

Master Plan

Design Memorandum No. 8

**Michael J. Kirwan Dam and Reservoir /
West Branch State Park, Ohio**



ENGINEERING

ON FILES

November 1982

U.S. Army Corps of Engineers, Pittsburgh District

12/1/82

ORPED-PL

10 December 1982

SUBJECT: Michael J. Kirwan Dam and Reservoir/West Branch State Park,
DM #8, Master Plan (Final)

Commander, Ohio River Division
ATTN: ORDPD-R

1. Prepared by the Architect-Engineer firm of Dalton.Dalton.Newport, Inc. under Contract No. DACW59-78-C-0028, eight copies of the subject Master Plan are submitted for final review and approval.

2. The draft of this Design Memoranda has been thoroughly reviewed by all concerned planning, engineering and operational elements of the Pittsburgh District and the real estate division of the Huntington District. In addition to review by other governmental agencies, a public forum was held to afford the general public an opportunity to comment on resource use objectives and all major plan proposals. Copies of the draft Master Plan were also placed in local libraries for public comment.

3. Our response to the review comments provided by your 14 May 1979 1st Indorsement follow in the same order as in your transmittal:

a. Paragraph 2 - Basic minimum facilities have been provided for the sightseeing public at the Corps' managed area below the dam. When there is a need for the development of recreational facilities, a cost-sharing agreement in accordance with then-prevailing policy would be prepared for execution by a non-Federal public body.

b. Paragraph 3 - The scope of clearing and grubbing has been defined and included in the respective cost estimates.

c. Paragraph 4 - The cost estimates for construction of paved roads have been re-analyzed and adjusted to reflect both the most accurate and current situation.

d. Paragraph 5 - The three plates mentioned have indications of handicapped considerations shown. These facilities, however, have received an additional evaluation for inclusion of further measures for handicapped use, as directed in EM 1110-1-103.

e. Paragraph 6 - Your comment concerning encouragement of the expansion of the unlimited ski speed zone is noted.

ORDPD-R (10 Dec 82) 1st Ind

SUBJECT: Michael J. Kirwan Dam and Reservoir/West Branch State Park, DM #8,
Master Plan (Final)

DA, Ohio River Division, Corps of Engineers, P.O. Box 1159, Cincinnati, OH
45201 28 January 1983

TO: Commander, Pittsburgh District, ATTN: CRPD-PL

The subject report is approved subject to the comments in the inclosed Review Memorandum. Revised pages should be furnished as appropriate.

FOR THE COMMANDER:

wd incl

JIMMY F. BATES
Chief, Planning Division

CF:

DAEM-CWO-R (wd 3 cy incl)

Long - being routed

Review Memorandum

1. Page 59, Table 4-7, 1970 Demographic Characteristics. This table should be updated to include 1980 data. Any resulting significant impact on scope of facility development will be reflected in plans and specifications.
2. Page 74-81, para 4.7, Projected Recreational Use. The text states that "the estimated annual visitation for the year 1980 is expected to be 1,170,000" This projected estimate is used as the basis for making visitation projections to the year 2070. The actual recorded visitation for 1980 was 813,900. This difference should be evaluated and necessary changes should be made in the text and in Tables 4-12, 4-14 and 4-15 and Figures 2-11 and 4-11, as appropriate.
3. Page 82, para 5.2.1, The Heritage Conservation and Recreation Service. This paragraph indicates that the Corps land has been restricted to public outdoor recreation use by the Secretary of the Interior. Although it is not clear how this commitment to use Corps' land was made, it appears that para 5.2.2 negates para 5.2.1. In para 9.3.2.2 this commitment is mentioned again and indicates that nonrecreational use cannot be permitted. This is confusing as it is discussed in the paragraph describing wildlife management and does not make clear whether wildlife management is considered recreation use. Further, if the land cannot be put to nonrecreational use, the use of an area by Kent State University for outdoor education and research is not appropriate. This should be clarified.
4. Page 130, para 8.4.1.2, Signage. All signs on Corps operated lands should conform with the guidelines in Graphics Standards Manual, EP 310-1-6 and the ORD Sign Handbook, OPDP 1130-2-4. The reference to "international symbols" should be changed to Federal recreation symbols with the standards stated above. Graphics on Plate 23 should be modified to conform with the ORD Sign Handbook.
5. Page 179 and 182, para 10.3.7.13 and 10.4.17, Revision. All changes to the basic text in the various appendices to the Master Plan must be approved by ORD. Minor changes such as telephone list, first aid kit supplies, etc.; should be revised on an as needed basis.

attach to ... 11/11/80 ...

MICHAEL J. KIRWAN DAM AND RESERVOIR/
WEST BRANCH STATE PARK
OHIO

DESIGN MEMORANDUM NO. 8

MASTER PLAN

U.S. Army Engineer District, Pittsburgh
Corps of Engineers
Pittsburgh, Pennsylvania

Prepared by
Dalton·Dalton·Newport
3605 Warrensville Center Road
Cleveland, Ohio 44122

November 1982

M. J. KIRWAN DAM AND RESERVOIR
Mahoning River Basin, Ohio

DESIGN MEMORANDUM NO. 8

MASTER PLAN

<u>Previously Issued Design Memoranda</u>	<u>Submitted</u>	<u>Approved</u>
1. Hydrology	12 May 59	2 Sep 59
2. General Design	2 Dec 59	8 Apr 60
Supplement No. 1 - Permanent Housing for Operating Personnel	16 Apr 62	18 May 62
Supplement No. 2 - Relocation of Township Highway 169A	2 Nov 62	3 Dec 62
Supplement No. 3 - Relocation of East Ohio Gas Company Gathering Pipeline System	3 Mar 65	5 May 65
Supplement No. 4 - Monumentation of Reservation Boundary Line	3 Aug 66	5 Oct 66
3. Real Estate - Dam Site and Construction Area, Portage County, Ohio	6 Nov 59	8 Jul 60
3A - Reservoir Lands, Portage County, Ohio	7 Nov 61	21 Feb 62
3B - Acquisition, Subordination, or Extinguishment of Oil, Gas, and Other Mineral Interests	20 Dec 66	29 May 67
4. Sources of Concrete Aggregate	18 Nov 60	14 Dec 60
5. Preliminary Master Plan - Part of the Master Plan	15 Sep 61	7 Dec 61
5A - West Branch and Portage Public Access Areas - Construction Design Memorandum	31 Dec 63	10 Apr 64
6. Detailed Design Memorandum of the Outlet Works	9 Oct 61	12 Dec 61
7. Reservoir Clearing	19 Mar 65	19 May 65

Currently Scheduled Design Memoranda

To be Submitted

None

U.S. Army Engineer District, Pittsburgh
Corps of Engineers
Pittsburgh, Pennsylvania 15222

November 1982

PREFACE

The Master Plan for Michael J. Kirwan Dam and Reservoir/ West Branch State Park discusses the recreational opportunities and facilities needed by 1980 and to the year 2070. The plan, as prepared, recognizes the authorized project purposes of flood control and low-flow augmentation in the West Branch Mahoning River and assumes the continuing operation of the project for these same purposes.

The State of Ohio has acquired control of approximately 95% of all the project land and water, through purchase and by lease agreement, which it administers through the Ohio Department of Natural Resources as West Branch State Park. The remaining 5% of the project land is held under federal control for project operations.

Extensive recreational development has been initiated by both the Corps of Engineers and the State of Ohio. As a result, additional recreational facility requirements beyond the year 1980 are minimal. Several optional "convenience facilities," i.e., golf course, winter sports area, lodge and cabins, have been incorporated into the Master Plan as a result of the prior planning effort and interest by the state.

Explicit guidelines are presented herein for the optimum development and sound management of all project resources. The Master Plan presents a comprehensive, land-use development concept for the entire project area, and reflects the excellent potential for providing necessary, high-quality recreational opportunities for the residents of Ohio and other visitors. This concept and its potential can only be realized through the cooperative efforts of all involved.

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APPENDICES

SECTION 1 INTRODUCTION

1.1 PROJECT AUTHORIZATION. The Michael J. Kirwan Dam and Reservoir, previously known as West Branch Reservoir, was authorized under Title II of the Flood Control Act (Public Law 85-500, 85th Congress S 3910) as approved 3 July 1958, in accordance with the recommendations of the Chief of Engineers in House Document Number 191, 85th Congress, 1st Session, and modified 14 July 1960 by Public Law 86-645 (74 Stat. 480).

1.2 OTHER PERTINENT RELATED DOCUMENTS AND ACTIONS. The following is a list of other documents which formulates the sequence of planning that eventually led to final project implementation.

1.2.1 House Document No. 306, 74th Congress, 1st Session (1935). This general report on the Ohio River Basin was developed subsequent to the provisions of House Document No. 308, 69th Congress, 1st Session, known as Section I of the River and Harbor Act of 21 January 1927, together with Section 10 of the Flood Control Act of 15 May 1928. This report pertained to the development of a general plan for improvements to the Ohio River Basin for the purposes of navigation, the efficient development of its water power, the control of floods, and for irrigation needs. Studies which led to this report considered a system of reservoirs on certain Ohio River tributaries; this system of reservoirs included one on the Mahoning River above Warren, Ohio. The benefits anticipated from such a system included the reduction of flood damage to areas along the Ohio River and its tributaries, the reduction of high-water interference with river navigation, the improvement of public health through low-water flow augmentation, and the production of hydroelectric power, as well as other less significant benefits. However, there was no recommendation for adoption of any specific Federal projects in this report.

1.2.2 House Flood Control Committee Document No. 1, 75th Congress, 1st Session (1937). This report, titled "Comprehensive Flood Control Plan for Ohio and Lower Mississippi Rivers," was prepared by the Chief of Engineers as a result of a resolution of the House Committee on Flood Control, and published as Committee Document No. 1 dated 10 February 1937. Together with the related House of Representatives' Report No. 2353, 75th Congress, 3rd Session, this report presented the results of additional studies of the Ohio River Basin flooding problems with specific reference to the great floods of 1936 and 1937, and its publication renewed Federal government

interest in flood control criteria contained in the Flood Control Act dated 22 June 1936. These reports recognized the need and justification for an extensive system of reservoirs for flood control and other purposes in the Ohio River Basin and included a favorable recommendation for the construction of reservoirs on the Mahoning River and its tributaries above Warren, Ohio.

1.2.3 House Document No. 277, 75th Congress, 2nd Session, 1938; and House Document No. 178, 76th Congress, 1st Session, 1939. These reports covered possible improvements to the Mahoning River and other rivers for purposes of navigation, and were used as data sources for determining the economic development potential of the Beaver and Mahoning River Basins.

1.2.4 House Document No. 266, 78th Congress, 1st Session, 1943. This document reported the results of comprehensive investigations conducted by the U.S. Public Health Service, assisted by the Corps of Engineers, on pollution of the Ohio River Basin. The contents of the report included information on the condition of the streams within the Mahoning River Basin and of the rivers for which it is tributary.

1.2.5 House Document No. 191, 85th Congress, 1st Session, 1957. Pursuant to a resolution of the Committee on Public Works of the House of Representatives adopted 10 March 1955, a review of reports on the Mahoning River Basin, with particular reference to the West Branch Reservoir, was submitted by the Chief of Engineers for transmittal to Congress by the Secretary of the Army, and published as House Document No. 191. This report recommended the construction of West Branch Reservoir on the West Branch Mahoning River for the purposes of flood control and low-flow augmentation. As mentioned previously, this recommendation, with modifications, became the basis for the final project authorization by Congress.

1.2.6 Local Cooperation Requirements. Local cooperation requirements, as stated in the General Design Memorandum No. 2, approved 8 April 1960, stated:

"The Chief of Engineers recommended the project provided that, prior to construction, local interests give assurances satisfactory to the Secretary of the Army that they will contribute in cash 49.6% of the total first cost of the project, which reflects the capitalized operation and maintenance cost allocatable to local interests, and that such payments be made

either in lump sum prior to commencement of Construction, or in installments prior to construction of pertinent items, in accordance with construction schedules as required by the Chief of Engineers; the final allocation of cost to be made after the actual costs have been determined. The contribution required of local interests, as set forth in House Document No. 191, is based on benefits resulting to local interests from land enhancement and low-flow regulation. The low-flow regulation provides benefits with respect to pollution abatement and water supply."

1.2.7 Name Change. The official designation of the project was changed from West Branch Dam and Reservoir to Michael J. Kirwan Dam and Reservoir in accordance with Public Law 91-639, dated 31 December 1970.

1.2.8 Ohio Department of Natural Resources. On 25 July 1968, the Corps of Engineers leased 3,228 acres of land and 2,650 acres of water, a total of 5,878 acres of the Michael J. Kirwan Project, to the Ohio Department of Natural Resources for the development of West Branch State Park, under the Department of the Army Lease Contract No. DACW59-69-RE-0032.

1.3 PROJECT PURPOSES. Michael J. Kirwan Dam and Reservoir is part of a coordinated system of reservoirs designed for flood protection and low-flow augmentation on the West Branch Mahoning River, Mahoning River, Beaver River, and upper Ohio River. Its primary purpose is the alleviation of floods in the West Branch Mahoning River Basin. The reservoir's influence is felt in the reduction of flood levels in the Village of Wayland and downstream at Warren, Niles, and Youngstown, Ohio. As part of a reservoir system, it subsequently contributes to the reduction of flood damage in the Beaver and upper Ohio Rivers. In addition to its flood control purpose, Michael J. Kirwan Dam and Reservoir functions specifically to improve the water quality in the West Branch Mahoning River by providing flow augmentation during periods of low flow. The subsequent pollution abatement resulting from this low-flow augmentation is significant along the lower West Branch Mahoning and Mahoning Rivers, where augmented flows reduce the concentration of mineral pollutants of industrial origin. Other incidental uses made possible by the Flood Control Acts of 1944 and 1958 include recreation, fish and wildlife preservation and enhancement, and land and forest conservation. All of these are addressed in this memorandum. Additional indirect benefits result from the increased sale of goods and services to the recreationist, increased employment, increases in land values adjacent to the project and additional revenues to

governmental agencies derived from fees, concessions, licenses, and taxes.

1.4 PURPOSE AND SCOPE OF THE MASTER PLAN. This Master Plan has been prepared in accordance with all applicable regulations, criteria and engineering manuals. The previously published Appendices to this Master Plan, whether approved or in draft form, were also considered in its preparation. The provisions of ER 1120-2-400 are reflected herein, specifically Appendix C of the above, titled, "Outline for Preparation of the Master Plan," dated 1 November 1971. All inventory data, needs analysis, and program development have been prepared in conjunction with the State of Ohio. The Master Plan recognizes and maintains the primary functions of flood control and low-flow regulation, and it defines the requirements for the development and management of all project lands to the year 2070, in 10-year increments. This Master Plan is intended to be a guide for the orderly and coordinated development, or protection, of all land and water resources of the project, yet maintains flexibility in the light of changing needs and conditions. The scope of this memorandum includes, but is not limited to: a determination of needs and program development, expressed in a narrative and technical report; the results of field studies of the natural systems; the development of proposed land use and illustrative site plans; the development of details and design standards, architectural designs, and incremental cost estimates; and continual coordination with appropriate federal and state agencies.

1.5 PREVIOUSLY ISSUED DESIGN MEMORANDA AND REPORTS.

1.5.1 U.S. Army Corps of Engineers Design Memoranda.
See complete listing on the flyleaf.

1.5.1.1 D.M. No. 5, Preliminary Plan. Part of the Master Plan, it established parameters for land acquisition for recreational development and initial development layouts.

1.5.1.2 D.M. No. 5A, West Branch and Portage Public Access Areas - Construction Design Memorandum. This provided individual facility justification and plans for early development and established funding procedures for implementation.

1.5.2 State of Ohio

1.5.2.1 West Branch State Park, Proposed Master Plan (Ohio Department of Natural Resources). Approved 6 March 1962.

1.5.2.2 Lodge - West Branch State Park, Portage County (Ohio Department of Natural Resources) Report and Plans. Dated 18 February 1976.

1.5.2.3 West Branch State Park, Land Use Master Plan (Ohio Department of Natural Resources). Dated December, 1977, pending approval.

1.5.3 Currently Scheduled Design Memoranda or Other Reports. None.

1.6 APPLICATION OF PUBLIC LAWS

1.6.1 Section 4, Public Law 534, Flood Control Act of 1944, as amended by the Flood Control Act, approved 24 July 1946 (Public Law 526, 79th Congress, 2nd Session), provides for the development of federal reservoir lands for recreational purposes, and thus is the basic authority for the recreational development of Michael J. Kirwan Dam and Reservoir.

1.6.2 Public Law 85-624, Fish and Wildlife Coordination Act of 1958, states the policy that fish and wildlife conservation shall receive equal consideration with other project development, and that relevant conservation measures be established and coordinated with other features of water resources development projects. Subsequently this law established the basis for the consideration of fish and wildlife values related to the development of the Master Plan for Michael J. Kirwan Dam and Reservoir.

1.6.3 Public Law 89-72, Federal Water Project Recreation Act of 1965. Inasmuch as the Michael J. Kirwan Dam and Reservoir project was under construction prior to F.Y. 1966, the effective date of this law, it has been classified as a Category "B" project according to Appendix I of ER 1120-2-404, and thus does not come under the law's cost-sharing provisions. However, the cost-sharing principles of P.L. 89-72 are being employed in connection with the recreational development of the project in accordance with subsequent administrative guidelines for such activities at lakes developed by the Corps of Engineers. The requirements, in summary, provide for a maximum of 50/50, federal/non-federal cost-sharing of recreational facility development costs and require the local, non-federal governmental entity to pay all operational, maintenance, and replacement costs of the project's recreational facilities. Following construction, and under contract with the Department of the Army, the recreational area and facilities are leased to the participating local, non-federal governmental entity for a period of 50 years for operation and management. Local cooperation is therefore essential

to the recreational development of federally owned lands. As previously mentioned, on 25 July 1968, the Corps of Engineers leased 5,878 acres of the Michael J. Kirwan Dam and Reservoir project lands and water to the Ohio Department of Natural Resources for the development of West Branch State Park. Only the further development of these federally owned, leased lands is eligible for cost-sharing under the principles of P.L. 89-72.

1.6.4 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' project resources.

1.6.5 Public Law 93-291, Archaeological and Historic Preservation Act of 1974; Executive Order 11593, Protection and Enhancement of the Cultural Environment. PL 93-291 amends the Reservoir Salvage Act of 1960 (P.L. 86-523). Together, they call for the preservation of historic and archaeologic materials and data that otherwise would be lost as a result of any Federal construction or federally licensed or aided activities. E.O. 11593 directs federal agencies to take a leadership role in preservation in two particular ways. First, for all property under Federal jurisdiction or control, the agencies must survey and nominate all significant historic properties to the National Register. These historic properties must also be maintained and preserved by the agency. Second, for every action funded, licensed, or executed by the Federal Government, the agency involved must ask the Secretary of the Interior to determine if any property in the environmental impact area is eligible for inclusion in the National Register. If the Federal action will substantially alter or destroy a Register-eligible property, the agency must allow the Advisory Council to comment on such undertakings.

1.6.6 Public Law 89-65, National Historic Preservation Act of 1966. The National Historic Preservation Act of 1966 (Public Law 89-665), declared 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 National Register properties.

1.6.7 Public Law 89-669, Protection of Rare and Endangered Species Act. This Act states the policy of Congress that the Secretaries of the Departments of the

Interior, Agriculture, and Defense shall seek to protect species of native fish and wildlife, including migratory birds threatened with extinction and, insofar as is practicable and consistent with the primary purposes of the agencies, shall design all policies and actions in a manner which will mitigate impacts to such species.

1.6.8 Public Law 93-205, Endangered Species Act of 1973. This act provides a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and provides a program for the conservation of such threatened and endangered species. The act also declares it to be the policy of Congress that all federal departments and agencies shall seek to conserve endangered and threatened species and shall use their authorities in furtherance of the purposes of this act.

SECTION 2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION. The Michael J. Kirwan Dam and Reservoir project and contributing watershed is located entirely in Portage County, Ohio, on the West Branch Mahoning River, at the western extreme of the Mahoning River Basin. The dam is located approximately 37 miles southeast of Cleveland and approximately 20 miles from both Akron and Youngstown. Two major transcontinental highways, the Ohio Turnpike (I-80) and Interstate 76, pass north and south of the project, respectively, about 10 miles apart. Park access from I-76 is approximately 2-1/2 miles northwest along SR 14. From I-80, Exit 13, it is approximately 14-1/2 miles southeast along SR 14, and from Exit 14, approximately 11 miles southwest along SR 5.

2.2 PROJECT DATA. The principal features of the dam and reservoir are summarized in Table 2-1.

2.2.1 Reservoir. The reservoir tributary drainage area is 80.5 square miles. Surface area, capacity, runoff, and discharge quantities for various significant pool elevations are given in Table 2-1, and in Section 2.4, Reservoir Characteristics.

2.2.2 Dam. The dam is of rolled earth fill. It is 9,900 feet long, or just 600 feet short of being two miles in length. Its maximum width at the base is 800 feet and its highest point is 83 feet above the streambed of the West Branch Mahoning River. The dam contains 3.2 million cubic yards of earth and is traversed its full length by a 16-foot access road. Figure 2-1 shows a view of the dam taken from the south-end immediately upstream.

2.2.3 Spillway. An uncontrolled spillway is located on the north abutment of the dam on the left bank, shown on Figure 2-2. The crest of the spillway is 300 feet in length and its elevation is 993.0 feet above National Geodetic Vertical Datum (NGVD).

2.2.4 Outlet Works. Controlled discharge from the reservoir is accomplished by a culvert at the centerpoint of the dam (Figure 2-3). Flow comes from the intake control tower, which contains three 2-foot x 3-foot gates for low-flow regulation discharge and three 5-foot x 8-foot barrel conduits for flood discharges. Access to the tower is by a service bridge from the roadway on top of the dam.

