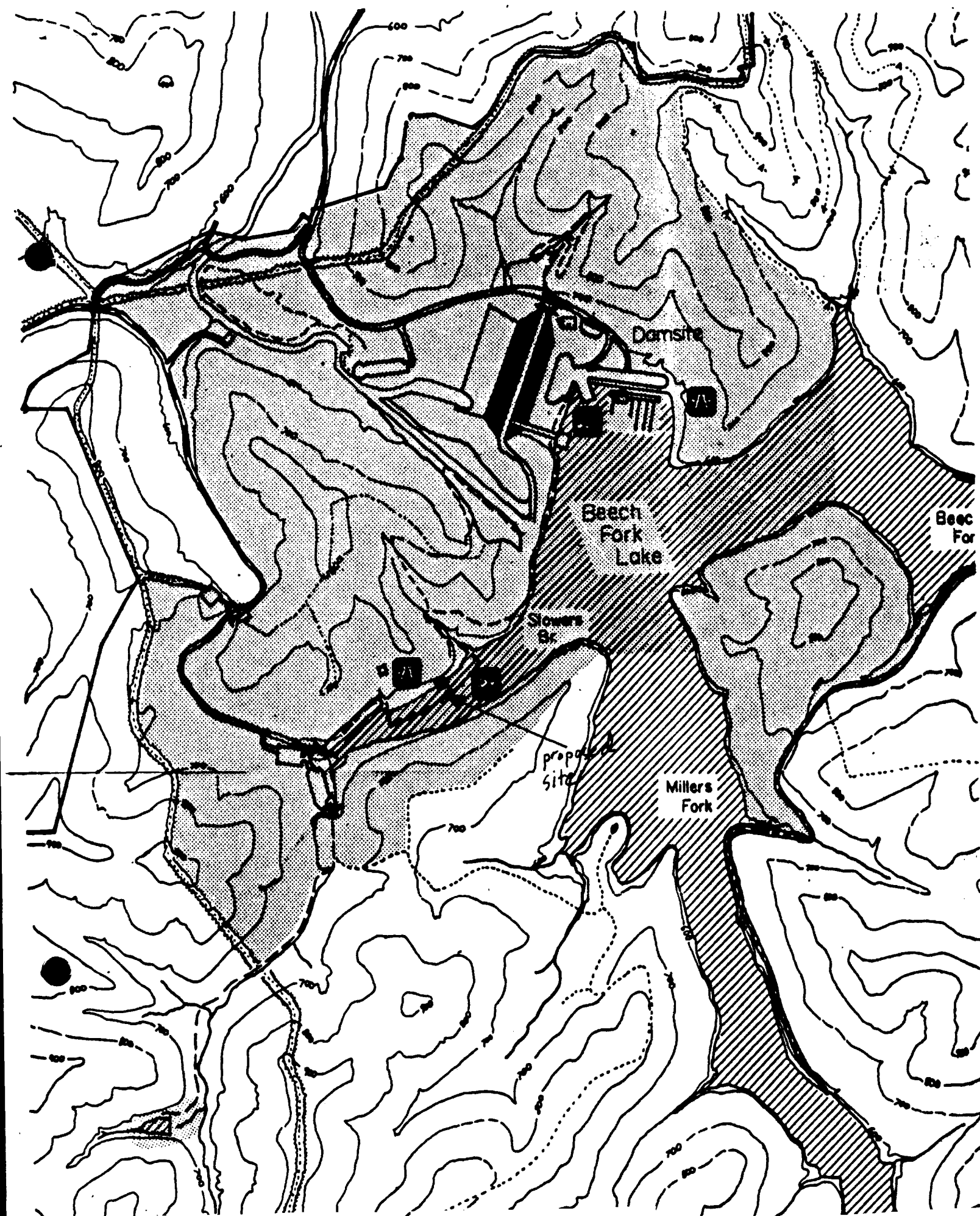
5. The proposed deck would provide a revenue producing facility in the heavily used beach area in the summer months. Approval is recommended.

Encl

  
SAMUEL P. CHRISTIAN  
Chief, Planning Division

Approved by:

  
JAMES R. VAN EPPS  
Colonel, Corps of Engineers  
District Engineer



BEECH FORK LAKE  
TWELVEPOLE CREEK, WEST VIRGINIA

MASTER PLAN  
DESIGN MEMORANDUM NO. 11

FINAL DRAFT  
DECEMBER, 1988

Prepared by  
Department of the Army  
Huntington District, Corps of Engineers  
502 Eighth Street  
Huntington, West Virginia 25701-2070

Exhibits prepared by  
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Vienna, West Virginia 26105

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343 Waller Avenue  
Lexington, Kentucky 40504

BEECH FORK LAKE  
WEST VIRGINIA

MASTER PLAN

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6	Project Recreational Facilities	end of text
7	Land Use Plan	end of text
8	Water Use Plan	end of text
9	Dam Area and Stowers Branch	end of text
10	Upper and Lower Bowen Areas	end of text
11	Lodge Complex	end of text
12	Proposed Golf Course	end of text

**chapter 1**  
**introduction**

CHAPTER 1  
INTRODUCTION

1-01 PROJECT AUTHORIZATION

The Beech Fork Lake project was authorized by the Flood Control Act of 1962 as a unit in the larger comprehensive flood control plan for the Ohio River, as discussed in the Flood Control Committee Document No. 1, 75th Congress, first session.

1-02 PROJECT PURPOSE

The authorized purposes of the project are flood control, outdoor recreation, and fish and wildlife conservation.

A. FLOOD CONTROL. Beech Fork Lake is operated for the reduction of flood damages on the Twelvepole Creek and as a unit of the coordinated system for flood protection on the Ohio River.

B. RECREATION. The Federal and State constructed recreation facilities completed include camping, picnic areas, boat ramps, swimming beach, and fishing access. (3144) acres of Federal land have been outgranted to West Virginia Department of Commerce for park and recreation purposes.

C. FISH AND WILDLIFE. (8,247) acres of Federal land and the lake waters have been outgranted to West Virginia Department of Natural Resources to manage the forest, fish and wildlife resources.



D. WATER QUALITY. Although not a authorized purpose, low flows on the Beech Fork and the Twelvepole Creek are augmented to maintain a minimum of 10 c.f.s. to preserve the downstream fishery and enhance water quality. The dam has selective withdrawal capability.

1.03 PURPOSE OF THE MASTER PLAN

The Beech Fork Master Plan, provides revised and current information relative to guiding the management and development of the project resources. It consolidates the original Public Use Plan, DM No. 11, with Supplements, and all other available related documents within a comprehensive planning format. The Master Plan establishes the policies, programs, and objectives for the development of the project resources in accord with ER 1130-2-435 and related Corps regulations.

1.04 PERTINENT PRIOR REPORTS

A number of design memorandums and other reports concerning Beech Fork Lake have been completed by the Corps of Engineers and are listed in Table 1-01. These reports have been utilized in the preparation of the Master Plan.

TABLE 1-01

PREVIOUSLY ISSUED DESIGN MEMORANDUMS  
BEECH FORK LAKE

Design Memorandum No.	Title	Approval Date
1	Hydrology	November 1965
2	General Design Memorandum	December 1967
3	Real Estate - Dam Site Part 1	May 1968

3A	Real Estate - Lake, Part II	September 1969
3B	Real Estate - Lake, Part III	January 1970
4		
5A	Land Requirements Plan - Public Use	May 1969
6	Spillway and Outlet Works	March 1971
6 Supl.	Spillway and Outlet Works	August 1972
6A	Inspection and Instrumentation	April 1964
7	Concrete Aggregates	December 1968
8	School Relocations	April 1969
9	Relocations - Gas Lines	April 1969
10	Power and Telephone Relocations	October 1969
11	Public Use Plan	May 1971
12	Sediment Range Layout	November 1977

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#### 1.05 APPLICABLE PUBLIC LAWS

The following Federal Statutes govern the administration and development of Beech Fork Lake:

A. SECTION 4, PUBLIC LAW 78-534, FLOOD CONTROL ACT OF 1944. This Act, as amended by the Flood Control Act, approved 24 July 1946, Public Law 526, 79th Congress, 2nd Session, H.R. 6597, provides for the development of reservoir areas under the control of the Department of the Army for recreation purposes. This law establishes the basic authority for the development of the Beech Fork Lake project for recreation purposes.

B. PUBLIC LAW 85-624, FISH AND WILDLIFE COORDINATION ACT OF 1958. This Act states the general policy that fish and wildlife conservation shall

receive equal consideration with other features of water resource development projects. Early and continuing coordination is encouraged to fulfill the spirit and intent of the law and administrative policy. This law establishes the basis for detailed consideration of fish and wildlife values in formulating future development plans for Beech Fork Lake.

C. PUBLIC LAW 89-72, FEDERAL WATER PROJECT RECREATION ACT OF 1965.

This Act imposes requirements of non-Federal cooperation and cost-sharing participation in recreation financing and administration. These requirements have been applied administratively to projects authorized before 1965; therefore, all Corps of Engineers participation in recreation development at Beech Fork Lake is subject to the requirements of P.L. 89-72. The cost-share policy at the time of contract negotiation will prevail.

D. PUBLIC LAW 86-717 OF 1960. This Act provides for the protection of forest cover for reservoir areas under the jurisdiction of the Secretary of the Army and the Chief of Engineers. The Act requires that, where practicable, fee lands shall be developed and maintained so as to encourage, promote, and assure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation, and accepted conservation practices; and to increase the value of forest areas for conservation, recreation, and other beneficial uses.

E. PUBLIC LAW 89-65, NATIONAL HISTORIC PRESERVATION ACT OF 1966. The National Historic Preservation Act of 1966 (Public Law 89-65), established a national policy of historic preservation, directed the expansion of the National Register of Historic Places to include cultural resources of state

and local, as well as national significance, and established certain procedures to be followed by Federal agencies in the event of a proposal that might have an effect on the National Register properties.

F. PUBLIC LAW 89-669, PROTECTION OF RARE AND ENDANGERED SPECIES ACT.

This Act states the policy of Congress that the Secretaries of the Interior, Agriculture, and Defense shall seek to protect species of native fish and wildlife, including migratory birds that are threatened with extinction, and, insofar as is practicable and consistent with the primary purposes of these agencies, shall preserve the habitats of such threatened species on lands under their jurisdiction.

G. PUBLIC LAW 91-190, NATIONAL ENVIRONMENT POLICY ACT OF 1969. This Act requires that an Environmental Impact Assessment shall be prepared to evaluate the impacts of any significant actions that may affect the environmental quality of Federally-owned land.

H. PUBLIC LAW 91-611, RIVER AND HARBOR AND FLOOD CONTROL ACTS OF 1970. Title II, Section 234, of this Act gives citation authority to designated Federal personnel for violations of those rules adopted by the Secretary of the Army related to the protection of Corps of Engineers projects resources.

I. PUBLIC LAW 93-291, PRESERVATION OF HISTORIC AND ARCHEOLOGICAL DATA ACT OF 1974. This Act provides for the preservation of significant scientific, prehistoric, historic, or archeological data that might be lost or destroyed as a result of various Federal actions.

J. PUBLIC LAW 99-662, WATER RESOURCES DEVELOPMENT ACT OF 1986. This law provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure. The Act discusses the new partnership relationships between Federal and non-Federal public entities as a result of increased cost-sharing in all stages of development and civil works projects.

K. PUBLIC LAW 81-152, FEDERAL PROPERTY ADMINISTRATION SERVICES ACT OF 1949. This Act provides the Government an economical and efficient system for the disposal of surplus property.

L. PUBLIC LAW 93-205, ENDANGERED SPECIES ACT OF 1973. The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the international treaties and conventions.

#### 1-06 SCOPE OF THE MASTER PLAN

In accordance the Engineering Regulation (ER) 1130-2-435, the Master Plan describes how all project resources will be enhanced, developed, used, and managed in the public interest. The Master Plan is focused primarily on those features contributing to the enhancement of existing recreational facilities and fish and wildlife areas. In recommending the development of new and upgraded facilities, a variety of elements have been considered, including the natural and cultural environment, current and projected recreation demand,

operation and management capabilities, and facility costs. The goals of the Master Plan are to:

1. Provide for the best possible utilization of project resources.
2. Provide for the enhancement of existing outdoor recreation opportunities as well as fish and wildlife resources.
3. Provide development concepts and criteria that will be in harmony with the character of the physical, historical, cultural, and biological environment of the area.
4. Assure sustained public utilization of project resources, up to a capacity which is consistent with aesthetic values and the natural environment.
5. Provide an inventory of project resources for developing future plans and a base for coordination with other agencies.

#### 1.07 MASTER PLAN OBJECTIVES.

The following objectives represent specific tasks that will be addressed by this Master Plan. The objectives will guide the data collection, analysis, and synthesis process throughout the plan. The objectives are:

1. Evaluate the natural and cultural resources of the Beech Fork Lake project and to identify the relationship between these resource characteristics and potential recreational use.

2. Investigate historical recreational use trends and to predict the type and quantity of recreational facilities that will be required to meet future facility demand.

3. Develop "Resource Use Objectives" which specify the attainable, publicly acceptable options for resource use based upon an analysis of resource capabilities and public needs.

4. Identify potential land and water use conflicts and to develop a land and water use plan that will minimize conflict and enhance multiple use of the area.

5. Develop conceptual development plans for existing and proposed recreational areas. These site plans shall consider:

a. Potential consolidation or elimination of areas that are currently underutilized.

b. The need for repair and replacement of existing recreation facilities to protect the health and safety of the public and to prevent degradation of natural resources.

c. Identification of appropriate future facilities that will be required to meet future recreational demand and that will minimize long-term environmental damages and operational and maintenance costs.

d. The potential for cost-shared facility development.

6. Provide general plans for the development of appropriate facilities that are required to support or enhance the use of primary recreation sites.

7. Develop design criteria that can be used to guide the preparation of a physical plan of development and the preparation of more detailed facility plans.

8. Clarify long-term project management responsibilities and to identify minimum management planning programs.

9. Develop plans to enhance fish and wildlife utilization of the project.

10. Identify possible special problem areas that may require corrective action, where appropriate.

1.08 MASTER PLAN FORMAT.

The Master Plan has been divided into eleven chapters. Chapters 1 through 6 provide a review of the various natural and cultural resources that characterize Beech Fork Lake, an analysis of existing and future recreational facility needs, and a summary of coordination efforts with other agencies. These chapters were developed utilizing a variety of existing data sources provided by local, state, and Federal agencies, information obtained from on-site investigations, coordination with various branches of the Corps of Engineers, and established planning and design procedures.

Chapter 7 presents facility recommendations that can be used to guide the future development of recreational facilities at Beech Fork Lake. The general recommendations included in the Master Plan are designed to serve as a base for preparing detailed site plans as required in the future. Chapter 7 also includes the land and water use plan for the project. Chapter 8 presents facility design criteria that were used to formulate development plans.



Chapter 9 discusses broad management guidelines and policies which form the basis for preparing a detailed Operational Management Plan for Beech Fork Lake. These guidelines address the purpose and scope of the required plan as well as unique characteristics of Beech Fork Lake as they relate to the preparation of the plan.

Chapter 10 presents cost estimates for the proposed recreation site developments and includes estimates for the rehabilitation of existing facilities. These cost estimates relate directly to the design criteria established in Chapter 8.

Chapter 11 is a summary of the conclusions, recommendations, and special considerations developed and presented throughout the plan.

The appendix contains lists of mammal, fish, trees, and bird species, and will include copies of letters received in the review process.

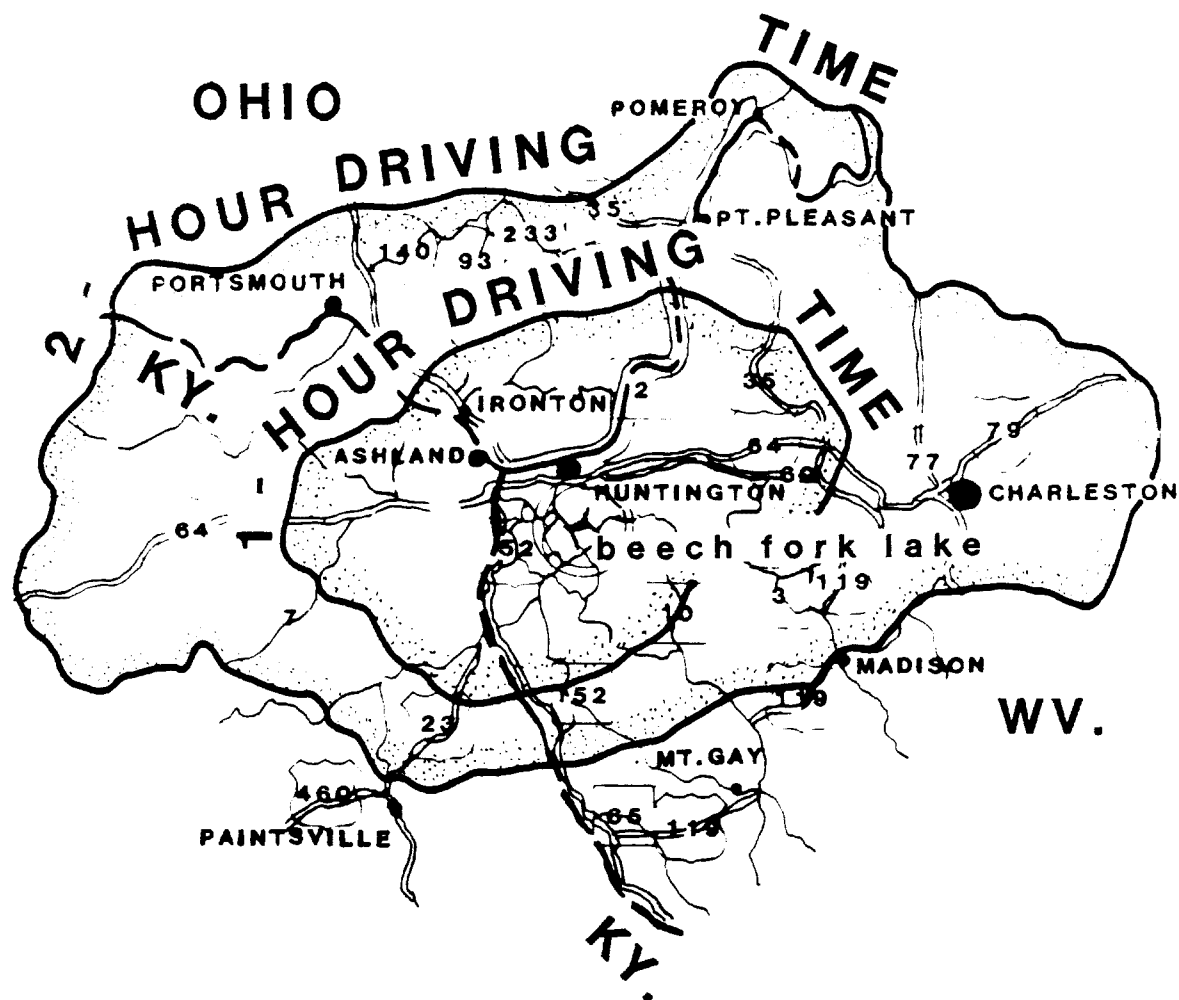
chapter 2  
project description

CHAPTER II  
PROJECT DESCRIPTION

2.01 PROJECT LOCATION. The planning area consists of 12,755 acres located in Wayne and Cabell Counties, in southwestern West Virginia. The dam site is located 2 miles southeast of the Village of Lavalette and 9 miles south of Huntington. Access to the dam from Huntington is accomplished by using State Route 152 from Huntington and County Route 13 from Lavalette. Access to the Bowen State Park area and Millers Fork is by State Route 152 and State Route 17. An alternative route to the State Park area is US Route 10 and State Routes 35 and 43. Interstate 64 passes through the southern part of Huntington and provides exits to both State Route 152 and State Route 10. A location and driving distance map is shown as Exhibit 1.

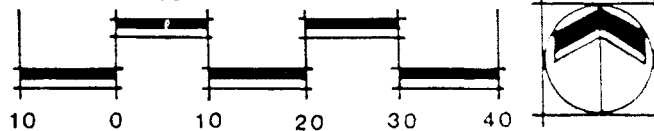
2.02 GENERAL PROJECT DESCRIPTION

Beech Fork Lake Dam is located on Beech Fork of Twelvepole Creek 3.5 miles upstream from the confluence with the Twelvepole Creek. The 88-foot high dam forms a lake at the seasonal pool of 8.3 miles in length and an area of 716 acres. The width of the lake varies from 1,000 feet near the dam to 600 feet over most of the length, and the mean depth at the seasonal pool is 12.7 feet. The largest tributary branch of the lake is Millers Fork, which is about 3 miles long. The lake is sinuous in shape, with numerous coves and flooded tributaries. Shoreline areas are usually wooded and steep except in the cove areas. Topography of the project area consists of rugged terrain with steep hillsides and sinuous ridgelines. Local elevations vary from 592 feet at the seasonal pool to 1000 feet on the hill crests for a relief of about 400 feet. Table 2.01 summarizes important lake data.



## location and driving distances

scale in miles



beech fork lake  
master plan  
update

exhibit

1

TABLE 2-01

## SUMMARY OF LAKE DATA

Drainage Area above Dam	78 Square miles
Maximum Flow of Record at Dam	22,000 c.f.s. (Feb 1939)
Streambed Elevation at Dam	557 feet m.s.l.
Total Length at Seasonal Pool	8.3 miles
Total Length at minimum Pool	5.8 miles
Average width of lake	713 feet
Mean Depth of Lake (seasonal)	12.75 feet
Shoreline Length (Seasonal Pool)	31 miles
Water Depth at Dam (Seasonal Pool)	40 feet
Height of Dam	88 feet
Crest Length of Dam	1,080 feet
Estimated Construction Cost	\$46 Million

	<u>SURFACE ELEVATION (Ft. N.G.V.D.)</u>	<u>SURFACE AREA (Acres)</u>
<u>Pool:</u>		
Year-Round Storage (Minimum):	583.5	450
Seasonal	592.0	716
Flood Control	614.5	1830

## STORAGE CAPACITY

<u>Pool</u>	<u>Acre-Feet</u>		<u>Inches, Runoff</u>	
	<u>Net</u>	<u>Gross</u>	<u>Net</u>	<u>Gross</u>
Minimum	4,200	4,200	1.0	1.0
Seasonal	4,980	9,180	1.2	2.2
Flood Control				
Summer	28,360	37,540	6.8	9.0
Winter	33,340	37,540	8.0	9.0

## 2.03 PROJECT DEVELOPMENT

A. GENERAL. Construction was initiated on the project in June 1970. The dam was completed in 1977 and impoundment was begun in the spring of 1978. Construction of the initially planned recreation facilities was completed in 1986, except for the State Park Lodge Complex and golf course. The State Park Camping facilities at the Bowen recreation complex were completed in 1980. The Stowers Branch swimming area opened to the public in 1980 with temporary bathhouse facilities. In 1985 a permanent bathhouse and paved parking were provided at Stowers Branch, and the work on the tailwater fisherman access and picnic area was completed. Also in 1985 the visitor center was completed.

B. REAL ESTATE ACQUISITION. Project lands were acquired under the Joint Land Acquisition Policy for Reservoir Projects, as published in the 22 February 1962 Federal Register. This policy called for a 300-foot horizontal guide-taking limit. Additional land, some of which is located above the limit, was acquired for construction, operation, and maintenance facilities and public-use areas. The 300-foot minimum guide-taking line embraced all of the more valuable valley and lower slopes, which left only low value residual hill lands that were acquired because providing access was neither practical or economically feasible. About 8,901 acres above the 300-foot limit was acquired. Table 2-02 shows the general breakdown of land use. The land use allocations will be presented in more detail in Chapter 7.

TABLE 2-02

## LAND OWNERSHIP AND MANAGEMENT

	<u>Acres</u>
Corps Operations and Recreation	1,212
Outgranted to State-Department of Commerce (State Park)	3,144
Outgranted to State- Department of Natural Resources (wildlife management)	8,247
Outgranted to Marina Concession	<u>5</u>
TOTAL FEDERAL LAND	12,608
EASEMENT	147

C. NON-FEDERAL PUBLIC. The State of West Virginia Department of Commerce is responsible for the costs of management for the Bowen Recreation Complex and adjacent land, also known as the Beech Fork State Park. The management of the forest, fish, and wildlife resources are under the control of the West Virginia Department of Natural Resources.

D. PRIVATE RECREATIONAL INVESTMENT. A private concessionaire has a license from the Corps to create and manage a marina at the Dam area. The marina is owned by Beech Fork Lake Marina, Inc.

#### 2.04 CORPS OF ENGINEERS OPERATIONAL STRUCTURES

A. DAM. The dam is a rolled earthfill type with impervious core, with a maximum height of 88 feet and a crest length of 1,080 feet. The top elevation is 640.0 feet m.s.l. and the top width is 32 feet. A service road crosses the length of the dam.

B. SPILLWAY. The spillway is located about 500 feet from the left abutment of the dam. It is uncontrolled, concrete lined, with a crest length of 80 feet at elevation 614.5. It discharges into a 313-foot long raceway and stilling basin.

C. OUTLET WORKS. The outlet works are located near the left abutment. The intake structure is rectangular, concrete wet well type, 117 feet high. Two gated sluices of 4' -6" x 10', each controlled by a single hydraulically operated tractor gate, and discharges through a 8' -6" x 11" -3" split circle conduit 720 feet long into a jump type stilling basin 73 feet long. Two low-flow wells are located on each 5'x4' inlets and a 2-1/2' by 3' discharge gate. Well No. 1 has inlet invert elevations at 582 and 573 feet m.s.l. and well No. 2 has inlet invert elevations at 582 and 564 feet m.s.l.

D. MAINTENANCE BUILDING. The building is located on the left abutment of the dam, accessed by the service road across the top of the dam. The area consists of a maintenance and utility building, and associated garages, shops, fenced storage yard with a total area of 3,640 sq. feet.

E. SEWAGE DISPOSAL. The sewage treatment plant and control building is located below the dam on the right bank, about 300 feet from the tailwater area. The disposal plant serves the dam area and Stowers Branch. Another small building is located adjacent to the plant which serves as a water quality testing facility.

F. VISITOR CENTER. The building is on the right abutment of the dam and is used as an overlook and for use as an operations office and visitor center. The contemporary style energy efficient building has incorporated



exhibit area, a theatre for visitors, and an outdoor fenced overlook which faces the lake and marina area.

2.05 STATE OPERATIONAL BUILDINGS

A. STATE PARK HEADQUARTERS. This is located in the east end of the lower Bowen Camping area and is part of the concession and operations building.

B. MAINTENANCE BUILDING. This building is located at the end of School House Branch, about 1500 feet north of the main access road at Lower Bowen Campground. The building and grounds provide storage space and facilities for all maintenance activities at the State Park area.

C. RESIDENTIAL BUILDINGS. There are two houses built by the State for the State Park Superintendent and the Assistant. The Assistant's residence is located on School House Branch north of the camping area, and the Superintendent's residence is located on Route 43 between the Day Use area and the Blue Goose Picnic area.

D. WEST VIRGINIA DNR OPERATIONAL BUILDING. This recently constructed building houses office and maintenance facilities for operations at Beech Fork Lake and East Lynn Lake. It is located on upper Millers Fork branch of the lake near Route 17.

E. SEWAGE TREATMENT PLANT. The plant is located at the lower end of the Bowen campground and serves the State Park area. A sewage dump station for campers is located near the Old Orchard Camp area.

## 2.06 RESERVOIR OPERATION

A. PLAN OF RESERVOIR REGULATION. Beech Fork Lake is operated as a unit in the comprehensive flood control plan for the Ohio River Basin. Its operation is correlated with East Lynn Lake for regulation of Twelvepole Creek. The plan of regulation is based on an adequate flood forecasting and warning system in operation at all times. The control stage on Beech Fork has been set low enough so that only nominal damages would occur at downstream points, taking into consideration the safe and effective operation of the reservoir. It is desirable to empty the reservoir of flood storage as quickly as possible, in view of the possibility of a major flood occurring at a time when the reservoir is partly filled. Operation for Ohio River flood control is based on the maximum retention of flows which would add to crest stages in excess of 52 feet on the Ohio River at Ashland, Kentucky. A stage of 52 feet at Ashland represents the point at which damage begins to occur in unprotected communities of the Ohio River Valley below Twelvepole Creek.

The maximum flood control pool elevation has been set at 614.5 feet. Flood storage allocations of approximately 33,340 acre-feet (winter) and 28,360 acre-feet (summer) would control all known floods in the Beech Fork Basin. This amount of storage would limit the outflow for the Standard Project Flood to 6,860 c.f.s. and the Standard Project Flood Series to 3,170 c.f.s. A reduction in crest flow would be effected for each flood at all downstream control points.

B. MINIMUM POOL. The elevation of the minimum pool has been set at elevation 583.5 feet m.s.l., which provides a capacity of 4,200 acre-feet and

a surface area of 450 acres. This storage serves to support the fish population during the winter months, and is used to maintain the minimum downstream release of 10 c.f.s. during the winter months.

C. SEASONAL POOL. A seasonal pool at elevation 592.0 feet m.s.l., with a surface area of 716 acres, is provided from April to mid-September for recreational purposes and to maintain the 10 c.f.s. minimum release during the summer months. The pool extends 8.5 miles above the dam. Recreation facilities which provide access to and for utilization of the 716-acre seasonal pool include boat launching facilities, a beach, camping, and picnicking areas.

D. EFFECTS OF LAKE OPERATION ON RECREATION. A rise or fall in the pool elevation at Beech Fork Lake affects the lands surrounding the lake, recreation facilities, and project visitation. A rise in the flood pool to elevations a foot or two above 592 feet would make the beach area at Stowers Branch unusable. A rise of 5 feet to elevation 597 would inundate some of the lower lying camping and day-use facilities at the Bowen State Park area. The launch ramps at the dam and State Park would be unusable. Damages to facilities would be caused mostly by siltation and erosion. Most buildings have been located above the 10 year seasonal pool flood level of elevation 600.5 feet. The maximum flood control pool at 614.5 feet would be exceeded at the 300 year frequency, although various flood events would raise the pool to various levels below this, which would cause various degrees of siltation and erosion damage. Some trees and other vegetation would be killed or damaged if high water stays high long enough. Some years the seasonal pool level is not reached because of a dry winter and spring. In order to maintain minimum

flows this condition sometimes persists all summer making the beach area unusable. To offset this the pool is usually raised earlier than normal to take advantage of spring rainfall to enable the pool to reach the seasonal level.

The minimum pool is set at elevation 583.5, a reduction of 8.5 feet from the seasonal pool, and reduces the area from 716 acres to 450 acres. Most of the land left bare with drawdown is located in the upper section of Beech Fork, Price Creek, and Millers Fork where the water is shallow, but also affects Stowers Branch and other cove areas. The primary adverse impacts of this is the large areas of mud flats in these areas which are bare of vegetation, and thus susceptible to erosion from rainfall. This tends to make the pool turbid during the winter and spring months. The launch ramp at the dam can still be used, although most other facilities are not normally in use during the cold season. The drawdown makes the lake less pleasing along the shoreline because of the exposed bank areas.

TABLE 2-03

FREQUENCY OF POOL LEVEL INCREASES FROM ELEVATION 583.5 FEET  
(Minimum Pool Season)

<u>Frequency</u>	<u>Elevation</u>
1 Year	590.0
5 Year	597.6
10 Year	600.5
20 Year	603.0
50 Year	606.7
100 Year	609.3
200 Year	611.9
300 Year	614.5

chapter 3  
environmental resources

CHAPTER 3  
ENVIRONMENTAL RESOURCES

3.01 PHYSICAL GEOGRAPHY.

The project is located on the Beech Fork of the Twelvepole Creek drainage basin. Twelvepole Creek basin lies within the maturely dissected Kanawha section of the Appalachian Plateau physiographic province. Erosion has dissected the plateau to form a dendritic drainage pattern. The Twelvepole Creek Basin is located in Cabell, Wayne, Lincoln, and Mingo Counties. The watershed has a drainage area of 441 square miles and is elongated and irregular in shape, being about 46 miles long with a maximum width of 12 miles. Twelvepole Creek is formed by the junction of the east and west forks, almost a mile south of the Town of Wayne (pop. 1,385). It flows 32 miles northward to its confluence with the Ohio River, between Ceredo and Huntington. The Beech Fork portion of the basin has an area of 78 square miles above the dam and has its headwaters in the moderately rugged hilly terrain near the Wayne-Lincoln County line. It flows northwest to its confluence with Twelvepole Creek above Lavalette, 15.4 miles upstream from Huntington. The floodplain varies in width from a few feet to about 2,000 feet wide at its confluence with Twelvepole Creek.

The stream fall from source to mouth is 440 feet, an average of 15.9 feet per mile. In the reservoir area the terrain is rugged, consisting of narrow steep-walled valleys. Maximum relief is about 460 feet. Most level land is

confined to the flood plains of Beech Fork and the tributaries of Millers Fork and Price Creek.

### 3.02 CLIMATE.

The climate of Beech Fork Creek Basin is continental and temperate, with large variations in seasonal temperatures. The entire basin is affected by frontal air-mass activity and is subject to both continental polar and maritime tropical air masses. The prevailing meteorological front movement is from the southwest. Annual precipitation is uniform over the basin, normally averaging about 42 inches. The average annual snowfall is about 21 inches. Extreme temperatures in the year have varied from a minimum of -14°F during February to a maximum of 105°F during July. The growing season averages about six months, usually from mid-April to mid-October. Two distinct types of storms are prevalent in the basin. The summer type is usually characterized by rainfall of short duration but high intensity, and over a small area. The winter-type storm is less intense, but covers a larger area and is of extended duration.

### 3.03 HYDROLOGY

A. RAINFALL RUNOFF. The headwater portion of the Beech Fork Basin is characterized by narrow valleys with steeply sloping sides. Runoff from these slopes tends to collect quickly in stream channels causing rapid fluctuations of stream stages. Infiltration losses are generally low due to the relatively shallow soils overlying bedrock on the slopes. Basin runoff is highest during the winter months when storm rainfall may be augmented by snow melt and when frozen or saturated ground results in low infiltration rates. Runoff is lowest

during the late summer and early fall when the ground is dry and infiltration rates are high. Flow measurements estimated at the Beech Fork dam site indicate a normal average flow of 89 cubic feet per second varying from 211 cubic feet per second in February to 12 cubic feet per second in October. The maximum monthly average flow is almost 400 cubic feet per second and the minimum average has been an almost unmeasurable, 0.168 cubic foot per second.

B. FLOODS. The upper portion of Beech Fork is subject to headwater floods, whereas the lower portion is subject to backwater from Ohio River floods as well as headwater floods, or a combination of both. Ohio River floods have caused backwater effects on Beech Fork as far upstream as the dam site. Floods are of short duration, seldom remaining above flood stage more than 24 hours, except in the lower reaches when prolonged by backwater from the Ohio River. The largest recorded flood for the Twelvepole Creek Basin occurred on 4 February 1939 at a stage of 31 feet, 15 feet above the no-damage stage of 16 feet at the gaging station in Wayne, West Virginia. The discharge was 22,000 cubic feet per second and major damage occurred to residences, schools, churches, highways, and bridges. Flood damages on Beech Fork are almost exclusively confined to low-lying residences, farms, and buildings, although for certain floods agriculture crop damages occur.

C. GROUND WATER. The ground water table in the lake area has the following characteristics: a colluvium mantle and zone of weathered rock on the slopes and colluvial and alluvial materials in the valley fill are slightly to moderately permeable. During the late spring months these materials approach complete saturation, with a water table at or near the ground surface. This is evidenced by the many seeps along the valley walls



and is indicated by the higher frequency of slides during March, April and May. Within these zones, water levels customarily recede during the summer months, despite higher quantities of rainfall, primarily because of higher rates of evapo-transpiration.

The lithology of the lake area consists of horizontally stratified bedrock, containing widely spaced aquifers separated by less permeable rock, with permeability regulated through fractures and contacts. Seasonal water level variations are normally small, particularly for deeper aquifers. Within this ground water reservoir, a continual ground water movement downward from the surface through successive permeable layers occurs, with a loss in head through each intervening aquiclude. Where bedrock (sandstones and siltstones) have a higher permeability than the upper weathered zone, either through vertical fracturing or because of lithological characteristics, a distribution of water levels between the two zones occurs. Where bedrock is comparatively impermeable, saturation in the weathered zone results, causing a uniform distribution of head throughout, and a true water table. When surface recharge falls below the rate of discharge to bedrock, a zonal distribution of water levels in near-surface materials also results. Both conditions occur, depending upon the season.

Hydrostatic conditions in rock strata are similar to those in overburden. The relatively higher permeability of the siltstone and sandstone aquifers results in a stratification of water levels, with the levels in each permeable zone being dependent upon relative rates of recharge and discharge. Because of these conditions, a true water table condition is the exception, and may be

only of seasonable duration. Generally, appreciable seasonal fluctuations of water levels are to be expected.

#### 3.04 WATER QUALITY.

A. SPECIAL PROBLEMS. The most noticeable problem relates to the excessive levels of manganese and iron in hypolimnetic waters during periods of thermal stratification. The dissolved metals present in water discharged from the hypolimnion is oxidized and precipitates in the outflow and downstream of the project. The result is coating of bed and banks of the stream, and indigenous organisms. Other problems include high levels of cadmium and mercury found throughout the watershed, and high fecal coliform found in the lake.

B. GENERAL CONDITIONS IN 1984-85. Specific conductance, alkalinity and hardness are all relatively low. The water is classified as soft, has low concentration of dissolved materials, and has little inherent capacity to resist shifts in pH. Taken together, these facts indicate that the water is very delicately poised with respect to quality changes, and is especially susceptible to suspended solid and pH problems.

Thermal stratification normally becomes established in Beech Fork Lake in May and June. Severe stratification occurs during the summer months. A deterioration of thermal stratification begins in the fall and normally extends into October. The duration and extent of thermal stratification depends on hydro-meteorological variations and will vary from year to year. The lake is nearly isothermal during the winter period, with a transition period during the spring as stratification becomes established.

Dissolved oxygen concentrations remain fairly constant throughout the water column during the winter period, but decreases as a function of depth during the summer months. Throughout the epilimnion, dissolved oxygen concentrations remain greater than, or equal to, 5.0 mg/l. As temperature decreases through the thermocline region, dissolved oxygen disappears rapidly, resulting in anoxic conditions near the bottom of the downstream section of the main lake during late summer.

Streams entering the project have a mean dissolved oxygen of 8.1 mg/l which is higher than the West Virginia state standard minimum of 5.0 mg/l. This is also true of the discharge mean of 8.9 mg/l, despite the dissolved oxygen depletion within the reservoir hypolimnion during late summer.

All values for nitrate plus nitrite were lower than the levels set in the state standard of 1.0 mg/l of nitrite. As the depletion of oxygen occurs in the hypolimnion during the summer months, the amount of ammonia and Kjeldahl nitrogen increases in the hypolimnion, mean ammonia does not exceed the state standard of 50 ug/l, although occasionally the hypolimnic levels exceed the standard at the main lake station. Due to proper reservoir regulation, the outflow has no significant concentrations of nitrate plus nitrite, ammonia or Kjeldahl nitrogen associated with it.

Productivity at Beech Fork Lake is fair to poor due to the following two limited factors:

- (1) The lake itself is turbid due to the physical nature of the watershed, with the mean turbidity at 283 NTU's, on the main lake station. High turbidity blocks out the needed light for optimum algae growth.

(2) The phosphorus content has been steadily decreasing at the inflows and lake stations since 1979. The mean total phosphorus of 40.9 ug/l at the inflowing streams is deceiving. In 1979, the mean total phosphorus was 123.5 ug/l and in 1983, it was less than 10 ug/l. The same situation is reflected at the main lake station for both total and dissolved phosphorus. In 1978 total phosphorus had highs of 205 ug/l and in 1983 the total phosphorus is less than 10 ug/l throughout the water column.

Streams entering the project have a pH range of about 6.0 to 8.0 with a mean of 7.04. In the pool, pH decreased immediately below the thermocline during periods of thermal stratification. Values in the epilimnion during such periods ranged from 7.0 to 8.2 and those in the hypolimnion from 6.2 to 7.0. At the outflow, pH ranges from 6.0 to 8.5 with a mean of 6.8. The pH of the outflow is within the range of the West Virginia State Standard (6.0 to 9.0).

Total iron at the two major inflow stations frequently exceeds the West Virginia state standard of 1.0 mg/l, with a mean of 1.15 mg/l and a range of 0.28 to 3.4 mg/l. Iron also occurs in high concentrations within the reservoir prior to stratification, with a mean of 3.3 mg/l at the main lake station. During summer months, total iron increases rapidly in the hypolimnion and has even been as high as 35 mg/l. Fall overturn eliminates stratification, and total iron is then evenly redistributed.

Dissolved iron in inflows and the epilimnion constitute less than one half of the total content, thereby indicating that suspended solids are the primary source of iron within the reservoir. Behavior of iron within the lake is governed by distribution of oxygen and resultant effects on pH and oxidation-

reduction potential. Total iron concentrations at the outflow are in excess of the state standard of 1 mg/l with a mean of 2.04 mg/l. Due to the severe effects of metal precipitating out in the outflow, the temperature objective curve has been abandoned in early fall to avoid discharging hypolimnic waters. During months when the lake is stratified, decreases in iron concentrations can occur in the outflow as a consequence of epilimnetic discharges. Periods of mixing, such as in spring prior to stratification and fall after overturn, can result in increased outflow iron concentrations.

High levels of manganese in water systems give an objectionable taste to water supply and leave tenacious black stains on laundry. As a result the West Virginia state standards limit total manganese to 1 mg/l in all state waters. High concentrations of manganese exist in both the watershed and lake throughout the year. The major inflows average 6.79 mg/l of total manganese with highs of 200 mg/l. The dissolved manganese is low with a mean of 0.11 mg/l and range of 0.01 to 0.31 mg/l. Most of the manganese is tied up in sediment as it flows into the reservoir.

Both total and dissolved manganese are high at the main lake station with means of 7.14 and 1.26 mg/l, respectively. During stratification periods the total manganese is commonly greater than 7 mg/l in the hypolimnion. Consequently, water from the outflow can contain concentrations in excess of the state standard. By careful reservoir regulation, the manganese problem can be minimized when the water is stratified by releasing the epilimnion waters which are lower in concentrations than the hypolimnion. During fall and spring overturns, manganese is evenly distributed throughout the water column

thus no selective withdrawal is possible and the concentration can increase at the outflows.

Cadmium is a heavy metal with a high toxic potential for both man and aquatic life. The West Virginia state requires waters with hardness of below 50 mg/l of  $\text{CaCO}_3$ , as in Beech Fork reservoir, to have cadmium levels below 7.8 ug/l. This level has been violated at the main lake station and possibly at the inflows.

Total mercury in all West Virginia waters is restricted to 0.144 ug/l. As is common in new lakes, the mercury grossly violated the state standard at six different inflows, the main lake station, and the outflow in 1978 and 1979. Levels were measured at less than 1 ug/l since 1980, but whether or not these values are above the standard of 0.144 ug/l is not known.

Two collections of aquatic invertebrates, taken in 1970 and 1971 revealed the presence of seven orders of insects at Beech and Millers Fork. By number, 76% of these organisms were pollution sensitive, thus indicating good water quality. Benthos samples collected during April 1976, have been processed and ten species have been identified. The diversity index (Shannon-Weaver) was 3.09, indicating good species diversity and water quality. Samples collected since impoundment have been partially analyzed. Tentative analyses show moderate diversities and numbers at the inflows. Effects of construction, high concentrations of heavy metals, and disruption of mechanisms of carbon input through the ecosystem are possible reasons why the benthic macroinvertebrate population below Beech Fork Dam during the study period has been

severely reduced. Density and diversity were extremely low and the organisms collected were highly tolerant forms.

On the basis of plankton data, the inflow waters at Beech Fork Lake constitute a moderate quality, relatively low productivity aquatic environment in which phosphate is probably the limiting nutrient.

The low concentrations and lack of diversity of lake plankton also indicate low productivity. Since nanoplankton concentrations were not evaluated, it is possible that production is higher than estimated.

Low plankton concentrations and lack of diversity at the outflow indicate minimal loss of biomass from the lake. However, since nanoplankton concentrations were not documented it is possible that losses are much higher. Periphyton was not collected, and productivity from this ecosystem component in the outflow area, in terms of such water quality indicators as diversity and community structure, are unknown.

C. DESTRATIFICATION PROJECT. During a typical summer, the lake is devoid of oxygen below eight feet. To alleviate this problem, destratification fans are installed in the lake near the dam. The facility was installed in May 1987 and the giant fan blades are floated six feet below the surface. The fans have six foot blades, are powered by three-horsepower electric motors. These fans force down the lighter warmer surface water which contains more oxygen to create a better mixture for lower depths. The fans are designed to create enough force to destratify the entire 716 acre lake. The lake conditions will be monitored to determine the effectiveness of the new destratification apparatus.

### 3.05 GEOLOGY

The Beech Fork Basin lies within the sedimentary strata of the Pennsylvanian age. Monongahela and the Conemaugh groups comprise the formations. The depositional environment of the Conemaugh group in the basin consists of repeated marine advances and retreats. The fluctuations are indicated by lenticular deposits of varying thickness.

Numerous redbed sequences occur, some of these grade laterally to gray nodular limestones. Another indication of this environment was the accumulation of sandstones of a lenticular configuration, such as the Saltsburg. In some areas, sands were deposited in channels which cut through underlying deposits and into older sandstones. The Morgantown and Grafton sandstones are local examples of coalescing formations. The formations encountered during subsurface investigations range from the Brush Creek coal to the Upper Connellsville sandstone. Marker beds include the Elk Lick limestone at elevation 608, the Upper Ames shale (limestone) encountered at elevation 565, the lower Ames limestone (shale) at elevation 532, and Brush Creek limestone at elevation 472.

The formations encountered at the project site consist of clays, indurated clays, claystones, shales, siltstones, sandstones, and thin limestones and coals. The clays occur as inclusions in the indurated clay and claystone strata. These clays are soft, gray, and slightly to moderately plastic. The majority of the rock encountered at the site (70 to 75 percent) consists of indurated clay. These redbeds (indurated clays) are soft to moderately hard and slake readily on exposure to alternate wetting and drying. They are



calcareous, slick sided, and contain thin limestone stringers and nodules. The claystones at the site are soft to moderately hard, gray, and slickesided. They contain discontinuous silty and calcareous lenses. The siltstones in the reservoir area are sandy to clayey, soft to moderately hard, gray to brown, slightly calcareous, and slightly micaceous. The sandstones encountered at Beech Fork are silty to clayey, moderately hard to hard, fine grained, brown to gray, and fractured. The fractures are ferruginously stained, and generally vertical. The limestones at Beech Fork are hard, gray, and lithographic. The coal seams occur as thin lenses and as blossoms in the clays and claystones.

### 3.06 MINERAL RESOURCES

The No. 5 Block coal seam of the Allegheny series is below the valley floor throughout the entire reservoir although the seam is not considered to be mineable at present. No coal seams of the Conemaugh series are known to be present in mineable thickness in the area.

The Pittsburgh coal seam, at the base of the Monongahela series, generally outcrops about halfway up the slope of hills at elevations well above the flood plain throughout portions of the reservoir area. Several old openings in that seam, from which domestic coal was produced some years ago, are evident within and adjacent to the general reservoir area. The only known commercial production from the seam was at a discontinued strip mine location at Moxley Branch.

All proven resources within the reservoir area are in the Pittsburgh coal seam, and are not expected to be commercially mineable for some period of time because of the poor quality of the coal. The reserves are not sufficient to

justify installation of rail facilities and would require long and expensive truck haul.

The area within and adjacent to the Beech Fork Lake has been a producer of natural gas for the past 60 years, and is expected to continue for another 20-30 years. Production has been obtained from several horizons. Some oil is associated with the gas wells, but is not in sufficient abundance to justify production drilling. Some gas well access roads are built in the area, which connect with the public roads.

### 3.07 SOILS

In the area of Beech Fork Lake, the overburden and soils on the valley slopes are composed of detritus derived from weathered indurated clay, siltstones, and sandstones. The soil is subject to movement on moderate slopes. Slides occur on the slopes and frequently appear as hummocks or overburden flows along the valley walls. The flood plain soils are mostly silt soils.

### 3.08 VEGETATION

The project area is located in the Low Hills Belt of the Cumberland and Allegheny Plateau region of the Mixed Mesophytic Forest. Most of the area once occupied by Mixed Mesophytic Forest is occupied by second growth, or has been converted to other land uses. Once the cutover areas have been converted to cultivation or pasture, the succeeding plant communities were predominately oak-hickory and scrub pine. The present timber resource is generally of poor quality and reflects a history of land abuse. Forest fires have damaged some areas, and erosion has caused losses of topsoil.

Remnants of typical mixed mesophytic forest are supported in some coves and lower ravine slopes. These areas contain about 30 percent beech, 30 percent oak, 15 percent tulip poplar, and 25 percent mixture of hickory, maple, white ash, and sweet buckeye. Some of these beech, tulip poplars, sugar maples and red oak are 36 inches in diameter and 80-100 feet high. In the flood plain and lower slopes, the sycamore is the dominant species in diameter and crown size. Multiflora rose is a common shrub, and box elder and slippery elm are common on the first terrace areas.

### 3.09 FISH AND WILDLIFE

A. AQUATIC LIFE. There are at least 43 species of fish which are known to occur in the Beech Fork stream above the reservoir. The lake itself has a growing fishery from initial stockings done when the lake was filled in 1977-78. Fish stocking done by the West Virginia DNR included channel catfish, walleye, largemouth bass, and black crappie. Also present are numerous other species, including bluegills and bullheads. The lake is beginning to be a good producer of fish from the numerous good habitat cove and channel areas. The West Virginia DNR has completed building and stocking two subimpoundments near upper Beech Fork for raising and introducing hybrid bass, and tiger muskys. Another subimpoundment is planned for the Rubens Branch area.

B. MAMMALS. According to a survey conducted by the State of West Virginia during 1948-51, some 30 species of mammals may be expected to occur in or near the Beech Fork project. These species include 1 marsupial (the opossum), 2 moles, 2 shrews, 4 bats, 6 carnivores, 14 rodents, one rabbit

(cottontail), and 1 hoofed animal (deer). Examination of range maps published from another source shows that up to 45 species of mammals might be expected in this area of West Virginia. Not all of these could be expected within the immediate project vicinity because of habitat conditions and the fact that some mammals do not occur in significant numbers within their specific ranges. Based on the above information, it is believed reasonable to assume that between 30-40 species of mammals might be found within the project vicinity. A list of trees, birds, mammals, and fish of the Twelvepole Creek basin is included in the the Appendix.

C. BIRDS. Members of the Brooks Bird Club conducted a survey in the Beech Fork area during 28 May-1 June 1969. At that time 81 species of breeding birds were identified. Taking into account winter residents and spring and fall migrants, the number of birds which occur throughout the year in the Beech Fork area would be considerably greater than the 81 species reported during late May to early June. It is important to note that 8 species of birds were included in The Blue List for 1973. The "Blue List" is a list of those more common and widespread species which appear to be declining in population or becoming more restricted in range for reasons not clearly understood. For instance, the Eastern Bluebird is undergoing a rather widespread population decline, yet was one of the most abundant species reported at Beech Fork. The yellowbilled cuckoo, yellow warbler, and yellow throat are declining in California, but are considered fairly common to common in the Beech Fork area. The purple martin is declining throughout its range and also was reported as scarce at Beech Fork. The red-headed woodpecker

appears to be declining nationwide, nor was it found at Beech Fork by members of the Brooks Bird Club.

D. GAME ANIMALS. Grey and Fox squirrels, Ruffed grouse and whitetailed deer are the predominant game species in the area. Raccoon and woodchucks are common and are often hunted. The bottom land food plots and land formerly used for farming are good habitat for Cottontail rabbits. Deer numbers are gradually increasing and provide hunting for a two week gun season. Other game species present are grey and red fox, opossum, morning doves, and mallards, teal, and wood ducks, which nest or stop over during migration. Beaver and mink are found in low numbers. Canada geese have been introduced from the New York area and nesting platforms have been provided in various areas around the lake. Recently the State DNR introduced wild turkeys into the area. The success of the stocking program will be monitored and continued if necessary.

E. RARE OR ENDANGERED SPECIES. The following animal species found in West Virginia or historically found in West Virginia, are considered endangered or threatened species by the Department of the Interior, Fish and Wildlife Service in accordance with the Endangered Species Act of 1973, as amended.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status</u>
Virginia big-eared bat	<u>Plecotus townsendii virginianus</u>	Endangered
Eastern cougar	<u>felis concolor cougar</u>	Endangered
Indiana bat	<u>Myotis sodalis</u>	Endangered
American peregrine falcon	<u>Falco peregrine anatum</u>	Endangered
Bald eagle	<u>Haliaeetus leucocephalus</u>	Endangered
Kirtland's warbler	<u>Dendroica kirtlandii</u>	Endangered
Pink mucket pearly mussel	<u>Lampsilis orbiculata orbiculata</u>	Endangered

Tuberculed-blossom pearly mussel	<u>Epioblasma (=Dysnomia) torulosa</u>	Endangered
Flat-spined three-toothed	<u>Triodopsis platysayoides</u>	Endangered

If any rare, endangered, or threatened, animals or plants are found to be present in the project area "Natural Area" habitat designations will be studied to protect these resources. At the present time two rare plants are probably found in the Stowers Branch area. These are Agave virginica, False Aloe; and Spiranthus ovalis, Oval Ladies Tresses. These species will be investigated for possible protection.

chapter 4  
recreation and cultural resources

CHAPTER 4  
RECREATION AND CULTURAL RESOURCES

4.01 HISTORICAL DEVELOPMENT. The first white men known to come to the present limits of Wayne County were those of the Big Sandy Expedition of 1758, who were sent to attack the Shawnee villages of the Scioto Valley in Ohio as retaliation for the Shawnee attacks on the Roanoke river settlements in 1757. This expedition reached the Big Sandy River area and was recalled to Virginia by Governor Francis Fauquier.

In 1772, King George III wished to reward his soldiers who had defeated France in the French and Indian War. The lands of this part of Virginia were partitioned and portions were granted to those entitled. The first patent for lands in what is now Wayne County was issued on 15 December 1772 to John Savage, and to soldiers who had served in his company. John Savage obtained the services of George Washington to survey the lands. The tract included 27,672 acres, and many of the important landmarks bore the letters G.W.S. for George Washington, Surveyor.

The first major grants in the Beech Fork area were made to John P. Duval and Samuel M. Hopkins. Duval received a chain of grants from 1785 to 1793 along Twelvepole Creek and near the mouth of Beech Fork amounting to nearly 10,000 acres. Hopkins was granted 70,000 acres in 1796, including parts of Butler, Ceredo, Union and Stonewall Districts of present Wayne County, in addition to sections of present Cabell County. In some instances the Duval and Hopkins grants overlapped in which case the Duval grant was recognized.



Settlement in the area began with Samuel Hatton in 1796, Peter Loar in 1797 and Henry Haney in 1802; however, major settlement did not occur until after the transfer of the Duval and Hopkins deeds in 1803 and 1808 respectively, after their deaths. Known settlers after this time included Reuben Booton, Berry Adkins, Asa Booton and Jefferson Bowen.

No major battles of the Civil War were fought in the area but local lore puts some guerilla activity in the area. Rebel leader Bill Smith is said to have been active here at that time and present residents of Winslow believe that there was a Union encampment in stream bottoms southwest of the community.

Although no occurrences of major historical significance are known for the area, there is some evidence of early settlements in the form of several log houses. All were built of hand hewn logs with half dove-tail notching, lacking log gables and eave beams. Chimneys were situated on the exterior of the gabled end of each of the houses with exterior fire boxes. These structural details indicate the houses were probable built between 1825 and 1850. More precise dating can only be done by studying land deeds and tax records. One log structure was moved to the camping area and is presently being managed by the West Virginia Department of Commerce. The log cabin may not qualify for the National Register but an official Determination of Eligibility should eventually be requested.

#### 4.02 ARCHEOLOGICAL RESOURCES

An archeological survey at Beech Fork Lake was completed in 1975 during which 19 archeological sites were recorded. Eleven out of the nineteen sites are located on Government property.

A total of 15 temporal components and 8 cultural components have been identified. Four Early Archaic (8000-6000 B.C.), 4 Late Archaic (3000-1000 B.C.), 1 Early Woodland (1000 B.C.-100 A.D.), 1 Middle Woodland (100-600 A.D.), 3 Late Woodland (600-1200 A.D.) and 2 Late Prehistoric (1200-1600 A.D.) temporal components are present and 1 Buck Garden, 1 Fort Ancient, 2 Buffalo, 3 Brewerton and 1 Adena cultural components are present.

The sites consist of 1 rockshelter (46WA22), 3 lithic scatters (46WA21, 23 and 24), 1 mound (46WA26), 1 open habitation with a mound (46WA34) and 2 workshops (46WA35 and 38). The rest of the sites are of unidentified function.

Price Creek Rockshelter (46WA22), the most significant site in the reservoir, was excavated during the 1975 survey.

The archeological survey of all Federal lands should be completed with priority given to areas that may be subject to bank erosion or new construction.

#### 4.03 SOCIO-ECONOMIC PROFILE

The project area is within the two counties of Wayne and Cabell. Cabell County is more highly urbanized because of the City of Huntington and is part of the Ashland/Ironton/Huntington metropolitan area. The population of Cabell County in 1980 was 106,835, with 378 persons per square mile. Seventy percent of the population is considered urban. Ninety-five percent of the population is white, 5 percent is black or other minorities. Between 1970-80, the population decreased slightly, partly because of migration to suburban areas.

The labor force in Cabell County is occupied in diverse economic activities. Twenty-three percent is employed in professional or related services, 22 percent is wholesale or retail trade, 21 percent is in manufacturing, and 9 percent is in public utilities. Farming is a minor but important part of the economic structure, and 20 percent of the land total is considered to be in farms, with an average farm size of 97 acres. Over half of the farmers work part time away from the farm.

During the 1970-80 period, there was a housing shortage which has since been improved by suburban and rural building. Housing in the area has increased over 20 percent since 1979, and 65 percent of the homes are owner occupied. Education of the population has been improving steadily, with 61.6 percent of persons over 25 having a high school education and 14 percent having four years of college or more.

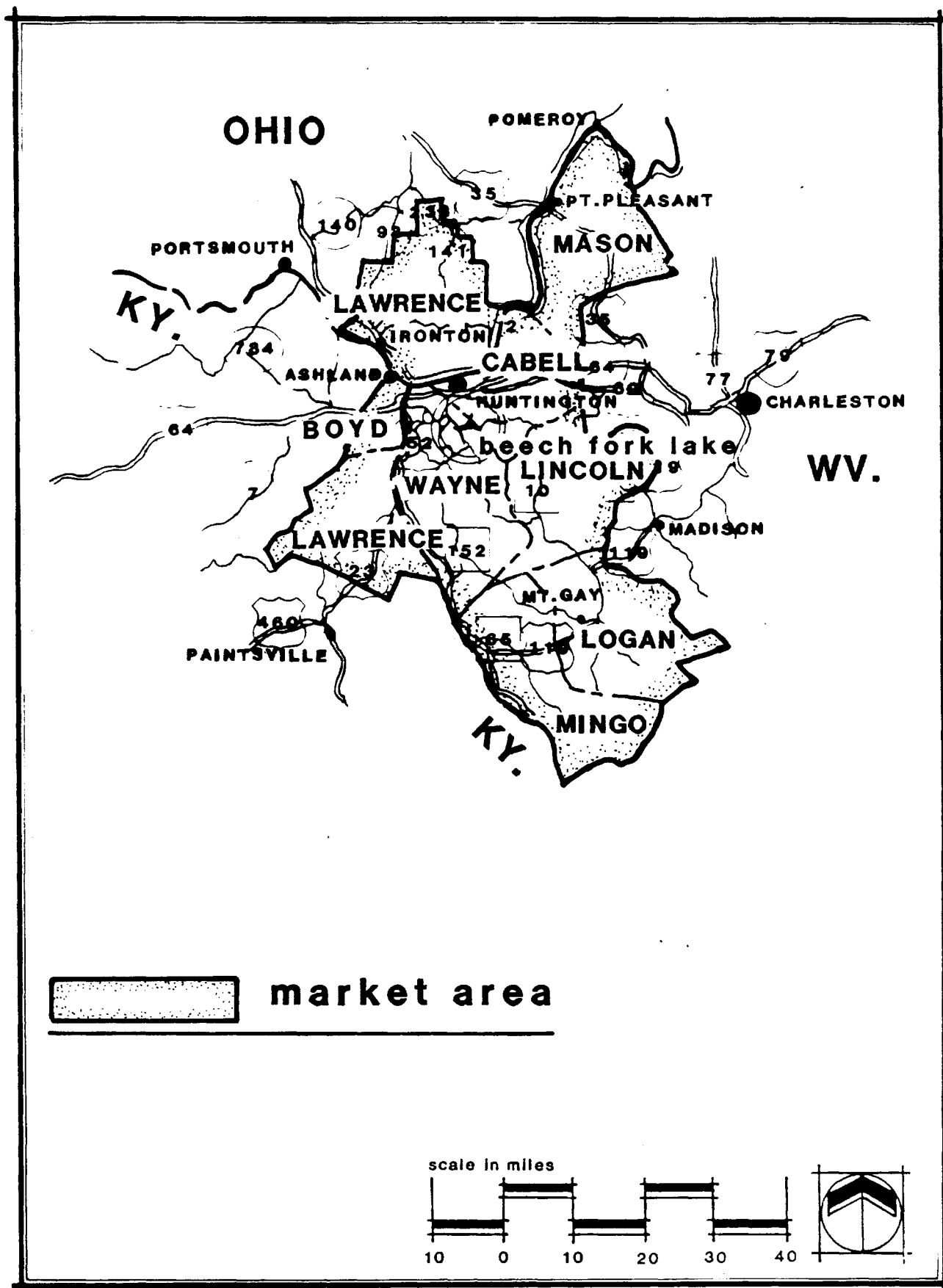
Wayne County, where most of the project is located, is much more rural in nature and has a smaller population of 46,021 in 1980, a 22 percent increase from 1970. Thirty percent of the population is considered urban, mainly concentrated in Lavalette, Wayne, and Ceredo-Kenova. Nearly all the population is white, or 99.6 percent. Housing has substantially improved, with a 36 percent increase in housing units from 1970 and a median value of \$40,300. Employment in the County is concentrated mostly in manufacturing, wholesale and retail trade, and professional or related services. Eight percent of the land is considered to be in farms, with an average farm size of 155 acres. Over 50 percent of farm owners are employed away from the farm. Education levels are lower than in Cabell County. Fifty percent of the persons over 25 have a high school education and 7 percent have a college education. The market area for the project is shown on Exhibit 2.

#### 4.04 REGIONAL RECREATIONAL FACILITIES

The area within a 50-mile radius of Beech Fork includes a large number of outdoor recreational and historical points of interest. About 20 miles south, East Lynn Lake is another major Corps-operated recreation area. The 50-mile radius of the project includes the large population centers of Huntington, Charleston, Ashland (Kentucky), and Ironton (Ohio). Other nearby Corps facilities are Dewey Lake, Paintsville Lake, and Grayson Lake in Kentucky. State-run outdoor recreation facilities in the area include Cabwaylingo State Forest, Laurel Creek Public Hunting Area, Chief Logan State Park, Big Ugly Public Hunting Area, Fork Creek Public Hunting Area, Kanawha State Forest, Hilbert Public Hunting Area, and Chief Cornstalk Public Hunting Area. In Ohio, Wayne National Forest and Lake Vesuvius provide hunting, fishing, and other outdoor activities. A regional recreation map (Exhibit 3) shows the distribution of these resources.

#### 4.05 SURROUNDING LAND USE

Land use surrounding the project and within the drainage area is about 83 percent woodland, 8 percent cultivated, 5 percent pasture, and 4 percent roads, homesites, and commercial development. Most land development occurs in the flat flood plains or lower hillsides along Beech Fork and the larger tributaries. Farm cultivated areas are restricted to the flood plains and some hillsides are used for pasture. Some new home development is occurring along the State Route 13 access road to the dam area, Route 52/4 in the Stowers Branch area, and along State Route 17 to Millers Fork. Part of this development is stimulated by the proximity of the Beech Fork recreation area.



beech fork lake  
master plan  
update

exhibit

2

Lumbering of the large areas of timber is done mostly on a small scale as the second and third growth timber becomes mature. Coal mining is a minor activity in the Beech Fork basin since the coal seams are mostly too thin to be profitable.

#### 4.06 PROJECT UTILITIES

A. SOLID WASTE. Solid waste produced by the project is put in trash receptacles, is then deposited in dumpsters where it is picked up by a contractor and transported to landfills in Cabell and Wayne Counties.

B. ELECTRICITY. The Appalachian Power Company is the only power company serving the project and adjacent area. A high tension power transmission line crosses the upper end of Millers Fork and also crosses the upper end of Beech Fork in the Bowen area.

C. GAS. Five gas utility companies have gas distribution lines within the project area. They are Cranberry Pipeline Corporation, Gas Supply Corporation, Tennessee Gas Pipeline Company, Big Sandy Gas Corporation, and H.H. Lusher. All of these are easements except for H.H. Lusher which is lease agreement.

D. TELEPHONE. There is one telephone company furnishing telephone service to the project area, the Chesapeake and Potomac Telephone Company of West Virginia.

E. WATER SUPPLY. Water for the dam area and Stowers Branch is provided by water distribution lines from the Lavalette Public Service



District, based in Lavalette, West Virginia. The Bowen State Park area is served by the Salt Rock Public Service District.

F. WASTE WATER TREATMENT. There are two sewage treatment plants located on the project area. The dam area and Stowers Branch are serviced by a plant located below the dam. The Beech Fork State Park has a plant located in the Lower Bowen Camping area.

#### 4.07 TRANSPORTATION SYSTEM

Access to the project from the main State highways of State Route 152 and S.R. Route 10 are provided by several routes, depending on the destination at the project.

A. DAM. State Route 13 from Lavalette is the principal access road to the dam. It is a narrow, two-lane road which is subject to undermining and slumping in several areas, but has been recently upgraded with new asphalt and is presently in good condition.

B. STOWERS BRANCH. This area can be reached by State Route 13, and then Route 52/4 to Route 15/2. An alternate route is 52/4 from Route 152, and then 15/2. These roads are paved, narrow and winding but are usually in good condition. Route 15/2 from Falls Branch road has recently been paved to the entrance gate at Stowers Branch.

C. BOWEN STATE PARK AREA. The shortest route is from State Route 10, and Cabell County Routes 35 and 43. These are two-lane, paved, winding roads and are difficult in some areas for campers and trailered vehicles. An



alternative access is using State Route 17 from State Route 152. These roads are continuously maintained.

D. MILLERS FORK AREA. County Route 17 from State Route 152 provides access. It has been upgraded, but is a winding mountain road.

E. PROJECT ACCESS ROADS. All roads within the operations and recreation areas are relatively new and continuously maintained, the State Park and the Corps maintain the roads within their respective operations and recreation areas.

chapter 5  
recreation use analysis

## CHAPTER 5 RECREATION USE ANALYSIS

### 5.01 INTRODUCTION

This chapter provides an analysis of the current and projected recreation use pattern at Beech Fork Lake. Analysis of the impact that regional demand has on project demand and facility needs is also discussed. Through a careful analysis of existing conditions, as well as future visitation projections, potential recreational demand and facility needs can be identified. Determination of suggested facility levels involves the application of planning judgment and standards -- results should be used as general guidelines for facility development plans. Final plans for recreation development must additionally consider budgetary constraints, agency goals, and other planning and management considerations.

### 5.02 EXISTING RECREATION FACILITIES

Information regarding existing recreation facilities is necessary in order to establish current and future facility needs for the project. Each recreation area is discussed in the following paragraphs. Table 5.02 is a more complete listing of facilities for each site.

A. DAM SITE AND TAILWATERS. This 34-acre Corps-operated complex offers a variety of recreational activities in two locations: (1) A 7-acre area below the dam is completed as a day-use area, mainly for picnicking and for access to the below-dam fishing area. The tailwater fisherman access area

is located along the outlet. Facilities include 45 parking spaces, waterborne restroom, asphalt paths to a handicapped access fishing pier, two picnic shelters, 2 picnic units, and a hiking trail. (2) The above dam area contains 27 acres. Facilities include an access road to an eight-lane boat launching ramp and canoe launch facility, parking lots for 144 cars and 97 car-trailer combinations, and a handicap fisherman access platform. The area also has waterborne restrooms, a picnic shelter, 12 picnic units, and two trails begin in this area. A combined overlook and visitor center, with parking, is located at the right abutment to the dam. The visitor center also serves as an operation office. The maintenance area is located at the left dam abutment and access is provided by the service road across the dam. A concessionaire-leased marina area is located upstream of the launch ramp and is operated by the Beech Fork Lake Marina. The marina has been recently expanded to 227 rental slips. There are rental boats available, a concession store, and fueling facilities.

B. STOWERS BRANCH AREA. This is a 8-acre (land) beach and picnic area operated by the Corps, located on Stowers Branch, a half mile upstream from the dam on the left bank. It has a 800-foot beach, 3 paved parking lots for 204 cars, 14 picnic units, waterborne restroom, and bathhouse. A hiking trail also starts in this area.

C. BEECH FORK STATE PARK. The State of West Virginia Department of Commerce has a license for 3,144 acres of land for public park and recreation. Within this area is a 158-acre intensive recreation complex located on the Beech Fork arm of the lake, approximately 5 miles from the dam. The complex is composed of three recreation sites--the Lower Bowen Camping Area, Blue Goose picnic area, and the Bowen day use Area. One area has been reserved for

future camping, the Upper Bowen Campground. This area will be developed by the state when there is additional demand for camping. The Lower Bowen Camping Area was developed by the Corps. Facilities include 275 campsites, parking for 140 cars and 62 cars with trailers, a two-lane launching ramp, nine waterborne restrooms (four of which are also washhouses), interior roads and a sewage treatment plant. A concession and office building, constructed by the state, serves the needs of campers and others using the area. This building contains the State Park Operations office, recreation rooms, restrooms and grocery store. The Bowen day-use area has been developed by the State, and has two softball fields, volleyball courts, a 304 parking lot, three picnic shelters, restrooms, two basketball courts, a tennis court, and an exercise trail. The Blue Goose Picnic Area is located a half mile north of the day use area and consists of 6 picnic units near a small pond. The State Park Superintendent and his assistant live in two separate dwellings constructed by the state. In 1987, 225,330 visitors made use of the area.

D. MARINA. This area containing 4.7 acres of land and water in the vicinity of the dam site is leased to a concessionaire, to develop and manage the Beech Fork Lake Marina. The Marina is operated by the Beech Fork Marina Inc., and provides boat slips for rent, boats for rent, gasoline, food, and boating supplies. The marina has been recently expanded to 227 boat slips.

E. FISH AND WILDLIFE MANAGEMENT AREA. The remaining land, a total of 8,247 acres including the lake, is licensed to the State of West Virginia Department of Natural Resources for fish, wildlife, and forest management purposes. The state has designated this land the Beech Fork Lake Public Hunting and Fishing Area. An operations headquarters building has been

Hunting and Fishing Area. An operations headquarters building has been constructed in the upper Millers Fork area of the project. The state will manage both Beech Fork Lake and East Lynn Lake Public Hunting and Fishing Areas from this building. Also, the state is constructing two waterfowl and fish nursery ponds within the license area. The state furnishes an Annual Management Plan and operates and maintains the land in accordance with the plan. Some other activities being conducted by the state are installing and maintaining information signs and boundary markers, sharecropping, planting and mowing for wildlife, providing waterfowl nesting structures, maintaining some access roads and closing others. Visitation for this area was 11,400 during 1986.

#### 5.03 REGIONAL RECREATION FACILITY NEEDS

A. CAMPING. Camping continues to be a popular activity in West Virginia. Surveys indicate that roughly half of State residents participate in camping. In Scorp Region II in 1980 there were a total of 854 camp sites. Based on estimated demand the number of camping sites should be doubled.

B. PICNICKING. Participation studies continue to indicate that picnicking is an extremely popular outdoor recreation activity with participation exceeding 60%. Group picnic facilities are an important part of basic park design. There are no definite demand indicators for the region.

C. SPORTS AND PLAYFIELDS. There is a definite need for additional sports facilities outside the larger communities in Scorp Region II. Because

of the lack of flat land in many areas, ballfields, tennis courts and basketball courts are in special demand.

D. GOLF. There are indications of a need for additional golf courses to meet resident population needs especially in regions 1, 2, and 3. Based on a standard of one regulation course per 25,000 population, region 2 has a need for 45 additional golf holes.

E. SWIMMING. It is estimated that in West Virginia 55 percent of the households participate in swimming. In region II, in 1980, there was a need for 11 additional swimming pools or beaches.

F. BOATING. Recreational boating is a popular and growing activity within the state. Motorboating requires public agency involvement to provide public access ramps on the major rivers and impoundments. In the past, public access to waterways was a special problem which is now gradually being improved. In Region II, motorboat registration from 1969 to 1980 increased from 1,830 to 5,392, (194%). This trend will continue if lake waters are available.

G. WALKING AND HIKING. Hiking is expected to be one of the fastest growing activities in the State. West Virginia has excellent possibilities for the development of a statewide system of trails.

H. HORSEBACK RIDING. Horseback riding and pedestrian activities are popular in the state. The Federal and state agencies generally recommend that the private sector take the lead in developing horse trails.

I. BICYCLING. During the past few years there has been tremendous national resurgence in the interest of bicycling, and this is also true in West Virginia. A grants program to fund construction of bikeways, bike safety, and related projects was established by Section 141 of the Surface Transportation Assistance Act of 1978 (P.L. 95-599).

J. FISHING. West Virginia waters offer excellent opportunities for freshwater fishing in some areas and extremely limited opportunities in other areas. About 15 percent of the State population participates in fishing. West Virginia has only one significant natural lake, so impoundments and stream fishing are the major sources for fishing. In 1985 for the State, the supply of fishing resources exceeded the demand for most species of fish, although the quality of fishing should be conserved or improved to satisfy increasing future demand.

K. HUNTING. West Virginia offers some of the best hunting opportunities in the United States. Approximately 18 percent of West Virginians hunt. The indications are that public demand for hunting areas will continue to increase. The supply of game and hunting areas is expected to be more than adequate in the future.

#### 5.04 PROJECT VISITATION AND FACILITY NEEDS

A. GENERAL. An analysis of past visitation at Beech Fork 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 Beech Fork Lake area. These surveys are designed to account for seasonality, weekend and weekday use, and recreation area use.



B. PROCEDURES FOR DETERMINING VISITATION. The percentage of vehicles actually entering the facility for recreation purposes, and the average number of persons per vehicle is used to develop an estimate of the total number of visitors at Beech Fork Lake. 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 1982 through 1986 are shown in Table 5.04. Table 5.05 shows projected visitation for years 1990, 2000, 2010, 2020, and 2030. This data was calculated as follows:

Base conditions were determined by using visitation for the years 1985, 1986 when all the facilities were nearly complete.

To obtain the projected visitation, the population of the market area in 1980 was projected to years 1990, 2000, 2010, 2020, 2030. This is shown in Table 5.03.

The actual visitation for the 1985-1986 period was then projected for the same rate of increase as the general population of the market area. The percentage breakdown for each recreation activity was obtained largely from 1986 with some adjustments to compensate for the swimming beach being closed in 1986, and completion of the below dam area.

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, the following methodology was used:

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

Where: DL = Design Load

D = Demand (Projected Visitation from Table 5.05)

%PM = Percent of Annual Use Expected During Peak Month

%WE = Percent of Peak Month Use Occurring on Weekends

N = Number of Peak (weekend) Days in a Month (9)

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. Table 5.01 presents the percent peak month and percent use occurring on weekends and also average group size and turnover rates.

TABLE 5.01

DEMAND VARIABLES USED\*

Activity	% PM	% WE	Average Group Size	Turnover Rate
Camping	20.7	62	4	1
Picnicking	19.5	71	5	2
Boating	18.4	74	4	40 Launches (2)
Fishing	16.3	74	3	3
Hunting	36.4	64	0.1/per acre	2
Sightseeing	14.5	62	4	3
Swimming	35	69	4	2

\* Demand variables were obtained from actual visitation and SCORP data.

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

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

Where: FN = Facility Needs

DL = Design Load (as calculated)

XG = Average Group Size (as shown in Table 5.01)

TR = Turnover Rates (as shown in Table 5.01)

The results of this formula, along with a list of existing facilities, are shown in Table 5.06. By subtracting the projected demand from the existing supply, the quantity of needs or surplus can be determined.

D. SUMMARY OF TABLE 5.06

1. CAMPING UNITS. The table states there is a shortage of camping units available during high use periods. This is occasionally true at the State Park campground on holiday weekends. On most summer weekends the supply is adequate.

2. PICNIC UNITS. Picnic units at the project are divided between the Dam area, Stowers Branch, and the State Park. The table states there are adequate numbers of picnic units and actual conditions bear this out at this project.

3. BOAT LAUNCHING LANES. The table states there is a slight shortage in boat launch lanes during high use periods. This is not considered true at the project since some of the demand for launch facilities is satisfied by the rental boats and slips at the Beech Fork Marina and the moorings available at the State Park.

4. BOAT TRAILER PARKING. The table shows a large shortage of boat trailer parking. At the dam and the State Park the amount of parking

space is considered adequate, although often these spaces are used by cars only which results in temporary shortage of parking space for boaters with trailers.

5. PARKING FOR FISHERMAN. The table shows adequate parking for fisherman. This is considered to be true at the project since part of the car trailer spaces are used by fisherman and there is sufficient car parking as a whole, with exception of some weekends when the beach is used to capacity.

6. HUNTING AREAS. Hunting resources are considered to be adequate because of the large acreage for fish and wildlife management.

7. SIGHTSEEING PARKING. Sightseeing parking is generally considered adequate because the large amount of parking space at the State Park, although shortages do occur in the dam area and Stowers Branch.

8. SWIMMING PARKING. Parking for swimmers is adequate since the 204 spaces at Stowers Branch provide parking up to the resource capacity. The table is misleading because most of the swimming demand occurs on a few weekends in summer, and some parking spaces at Stowers Branch are used by picnickers, fishermen, and hikers.