2.3 BASIN HYDROLOGY AND CLIMATE.

2.3.1 Basin Hydrology. The hydrologic characteristics of the drainage area upstream of Kirwan Dam are a

Table 2-1. Dam and Reservoir Features

(1) Reservoir Data

Pool	Storage				
	Elevation (ft. m.s.l.)	Area (Acres)	Capacity (Acre Ft.)	Runoff (Inches)	Design Discharge (cfs)
Minimum pool	951.0	580	3,800	0.9	2,090
Maximum winter pool	981.0	2,340	45,500	10.6	3,630
Maximum summer flow regulation pool	985.5	2,650	52,900 net	12.33	3,810
Flood control (winter) above elevation 981.0	993.0	3,240	33,200 net	7.7	4,090
Flood control (summer) above elevation 985.5	993.0	3,240	22,000 net	5.1	4,090
Full pool	993.0	3,240	78,700	18.3	4,090

(2) Dam

Type	Rolled earth fill embankment
Length, feet	9,900
Elevation, top of dam	1,011.0
Elevation, stream bed	928.0
Height:	
Stream bed to top, feet	83
Stream bed to spillway crest, feet	65

(3) Spillway

Type	Sidehill, uncontrolled, broadcrested weir
Fixed crest, elevation	993.0
Effective crest length, feet	300

(4) Outlet Works

Type	Intake tower with cut and cover conduit running under dam and emptying into a stilling basin
Number of conduits	One 3-barrel conduit
Size of each barrel	5' x 8'
Invert elevation	936.0
Low-flow regulation	3 - 2' x 3'
Invert elevation	939.0, 956.0, and 972.0

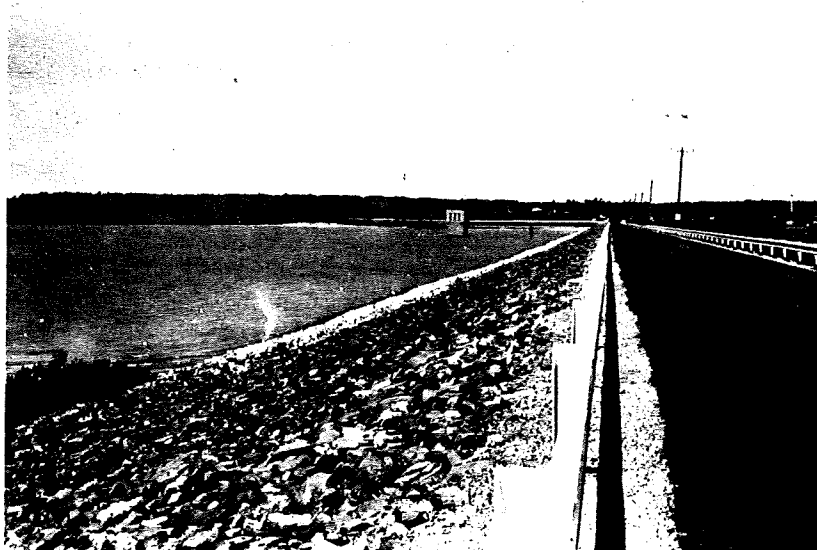


Figure 2-1 Dam, looking north.

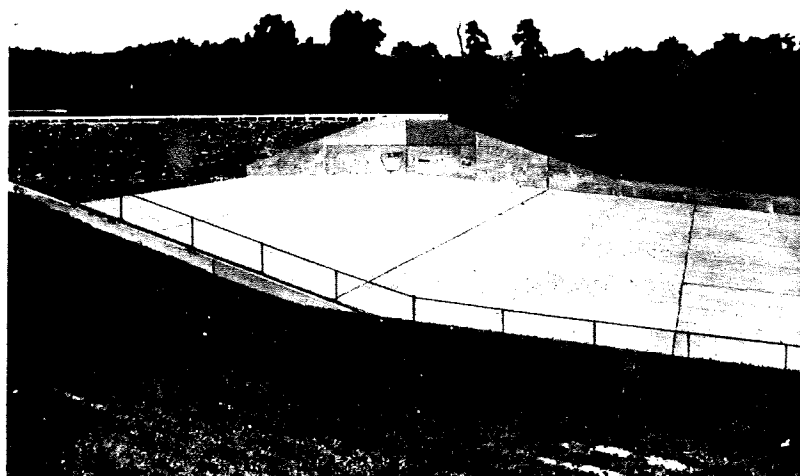


Figure 2-2 Spillway.

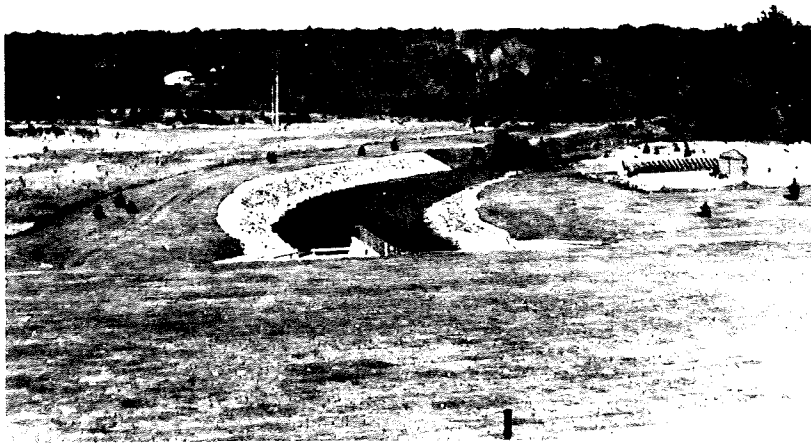


Figure 2-3 Outlet Works.

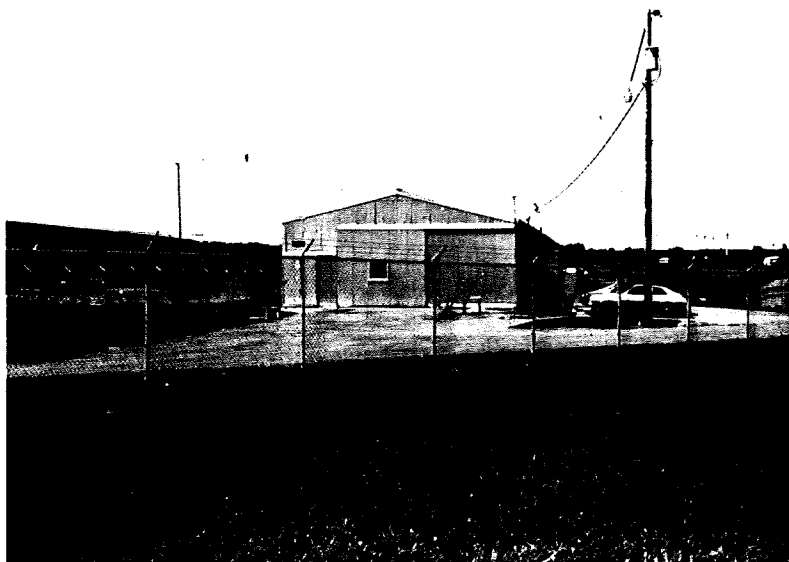


Figure 2-4 Maintenance Building & Storage Yard (Corps).

function of the climate, surficial materials, and topography. Surficial materials consist of ground moraine--an unstratified mixture of clay, silt, sand, and coarse fragments (till)--which generally has a low permeability and subsequently low infiltration and high runoff rates. The estimated median annual runoff is 11.26 inches (COE, 1959). The drainage pattern in the watershed reflects development on recently deposited materials from Wisconsin glaciation meltdown. Upstream of the dam, the West Branch Mahoning River and its tributaries display a dendritic drainage pattern, i.e., stream valleys branch irregularly in many directions without systematic arrangement, and tributaries join the mainstream at various, but usually acute, angles. This type of drainage pattern is characteristic of random headward erosion in materials of uniform resistance which do not have any structural control.

South of the reservoir, an area of confused drainage and scattered marshes exists along the watershed divide between streams entering the West Branch Mahoning River and streams entering Berlin Reservoir, further demonstrating the lack of structural control and the recent deposition of surficial materials in the region. The drainage density of the watershed above the dam is 1.57 miles of channel per square mile of watershed. This drainage density illustrates the relatively low permeability of the surficial materials and the relatively high quantities of runoff.

The maximum and minimum flows at Wayland, Ohio, for the water year October, 1976 to September, 1977 were 156 and 21 cubic feet per second (cfs), respectively. The average discharge over the nine-year period of record is 104 cfs: The flow at this point in the West Branch Mahoning River is totally regulated by Kirwan Dam. Maximum flows were observed during the months of November, December, and January in this water year. High flows were also recorded during May, June, July, and August. Low flows occurred during February, March, April, and September (USGS, 1978). These flows represent the cumulative effects of seasonal runoff variations and reservoir operations.

2.3.2 Climatic Overview. The climate of the project area is characterized by even monthly precipitation, warm summers, and cold winters. Annual temperatures usually range from a few degrees below zero to the low 90s. Monthly precipitation averages less than four inches, with the greatest amounts usually occurring during June, July, and August.

2.4 RESERVOIR CHARACTERISTICS. At full pool (spillway crest elevation 993.0), impoundment would be 78,700 acre-feet of water. The permanent storage level is at elevation 951.0, the minimum pool, for summer and winter. The principal function of permanent storage levels is to provide sufficient water coverage for the outlet works' gates in order to prevent freezing and the accumulation of drift. The resulting pool is also sufficient to maintain an adequate volume of water to sustain fish life. The summer conservation pool has been established at elevation 985.5, with a reservoir capacity of 52,900 (net) acre-feet of water, while the average Labor Day pool (winter conservation pool level) is approximately at elevation 981.0. The average 31 October pool (end of the boating season) is about elevation 975.0.

At summer conservation pool level (normal recreational pool) elevation 985.5, the reservoir is approximately 7 miles long with an average width of 3/4 miles. The widest part of the reservoir is about 1-1/2 miles.

The largest tributaries of the reservoir above the dam site are Silver Creek, Hinkley Creek, Bixon Creek, Barrell Run, and Harmon Brook. The shoreline of approximately 40 miles is characterized by many arms, bays, and inlets, providing interest and protection for the shoreline development. At the dam, the water depth is over 50 feet and, except for the upper reaches of the impoundment, is of sufficient depth for most types of water-oriented recreation.

Due to the effects of glaciation, the adjacent land-area surface characteristics are gently rolling. The land in the 80.5-square-mile drainage area is principally in farms, with a mixture of cultivated land, pastures, and wood lots. There is no evidence of serious soil erosion.

The largest community in the basin is the City of Ravenna, Ohio, with a population of 11,780 (1970), located on the western edge of the basin.

2.5 PROJECT STRUCTURES (OPERATIONAL).

2.5.1 Maintenance and Storage Complex. A corrugated metal maintenance building, together with a storage yard and four-car parking area, was constructed in 1968. The complex is shown on Plate 11. This building, servicing the entire Beaver Basin, is used as a general maintenance shop, with facilities for carpentry, mechanics, welding, and painting. There are two storage stalls (shop area of 16 by 32 feet and a maintenance area of 120 by 32 feet)

provided in the maintenance building for storage of project vehicles and equipment. Additional storage is provided in a garage located between the two Reservoir Managers' dwellings and outdoors in a 100 by 305 foot yard behind the maintenance building (see Figures 2-4 and 2-5).

2.5.2 Intake Control Tower and Operation Building.

The dam intake control tower and operation building houses the project administrative office, and two floors of the facility are used for maintenance and repair of the dam operating equipment (see Figure 2-6). A storage area for equipment and supplies is also provided.

2.6 RESERVOIR OPERATIONS.

2.6.1 Flood Control. Although flood control may be necessary at any time during the year, most floods in the Mahoning River Basin occur from December through April. Beginning in February, when reservoir storage is normally at its lowest level, water is gradually stored (providing runoff is sufficient) until gross reservoir storage reaches 56,700-acre-feet at summer conservation pool elevation 985.5 (maximum summer-flow regulation pool). This level is normally attained in late April or early May, and sustained until mid-June, again depending on basin runoff conditions.

During periods of high flow in the Mahoning River Basin, water is impounded in the reservoir until such time as this stored water can be released without being detrimental to downstream river stages. Scheduled pool levels are restored within a 5-10 day period after release begins. A general storage and release schedule for the project is shown in Figure 2-7.

2.6.2 Low-Flow Augmentation. From mid-June until November, the low-flow season, stored water is released to augment downstream flow and to create sufficient flood-control storage for the next winter-spring high runoff season. Releases from the reservoir are established at the District Office from a general low-flow augmentation schedule for the Mahoning River. The schedule provides for flow augmentation to maintain minimum flows and to the control water quality and, in particular, water temperature at key locations on the Mahoning River. Reservoir area capacity curves are shown in Figure 2-8.

2.6.3 Reservoir Drawdown. Drawdown between summer pool elevation 985.5 and winter low-water storage levels is dependent on the demand for low-flow augmentation and on basin runoff quantities. Whenever possible, the pool is maintained at or near summer conservation pool level



Figure 2-5 Reservoir Managers'
Dwellings looking north

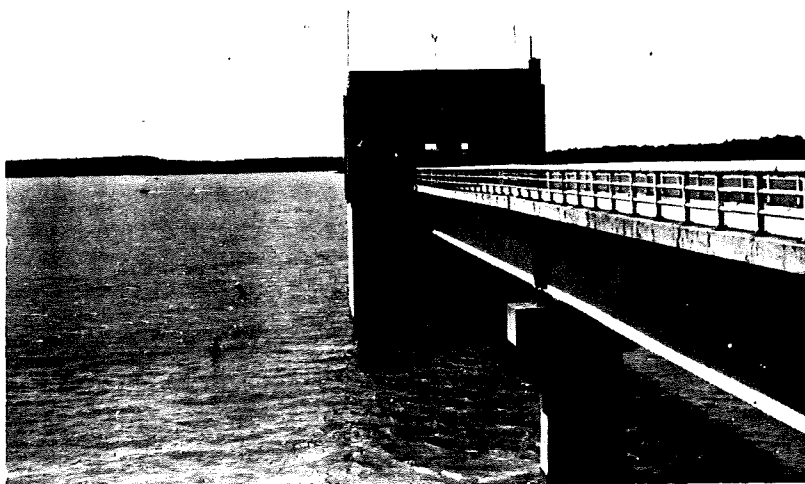
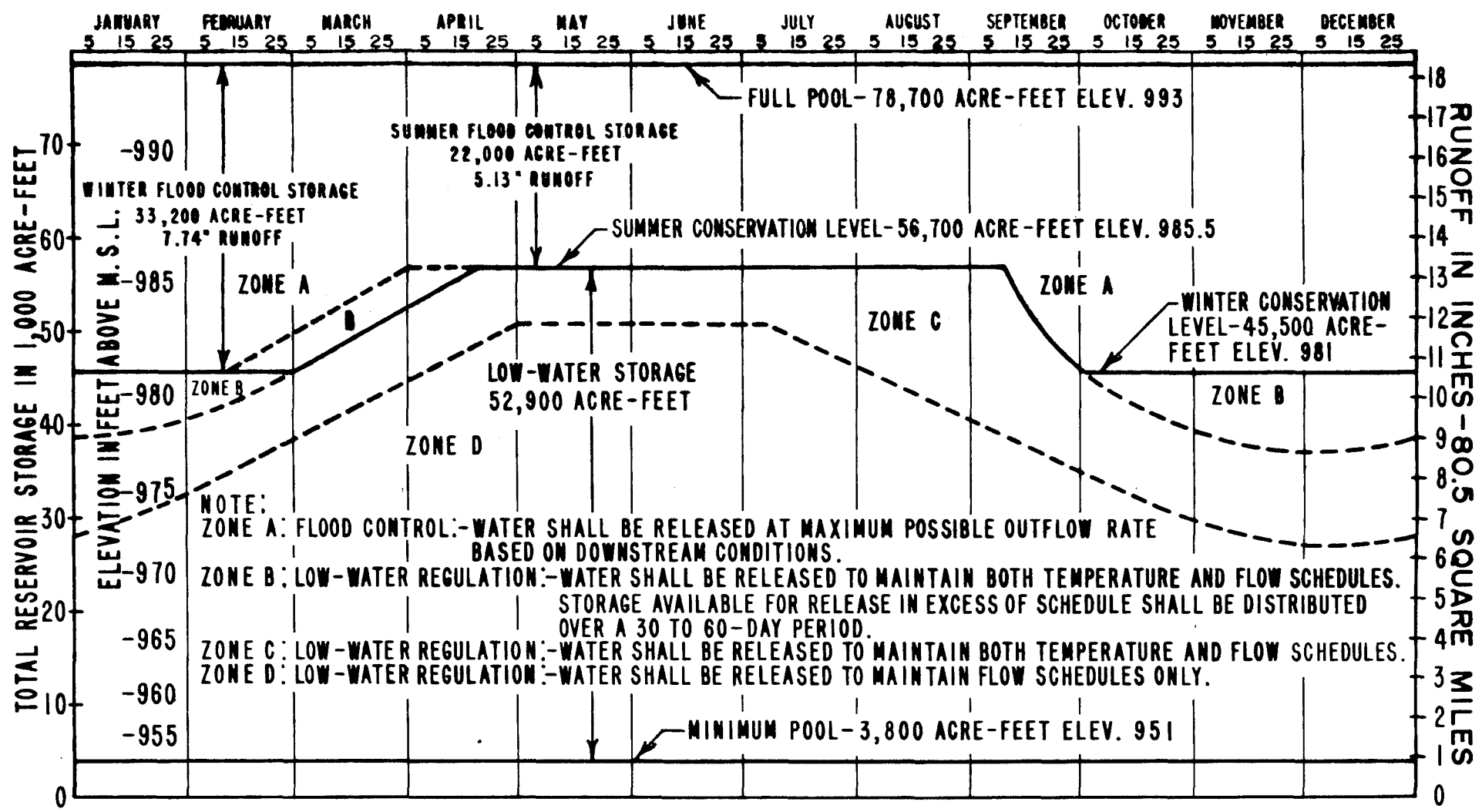


Figure 2-6 Intake Control Tower and
Operations Building

FIGURE 2-7--STORAGE AND RELEASE SCHEDULE

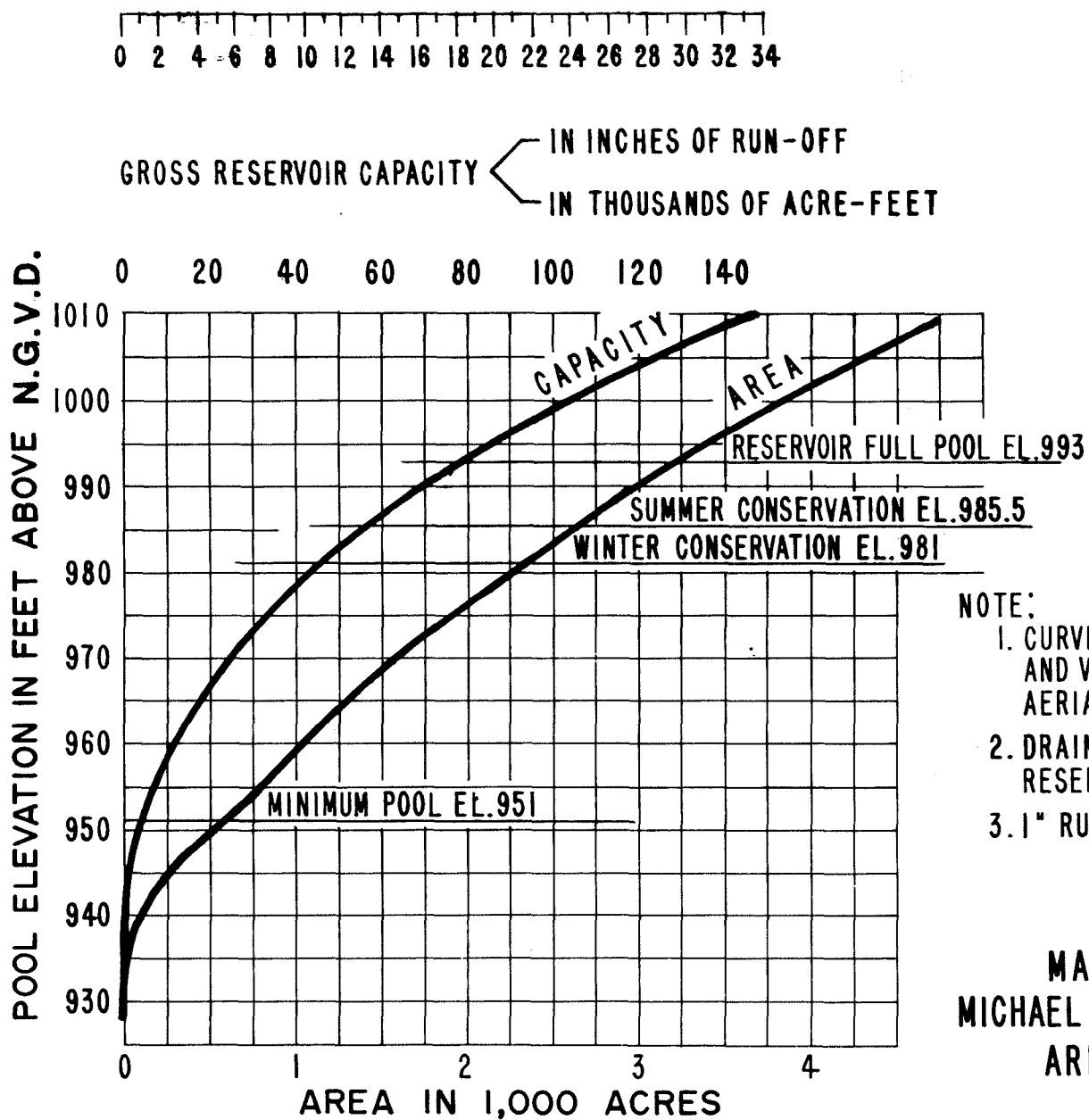
-16-



MAHONING RIVER BASIN
MICHAEL J. KIRWAN DAM & RESERVOIR
STORAGE AND RELEASE SCHEDULE

FIGURE 2-8- RESERVOIR AREA CAPACITY CURVES

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NOTE:

1. CURVES DEVELOPED BY HORIZONTAL AND VERTICAL FIELD CONTROLLED AERIAL SURVEY NOV. 1958 - FEB. 1959
2. DRAINAGE AREA TRIBUTARY TO RESERVOIR 80.5 SQUARE MILES.
3. 1" RUN-OFF = 4,290 ACRE-FEET.

MAHONING RIVER BASIN
MICHAEL J. KIRWAN DAM & RESERVOIR
AREA-CAPACITY CURVES

until approximately the end of the recreation season (after Labor Day). Because of varying downstream demands, however, the results of this practice are not consistent from year to year.

Figure 2-9 shows the results of an 11-year tabulation of actual drawdown operations from 1970 to 1981. The mean of the high, low, and average pool elevations as of the first day of each month are plotted for this period. The curve, based on the averages, shows that drawdown from the summer conservation pool level (elevation 985.5) begins in June and by early September (Labor Day) reaches elevation 982.68. By the end of October the elevation reaches elevation 979.24. This constitutes an average yearly reduction in pool level of 2.82 feet by Labor Day and 6.26 feet by the end of the recreation season, the end of October. Existing facilities for water-related activities located near the reservoir have been designed to accommodate this fluctuation in pool level. Support facilities such as parking areas and service roads are located at or above the 5-year pool level (elevation 988.0) as required to maintain access and provide service to these activities. All other public facilities and utilities are located above full-pool elevation 993.0 and therefore would not be affected by pool fluctuation except under extraordinary conditions.

2.6.4 Reservoir Storage Frequency. To determine the desirable reservoir storage levels for flood control and the resulting downstream effects during floods, yearly flow records of the West Branch Mahoning River were analyzed from the early 1900s to 1956. Based on these records, it was determined that the March, 1913, flood was the worst on record and, hence, is considered as the design flood. According to frequency studies based on records at the stream flow stations in the Mahoning Valley, it was determined that this design flood has a recurrence interval of several hundred years. A partial storage-frequency curve was developed of reservoir storage levels by using flood storage data involving levels above the summer pool level equivalent to 56,700-acre-feet. This curve, Figure 2-10, indicates that a storage level, two feet above the summer pool level, will be almost a yearly occurrence, while flood storage of three feet above the summer pool level will occur approximately every five years, on an average.

2.7 VISITATION

2.7.1 Recent Attendance. Visitation to the Michael J. Kirwan Dam and Reservoir from 1967 to 1977 is illustrated on Figure 2-11. Visitation figures are U.S. Army Corps of Engineers estimates based on actual traffic

FIGURE 2-9 - RESERVOIR DRAWDOWN

-19-

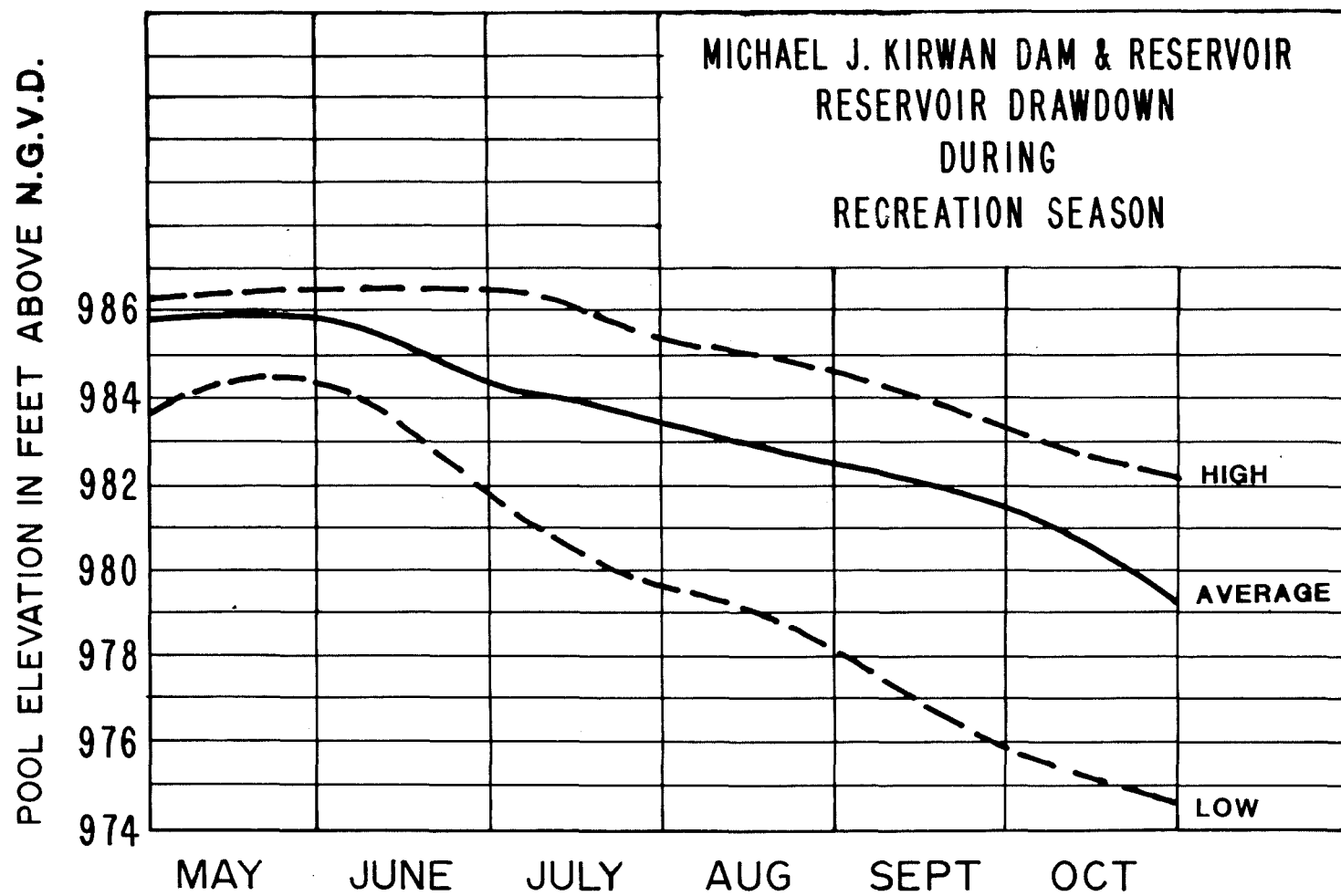
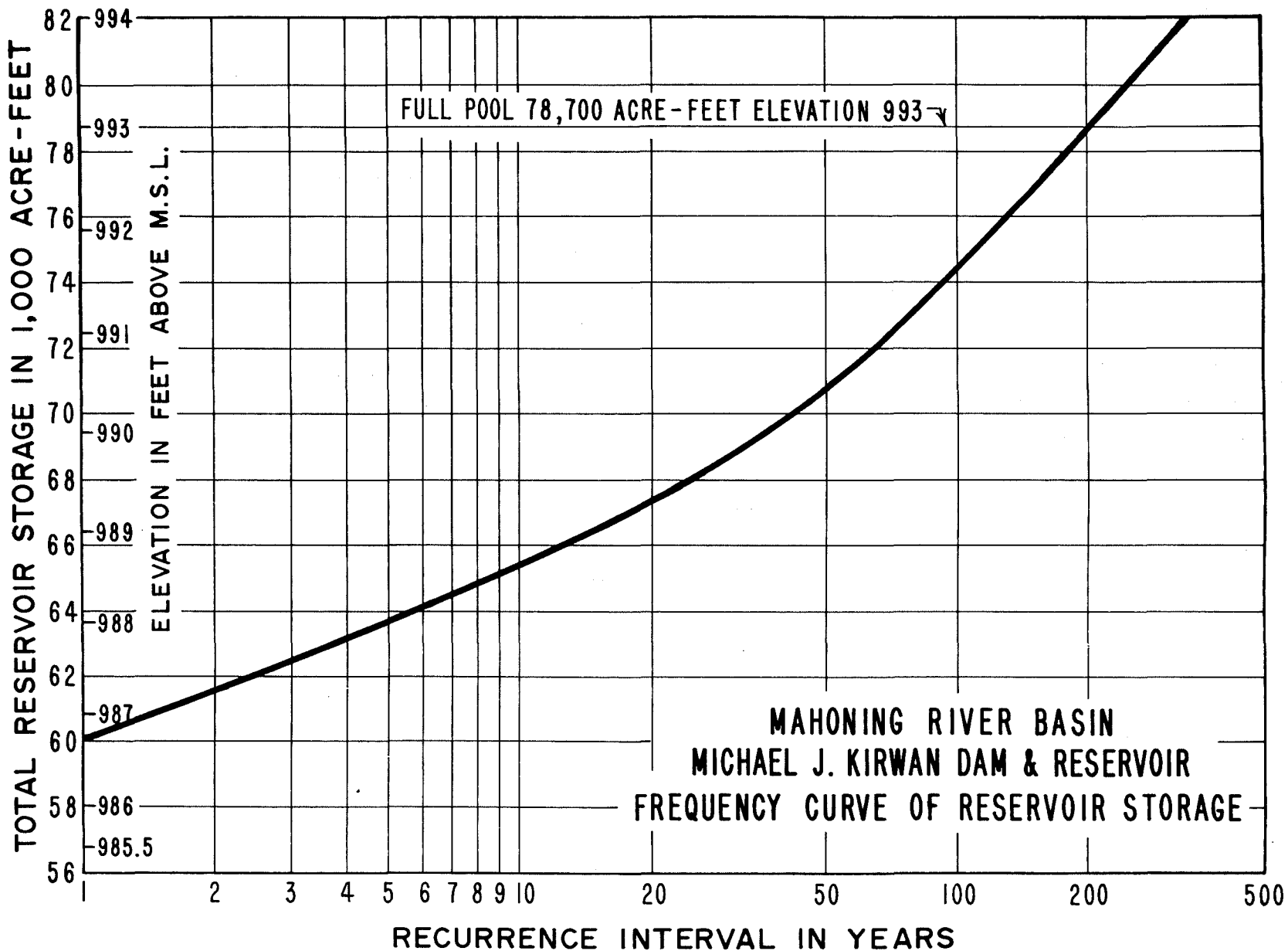


FIGURE 2-10-FREQUENCY CURVE OF RESERVOIR STORAGE
-20-



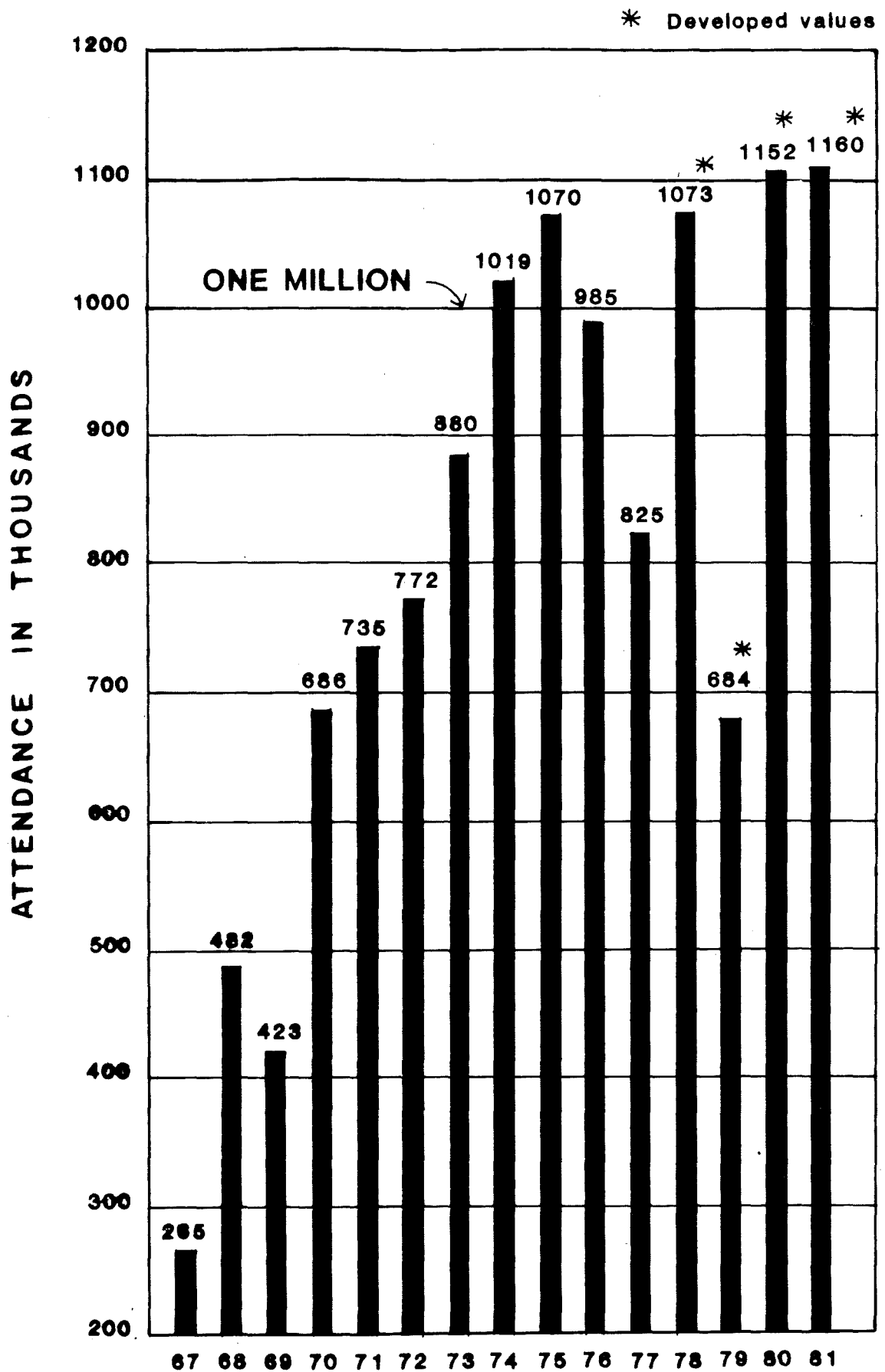


FIGURE 2-II - ANNUAL VISITATION

counts plus observations. From 1967 to 1969, the visitation figures were relatively low, because facilities were just opened and demand was developing. An inconsistency occurs in the recorded attendance figures for 1976 and 1977, which were 868,235 and 691,540, respectively. These figures represent a drop of 19% and 35%, respectively, from the 1975 figure of 1,069,640. This sharp drop appears to be, in part, the result of a change in estimating procedures instituted by the Corps at the end of 1975; that hypothesis is borne out by the fact that the actual observed attendance remained consistent during this period. During this same period, the state's West Branch State Park attendance records show a considerable rise in visitation, to 1,193,961 in 1977. Consequently, an adjustment in the recorded visitation data was developed to increase the reliability of future projections. The adjustments were made by using the State Park figures for camping, swimming, and picnicking as a substitute for the Corps' participation figures for 1976 and 1977. The resulting adjusted total attendance for each of these two years was 985,300 for 1976, and 825,060 for 1977. The State Park estimates for these recreational activities are considered reliable, since they are based on actual counts (camping), observations by lifeguards (swimming), and rangers (picnicking), plus traffic counter verification. Average monthly attendance percentages for the years 1973 through 1976 (from West Branch State Park figures) are shown below. The averages for this four-year period show the intensity of use in the months of June and July accounts for more than 50% of total, annual park usage.

2.7.2 Use of Recreational Facilities. Facilities are available at the project for the following recreational activities: tent and trailer camping; all forms of boating, including pleasure boating, fishing from boats, and waterskiing; swimming; shore fishing; picnicking; sight-seeing; hiking; nature program; trail riding and camping for horsemen; snowmobiling; cross country skiing, sledging, and hunting. Observation of the use of the recreational facilities by personnel working at the project suggests that the demand for camping and boating facilities far exceeds the supply. Regardless of weather conditions, the campground fills up every summer weekend several days before the weekend begins. This has been the case since at least 1973. The competition for use of the boat launching ramps on most summer weekends leads to long waits, frustration, and attempts to launch larger power boats from the fishermen's access area near the causeway which was intended only for launching car-top craft. To a lesser extent, picnic facilities and the parking lot for the swimming beach do not meet demands on peak holiday weekends or hot sunny weekends. This was particularly

true in 1980 and 1981 when exceptional weekend weather increased demands on park facilities to an extent never before experienced. Shortages of picnic facilities result in people picnicking along the roads. Shortages in the beach parking lot result in swimmers parking their cars wherever possible, close to the swimming areas. Table 2-2 gives average participation percentages for each of the recorded activities. These percentages are for total attendance, with some overlap (22%) for those visitors engaging in more than one activity. The percentages were averaged from Corps of Engineers' activity participation data for the years 1970 to 1977 and West Branch State Park data for the years 1973 to 1977.

2.8 REAL ESTATE. The extent of project land and water is shown on Plate 2. These lands include:

2.8.1 Reservoir Operations Area. 420 acres of land from the original fee-taking have been kept by the Corps of Engineers for operation of the reservoir.

2.8.2 Leased Lands and Water. 3,228 acres of land were outgranted under a lease for public park and recreational purposes by the Secretary of the Army to the State of Ohio, Department of Natural Resources, for the development of West Branch State Park. This is the only land adaptable to joint project development and the only land on which cost-sharing of new construction can occur. Under the same agreement, 2,650 acres of water (based on maximum summer pool elevation 985.5) was also leased to the Ohio Department of Natural Resources. This lease for the lands and waters which now make up a large share of the state's West Branch State Park, was consummated in 1968 and will expire in 2018.

2.8.3 State of Ohio Lands. 2,124.1 acres of land adjacent to the leased land has been acquired by the State of Ohio for the purpose of expansion of West Branch State Park.

2.8.4 Total Park Area. The total of all lands and water presently available for park development, excluding Corps' operational areas, is 8,002 acres. Corps' operational land, if used as a recreational resource, would increase this area to approximately 8,400 acres.

Table 2-2. Historical Average Activity
Participation by Percentages

Boating (includes waterskiing, pleasure boating, and fishermen using boats)	22%
Camping	12%*
Fishing (shore)	5%
Swimming	21%
Picnicking	15%
Sightseeing	42%
Hiking	4%
Nature Program	<u>1%</u>
	122%

*Camping at West Branch State Park has averaged 8% of total visitation. The number has been increased to 12% mainly to accommodate a latent demand due to limited facilities.

SECTION 3 OPERATING PROJECTS-STATUS

3.1 PROJECT DEVELOPMENT AND OPERATION CHRONOLOGY - CONSTRUCTION. Construction of the dam and operating facilities started in May, 1963, and was completed in November, 1966, at which time the impoundment of water was begun. Construction on the first phase of recreational development, which consisted of two boat launching ramps, was started in March, 1966, by the Pittsburgh District of the U.S. Army Corps of Engineers. Additional construction for picnic and camping facilities began in May, 1966, and was completed in July, 1968--all by the Corps of Engineers. Upon completion, all recreational lands and facilities were leased to the State of Ohio. Subsequent development by the state, since July, 1968, has included the construction of a swimming beach, bathhouse, and marina complex. This construction was initiated in 1971 and completed by 1973. Existing facilities are shown on Plates 11 and 13.

3.2 EXPENDITURES FOR PUBLIC USE AND ENVIRONMENTAL RESOURCE DEVELOPMENT

3.2.1 Federal Government. The total expenditure of regular construction funds by the U.S. Army Corps of Engineers through September, 1981, was \$1,140,000. No Code 710 or cost-shared development has been undertaken at the project. The Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) has provided grants amounting to \$1,042,405 for construction of the West Branch marina, swimming beach, bathhouse, roads, parking, water treatment plant, and utility and sewer lines.

3.2.2 Ohio Department of Natural Resources. Total expenditures by the State of Ohio for land acquisition and capital improvements, through 1978, are \$4,481,500. An additional \$2,600,000 has been allocated by the state for sanitary and water-supply improvements in the existing campground and the development of 100 additional camping sites. It was the intention of the state to seek Code 710 cost-sharing monies from the Corps of Engineers for a portion of this development. A portion of the campground planning and estimating effort of this Master Plan has been phased so that it can be utilized to determine the extent of possible Corps of Engineers' participation in this development.

3.2.3 Private Recreational Development. There are two concessionaires presently operating in West Branch State Park. These are located at the bathing beach and at the marina. Facilities and basic equipment are provided

under terms of the separate leases by the State Department of Natural Resources, Division of Parks, with the exception of rental boats (15 required), which are furnished by the leasee and inspected and approved by the Division of Parks. No private recreational investment is associated with the development of facilities at West Branch State Park.

3.2.4 Anticipated Project Development. Additional Corps development of a new manager's office complex and visitor information center, north of the project entrance off Wayland Road is presently under construction. This development is further detailed in Section 8.4.1. Proposed Corps development at 100% federal government funding is shown on Plates 11 and 12.

SECTION 4 RESOURCE INVENTORY AND FACTORS
INFLUENCING DEVELOPMENT

4.1 NATURAL RESOURCES

4.1.1 Geology. The Michael J. Kirwan Reservoir and surrounding area is underlain by the Hiram Till ground moraine, deposited during the Defiance Stage (or advance) of the Wisconsin glacial period. This Hiram Till consists of an unstratified mixture of clay, silt, sand, and coarse materials which form relatively flat uplands sloping toward the original channel of the West Branch.

End moraines, also consisting of the Hiram Till, are located in the northwest sector of the park and are approximately one mile south of the dam between Wayland and Thomas Roads (Winslow and White, 1966). Still another end moraine, part of the Kent system, lies west and north of the project area. Topographically, end morainal deposits are characterized by rolling, hummocky land which is generally higher than the surrounding ground morainal deposits. These end morainal deposits often contain boulders, undrained depressions, and are excellent sources of sand and gravel. There are several small gravel pits and a small quarry located north of the project near SR 5. Quaternary alluvial deposits directly underlie the original stream channel and consist of lenses of poorly sorted, poorly bedded silt and sand.

Surficial materials are underlain by Pennsylvanian-age bedrock at depths ranging from 60 to 175 feet. Outcrops in the northeast corner of Edinburg Township would be expected to display the same stratigraphic relationships as found in the Silver Creek area. A representative stratigraphic section for this area is presented in Figure 4-1. Bedrock units here dip very gently to the southeast. Additional local outcrops are found along Rock Spring Road just south of the state park boundary and along Hinkley Creek, north of the reservoir.

Development of an interpretative trail from a new Alliance Road parking area to the ledges mentioned above (Figure 4-1) would provide an opportunity for visitors to see rock outcrops in a region where they are normally covered by glacial drift deposits. Below the outcrop is a natural overlook area which would provide good views of the bedrock geology of the ledges and the lake. Regular visits to this area are already occurring, and the development of a signed trail for interpretation would protect the area from further encroachment by suggesting limits to hiker travel. This proposal, as a new opportunity for the area, is further defined in Section 7.3.2.1.

EDINBURG TOWNSHIP, PORTAGE COUNTY, OHIO: Section recorded along Silver Creek, for distance of 1 mile, above bridge on Charlestown-Edinburg Township line, 0.5 mile west of the common corner between Charlestown, Paris, Palmyra, and Edinburg Townships) (Winslow and White, 1966, p. 79)

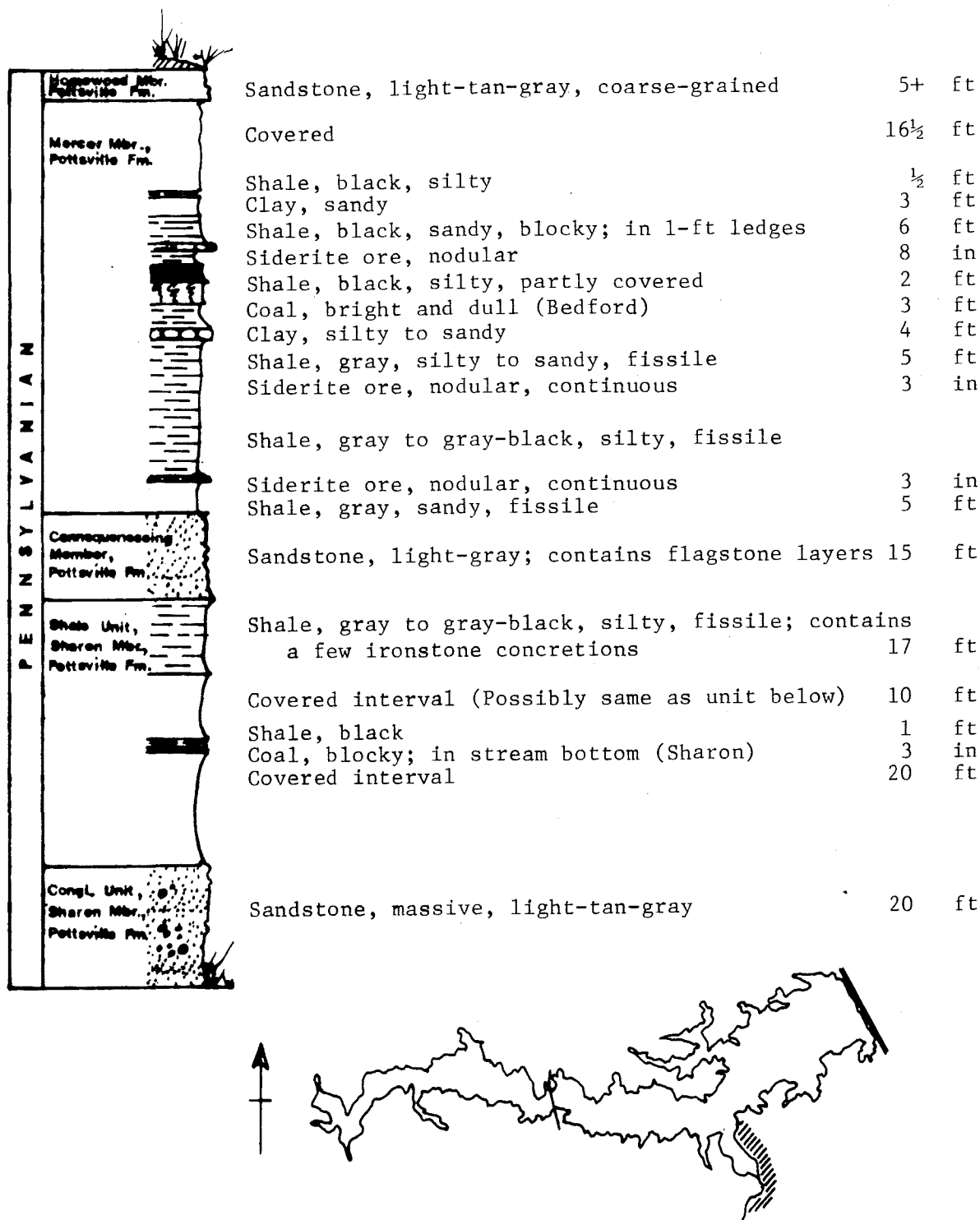


FIGURE 4-1 - STRATIGRAPHIC SECTION

Twenty-four oil and gas wells have been drilled in the park, thirteen of these since 1978. The intensity of drilling operations in the past few years has resulted in several serious problems, such as soil erosion resulting from land disturbance during site set up, accidental spills of oil and gas well brines, and the occasional illegal dumping of brine within the park. Improper brine handling has resulted in some localized contamination of the reservoir as well as surface waters and possibly even local groundwater. A major impact has been the elimination of vegetation where spills occurred. Many of these problems have been corrected but more stringent requirements are needed and can only be effective through the permitting procedure (see also Section 4.1.2.2).