## BEECH FORK LAKE

TABLE 5.02

## Summary of Existing Recreation Facilities

FACILITIES	ABOVE DAM AREA	TAILWATER AREA	STOWERS BRANCH	LOWER BOWEN CAMPING	LOWER BOWEN DAY USE AREA	BLUE GOOSE PICNIC AREA	TOTAL
Developed Acres	27	7	8	130	28	3	203
Campsites				275			275
Picnic Units	12	2	14		24	6	58
Parking Spaces (Cars only)	144	39	204	140	304	6	837
Parking Spaces (Car and Trailer)	97	4		62			163
Launch Lanes	8			2			10
Comfort Stations	1 WB	1 WB	1 WB	9 WB	1 WB		13
Water Supply Source	Lavalette	Lavalette	Lavalette	Salt Rock	Salt Rock	Salt Rock	2
Beaches			1				1
Developed Trails (miles)	0.4	0.6	2.0	4.0	0.4		7.4
Picnic Shelters	1	2			3		6
Shower Stalls			8	24			32
Sewage Treatment Plant		1		1			2
Waste Disposal Station				1			1
Playground				2	1		3
Mooring Stanchions				98	12		110
Fishing Access-Handicapped	1	1		1			3
Swimming Access-Handicapped			1				2
Ballfields					2		2
Tennis Courts					1		1
Basketball Court					2		2
Volleyball Court				2	1		3
Marina-boat Slips	227						227
Boat Rental Piers	1			1			2
Golf Course							
Shooting Range							
Swimming Pool							
Amphitheatre							
Lodge Rooms							
Cabins							
Park Office	1			1			2
Overlooks	1						1

WB = Waterborne

TABLE 5.03

## PROJECTED POPULATIONS - MARKET AREA

Counties	1980 Actual	1985	1990	2000	2010	2020	2030
Wayne	46,021	44,067	49,173	52,500	51,517	51,214	51,754
Cabell	106,835	105,613	117,572	124,053	129,928	128,642	132,216
Mason	27,045	26,137	29,003	36,127	29,606	30,822	31,600
Lincoln	23,675	23,294	25,453	26,124	25,547	25,506	27,117
Mingo	37,336	35,459	39,600	41,381	40,567	42,115	43,037
Logan	50,679	47,147	51,927	56,471	57,873	58,191	57,422
Lawrence, Ohio	63,849	60,930	63,412	63,818	64,680	64,622	67,884
Lawrence, KY	14,121	14,694	14,805	15,213	15,676	16,301	16,688
Boyd, KY	<u>55,513</u>	<u>56,570</u>	<u>58,055</u>	<u>60,054</u>	<u>62,171</u>	<u>64,833</u>	<u>66,444</u>
	425,074	413,911	449,000	469,741	470,565	483,226	494,162

TABLE 5.04  
VISITATION - BEECH FORK, 1982-1987

Year	No. Persons	Camp	Picnic	Boat	Fish	Hunt	SS	Swim	Other
<u>1982</u>	426,200	42,500	31,800	96,500	94,900	4,100	97,600	58,000	0
Percent Use		10	7	23	22	1	23	14.0	0
<u>1983</u>	470,690	80,569	46,431	117,069	116,693	3,476	115,322	87,362	3,941
Percent Use		14	8	20	20	0	20	15	0
<u>1984</u>	525,523	81,926	39,602	117,348	115,812	3,954	118,772	44,690	3,543
Percent Use		16	7	22	22	1	23	8	1
<u>1985</u>	515,811	84,258	37,836	118,612	116,946	4,092	118,356	32,554	4,155
Percent Use		16.3	7.3	22.9	22.6	0.7	22.9	6.3	0.8
<u>1986</u>	526,730	84,798	37,498	128,190	126,228	4,058	128,978	13,553	3,454
Percent Use		16.1	7.2	24.4	24	0.7	24.5	2.5	0.6
<u>1987</u>	552,188	82,276	37,292	116,365	121,932	6,777	145,030	38,820	4,106
Percent Use		14.8	6.7	21.0	22.0	1.2	26.2	7.0	0.7

TABLE 5.05

PROJECTED VISITATION, BEECH FORK LAKE  
1990-2030

Year	No. Persons	16.1% Camp	7.2% Picnic	23.6% Boat	23% Fish	0.7% Hunt	22.5% SS	6.3% Swim	0.6% Other
1990	559,139	90,021	40,258	131,956	128,601	3,914	125,806	35,225	3,355
2000	584,859	94,162	42,109	138,026	134,517	4,094	131,593	36,846	3,509
2010	585,443	94,256	42,151	138,164	134,651	4,098	131,724	36,882	3,512
2020	600,664	96,706	43,247	141,756	138,152	4,204	135,149	37,841	3,663
2030	613,878	98,834	44,199	144,875	141,191	4,297	138,122	38,674	3,683



TABLE 5.06

## SUMMARY OF FACILITY NEEDS - BEECH FORK LAKE

Facility Type	Camping Units		Picnic Units		Boating (Lanes)		Boating (Parking)		Fishing (Parking Space)		Hunting (acres)		(1) SS (Parking Space)		Swimming (Parking)	
Existing Supply	275		73		10		159		225		7,531		232		150	
YEAR	FN	(-) (+)	FN	(-) (+)	FN	(-) (+)	FN	(-) (+)	FN	(-) (+)	FN	(-) (+)	FN	(-) (+)	FN	(-) (+)
1990	320	-45	62	+11	12	-2	249	-90	191	+41	506	+7,025	104	+128	118	+32
2000	335	-60	65	+8	13	-3	261	-102	200	+32	529	+7,002	109	+123	123	+27
2010	336	-61	65	+8	13	-3	261	-102	200	+32	530	+7,001	109	+123	124	+26
2020	344	-63	66	+7	13	-3	268	-109	205	+27	544	+6,987	112	+120	126	+24
2030	352	-77	68	+6	14	-4	273	-114	210	+22	556	+6,975	115	+117	129	+21

+ = Surplus

- = Need

(1) Parking spaces were allocated based on percentage visitation with adjustments. Sightseeing parking assumes that visitors park at least once.

(2) Marina slips and moorings would compensate for some deficit in launch lanes.

chapter 6  
coordination with other agencies

CHAPTER SIX  
COORDINATION

6.01 SUMMARY OF COORDINATION

The Master Planning process requires the active participation of most elements of the Corps of Engineers, the major outgrant holders especially the West Virginia Department of Natural Resources, and the Department of Commerce, as well as all interested private organizations and individuals. Coordination with all public and private agencies will be conducted throughout the planning process.

It is important that these lands which are a part of the Public Domain be developed and managed to maximize public benefits. This requires a large amount of coordination throughout the planning process to ensure that solution to water resource problems satisfies the needs of the people to the maximum degree possible.

A goal of the Master Plan is to maintain the channels of communication established in the development of the project and to ensure maximum utilization of project resources through these channels. This final draft Master Plan will be reviewed by various branches of the Corps District, and also various state and federal agencies. All suggestions and comments will be utilized in the final report, and review letters will be included in the appendix.

chapter 7  
physical plan of development

CHAPTER 7  
PHYSICAL PLAN OF DEVELOPMENT

7.01 INTRODUCTION

This chapter presents a series of resource use objectives that were developed to guide the overall planning process. Also discussed are the land and water use allocations that are designed to guide the overall management and physical use of project resources. The existing facilities are described in detail and site analysis shows various shortcomings. The recommendations propose improvements to the existing facilities.

7.02 RESOURCE USE OBJECTIVES

Resource use objectives have been developed for Beech Fork Lake in accord with ER 1105-2-167. This ER defines resource use objectives as specific to the project, which define the attainable, publicly acceptable options for resource use determined from study and analysis of resource capabilities and public needs as determined from previous chapters. The objectives are presented in two major categories: Recreational Design, Operation, and Maintenance; and Fish, Wildlife and Forest Management.

The initial recreation facilities are completed at Beech Fork Lake and are generally adequate to meet current demands, although site improvement to existing areas may be required.

A. RECREATIONAL DESIGN, OPERATIONS, AND MAINTENANCE

Objective 1. Maintain high quality camping, day use, and swimming facilities, to meet current and future demand, within the resource capabilities.

Objective 2. Provide sufficient parking for recreation users without exceeding the resource capacity.

Objective 3. Make improvements to the trail system to meet the needs of a variety of users.

Objective 4. Provide for the improved visual qualities of the recreation sites by using landscaping elements and erosion control methods.

Objective 5. Upgrade all facilities to current design standards.

Objective 6. Provide additional playgrounds and athletic facilities.

Objective 7. Plan operations and maintenance practices to minimize costs.

Objective 8. Plan project operations activity to minimize damages from over use and vandalism.

B. WILDLIFE AREA OBJECTIVES

Objective 9. Provide access and appropriate facilities for fishermen and hunters.

Objective 10. Improve wildlife resources and associated habitat within a stewardship concept as required by PL 89-72, and to protect flora and fauna identified within national programs such as endangered species, or species for special emphasis.

Objective 11. Protect and manage the forest resources including timber, wildlife, soil, water, and aesthetics as prescribed by PL 86-717.

7.03 PROJECT LAND USE CATEGORIES

The land use plan for the Beech Fork Lake project provides the basic framework that will guide the development, management, and operation of all project resources. Four general land use categories have been established based on the function of each and the management agency; federal or state.

A. PROJECT OPERATIONS. Lands in the category provide for the safe efficient operation of the project for authorized purposes other than recreation and fish and wildlife. These lands are required to provide space for operational structures, maintenance and storage facilities, waste treatment, administrative facilities, and operations function.

B. INTENSIVE RECREATION. These recreation sites support the greatest concentrations of people participating in all types of recreation. These include campgrounds, the boat launch area, picnic or day use areas, swimming beaches, and fishing access areas. These areas are the most developed.

Temporary use of the acreage on these sites may include primitive camping and other uses in order to preserve, or enhance, desirable spatial or aesthetic characteristics in support of the long range plans.

Three intensive use areas have been developed at Beech Fork Lake and are listed below. These areas total 203 acres and facilities are developed at each site. Table 7.01 gives the breakdown by acreage for Land Use categories.

1. Damsite and Tailwaters
2. Stowers Branch Area
3. Bowen Recreation Complex

C. LOW DENSITY RECREATION. Land in the category is used for hiking trail alignments, land reserved for future expansion, nature study, wildlife management, and forest management. These areas are excess land for recreation, and not included in the intensive recreation or fish and wildlife areas. This land is used to preserve or enhance desirable spatial or aesthetic characteristics in support of the long range plans for recreation of higher density. The following are currently in this category and total 3,837 acres.

1. Land near the dam and Stowers Branch not included in operations and intensive recreation.
2. Land surrounding the intensive recreation areas at the State Park.

TABLE 7.01  
LAND USE ALLOCATIONS

<u>Federally-Owned and Managed Land</u>	<u>Acres</u>
Project Operations	309
Intensive Recreation	42
Low Density Recreation	<u>861</u>
SUBTOTAL	1212



Federal Land Licensed to West Virginia Department of  
Commerce

State Park Operations	10
Intensive Recreation (State Park)	158
Low Density Recreation (State Park)	<u>2,976</u>
SUBTOTAL	3,144

Federal Land Licensed to West Virginia Department of  
Natural Resources

Operations Area	3
Seasonal Pool Area.	716
Wildlife and Forest Management (Multiple Use)	<u>7,528</u>
SUBTOTAL	8,247

Federal Land Leased to Private Sector

Marina Concession	<u>5</u>
TOTAL FEDERAL LAND	12,608
CORPS EASEMENT	147

D. MULTIPLE RESOURCE MANAGEMENT. Land in the category is managed to support wildlife, Fishery, and forest resources by protection and conservation. These areas are also used for low density recreation. They take in the largest part of the project acreage and includes the forests, former farmlands, and the lake waters. The West Virginia Department of Natural Resources has a license from the Corps to manage these areas according to the annually approved management plan. Conservation of these areas includes fire protection, game and fish management, plantings and habitat control for game cover and food, law enforcement, fish stocking and research activities. Forest management involves all applicable silvicultural practices which includes timber harvest within a sustained yield concept in order to achieve multiple objectives.

E. USER FEES. The Chief of Engineers is authorized under the Land and Water Conservation Act of 1965 as amended (16 U.S.C. 1401) (Public Law 93-303) to charge certain use fees at public park and recreation facilities provided at Federal expense at water resource development projects operated and maintained by the Department of the Army. The charges consist of camping fees where the following facilities are provided: designated tent and/or trailer spaces, drinking water, access roads, refuse containers, fireplaces, visitor protection and toilets.

The revenues collected under this act are credited into a special account in the Treasury of the United States to be administered in conjunction with, but separate from, revenues in the Land and Water Conservation Fund. Revenues in the special account are available to the Corps of Engineers only by direct appropriation. The appropriated funds are allocated back to the projects at which fees are collected in proportion to the revenues collection. Guidance for the use of these funds is contained in OCE Letter of 4 October 1984.

#### 7.04 WATER USE PLAN

The water use plan is designed to protect the boating public, minimize conflicts between water and land use activities, and to protect the environment. The water areas are leased to the State of West Virginia for the management of fish and wildlife in cooperation with the Corps of Engineers. The water use zones for the lake are divided into three areas as described below. Exhibit 8 illustrates the zones and Table 7.02 presents the acreage in each category at the seasonal pool.

A. UNRESTRICTED AREA. This is the unlimited speed zone and is available for all water-oriented recreation activity. The zone is the largest and is located mostly in the wider deeper parts of the lake where user conflicts can be minimized, and underwater obstructions do not present a hazard. These are the best areas for pleasure boating, sailing, and deep water fishing.

B. CONTROLLED AREA, NO WAKE ZONE. Craft speeds in this zone are controlled to a level which will not create a significant wake which would disturb other water uses. The following types of areas are effected. Buoys designate these areas.

1. Water areas in proximity to boat launching ramps and marinas where wave action would create a disturbance or damage facilities.

2. Water areas which are shallow, narrow or contain submerged obstacles and would be a hazard to fast moving boats.

3. Waters which are best suited for fishing, hunting, canoeing, protection of natural habitat, or other water uses that require an undisturbed environment.

C. BOAT EXCLUSION AREA. This category applies to areas used for operational purposes such as dam water intakes, or other areas where boats would create a safety hazard such as near scuba diving activities, or swimming beaches. Buoys or other signs designate these areas.

TABLE 7.02  
WATER USE ALLOCATIONS (SEASONAL POOL)

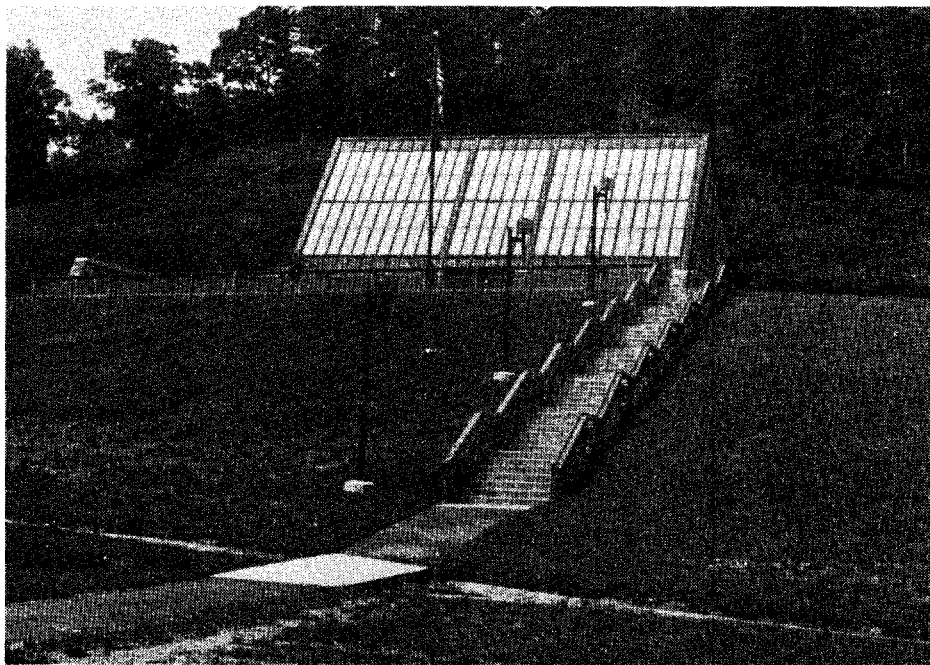
	<u>ACRES</u>
Unrestricted Area	461
Controlled Area - (No-Wake Zone)	250
Restricted Area - (Dam Intake, Beach)	<u>5</u>
TOTAL	716

#### 7.05 RECREATION AREA ANALYSIS

At Beech Fork Lake, all of the intensive recreation areas have been developed and are essentially complete. The primary focus of the Updated Master Plan is on preservation and enhancement of existing recreation areas. The following intensive use areas are described in detail, site analysis is performed, and recommendations are proposed for improvements to these areas.

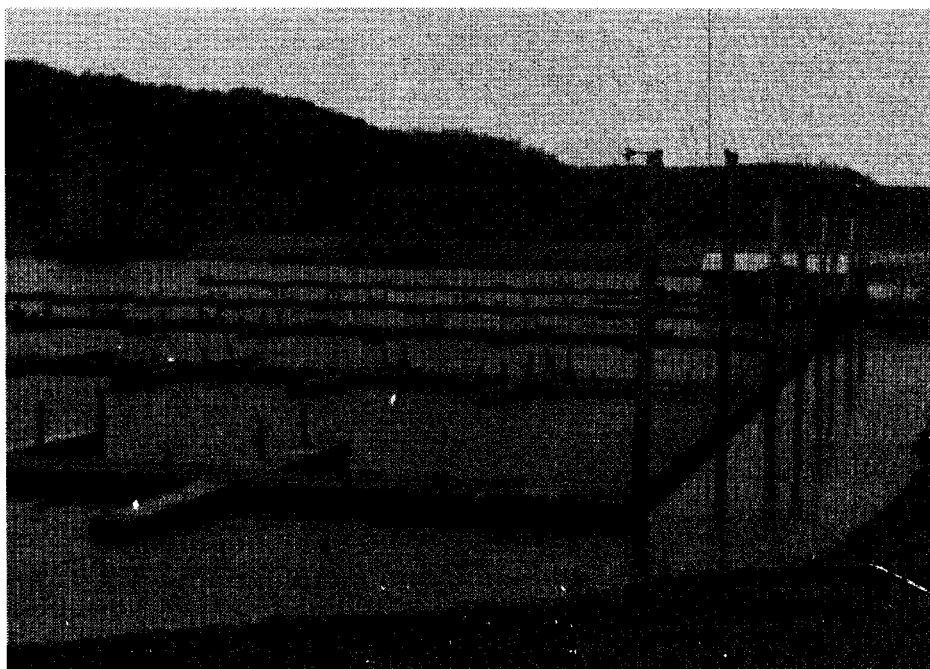
##### A. ABOVE DAM AREA. (Photos 7.01-7.03) (Exhibit 9)

1. EXISTING FACILITIES. This area of 27 acres has been developed as the boat access area, and also for picnicking, fishing, and sightseeing. Facilities located here include the 8 lane launching ramp, parking for 97 cars with boat trailers, 144 for cars only. There is a picnic shelter and 12 picnic units. Also in the area is a waterborne restroom and handicapped fishing access. The visitor center is located on the right abutment of the dam and has an interior exhibit area, theatre, and office facilities. Outside is the overlook area. The concessionaire marina is located opposite the launch ramp and has 227 boat slips, a store, and rental boats. An access road to the



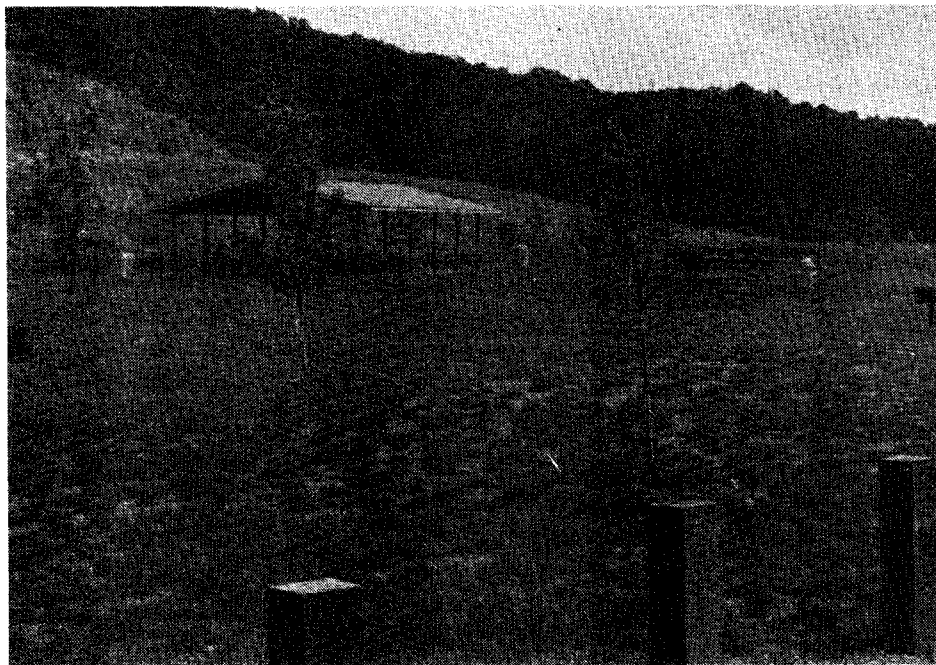
Photograph 7-1

Visitors Center and Overlook



Photograph 7-2

Marina area



Photograph 7-3

Above dam picnic area

radio tower area has recently been completed. A nature interpretive trail begins near the dam.

## 2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The area is large and spacious with superb views of the lake, dam, and surrounding terrain, especially from the overlook area. The grass covered dam enhances the visual qualities of the site. The marina has been expanded without becoming overcrowded. Trees have

been planted throughout the area. Parking and picnic spaces are usually adequate with the exception of holidays.

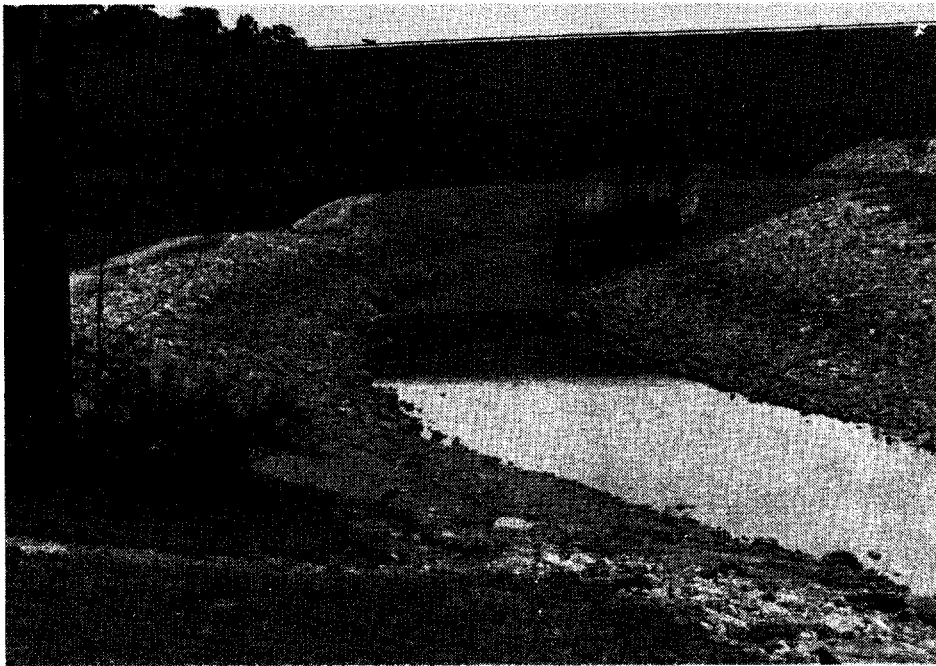
b. NEGATIVE SITE FEATURES. Trees are planted in the area but are not large enough to provide shade. The access road to the radio tower is new and needs some tree screening to make it less obvious. Parking space for cars is not adequate during some summer weekends, and holidays.

3. PROPOSED DEVELOPMENT. Another picnic shelter is needed in the area close to the dam, since there is little shade. The radio tower access road should be allowed to become naturally vegetated on both sides or plantings are needed to screen the area. A tot-lot is planned for the picnic area. Additional 30 car spaces should be provided near the dam.

4. FUTURE PLANS. Additional 20 car spaces can be provided when needed.

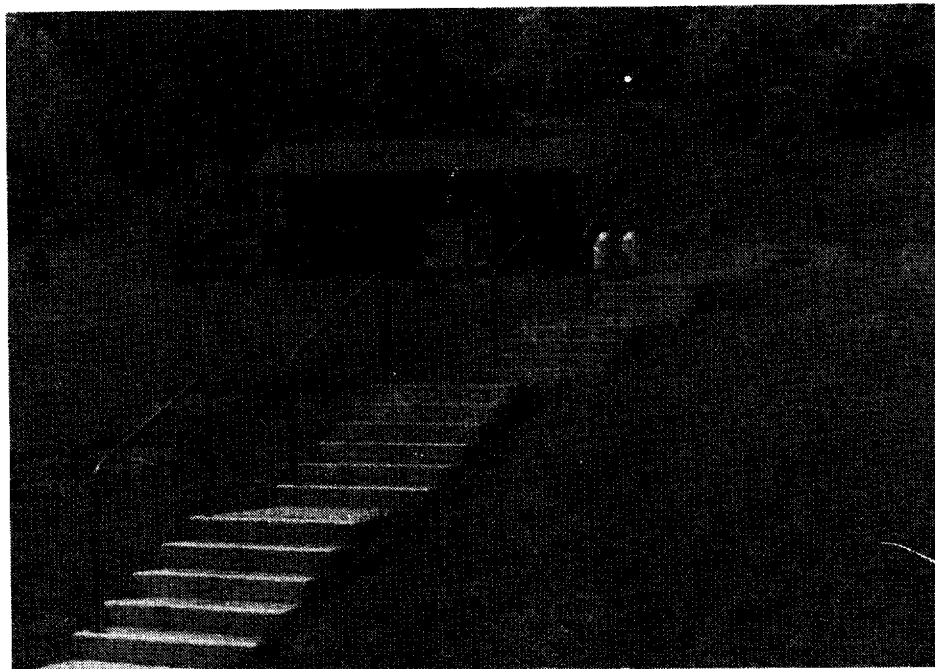
B. BELOW DAM AREA. (Photos 7.04-7.06) (Exhibit 9)

1. EXISTING FACILITIES. This intensive recreation area of about 7 acres consists of tailwater fishing area, and a picnic area located at the lower end. The sewage treatment plant is located below the dam on the right bank and is enclosed by fence. This area includes of two buildings, one being used as water quality laboratory. Recreation facilities consist of pathways to the tailwater, a path and fishing platform for the handicapped, 2 picnic shelters, 45 parking spaces, and 2 picnic units. A waterborne restroom is located here. A hiking trail begins in this area.



Photograph 7.04

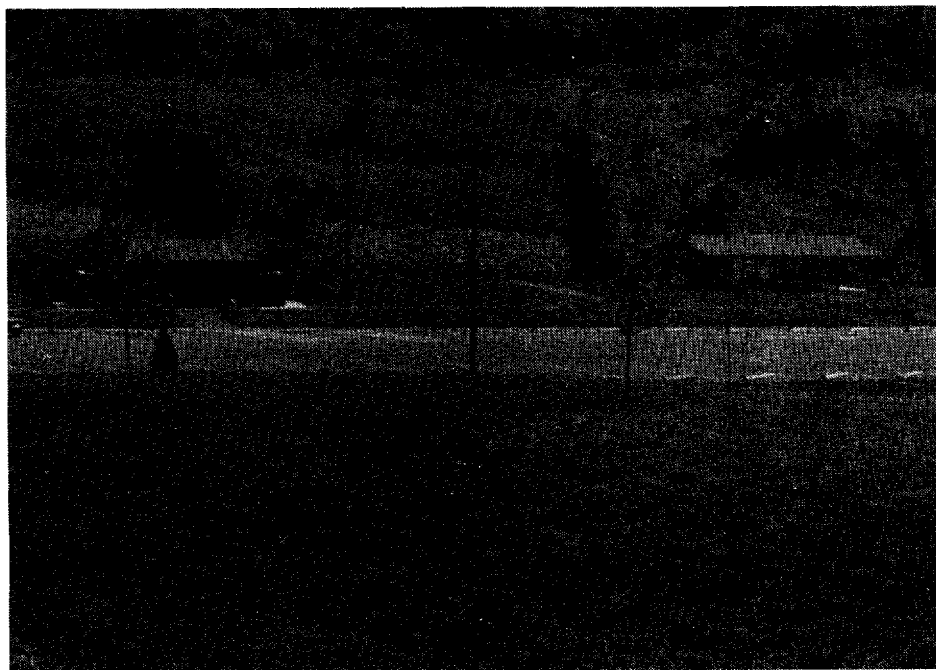
Tailwater fishing area



Photograph 7.05

Tailwater picnic shelter





Photograph 7.06

Tailwater picnic shelter and restroom

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The area is scenic with good views of the tailwater and dam. The picnic area is well planned and spacious. One picnic shelter was originally the overlook shelter at the dam. Larger trees provide shade in the lower tailwater area. Parking space is adequate. Fishing is good at times from fish that come through the dam and stream species which are attracted by forage fish in the tailwater.

b. NEGATIVE SITE FEATURES. Some additional shade is needed in the upper tailwater area. The tailwater is not stocked with game species by DNR.

3. PROPOSED DEVELOPMENT. Provide tot-lot near picnic area. In the lower tailwater area which is presently undeveloped provide a exercise trail, game court, parking for 10 cars, and road access from S.R. 4/52.

4. FUTURE PLAN. A softball field should be provided in the east end of the tailwater area near S.R. 4/52. This can be done when demand is sufficient.

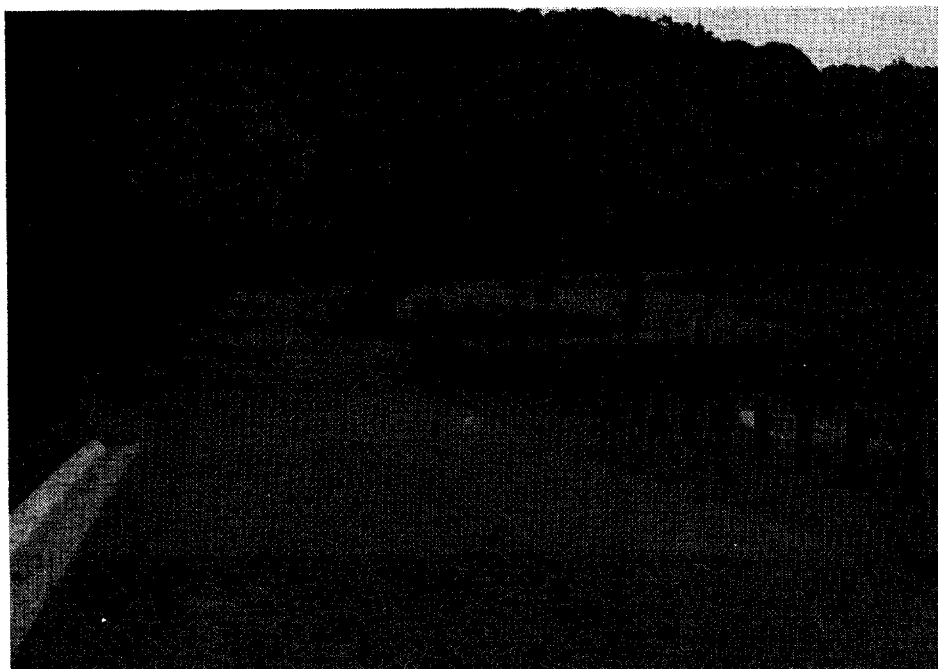
C. STOWERS BRANCH AREA. (Photos 7.07-7.10) (Exhibit 9)

1. EXISTING FACILITIES. This area has 8 developed acres located about .75 miles from the dam. Facilities include paved parking for 204 cars in three parking areas, 14 picnic sites located uphill from the beach area, and a beach area of about 800 feet in length. There is a waterborne restroom which include 8 outside shower stalls. One developed trail starts in the area.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. This is a popular area in the summer because of the beach. The entrance drive and cove area is scenic. Access is controlled when the parking lots become full therefore preventing overuse of the area. From the parking area there is also easy access for bank fisherman. Access to several trails is provided from this area. This area is also accessible by trail from the dam.

b. NEGATIVE SITE FEATURES. The beach area becomes unusable when the lake water levels are several feet below or above the seasonal pool. When the beach is not usable there are not enough recreation facilities to keep the area open to the public during the fall and winter season. The coliform count becomes too high for safe swimming at various times in the summer.



Photograph 7.07

Parking area at Stowers Branch



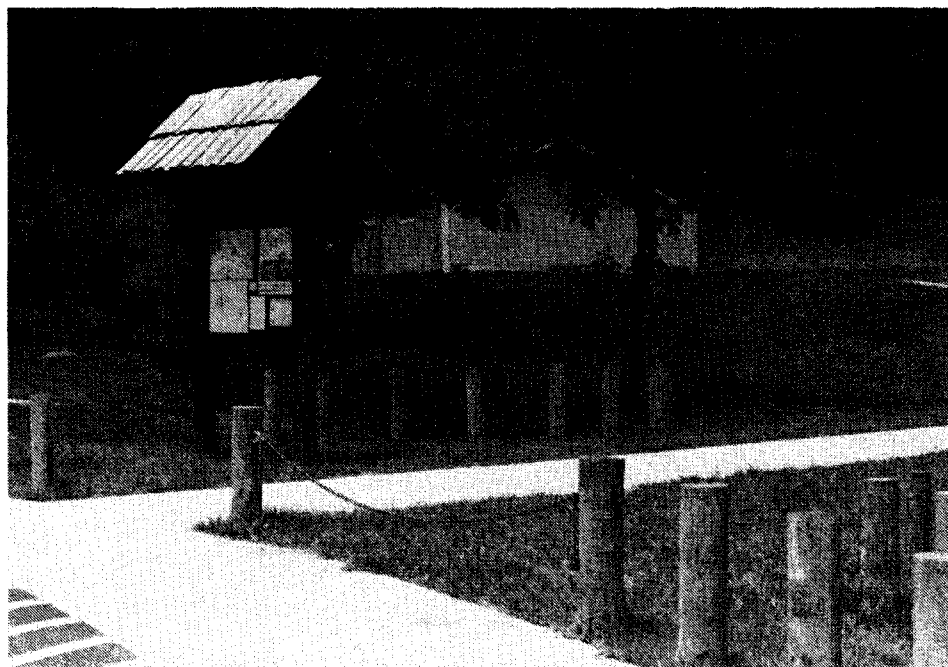
Photograph 7.08

Beach, handicap access and parking at Stowers Branch



Photograph 7.09

Picnic area at Stowers Branch



Photograph 7.10

Information sign and restroom-shower building at Stowers Branch

3. PROPOSED DEVELOPMENT. Near the entrance gate provide 3 additional parking spaces for hikers using the area.

4. Future Plan. None.

D. LOWER BOWEN CAMPING AREA (Photos 7.11-7.18) (Exhibit 10)

The State Park intensive use area consists of 158 acres divided into three recreation sites: the Lower Bowen Camping Area, Lower Bowen Day Use Area, and the Blue Goose Picnic Area.

1. EXISTING FACILITIES. This 130 acre camping area consists of 226 camping sites for trailers or tents, and 49 sites with full hookups for trailers only. There are 140 paved parking spaces for cars only, and 62 for cars with trailers. Sanitary facilities consist of 9 restrooms, 4 of which are washhouses. Two playgrounds and volleyball courts are provided. There is a concession and park headquarters building in this area, and a two-lane boat launch area. Other facilities in this area are the maintenance building, sewage treatment plant, and residential buildings for the Superintendent and Assistant. Recently completed is a handicap fishing pier, and a boat rental pier.