4.1.1.1 Soils. Soils of a region form under varying conditions of climate, composition of materials, vegetation, topographic variation, and time. Soils occurring in the West Branch State Park demonstrate this variation, largely due to factors related to the Quaternary geology of the region and topography. Materials surrounding the reservoir consist of the Remsen-Trumbull-Geeburg Association. These soils are formed on glacial tills which are high in clay and create a slowly draining soil. This association tends to retain moisture and has slow permeability, restricting its use somewhat for septic tank and leach fields.

Two other soil associations are found in the state park. These are the Mahoning-Ellsworth soils association, which is moderately well drained, and the Loudonville-Mitiwanga-Dekalb soil association, which forms on end moraines. The Loudonville-Mitiwanga-Dekalb Association is found on somewhat steeper slopes than the other soils and is well drained. These soils are relatively shallow which result in development limitations due to high seepage rates.

The soils of the project area have been surveyed by the Soil Conservation Service, and draft mapping of the Portage County soils was available for this analysis. For this study, the soils were grouped according to limitations associated with recreational development, and a generalized soils suitability map (Plate 4) was prepared. The principal limitation which exists with the soils in the project area is a high water table during much of the year due to poor or impeded drainage. These limitations range from moderate to severe. The local soils are derived primarily from ground moraine materials and contain relatively large amounts of clay. The clay restricts drainage causing increased swelling/shrinkage action during wetting and drying cycles, which makes the soils susceptible to compaction when machinery is operated over

these areas, particularly when the soil is wet. Additional limitations to recreational development exist in steep slope areas along some of the side valleys which enter the main reservoir. Still others exist in the relatively level tributary valley floors where periodic flooding occurs due to either high reservoir levels or runoff from the sub-watershed entering a tributary valley. Table 4-1 summarizes the principal soil limitations to recreational development and identifies the soil series present in the project.

4.1.2 Archaeology

4.1.2.1 Prehistoric. Coordination with the regional preservation archaeologist of the Ohio Historic Preservation Office indicates that five (5) archaeological sites have been identified on government land (Plate 6). A determination of the eligibility of these sites for listing on the National Register of Historic Places has not been made, and additional site excavation would be required before making a final determination. In addition, three suspected or potential archaeological site locations within the project area have not yet been verified, nor may the survey conducted in the early 1960s which located the above sites be considered adequate to satisfy the requirements of Executive Order 11593 to survey all federal lands. Detailed site identification has been and should be avoided to prevent possible unauthorized salvage or disturbance. Specific locations and information are on file with the Pittsburgh District, U.S. Army Corps of Engineers.

Since there has not been a complete survey of the project area, additional sites may be discovered as a result of future park development activities and survey work conducted by the Ohio Historic Preservation Office or other qualified individuals. The planning process for any development activities should include coordination with the District Office and State Preservation Officer to evaluate the potential impact on cultural resources,

4.1.2.2 Historic. Historic Indian activities within the park are not completely known, although, in one location in the project area, a Shawnee Indian burial ground supposedly exists. This area is located on a high knoll known as Nesters' Hill, east of Porter Road (County Road 54) and north of Calvin Road (Township Road T-124). Although the existence of this burial ground has not been substantiated, this area should be considered to be a partially sensitive archaeological area for the purpose of future development until proven otherwise. Before development proposals are implemented in this area, a cultural

Table 4-1. Soils

<u>Soil</u>	<u>Limitation on Recreational Development</u>
Remsen (B)*	<u>Slight to Moderate,</u>
Jimtown	slowly drained.
Geeburg (B)*	
Glenford	
Dekalb Channery Loam	
Wheeling	
Remsen (C, D)* Loudonville	<u>Moderate,</u>
Trumbull	poorly drained, slopes
Geeburg (C, D)*	to 18%, some erosion
	present, shallow depth to
	bedrock (Loudonville)
Holby	<u>Severe,</u>
Orrville	steep slopes, periodic flooding
Tioga	

*B = slope range between 1-5%;
 C = slope 5-12%;
 D = slope 10-25%.

resources survey is likely to be required and should be coordinated through the District Office. This should also be required prior to permitting gas and oil well drilling in these areas. To date there are two gas wells on or near Nesters' Hill with a well-service road cut over the top of the hill.

4.1.3 Historical Features

4.1.3.1 On Site. A number of locations within the boundaries of the facility are worthy of historical note. The Old State Road, the route now followed by Summit Street and Haze Road, is believed to be the oldest road in the Western Reserve. Dating from 1803, the road ran east/west just north of the Kirwan Project, running through Campbellsport on the western edge of the project area. Campbellsport was founded with what is purportedly the oldest brick land-office building in Ohio, built circa 1810. When the filling of the reservoir threatened this building, it was moved to a site at the Portage County Historical Society, where it has since been preserved and restored. Campbellsport was a mustering point for militiamen during the War of 1812. One of Captain (later General) Campbell's militiamen wrote an account of his trip from Campbellsport to Cleveland which has also been preserved by the Portage County Historical Society.

In 1840, Campbellsport became a canal port on the Pennsylvania and Erie Canal. The canal ran from Beaver Falls to Akron, adjacent to the West Branch Mahoning River, where it joined the Ohio Canal. The remains of the canal and tow path were covered by water when the reservoir was filled, although some traces of it may still be present near Campbellsport or northeast of the dam.

The roadbed of the Pittsburgh Western Railroad paralleled the canal. This section was notorious for its crookedness, and each curve had its own name and history of derailings. The right of way is still shown on the USGS maps.

The Elliott Club Cemetery, or "Lost Cemetery," on the southern shore of the reservoir, adjacent to Cable Line Road near the end of Porter Road, consists of the graves of seven members of a 19th century family. The 15-foot by 30-foot cemetery is included in Portage County's list of historic sites. The graves date from 1835-1870. Further information on the history of this particular family is available from the Portage County Historical Society (see also Section 4.5.4).

4.1.3.1.1 Required Reconnaissance. Development activities within the project area would not be permitted to proceed until a determination has been made that these activities would not harm significant historic and/or archaeological resources. At sites which may be directly affected by the project, field inspection and reconnaissance would first be performed to identify possible archaeological sites, provide an estimation of the potential data yield and site significance, and form a basis for developing further detailed site survey plans if required. The results of this preliminary, low intensity survey may lead to a systematic and comprehensive program of sampling at suspected sites of archaeological significance. The program would be planned to provide a statistically valid sampling survey of the surface and subsurface in the potentially affected area. Data obtained as a result of this intensive survey would be classified and evaluated to support or deny a determination that the site is significant from a local, state, or national perspective. Finally, the State Historic Preservation Office and the Corps of Engineers would determine the site's possible eligibility for the National Register of Historic Places and/or the Ohio State Registry of Archaeological Landmarks by applying the applicable nomination criteria.

No project-related construction would proceed which could affect an archaeological site determined to be significant and potentially eligible for nomination to the national or state registers until an appropriate and acceptable mitigation plan has been developed. Such a plan may include in-place preservation of artifacts through site avoidance or salvage. If salvage is determined to be the optimum course of action, further detailed planning would be performed prior to initiation of any excavation work. Project construction would resume upon completion of the archaeological salvage operations.

4.1.3.2 Near the Site

4.1.3.2.1 The Frederick Wadsworth House. Built around 1824 by Frederick Wadsworth, this house is important both because of its builder and because it exemplifies the late Adam style of neo-classical innovation. At 4889 State Route 14, the house stands on a hill on which glacial furrows can still be seen. Frederick Wadsworth was a regimental staff clerk during the War of 1812 and kept the records at nearby Campbellsport where militiamen were mustered. He was heavily involved in the promotion of the Pennsylvania and Erie Canal. The Frederick Wadsworth House is included on the National Register of Historic Places.

4.1.3.2.2 Historic Sites of Local Significance. Portage County has developed a list of historic places of local significance. The following are included on that list and are close to the project area (See Plate 6).

The Baldwin House, Charlestown
The Charlestown Cemetery, Charlestown
The Charlestown Methodist Church, Charlestown

4.1.4. Ecology and Unique Environmental Resources. The project area is located within the glaciated portion of northern Ohio. Glaciation was a major factor in the natural distribution of plants and animals, though more recently, human activities have become a significant determinant. Through logging and farming activities many of the native forests have been removed or altered. Examples of such altered woodlands are scattered throughout the vicinity of the reservoir.

The most recent factor contributing to the present-day ecology of the area has been construction of the reservoir. This added both aquatic and land/water interface (ecotone) habitats to the ecological community. Significant ecotones include backwater and shoreline wetlands bordering the reservoir.

Thus, terrestrial communities are relict pockets and altered remnants of the original biota. These include diverse old-fields, thickets, and coniferous and hardwood forests. The types of plants and animals found in these communities are discussed in detail in Sections 4.1.5.3 and 4.1.6.

Significant ecological communities are identified on Plate 7 (Significant Ecological Resources). Sources of information for identification of these areas were: Appendices B and D: Forest, Fish, and Wildlife Plan; coordination with the Ohio Department of Natural Resources (ODNR) Division of Natural Areas and Preserves; and field observations.

These significant communities are described in the following sections.

4.1.4.1 Natural Areas. These areas contain remnants of the original forests. Although none are considered unique enough to be included in Ohio's State Nature Preserve System, these are the most significant natural areas remaining in the vicinity. Construction of trails and development of other passive recreation activities,

including nature study, are acceptable. Intensive recreation development is not considered to be the best use for these areas.

Area 1, Gilbert Road Natural Area Owned by C.O.E. This area is approximately 45 acres in size and contains several forest types. There is high ecological diversity, with good scenic qualities. A population of long beech fern (a species considered potentially threatened in Ohio) was identified; this species had not previously been identified by the Ohio Natural Heritage Program. This natural area may be threatened by potential development on private lands directly to the east of Gilbert Road.

Area 2, Silver Creek Natural Area Owned by C.O.E. Approximately 112 acres of three different forest types comprise this compartment. A scenic overlook is present, as well as an unusual upland forest containing skunk cabbage. The only known, recent sighting of a venomous snake (Massasaga rattlesnake) in the reservoir vicinity occurred at this site. The area provides excellent opportunities for nature study and hiking. The sandstone outcroppings also contribute to the overall importance of this site.

Area 3, Beech Woods Natural Area Owned by C.O.E. This site is approximately 25 acres in size and contains an outstanding, maturing to mature, beech forest. The forest is considered to be unsurpassed by any other natural feature in the vicinity, because of the majestic quality of the trees. Intense development should be avoided; hiking trails for nature study are considered to be the best use of this area.

4.1.4.2. Wild Areas. These ecosystems have experienced limited to extensive disturbance, but, because of certain attributes, the areas should not be highly developed and the ecosystems further disturbed. Important attributes include scenic qualities, wildlife diversity, and nature study potential. These ecosystems could withstand limited development, such as picnicking, hiking trails, or construction of cabins, provided that care is taken in site development.

Area 4, Owned by the State of Ohio. This scrub forest and old-field has been disturbed previously by logging and farming. However, it should not be further disturbed, because of its significant location between the Gilbert Road Natural Area and the upland wetland identified to the south. This area provides a natural buffer to the adjacent upland wetland which is an excellent habitat for many species that are not found elsewhere in the reservoir vicinity.

Area 5, Owned by C.O.E. With the identification of the scenic overlook in the Silver Creek Natural Area, this forest should remain because of its contribution to the overall scenic qualities. The forest also offers protection for the wildlife that use the associated wetlands by providing isolation from human activities. Through proper planning the forest will retain its scenic attributes and wild appearance and will contribute significantly to the aesthetics of the lodge and cabin complex proposed by the State of Ohio.

Area 6, Owned by C.O.E. The scenic qualities of this beech/maple forest along the south shore make it an ideal location for picnicking. Mixed with stands of pine and upland oak forests, its scenic qualities, with a view of the reservoir, are factors for maintaining the forest and limiting development.

Area 7, Owned by C.O.E. These forests and old-fields contain an excellent diversity of wildflowers. A small, spring-fed stream weaves through small rock outcroppings to the edge of the reservoir. Although the forest has been disturbed, its scenic and botanical qualities should be preserved. The forest would be an ideal part of a hiking trail to connect the picnic site and the west boat launch.

Area 8, Owned by C.O.E. This area, known as Bixon Creek, contains a diversity of habitat, making it excellent shelter for wildlife as evidenced by beaver dam construction on the creek. This is the largest single tract of land being recommended for classification as a wild area. Only passive recreation, such as hiking, nature study, and wild-life observation, is recommended.

Area 9, Owned by C.O.E. The West Branch Mahoning River flows into the reservoir through this compartment. The area contains a good seasonal diversity of aquatic plants and provides excellent habitat for terrestrial and aquatic wildlife species. Also, many floodplain plant species may be found here which are not found elsewhere in the reservoir vicinity. Potentially threatened plants, the long beech-fern and the ostrich fern, were identified here (See Section 4.1.4.6).

Area 10, Owned by C.O.E. This mixture of forests, fields, and thickets is important because it contributes to the overall attractiveness and serene environment in the backwater. It is also the largest block of woodland in the project area (265 acres). It should not be intensely developed because of these attributes and its location adjacent to the camping site. Trails for hiking and

nature study are considered to be the best development for this area.

4.1.4.3. Wetlands. Wetlands are scattered all along the shoreline of the reservoir. They were formed as a result of the construction of Kirwan Dam. The most significant wetlands are found in embayments where small tributaries that formerly flowed into the West Branch Mahoning River now enter the reservoir. These wetlands show seasonal variations in productivity, which is greatly influenced by fluctuations in the reservoir's water level. Numerous wildlife species use the wetlands during the summer months for nesting habitat and for food. The wetland vegetation plays a role in trapping sediment and minimizing shoreline erosion. Because of these factors, the wetlands are important to the ecology of the reservoir and should be left intact.

4.1.4.4. Upland Wetlands. There are few upland wetlands in the project area. All are found above the summer pool level of the reservoir. They formed as a result of manmade ponds going through an advanced stage of succession. These wetlands are important for wildlife shelter, and should either be retained in their present state or developed only for wildlife observation in association with nature hiking trails.

4.1.4.5. Geologic Features. Exposed geologic features consist of sandstone or shale outcroppings which provide contrast in the landscape and scenic views from hiking trails. In addition, the outcrops provide micro-habitat for unusual plants and animals.

The most significant location for exposed geologic features is in the Silver Creek area on the south side of the reservoir. It provides an additional dimension to the natural area that could be worked into a program of hiking and nature study.

4.1.4.6 Species of Interest. Consultation with biologists from the ODNR indicates that several unusual plant and animal species inhabit the project area. These species have been identified by the Ohio Natural Heritage Program as part of its state-wide study to identify unique plant and animal species or important ecosystems. Species identified by the Heritage Program are as follows:

Area A, Four-toed Salamander (Hemidactylium scutatum). Four-toed salamanders were collected near Lake Jay some time after 1950. Since that time, it appears that its habitat has been altered by construction of the reservoir. The four-toed salamander might still be found in

ravines above the pool area. It is included in Ohio's Threatened and Endangered Species List.

Area B, Long Beech-Fern (*Thelypteris phegopteris*; *Dryopteris phegopteris*; *Phegopteris connectilis*). A population of long beech-fern was found in heavy timber on the north side of the reservoir west of Rock Spring Road. It is considered potentially threatened in Ohio.

Area C, Ostrich Fern (*Matteuccia pennsylvanica*). This species was found on a wooded floodplain of a large stream, one-half mile north of Campbellsport, at the inflow of the West Branch Mahoning River. The ostrich fern is considered potentially threatened in Ohio.

Species found outside of the study area, but which may also occur within the park on the upstream portion of the West Branch Mahoning River, are as follows:

Area D, Allegheny Brook Lamprey (*Ichthyomyzon greeleyi*). Allegheny brook lampreys were collected in 1968 in the West Branch Mahoning River next to Jennings Woods near the McCormick Road Bridge. This species is listed on Ohio's Threatened and Endangered Species List.

Area D, Allegheny Crayfish (*Orconectes obscurus*). This species was collected in the West Branch Mahoning River at the McCormick Road Bridge near Jennings Woods. It is listed on Ohio's Threatened and Endangered Species List.

If other than passive recreation activities are considered for areas in which the species of interest are located, further study should be done to determine the current status of the populations. In addition, consultation with the ODNR should be initiated if any activities are contemplated that could affect the species listed on Ohio's Threatened and Endangered Species List.

No species on the National Endangered Species List are known to reside in the reservoir vicinity, nor has any area been designated as critical habitat. Threatened or endangered bird species may pass through the project area during migration. On at least two occasions, ospreys (*Pandion haliaetus*) have been sighted flying over the reservoir.

4.1.5 Environmental and Scenic Qualities

4.1.5.1 Climate. The Michael J. Kirwan Dam and Reservoir in northeastern Ohio is located in a region of modified continental climate with warm summers, cold winters, and precipitation generally evenly distributed

throughout the year. The area is not directly influenced by the moderating effects of the Great Lakes and has a somewhat shorter growing season than is found further north along Lake Erie.

A large annual variation in temperature occurs with the summer monthly mean temperature of between 70° and 75°F and a winter monthly mean temperature between 27° and 30°F. There is an average of 10 days during the months of June, July, August, and September where temperatures are above 90° F. The growing season averages 136 days per year between spring and fall frosts (32°F) (Table 4-2), and is approximately 160 days between killing frosts, which is almost one month less than the Cleveland or Pittsburgh areas. The number of heating degree days is estimated to be 6,037, using 65°F as a base.

The 37 inches of annual precipitation occur on an average of 152 days with 0.01 inch of precipitation or more per day. The driest months are generally September, October, and November. The mean annual snow fall is between 36 and 40 inches. Mean annual lake evaporation is 30 inches with 78% of the total occurring between May and October.

Sunshine is greatest during July, when it occurs 60% of the possible hours; sunshine is least during December and January when it appears less than 30% of the available hours. Cloud cover averages between 50% and 60% of the time during most months, with January the most cloudy with an average of 80%.

Climatic data for the facility was derived from three stations: Hiram, Youngstown Airport, and Akron-Canton Airport (see Tables 4-3, 4-4). All are located near the reservoir. Youngstown is located east of the reservoir, Hiram is located northwest of the reservoir, and Akron-Canton Airport is located southwest of the reservoir. Of particular interest to the management of the reservoir is the rainfall total for the months of May, June, and August. During the months of May and June, any one of these three stations might experience as much as three times the rainfall recorded at the other two stations. This reflects the nature of local summer storm patterns which can be expected in the northeastern Ohio region, causing rapid local buildup of water discharge in a sub-basin of a drainage area. During August of 1975, each station experienced almost double the normal rainfall for the period, again reflecting the variability in precipitation which can be expected on an annual basis within the basin.

Table 4-2. Temperature Extremes

Station	Temperature								Days Between Spring & Fall Frost (32°F)			
	Maximum (Highs)				Minimum (Lows)							
	1976	1975	1974	1973	1976	1975	1974	1973	1976	1975	1974	1973
Akron-Canton Airport	88	93	93	94	-7	-6	-1	-8	158	165	149	204
Hiram	88	93	92	93	-8	-8	0	2	164	159	139	205
Youngstown Airport	88	93	92	93	-6	-8	2	-10	159	159	148	183

Table 4-3. Average Temperature and Departure from Normal for a Four-Year Period for Three Stations Located Near the M. J. Kirwan Dam in Northeast Ohio.

Station	Jan					Feb					Mar				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO AP	26.3	-3.3	5.7	4.4	3.5	27.7	9.1	3.5	-0.6	-1.2	36.2	7.1	-0.2	3.1	10.6
Hiram	26.0	-4.0	4.8	5.2	1.6	27.2	8.7	2.2	-0.1	-0.4	35.8	8.0	-0.7	2.7	m
Youngstown	25.7	-5.8	4.5	4.3	0.1	26.7	7.9	2.5	-1.3	-2.7	35.3	7.9	-1.9	1.2	9.2
Station	Apr.					May					June				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO AP	48.5	0.7	-4.6	3.3	1.2	58.7	-3.5	4.5	-0.6	-2.5	68.3	0.3	1.2	-2.0	1.6
Hiram	48.5	2.4	-6.0	3.3	1.4	58.4	-1.1	5.0	-0.4	m	67.4	2.3	0.9	-1.7	m
Youngstown	47.7	2.5	-6.8	2.1	0.8	57.6	-2.2	4.4	-1.5	-3.5	67.0	1.9	1.6	-1.7	2.1
Station	July					Aug.					Sept.				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO AP	71.7	-3.3	1.0	0.2	0.5	70.3	-4.0	2.9	0.8	1.0	63.7	-3.9	-4.8	-3.6	1.8
Hiram	71.1	-1.3	0.2	-0.1	0.6	69.5	-2.1	2.2	0.5	2.5	63.5	-1.9	-4.1	-3.8	1.9
Youngstown	70.7	-2.0	0.4	-1.0	0.6	69.2	3.1	2.0	-0.1	1.0	62.7	-3.2	-4.0	-4.4	1.0
Station	Oct.					Nov.					Dec.				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO AP	53.3	-6.7	0.6	-2.6	4.2	40.7	-7.5	6.8	2.8	4.5	29.4	-5.8	4.0	2.1	2.4
Hiram	53.4	-5.4	1.1	-2.6	3.4	40.7	-8.1	6.4	m	2.7	29.1	-6.3	2.4	0.8	2.1
Youngstown	52.6	-6.7	-0.1	-3.3	2.9	40.3	-7.9	5.9	1.4	3.5	28.8	-6.7	1.7	1.7	2.0
Station	Annual														
	Ave.	1976	1975	1974	1973										
Akron-Canton WSO AP	49.6	-1.8	1.7	0.6	2.2										
Hiram	49.2	-0.7	1.2	m	m										
Youngstown	48.7	-1.5	0.8	-0.2	1.4										

Table 4-4. Average Rainfall and Departure from Normal for a Four-Year Period
for Three Stations Located Near the M.J. Kirwan Dam in Northeast Ohio.