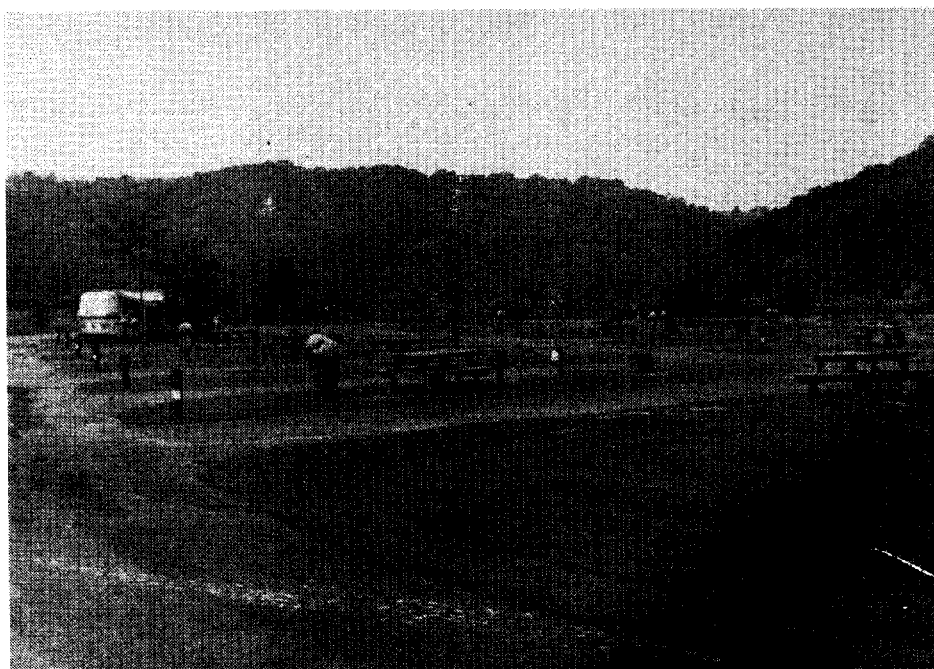
2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. Spacious area with varied campground settings close to the lake. All sites have electric hook-ups. 49 of the sites developed by the State have full hookups with water and sewage service. There are two playgrounds, volleyball courts, and handicap facilities at the restrooms. Several hiking trails in the area are convenient



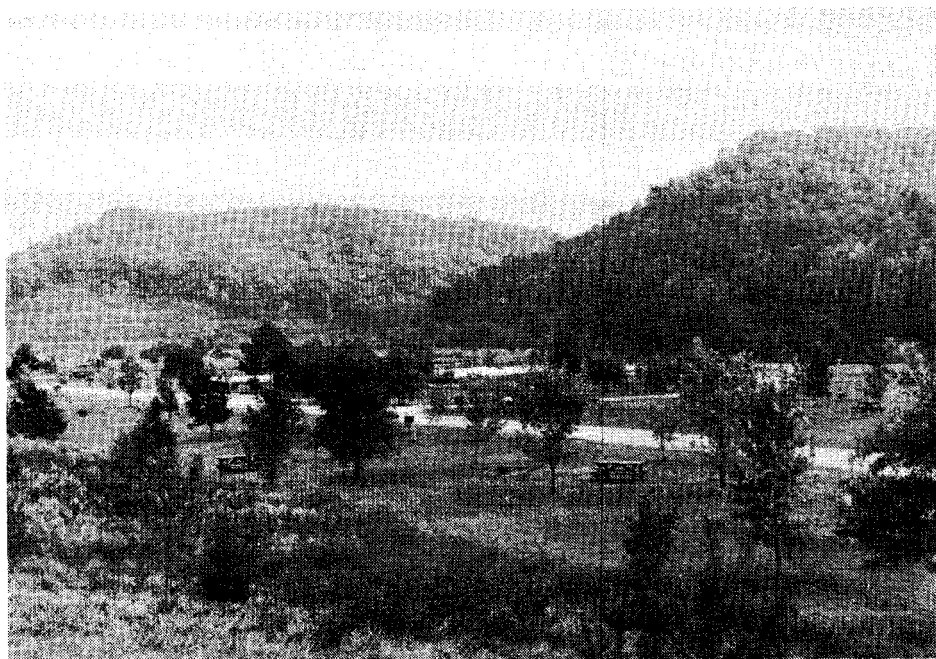
Photograph 7.11

State park entrance station



Photograph 7.12

Old Orchard camp area at state park



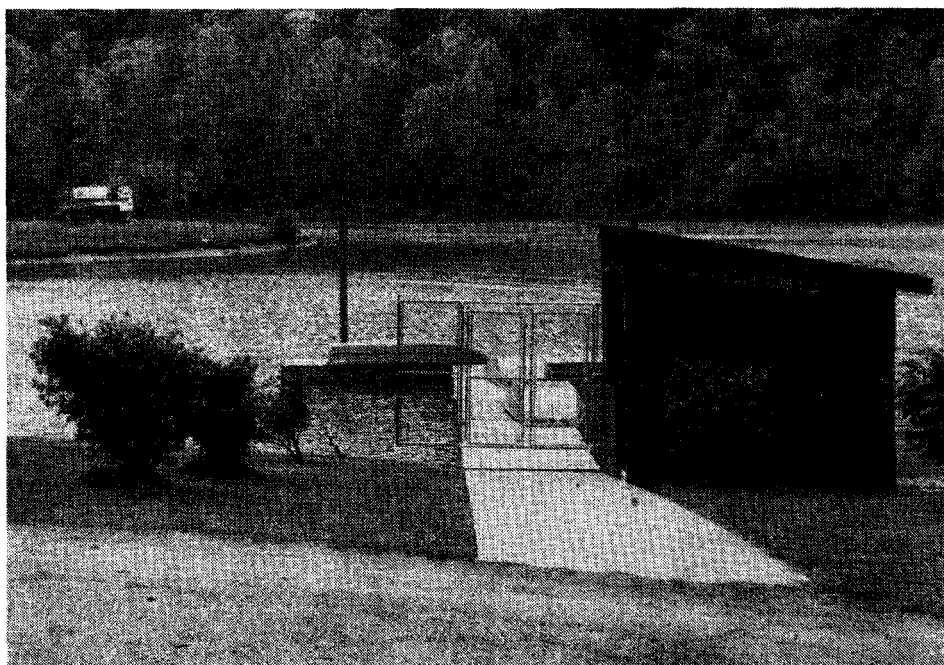
Photograph 7.13

Four Coves Camping Area at State Park



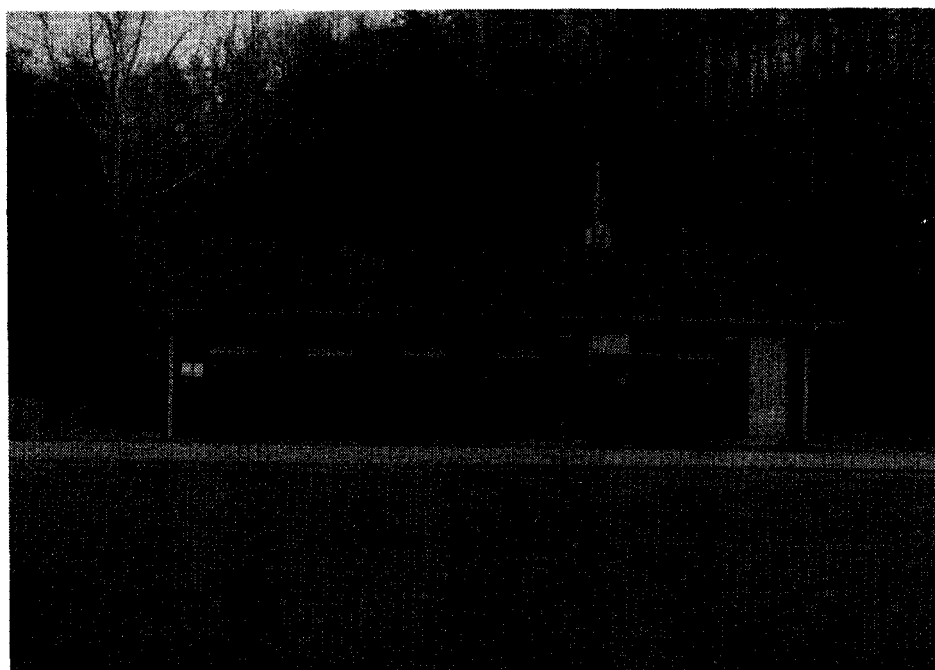
Photograph 7.14

Launch ramp at State Park



Photograph 7.15

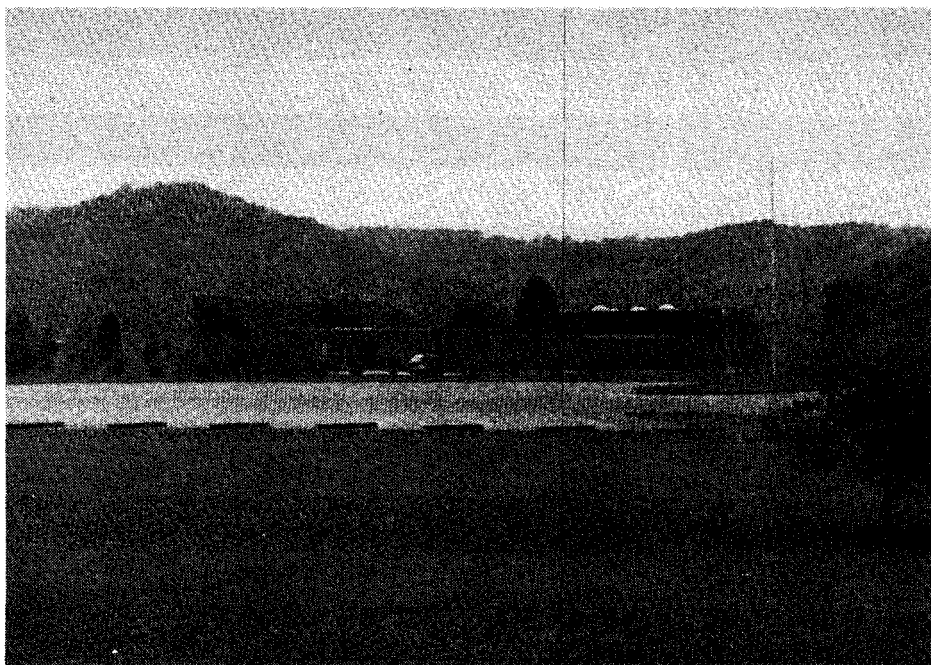
Boat rental pier at State Park



Photograph 7.16

Typical restroom and washhouse at State Park





Photograph 7.17

State park operations building and concession



Photograph 7.18

Tot-lot at State Park campground

for campers. Trees and shrubs are planted throughout the area to provide screening between campsites. All roads and facilities are well maintained.

b. NEGATIVE SITE FEATURES. There is no developed beach so some campers swim in unsupervised areas. The sewage treatment plant is highly visible in the lower end of the project and should have additional vegetative screening.

3. PROPOSED DEVELOPMENT. Plant additional trees and shrubs for screening of campsites and sewage treatment plant.

4. FUTURE PLANS. None

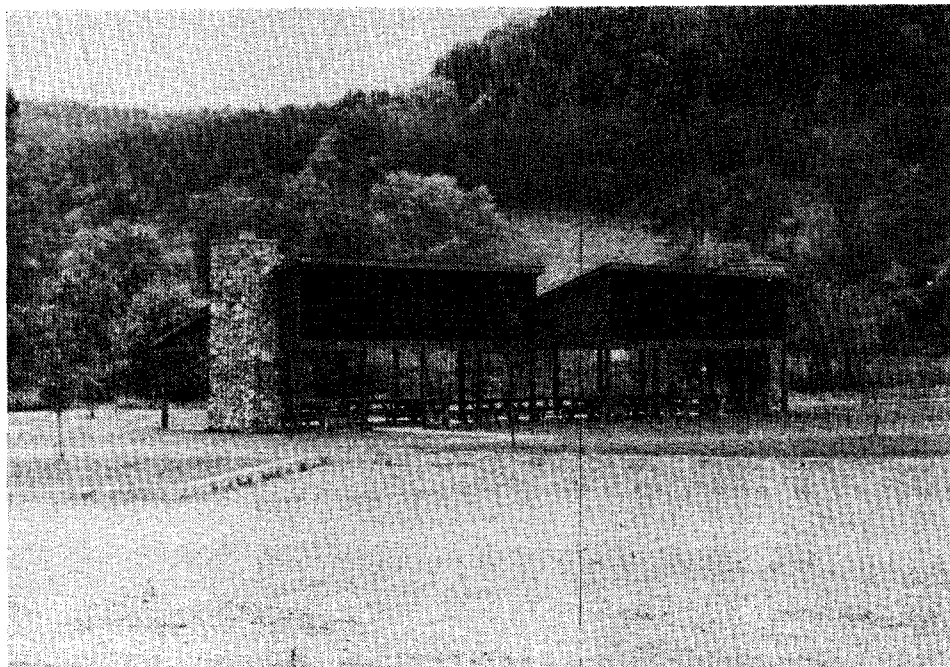
E. LOWER BOWEN DAY USE AREA. (Photos 7.19-7.24) (Exhibit 10)

This area of 28 acres is located on the east side of S.R. 17, south of S.R. 13.

1. EXISTING FACILITIES. The facilities consist of 24 picnic units, two large picnic shelters each with 2 fireplaces, one half size shelter with electric grills, 2 basketball courts, 1 tennis court, 2 softball fields, a playground, 2 volleyball courts, and 2 horseshoe courts. An exercise trail has been recently developed around the area. Parking is provided for 304 cars on a stone surface lot. One waterborne restroom is provided. Trees are planted throughout the area.

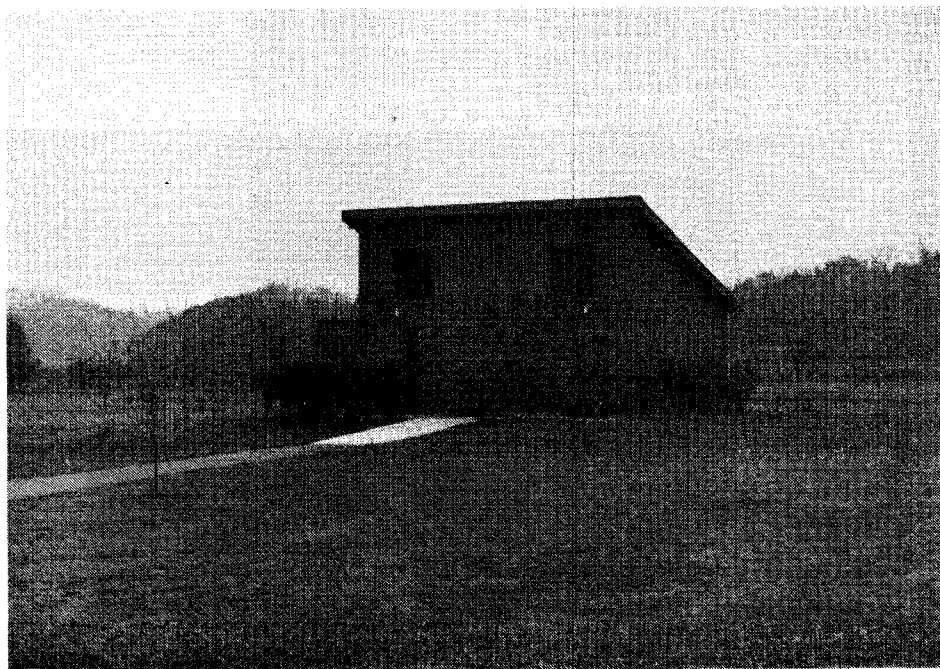
2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The area is attractive and spaciouly located along the upper Beech Fork. The architecture of the picnic



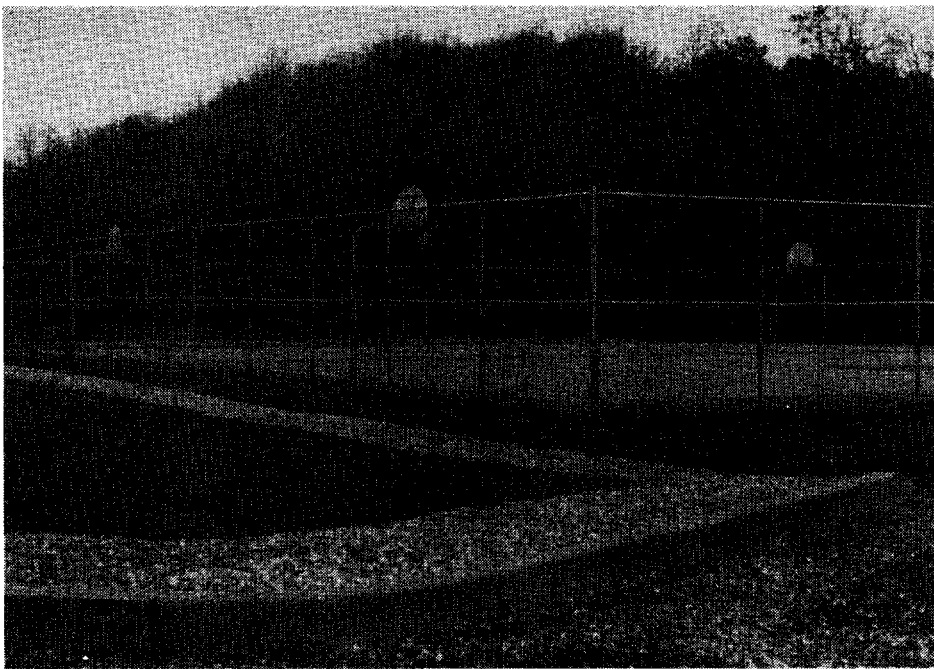
Photograph 7.19

Recently completed large picnic shelter at Bowen day use area



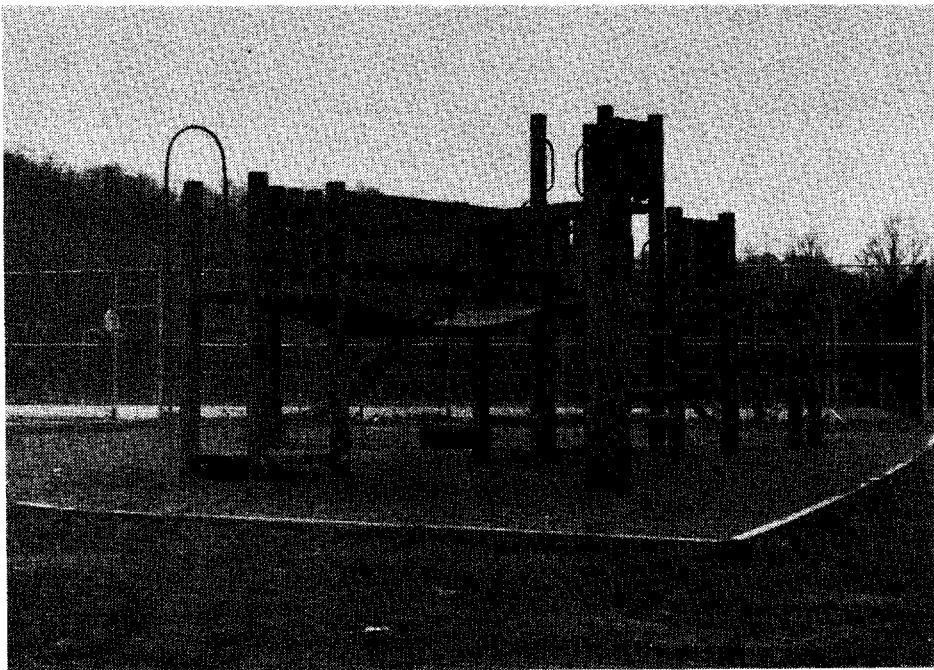
Photograph 7.20

Restroom at Bowen day use area



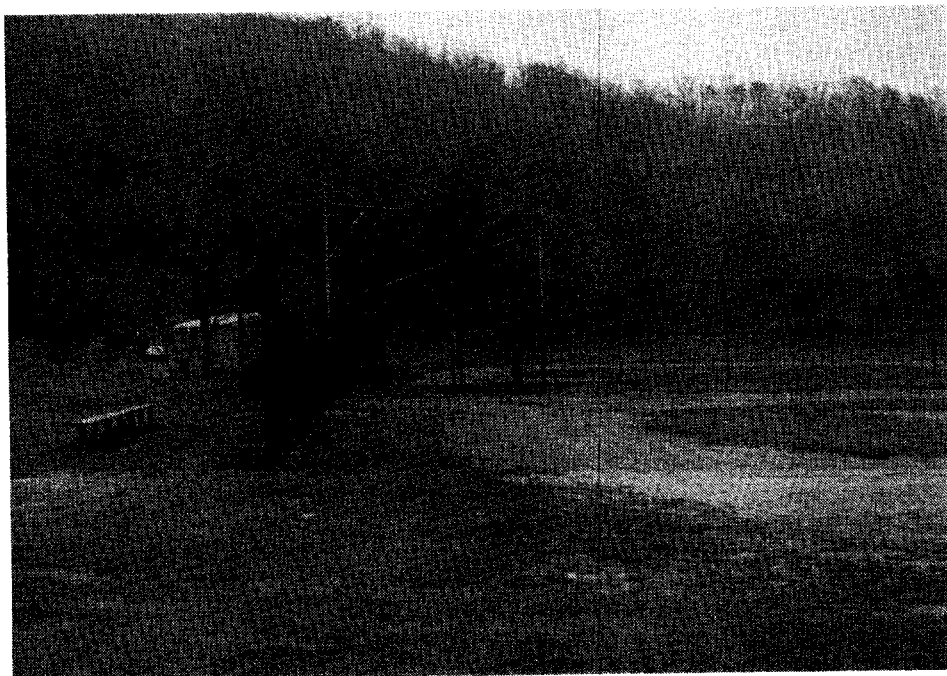
Photograph 7.21

Basketball courts at Bowen day use area



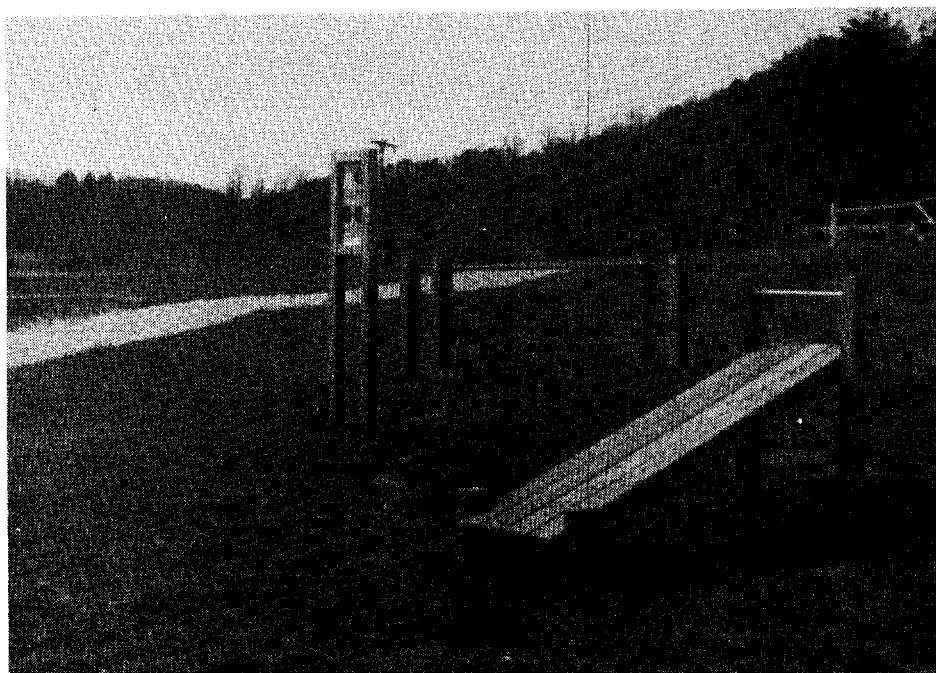
Photograph 7.22

Tot-lot at Bowen day use area



Photograph 7.23

Ballfield at Bowen day use area



Photograph 7.24

Exercise trail at Bowen day use area

shelters and restroom is contemporary dark stained wood construction which blends well with the environment. Parking space is adequate. There are a large variety of activities for the area.

b. NEGATIVE SITE FEATURES. The area needs additional shade. Some of which will be provided by growth of trees. During the hot months the athletic facilities are underused.

3. PROPOSED DEVELOPMENT. Provide the planned swimming pool area for the use of campers and day users. This would be a popular hot weather activity and would increase visitation. An additional large picnic shelter has recently been completed. One smaller picnic shelter has also been added.

4. FUTURE PLANS. Two additional small shelters will be built when needed.

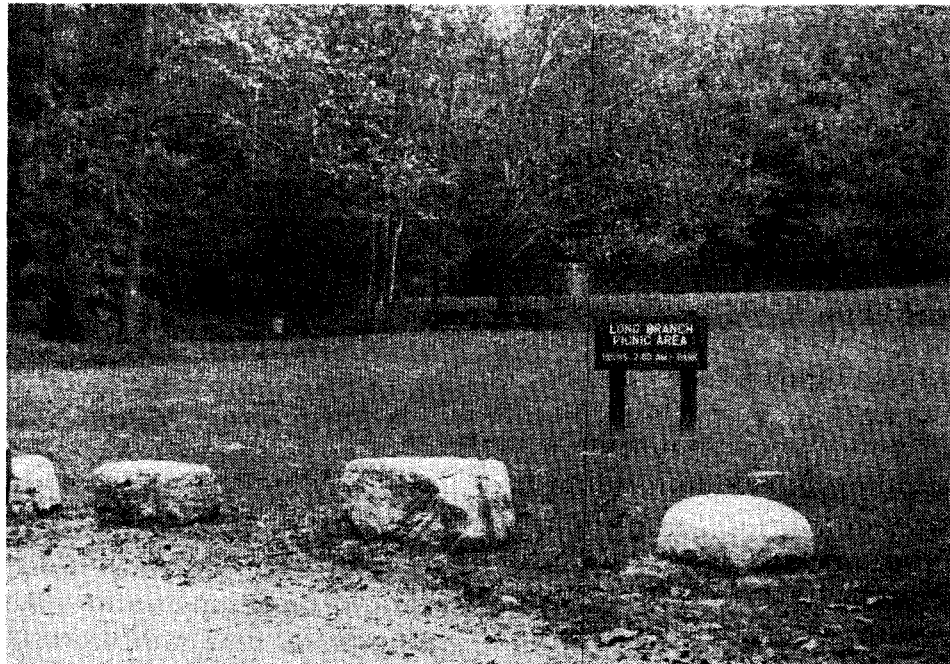
F. BLUE GOOSE PICNIC AREA. (Photo 7.25) (Exhibit 10)

1. EXISTING FACILITIES. This 3 acre area is located 2000 feet north of the park entrance on S.R. 43. This site has 6 picnic tables with 3 cookers located below a small manmade pond. There is stone parking for 6 cars. No restroom is provided.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. This quiet area is isolated from the rest of the recreation area, and has a natural setting near a small dam and pond. There is adequate space between picnic units.

b. NEGATIVE SITE FEATURES. Parking space is barely adequate if all picnic units are being used. No restroom is provided, although the day use area is not far away.



Photograph 7.25

Blue Goose picnic area

3. PROPOSED DEVELOPMENT. Provide a portajohn restroom in the area. Several more parking spaces should be provided, if use of the area increases.

4. FUTURE PLANS. None.

G. FUTURE STATE PARK CAMPING AREAS

1. UPPER BOWEN CAMPING AREA. This 22 acre area is located on the west side of S.R. 43 north of the Lower Bowen Camping Area. The campground will be developed when demand for additional camp sites becomes evident. Ninety campsites will be developed in this flat area with electrical hookups and other facilities similar to the Lower Bowen Camping area.

H. FUTURE GOLF COURSE. A 18-hole golf course has been proposed by the State to be part of the Beech Fork State Park. Location of the golf course will be in the area of the Village of Winslow about 2.5 miles east of the present camping area. The course will be developed when the demand exists and funds are available. As an alternative to the proposed lodge complex described in paragraph I, an expanded clubhouse with meeting rooms and guest cabins may be developed here.

I. FUTURE LODGE AND CABIN COMPLEX. A future lodge/swimming pool/cabin complex is being studied for the Mary Davis Branch area of the lake, located 3.5 miles upstream of the Beech Fork Dam on the south side of the lake. The Bowen Campground is 1.5 miles upstream of the lodge site. There are several plateau areas on this branch with excellent views of the lake. The lodge will contain about 115 guest rooms which will connect with the swimming pool. There will be meeting rooms, a restaurant, and gift shop. There will also be game courts, a miniature golf course, and a picnic area. Located nearby there will be 30 deluxe guest cabins facing the lake. A proposed access road to be cost shared with the Corps will be 3 miles long and will extend from the Government property line to the lodge area. The alignment of the road will follow the relatively flat ridge line. The State will build the 0.6 miles from the Government property line to S.R. 17. As described in Supplement No. 6 to the original Master Plan, the Corps will cost share the development of a launch ramp and picnic area near the Lodge. Facilities will consist of a one lane launch ramp, parking lots for 315 cars or trailers, game courts, picnic shelters, and 50 picnic units.



## 7.06 TRAIL SYSTEMS

A. ROCK HOLLOW TRAIL. This nature interpretive trail is located north of the entrance road into the dam area. The 2200 feet circular route trail begins a short distance from the visitor center.

1. EXISTING FACILITIES. A sign identifies the starting point and a brochure and interpretive signs along the way point out significant ecological information for the trail user.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The trail is relatively short along a wooded hillside with frequent changes in grade. The trail is well maintained and a easy walk for most users. Interpretive signs and trail markers make this a self guided nature trail.

b. NEGATIVE SITE FEATURES. None.

3. EVALUATION. The trail is easily accessible from the visitor center, and parking facilities. It is the most developed trail at the project.

4. PROPOSED DEVELOPMENT. None

B. TAILWATER TRAIL. The trail begins in the tailwater area near the upper level picnic shelter and follows Beech Fork Creek to 52/4 and loops back. The distance of the trail is about 3000 feet.

1. EXISTING FACILITIES. There are signs identifying the trail. Part of the trail is used by fishermen for access to the creek area.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The trail is located on nearly level terrain along the wooded streambank and field edges. It provides access to fishing spots along the creek and for observation of wildlife. Parking is available in the tailwater area. Grass is mowed along the alignment. Most of the trail is located high enough to avoid high water. Trail signs have recently been added.

b. NEGATIVE SITE FEATURES. On part of the length there is uneven footing over mowed grass, although frequent use of the trail would probably improve the surface.

3. EVALUATION. The trail is easily accessible from the tailwater parking, is relatively short, and provides opportunities for fishing and wildlife observation.

4. PROPOSED DEVELOPMENT. Provide a compact surface on the trail where needed to making walking easier.

C. BEECH FORK TRAIL. The trail begins above the dam in the picnic area and extends along the bank to the Stowers Branch Recreation Area and loops back through the woods to the mouth of the spillway.

1. EXISTING FACILITIES. There are signs identifying the trail.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. Sections of the trail provide good views of the lake. It also provides access for the lake shore for bank

fishing. Parking is available near the dam and at Stowers Branch. The trail is well maintained.

b. NEGATIVE SITE FEATURES. There is a need for additional trail signs. The trail surface is frequently wet and could use stone surfacing.

3. EVALUATION. The trail is easily accessible from the above dam parking area, and provides a scenic and easy walk along the lake shore.

4. PROPOSED DEVELOPMENT. Provide additional signs identifying the trail.

D. STOWERS BRANCH TRAIL. The trail begins near the parking lot at Stowers Branch and extends south for 3000 feet to a small pond.

1. EXISTING FACILITIES. A sign identifies the beginning of the trail. The trail follows mostly the stream bottom upstream, the route is mowed and signs identify the route as well as no hunting areas along the trail.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The trail is relatively level, and traverses open areas and woodland. The pond is an interesting terminous which has a Beaver lodge and shows considerable beaver activity. An unmarked Millers Fork fire access trail branches off this to reach the lake. The trail is well marked and maintained.

b. NEGATIVE SITE FEATURES. None.

3. EVALUATION. This is an easy and pleasant trail for most users and provides access to other trails in the area.

4. PROPOSED DEVELOPMENT. None

E. MILLERS FORK TRAIL.

1. EXISTING FACILITIES. This trail branches off from the Stowers Branch trail. There are no trail signs or markers. Length is about 2500 feet to the lake shore.

2. SITE ANALYSIS.

a. POSITIVE SITE FEATURES. The trail traverses wooded hill land with numerous changes in gradient. It provides access to the lake shore areas and DNR wildlife area.

b. NEGATIVE SITE FEATURES. The trail ascends a ridge which may be difficult for some hikers. There are no trail signs or markers.

3. EVALUATION. The trail is the primary foot access to interior areas of the project and to the Millers Fork shore areas.

4. PROPOSED DEVELOPMENT. The trail needs a sign at the beginning and markers along the way.

F. STATE PARK TRAILS.

1. EXISTING FACILITIES. There are four developed trails within or adjacent to the State Park intensive recreation areas.

a. OVERLOOK TRAIL. This trail begins in the Bowen Campground from the main access road near the Old Orchard Camp area and extend for 3850 feet in a loop route. There is a scenic overlook along a ridge.

b. LAKEVIEW TRAIL. This trail connects the Four Coves Camp area with Lakeview camping area with two connecting branches from the boat launch area and one washhouse. The length is about 5500 feet.

c. LOST TRAIL. This trail begins in the Moxley Branch Camp area and traverses a loop route along a ridge on the opposite side of the lake from the four coves camp area. The length is about 12,000 feet.

d. EXERCISE TRAIL. This trail is part of the Bowen Day Use area and features a paved walkway and exercise equipment at various locations along the route.

(1) POSITIVE SITE FEATURES. These trails all have signs identifying the trail head or are identified on brochure maps. The routes are well marked. The trail surfaces are bare ground or wood chips. Bridges are built in crossing streams or ravines. There is at least one nearby trail for each camp area and also the day use area.

(2) NEGATIVE SITE FEATURES. None

e. EVALUATION. These trails are a valuable recreation resource for campers and day users and should be maintained or upgraded when necessary.

f. PROPOSED DEVELOPMENT. None

## 7.07 WILDLIFE AREAS

A. GENERAL DESCRIPTION. The West Virginia Department of Natural Resources has entered into a forest, fish, and wildlife management license for most of the project area not managed by the Corps of Engineers or as a part of the State Park area. The license area totals 7,531 acres of land and 716 acres of water or 60 percent of the project area and is known as the Beech Fork Lake Hunting and Fishing Area. The lake waters are managed by WVDNR who are responsible for fishery enhancement and law enforcement.

Areas within the State Park and some Corps managed land allocated to low density recreation are managed as natural areas, although no hunting is normally allowed. Hunting is permitted on all the DNR wildlife area and some Corps managed area not restricted by other uses. Fishing is permitted on all lake waters except where restricted because of dam operations, marina operation, launch ramps, and near the beach area.

West Virginia DNR activities for management of fish and wildlife resources includes fish stocking, maintenance of access trails and information signs, planting of trees and shrubs, mowing and brush clearing to improve habitat, sharecropping agreements with farmers, transplanting of beaver, turkey, and deer, construction of nesting structures, fire prevention, and developing fish ponds and waterfowl marshes. An operations building to manage the wildlife areas at Beech Fork Lake and East Lynn Lake has been constructed in the Millers Fork area next to S.R. 17.

B. FISH REARING SUB-IMPOUNDMENTS. Two ponds for raising tiger musky and other game fish has been constructed on a tributary of the Beech Fork upstream of the Bowen Day Use area. Another fish rearing pond will be

constructed on Rubens Branch, about 2 miles from the dam. The size of the ponds are about 2 acres and will also provide habitat for waterfowl. Both ponds have been designed by the WVDNR and U.S. Soil Conservation Service. Labor and equipment are provided by the WVDNR and the West Virginia National Guard.

C. PROPOSED WILDLIFE AREA IMPROVEMENTS

1. Develop forest fire control access road into Lyons Branch from Bowen Ridge Cemetery Road. From near the lake provide access into Wolfpen Branch to repair old fishing lake and dam. Develop two or more water control devices in Lyons Branch, and adjacent hollow using old road grade and culverts. This would be a relatively large endeavor, but would be cost effective since most of the work would be done in one area. Portions of this area are located on public hunting areas, and some are on State Park land. This project on State Park land would serve as a refuge for wildlife and would enhance the aesthetics for park visitors. Equipment needed would be a backhoe, bulldozer, culverts, and culvert pipe suitable for simple water control devices.

2. Develop a waterfowl marsh on Upper Millers Fork using existing dikes and road grades. Equipment needed would be backhoe, bulldozer, culverts and culvert pipe.

3. Control burn several scattered woodland tracts to improve wildlife habitat, especially for turkey.

4. Designate natural area for rare "Agave virginica" and "Spiranthes ovalis" plants on the Stowers Branch area, uphill from beach area. This will be studied by the Corps.

#### 7.08 FACILITY MAINTENANCE

A. GENERAL DESCRIPTION OF CORPS FACILITIES. The Corps of Engineers has a maintenance building and fenced parking area located on the left descending side of the dam. Access to the area is provided by the road across the dam. The building and grounds total 3,640 feet, and includes storage area, garage, and workshops. The sewage treatment plant and two associated buildings are located below the dam. One building (384 square feet) is the control building for the plant and the other building (576 square feet) is used as a water quality laboratory. Both buildings are enclosed by a fence and provide space for additional maintenance equipment.

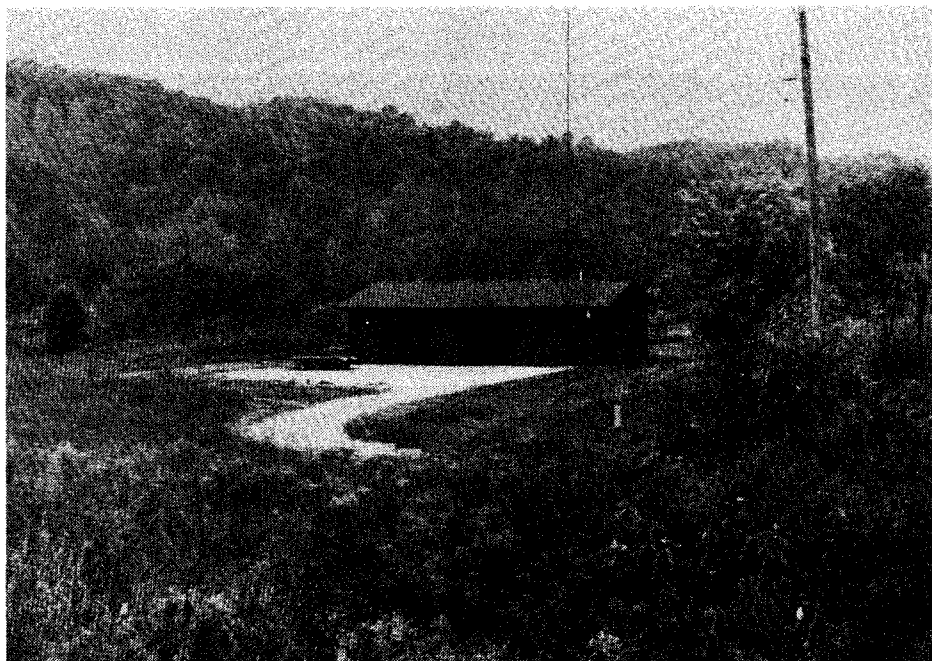
Project personnel are capable of performing all routine maintenance work. Maintenance items that are accomplished under contract are done so because of the need for specialized equipment and training, or because of limited project manpower. Present equipment allows maintenance in areas of welding, mechanics, carpentry, and painting. Most vehicle maintenance is accomplished at the project, as are the bulk of equipment repairs and woodworking tasks.

1. RECOMMENDATIONS. The present facilities are adequate to meet the needs for maintenance of the Dam area and Stowers Branch.

B. STATE PARK MAINTENANCE FACILITIES. A large maintenance building and storage yard has been built and is located at the end of School House Branch in the Bowen Camping area. This is a new building and meets the needs for maintenance facilities.



C. WILDLIFE AREA MAINTENANCE. A maintenance and headquarters building has recently been completed for management of the Beech Fork, and East Lynn Hunting and Fishing areas. The building is located on Millers Fork adjacent to County Route 17. This facility meets the requirements for the State at present. (Photo 7.26).



Photograph 7.26

West Virginia DNR maintenance building

chapter 8  
facility design criteria

CHAPTER 8  
FACILITY DESIGN CRITERIA

8.01 INTRODUCTION.

General policies and procedures for the planning, design, operation and maintenance of recreation facilities at Corps of Engineers Civil Works projects are established in the Engineer Manuals, Engineer Regulations and Technical Reports referenced below:

EM 1110-2-400, Recreation Planning and Design Criteria.

ER 1110-2-400, Design of Recreation Sites, Areas and Facilities.

ER 1110-2-102, Design Features to Make Buildings and Facilities Usable  
by the Physically Handicapped.

EM 1110-2-103, Design for the Physically Handicapped.

EM 1110-2-410, Design of Recreation Areas and Facilities.

EM 1120-2-400, Recreation Resources Planning.

EM 1130-2-400, Recreation - Resource Management of Civil Works Water  
Resource Project.

EM 1165-2-400, Recreational Planning, Development and Management  
Policies.

EP 310-1-6 Graphic Standard Manual

EM 110-2-4201

CERL Technical Report D-63, Design Guidelines for Recreational Roads.

These guidelines, along with State of West Virginia public health and sanitation requirements, and state building codes, form a basis for the detailed design and construction phases of the project. Design principles and criteria appropriate to the Beech Fork Lake project are discussed in this

chapter. Sections 8.02 through 8.22 address the general standards necessary for expanding existing areas and developing new facilities.

#### 8.02 SITING.

A. GENERAL. There are a number of site characteristics that influence the site selection for proposed facilities. Topography, area size, access potential, relative location and site attractiveness are all major considerations which dictate site selection for recreation facilities. The likelihood and impact of flooding, wind and wave action and operations and maintenance requirements are also important.

Only the most adaptable topography should be used for siting facilities. Forced siting should be avoided unless the efficient use of the area requires modification of existing land forms. Major cuts and fills should be used only when a satisfactory alternative site is unavailable, and then only for the siting of a specific facility. Existing clearings should be used whenever possible. Similarly, existing disturbed areas and roads or road beds should be used whenever possible.

Final design and construction supervision should play a key role in the successful implementation of the proposals presented in the Master Plan. The layout of roads and facilities must be considered as preliminary in order to provide the project designer and field supervisor the latitude necessary to adapt the construction plans to the site.

B. ELEVATION CONSIDERATIONS.

1. Habitable buildings, washhouses and restrooms, sanitary sewage and water systems (except "closed systems") and other facilities subject to substantial damage from inundation should be sited at levels above the flood control pool level of 614.5 feet (National Geodetic Vertical Datum). Due to the long horizontal and vertical distance from the lake edge at summer pool to the flood control pool and the desirability of placing facilities near the lake, these facilities may need to be located below this. In these cases the structures should be designed to withstand inundation. Circulation roads, parking, picnic sites and campsites may extend to the five year flood pool level of 597.6 feet.

2. Boat launching ramps should be constructed to extend at least to elevation 578.5 feet or 5 feet below the normal minimum pool at elevation 583.5 feet to accommodate launching and removal of boats during dry seasons. Basins for marinas and boat service facilities will be dredged to at least elevation 577.5 feet.

3. Boat mooring posts should be located within four horizontal feet above the seasonal pool level of 592 feet.

4. The top of combination walls/docks should be set at elevation 594 feet to accommodate docking and loading of boats when the lake is at the seasonal pool elevations of 592 feet.

8.03 SITE PREPARATION.

Site preparation (including excavation, clearing and grubbing) for the various buildings, camping areas and day-use areas should vary according to individual

site conditions such as slope, vegetation, surrounding land use and soil characteristics. All grading and earthwork should be done in accordance with established erosion control measures and shall meet all state and local regulations. During all site construction operations, particular emphasis should be placed on the protection of vegetation and other site features and on blending necessary cuts and fills uniformly with the existing contours.

#### 8.04 LANDSCAPE PLANTING.

The major objectives for providing landscape planting within recreation areas include: screening undesirable features; reducing wind and noise; providing shade; providing privacy; the enhancement of structures; the definition of recreational use areas; reforestation; erosion control and the enhancement of wildlife habitats. Planting in all areas should strive to imitate the character of the site through naturalistic planting concepts and the use of plant materials which are native to the area. All plant materials selected should be indigenous, maintenance free and functional.

#### 8.05 ROADS.

The road system within the project boundary plays a significant role in providing a quality recreational experience for the visiting public. The following guidelines will be considered in locating and designing proposed access and circulation roads.

A. ALIGNMENT. Curvilinear alignment is preferred over long tangents. Roads will be designed to complement the existing terrain and to optimize scenic views. In addition, consideration will be given to the creation and

maintenance of irregular right-of-way borders to enhance the visual characteristics of the roadway.

B. PROFILE. Deep cuts and high fills are to be avoided to reduce environmental impacts. When suitable, borrow material is available, consideration should be given to building the roadbed slightly above the natural ground level. Positive effects of this method of road construction relate to improved drainage, minimal environmental disturbance, reduced cost, and control of vehicular traffic in undesignated areas.

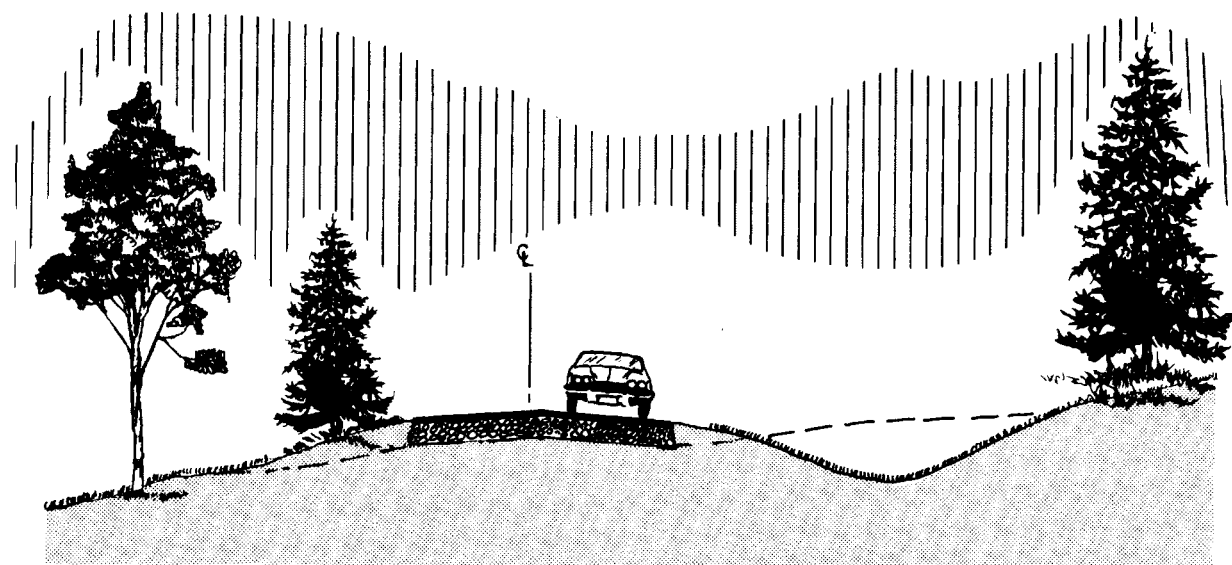
C. DRAINAGE. Swales and interceptor ditches will be constructed as necessary. The use of culverts will be kept to a minimum. One-way circulation roads will be cross-sloped where possible to minimize ditching.

D. MATERIALS. All access and circulation roads will be paved. The thickness of these sections will be based on soil studies conducted during the final Feature Design Memorandum stage. Service roads may be a gravel surface. The cost estimates for roads include materials, labor, and grading.

Major design standards for the development of various types of roads are included in CERL Technical Report D-63 and EM 1110-2-400.

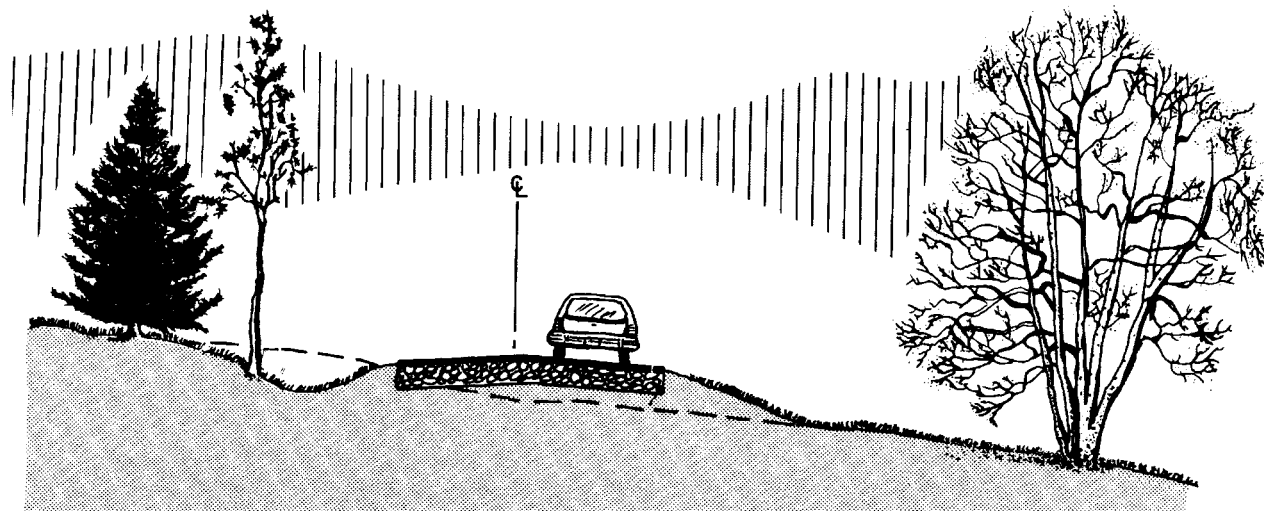
Existing paved roads which are not necessary should be removed and replaced with natural landscape features.

1. Design Standards and Typical Road Sections. Table 8.01 includes the major design standards associated with the various types of roads that should serve the proposed recreational and operational areas within the project boundaries. A typical section of each road type is shown on Figures 8.01 through 8.04.



STABILIZED SHOULDER 4% SLOPE 4'		4'
FILL SECTION	ACCESS ROAD	CUT SECTION
SLOPE VARIES 20-22' WIDE 2% SLOPE 2" ASPHALTIC CONCRETE SURFACE ON A GRANULAR BASE		
		SLOPE VARIES

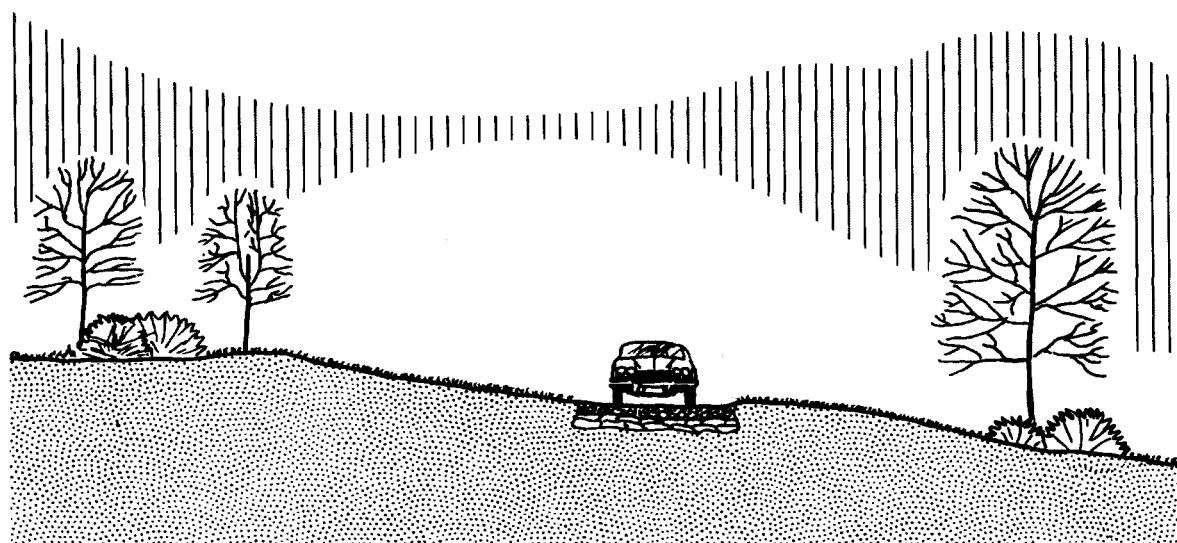
Figure 8-01  
Typical Major Access Road



DITCH AS REQUIRED TO PROVIDE PROPER DRAINAGE 2'		2'
CUT SECTION	CIRCULATION ROAD	FILL SECTION
SLOPE VARIES	18-20' WIDE 2% SLOPE 2" ASPHALTIC CONCRETE SURFACE ON A GRANULAR BASE	SLOPE VARIES

Figure 8-02  
Typical Two-Way Circulation Road





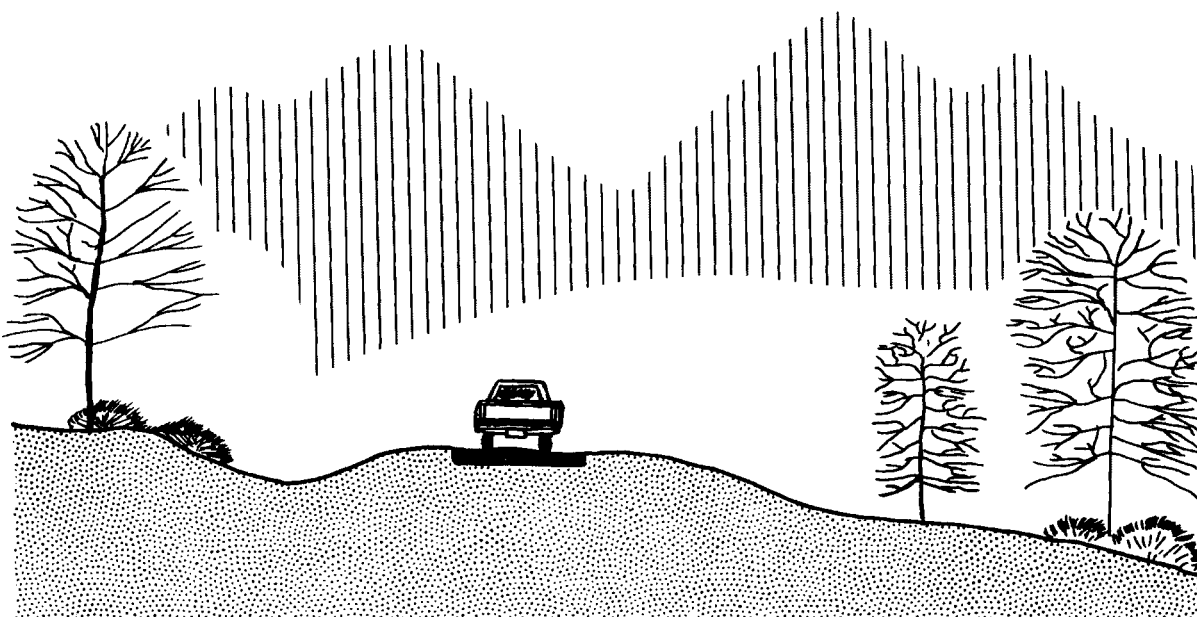
2' 2'

ONE WAY ROAD	FILL SECTION
--------------	--------------

12' WIDE  
2% CROSS  
SLOPE

2" ASPHALTIC  
CONCRETE

FIGURE 8-03  
TYPICAL ONE-WAY CIRCULATION ROAD



DITCH AS REQUIRED TO PRO-  
VIDE PROPER DRAINAGE

2' 2'

CUT SECTION	SERVICE ROAD	FILL SECTION
-------------	--------------	--------------

SLOPE VARIES 10' WIDE 2% SLOPE SLOPE VARIES

6" GRANULAR BASE

FIGURE 8-04  
TYPICAL SERVICE ROAD

TABLE 8.01

## ROADWAY DESIGN STANDARDS

<u>Road Type</u>	<u>Road Width (ft.)</u>	<u>Shoulder Width (ft.)</u>	<u>Maximum Gradient (%)</u>	<u>Maximum Design Speed (mph)</u>	<u>Minimum Radius (ft.)</u>
Major Access	20-24	2-4	10	40	270
Two-Way Circulation	18-24	2-4	10	30	150
One-way Circulation	12-14	2	10	30	100
Service	10	2	12	40	50

8.06 PARKING.

A. GENERAL. Additional parking facilities at Beech Fork Lake should be provided as an integral part of the circulation system. The parking facilities should be sited so that their physical impact on the natural environment is minimized. Various techniques should be utilized to screen parking areas from recreational facility areas including mounding, landscape screening and recessing lots. The visual character of all parking areas should be enhanced by providing planting islands and/or landscaped aisles wherever possible, as shown in Figure 8-05. In some cases, two or more small lots may be easier to site than a large lot with uniform grading. All proposed parking lots should be physically separated from the major access roads to minimize circulation conflicts. Pedestrian circulation should also be considered in the layout of parking lots.

B. DESIGN CRITERIA.

1. MATERIALS. All pertinent parking areas will be paved and overflow parking areas will have a gravel surface. Design of parking areas and thickness of sections will be determined during the Feature Design Memorandum stage. Installation of gravel or porous paving rather than nonporous materials should be considered as a means of reducing large expanses of normally unused paved parking. Cost estimates for parking areas include paving materials, site preparation, grading and labor.

2. SIZE. Car-trailer spaces will be a minimum 10 feet by 40 feet and car parking spaces will be 10 feet by 20 feet. Approximately two percent of the total number of spaces in each use area will be specifically designed and reserved for the use of the handicapped persons. These spaces will be 13 feet wide and conveniently located to walkways, buildings, site impact areas, etc.

3. LAYOUT. Parking lots should be designed to allow for efficient movement of vehicles through the lot. Parking areas may be in separate lots off of the circulation or access roads or may have spaces which are at 90 degrees to a circulation road. Lots for cars with trailers will provide pull-through spaces where possible or pull-in and back-out spaces in areas where space is limited by slopes, vegetation or other constraints. Car with trailer spaces will be at a 45 degree angle to the aisle when possible.

4. OTHER FEATURES. All parking spaces, except pull-throughs, will be provided with wheel stops. Curbing and catch basins will be minimized; storm run-off will be surface drained whenever possible.

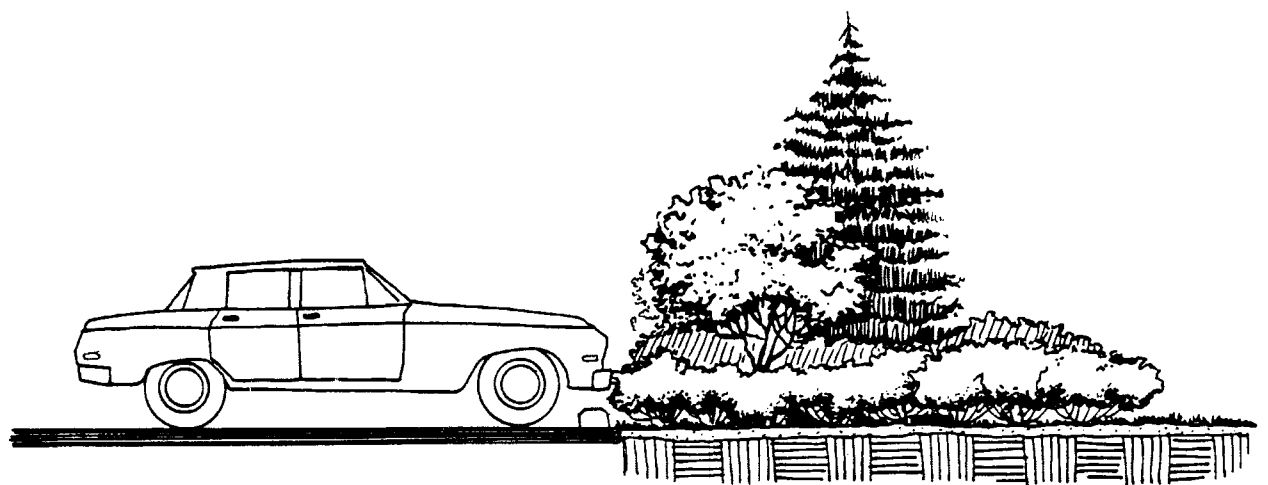
#### 8.07 BOAT LAUNCHING RAMPS.

All ramps shall have a slope between 12 and 16 percent. The lower limit of each all season ramp should be elevation 578.5 feet, five feet below the normal minimum pool at elevation 583.5 feet. The upper limit should be elevation 598 feet, six feet above the summer seasonal pool. A vehicular turnaround will be provided at each multiple launch area. At least one courtesy dock should be provided at each boat access launch ramp.

#### 8.08 DOCKS AND MARINA FACILITIES.

A. COURTESY DOCKS. A minimum of one concrete courtesy dock should be provided at each boat launch ramp to facilitate safe and convenient boat loading, launching, and retrieval. Docks should be accessible from both sides so that boats can be moved from the launch area before loading. Basic criteria for the design of courtesy docks include:

1. LIVE LOADS. Fifty psf uniform live load on dock and bridge, or 400 pounds concentrated load applied over an area of 12 by 12 inches.
2. WIND LOADS. Uniform load of 17 psf (80 mph) on all projected surfaces assuming 100 percent boat occupancy.
3. WAVE AND CURRENT LOADINGS. Will be considered on a site by site basis.
4. FREEBOARD. Dead load freeboard of all floating dock units shall be 18 by 24 inches. Freeboard under dead load and 30 psf live load shall not be less than 10 inches.



**Figure 8-05**  
**Typical Parking Area Screening**

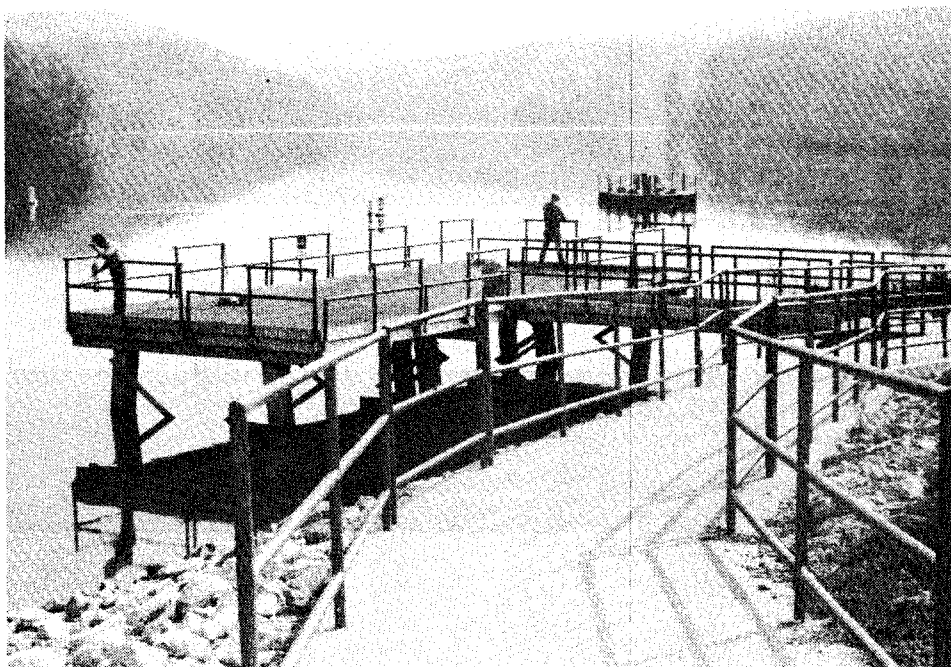
B. MOORING POSTS. The wood posts should be spaced 20 feet apart and should be located within four horizontal feet above the seasonal pool level of 592 feet. A typical mooring post facility is shown in Figure 8.06.

C. FISHING ACCESS. ORDER 1130-2-18 provides authority for the construction of access to lake waters near dam areas. Steps can be provided, also filling of voids in riprap with small stones to provide for a construction of fishing platforms. An access berm above the seasonal pool can be a part of the design stage of new projects. A typical access design is shown in Figure 8.07.

D. HANDICAP FISHING ACCESS. Design of these facilities can be of several types to fit the terrain situation at each site. Handicap access should be provided at each major recreation site. These facilities are illustrated in Photographs 8.01 through 8.03.

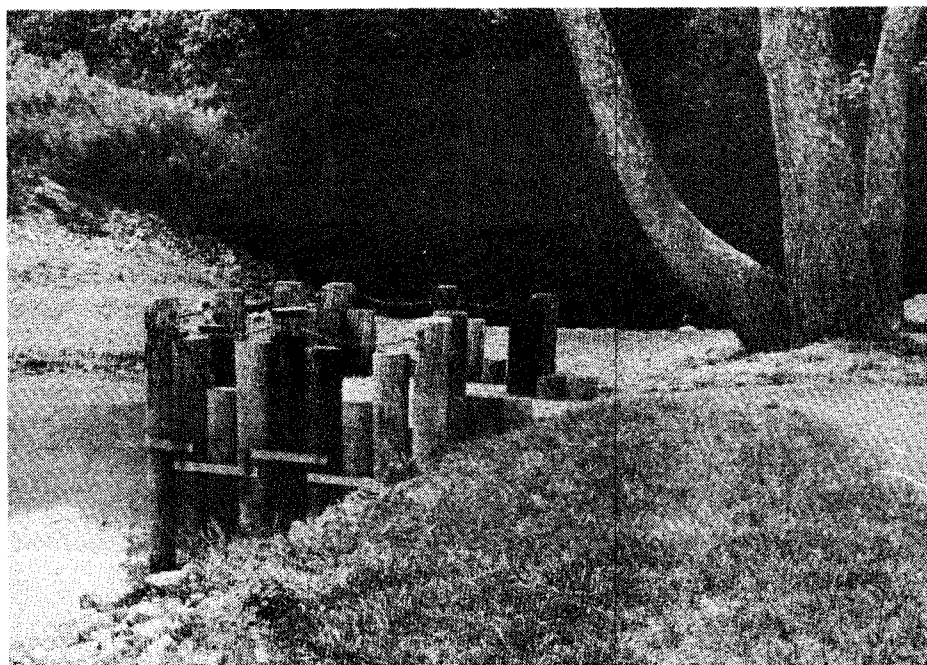
#### 8.09 BEACHES.

Beaches will be surfaced with sand at a slope of three to five percent. Slopes greater than 5 percent are not feasible as the sand will shift during drawdown even when the area is stabilized with retaining walls or curbs. A turf sunning area will extend above the sand area. This turf area will be surrounded by a diversion berm to minimize maintenance problems resulting from large quantities of surface runoff moving over the beach area. Large turf areas may be provided with intermittent plantings to provide partial shade and protection from strong winds. Beaches and sunbathing areas should be separated from parking areas with a vegetation buffer strip.



Photograph 8.01

Handicap access fishing pier at dam and  
destratification fans in background



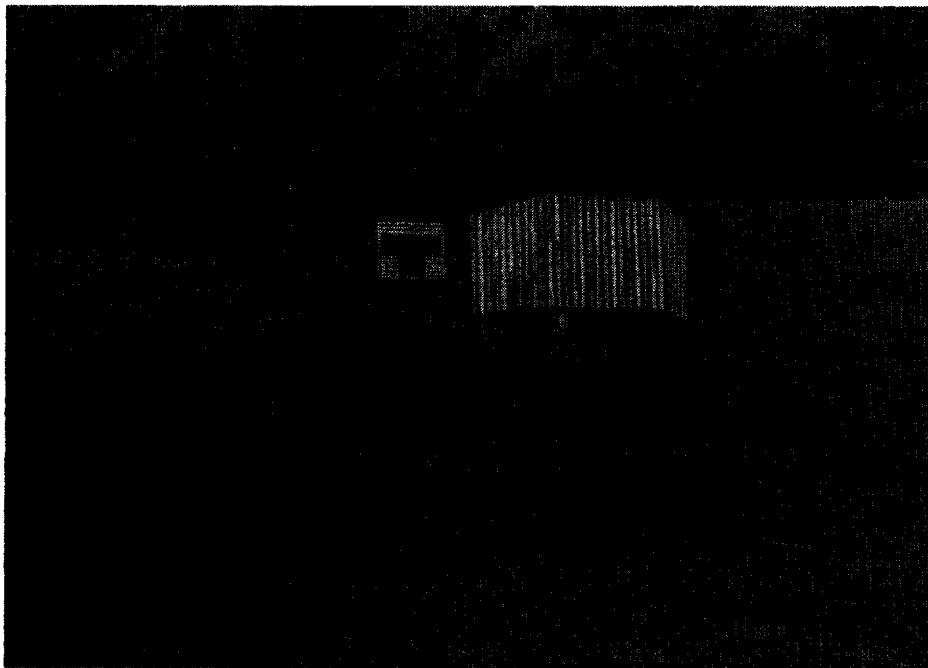
Photograph 8.02

Handicap access fishing pier and weir in  
background at tailwater area



Photograph 8.03

Handicap access fishing pier - State Park



Photograph 8.04

Typical amphitheatre (Burnsville Lake)



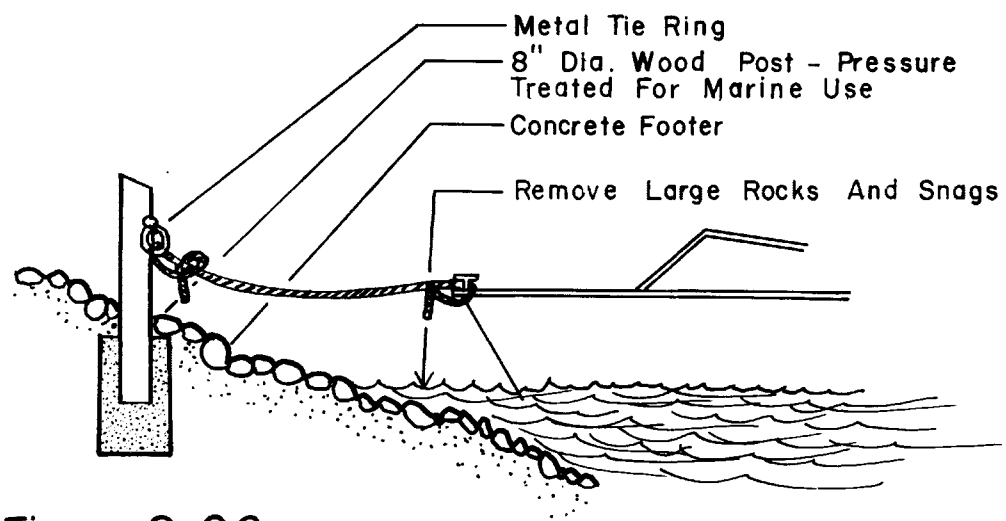


Figure 8-06  
Typical Boat Mooring Post

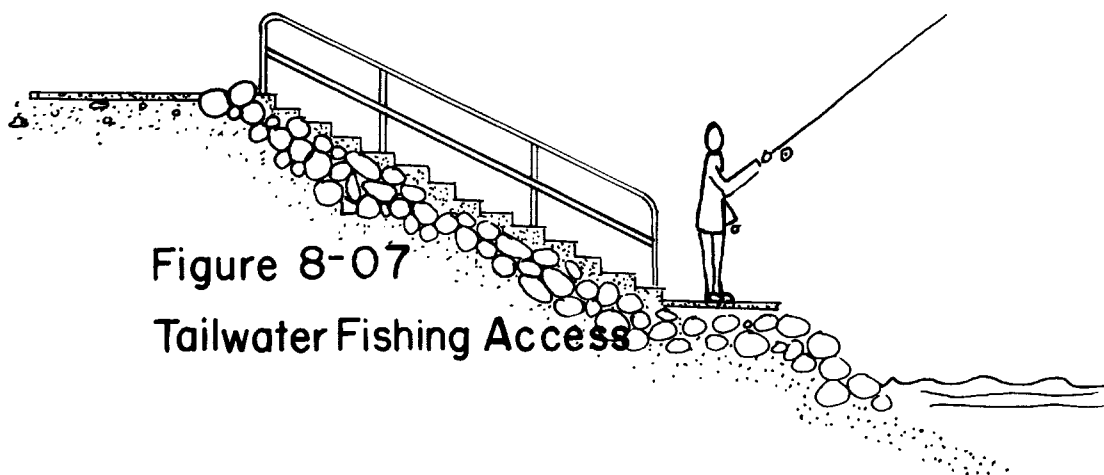
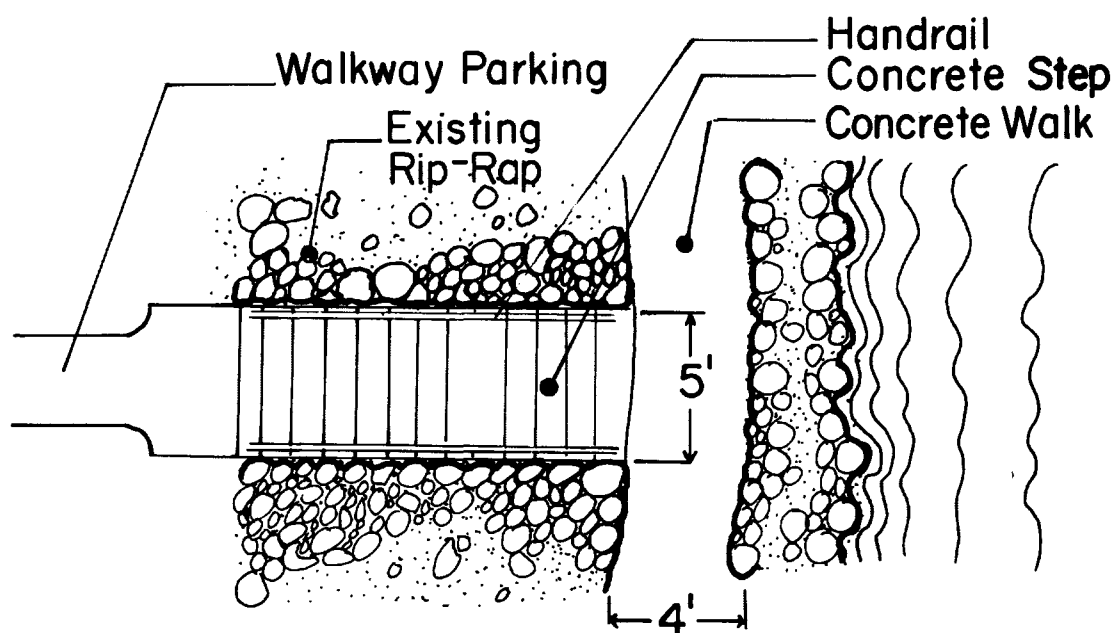


Figure 8-07  
Tailwater Fishing Access

Swimming areas will be outlined with buoys, international orange in color, with cable passing through each buoy. The buoys should be visible to a swimmer at a distance of not less than 100 feet. Additionally, warning buoys to boaters should be provided at 200-foot intervals, or a minimum of two per area. The warning buoys should be parallel to and 300 feet (100 feet minimum) beyond the buoyed safety line defining the swimming area.

Supporting facilities will include a changehouse and comfort station. These structures should be located as high as possible without being inconvenient to the swimmer and should be constructed to withstand flooding.

#### 8.10 CAMPING AREAS.

A. GENERAL. Camping areas should be designed to blend with the natural landscape. Therefore, deep cuts and fills will be avoided; individual sites will be located in the field giving particular emphasis to individual site characteristics such as terrain, vegetation, and views. All campsites should be located as close to the lakeshore as possible, above the five year flood level of 597.6 feet elevation to minimize flood damage to facilities.

B. CAMPGROUND LAYOUT. Circulation roads in campgrounds should be one way when possible to minimize construction costs and traffic conflicts. Spurs should be designed as pull-throughs and back-ins to increase diversity. Tables, grills, and impact areas should be opposite camper trailer doors which are generally located on the right side of the trailer. Pull-through and roadside spurs should only be used on the right side of roadways. Back-in spurs should be angled 30 to 60 degrees. If 90 degree angle spurs are necessitated by terrain, spur entrances should be flared to provide adequate

width. Due to visibility problems with backing a trailer into a spur, 90 degree angle spurs should only be placed on the left side of roads.

C. SPACING AND LANDSCAPING. Sites will be spaced to allow an average of 60 feet between sites and a density of approximately five sites per acre. Dense landscape planting providing both canopy and understory vegetation will be developed and maintained within camping areas whenever possible to provide each camping group with a sense of privacy.

D. TRASH COLLECTION. Centralized trash collection facilities may be provided to minimize operational expenses. A centralized trash collection facility will be located within 60 feet of each camp unit, or trash receptacles may be provided at each site.

E. CAMP UNIT DESIGN. Each camp unit will be provided with a gravel or paved car/trailer parking spur (10 feet by 45 feet) with a maximum slope of two percent on the rear half of the spur. Also to be included are one lantern post, one picnic table, a fire ring or grill, an enclosed gravel impact area (approximately 15 feet by 30 feet), a site identification marker, and electrical hookups. These items and site preparation and grading are included in the cost of each unit. Impact areas and spurs should be integrated where possible so that the site may be used by a tent camper, pop-up camper, van, trailers, or any other type of recreational vehicle. Figure 8.08 illustrates the basic components of a camp unit.

F. PRIMITIVE CAMPSITES. Provide at least 4 camp spaces, fire circle, and 1 trash receptacle for each group of 4 spaces. Provide a vault toilet or porta-john to serve each 8 spaces.

G. SITES FOR THE HANDICAPPED. Approximately four percent of the camp units should be designed for use by the handicapped, preferably the sites nearest the washhouse. Design considerations for these sites include paving impact areas, providing a wide spur for wheelchair movement around the vehicle, providing paved pathways to the site, providing a picnic table which can accommodate wheelchairs, and providing curbs around the area. These sites should be on a level surface.

H. SANITARY FACILITIES AND UTILITIES. All areas will be provided with waterborne sanitary facilities. All camp units will be located within 300 feet of a restroom or washhouse, and not more than 600 feet from a washhouse. Facilities located in these areas will be distributed as described in EM 1110-2-400 with a restroom for each 50 camp units and a washhouse for each 50 to 100 units in addition to the comfort station. One water hydrant/fountain will be provided for each 8 camp units or 1 hand pump for 25 spaces.

I. PLAY AREAS. Two or three acres of relatively open, flat land should be provided as play areas for each 50 space campground. Facilities in these areas can consist of ballfields, tot-lots, horseshoe pits, volleyball courts or other appropriate facilities.

J. AMPHITHEATERS. Can be provided where there is enough demand for use such as in group camps, campgrounds, and large day use areas. An amphitheatre should have sufficient parking space nearby either in a campground or day use area. A typical amphitheater is shown in photograph 8.04.

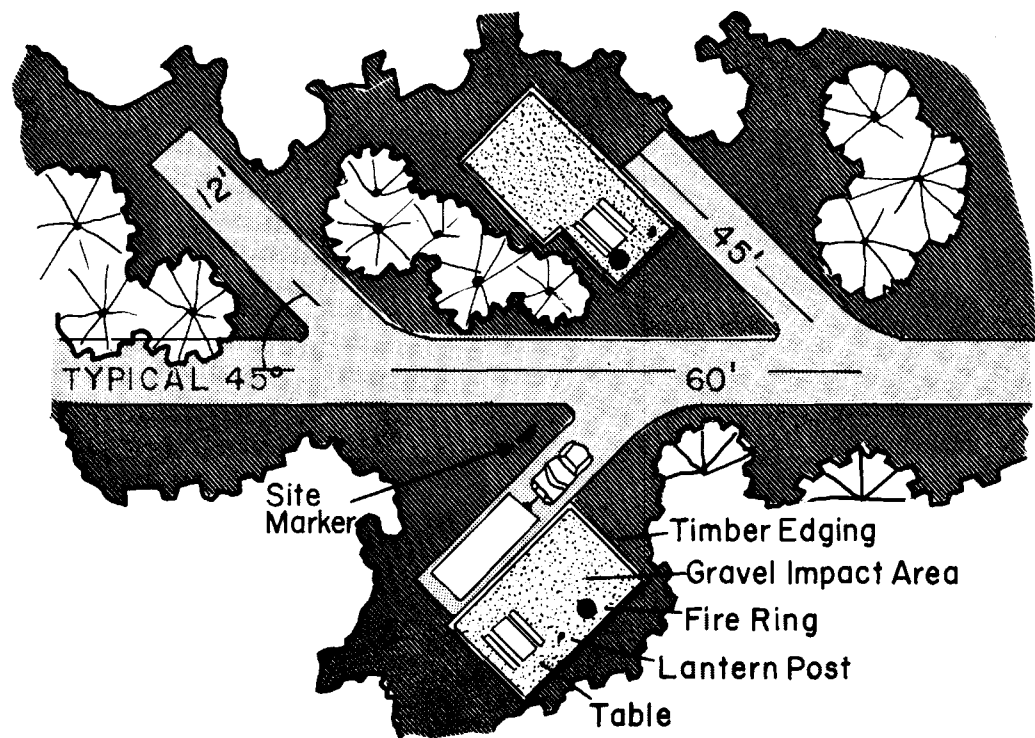


Figure 8-08  
Typical Campsite

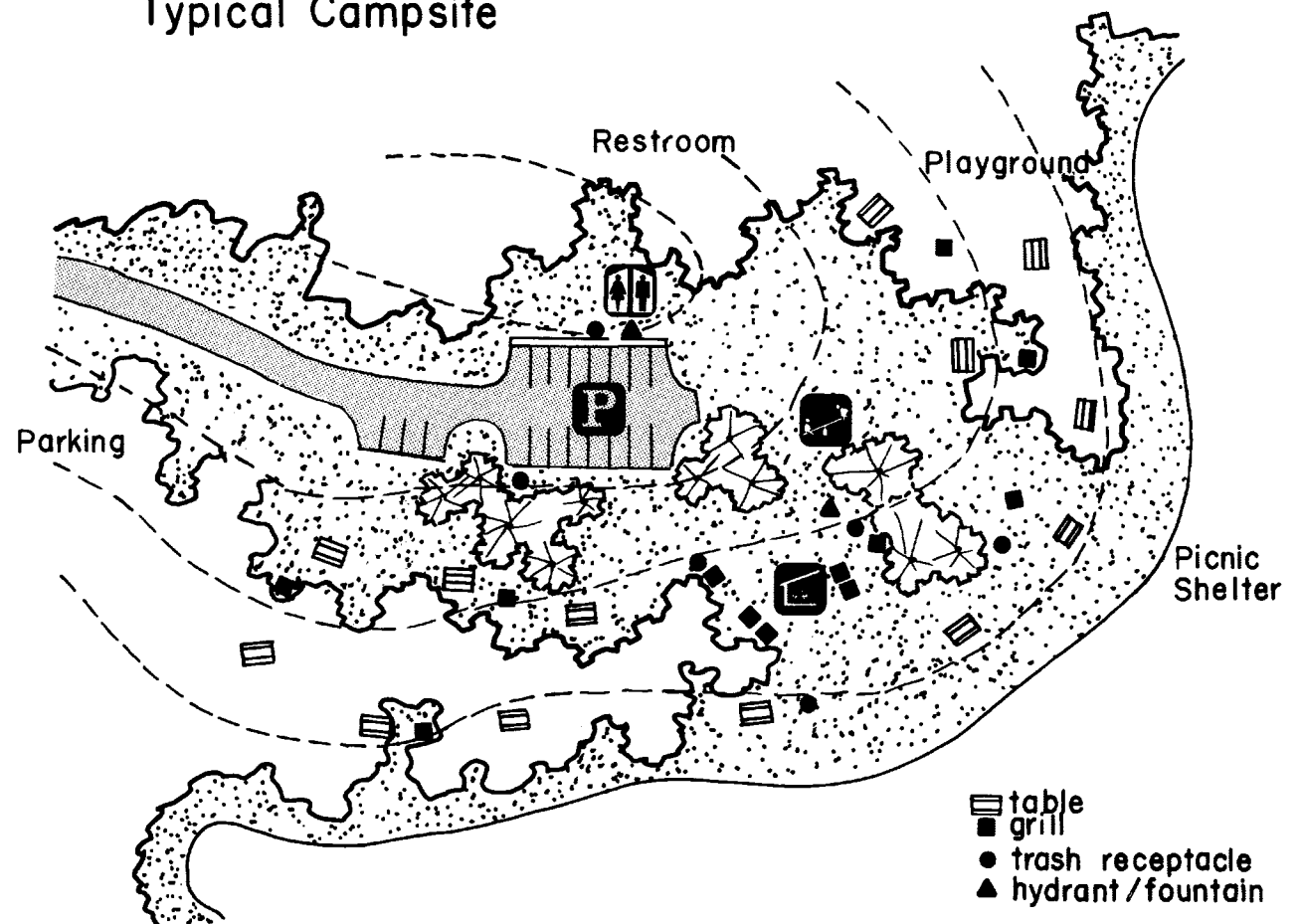


Figure 8-09  
Typical Picnic Area

## 8.11 PICNIC AREAS.

A. AREA DEVELOPMENT. Picnic areas will be water oriented when possible and will consist of picnic units, picnic shelters, playgrounds, water and sanitary facilities, game fields and game courts, circulation roads and parking areas. An example of a typical picnic area is shown in Figure 8.09.