Station	Jan					Feb					Mar				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO-AP	2.69	0.47	1.10	0.24	-1.19	2.16	0.83	1.42	-0.31	0.03	3.15	0.34	0.30	2.53	1.04
Hiram	2.80	0.7	0.80	-0.37	-1.16	2.41	1.07	1.37	-0.74	-0.15	3.43	0.83	-0.64	1.44	1.29
Youngstown	2.94	0.26	0.20	-0.16	-1.36	2.42	0.82	0.70	-0.81	-0.71	3.24	0.77	-0.02	1.24	0.37
	Apr.					May					June				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO-AP	3.32	-1.68	-1.56	-0.82	0.11	3.87	-2.72	-0.30	0.98	0.12	3.50	0.44	-0.74	-0.76	-0.64
Hiram	3.98	-1.41	-2.51	1.15	-0.48	4.06	-2.30	-0.14	1.33	1.82	3.95	0.20	2.81	-0.62	0.84
Youngstown	3.67	-2.03	-2.06	-0.62	0.69	3.90	-2.29	2.04	0.77	1.03	3.59	0.48	-0.84	0.36	-0.07
	July					Aug.					Sept.				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO-AP	3.80	5.20	-1.58	1.38	0.11	2.77	-0.76	-4.70	5.42	1.10	2.60	1.30	2.67	-0.79	-0.53
Hiram	3.94	0.93	-1.36	-1.52	-0.47	2.95	-0.05	3.39	3.56	0.67	2.96	1.48	1.85	1.04	0.81
Youngstown	3.90	3.26	-1.55	-0.70	-1.35	3.23	-0.82	2.83	3.98	0.67	2.64	2.52	2.04	0.72	0.07
	Oct.					Nov.					Dec.				
	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973	Ave.	1976	1975	1974	1973
Akron-Canton WSO-AP	2.48	2.12	0.20	-0.86	2.12	2.25	0.18	-0.83	0.91	0.18	2.27	0.11	0.48	1.92	0.11
Hiram	2.96	2.97	-0.07	-1.30	2.97	2.82	-0.02	-1.21	1.56	-0.02	2.53	0.21	0.39	0.61	0.21
Youngstown	2.71	0.18	-0.35	-1.27	0.18	2.81	1.10	-1.06	1.01	1.10	2.68	0.36	0.34	0.48	0.36
	Annual														
	Ave.	1976	1975	1974	1973										
Akron-Canton WSO-AP	35.13	0.50	5.86	7.08	0.36										
Hiram	39.69	-2.41	4.68	6.14	6.33										
Youngstown	37.99	0.46	2.63	5.00	-2.56										

The climatic patterns which occur at the Michael J. Kirwan Reservoir provide the opportunity for a wide variety of outdoor recreation during the year. During the winter months of January and February, snow cover on the ground is essentially continuous for an average period of 25 to 30 days, when the daily mean temperature is approximately 27°F and the average daily minimum is approximately 20°F. This permits the use of cross-country ski trails and snowmobiling for short periods each year. Brief periods of continuous snow cover occur during December, but generally this cover melts completely between successive snow storms.

During the summer months, rainfall exceeding 0.01 inch occurs on about one-third of the days. Summer storms in the area are generally related to the relatively rapid passage of alternating high- and low-pressure air masses, limiting the rainfall periods to a few hours. Winter and early spring storms develop over large areas in more stationary air masses. This results in more precipitation during successive days; however, the interval between precipitation periods may be greater.

4.1.5.2 Topography. The shoreline of the reservoir varies in steepness from essentially level to 20 degrees of slope. This variation limits development potential to the less steep areas, because of the increased limitations on construction and the subsequent erosion problems as the shoreline continues to stabilize. Development along the shoreline has been used to advantage by locating the camping areas on land well above the lake, thus providing panoramic views of the lake, while the day use facilities, such as picnic areas, swimming beach, and bathhouse, are located in areas which have long, gentle slopes to the shore. Within the state park, land elevations range between 986 feet National Geodetic Vertical Datum (NGVD) to approximately 1,150 feet NGVD on high elevations on the south side of the reservoir. High elevations within the state park north of the reservoir are approximately 100 feet lower than on the south side. These higher points are probably controlled by structure (an erosion-resistant sandstone which was not worn as rapidly by the action of Quaternary glaciation).

The greatest relief in the state park is located along Silver Creek west of Alliance Road, where the plateau is almost 100 feet above the reservoir. Vertical relief between 20 and 40 feet is common along many of the stream valleys which drain into the reservoir.

The location of combination winter cross-country ski trails and summer hiking trails can take advantage of the

topographic variation which occurs in several areas. Several such trails are already developed north and south of the closed portion of Cable Line Road between Rock Spring Road and Porter Road.

4.1.5.3 Vegetation. The vegetation of the West Branch State Park which surrounds the M. J. Kirwan Reservoir reflects the anthropological history of the region. The wooded sites above the reservoir elevation of 988 feet retain much of the upland-woodland characteristics which were present when the land was purchased from the private land owners. Approximately 31% of the land is covered by fallow farm land which is currently supporting an increasing population of woody species. Plate 5 is a physiognomic representation of the existing vegetation and is based on black and white aerial photographs of the area. Additional portions of the state park present examples of woodland development ranging from early canopy closure stages with wind-distributed tree species, such as maple and ash, to late canopy closure stages where tree species have typically heavier fruits which are animal-distributed, such as oaks and American beech. Along the margins of the reservoir, new floodplains are developing where there are gentle slopes to the water's edge and where limited wave action occurs. These new floodplain areas occupy about 2% of the area. Small areas on the south side of the reservoir are share-cropped, with 10% of the grain crop left to provide food for the wildlife.

The mature forests of the region are typically mixed hardwoods of which several species share dominance. The understory trees are usually light-tolerant young trees such as sugar maple, or scattered, small, slow-growing species, such as American beech, which are released when a canopy opening occurs in the stand. These mixed forests are frequently termed mixed mesophytic forests, although this term is misleading when used to describe the West Branch woodlands, since the characteristic tree of this association, the yellow buckeye, is absent in northern Ohio.

The spring wildflower display is excellent in these mixed woods, before the canopy closes for the summer. Another major period of flowering occurs in the early fall from late August to September when the woodland species of goldenrod, ironweed, and cardinal flower make their appearance. The final flowering of the season occurs in October and November with the flowering of witch hazel after the final fall of tree leaves.

Generally, the wooded areas in the state park are small (25-40 acres) and have been subject to disturbance. Several larger areas of woodlands exist both north and south

of the reservoir. The largest of these areas is located between Cable Line and Booth Roads in the southwest section of the state park. Other significant and large areas of wooded vegetation are located north of Lake Jay Bay.

Several smaller units along the shores of the reservoir offer potential sites for development as picnic or camping sites. Examples include small wooded areas north of Cable Line Road between Rock Spring Road and Porter Road, and in the Lake Jay Bay area described above.

In relating development planning to the existing vegetation, consideration must be given to the length of time required to reach the particular stage of forest development. Thus, a hierarchy for sensitivity to development would rank open fields under annual cultivation as least sensitive to development, since replacement of this vegetation would require the least amount of time; mature, closed canopy forests typical of the mature woods in the region would be most sensitive to development, since their total replacement would require the greatest length of time. The legend of the vegetation map (Plate 5) presents a hierarchy reflecting this sensitivity to development.

4.1.5.4 Land Use. The predominant land use within a five-mile perimeter of the project area is agriculture, with emphasis on both field crops and orchard production (localized southwest of the project). Although some residential development occurs along all of the county roads in the area, the major concentrations include Ravenna, Ohio, and some residential sprawl along SR 5 to the east, immediately northwest of the project. There is a 21,422-acre, federally owned parcel abutting SR 5 north of the project near the dam, designated as light industrial use. This is the Ravenna Arsenal, used in wartime for the manufacture of munitions and presently used for munitions storage. A large portion of this site is an undeveloped wooded buffer. Public access is prohibited. There is a small amount of marketable timber on private lands in the region, and the sugar maple (Acër sacharrum) is important to the area in the production of maple syrup.

4.1.5.5 Scenic Aspects. The configuration of major roads serving the project, together with the topography of the area, virtually eliminates long vistas of the reservoir. Because of its location at the upper reaches of the reservoir, even the SR 14 bridge crossing is unimpressive, with mud-flats which are due to reservoir draw-down, visible a good portion of the year. The Village of Wayland and Wayland Road on the east are downstream and below the dam embankment level, and, therefore, views over the reservoir are not possible. Only by entering the

project land from the south can the full magnitude of the reservoir be comprehended. There are excellent views of the project from the Rock Spring Road causeway, the dam, and all of the developed south shoreline areas. According to State Park tabulations, scenic drive visitation accounted for as much as 44% of all project visitation in both 1978 and 1981.

4.1.5.6 Water Quality. The quality of water impounded in the Michael J. Kirwan Reservoir is excellent. The reservoir water exhibits moderate hardness and the pH registers slightly alkaline, with normal ranges of 7.2 to 7.8. During summer stratification, readings of 8.0 above the thermocline are normal, while readings below the thermocline may reach an extreme of 6.5. Dissolved oxygen remains at levels close to 6.0 parts per million (ppm) throughout the water column during all times of the year except for the summer stratification period. The reservoir thermally stratifies in early July at a depth of 24 to 30 feet below surface levels. A dissolved oxygen deficiency (below 3.0 ppm) occurs at and below the thermocline during the stratification period. This stratification is intense and normally persists until mid-September or early October.

4.1.5.7 Recreation. The outdoor recreational interests of the people using the Michael J. Kirwan Dam and Reservoir and West Branch State Park include camping, boating, water skiing, fishing, picnicking, swimming, sightseeing, and some hunting. The type and number of facilities already provided by the Corps and the ODNR reflect these interests. To some degree, land-use zoning has been addressed and accomplished in previous development by the separation of day-use activities from camping. Existing wildlife areas are generally those areas which have marginal accessibility, and are not located near the concentration of day-use activities. At the beginning of the Master Plan preparation, the State conceded that although these areas are so designated, only a minimal amount of wildlife management effort is being expended there. Most of the Fish and Wildlife Division effort has been, and probably will continue to be, the upgrading of the reservoir fisheries. This again is a direct result of the demands for the recreational activity of fishing. Inasmuch as the emphasis to date has been placed on the development of facilities for active recreation, with wildlife conservation and management taking a secondary role, this program is not likely to be altered by future development, and thus establishes a general active recreational development "theme" for the lands and waters of the project.

4.1.6 Fish and Wildlife

4.1.6.1 Fish. The ODNR Division of Wildlife has fish management responsibilities under existing lease arrangements. Since the completion of the dam and reservoir, ODNR has taken an active role in improving fisheries.

The reservoir fisheries are managed to provide stable and balanced populations of panfish and trophy fish. To this end, three predator species (walleye, tiger muskellunge, and striped bass) have been stocked annually since 1970. The intent of stocking with these predators has been to thin out populations of small panfish (thus stimulating growth of the survivors) and to establish trophy fish populations. Table 4-5 lists the fish stocked since 1970. In addition to the stocked fish, the reservoir contains the following warmwater sport fishes: black crappie, white crappie, bluegill, brown bullhead, yellow perch, and largemouth and smallmouth bass.

The fishery resources at the project area are becoming increasingly important as a recreation resource for the region. In 1977, the largest striped bass in Ohio was caught in the reservoir. As the tiger muskellunge fishery develops, the reservoir is expected to continue to gain in prominence as a fishery resource.

ODNR has instituted a habitat improvement program as a part of the fish management. In 1976 and 1977, a total of 150 and 125 discarded coniferous Christmas trees, respectively, were submerged at locations around the reservoir. This practice is expected to continue along with the stocking program involving tiger muskellunge, striped bass, and walleye.

There is no sport fishing at the reservoir outflow, below the dam, because water conditions there are apparently unsuitable for harboring stable fish populations. The exact reasons for the absence of fish have not been studied, but they may be related to the following factors:

- The inability for natural stocking to occur (with fish coming through the dam) due to pressure differentials.
- The apparent physical blockage of the river downstream of the reservoir, reducing upstream migration.
- The shallowness of the river at this point, leading to high water-temperatures and low dissolved oxygen levels during hot summer weather.

Table 4-5. Fish Stocked at Michael J. Kirwan Reservoir
(1970-1981).

<u>Year Stocked</u>	<u>Species</u>	<u>Number</u>	<u>Size</u>
1970	Walleye	500,000	fry
1970	Muskellunge	1,380	fingerling
1971	Walleye	1,475,000	fry
1972	Walleye	15,000	fingerling
1972	Channel catfish	10,000	fingerling
1972	Muskellunge	416	fingerling
1973	Walleye	40,000	fingerling
1973	Channel catfish	10,000	fingerling
1973	Flathead catfish	7,000	fingerling
1973	Largemouth bass	10,000	fingerling
1974	Walleye	18,500	fingerling
1975	Tiger muskellunge hy-brid	13,300	fingerling
1976	Striped bass	30,000	fingerling
1976	Tiger muskellunge hy-brid	13,420	fingerling
1976	Striped bass	7,800	fingerling
1977	Tiger muskellunge hy-brid	5,500	fingerling
1977	Striped bass	2,400	fingerling
1978	Walleye	28,125	fingerling
1978	Tiger muskellunge hy-brid	29,930	fingerling
1978	Striped bass	3,840	fingerling
1979	Striped bass	19,720	fingerling
1979	Tiger muskellunge hy-brid	26,106	fingerling
1980	Striped bass	14,960	fingerling
1980	Tiger muskellunge hy-brid	10,000	fingerling
1981	Walleye	94,500	fingerling
1981	Striped bass	49,531	fingerling
1981	Tiger muskellunge hy-brid	9,825	fingerling

- The fact that this stretch of the river may be occasionally anoxic and high in sulfur dioxide concentration during summer months because it draws water from lower levels of the reservoir.

Until a determination is made and corrective measures are undertaken, little change is expected in the quality of fishing at the outflow.

4.1.6.2 Wildlife. Wildlife in the reservoir vicinity may be classified as either non-game or game. The former include native Ohio wildlife which may be found throughout the project area in the appropriate habitat. A partial listing of non-game wildlife observed or expected in the project area is found in the Forest, Fish, and Wildlife Management Plan (Appendices B and D). Included in these Appendices are lists of major mammals, resident birds, birds of prey, migratory birds, major reptiles and amphibians, and major invertebrates. Species of interest, including those considered to be threatened or endangered either by the State of Ohio or the Federal government, are discussed in Section 4.1.4 of the Master Plan and in these Appendices.

Game species include the cottontail rabbit, fox squirrel, woodcock, white-tailed deer, bob-white quail, woodchuck, raccoon, and several species of waterfowl. Some of these species are found only in small numbers.

The ODNR's Division of Wildlife currently administers for the Division of Parks and Recreation land west of Rock Spring Road on the south side of the reservoir. This 1,020-acre tract of land is known as the West Branch Reservoir Wildlife Area. Currently, portions of this land, as well as other areas along the south side of the project, are share-cropped. Total land share-cropped averages approximately 125 acres each year.

Other wildlife management activities include upland small game and deer management through natural succession control, brush pile construction, and orchard improvement. The only wildlife stocking program by ODNR involves the yearly release of 800 to 900 pheasants (50% male, 50% female) on the south side of the project area.

Waterfowl hunting is also permitted on the reservoir. ODNR's Division of Parks and Recreation leases 15 locations around the reservoir each fall on which duck blinds may be constructed. At the start of the season, the hunter pays a \$20 deposit which is refunded at the end of the season, upon removal of the duck blind. Selection for these 15 sites is made through a hunter application lottery.

Waterfowl management activities are limited, although wood duck nest boxes have been placed at various locations around the reservoir in recent years. In addition, the placement of Canada geese nesting platforms is being considered in light of the breeding success, over the past two years, of a natural population of Canada geese.

The overall significance of hunter activities is not known. Although estimates have been made, no actual tallies have been taken of the number of hunters using the area or the number and types of game species being taken.

4.2 PHYSICAL RESOURCES AND CHARACTERISTICS OF THE PROJECT AREA

4.2.1 Industrial. Manufacturing activities represent the single largest employment sector in Portage County, accounting for 10,300 jobs in 1975 with average annual earnings of \$10,200. The Bureau of Census reports that there were 198 manufacturing firms in 1972 with payrolls of \$82.4 million. This represents a 50% increase over 1963 and a continuation of the trend of locating employment centers in suburban counties.

Area non-durable goods industries consist of food and tobacco products; textile, apparel, and leather products; paper and printing; and chemicals, petroleum, rubber, and plastics products. Durable goods industries consist of furniture, lumber, and wood products; stone, clay, and glass products; primary and intermediate metal products; electrical and non-electrical machinery; transportation; and ordnance products.

4.2.2 Agricultural. Portage County's agricultural sector is important not only to the county, but also to the surrounding urban areas. While this sector had a 1970 employment of only 890 persons, it produced farm products valued at \$9.9 million. The main farm products, ranked by value, are dairy products (\$3.5 million); crops of corn, hay, and other grains (\$3 million); and livestock and livestock products (\$2.1 million).

In spite of the above, the county is not immune to the harsh economic realities facing farming in general. Between 1964 and 1969, the number of farms decreased by 26% to 1,030, while the number of farm acres decreased by 13% to 124,000 acres. Conversely, the average farm size increased by nearly 20%, and the number of farms exceeding 500 acres increased in number from 13 to 16. Thus, there is a definite trend toward fewer, but larger, farms where modern management methods can be used to advantage.

4.2.3 Accessibility

4.2.3.1 Regional Location/Access. The Michael J. Kirwan Dam and Reservoir is located in Portage County, and is accessible to three major urban areas: Cleveland, Akron/Canton, and Youngstown. In terms of distance, the project and state park are approximately equidistant from all of these major population centers: 29 miles from Youngstown, 33 miles from Canton, closest to Akron at 23 miles, and farthest from Cleveland at 37 miles. Residents of Portage County and the six contiguous counties can travel to the project via the four major roadways providing access to it from all directions.

State Route 5 is a two-lane highway extending east and west from the Pennsylvania state line, through Warren to Ravenna. SR 5 connects with the Ohio Turnpike (I-80) at Interchange 14, west of Warren.

I-76 is a major freeway which regionally connects I-71 west of Akron, passes through Akron, and joins with the Ohio Turnpike at Exit 15 near Youngstown where it becomes the eastern leg of the Turnpike, extending southeast toward Pittsburgh. At Exit 15, I-76 also connects to I-680 into Youngstown.

State Route 14 is a major highway which extends southeasterly from Cleveland, past the reservoir, to Salem, Ohio, then easterly to the Pennsylvania State line. This route is an extension of I-480, from Cleveland, terminating at the Ohio Turnpike at Exit 13. I-480 connects with all major expressways in the Cleveland metropolitan area.

State Route 44 is a major north-south route through Ravenna, west of the reservoir, connecting Canton with Painesville, Ohio.

These four routes are the major access roads to the project, with connections to most major roadways in the cities served. The condition of these major access roads is excellent with surface conditions that allow for speeds equal to the posted limits, making travel to the site comfortable and the travel times short. The reservoir is within a one-hour drive from most of the seven-county regional use market area, and no more than two hours from the most distant locations in the area.

<u>Route</u>	<u>1976 (Base Year)</u>	<u>1996 (Projected)</u>
SR 5	6,580	11,500
SR 14	8,930	14,600
SR 44	5,200	8,840
I-76*	20,475	32,000

*This count is an average taken between SR 14 and I-76.

4.2.3.2 Regional Traffic Conditions. The traffic data listed above were obtained from the Traffic Survey Report of the State Highway System, Ohio, 1976, by the Ohio Department of Transportation (ODOT). These counts are representative of the Ravenna area and are two-way average daily traffic (ADT) volumes.

Based on estimating guidelines used by the ODOT which indicate that 10,000 ADT is the limiting volume for a two-lane highway, SR 5, SR 14, and SR 44 are presently operating under acceptable conditions. I-76 is also well below the acceptable interstate capacity of 40,000 to 50,000 ADT. ODOT does not anticipate improvements to any of these roadways within the next few years due to financial restrictions and state highway priorities as well as the roadway's present acceptable operating conditions.

4.2.3.2.1 Projected Future Traffic - 1996. A 3 to 3.5% traffic growth rate per year was used for the 20-year projection from 1976 to 1996. Based on the previously mentioned 10,000 ADT limiting capacity, the results show, that SR 5 and SR 14 will need to be widened to four lanes by the design year. SR 44 and I-76 will continue to operate within the acceptable limit under their present conditions. All roadways except I-76 are subject to isolated intersection constraints which must be analyzed individually to determine any inadequacies such as the need for signalization, further widening, or special turn movement considerations.

4.2.3.3 Park Entrances. Currently, the project and state park have many entrances, as a result of the relationship of the Portage County road system and the boundaries of the property purchased for the reservoir. Available access points to the park (shown on Plate 8) are:

• East Side

1. Wayland Road (C-132), the main entrance to the Federal Administrative Area.
2. Cable Line Road (C-120), connecting Wayland Road from State Route 627.

• South Side

1. John Thomas Road (C-137-C), (narrow gravel surface makes access difficult).
2. Alliance Road (T-125-B), (also gravel and difficult to traverse).
3. Porter Road (C-54), (gravel south of Hughes Road).
4. Rock Spring Road (extension of SR 183).
5. Booth Road (T-119), off SR 14 (very difficult to traverse due to road condition).

• West Side

1. Cable Line Road (C-120), off SR 14 (closed due to impassable road conditions).

• North Side

1. Rock Spring Road, currently the main entrance to the park from SR 5 (bridge over the Baltimore and Ohio Railroad is in poor condition with poor vertical alignment and sight distances). See Figure 4-2. Further south on Rock Spring Road the project causeway bisects the reservoir (Figure 4-3).

4.2.3.4 Existing Roadway Conditions. Table 4-6 shows an inventory of the roadways within and adjacent to the project. Generally, the condition of the existing local roads is poor. The proximity of many of these roads to the project and their use for park access and circulation create a question of responsibility for their upkeep. The county's lack of road improvement funds coupled with the lack of manpower for maintenance has deferred much-needed road improvements. For these same reasons the state seems reluctant to construct or improve and maintain roads which are entirely within the project, expressly for park access and circulation. Adequate roadway widths and surfaces exist in only a few places in the entire project circulation scheme. These roadway surface conditions are illustrated on Plate 8 and Figures 4-4 through 4-7.

Major U.S. and state roadways leading to the project are in excellent condition, and, with projected improvements and adequate maintenance, they will be sufficient to handle future park visitation demands.

4.2.4 Population Characteristics. The 14-county, 50-mile, day-use visitation area contains a population of slightly more than 4 million persons. Major concentrations of people or metropolitan areas are located on nearly all sides of the project. The 1970 census data presented in Table 4-7 show that the area has a fairly urban character, with urban concentrations in Cuyahoga (Cleveland), Lake, Mahoning (Youngstown), Portage (Kent



Figure 4-2 Rock Spring Road Bridge
 over B&O Railroad.



Figure 4-3 Causeway, looking north.

Table 4-6. Roadway Inventory

Roadway Name	Access Type		Length (feet) Adjacent (A) or Within (W) Property	# of Lanes	Width (feet) of Pavement	Pavement Type	Pavement Condition	Part of new Park Major Access Roadway Systems	Comments
	Internal	External							
1. SR 5		x	32,000 (A)	2	31	asphalt	very good		major access road (NW-SE), 3-foot shoulders (paved)
2. SR 14		x	5,000 (W)/6,000 (A)	3	24	asphalt	very good		major access road (E-W), 1/2 mile section between Booth and Cable Line
3. Knapp Road	x	x	4,900 (W)/2,900 (A)	2	18.5	tar & chip	good		access to Kent State project, 1 lane ER bridge
4. Rock Spring Road	x	x	10,500 (W)	2	24	asphalt	good (poor/fair south of Hughes)	x	bridge @ SR 5-high arch-sight/speed restriction-wood
5. Booth Road	x	x	5,000 (A)/2,400 (out)	2	18	oil/gravel	poor		minimal surface, extreme potholes, recent asphalt in small sections
6. Hughes Road		x	6,700 (out)	2	18.5	asphalt	poor/fair		
7. Calvin Road	x	x	5,500 (A)/800 (W)	2	19	asphalt	fair		
8. Alliance Road	x		5,000 (W)	2	18.5	asphalt	good	x	gravel south of Calvin Road. New curve alignment @ Cable Line Rd. (2 miles)
9. John Thomas Rd.	x	x	1,800 (W)	2	21	tar/chip	fair		
10a. Cable Line Road (eastern portion)	x	x	3,500 (W)	2	24.5	asphalt	very good	x	(recently upgraded)
10b. Cable Line Road (western portion)	x		20,200 (W)	2	20	gravel & deteriorated paving	poor	x	most of portion between SR 14 & County Road 54 is gravel/very poor condition and closed to traffic; a short segment from Rock Spring to the west launch area is good.
11. Gilbert Road	x		1,000 (W)/3400 (A)	2	18.5	asphalt	very good	x	

Table 4-6 (Continued)

Roadway Name	Access Type		Length (feet)		# of Lanes	Width (feet) of Pavement	Pavement Type	Pavement Condition	Part of new Park Major Access Roadway Systems	Comments
	Internal	External	Adjacent (A) or Within (W) Property							
12. Kirwan Dam Road	x		11,000 (W)		2	18	asphalt	very good	x	cul-du-sac on dam itself and not major reservoir road, access controlled park entrance
13. Wayland Road		x	1,300 (A)		2	17	asphalt	fair		major N-S access at east end of reservoir
14. I-76		x	--		4	--	concrete	good		major E-W access
15. Esworthy Road	x		6,000 (W)		2	24	asphalt	good	x	
16. Copeland Road	x		2,800 (W)		2	24	asphalt	good	x	
17. Horsemen's Camp Access Road	x		10,400 (W)		2	16	No pavement (gravel and tar)	fair		
18. Porter Road	x	x	3,000 (W)/1,300 (A)		2	18	asphalt	good		poor condition south of Calvin
19. Newton Falls Road	x	x	2,000 (A)		2	16.5	asphalt	good/excellent		no direct access to reservoir
20. Fisher Road		x	600 (A) 7,000 (out)		2	14-16	gravel	fair		width narrow and irregular



Figure 4-4 Road conditions typical of Cable Line Road & Booth Road.



Figure 4-5 Cable Line Road looking west from Rock Spring Road.



Figure 4-6 Cable Line Road looking east
from entrance to West Launch Area.



Figure 4-7 Cable Line Road looking west
from Porter Road.

Table 4-7. 1970 Demographic Characteristics - 50-mile Day Use Market

<u>County</u>	<u>Total 1970 Population</u>	<u>Percent Urban</u>	<u>18 yrs. of Age and over</u>	<u>Median Age</u>	<u>Employed Persons</u>	<u>Median Family Income</u>
Carroll	21,579	21.7	63.6	28.6	7,718	\$ 8,635
Columbiana	108,310	55.9	65.4	30.5	39,624	9,028
Cuyahoga	1,721,300	99.6	66.7	30.2	695,800	11,299
Geauga	62,977	14.4	59.5	25.7	23,807	12,411
Lake	197,200	89.1	61.1	26.1	77,766	11,964
Mahoning	303,424	84.0	66.3	30.5	111,150	10,095
Medina	82,717	49.7	60.0	26.0	31,212	11,173
Portage	125,868	53.5	64.7	22.6	47,306	11,052
Stark	372,210	73.4	65.1	28.9	141,260	10,250
Summit	553,371	90.4	64.9	28.4	212,757	11,057
Trumbull	232,579	69.7	63.7	28.0	88,335	10,777
Wayne	87,123	40.2	62.9	25.8	34,894	9,992
Lawrence, Pa.	107,374	52.8	67.0	31.2	37,911	8,663
Mercer, Pa.	<u>127,173</u>	<u>49.8</u>	<u>65.6</u>	<u>29.7</u>	<u>45,491</u>	<u>9,286</u>
TOTAL AREA	4,103,205	83.3	65.4	28.8	1,595,031	\$10,853
Ohio	10,651,848	75.3	64.8	27.9	4,063,780	\$10,309

Source: County and City Data Book, 1976 U.S. Department of Commerce.

and Ravenna), Stark (Canton), and Summit (Akron) counties. These dispersed urban centers all have easy access to the project by the area's extensive highway system. Typical of most urban areas, the median age (28.8 years) of the market area's residents is significantly higher than Ohio's median age (27.9) or the nation's (28.3). This older population distribution relates directly to the type of recreational mix demanded, as well as the ability and interest of the population to use available recreational opportunities. In addition, the market area's population also has relatively high levels of income, with a median family income of \$10,900, comparing favorably to Ohio's \$10,300 or the nation's \$9,500 per family. Subsequently, the population has more money available to be spent on recreation, and this high income level serves to strengthen the ability of the population to demand and obtain the use of a wide variety of recreational facilities.

4.2.5 Population Growth Trends. The 50-mile day-use market area is expected to grow at a modest, steady rate throughout the forecast period. The population projections presented in Table 4-8 reflect that some areas were experiencing population adjustments during the 1970s, with 4 of the 14 counties showing slight decreases. The counties experiencing the greatest population growth are the "suburban" type counties of the central metropolitan areas and include Medina, Geauga, Lake, and Portage counties. While these "suburban" counties may have the highest population growth rates, the two largest central counties of Cuyahoga and Summit will contain the greatest absolute growth in numbers of people. Between 1980 and 2020, Cuyahoga and Summit counties are expected to increase by 600,000 people. This amount is more than 71% of the 846,000 projected growth for the entire 14-county area. The expected overall density of the market area is one person per acre in 1980, increasing to 2.15 persons/acre in 2020, and, eventually to 2.37 persons/acre in 2070.

The population projections were based on the annual growth rates from the OBERS Projections prepared for the Water Resources Council by the Bureau of Economic Analysis. The projections assumed that the county's growth rate would approximate the growth rate of the Water Resource Subarea in which it was contained. For the post-2020 growth rate estimates, the average 2000-2020 rate for all 14 counties was used.

4.2.6 Demand Trends. Although present population statistics seem to be somewhat static due to a shift from a manufacturing to non-manufacturing industrial base, as shown by recent declines in both the rubber and steel

Table 4-8. Population Projections¹ - 50-mile Day-Use Market

County	1970 ²	1980 ³	1985	1990	2000	2010	2020	2030	2040	2050	2060	2070
Carroll	21,579	25,598	24,900	25,400	26,200	27,000	28,000	29,000	30,000	31,000	32,000	33,000
Columbiana	108,310	113,572	114,500	115,700	116,900	120,000	123,000	126,000	129,000	133,000	137,000	141,000
Cuyahoga	1,721,300	1,498,295	1,710,100	1,759,900	1,811,700	1,889,000	1,970,000	2,054,000	2,142,000	2,233,000	2,328,000	2,427,000
Geauga	62,977	74,474	71,800	73,900	76,100	78,000	80,000	82,000	84,000	86,000	88,000	90,000
Lake	197,200	212,801	219,200	225,600	232,200	239,000	246,000	253,000	260,000	267,000	274,000	282,000
Mahoning	303,424	289,487	314,500	317,800	321,000	330,000	339,000	348,000	358,000	368,000	378,000	398,000
Medina	82,717	113,150	105,100	108,200	111,400	117,000	120,000	123,000	126,000	129,000	133,000	137,000
Portage	125,868	135,856	141,700	145,800	150,100	154,000	158,000	162,000	166,000	171,000	176,000	181,000
Stark	372,210	378,823	397,100	404,900	417,200	429,000	441,000	453,000	466,000	479,000	492,000	506,000
Summit	553,371	524,472	570,700	587,300	604,600	630,000	657,000	685,000	714,000	744,000	776,000	809,000
Trumbull	232,579	241,863	247,100	249,700	252,200	259,000	266,000	273,000	281,000	289,000	297,000	305,000
Wayne	87,123	97,408	94,000	95,800	98,700	101,000	104,000	107,000	110,000	113,000	116,000	119,000
Lawrence	107,374	107,150	108,500	109,600	110,700	114,000	117,000	120,000	123,000	126,000	129,000	133,000
Mercer	<u>127,173</u>	<u>128,299</u>	<u>129,100</u>	<u>130,400</u>	<u>131,700</u>	<u>135,000</u>	<u>139,000</u>	<u>143,000</u>	<u>147,000</u>	<u>151,000</u>	<u>155,000</u>	<u>159,000</u>
TOTAL	4,103,205	3,941,248	4,248,300	4,350,000	4,460,700	4,622,000	4,788,000	4,958,000	5,136,000	5,320,000	5,511,000	5,720,000

¹ Based on growth rates from OBERS PROJECTIONS, U.S. Water Resources Council, 1974.

² 1970 Census, U.S. Bureau of the Census.

³ 1980 Census, U.S. Bureau of the Census.

industries in the area, inflationary costs associated with traveling and vacations have created a demand for vacations of shorter duration, closer to home. Should this present trend continue, the project, because of its location in the heavily populated northeast quadrant of Ohio, could realize demands for its facilities far in excess of normal projections. According to 1977 Corps tabulations, demand for recreational activity by type and percent of total visitation is expressed in Table 4-9. These figures are based on totals only, and no adjustments have been made for multiple facility users.

Table 4-9. Existing Recreational Demand and Percent Use
(Base Year 1977)

<u>Recreational Activity</u>	<u>Percent of Visitation</u>
Sightseeing	43
Swimming	14
Boating	13
Fishing	11
Picnicking	8
Camping	4
Water Skiing	3
Hiking	2
Hunting	1
Winter Sports	<u>1</u>
	100

These percentages vary slightly with estimates compiled by ODNR, but are generally consistent with those figures. They do, however, reflect a surprising uniformity in the range of recreational interests, with about 5% of all usage devoted to activities other-than-day-use. In similar facilities, this percentage of other than day use activities usually averages 15 to 25% of total use. This apparent statistical difference, together with the constant demand for camping sites at the project, points to

an immediate need for additional camping facilities to compensate for this apparent deficiency.

4.2.7 Visitation Market Area. Place of residence is the single most important factor in the determination of a project's "market area." Other, lesser factors include: (a) the size of the project, (b) facilities available to meet people's desires, (c) proximity to competing recreational centers which offer alternative choices, and (d) population concentrations near the project. It has been determined by statistical analyses of camping records provided by ODNR that 85% of the campground users originate from a 14-county, 50-mile radius of the project. Day-use visitors, because of the nature of a one-day stay, originate from this same area in percentages which at least equal or exceed those of campground use. Since this 50-mile radius area contributes at least 85% of all day-use visitation, it has been selected as the "market area" limit for master planning purposes. This area is shown on Plate 1 and indicates the location of, and distances to, the major population centers in each county.

4.2.8 Competing Recreational Opportunities. A number of public and private resources exist in the Michael J. Kirwan Dam and Reservoir/West Branch State Park day-use market area as shown on Table 4-10 and provide opportunities for water-associated recreation activities. As shown on Plate 1, ten state parks (seven Ohio, two Pennsylvania, and one West Virginia) and eight Corps of Engineers' reservoirs co-exist within a 50-mile radius of the project. There are also at least 26 private campgrounds within the market area; the following activities are provided in these private campgrounds in the quantities indicated.

While the presence of so many facilities, both private and public, would seem to indicate more than enough opportunities available to recreationists within the market area, demand statistics indicate this is not the case. Furthermore, only three of the state parks and three of the Corps-maintained reservoirs are large enough to offer the same range of water-related activities that would qualify them as major water-oriented recreation competitors.

Table 4-10. Private Facilities within the Market Area

<u>Activity</u>	<u>No. of Private Campgrounds Offering Activity</u>
Boating	16
Swimming	22
Fishing	20
Picnicking	21
Camping	26*

*Total campsites available for tents, tent-trailers, etc.
= 5,924 spaces.

Two Lake Erie state parks and 21 pleasure boat facilities along Lake Erie were also considered. However, in light of current demands for the Kirwan facility and because Lake Erie boating appeals largely to owners of large power and sail boats, rather than to the owners of small, trailer-transported boats, these areas were dropped from consideration. The impact of the 30,000-acre Cuyahoga Valley National Recreation Area, which falls within the project market area, was not deemed significant because it lacks water-oriented recreational facilities. Similarly, the recreation opportunities offered by the Cleveland-Akron Metropark Systems, although quite intensive in sightseeing and picnicking, are more river-oriented and thus do not qualify as major recreation competitors either. Those facilities considered to be competing water-oriented recreation opportunities are shown in Table 4-11.

4.2.9 The Local Economy. The general local economy of the area is fairly typical of the state's profile. Of the approximately 49,000 employees in Portage County, 37% are employed in manufacturing, 17% in wholesale and retail trade, and 5% in services. The local economy is unique in its scope of educational services which accounts for 14% of the total employment, due primarily to the needs of Kent State University. The University gives the Portage County labor force a highly educated, white collar character.

Table 4-11. Competing Water-Oriented Recreation Opportunities

Water-Oriented Recreation Opportunities	Facilities						
	Water Area (acre)	Total Area (acre)	Boat Launch Lanes	Picnic Sites	Trails (Mi.)	Camp- Sites	Other
<u>STATE PARKS</u>							
<u>Ohio:</u>							
Guilford Lake	396	489	3	269	-0-	82	
Mosquito Creek	7,850	11,811	14	589	10	234	
Portage Lakes	2,150	2,441	4	445	1	-0-	
Punderson	90	890	2	448	3	201	
Pymatuning	3,580	8,449	8	490	2	434	
<u>Pennsylvania:</u>							
Pymatuning	17,000	22,000	12	1,100	3	832	
<u>West Virginia:</u>							
Tomlinson Run	±10	1,399	-0-	150	12	10	Tennis court, pool
<u>CORPS PROJECTS</u>							
<u>Huntington District:</u>							
Atwood Lake	10,540	11,315	4	766	3	569	
Beach City Lake	420	1,342	1	36	-0-	-0-	
Leesville Lake	1,000	2,280	6	41	-0-	203	
<u>Pittsburgh District:</u>							
Berlin Lake	2,900	6,886	18	147	13	466	
Mosquito Creek Lake	7,800	11,214	9	654	8	234	
Shenango River Lake	3,550	11,544	19	7	15	685	

4.3 RELATED CULTURAL AREAS

4.3.1 Kent State University Project

4.3.1.1 Authority. In 1972, the Board of Kent State University and the Director of the Department of Natural Resources of the State of Ohio signed a sublease agreement for an area of approximately 98 acres of federal land in the northwest corner of the project area. They also signed a lease for an area of state-owned property on Knapp Road (T-169A) amounting to slightly more than two acres. The sublease is subject to all agreements and limitations of the original 1968 lease between the U.S. Army Corps of Engineers and the ODNR and its 1972 supplement. The lease and sublease are in effect until the expiration of the lease between Department of Natural Resources and the Corps of Engineers in 2018.

According to the lease, the University has the right, privilege, and authority to "construct, maintain, remove and repair buildings, roadways and bridges with approval of the Department of Natural Resources." This approval is forthcoming as long as the modifications are in keeping with the general concept and the uses outlined in the 1969 Development Plan for an Outdoor Education Center.

4.3.1.2. Concepts and Uses Outlined in 1969 Development Plan. Plans for an Outdoor Education Center were initiated in 1969 by Kent State University. In 1971, the University developed these plans with the help of ODNR and submitted them to the Pittsburgh District which approved them. Subsequently, the plans were included as part of a document called "Proposed Plans - West Branch Property," dated March 1973.

The following programs and curricula are the basis for the development plan and are written into the lease and sub-lease agreement.

4.3.1.2.1 Secondary Education. The proper instruction of future teachers in all facets of conservation under natural environmental conditions to better prepare them for properly teaching conservation and environmental subjects in their classrooms.

4.3.1.2.2 Special Education. The provision of communal camp living and development of motor skills in outdoor-oriented activities for handicapped children, whereby not only the handicapped children but future teachers of such children would benefit.

4.3.1.2.3 Biological Sciences. The provision of an outdoor laboratory for study purposes and activities of all biological science courses and the ecological approach to these studies to teach the total relationship between man and the world around him.

4.3.1.2.4 Parks and Recreation. The provision of an outdoor area for the proper training of future park administrators, recreation leaders, forestry and wildlife personnel, YMCA and YWCA leaders, and scout leaders.

4.3.1.2.5 Environmental and Biological Research. The provision of an outdoor area for graduate and faculty work on an ongoing basis for studies and research on terrestrial and aquatic environment.

4.3.1.3 Site Development Plans. In general, site plans developed for the 1973 "Proposed Plans - West Branch Property" concentrated on the Special Education program. It was believed that if the conceptual thinking was programmed to the most restrictive use, that of handicapped children, the facilities would be successful for all of their intended purposes.

There are six major elements of the site development plan (see Plate 20).

4.3.1.3.1 Main Building, which is composed of administrative and staff area, an education wing, an assembly and dining hall, and six sleeping cabins connected to the larger building. The design permits the addition of an indoor/outdoor swimming facility at a later date.

4.3.1.3.2 Boat Dock for 20 boats.

4.3.1.3.3 250-Foot Beach, which would require extensive earth moving and grading as well as the filling of a reservoir inlet.

4.3.1.3.4 Camping Area, of 20 to 30 tent sites, plus toilet facilities, water, grills, and a shelter.

4.3.1.3.5 Outdoor Theatre for 200 people, which has been located to take advantage of natural features.

4.3.1.3.6 Play Areas for softball, football, archery, and other field activities which are planned for existing cleared areas, requiring a minimum of grading. The area to be filled behind the proposed beach would be suitable for smaller court games.

These areas are to be connected by 10-foot-wide, hard-surface trails to accommodate wheelchairs, as well as an occasional emergency or service vehicle. Cleared and gravelled trails would be planned later to take advantage of natural areas of interest. Approximately 2,000 feet of 20-foot-wide roads and parking are planned. Roads and the drainage and grading for them have been kept to a minimum.

Design criteria for water supply were: 150 gallons per day per person, plus 30 gallons per day per dining hall seat, with design populations of 200 people and 150 dining seats. Three wells, including a standby unit, would supply this quantity, plus excess capacity. It is expected that a water treatment plant will be required.

A sanitary sewer system is expected to be necessary to serve the main building and the camping area. A plant with a capacity of 35,000 gallons per day to supply treatment is anticipated.

The site development plan also recommends the acquisition of two sites to provide a residence for a permanent caretaker and a small farm as an adjunct educational area.

4.3.1.4. Current Situation. Due to a lack of funding, the development plan has not yet been implemented. Around 1973, the Marine Corps Green Berets assisted in the construction of some temporary facilities, including three rustic shelters, a small bridge, and a boat dock. The site has been used by Kent State University students in the parks and recreation program, and occasionally by the biology and special education programs. The University is actively seeking funds for this area, in particular, to provide water and sanitary facilities. Discussions between the Department of the Interior and the University may lead to matching funds. It is expected that, with water and sanitary facilities available, the University departments would take greater advantage of the site. The new University president and his administration, and the University's Department of Health, Physical Education and Recreation consider the West Branch site a priority project, but, until funding sources can be identified, no timetable for development can be established.

This site is not only remote from other active recreation areas within the park, but it is isolated from other parklands by the Knapp Road right of way on the west and the Hinkley Creek inlet to the east. In addition, it is served by a separate, non-park access road. For these reasons, the site is well-adapted to its proposed use.

4.4 RESERVOIR PLAN OF OPERATION. In addition to the benefits derived from the reservoir, three minor adverse effects on the recreation potential of the reservoir and state park, related to operational procedures, have been identified.

4.4.1 Drawdown. The drawdown of the reservoir pool in the fall of each year, combined with the topography of the area, tends to reduce the recreation potential in parts of the reservoir. The drawdown of 4 to 10 feet by 1 October of each year (depending on summer precipitation) creates vast mud-flats in the upper reaches of the reservoir limiting boating access and detracting from the general aesthetics. The aesthetic consideration is not of an overriding importance, except for the fact that the only major vistas of the reservoir off a main road (SR 14) occur in this area, and the effects of the drawdown are thus highly visible. The amount of drawdown in any one year also affects the longevity of boat-launch ramp use. With the toes of the ramps at elevation 972.5 in dry years, the existing ramps function until mid-October. As the boating season progresses into September and October, boat launching and boating become more hazardous, due to the exposure of stumps near the shoreline and in the more shallow parts of the reservoir. Pool fluctuations resulting from drawdown are shown on a yearly basis on Figure 4-8.

4.4.2 Flood Conditions. Since most floods occur in late winter and spring, it is not expected that flood water storage would substantially hamper the summer recreational uses. However, an occasional impoundment of water above elevation 988 could inundate parking areas and the service roads used to service water-related activities.

4.4.3 Outflow Water Quality. Tests of the outflow water have indicated near-saturation levels of dissolved oxygen, and water temperatures vary from about 33°F in winter to about 68°F in summer. Yet, for reasons not determined, few fresh water game fish, other than some forage species, migrate upriver to these waters, and few fish, if any, can survive the pressure differential coming through the outlet works from the reservoir. Therefore, the potential fisheries in this section of river which is apparently suitable to sustain fish life are not naturally replenished nor are they stocked by the state. This condition reduces the recreational value of this section of river and limits its use to sightseeing, in particular, viewing the outlet structure and spillway. This impact is not significant considering the availability of shore fishing in the reservoir.