The maximum cross slope in a picnic area will not exceed 15 percent or be less than 2 percent. Each picnic area will include at least 10 units with a maximum density of 12 units per acre. One car parking space will be provided for each picnic table. One grill will be provided for each two tables and conveniently located centralized trash collection facilities will be located in the area. One hydrant/fountain is to be provided for each ten tables. The cost estimate for picnic areas include these items. Picnic tables will be spaced a minimum of 60 feet apart. Table locations should be changed occasionally to minimize wear on the grass surface. Road and parking areas should be designed to limit access of vehicles to paved areas only. Ditching along the side of paved areas, curbs, or cast concrete or wood wheel stops may be used to control impact areas.

B. SANITARY FACILITIES. Restrooms should be located a minimum of 100 feet and a maximum of 600 feet from the picnic tables they serve. In areas that do not have sufficient use to justify waterborne facilities, vault toilets should be used. One restroom or vault toilet with facilities for both men and women, should be constructed for each 25 picnic tables in high use areas.

C. PICNIC SHELTERS. Picnic shelters should be placed where demand warrants their construction and maintenance. The style of picnic shelters should match those already constructed in the area because of their high quality and good appearance. Each shelter will be designed to accommodate at least six tables. Additional support facilities should include three grills, a trash dumpster and potable water. Fees can be charged for group use.

D. PLAYGROUNDS. One playground or tot-lot should be provided at each area with 30 or more picnic tables. Playgrounds are discussed in Section 8.12.

E. OPEN PLAY AREA. Open play areas of approximately one acre in size will be provided at picnic areas with 50 or more tables.

#### 8.12 PLAYGROUNDS.

A. GENERAL. A minimum of one playground should be provided in each recreation area. Natural materials should be utilized and the play area layout should be designed to fit into the natural setting with consideration given to preservation of trees and other vegetation. Equipment which promotes a creative kind of play is recommended; such as wood climbers, playwalls, sculptured earth mounds, swings, sand areas and benches.

Appropriate surface materials include sand, bark chips, turf, and smooth pea gravel. Small play areas with one or two climbing structures should be added to some existing areas where no play structure exist.

B. DESIGN CRITERIA. The following general guidelines apply to all playground development:

1. The location should be near the major use areas within each site in a manner that does not conflict with pedestrian or vehicular traffic patterns.

2. Playgrounds should be landscaped to provide partial shade if the site does not provide it already.

3. Open turf areas should be preserved adjacent to playgrounds whenever possible to provide opportunities for field games and free play activities.

4. One playground will be provided for each camp area or picnic area.

#### 8.13 TRAILS.

A. GENERAL. Trails should be used where they enhance public enjoyment of the environment and utilization of fish and wildlife resources. Important factors to consider when designing a trail include alignment, terrain, topography, vegetation, aesthetic values, points of interest, road crossings or other potential dangers, and final destinations. Zoning of trails for various types of use intended is also necessary. The trail type to be provided at Beech Fork will be hiking. Hiking trails should provide secondary benefits by providing access for hunting, fire control, etc.

B. DESIGN CRITERIA (GENERAL). The following general guidelines are applicable to all trail development.



1. Vegetation or native rock materials should be placed where necessary to prevent erosion.

2. Trails should be routed around large trees where practical to avoid unnecessary tree removal.

3. Trails should be inspected periodically to check trail conditions and markings.

4. Pedestrian trails should be used for travel only, except where access roads will be used by both pedestrians and maintenance vehicles. Trails which are designated for pedestrian use only should be closed off with logs, zig-zag barriers, or stairways to discourage non-pedestrian users.

5. If it is necessary to develop trails utilizing side-hill construction techniques, the cut slopes may be as steep as the soil material will tolerate without serious erosion. Most soils will tolerate a 1/2:1 or 3/4:1 cut slope. Care should be taken to ensure that an angle of repose is used that will maintain a stable condition indefinitely and will permit vegetation to grow.

6. All trail construction should be planned to produce the least disturbance to the natural environment, consistent with the intended use.

7. Trails should provide a variety of experiences, taking advantage of panoramic and focal views, traversing ridges and valleys, open spaces and forested areas, and traveling along water bodies whenever possible.

8. Curbs and/or handrails should be provided where appropriate.

9. Inter-site walkways should be considered to link major recreational facilities.

10. Abrupt changes of direction or grade should be avoided. The linear foot unit cost estimate for each trail type includes the construction of the trail, surface materials, stairs, curbs, handrails, signage, and grading.

C. SIGNAGE. Adequate signage is essential at trail heads, intersections, points of interest, and at locations on the trail where the direction is not readily discernible. Trail signs should include mileages to various points of interest along the way, along with the total trail mileage. Frequent mileage markers along the trail are helpful to the hiker and useful in the operations and maintenance of the area.

D. SURFACING. Surfacing is a costly item in trail construction. Therefore, natural materials will be used wherever feasible. Asphaltic concrete material will only be used on trails for the handicapped, bicycle trails, and on trails with concentrated use. Wood chips, chaff, or other natural surfacing materials will be used for most hiking trails that are not designed for use by the handicapped.

E. TYPICALS. Typical hiking trail and paved walkway sections are shown on Figures 8.11 and 8.12. These typicals show minimum and maximum grades for the trail types, surface materials, trail width and other pertinent information.

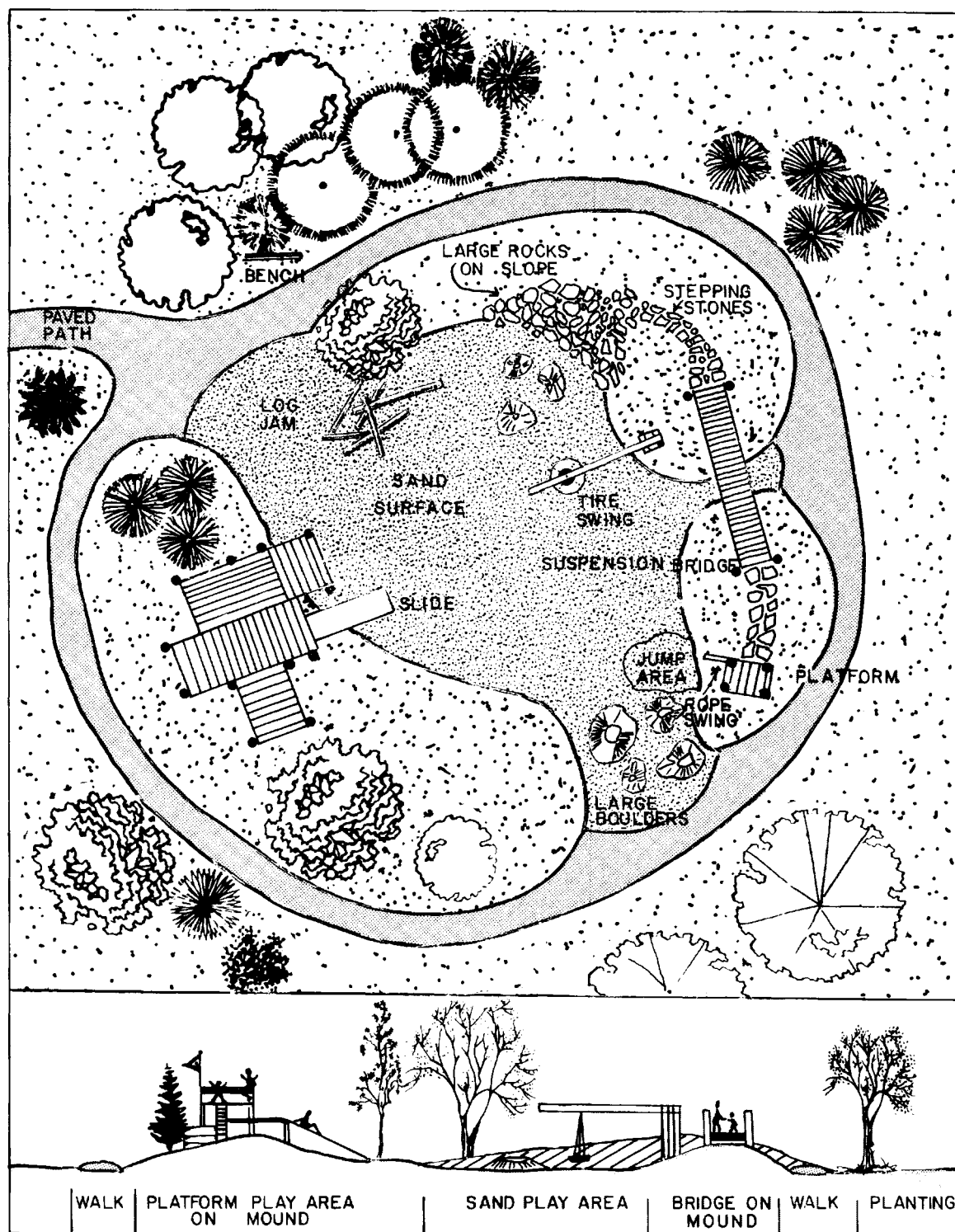


Figure 8-10  
Typical Large Playground

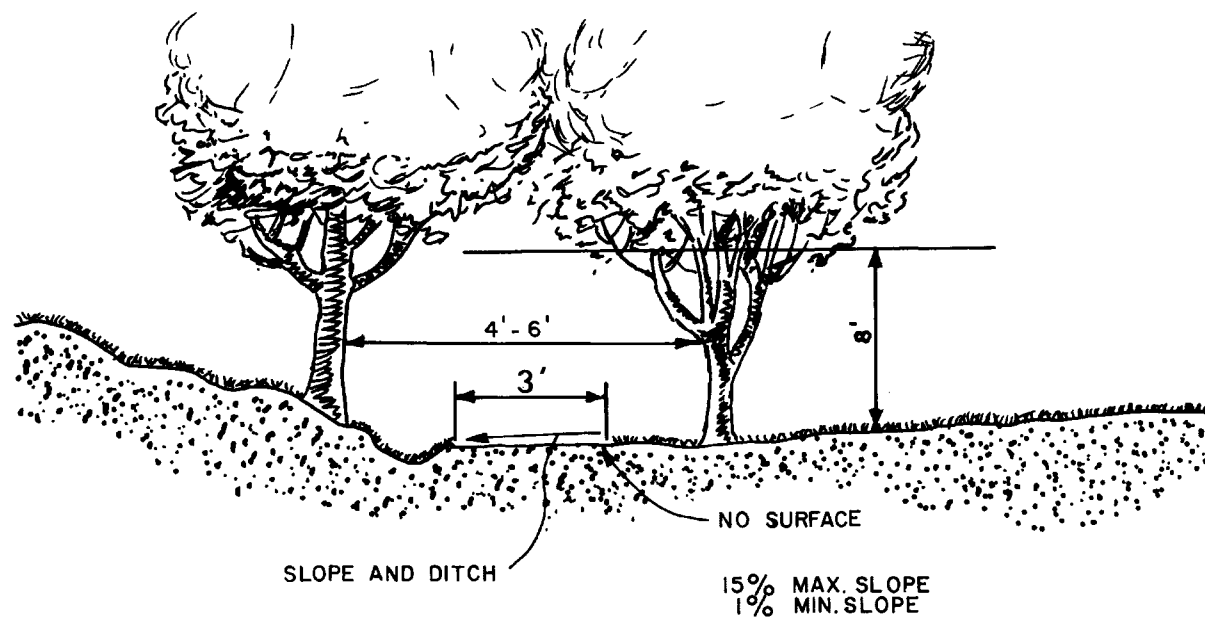


Figure 8-11  
Typical Hiking Trail

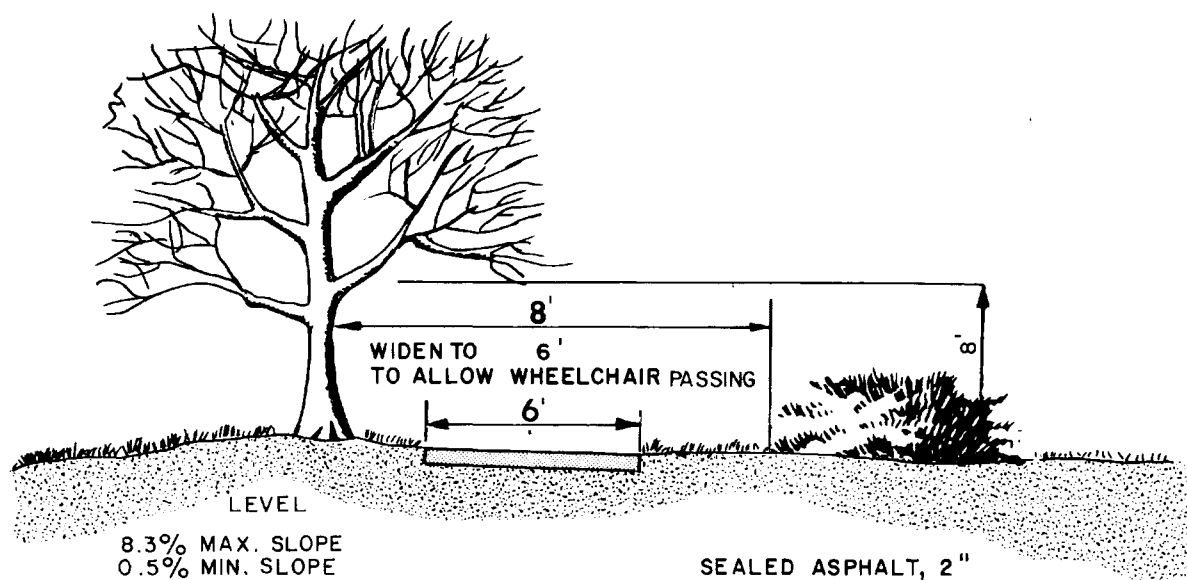


Figure 8-12  
Typical Paved Walkway Trail

F. FOOTBRIDGES. Footbridges should be used to span drainage ways when they are encountered on foot paths. Bridges should be built as shown on Park Practice Program Design, Index B-3139 which is illustrated on Figure 8.13. This design or a similar style should be used because of its strength, rustic appearance, and flexibility of span lengths.

G. OVERLOOKS. At scenic points along the trail where desirable views need to be enhanced, an overlook should be developed. A typical overlook is shown in Figure 8.14.

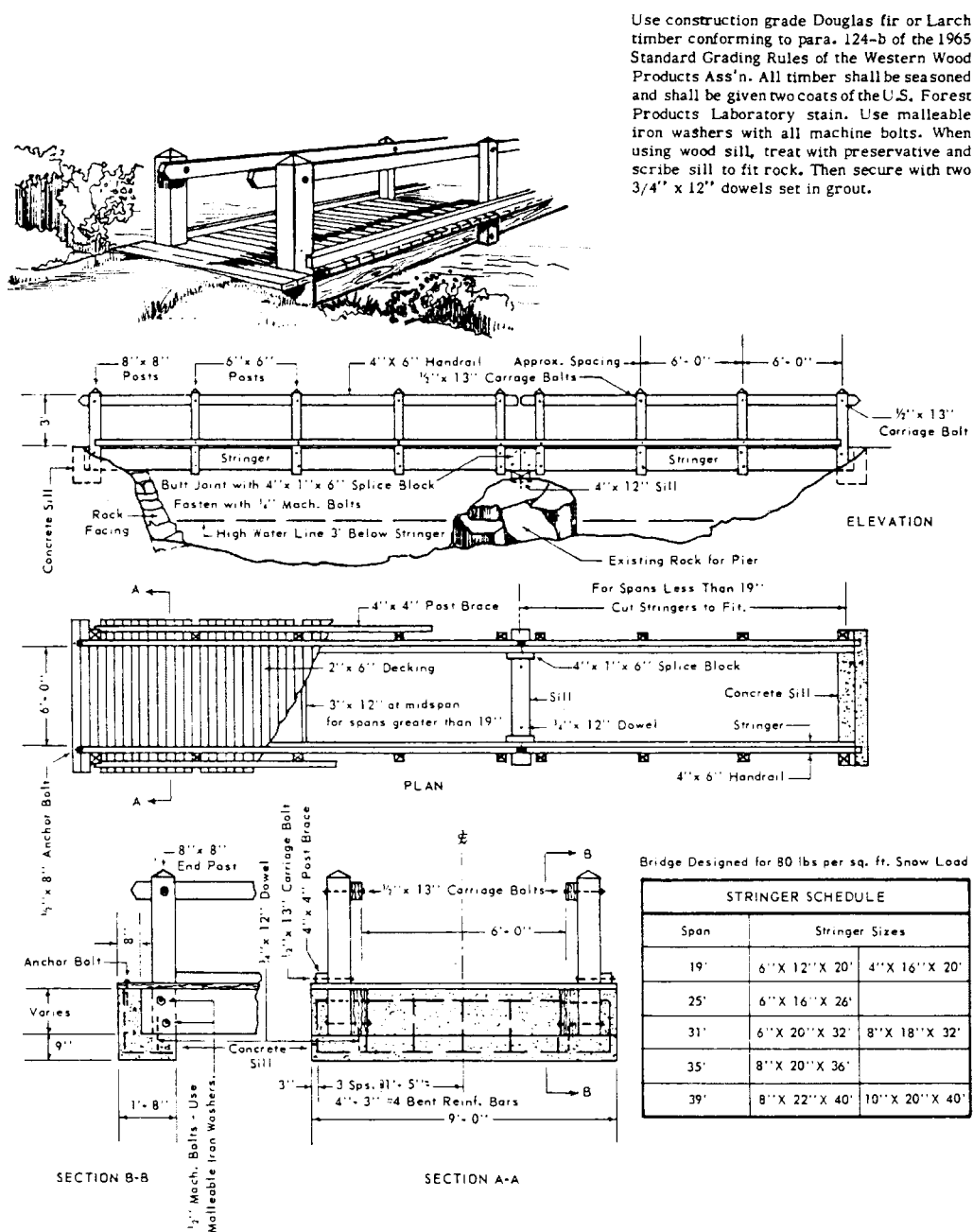
H. SPECIAL CONSIDERATIONS.

1. TRAILS FOR THE HANDICAPPED. Trails to be utilized by the handicapped should conform to established design criteria. The following criteria should be used to provide the handicapped person with maximum mobility with a minimum of assistance and effort.

a. Non-slip bituminous asphalt level surface (avoid high crowns and minimize expansion joints).

b. Paved trails should have a minimum width of 6 feet to allow for passage of wheel chairs.

c. On long grades of three to eight percent, level 6 x 6 foot platforms should be provided no more than 30 feet apart and at all changes in direction. Bench and rest areas may be combined with passing areas and/or platforms.



**Figure 8-13**  
**Typical Footbridge**

United States Department of the Interior, National Park Service			FOOTBRIDGE	
<b>THE PARK PRACTICE PROGRAM</b>			Contributed by	
National Conference on State Parks & National Recreation & Parks Association			FOREST SERVICE	
DATE	June 1972	PLATE	824	L
INDEX	B-3139	CONTROL	F-1290-B	U.S. Dept. of Agriculture

Mounded Planting Area

Wood Benches

Natural Surface

Protective Fence

Rock Cliffs

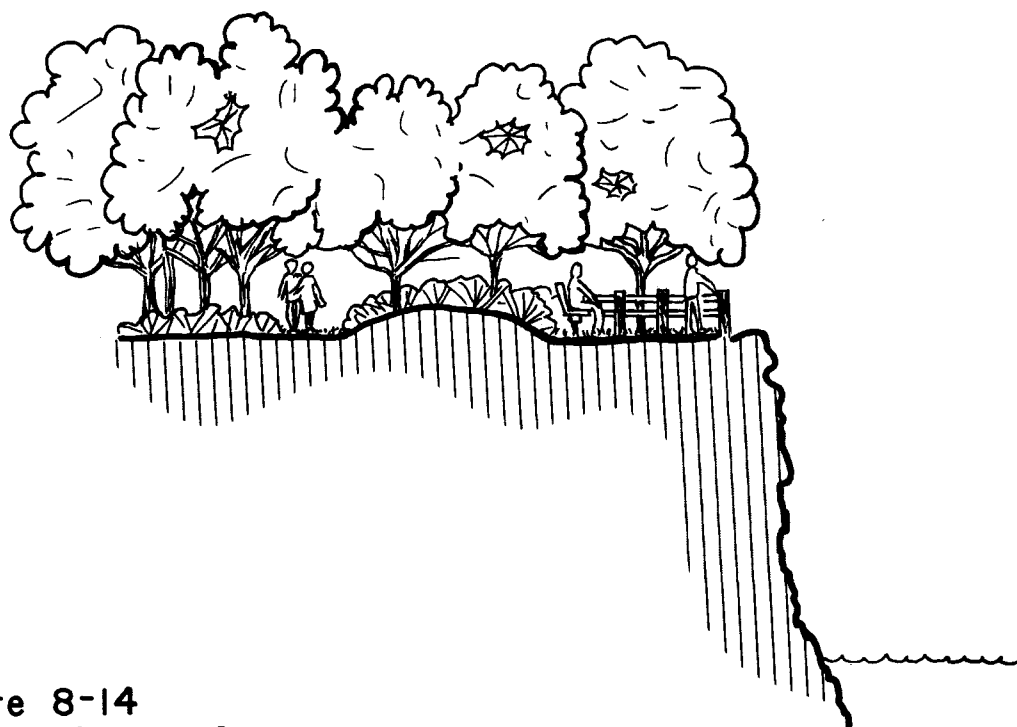
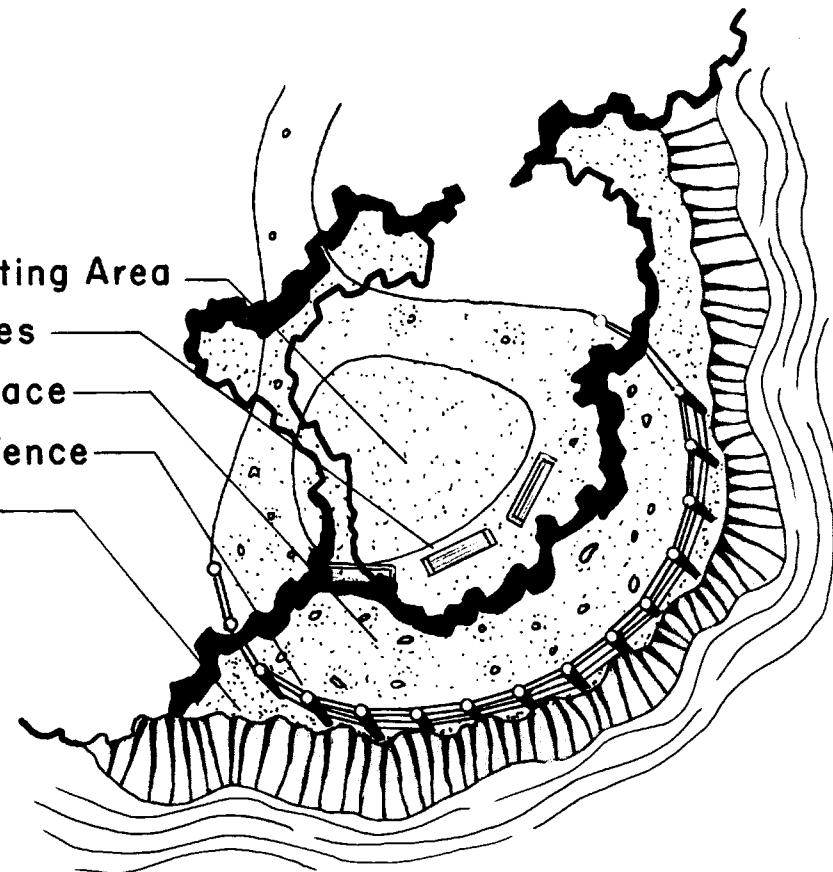


Figure 8-14  
Typical Scenic Overlook

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

e. Hand rails or curbs may be necessary if there is a steep cross slope to the trail.

#### 8.14 SIGNS.

A. POLICY. It is the responsibility of the Corps of Engineers to provide appropriate signs and markers at each project to guide, inform, and protect visitors and employees. The effective use of signs is an integral part of project management. Both Corps policy and individual project requirements must be satisfied.

B. SIGNAGE GUIDELINES. Signs should conform to the sign guidelines contained in the Sign Standards Manual, Chapter 4 of EP 310-1-6, Graphics Standards Manual. All other regulations are superseded by this manual. State of West Virginia managed areas will use signs to conform to State standards, although in new license agreement the Corps sign standards should be made part of license documents. Corps project personnel should work with licensees in implementing the sign program. The following principles will guide the use of signs.

1. SIGN MESSAGE. A sign is designed for the first time viewer. It is important that sign legend be brief, using as few words as possible. All signs, except for directionals, should convey no more than one thought.

2. SIGN PANEL DESIGN. An effectively designed sign integrates a clear, succinct, legend with legible, well spaced typography.



3. TYPOGRAPHY. The Corps sign system uses the Helvetica letter-style for all sign legends. This typeface is both highly legible and readily available.

4. VIEWING DISTANCE. View distance charts are used to specify the size of the legend typography.

5. SIGN COLOR. Viewer response time is a function of target value and legibility. These factors are also dependent on contrast between legend and background color.

6. SIGN PLACEMENT. The following are general guidelines for placing signs.

a. Straight Ahead. Sign placement must be within the approaching drivers immediate cone-of-vision.

b. Perpendicular. The sign face should be perpendicular to the approaching viewer.

c. Right Side. Place signs on the right side of the roadway.

d. Distance Legibility. All signs must be legible at the distance they are to be read.

e. Advance Warning. Signs must be placed well in advance to provide safe distance for reaction.

f. Viewing Angle. Mount signs at eye level.

g. Spacing. Signs must be located with respect to other signs.

h. Site Preparation. Placement must be carefully considered to ensure that the sign fits the location without major regrading. Domestic landscaping will not be used around signs.

i. Field Test. Sign placement should be field tested prior to permanent placement.

7. SIGN MOUNTING. There are two principle methods of mounting signs. These are ground mounting on posts fixed in the ground, and on existing walls.

8. SIGN MATERIALS. Certain materials are specified because of their proven suitability.

9. SIGN MAINTENANCE. The maintenance of signs is an integral part of a comprehensive sign program management. This includes inspection, repairing, replacing, removing, cleaning, and refinishing.

C. TYPES OF COE SIGNS.

1. IDENTIFICATION SIGNS. All U.S. Army Corps of Engineers projects and facilities are identified with a standard identification sign. The graphic format has been standardized for use at all locations. The standard identification sign is intended for use along public access routes and incorporates the COE signature on the sign panel. At a location where under the terms of the lease, a different managing agency has placed their own identification sign, a Corps Participation Credit sign is used. Examples of standard identification signs are shown in Figure 8.15.

a) Standard identification sign with full name of the project.



a)

b) Standard identification sign with the area name as the primary legend and the project identification placed as the secondary legend.



b)

c) Identification sign with area name as primary legend and cooperating sponsor identified in the secondary legend.

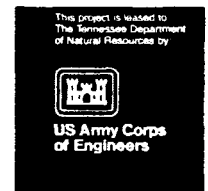


c)

d) Identification sign of operating agency with second sign identifying Corps participation in the project.



d)



e) Secondary identification sign placed within a project or area at the entrance to a specific facility.



e)

Figure 8.15  
Typical Identification Signs  
From Sign Standards Manual

A secondary identification sign is available for use within a Corps project. It is placed along project roadways to identify individual facilities within the project. The Corps Signature is not used on the panel. Once a sign is located within a project boundary, the Mark is no longer appropriate. No District or Division identification will be placed on signs.

2. DIRECTIONAL SIGNS. Well planned and properly designed directional signs are important visitor aids. They lead visitors to a Corps project, direct them to various recreation areas, and then guide them to facilities within each area. Directional signs are highly visible and seen by recreation users and people traveling in the vicinity of Corps projects. A sign should be provided at all intersections where change of direction is necessary. Signs directing potential users to a Corps project may be located several miles from the project. Within a recreation area, symbols can be used for directional signs instead of words.

3. RECREATION AREA SIGNS. These signs represent the majority of the signs which will be used on a Corps lake project. This group of signs has a variety of purposes and applications. They outline fees charged, hours of operation, services available, and procedures to be followed. The legends used on these signs have been carefully developed, reviewed, and approved for nationwide use.

4. RECREATION SYMBOL SIGNS. A group of recreation area symbols has been created as part of the Corps Sign Standards System. Most of the symbols were adapted from the National Park Service (NPS) system and refined for greater legibility and clarity of meaning. A number of new symbols have been added to address specific communication needs.

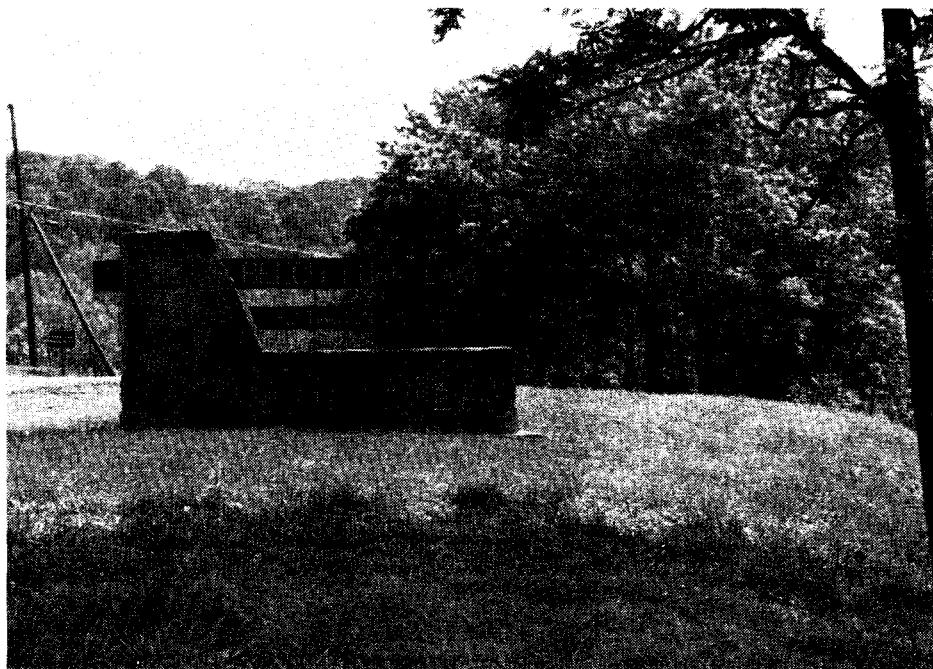
5. TRAFFIC SIGNS. The Manual on Uniform Traffic Control Devices for Streets and Highways has been adopted as the standard for all regulatory and warning signs used on Corps project roadways for vehicular traffic.

6. INDUSTRIAL SAFETY SIGNS. The industrial safety sign system shown in this section has been developed for both public and restricted areas of Corps projects and facilities. The functions of the signs are: to alert or warn people about hazards, to restrict access, and instruct people of safety requirements. Each of the Corps safety signs is designed for a specific intended purpose. There are five basic types of signs in this group: Danger, Caution, Safety, Notice, and Directional Signs. Danger signs are red, Caution are yellow, Safety signs are green, Notice or Control signs are blue. Directional signs are black which point out the way to extinguishing equipment, escapes or exits, and for emergency procedures.

7. REGULATORY SIGNS. The basic regulation that governs all Corps projects is Title 36 (Chapter III, Part 327) of the U.S. Code. A full copy of the code should be placed where it can be easily viewed. All other federal, state, and local laws should be displayed where they are applicable to the project.

8. NAVIGATION SIGNS. These signs provide information and warn of hazards in the water areas of the project. They are intended for boaters primarily.

Typical existing Corps of Engineers signs are shown in Photographs 8.05, 8.09 and 8.10. Current state wildlife and state park signs are shown in Photographs 8.06 to 8.08.



Photograph 8.05

Project entrance sign will be changed by 1995



Photograph 8.06

State Park entrance sign



Photograph 8-07

State Wildlife area sign



Photograph 8.08

Directional sign at State Park



Photograph 8.09

Recreation symbol signs at dam



Photograph 8.10

Sign at trail head, Stowers Branch trail



#### 8.15 NAVIGATION AIDS.

Small boat navigation aids at Beech Fork Lake should include warning, directional, caution, and control buoys which conform to the Uniform State Waterway Marking System and to Coast Guard regulations. Boat launching ramps and marinas should provide adequate lighting to guide evening fishermen and other boaters back to shore. Potential shallows created by drawdowns should be identified as danger areas and buoyed accordingly. Other potential hazard areas should also be identified. The Corps is responsible for providing these navigational aids in the water management areas.

Boating courtesy and safety rules should be posted at all launching ramps and marinas to promote safe and enjoyable boating experiences.

#### 8.16 RECREATION AREA STRUCTURES.

The development of detailed design documents for all of the proposed recreational structures should be based on the following design criteria:

1. All major buildings must present a positive image to the public.
2. The functional areas of the building must be discernible to provide for efficient usage.
3. Facilities should be designed for minimum maintenance and operational expense, and should be as vandal-proof as possible.
4. The design of all structures should reflect the environment which is characteristic of the Beech Fork Lake area. Natural materials that are attractive, visually unobtrusive, and that withstand weather and age should be utilized.

5. Natural lighting and ventilation should be optimized to reduce operational costs and to enhance the personal use of structures.

6. The same architectural style and materials should be used throughout the project to provide continuity.

7. Any structures to be located in probable flood zones should be constructed to withstand the effects of flooding.

Some of the existing structures at Beech Fork Lake are shown in Photographs 7.01, 7.02, 7.18, and 7.23.

#### 8.17 WASTEWATER COLLECTION AND TREATMENT.

The type and extent of the system should be designed after thorough investigation of the specific site and discussion with health officials. Some of the type plants and facilities for disposal of wastes are listed below.

A. CONNECTION TO EXISTING PLANT. Connection with existing treatment plant system or participation with a new treatment plant is a logical choice. Under Section 107 of the Water Resources Development Act of 1974 (PL 93-251; 88 Stat. 12) federal participation with local government entities for sewage treatment installation is permitted.

#### B. TYPES OF SEWAGE TREATMENT SYSTEMS.

##### 1. Central Treatment Plant.

2. Package Units. This type of treatment should be considered for individual facilities.

##### 3. Land Treatment.

4. Stabilization Ponds.
5. Septic Tanks with Tile Fields.
6. Vault and Pit Toilets.
7. Chemical Toilets.
8. Sanitary Waste Stations.

#### 8.18 SOLID WASTE DISPOSAL.

For solid waste disposal, feasible solutions are contracting with off-project sanitary collection, using a land fill on project lands in isolated areas, or incineration. The plan of disposal should be coordinated with local health officials. Dumpsters used on the project should be enclosed by wooden fences.

#### 8.19 ELECTRICAL AND TELEPHONE SERVICE.

These facilities will be located in such a manner as to preserve the landscape and enhance the quality of the environment to the maximum extent. This can be accomplished through the placement of these facilities underground wherever practicable especially with recreation sites. Where public telephones are required, these facilities can be provided within basic structures or especially within park-adapted structures.

#### 8.20 SITE LIGHTING.

Low level night lighting should be provided around camping areas, control stations and sanitary facilities. Security lighting to discourage vandalism and provide lighting for emergency work should be provided at administrative, maintenance, and operational structures. A high intensity light should be

provided at boat launch ramps for night identification and night-time launchings. All lighting and electrical service should be designed in accordance with the criteria and standards contained in Appendix A of EM 1110-2-400.

#### 8.21 WATER SUPPLY SYSTEM.

Potable water facilities should be designed in accordance with EM 1110-2-4201. Wells and storage tanks should be screened from public view.

#### 8.22 FACILITIES FOR THE ELDERLY AND THE HANDICAPPED.

To extend practical, existing and future public use, facilities should incorporate measures to accommodate the elderly and the handicapped. Facilities design will take into account the special needs of the elderly and the handicapped and will be built according to latest standards. Considerations include:

1. Trails and walks designed with appropriate slope, surfacing and related design features to facilitate easy access and use by all visitors.
2. Building entrance ramps with non-slip surfaces for wheelchair access.
3. Water closets for use by the handicapped in each restroom and a minimum of one accessible restroom in each major recreation area.
4. Special parking spaces to accommodate wheelchair unloading and that allow safe and convenient access to related facility areas.
5. Play equipment, picnic tables, drinking fountains, and other site furniture that allow use by the handicapped.

### 8.23 SITE REHABILITATION DESIGN CRITERIA.

A. GENERAL. Since Feature Design Memorandums might not be prepared prior to implementing facility rehabilitation projects, general design criteria have been included herein. Rehabilitation efforts at Beech Fork Lake will be aimed at upgrading existing facilities to the general standards and criteria provided in the earlier portions of this chapter. The authority for the rehabilitation program is provided by the 1979 Command Goals and Objectives of the U.S. Army Corps of Engineers.

B. ROADS. Existing gravel or paved roads that are in poor condition, or that are inadequate for current use levels, should be repaired and surfaced to meet the standards for new roads.

C. PARKING AREAS. Existing parking areas which show signs of excessive wear, and unsurfaced areas which are used for parking, should be upgraded with a paved or gravel surface, depending on the amount of use. Existing parking areas may need to be made more functional and circulation patterns improved by redesign and/or placement of planting islands. Wheel stops should be placed in lots where they are not existing and mounds or vegetation screen should be provided where they are necessary.