4.4.4 Summary. Certain of the aforementioned potentially adverse conditions resulting from reservoir operations are theoretical in nature and have had, and will have, little impact on recreational development. This may be due to actual operating characteristics, as discussed, which in reality are more significant than these theoretical considerations. These are the full pool elevation 993.0 which has never been reached since impoundment, and the maximum summer pool elevation 985.5 which has been reached in 13 of the 15 years of the project life, to date. This consistency in attaining summer pool in May of each year is an important factor in the quality of year-long, water-related activities. Pool fluctuations are shown in Figure 4-8.

4.5 RELOCATIONS AND DEMOLITION

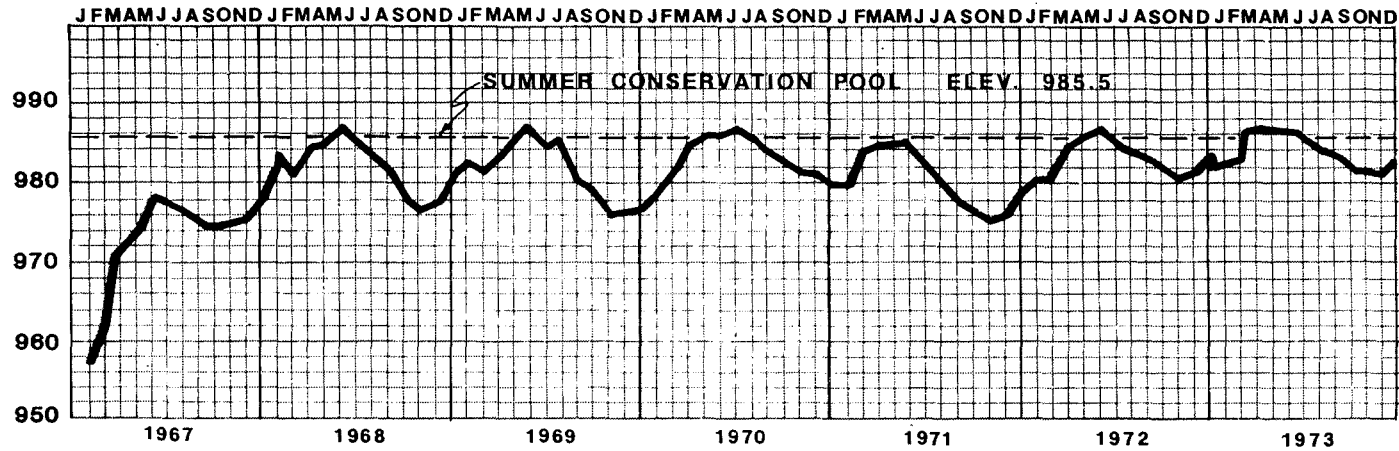
4.5.1 Bridges. The construction of the project resulted in the demolition of both rail and highway bridges. A total of nine bridges were removed. Where bridge abutments were located within the pool fluctuation range, they were removed in the interest of boating safety.

4.5.2 Power and Telephone Facilities. Power and telephone facilities were removed by the owners or abandoned in the project area. All abandoned lines became the property of the government and were removed by the clearing contractor.

4.5.3 Gas Lines - Gas and Oil Wells. Two high-pressure East Ohio Gas Company gas lines which traversed the site were abandoned and salvaged. A 3-inch and 4-inch gas gathering pipeline system at the western end of the reservoir has been partially relocated to accommodate the project. The abandoned portions of this system were plugged, and the rights thereto transferred to the government. Several operating gas and oil wells still exist on West Branch State Park property with the right-of-access and operation licensed by the state. Only one, at elevation 989.7, required protection from potential flooding. All others are above the 200-year flood elevation 993.0. Operating and abandoned wells are shown on Plate 4, and Figures 4-9 and 4-10 show typical oil wells and storage tanks within the area.

4.5.4 Cemeteries. A small cemetery exists on the property previously owned by the Elliot Lake Club, Inc. It is located north of Cable Line Road just west of Porter Road within the area of recreation lands acquired by the Corps. Since the cemetery is 15 feet above the maximum water surface of the reservoir, grave relocations were not necessary, and the actual cemetery plot (shown on Plate 6) was not acquired by the Corps.

POOL FLUCTUATIONS 1967-81



-71-

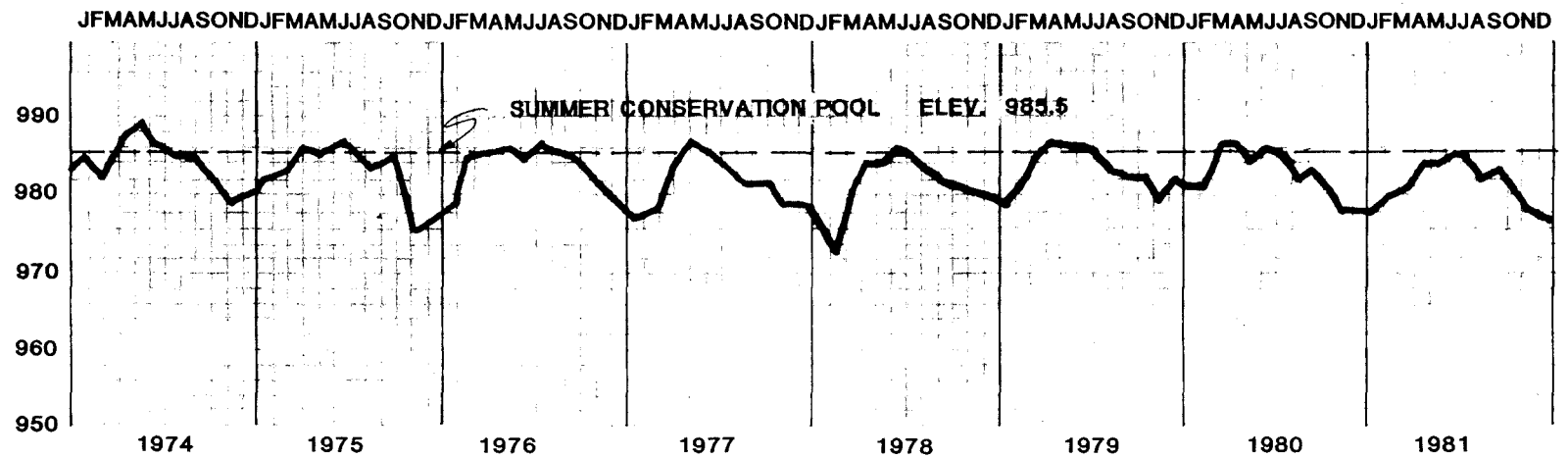


FIGURE 4-8 - POOL FLUCTUATIONS

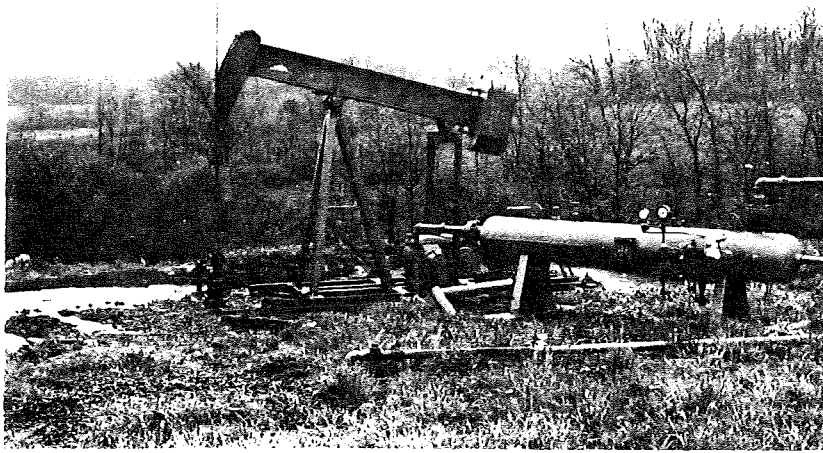


Figure 4-9 Typical oil/gas well.

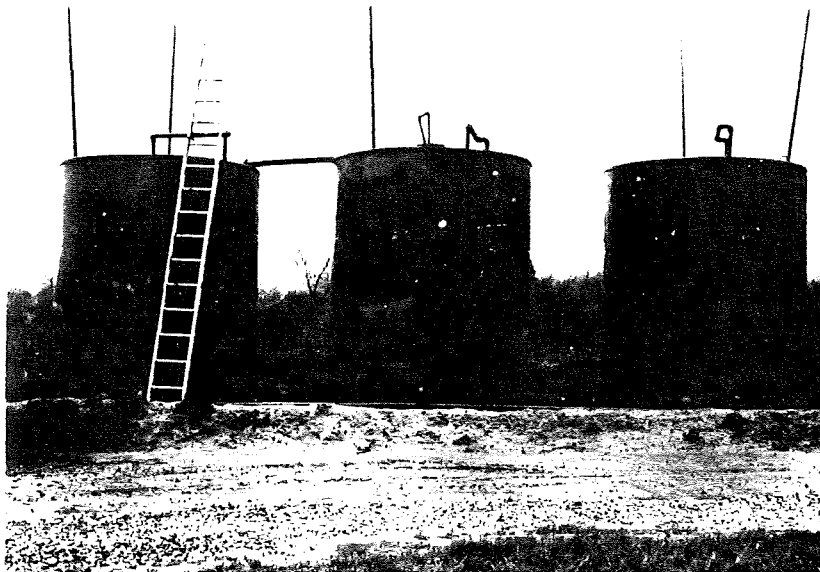


Figure 4-10 Oil storage.

4.6 ADAPTABILITY OF PROJECT STRUCTURES FOR PUBLIC USE

4.6.1 Overlook Area at the Spillway. There is a shelf of land south of the spillway at the northern terminus of the main dam structure which has been evaluated for development as an overlook area. U.S. Army Corps of Engineers memorandum ORPED-PL, dated 6 January 1982, deletes this project as a public access area.

Percolation tests made during subsurface soil investigation revealed that the soil was not suitable for sewage disposal. According to Corps studies, it would be very costly to design, build, and operate an acceptable sewage treatment plant for this area. Design of the restrooms could include the use of low-flush fixtures and a sewage holding tank which would be pumped out as needed. This, too, is costly to operate and maintain.

Well-water quality tests revealed that considerable filtering and backwash are required to make the water acceptable. Disposal of the backwash water could also present a problem because the soil is unsuitable and a discharge permit would be required.

In addition to difficulties with sewage and water treatment, access to the site over the 16-foot-wide dam roadway would be hazardous for extensive two-way traffic and yet would be made necessary by this development. The existing turnaround on the site will be used, however, as an undeveloped area for sightseeing by windshield survey. Parking and picnicking will not be encouraged.

4.6.2 Manager's Complex and Visitor Center. This facility is presently under construction in that area north of the project entrance off Wayland Road. This development will remove the manager's office from the control building and make it more accessible to the public. A small visitor center, together with adequate short-term parking, will be provided. This center will provide information on the primary functions of the dam and reservoir, its construction, and the mechanics of its operation.

4.6.3 Convenience Parking Area. This area, presently being developed by District personnel, is to provide hikers and sightseers access to a trail system developed to view the lower spillway and outlet works. It is located off Wayland Road, north of the West Branch Mahoning River Bridge. The topographic character of this site is somewhat irregular and impounds surface water. Substantial drainage construction and regrading was required.

4.7 PROJECTED RECREATIONAL USE

The estimated annual visitation for the year 1980 is expected to be 1,170,000, and for the year 2070, 1,600,000. This projection assumes that facilities are provided to satisfy demand. This 90-year study period is considered to be the economic life of the reservoir. The ultimate day-use visitation is based on population growth projections for the 14-county, 50-mile zone around the reservoir, and based on the assumption that the magnitude of competing, water-oriented recreation facilities in this zone will stay fairly constant. This recreation-use market area is illustrated on Plate 1.

4.7.1 Estimation Methodology. The methodology employed in estimating future recreation use at the project is based on the "similar project" theory, as outlined in Technical Report No. 2, Estimating Initial Reservoir Recreation Use, and as prescribed in ER 1120-2-403, "Procedure for Estimating Recreation Use," dated 26 March 1970.

The New Hogan project in California and the Hills Creek project in Oregon were selected for their similarity to this project in physical, socioeconomic, and competitive market characteristics. Table 4-12, "Comparison of Pertinent Project Data," shows a comparison of these reservoirs' characteristics.

Physical characteristics include the area and circumference of the average recreation pool, the terrain around the reservoir, the number of access areas, and existing recreation facilities. Competing water-oriented recreation areas are lakes and reservoirs within 50 miles of the project (Lake Erie was not included for this project because of the difference of its water-oriented recreation market). Competing facilities were examined based on distance, size, and attendance. The distribution of population and the attendance from zones within the market area were examined to note similarities and dissimilarities between the projects.

4.7.2 Per Capita Use Rates. Because of the similarity of the New Hogan and Hills Creek projects to the Kirwan project, the per capita use rates for the two similar projects, taken from Technical Report No. 2, were used to develop a per capita use curve for the Michael J. Kirwan project. Dissimilarities between the projects were recognized and were empirically adjusted to develop the finalized Per Capita Use Curve, shown on Figure 4-11.

4.7.3 Determining Day-Use. Preliminary studies of recreation use at existing Corps of Engineers projects

Table 4-12. Comparison of Pertinent Project Data

Item	Michael J. Kirwan Ohio	New Hogan California	Hills Creek Oregon
Location (State)			
Maximum pool:			
Acre-feet	78,700	325,000	356,000
Surface acres	3,240	4,410	2,819
Average recreation pool:			
Surface acres	2,650	2,650	2,700
Shoreline miles	40	42	35
Year impoundment began	1966	1963	1961
Number of access areas	7	3	5
Recreation facilities:			
Tent and trailer spaces	103	25	58
Day-use areas (capacity in recreation days)	14,000	10,000	1,500
Boat launch lanes	4	3	5
Attendance (recreation days):			
1977	825,000	117,000	34,570
1976	985,000	194,200	130,600
1975	1,070,000	274,200	105,420
1974	1,019,000	241,100	94,510
1973	880,000	233,600	174,180
1972	772,000	259,400	158,500
1971	735,000	321,100	135,500
1970	686,000	254,900	164,800
1969	423,000	294,200	136,700
1968	482,000	348,860	
1967	265,000	300,500	99,600
1966	--	344,210	107,450
1965	--	248,880	95,500
1964	--	103,400	66,410
Recreation season	May-Oct	Apr-Sept	May-Sept
Project purpose (FC = flood control, R = recreation, C = conservation, P = power, WS = water supply, and I = irrigation)	FC, R, C, WS	FC, I	FC, C, P
Timber cover	Moderate	Sparse	Dense
Reservoir terrain	Moderate	Moderate	Steep
In National Forest	No	No	Yes
Access:			
Paved road, about 1/2 of reservoir	Yes	No	Yes
Limited access, about 1/2 of reservoir	Yes	Yes	No
Overnight lodging nearby	Yes	No	Yes
Competing water-oriented recreation areas:			
0-25 miles-lake (acres)	13,590	9,956	5,385
-river (miles)	22	0	0
25-50 miles			
-lake (acres)	11,260	14,220	16,452

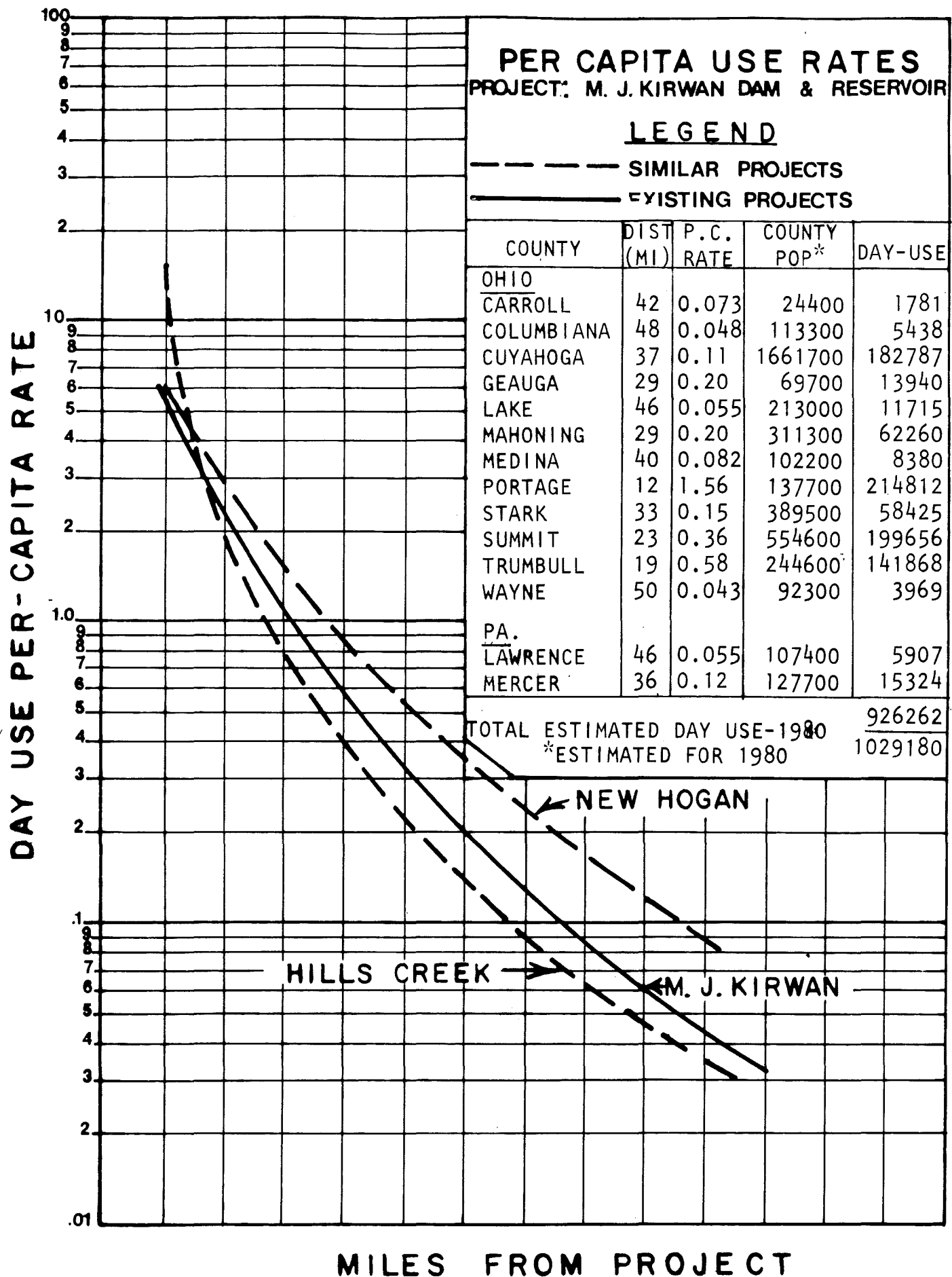


FIGURE 4 - II PER CAPITA USE CURVE

have shown that the per capita attendance rate of the largest urban center in the county (centroid) will provide a reliable indication of the per capita rate of the entire county population. Accordingly, the largest town in each of the 14 counties in the project's day-use market area was selected and its distance in road miles from the Kirwan project was measured.

The project day-use market area is defined as the area contributing 80% or more of the annual day-use visitation to the project. On the basis of studies of day-use visitors' origins (described in Section 4.2.7), this area has been determined by circumscribing a circle with a 50-road-mile radius from Kirwan Dam. This market area includes 14 counties which fall either wholly or mostly within this "circle."

Per capita use rates were obtained from the per capita use curve generated for Kirwan Dam (shown on Figure 4-11). Day-use per capita rates were determined by locating intersection points on the curve for each county, based on the road mile distance of the largest town from Kirwan Dam. This per capita rate multiplied by the county population provided the estimated attendance from that county, and the sum of all of the county attendances provided the total day-use which is estimated to originate from the market area. The potential 1980 and 2070 day-use attendance rates for the project were computed by this method and are shown on Tables 4-13 and 4-14.

4.7.4 Total Estimated Attendance. Technical Report No. 2 indicates that the project market area is the source of 80 to 100% of total day-use, or an estimated average of 90%. Accordingly, the base day-use within the project market area, shown on Tables 4-13 and 4-14, was divided by 0.9, which yielded a total base year day-use for 1980 and 2070 of 1,029,200 and 1,398,200, respectively. The total estimated attendance was then derived by dividing the total base year day-use by 1.00 minus the percentage of total use which is estimated to be overnight use. The percentage of overnight use was projected at 12%, based on data from actual use of facilities at Kirwan Dam in recent years plus an allowance for the large, latent demand for camping facilities evidenced in the numbers of potential campers turned away every summer weekend regardless of the weather. West Branch State Park attendance figures for 1973 to 1977 indicate that about 8% of use was overnight; 4% was then added for the latent demand. Table 4-15 shows the predicted annual recreation use at Kirwan Dam for the years 1980 through 2070.

Table 4-13. Kirwan Dam Initial 1980 Attendance

<u>State & County</u>	<u>1980* Population</u>	<u>Distance of Largest Town from Project (miles)</u>	<u>Day-Use* Per Capita Rate</u>	<u>Day-Use Attendance at Project (Rec Days)</u>
<u>Ohio</u>				
Carroll	24,400	42	0.073	1,781
Columbiana	113,300	48	0.048	5,438
Cuyahoga	1,661,700	37	0.11	182,787
Geauga	69,700	29	0.20	13,940
Lake	213,000	46	0.055	11,715
Mahoning	311,300	29	0.20	62,260
Medina	102,200	40	0.082	8,380
Portage	137,700	12	1.56	214,812
Stark	389,500	33	0.15	58,425
Summit	554,600	23	0.36	199,656
Trumbull	244,600	19	0.58	141,868
Wayne	92,300	50	0.043	3,969
<u>Pennsylvania</u>				
Lawrence	107,400	46	0.055	5,907
Mercer	127,700	36	0.12	<u>15,324</u>
TOTAL DAY-USE FROM MARKET AREA				926,000
TOTAL BASE YEAR DAY-USE (926,000 ÷ 0.9)				1,029,000
TOTAL ESTIMATED ATTENDANCE (1980) (1,029,000 ÷ 0.88)				1,170,000
ROUNDED FIGURE				1,170,000

* (Source) Section 4.2.5, Table 4-8.

** (Source) Section 4.7.2, Figure 4-11.

Table 4-14. Kirwan Dam Ultimate Attendance (2070).

<u>State & County</u>	<u>2070* Projected Population</u>	<u>Distance of Largest Town from Project (miles)</u>	<u>Per Capita** Day-Use Rate</u>	<u>Day-Use Attendance at Project (Rec Days)</u>
<u>Ohio</u>				
Carroll	33,000	42	0.073	2,409
Columbiana	141,000	48	0.048	6,768
Cuyahoga	2,427,000	37	0.11	266,970
Geauga	90,000	29	0.20	18,000
Lake	282,000	46	0.055	15,510
Mahoning	398,000	29	0.20	79,600
Medina	137,000	40	0.082	11,234
Portage	181,000	12	1.56	282,360
Stark	506,000	33	0.15	75,900
Summit	809,000	23	0.36	291,240
Trumbull	305,000	19	0.58	176,900
Wayne	119,000	50	0.043	5,117
<u>Pennsylvania</u>				
Lawrence	133,000	46	0.055	7,315
Mercer	159,000	36	0.12	<u>19,080</u>
TOTAL DAY-USE FROM MARKET AREA				1,258,000
TOTAL BASE YEAR DAY-USE (1,258,000 ÷ 0.9)				1,398,000
TOTAL ESTIMATED ATTENDANCE (2070) (1,398,000 ÷ 0.88)				1,589,000
ROUNDED FIGURE				1,590,000

*Section 4.2.5, Table 4-8.