D. CAMPING AREAS. The campground is new and generally meets the design standards. Items which need to be studied further in the rehabilitation of camping areas include:

1. Repaving where necessary.
2. Creation of gravel impact areas.

3. Surfacing or paving paths worn by pedestrian traffic to control and direct campers to use these paths and to reduce the amount of site disturbance.

4. Provide additional landscaping to provide a buffer between sites and to increase the aesthetic quality of the area.

5. Provide areas for basketball or volleyball and horseshoes to enhance visitor use of the area.

Figure 8.16 shows the appropriate measures taken to rehabilitate each site. These measures include paving the parking spur if not already done, adding a lantern post to avoid damage to trees, adding a gravel impact area at all sites to avoid site disturbance and provide a place for tents, and replacement of deteriorated wood site number posts with a new one.

E. PLAYGROUNDS. In the design and rehabilitation of playgrounds, one of the most important factors to be considered is the safety of the children who will use the area. Existing play structures which are worn or broken should be replaced with new structures which meet current standards. The surfaces of playgrounds become worn with time and need to be replenished with additional sand, shredded bark, pea gravel or turf, depending on the existing material. Playgrounds which receive more use than originally anticipated should be made larger and provided with additional play structures.

F. TRAILS. Pedestrian trails should be sited to direct the traffic of users and to try to limit the area of site disturbance caused by constant foot traffic over an area. In locations where pedestrian use had compacted the

soil and eliminated ground cover, efforts should be made to aerate and revegetate. Paths and steps will be provided to minimize site disturbance. Trails should be cleared of tree branches and vegetation that represent a potential safety hazard to trail users. Culverts and ditching should be provided where necessary to minimize trail erosion. Steps or ramps should be provided where steeper trail areas are eroding. Steps or switch backs and new trails may be specified for areas where the slopes of existing trails are too steep. Further study for an area may determine areas where existing trails should be made accessible to handicapped persons, in which case the materials and criteria discussed in Section 8.22 will be followed. Trail markers and signs should also be replaced and added as needed.

G. RECREATIONAL AREA STRUCTURES.

1. GENERAL. The criteria in this chapter for new structures has been established to provide for aesthetically pleasing and functional structures throughout the project. These criteria also serve to establish unity between sites through the use of similar architectural types and materials. Consideration will be given (during planned rehabilitation efforts) to make existing structures conform to these standards and add to the unity of the project. Rehabilitation efforts will include, but are not limited to the following:

- o Modifying appropriate sites, buildings, and interiors to be accessible to the handicapped.
- o Providing doors and windows which are resistant to vandalism.

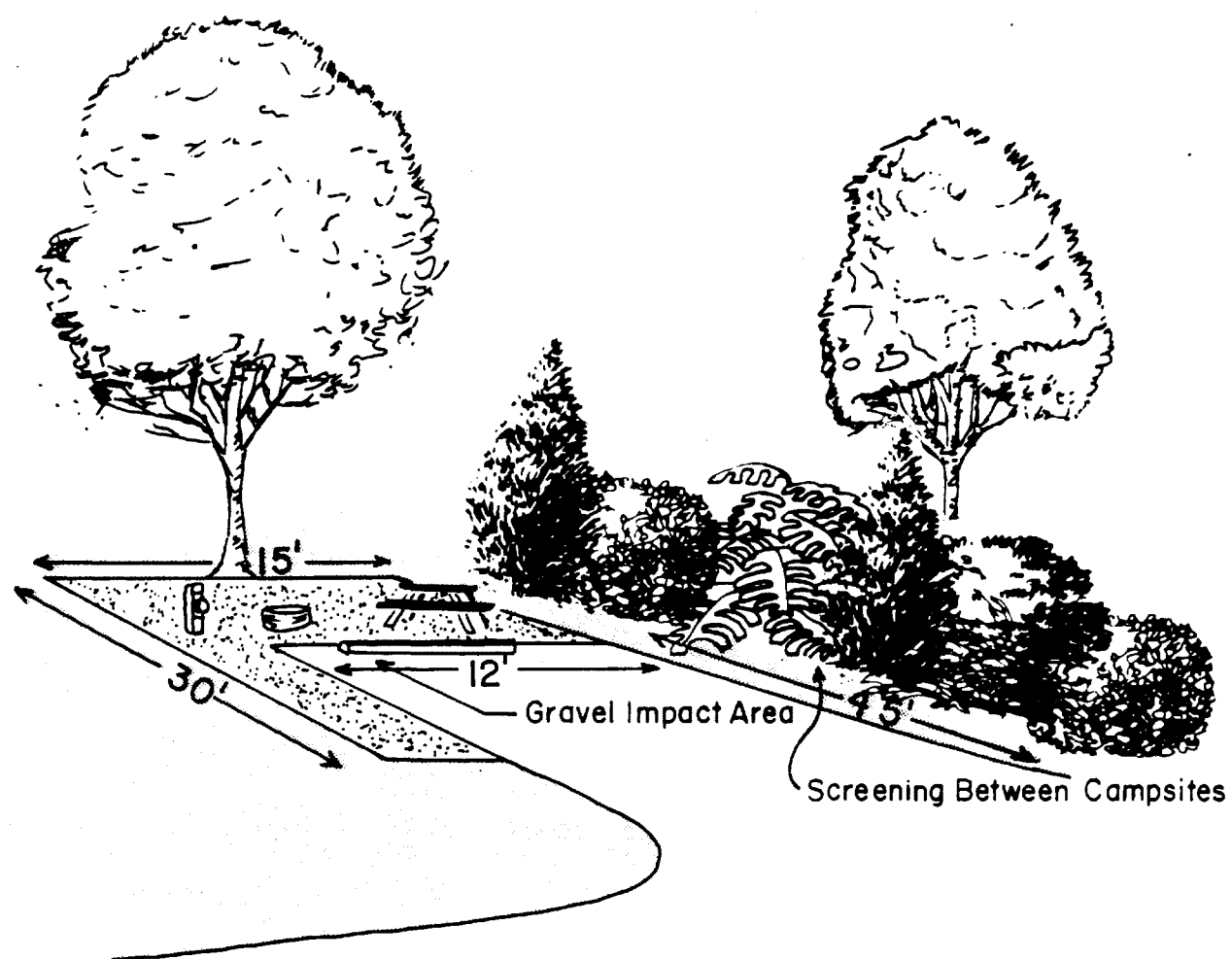


Figure 8.16  
Typical Upgraded Campsite



- o Provide landscaping to add to the visual appeal of the structure.
- o Enlarge structures as determined to be necessary.
- o Repair or replace any plumbing, electrical, interior finishes and fixtures as required.

H. SHORELINE AND DRAINAGEWAY STABILIZATION. Erosion protection is needed in some areas of the shoreline at Beech Fork Lake. Protection is especially needed where the shore is highly visible and/or where the water has already severely eroded the bank. Increasing the grades at the shoreline results in less surface area for erosion to take place and provides a more constant, stable, and attractive bank. Examples of good shoreline stabilization techniques include placing interlocking rip-rap on the bank, placing gabions as a wall to retain soil and resists wave action along the bank, or constructing walls along the shore where wave action takes place. Planting a water tolerant ground cover with extensive root systems to hold the soil in place will successfully prevent erosion in less critical areas. It is recommended that a more comprehensive study of shoreline erosion be done and that a plan for shoreline stabilization be adopted.

chapter 9  
resource management guideline

CHAPTER 9  
RESOURCE MANAGEMENT GUIDELINES

9.01 INTRODUCTION.

In conformance with ER 1130-2-400, the District's Operations and Readiness Division will prepare an Operational Management Plan (OMP) for Beech Fork Lake. This plan combines information formerly contained in the Resource Management, Forest Management, Fire Protection, and Fish and Wildlife Management Plans and Project Safety Plans. The Division's responsibilities will include the coordination of this plan with non-Federal entities actively involved in the operation and maintenance of public access sites associated with the project. The Operational Management Plan will be subject to approval by the Division Engineer and will appear under separate cover.

This section of the Master Plan establishes broad management guidelines and policies which form the basis for preparing a detailed OMP. Therefore, this chapter does not provide specific administrative or operational procedures for Beech Fork Lake. However, recommendations are included to guide the development of effective policy pertaining to the management of project resources. It is particularly important that the Master Plan provides for the early identification of management relationships and responsibilities in order to minimize conflicts, inefficient management activities, or duplicated efforts.

The OMP is divided into two parts: Natural Resources Management and Park Management. Natural Resources Management will replace the former Master Plan Appendices B (Forest/Range Management), C (Fire Control), and D (Fish and

Wildlife Management). This part will be based on a total ecosystem or compartment approach to management of natural resources. Land use and/or water use areas are typically used as compartment areas, especially as they relate to cover type development for species management. Park Management (Part 2) will replace the former Master Plan Appendices A (Project Resource Management Plan) and E (Project Safety Plan). It will be composed of descriptions, objectives and implementation plans for the overall management of the project.

#### 9.02 NATURAL RESOURCES MANAGEMENT.

A. OBJECTIVES. The major objectives of this part of the OMP are:

1. To provide development procedures that are responsive to the characteristics and needs of the Beech Fork Lake project.

2. To increase the value of project lands and waters to support fish, wildlife and forest resources in a manner that is compatible with outdoor recreation; and to promote natural ecological processes by following accepted conservation practices.

3. To protect all lands and waters from damage caused by natural or man induced forces, including fire, insect or disease outbreaks, pollution, encroachment, etc.

B. COMPARTMENT DESCRIPTIONS. Descriptions based on the logical compartmentalization of project lands, typically by land use, will be provided. As a minimum, descriptions are to include the following:

1. Topography (slope, aspect, general soil type, etc.);
2. Aquatic Resources (type, temperature, turbidity, etc.);
3. Vegetation (species, size, density, etc.);
4. Fish and Wildlife (species);
5. Special Considerations or Problems (protected habitat, rare and endangered species, pollution, forest fire control).

C. MANAGEMENT OBJECTIVES. Forest, fish and wildlife management objectives and activities will be addressed in the Annual Management Plans prepared by the West Virginia Department of Natural Resources, and Department of Commerce. The annual management plans establish specific objectives for the integration of fish, wildlife, and forest resource management and conservation.

D. IMPLEMENTATION PLAN. This plan will address the issue of forest management and fish and wildlife management within the framework of the variety of ecosystems present at Beech Fork Lake. Management techniques to meet the objectives of this report are discussed below.

1. FOREST MANAGEMENT.

- a. General. The forest management program at Beech Fork Lake emphasizes protection, management and improvement of the forest resources by conservation of timber, wildlife habitat, watershed capacity and aesthetics. Recreational opportunities also result from proper management of these resources.

b. Forest Management Plan. In accordance with Public Law 86-717, and ER 1130-2-400, the Corps of Engineers completed a draft Forest Management Plan for the Beech Fork Lake project area. This plan was developed in order to initiate a program of forest management for the enhancement of aesthetics, recreation, timber, watershed, and fish and wildlife resources. It included a reconnaissance and description of the area forest resources along with recommendations for forest improvement. The plan included a comprehensive classification of the forest stands that are within project area lands by age, cover type, and slope aspect. It also included a forest cover type map and a cataloging of timber quantity and quality. This analysis of forest conditions was utilized to establish the silviculture activities necessary for achieving desired results.

Future planning efforts will:

- o Improve measures to protect resource from fire, insects, and disease.
- o Identify forested areas that may be suitable for intensive sustained yield forest management as requested by PL 86-717.
- o Identify specific reforestation and landscaping activities that will be undertaken to improve the overall visual character of the project, especially in areas with substantial recreational use opportunities.

- o Identify areas with erosion problems and implement corrective practices; establish guidelines regarding all phases of project management and operations to assure watershed protection.

c. Forest Management of Various Land Use Areas. The development of detailed policies and procedures, and the recommendation of forest management techniques, is beyond the scope of this report. However, general guidelines for the management of the forest in various land allocation categories are suggested as described below:

- o Intensive Recreation Lands - The potential for adverse impacts resulting from public use is relatively high in these areas. Forested areas within intensive recreation lands should be managed to reduce hazards to visitors, to reduce impacts to the forest from those visitors, to provide maximum aesthetic enjoyment, and to provide for utilitarian needs such as screening and shade.

- o Multiple Resource Management Lands - Management of the forest in the multiple resource management area should attempt to create diverse habitats that can support a variety of game and non-game wildlife species. Management practices should include resource protection, stocking and release programs, shrub and tree planting and thinning, and timber harvest, and should be accomplished under the guidance of a professional forester and a wildlife biologist. Species composition, the location and shape of openings, and edge treatment should be designed to create an environment that is beneficial to wildlife and aesthetically pleasing to users.

o Monitoring Program and Plan Review - A forest resource monitoring program should be designed and implemented to record the impact of various land use activities on plant communities. The results of this monitoring program would be helpful in making planning and management decisions in the future and in detecting areas endangered by overutilization.

## 2. FISH AND WILDLIFE MANAGEMENT.

a. General. Beech Fork Lake provides an environment which is capable of sustaining diverse fish and wildlife populations. It is important that these resources be protected and managed so that the public may derive benefits associated with such activities as fishing, hunting, nature study and photography.

The fish and wildlife management program must be coordinated with other management plans including forest management, public use area development and maintenance, and interpretive programs. The program should consider the species being managed, habitat needs, condition of existing habitat, habitat maintenance programs, staff requirements, and planned coordination between the Corps of Engineers and the West Virginia Department of Natural Resources.

Major objectives of the updated management program are:

o To preserve and maintain suitable habitat conditions necessary for optimum fish and wildlife propagation while maintaining an appropriate ecological balance.



- o To provide recreational opportunities through both consumptive and nonconsumptive use of fish and wildlife resources.

- o To protect native fish and wildlife populations from exploitation and environmental degradation.

- o To manage the fish and wildlife resources to obtain maximum benefits commensurate with the lake's other functions of flood protection, water quality control, and recreation.

- o Coordination of the fish and wildlife program with other activities such as forest management, recreation area development, and interpretive programs.

b. Existing Plans. The West Virginia Department of Natural Resources is primarily engaged in management activities for game species under its existing Annual Management Plan. This involves the establishment of wildlife food plots, building public use facilities, planting of trees and shrubs, control of vegetation, fire break maintenance, and building nest structures.

Other habitat techniques are employed such as edge cover protection, vegetation manipulation, and a stocking and release program in remote areas.

The state closely monitors the deer herd populations in the areas and periodically is engaged in a stocking program. Other game species found in the area and receiving management considerations are Wild Turkeys, cottontail rabbit, mourning dove, raccoon, and grouse.

3. FIRE PROTECTION. A fire protection program has been developed by the Corps of Engineers to establish a policy with regard to the control and suppression of fires. This program includes guidelines related to equipment needs, training of personnel, visitor education and awareness, fire response procedures, cooperative agreements with local community fire departments, and procedures for communication with these groups.

West Virginia and the Corps of Engineers cooperate with regard to fire suppression activities. This arrangement was formalized by a Memorandum of Understanding which established procedures and guidelines for fire control on public lands.

The Resource Manager is responsible for initiating action regarding fire protection at Beech Fork Lake. Fire hazard rating information is provided to the Manager by West Virginia Department of Agriculture. West Virginia DNR has primary responsibility for surveillance.

#### 9.03 PARK MANAGEMENT.

A. GENERAL. The Park Management section of the OMP incorporates the former Master Plan Appendices A (Project Resource Management Plan) and E (Project Safety Plan). The following detailed discussion is based on the subject areas presented in ER 1130-2-400, Appendix B and is divided into two general headings--Project Safety and Project Resource Management.

#### B. PROJECT SAFETY.

1. AUTHORITY AND SCOPE. This part of the OMP will be prepared by the Corps of Engineers to insure maximum safety to the public and staff with

regard to maintenance and operation of the dam and all project facilities. The safety plan shall address accident prevention, equipment, facilities, operations procedures, water safety, and health and safety standards.

2. OBJECTIVE. The primary objective of the safety program is to provide a safe environment for project personnel and the visiting public and to prevent damage from accidents or fires. The Resource Manager will fully coordinate the implementation of this plan with all parties having management responsibility at Beech Fork Lake.

3. GENERAL PROGRAM GUIDELINES. The safety program involves training project personnel in first aid, emergency procedures, identification of safety hazards, and the proper handling of equipment, materials, and chemicals. In addition, periodic safety inspections are conducted by the Corps of Engineers and OSHA to ensure compliance with standards of operation. Existing safety measures also include debris and drift removal and the erection of warning signs, barricades and buoys in hazardous areas.

Standards and procedures shall be outlined in the safety plan to provide safe conditions throughout the project area. These include basic controls for the safe movement of pedestrians, vehicles and boats, and an inspection procedure to ensure that safety hazards are identified and/or corrected. Minimum health and safety standards shall be established for restrooms, maintenance areas and all other facilities.

4. STAFF REQUIREMENTS. The Resource Manager should develop plans and programs designed to implement and enforce pertinent provisions of EM 385-1-1, as well as regulations in the 385 series and requirements related

to accident prevention. Basically, such planning will encompass two general areas: (1) contractor and Corps employees; and (2) programs designed to provide a hazard-free environment for the visiting public. The Resource Manager will maintain close liaison with the District Safety Office.

5. IMPLEMENTATION AND PLAN REVISIONS. The plan shall be administered under the direction of the Resource Manager. It is essential that the plan be coordinated between all agencies responsible for project lands. Where there are overlapping safety responsibilities which could be more effectively administered jointly, such provisions should be made. The safety plan should be reviewed periodically to assure that it is current. Exhibits included in the Project Safety Plan should be changed as required.

C. PROJECT RESOURCE MANAGEMENT.

1. INTRODUCTION. Beech Fork Lake is under the joint management of the Huntington District, Corps of Engineers and the West Virginia DNR, and Department of Commerce. The Corps of Engineers is responsible for operation of the project for its primary purposes and for defining administrative policy for management of its land and water resources. The management of land and water areas by West Virginia will continue to be accomplished under a license agreement for recreational purposes and for fish, wildlife, and forest management.

2. GENERAL. Due to the nature of the cooperative arrangement between the Corps of Engineers and the State, both of these agencies will support the primary project purposes of flood control, pollution abatement, recreation, and fish and wildlife conservation.

3. SCOPE. This part of the OMP will include a discussion of the authorized purposes of the project, operational concepts, land acquisition policy, Corps of Engineers staffing, organization, maintenance, management, security, and interpretive programs.

4. COORDINATION MEETINGS. It is recommended that periodic meetings be held at the project for the purpose of discussing common problems and determining which agency is best equipped to handle these problems and also for the purpose of revising the Resource Management Plan. Representatives from the District office, project resource management office and appropriate State representatives in decision-making positions, should attend these meetings. In addition, it may be appropriate to include law enforcement agencies, local groups, and others that have an interest in the project.

5. RESOURCE MANAGEMENT PLAN REVISION. The Resource Management Plan should be reviewed annually for any necessary changes at the time of the annual coordinating meeting. If changes are required, they will be forwarded, as a revision, to the Huntington District office for approval.

6. MANAGEMENT AND OPERATIONAL RESPONSIBILITIES. The Huntington District, Corps of Engineers, will assume primary responsibility for the coordination of planning, management and operations activities. The West Virginia DNR and Department of Commerce will assume a major role in matters regarding natural resource management and public fishing and hunting. In compliance with the license agreement between the state and the Department of the Army, the Corps of Engineers will be responsible for monitoring and approving activities initiated on all federally-owned land.

7. CORPS OF ENGINEERS. The Corps of Engineers, in cooperation with the West Virginia DNR, and Department of Commerce will:

a. Monitor all types of public recreation use and recreation technology being used so as to insure management practices and recreation developments that are consistent with public preferences.

b. Monitor changes in environmental quality (terrestrial and aquatic) that may occur as a result of certain use activities on or near project lands.

c. Keep records on water quality and volume of water discharged from the dam.

d. Establish and maintain seasonal water levels that are most compatible with the project's authorized purposes. The Corps of Engineers will provide the State with a written copy of the water management plan so that they can coordinate their activities with anticipated pool fluctuations.

e. Review and approve all subleases, licenses, concession contracts, management plans, and development plans proposed by the State.

f. Periodically review the need to acquire or lease additional lands, and establish and maintain boundary monuments.

g. Periodically update the Master Plan to reflect current conditions and public needs with the assistance of appropriate cooperating agencies.

h. Monitor and resolve all cases of unauthorized use of project lands and waters including visual and physical encroachments.

i. Encourage local governments to adopt and enforce appropriate regulations to control private development adjacent to the project, thereby avoiding the resultant problems of water pollution, visual pollution, solid waste disposal on public lands, or use of project roads to provide access to private property.

j. Establish a permanent program to identify areas of significant environmental problems or degradation, and remedy these situations through established conservation techniques.

8. STATE OF WEST VIRGINIA. The following management activities will be the responsibility of the State of West Virginia, Departments of Commerce, and Natural Resources.

RECREATION MANAGEMENT.

a. Participate in the coordination and review of the Master Plan for Beech Fork Lake, including recommendations related to recreation area priorities, design criteria, use policies, cost estimates, land and water use allocations, etc.

b. Coordinate with the Corps of Engineers during the detailed planning and construction stages of all cost-shared facilities and improvements.

c. Perform all cleanup activities on areas licensed to the State.

d. Maintain all facilities including buildings, roads, barricades, etc., on State licensed areas.

e. Maintain all traffic control and recreation signs on licensed land.

f. Provide planning and design documents required to develop any 100 percent state-funded facilities beyond the general guidelines provided in the Master Plan and coordinate this planning and development with the Corps of Engineers.

FOREST, FISH AND WILDLIFE MANAGEMENT.

a. Assume general responsibility as defined by the license agreement for management, operation and maintenance of all project lands licensed to the State for forest, fish and wildlife management. The Corps has ultimate responsibility for all land use on the project.

b. Develop specific Fish and Wildlife and Forest Management recommendations as part of the Annual Management Plans to be submitted to the Corps of Engineers.

c. Post boundaries on State licensed land such as "No Hunting Areas," etc.

d. Enforce laws and regulations pertaining to hunting, fishing, boating, and other special regulations and will provide training in boating and hunting safety.



LAW ENFORCEMENT/SECURITY.

a. Maintain law and order through the joint efforts of the Sheriff's Departments of Cabell and Wayne Counties, the State Police, Local State Conservation Officers, and Water Safety Officer.

b. Patrol leased area boundary line for unauthorized use and encroachment.

9. OPERATION AND MAINTENANCE FACILITIES. The Corps of Engineers maintains an office and maintenance building at the dam site. These buildings provide office space for Corps of Engineers personnel, maintenance and storage areas required to maintain the dam and adjacent recreation areas.

10. LAW ENFORCEMENT. A specific law enforcement policy should be developed in conjunction with the project OMP. Definite jurisdiction boundaries should be established and provisions made to handle all situations.

Several law enforcement agencies patrol the project lands and waters. In acquiring lands necessary for the project, the Federal Government did not seek or obtain exclusive jurisdiction on fee-owned lands. Consequently, all state laws continue to apply, and State and local law enforcement agencies continue to have jurisdiction and enforcement responsibilities. The following is a list of concerned agencies and their jurisdiction:

a. Corps of Engineers. Corps of Engineers personnel have the authority to enforce certain Federal regulations (Title 36 CFR Chapter III, Part 327) on project land and water, primarily on federally-managed Project Operations lands. Such enforcement operates under the Federal Court System, consisting essentially of a violation citation program. Public Law 91-611,

River and Harbor and Flood Control Act of 1970, gives citation authority to designated federal personnel for violations of those rules adopted by the Secretary of the Army related to the protection of Corps of Engineers project resources.

b. Law Enforcement Agencies. County Sheriff's Departments and/or local communities have law enforcement powers and responsibility on project lands in their respective jurisdictions. The West Virginia Conservation Officers also assume responsibility for game law enforcement within the project boundaries.

11. FEE SYSTEMS AND COLLECTION.

a. Corps of Engineers. Entrance or admission fees may not be charged by the Corps of Engineers on project lands that are managed by the Corps of Engineers. However, user fees may be collected at Corps of Engineers facility areas that have been designated by the Secretary of the Army in accordance with applicable law. The Corps collects fees for reserving picnic shelters.

b. State of West Virginia. The State DNR does not collect fees for use of the licensed land and water areas. The State Department of Commerce collects fees for use of campsites.

12. UPDATE SCHEDULING. The Resource Manager will prepare an annual work plan to implement the work required to fulfill the Corps of Engineers management procedures described in the OMP. This work plan will include such items as equipment and material needs, manpower requirements, budgetary requirements, schedules for starting and completing each task, and other data

that will be required to implement the plan. All planning will be done within a five-year time frame and the entire OMP is to be updated when considered necessary.

chapter 10  
cost estimates

CHAPTER TEN  
COST ESTIMATES

10.01. SUMMARY OF ESTIMATED COSTS.

The cost estimates were calculated for the proposed recreation facilities at the dam and Stowers Branch and development at Mary Davis Branch. All the proposed facilities at Corps managed areas were assigned a development time frame of 0-3 years or 3-6 years based on the degree of current need. All development costs were estimated based on 1988 price levels.

TABLE 10.01  
SUMMARY OF ESTIMATED COSTS

Area	Cost
Dam and Tailwater	\$ 153,500
Stowers Branch	5,100
Mary Davis Branch	<u>4,533,000</u>
(including access road)	
TOTAL COSTS	\$4,691,600

TABLE 10.02

## DAM AND TAILWATER AREA

Description	Development Period	Unit	Unit Cost	Quantity	Cost
Picnic Shelter	3-6	ea.	21,000	1	21,000
Signage (trails)	3-6	ea.	100	10	1,000
Game Court	3-6	ea.	5,000	1	5,000
Fitness trail	3-6	l.f.	1.00	1,800	18,000
Fitness equip.	3-6	ea.	200	6	1,200
Car Parking (stone)	3-6	space	500	3	5,000
Car Parking (paved)	3-6	space	800	50	40,000
Tot-lots	0-3	ea.	5,000	2	10,000
Access road (stone)	3-6	S.Y.	5.00	222	<u>1,111</u>
SUBTOTAL					\$102,311
Contingency (25%)					<u>25,577</u>
TOTAL FACILITIES					<u>127,888</u>
Eng. and Design (10%)					12,788
Sup. and Admin. (10%)					<u>12,788</u>
TOTAL FACILITY COSTS					\$153,500

TABLE 10.03

## STOWERS BRANCH

Description	Development Period	Unit	Unit Cost	Quantity	Cost
Signage-Trails	0-3	ea.	100	10	\$ 1,000
Car Parking (paved)	3-6	space	800	3	<u>2,400</u>
SUBTOTAL					\$ 3,400
Contingency (25%)					<u>850</u>
TOTAL FACILITIES					4,250
Eng. and Design (10%)					425
Sup. and Admin. (10%)					<u>425</u>
TOTAL FACILITY COSTS					\$ 5,100

TABLE 10.04

MARY DAVIS BRANCH  
LAUNCH AND PICNIC AREA

Description	Quantity	Unit	Unit Cost	Cost
20' wide Asphalt Concrete Road	18800	L.F.	\$ 94.	\$1,767,200
Parking Lot Asphalt Concrete	220	Ea.	800.	176,000
Parking Lot Asphalt Concrete	70	Ea.	800.	56,000
Parking Lot, Asphalt Concrete Car & Trailer	25	Ea.	1,600.	40,000
50' x 30' Asphalt Game Court	2	Ea.	2,100.	4,200
12' Backstop and 3' Fence	640	L.F.	25.	16,000
6' wide Asphalt Sidewalk	2,500	L.F.	5.40	13,500
1 Lane Boat- Launching Ramp with Piers	1	Job	25,000.	25,000
Picnic Units (including 2 tables, 1 cooker, 1 trash receptacle)	50	Ea.	1,300.	65,000
Picnic Shelters (Wood)	2	Ea.	21,000.	42,000
Tot Lot	2	Ea.	40,000.	80,000
Dusk-to-Dawn Lights	8	Ea.	1,500.	12,000
Drinking Fountains with Dry Wells	6	Ea.	4,300.	25,800
Sewage Treatment Plant 5,000 GPD	1	Job	---	50,000

TABLE 10.04 (Cont'd)

Description	Quantity	Unit	Unit Cost	Cost
7' Chain Link Fence	440	L.F.	15.00	6,600
10' wide Aggregate Maintenance Road	1,300	L.F.	10.00	13,000
Small Grinder Lift Station	1	Ea.	---	18,000
Large Grinder Lift Station	1	Ea.	---	23,000
Restroom-Waterborne	1	Ea.	---	80,000
Restroom-Waterborne	1	Ea.	---	80,000
100,000 Gallon Water Storage Tank with Altitude Valve	1	Job	---	116,000
6" Water Line	6,800	L.F.	14.00.	95,200
4' Water Line	2,600	L.F.	10.00	26,000
2" Water Line	1,000	L.F.	8.70	20,880
2" Force Main Sewer Line	2,400	L.F.	8.70	20,880
10" Gravity Line with Manholes	2,100	L.F.	25.00	52,500
Electric--Underground (Secondary) Aerial (Primary)	2,500	L.F.	9.00	22,500
SUBTOTAL				\$2,947,260
Contingency (25%)				<u>736,740</u>
TOTAL FACILITIES				3,684,000
Telephone Relocations				<u>93,000</u>
Total with Relocations				3,777,000
Eng. and Design				378,000
Sup. and Admin.				<u>378,000</u>
TOTAL FACILITY COSTS				\$4,533,000



1 1  
summary of conclusions  
and recommendations

CHAPTER 11  
CONCLUSIONS AND RECOMMENDATIONS

11.01 INTRODUCTION.

Based on the primary goals stated in Chapter 1, the major purposes of the Beech Fork Lake Master Plan are to: (1) provide for the best possible utilization of project resources; (2) prepare plans for a variety of outdoor recreation opportunities and to enhance the wildlife resources; (3) develop concepts and criteria to guide future development in harmony with existing character of the area; (4) assure sustained public utilization of project resources, up to a capacity which is consistent with cultural values and the natural environment; and (5) to provide a inventory of project resources. In order to accomplish these broad goals, a number of secondary objectives, as described in Chapter 1, were undertaken. These tasks guided the data collection, analysis, and synthesis processes utilized throughout the plan and ultimately shaped the physical plan of development.

11.02 CONCLUSIONS.

A major task of the Master Plan was to identify the potential of the project for future outdoor recreation activities. In order to accomplish this task, the recreational needs of the Beech Fork Lake market area were identified and the existing recreation resources were examined to determine their success and potential for satisfying these needs. The study of facility needs indicates that the existing swimming, picnicking, boat launch, fishing, hunting, and sightseeing facilities meet demand while deficiencies exist in parking space, and camp spaces during heavy use periods. There is also a need for new

playgrounds and athletic facilities in the dam area. The 1980-85 Statewide West Virginia Comprehensive Outdoor Recreation Plan (SCORP) also indicated regional demand for additional facilities: including camping, picnicking, swimming, horseback-riding, golf, and boating. The existing and proposed facilities at the project will help satisfy these demands except for horseback trails. Golf facilities are planned as part of the State Park expansion.

Future visitation to the project was estimated on the basis of population projections for the market area and historical visitation. On this basis, Beech Fork Lake can be expected to experience 559,000 visits in the year 1990. By the year 2030, the project can be expected to generate 614,00 visits annually. This indicates there will be a gradual increase in demand and the existing and planned facilities should be periodically evaluated to gradually increase development to meet demand within the resource capability.

In order to properly design and improve recreational development, specific design criteria must be developed and adhered to. Criteria in effect for Corps of Engineer projects and other accepted criteria were incorporated into a single set of criteria that can guide facility design at the project.

#### 11.03 RECOMMENDATIONS.

A. PHYSICAL DEVELOPMENT RECOMMENDATIONS. It is recommended that the recommendations and criteria pertaining to the physical development of the project presented in this plan be accepted and used to guide the present and future development and use of the Beech Fork Lake project.

B. MANAGEMENT RECOMMENDATIONS.

1. It is recommended that the Corps of Engineers and the West Virginia Departments of Natural Resources and Commerce, continue formulation of programs and policies that address the issues and management responsibilities summarized in Chapter 9 of the Master Plan in the formulation of an OMP. This plan will include specific recommendations for Natural Resource Management and Park Management. It will replace the former Master Plan Appendices A (Project Resource Management), B (Forest Management), C (Forest Fire Control), D (Fish and Wildlife Management), and E (Project Safety Plan).

2. It is recommended that all management plans and activities be closely monitored, coordinated between the Corps of Engineers and the State of West Virginia, and periodically reviewed.

appendices

# EXHIBIT I

## LIST OF TREES, FOUND IN BEECH FORK AREA

### Cove and lower ravine slopes

Fagus grandifolia	Beech
Quercus alba	White oak
Quercus rubra	Red oak
Quercus velutina	Black oak
Quercus montana	Chestnut oak
Quercus coccinea	Scarlet oak
Quercus falcata	Spanish oak
Liriodendron tuliperifera	Tulip poplar
Carya sp.	Hickories
Acer sp.	Sugar maple & others
Fraxinus americana	White ash
Aesculus octandra	Sweet buckeye
Cornus florida	Flowering dogwood
Carpinus caroliniana	Ironwood
Oxydendron aboreum	Sourwood
Lindera benzoi	Spicebush

### Ridge top

Quercus alba	White oak
Quercus velutina	Black oak
Quercus coccinea	Scarlet oak
Quercus montana	Chestnut oak
Pinus virginiana	Scrub pine
Liriodendron tuliperifera	Tulip poplar
Fagus grandifolia	Beech
Pobinia pseudo-acacia	Black locust
Juglaus nigra	Black walnut
Praxinus americana	White ash
Morus rubra	Mulberry
Nyssa sylvatica	Sour gum
Acer saccharum	Sugar maple
Diospyros virginiana	Persimmon
Oxydendron arboreum	Sourwood
Cornus florida	Flowering dogwood
Cercis canadensis	Redbud
Sassafras officinale	Sassafras
Rhus radicans	Poison ivy
Lonicera japonica	Japanese honeysuckle
Psedera quinquefolia	Virginia creeper

### Riparian Species

(Beech and steep bank)

Acer negundo	Boxelder
Aesculus sp.	Buckeye
Betula nigra	River birch
Fraxinus pennsylvanica	Green ash

Juglans cinerea  
Juglans nigra  
Lindera benzoin  
Platanus occidentalis  
Prunus serotina  
Salix nigra  
Tilia americana  
Ulmus americana  
Ulmus rubra  
(First terrace)  
Acer negundo  
Acer saccharinum  
Aesculus sp.  
Fraxinus americana  
Prunus serotina  
Ulmus rubra

Forested slopes

(north facing)  
Acer rubrum  
Acer saccharinum  
Carpinus caroliniana  
Carya ovata  
Fagus grandifolia  
Quercus rubra  
Tilia sp.  
(East facing)  
Acer saccharinum  
Acer rubrum  
Carya laciniata  
Carya ovata  
Cercis canadensis  
Cornus sp.  
Fagus grandifolia  
Fraxinus americana  
Prunus sp.  
Pinus echinata  
Quercus alba  
Quercus rubra  
Quercus montana

Butternut  
Walnut  
Spicebush  
Sycamore  
Black cherry  
Black willow  
Basswood  
American elm  
Slippery elm

Boxelder  
Silver maple  
Buckeye  
White ash  
Black cherry  
Slippery elm

Red maple  
Silver maple  
Ironwood  
Shagbark hickory  
Beech  
Red oak  
Basswood

Silver maple  
Red maple  
Shellbark hickory  
Shagbark hickory  
Redbud  
Dogwood  
Beech  
White ash  
Wild plum or cherry  
Shortleaf pine  
White oak  
Red oak  
Chestnut oak

# EXHIBIT II

## FISHES OF BEECH FORK DRAINAGE

<i>Ambloplites rupestris</i>	Rock bass
<i>Lepomis cyanallus</i>	Green sunfish
<i>Lepomis macrochirus</i>	Bluegill
<i>Lepomis megalotis</i>	Lonegear sunfish
<i>Micropterus dolmieu</i>	Smallmouth bass
<i>Micropterus punctulatus</i>	Spotted bass
<i>Micropterus salmoides</i>	Largemouth bass
<i>Pomoxis annularis</i>	White crappie
<i>Esox americanus vermiculatus</i>	Grass pickerel
<i>Esox americanus</i>	Redfin pickerel
<i>Labidesthes sicculus</i>	Brook silversides
<i>Dorsoma cepedianum</i>	Gizzard shad
<i>Campostoma anomalum</i>	Stoneroller
<i>Ericymba buccata</i>	Silverjaw minnow
<i>Notropis atherinoides</i>	Emerald shiner
<i>Notropis cornutus</i>	Common shiner
<i>Notropis rubellus</i>	Rosyface shiner
<i>Notropis stramineus</i>	Sand shiner
<i>Notropis umbratilis</i>	Redfin shiner
<i>Notropis spilopterus</i>	Spotfin shiner
<i>Pimephales Notatus</i>	Bluntnose minnow
<i>Rhinichtys atratulus</i>	Blacknose dace
<i>Semotilus atromaculatus</i>	Creek chub
<i>Hybopsis micropogon</i>	River chub
<i>Hybopsis amblops</i>	Bigeye chub
<i>Etheostoma blennioides</i>	Greenside darter
<i>Etheostoma caeruleum</i>	Rainbow darter
<i>Etheostoma flabellare</i>	Fantail darter
<i>Etheostoma nigrum</i>	Johnny darter
<i>Etheostoma zonale</i>	Banded darter
<i>Percina caprodes</i>	Logperch
<i>Percina maculata</i>	Blackside darter
<i>Percina sciera</i>	Dusky darter
<i>Percopsis omiscomaycus</i>	Troutperch
<i>Lampetra aepytera</i>	Least brook lamprey
<i>Catostomidae commersoni</i>	White sucker
<i>Hypentelium migricans</i>	Northern hog sucker
<i>Minytrema melanops</i>	Spotted sucker
<i>Moxostoma anisurum</i>	Silver redhouse
<i>Moxostoma erthrurum</i>	Golden redhorse
<i>Ictalurus natalis</i>	Yellow bullhead
<i>Ictalurus melas</i>	Black bullhead
<i>Noturus miurus</i>	Brindled madtom



# EXHIBIT III

## MAMMALS OF BEECH FORK AREA

### MARSUPIALS

1. *Didelphis virginiana*

Opposum

### MOLES

2. *Parascalops breweri*
3. *Scalopus aquaticus*

Hairytail mole  
Eastern mole

### SHREWS

4. *Cryptotis parva*
5. *Blarina brevicauda*

Least shrew  
Shorttail shrew

### BATS

6. *Myotis lucifugus*
7. *Pipistrellus subflavus*
8. *Lasiurus borealis*
9. *Eptesicus fuscus*

Little brown myotis  
Eastern pipistrel  
Red bat  
Big brown bat

### CARNIVORES

10. *Procyon lotor*
11. *Mustela frenata*
12. *Mustela vison*
13. *Spilogale putorius*
14. *Mephitis mephitis*
15. *Urocyon cinereoargenteus*
16. *Vulpes fulva*

Raccoon  
Longtail weasel  
Mink  
Spotted skunk  
Striped skunk  
Gray fox  
Red fox

### RODENTS

17. *Marmota monax*
18. *Tamias striatus*
19. *Sciurus carolinensis*
20. *Sciurus niger*
21. *Glaucomys volans*
22. *Reithrodontomys humulis*
23. *Peromyscus leucopus*
24. *Neotoma floridana*
25. *Synaptomys cooperi*
26. *Microtus pennsylvanicus*
27. *Ondatra zibethica*
28. *Rattus norvegicus*
29. *Mus musculus*
30. *Napaeozapus insignis*
31. *Castor canadensis*

Woodchuck  
Eastern chipmunk  
Eastern gray squirrel  
Fox squirrel  
Southern flying squirrel  
Eastern harvest mouse  
White-footed mouse  
Eastern woodrat  
Southern bog lemming  
Meadow vole  
Muskrat  
Norway rat  
House mouse  
Woodland jumping mouse  
Beaver

### RABBITS

32. *Sylvilagus floridanus*

Eastern cottontail

### HOOVED MAMMALS

33. *Odocoileus virginianus*

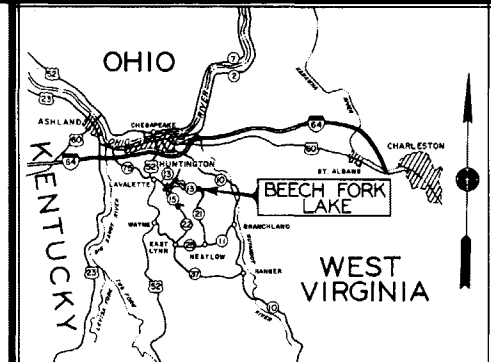
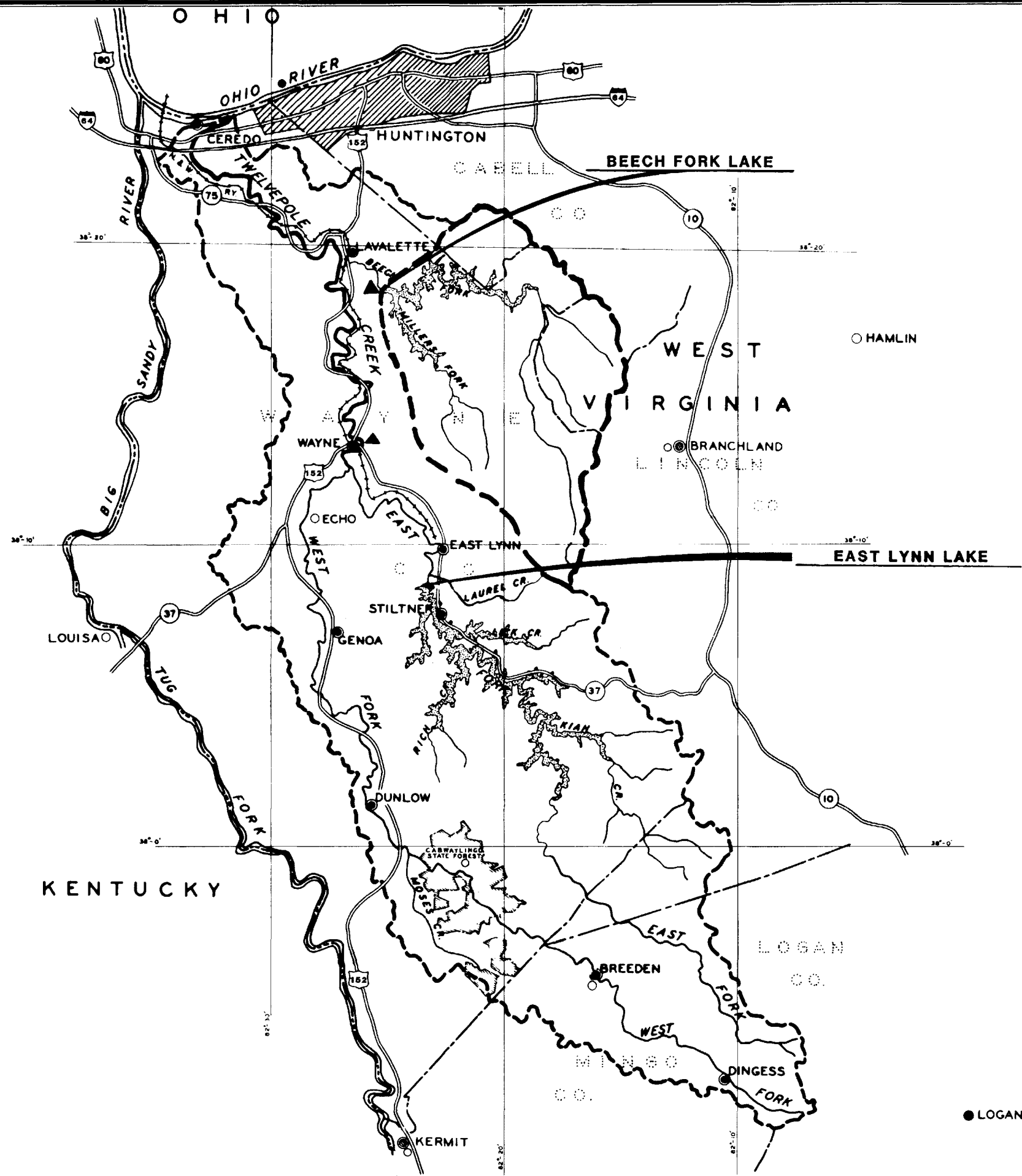
Whitetail deer

EXHIBIT IV

BIRD LIST FOR  
BEECH FORK AREA

Green Heron  
Wood Duck  
Turkey Vulture  
Cooper's Hawk  
Red-tailed Hawk  
Broad-winged Hawk  
Sparrow Hawk  
Ruffed Grouse  
Bobwhite  
Mourning Dove  
Yellow-billed Cuckoo  
Black-billed Cuckoo  
Barred Owl  
Whip-poor-will  
Chimney Swift  
Ruby-throated Hummingbird  
Belted Kingfisher  
Yellow-shafted Flicker  
Pileated Woodpecker  
Red-bellied Woodpecker  
Hairy Woodpecker  
Downy Woodpecker  
Eastern Kingbird  
Great Crested Flycatcher  
Eastern Kingbird  
Great Crested Flycatcher  
Eastern Phoebe  
Acadian Flycatcher  
E. Wood Pewee  
Barn Swallow  
Purple Martin  
Blue Jay  
Common Crow  
Carolina Chickadee  
Tufted Titmouse  
White-breasted Nuthatch  
Carolina Wren  
Mockingbird  
Catbird  
Brown Thrasher  
Robin  
Wood Thrush  
Eastern Bluebird  
Blue-gray Gnatcatcher  
Starling  
White-eyed Vireo  
Yellow-throated Vireo  
Red-eyed Vireo  
Warbling Vireo

Black-and-white Warbler  
Worm-eating Warbler  
Golden-winged Warbler  
Blue-winged Warbler  
Parula Warbler  
Yellow Warbler  
Cerulean Warbler  
Yellow-throated Warbler  
Pine Warbler  
Prairie Warbler  
Ovenbird  
Louisiana Waterthrush  
Kentucky Warbler  
Yellowthroat  
Yellow-breasted Chat  
Hooded Warbler  
American Redstart  
House Sparrow  
Eastern Meadowlark  
Red-winged Blackbird  
Orchard Oriole  
Baltimore Oriole  
Common Grackle  
Brown-headed Cowbird  
Scarlet Tanager  
Summer Tanager  
Cardinal  
Indigo Bunting  
American Goldfinch  
Rufous-winged Towhee  
Chipping Sparrow  
Field Sparrow  
Song Sparrow



VICINITY MAP  
SCALE IN MILES

# twelvepole creek drainage basin

## LEGEND

- drainage area boundary
- county boundary
- state boundary
- interstate highway
- u.s. highway
- state highway
- railroad
- recording rain gage
- non-recording rain gage
- recording stream gage
- towns or communities



twelvepole creek basin  
west virginia  
beech fork lake  
master plan update  
u. s. army engineer district  
huntington  
corps of engineers

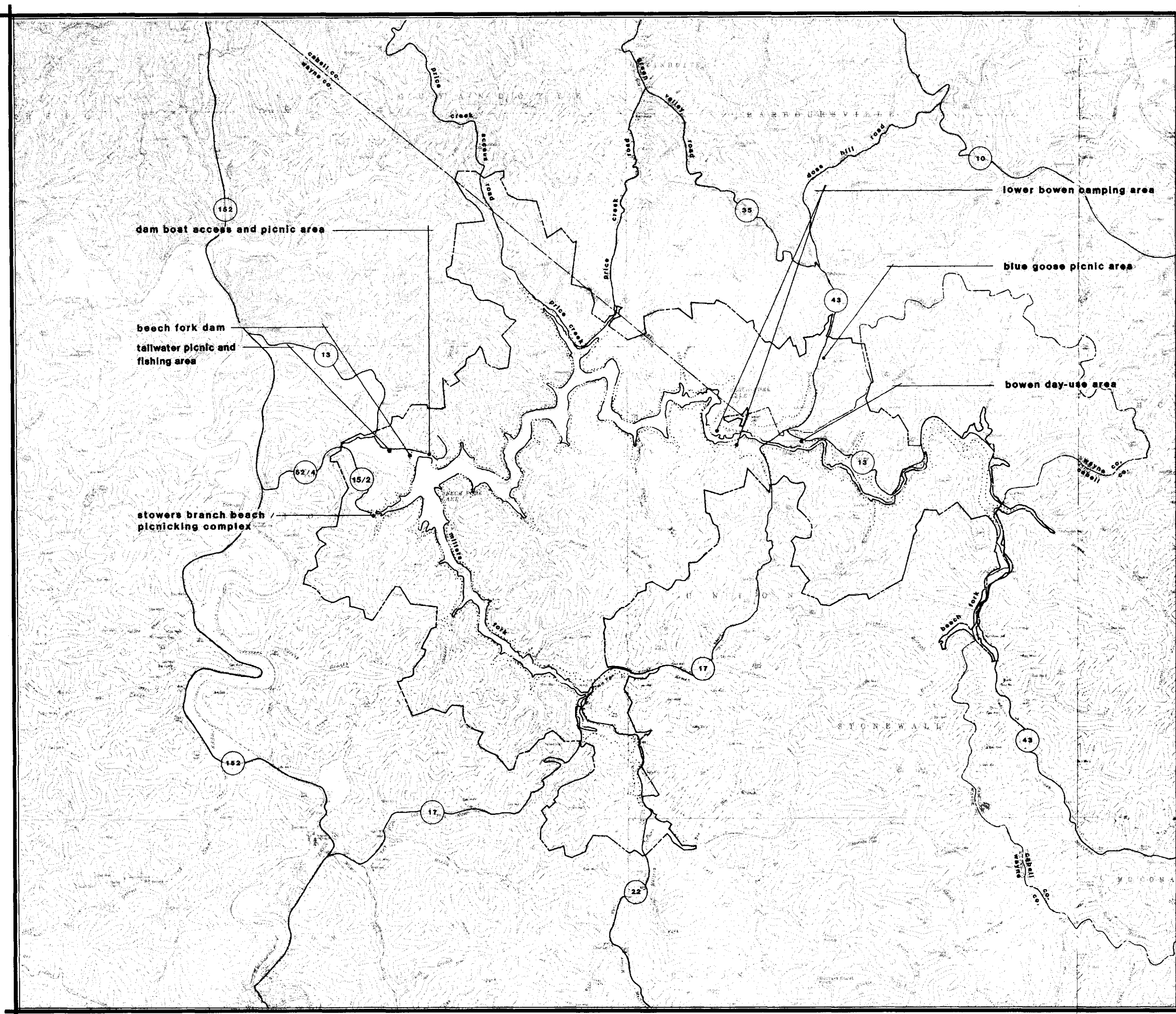
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Associates  
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exhibit 4

# project area topography

## LEGEND

- project boundary
- 583.5 minimum conservation pool (not shown)
- 592.0 seasonal pool
- 614.5 maximum flood control area



twelvepole creek basin  
west virginia

**beech fork lake**  
**master plan update**

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huntington  
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exhibit 5

# recreation facility distribution map

- LEGEND**
- project boundary
  - 583.5 minimum conservation pool (not shown)
  - 592.0 seasonal pool
  - 614.5 maximum flood control area

- hunting area
- camping area
- marina
- launching ramp
- swimming/beach
- handicapped/fishing pier
- hiking trail
- fitness trail
- bicycle trail
- playground
- picnic area
- picnic shelter
- restrooms/showers
- trailer sanitary station
- information/visitor center
- park headquarters

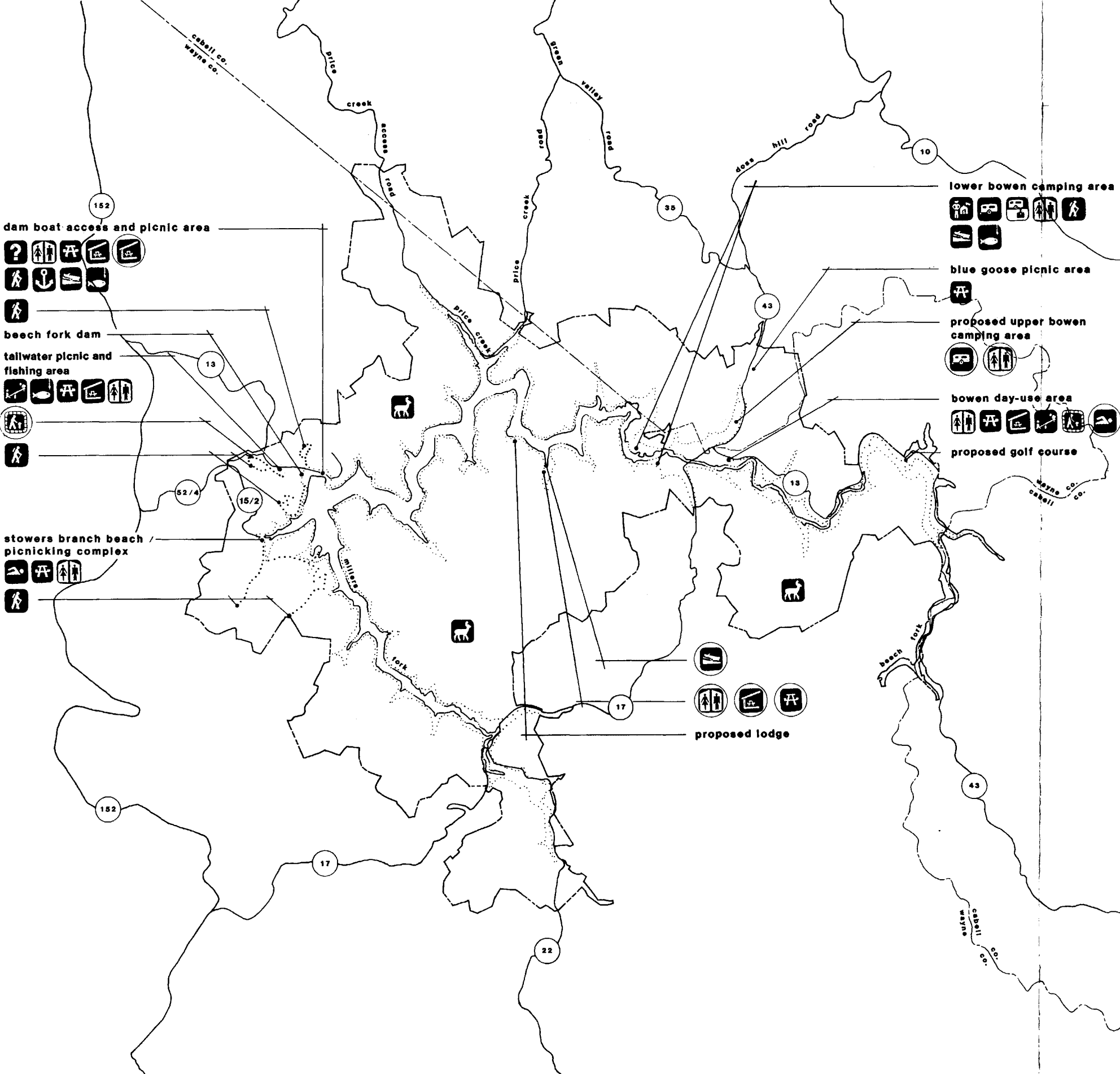
proposed recreation site



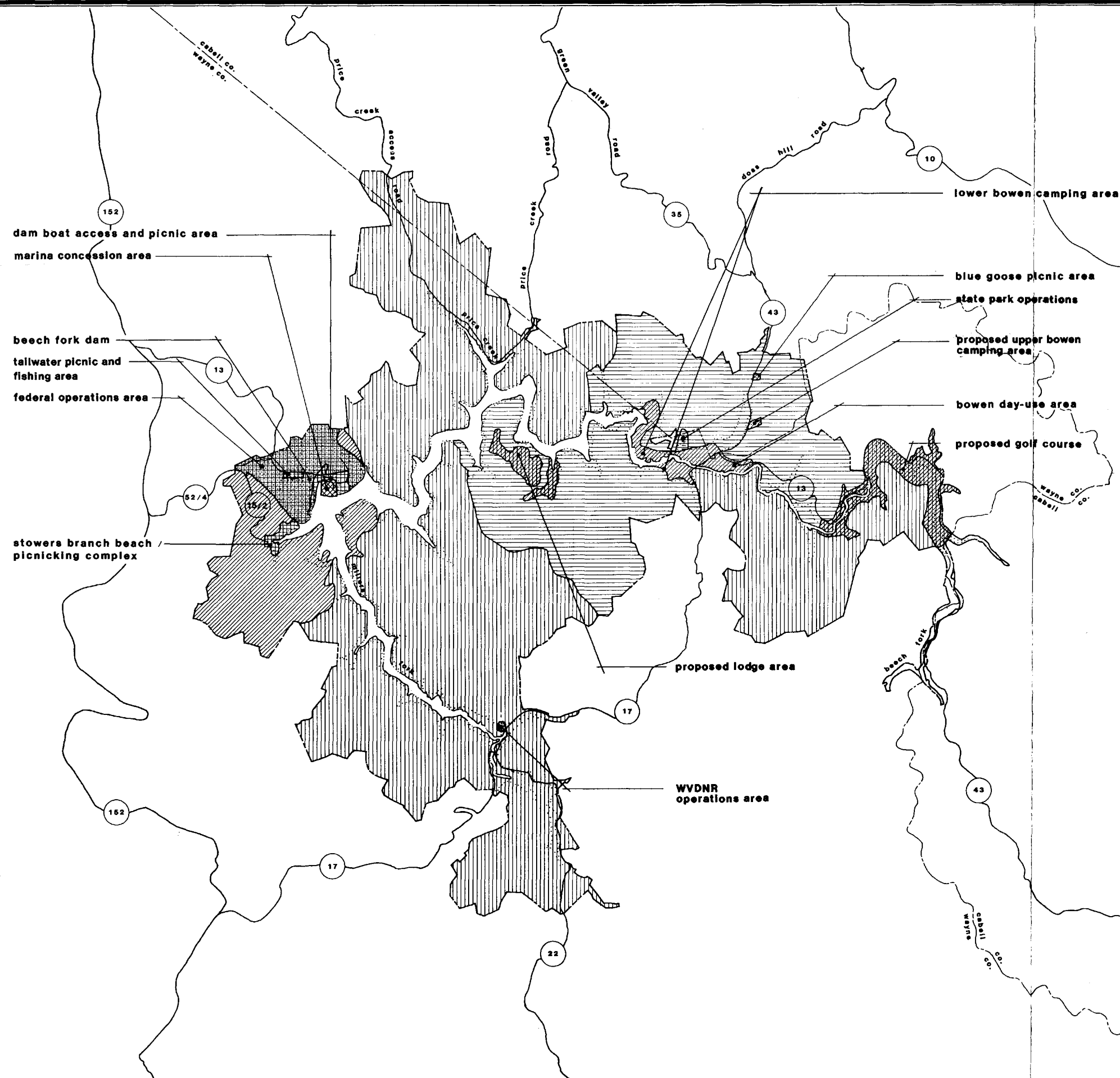
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beech fork lake  
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exhibit 6



# land use plan



## LEGEND

- project boundary
- 583.5 minimum conservation pool (not shown)
- 592.0 seasonal pool
- 614.5 maximum flood control area

### FEDERALLY OWNED AND MANAGED LAND

	acres
operations	309
intensive recreation	42
low density recreation	861
subtotal	1212

### FEDERAL LAND LICENSED TO THE STATE (dept. of comm.)

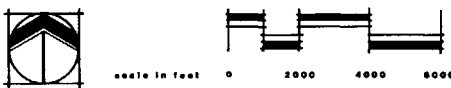
state park operation	10
intensive recreation (state park)	158
low density recreation	2976
subtotal	3144

### FEDERAL LAND LICENSED TO THE STATE (WVDNR)

operations area	3
seasonal pool area	716
multiple resource management	7528
subtotal	8247

### FEDERAL LAND LEASED TO THE PRIVATE SECTOR

marina concession	5
total federal land	12608
corps easement	147



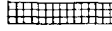
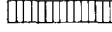

twelvepole creek basin  
west virginia  
**beech fork lake**  
**master plan update**  
u. s. army engineer district  
huntington  
corps of engineers

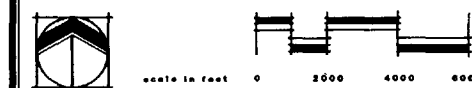
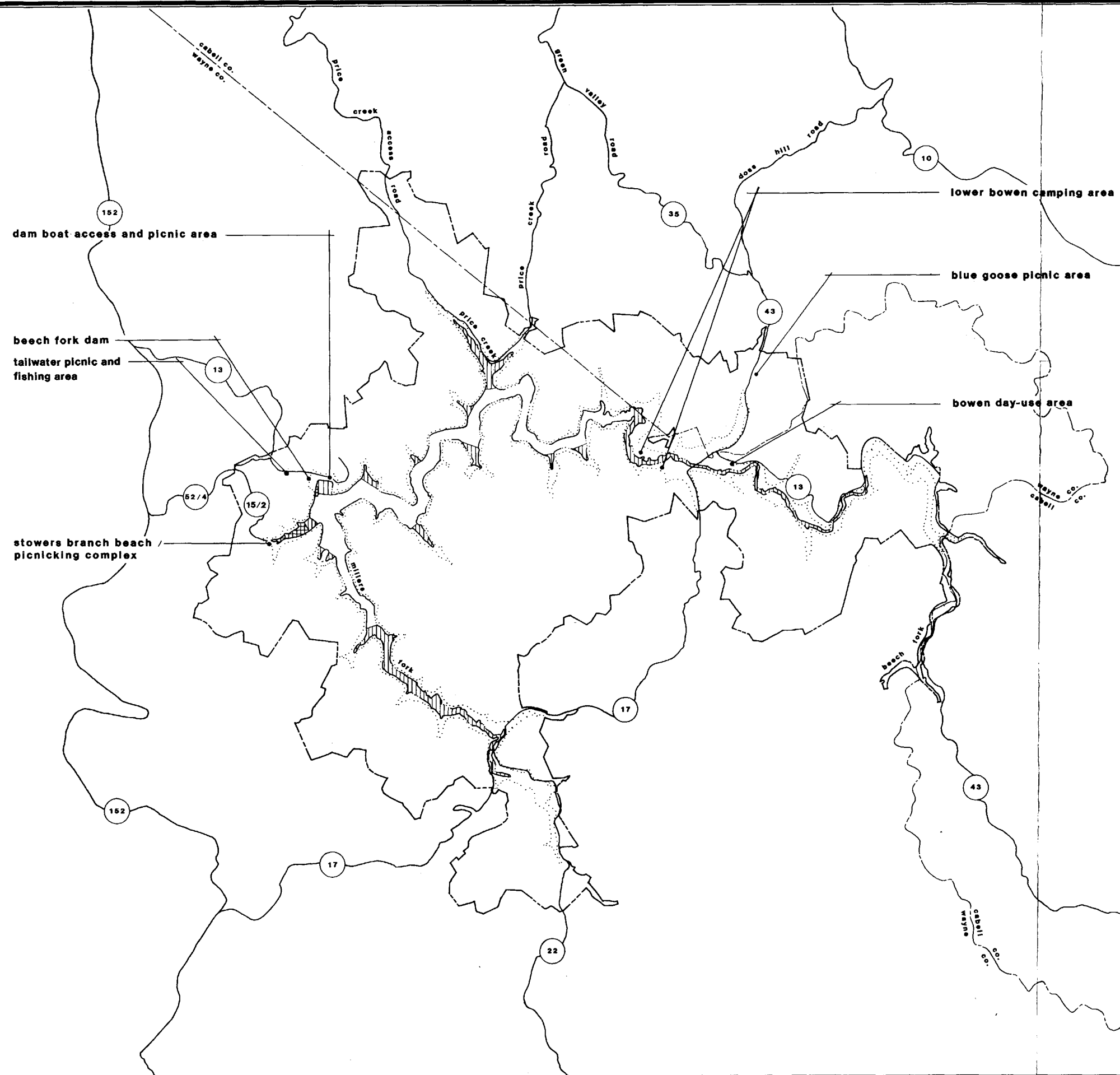
# water use plan

## LEGEND

- project boundary
- 583.5- minimum conservation pool (not shown)
- 592.0- seasonal pool
- 614.5- maximum flood control area

## SEASONAL POOL

	acres
 boat exclusion area	9
 controlled area no wake zone	246
 unrestricted area	465

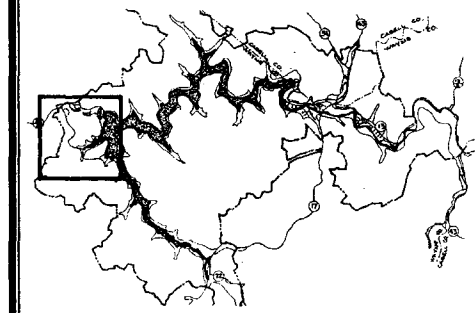
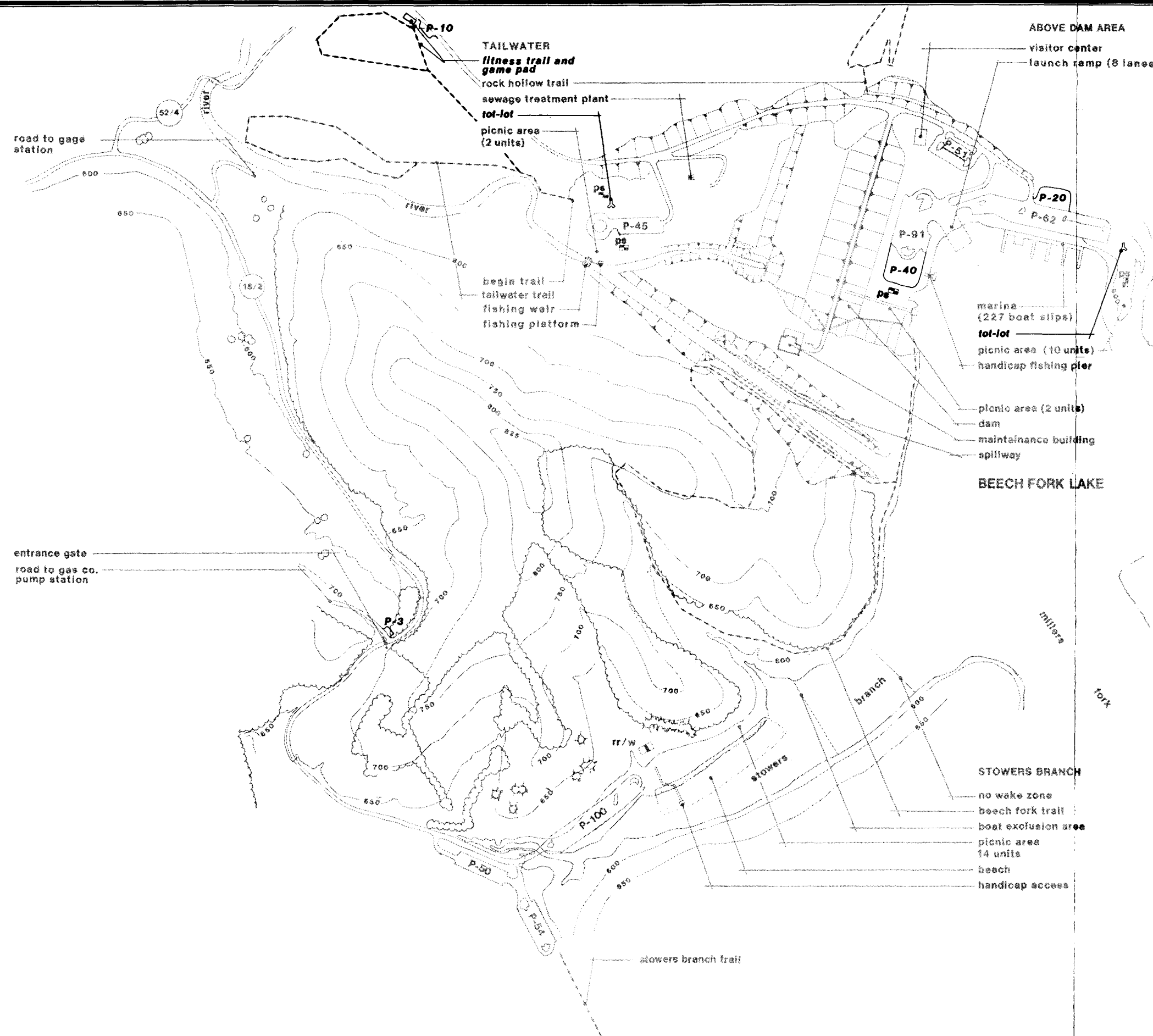


twelvepole creek basin  
west virginia  
beech fork lake  
master plan update  
u. s. army engineer district  
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exhibit 8





key map  
scale in feet  
0 2000 4000 6000

# dam area and stowers branch

## LEGEND

- project boundary
- 580.0 minimum conservation pool
- 592.0 seasonal pool
- 614.0 maximum flood control pool
- existing vegetation

## EXISTING FACILITIES

- roads and parking
- hiking trail
- restroom
- picnic shelter
- restrooms/washhouse

## PROPOSED FACILITIES

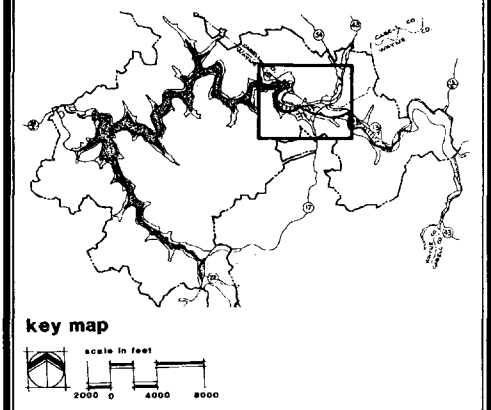
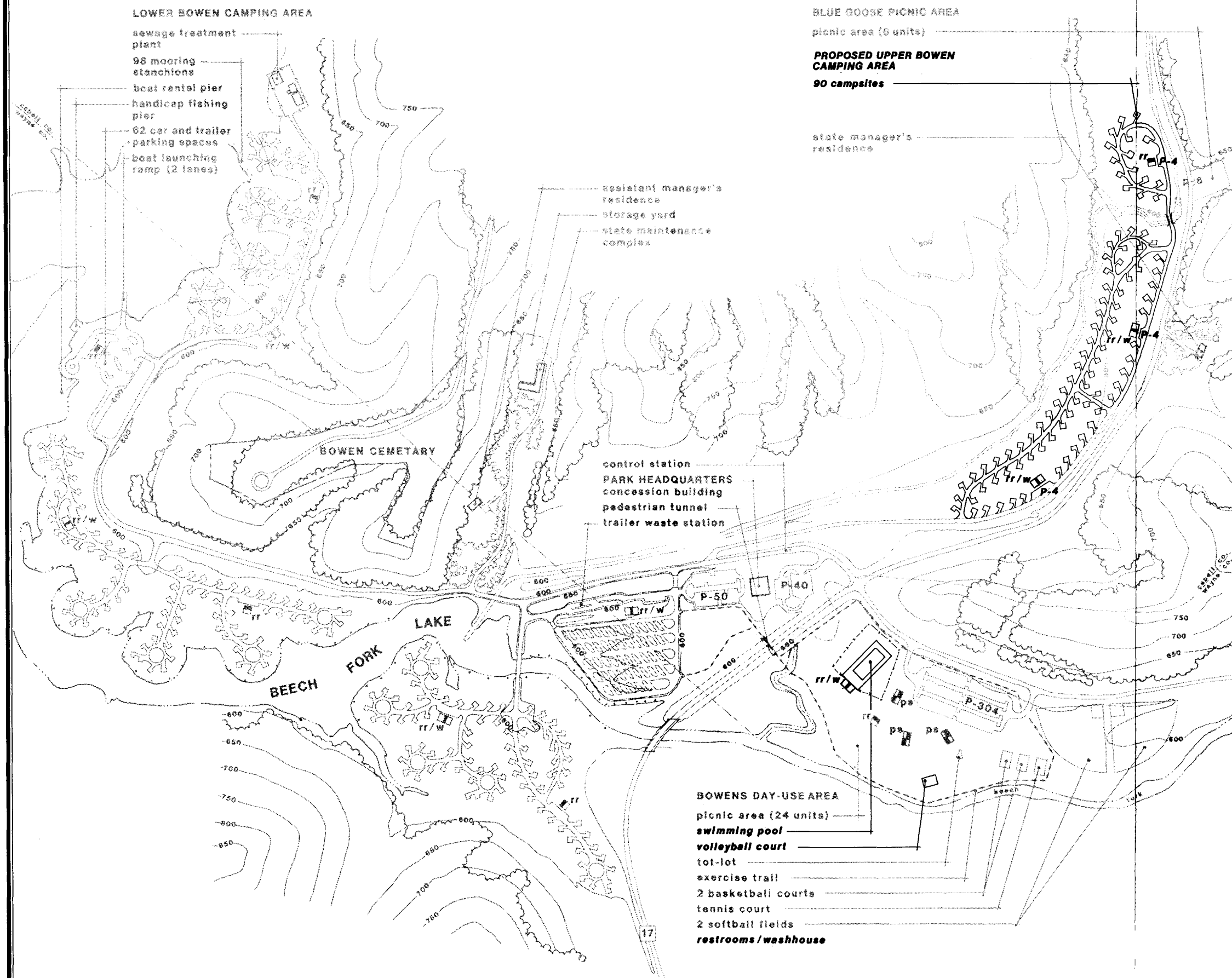
- picnic shelter
- tot-lot
- roads and parking
- number of parking spaces

scale in feet 0 200 400 600

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west virginia  
**beech fork lake**  
**master plan update**  
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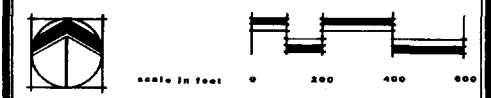
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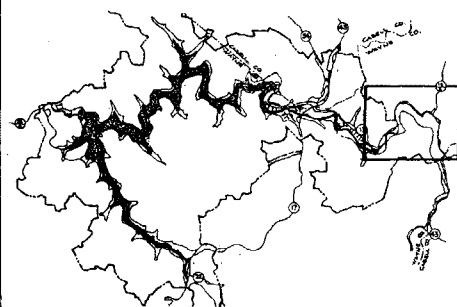
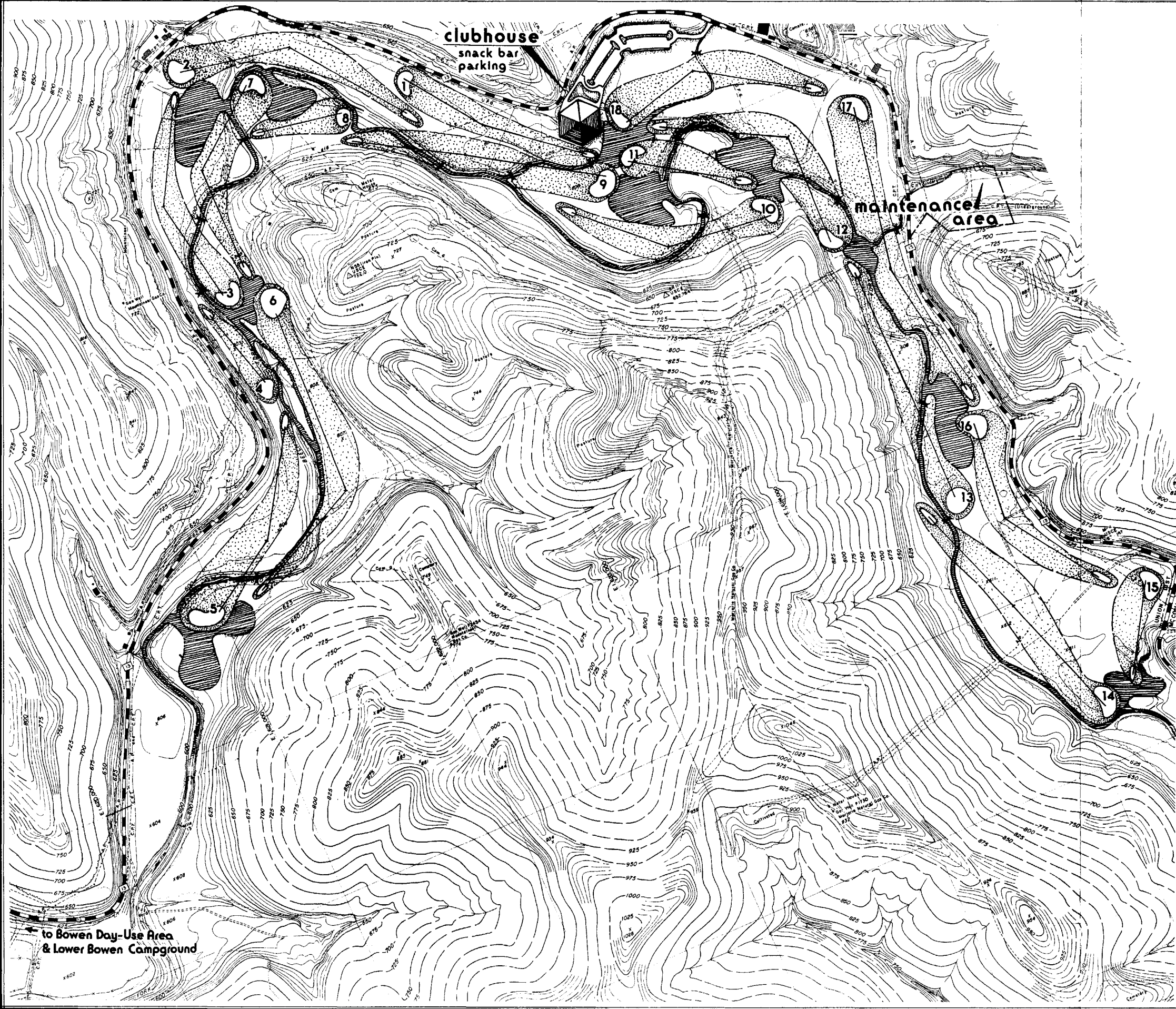
exhibit 9



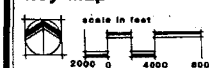
# upper and lower bowen areas

- LEGEND**
- project boundary
  - 582.5 minimum conservation pool
  - 592.0 seasonal pool
  - 614.5 maximum flood control pool
  - existing vegetation
- EXISTING FACILITIES**
- roads and parking
  - exercise trail
  - restrooms
  - restrooms/washhouse
  - picnic shelter
- PROPOSED FACILITIES**
- roads and parking
  - restrooms
  - restroom/washhouse
  - campsites





key map



## proposed golf course



twelvepole creek basin  
west virginia  
beech fork lake  
master plan update  
u. s. army engineer district  
huntington  
corps of engineers



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exhibit 12