**Section 4.7.2, Figure 4-11.

Table 4-15. Projected Annual Recreation Use (Recreation Days) (rounded)

Year	Day-Use	Overnight Use	Total Use
1980	1,029,200	140,300	1,170,000
1985	1,053,600	143,700	1,200,000
1990	1,076,300	146,800	1,220,000
2000	1,105,500	150,700	1,260,000
2010	1,142,500	155,800	1,300,000
2020	1,181,000	161,000	1,340,000
2030	1,220,100	166,400	1,390,000
2040	1,261,200	171,900	1,430,000
2050	1,304,800	177,900	1,480,000
2060	1,349,800	184,100	1,530,000
2070	1,398,200	190,700	1,590,000

Because of steady population growth projections, a corresponding steady growth in day, overnight, and total use is exhibited. In reality, other intangible factors such as weather and the availability and cost of fuel are important elements in Total Use. (Note season dip in 1979 and peak in 1975.) When comparing Total Use estimates they should, in reality, be considered as 10-year averages, as opposed to growth milestones.

SECTION 5 COORDINATION

5.1 GENERAL. Federal, state, and local governments and interested organizations were contacted during the preparation of the Master Plan to identify concerns about the Kirwan Dam project and to obtain agency comments. These comments also assisted in identifying additional sources of information and related issues that were to be considered during further studies. A listing of agencies and organizations contacted is found in Table 5-1. Comments received are summarized below.

5.2 FEDERAL AGENCIES

5.2.1 The Heritage Conservation and Recreation Service. As of 1 October 1980, the Heritage Conservation and Recreation Service (HCRS) was disbanded and its responsibilities absorbed by the National Park Service. At the time of this master plan's development, HCRS indicated that their program responsibility in the project involved previous Land and Water Conservation Fund grants for initial development of West Branch Reservoir State Park and the State Park Marina. HCRS indicated that, since the entire 8,000 acres are included within the grants' project, the lands cannot be converted to uses other than those for public, outdoor recreation, without the approval of the Secretary of the Interior. HCRS indicated a desire to review the draft Master Plan prior to finalization.

5.2.2 The National Park Service. At the time of the preparation of this master plan, the National Park Service indicated that it had no programs or areas in Portage County that would be affected by the project Master Plan effort (see Section 5.2.1).

5.2.3 The Soil Conservation Service. This agency provided unpublished soils information for the project area. The Soil Conservation Service (SCS) indicated an interest in providing planning input and assistance. Soils information provided has been incorporated into the Master Plan.

5.3 STATE AGENCIES

5.3.1 The Ohio Department of Highway Safety. This agency provided a detailed accident listing for rural Portage County to assist in determining traffic problems in and around the project area. The Ohio Department of Highway Safety (ODHS) indicated no knowledge of any particular problems in the area of the project.

Table 5-1. Organizations Contacted During Preparation of Master Plan.

Agencies		Comments Solicited in Writing	Response Received	Meetings (+) or Phone Discussions (*)
I. Federal Agencies				
• U.S. Department of Interior				
Heritage Conservation & Recreation				
Service		X	X	
Fish and Wildlife Service		X	X	*
National Park Service		X	X	
• U.S. Department of Agriculture				
Soil Conservation Service		X	X	
• U.S. Environmental Protection Agency		X	X	
II. State Agencies				
• Ohio Department of Highway Safety		X	X	
• Ohio Department of Transportation		X	X	
• Ohio Environmental Protection Agency		X	X	
• Ohio Department of Natural Resources				
West Branch State Park Manager				++
Division of Natural Areas and Preserves		X	X	*
Ohio Natural Heritage Program		X	X	*
Division of Oil and Gas		X	X	
Division of Parks and Recreation				++
Division of Wildlife		X	X	++
• Ohio Historic Preservation Office				
Cleveland Museum of Natural History				
Regional Preservation Office,				
Archaeology		X	X	*
Western Reserve Historical Society		X	X	*
III. County and Local				
• Portage County Planning Commission		X		++
• Board of Portage County Commissioners		X	X	
• Portage County Sanitary Engineer		X	X	*
• Portage County Engineer		X	X	
• Portage County Health Department		X		*
• Portage County Community Development		X		*
• Mayor, City of Ravenna		X		
• Portage County Historical Society		X	X	**
• Ravenna Township Trustees		X		
• Rootstown Township Trustees		X		
• Paris Township Trustees		X		
• Edinburg Township Trustees		X	X	
• Palmyra Township Trustees		X		
• Charlestown Township Trustees		X		
IV. Regional Planning Agencies				
A. NEFCO		X	X	
B. Akron Metropolitan Area Transportation				
Study		X		
V. Other				
Environmental Studies, University of Akron		X		
Kent State University		X	X	*
Buckeye Trail Association		X	X	
Ohio Edison				++
Muskingum Watershed Conservancy District				*

5.3.2 The Ohio Department of Transportation. This agency provided traffic projections for the year 2000 for state routes adjoining the project. Based on the projections, the Ohio Department of Transportation (ODOT) indicated that SR 5 and SR 14 will require 4 lanes sometime between the present and the year 2000. Route 14 currently crosses the western end of the reservoir. ODOT did not note any traffic problems in the project area at this time.

5.3.3 The Ohio Department of Natural Resources. This agency was contacted throughout the development of the Master Plan, because it has leased most of the project lands. Several meetings were held with the Division of Parks and Recreation and the West Branch State Park Manager to define project needs and to review concepts being considered in the Master Plan. The results of these meetings are taken into account in the Master Plan, but are not discussed in this section. Following is a list of other divisions contacted within the Ohio Department of Natural Resources (ODNR), along with a summary of responses.

5.3.3.1 The Division of Natural Areas and Preserves. This agency was contacted to determine if any areas were worthy of dedication as State Nature Preserves. Although the areas specified as natural areas in the Master Plan are of good quality according to the Division of Natural Areas and Preserves (DNAP), there are no plans to dedicate any of these areas.

5.3.3.2 The Ohio Natural Heritage Program. This is a state program within the Ohio Department of Natural Resources which inventories Ohio's natural features; it provided valuable information on threatened and endangered species in the project area on file with the Ohio Natural Heritage Program (ONHP).

5.3.3.3 The Division of Oil and Gas. This agency provided information on the location and operating status of oil and gas wells in the project area. It also provided a copy of the environmental guidelines for drilling and operation of oil and gas wells.

5.3.3.4 The Division of Wildlife. In addition to attending the initial project meeting for this study, the Division of Wildlife provided information on fish stocking, wildlife management, and the location and extent of share-cropping activities at the project.

5.3.4 The Regional Offices of the Ohio Historic Preservation Office, Ohio Historical Society. This agency

provided information on the location of historic and pre-historic resources in the area. Specifically, the Western Reserve Historical Society identified the location of one National Register site just outside the project. The Cleveland Museum of Natural History provided information on the location of five confirmed prehistoric sites within the project area. These sites are not presently considered significant enough to warrant listing on the National Register of Historic Places, and additional work would be required to enable the keeper of the Register to make a determination of their status. The Museum also noted that no thorough survey has yet been made.

5.4 COUNTY AND LOCAL AGENCIES

5.4.1 The Portage County Engineer. This office provided several comments related to park access. Comments consisted of: the need to provide improved signing for access roads; the need to upgrade many of the unimproved access roads that were not initially constructed to withstand the large volumes of traffic; and the lack of county funds to upgrade the access roads to carry the additional traffic generated by the project.

5.4.2 The Edinburg Township Trustees. The Trustees suggested that the state take over maintenance of Porter Road (currently county operated) because of excess, park generated traffic and that consideration be given to providing baseball fields, tennis courts, and additional recreational facilities. It was also suggested that assistance be given to the township in obtaining grants for the fire department, since it provides fire protection to the park.

5.5 REGIONAL PLANNING AGENCY

5.5.1 Northeast Ohio Four County Organization (NEFCO). This agency provided a range of suggestions and comments on projected area population, access, potential development problems which may affect reservoir water quality and the project's aesthetics, and the need for additional hiking trails.

5.6 OTHER

5.6.1 Kent State University. The University has subleased from the Ohio Department of Natural Resources (ODNR) a 100-acre tract of land on the north side of the reservoir where they conduct several outdoor education sessions. An Outdoor Recreation Center is proposed for the area; however, because of the lack of funds, these plans have not progressed. Kent State provided a copy of

the proposal and a description of the Outdoor Recreation Center. In addition, Kent State indicated their continued intention to develop and use the area as funds become available (see Section 4.3.1).

5.6.2 The Buckeye Trail Association. This association was contacted about the location of the Buckeye Trail within the project area. The association noted that due to certain problems with the original trail through the project area, hikers have been rerouted along SR 14 at the west end of the reservoir. The association provided suggestions for the improvement of the former trail through the project. Only a "side trail" is identified in the project at present--that trail leaves the main trail at SR 14 near Cable Line Road, crosses the causeway, and ends at the nature center where the park trails begin. Trail sections, where they diverge from existing roads, are shown on Plate 10.

5.6.3 Public Forum. A public forum was held May 14, 1981, at the Community Hall, Edinburg, Ohio. Attendance represented local, state, and federal agencies, residents of the area, and other recreationists, all interested in the planning of the project resources.

5.6.3.1 Access and Circulation. A topic of more than casual interest was the proposed park access and circulation plan. It was concluded by the Corps and the state that, although the existing roads do not provide optimum access to the reservoir and the state park, they should remain as the major component of the project's vehicular access and circulation system. This decision was based on a cost/benefit evaluation, and generally reflects the desires of people of the region to maintain local non-recreational traffic circulation through the park.

A general concern was the condition of local roads around the project. Many people felt that since these roads are the only park circulation, either the federal or state government should do more to maintain these roads either directly or through subsidies to the county and local townships.

5.6.3.2 Boating Facilities and Safety. The general attitude was that both the lake and boat ramp access were already crowded. There was a great deal of concern about the horsepower levels of boats and complaints of poor enforcement of speed and boating regulations, particularly in reference to water skiing and after-sunset rules.

5.6.3.3 Project Features. Concern was expressed about the distance from campground to the existing swimming area, lack of bicycle paths, showers, and electrical hookups in the campground, and a concessionaire-operated lodge and the expense to the visitor.

5.6.3.4 Environmental Concerns. Concerns were expressed about localized shore erosion, sediment buildup, water and sewage treatment, and the potential disturbance of what are thought to be Indian burial grounds (discussed in Section 4.1.2.2).

5.6.3.5 Community Impact. Concern was expressed over the use of state money appropriated for West Branch State Park that was used elsewhere and the non-signing of property lines which had been promised to protect private property from hunters using project lands.

SECTION 6 PROGRAM DEVELOPMENT

6.1 DESIGN-DAY ANALYSIS AND MAXIMUM PRACTICAL USE.

6.1.1 Facility Design-Day Load. To determine the extent of recreation facilities needed to accommodate projected user demand, visitation on an expected design-day is calculated. A design-day is considered to be an average weekend day during the peak month of the recreation season. The design-day load is calculated for each of the design years between 1980 and 2070. The computation of facility design-day load for 1980 (considered the initial attendance year) is shown below.

$$\text{Facility Design-Day Load} = L = (A \times P \times E) \div D$$

where

A = Estimated annual attendance (1,169,500)

P = Average proportion of annual attendance expected during the peak month. West Branch State Park records show the peak month to be July with 27.2% of the average annual attendance for years 1973 through 1977.

E = Proportion of peak month use expected on weekends. From West Branch State Park records for years 1973 through 1976, the proportion was an average of 47.9%.

D = Average number of weekend days during the peak month (generally assumed to be 9).

$$\begin{aligned} 1980 \text{ L} &= \frac{1,169,500 \times .272 \times .479}{9} &= 16,980 \\ & &= \underline{17,000} \text{ (rounded)} \end{aligned}$$

Facility design-day loads for succeeding design years are given in Table 6-1.

6.1.2 Maximum Practical Use. Since concerns have been raised that the water surface of Kirwan may be reaching boating capacity on peak weekends now, a determination of maximum practical use (MPU) was made to discover when the reservoir's water surface would actually reach capacity. MPU is usually defined as an estimate of annual recreational capacity proportional to a level of water surface acreage. For this reason, MPU is dependent upon the amount of water-oriented recreation, expressed as a function of an upper bound on the number of boaters on the design-day load previously established.

Table 6-1. Facility Design-Day Load for Each Design Year.

<u>Year</u>	<u>Design-Day Load</u>
1980	17,000
1985	17,400
1990	17,700
2000	18,200
2010	18,800
2020	19,500
2030	20,100
2040	20,800
2050	21,500
2060	22,200
2070	23,000

Attainment of this upper bound inhibits other non-water-oriented activities on the design-day. Therefore, to compute MPU, it is necessary to identify the upper bound on boaters and to apply that figure to an upper bound of facility design-day load which is further projected as an estimate of maximum annual attendance.

6.1.2.1 Upper Bound on Boaters = B max.

$$B \text{ max.} = (S \times R_b) \times (W \div w)$$

where

S = Average size of boating party (4 from West Branch State Park estimates)

R_b = Turnover rate for boating (1.5)

W = Total water surface acres at average recreational pool at elevation 982.0 NGVD (2,650)

w = Number of surface acres of water per boat (4) given mix of boat fishermen, water skiers, and pleasure-boaters

$$B \text{ max.} = 4 \times 1.5 \times \frac{2,650}{4} = 3,975$$

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

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

Handwritten notes:
 $\frac{2650}{4} = 662$
 $\frac{2650}{4} = 662 \text{ boats at one time}$

where

- pb = Proportion of total attendance pleasure boating (13.1%)*
ws = Proportion of total attendance water-skiing (4.2%)*
pf = Proportion of total attendance boat fishing which will not also engage in waterskiing or general pleasure boating (5.6% of the total attendance were boat fishermen x 40% estimated not to engage in waterskiing or general pleasure boating = 2.2%)*

$$L \text{ max.} = \frac{3,975}{.131 + .042 + .022} = 20,385$$

*These percentages were determined by averaging participation as shown on yearly recapitulation sheets for Kirwan Dam, 1970 through 1977.

6.1.2.3 Maximum Practical Use (MPU)

$$MPU = (L \text{ max.} \times D) \div (P \times E)$$

where

P = Average proportion of annual attendance expected during the peak month (27.2%--extracted from pertinent use data for West Branch State State Park)

E = Proportion of peak month use expected on weekends (47.9%)

D = Average number of weekend days during the peak month (assumed to be 9)

$$MPU = \frac{(20,385 \times 9)}{.272 \times .479} = \frac{183,465}{.1303} = 1,408,020 \\ = \underline{1,408,000} \text{ (rounded)}$$

The MPU of 1,408,000 indicates that the total recreational capacity of Kirwan will be reached about 2035 when annual recreational use is projected to be 1,409,000 (interpolated). This MPU projection assumes that the percentage of annual attendance devoted to waterskiing, pleasure boating, and fishing from boats will remain the same as in the 1970s. In fact, it is likely that, as the water surface of the reservoir reaches capacity use, the percentage of visitors boating would diminish. Subsequently, the MPU

would not be reached until some years later than the projected 2035 date. Nevertheless, the implication is that regardless of increasing demand the project will not sustain increases in water-oriented facilities and use much beyond 2030 to 2040 (assuming that all facilities needed for the design years, 1990, 2000, 2010, and 2020, have been provided).

6.2 FACILITY COMPUTATIONS

6.2.1 Design-Day Loads for Each Activity. To determine the demand for each type of recreational facility, the design-day load is distributed among the summer activities. The proportion of the design-day load attributed to each activity was determined by averaging participation percentages from West Branch State Park records for 1973 through 1977 and Corps of Engineers yearly recapitulation sheets for Kirwan Dam from 1970 through 1977. The activities, their proportion of the total design-day load, and each activity's design-day load for 1980 are shown in Table 6-2. The increase by 21% in total design-day load from the 17,000 day load to 20,570 for 1980 compensates for users who engage in more than one activity per day. This increase is consistent with use records at all Pittsburgh District projects for the Corps of Engineers. Several activities existing at the project which have not been included in design day-load distribution are horseback riding, snowmobiling and other winter sports, and hunting. Reliable base data on actual demand and use is not available for most of the winter sports, so their facility requirements are dealt with qualitatively (see Table 6-3). It is assumed that hunters use facilities, i.e., parking, trails, etc., provided for summer activities and thus do not need separate facilities. Horseback riding, because of its sporadic demand from year to year, may have improved facilities provided, but the extent of development cannot be directly related to day-use statistics.

6.2.2 Turnover Rates and Load Factors. Table 6-4 shows turnover rates and load factors for each activity. A load factor refers to the number of people in an activity group, such as the number of people in a boating party. The turnover rate refers to the number of times per day a particular facility such as a picnic table is used. Turnover rates and load factors were derived from the experience of those working at the project and from the Pittsburgh District Corps of Engineers' information on other reservoirs.

Table 6-2. Design-Day Load by Activities.
(1980 Design-Day Load = 20,570)

<u>Activity</u>	<u>Percent of Total Design-Day Load</u>	<u>1980 Design-Day Load for Activity</u>
Boating	22	3,740
Camping	12	2,040
Fishing (without boats)		850
Swimming	21	3,570
Picnicking	15	2,550
Sightseeing	42	7,140
Hiking	4	680
	<u>121</u>	<u>20,570</u>

Table 6-3. Visitors Participating in Fall
and Winter Sports.

WEST BRANCH STATE PARK RECORDS
(Calendar Years 1973 Through 1977)

<u>Year</u>	<u>Hunters</u>	<u>Snowmobilers</u>	<u>Winter Sports</u>
1973	4,162	744	1,711
1974	7,715	1,304	1,976
1975	8,310	86*	329*
1976	12,902	678	1,098
1977	15,300	600	1,755

*Records seem to be incomplete since there was adequate snowfall recorded.

NOTE: In some cases records indicate counted snowmobiles and in others, snowmobilers, so all data was converted to snowmobilers, using a load factor of 2. It is not clear whether the winter sports category included the snowmobilers or not, as recorded, and it was assumed that it did not. That category definitely does not include hunters.

Table 6-4. Load Factors and Turnover Rates for Activities.

<u>Activity</u>	<u>Load Factor</u>	<u>Turnover Rate</u>
Boating	4	1.5
Camping	4	1
Fishing (shore)	1.5	2
Swimming	3	1.5
Picnicking	4	1.75
Sightseeing	3.5	5
Hiking	2.5	5
Nature Program	2	3

6.2.3 Facility Computations for Each Activity.

Facilities required to accommodate the initial design-day loads (1980) and future design-day loads to the Year 2070 were calculated. The facility requirements for each activity were developed by applying criteria taken from the U. S. Bureau of Outdoor Recreation's Outdoor Recreation Space Standards published in 1970. Computation of the facility requirements for 1980 is shown below. Table 6-5 shows the facility requirements for the design years from 1980 to 2070 in ten-year increments. Note that these facility requirements are based on unconstrained demand projections and do not reflect the project reaching capacity within the next 50 years (see Paragraph 6.1.2, "Maximum Practical Use").

6.2.3.1 Boating. This computation uses the 1980 design-day boating load of 3,740 since it is less than the Maximum Practical Boating Use for the water surface area.

1980 Design-day
Boating Load = 22% of total design-day load =
3,740

Total Number of
Boating Parties = Boaters (3,740) ÷ load factor
(4) ÷ turnover rate (1.5) = 623
boating parties

Table 6-5. Design Load and Facility Requirements, 1980 to 2070.

	1980	1985	1990	2000	2010	2020	2030	2040	2050	2060	2070
Total Design-Day Load	17,000	17,300	17,700	18,200	18,800	19,400	20,100	20,700	21,500	22,200	23,000
Boating											
Design Load (22%)	3,740	3,806	3,894	4,004 ^a	4,136 ^a	4,268 ^a	4,422 ^a	4,554 ^a	4,730 ^a	4,884 ^a	5,060 ^a
Facilities Required:											
launch ramp lanes	10	10	11	11	12	12	13	13	14	15	15
car/trailer spaces	270	270	300	300	325	325	350	350	380	405	405
car spaces (causeway)	50	50	50	50	50	50	50	50	50	50	50
car spaces (marina)	100	100	100	100	100	100	100	100	100	100	100
Camping											
Design Load (12%)	2,040	2,076	2,124	2,184	2,256	2,328	2,412	2,484	2,580	2,664	2,760
Facilities Required:											
campsites	485	494	506	521	539	557	578	596	620	641	665
extra car spaces	100	100	100	105	110	110	115	120	125	130	135
Picnicking											
Design Load (15%)	2,550	2,595	2,655	2,730	2,820	2,910	3,015	3,105	3,225	3,330	3,450
Facilities Required:											
picnic tables	365	370	380	390	400	415	430	445	460	475	495
grills	90	90	95	100	100	105	110	110	115	120	125
parking spaces	365	370	380	390	400	415	430	445	460	475	495
Sightseeing											
Design Load (42%)	7,140	7,266	7,434	7,644	7,896	8,148	8,442	8,694	9,030	9,324	9,660
Facilities Required:											
parking spaces	41	42	42	44	45	47	48	50	52	53	55
Swimming											
Design Load (21%)	3,570	3,633	3,717	3,822	3,948	4,074	4,221	4,347	4,515	4,662	4,830
Facilities Required:											
beach area (acres)	4.1	4.2	4.3	4.4	4.6	4.7	4.9	5.0	5.2	5.4	5.6
water area (acres)	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.9
parking spaces	795	810	825	850	880	905	940	965	1,005	1,035	1,075
Hiking											
Design Load (4%)	680	692	708	728	752	776	804	828	860	888	920
Facilities Required:											
hiking trail (miles)	6.8	6.7	7.1	7.3	7.5	7.8	8.1	8.3	8.6	8.9	9.2
Shore Fishing											
Design Load (5%)	850	865	885	910	940	970	1,005	1,035	1,075	1,110	1,150
Facilities Required:											
parking spaces	145	145	150	150	155	160	170	175	180	185	190

^a The Design Loads beyond 1998 exceed the boating maximum practical design load; numbers are shown for information.

^b The number shown is the estimated demand, the park is limited to 250 sites by the state.

^c The number shown is the estimated need. Based on the state limit of 250 sites, only 50 extra car spaces are currently needed.

Boating Parties
Requiring Launching
Facilities =

Number of parties boating (623) -
boating parties from marina (esti-
mated to be 150 parties/day) +
cartop boats launched at causeway
fishing area (estimated to be
75/day)

= 623 - (150 + 75) = 398 boating
parties requiring launching
facilities

Boat Launching Lanes = Number of parties boating requir-
ing launching facilities (398) ÷
launching ramp lane capacity (40
boats/day) = 10 launching ramp
lanes

Car/Trailer Spaces = 27 per launch lane (40 boats/day
÷ 1.5 turnover rate) x 10 launch
ramp lanes = 270 spaces. 270 ÷
75 car/trailer spaces per acre =
3.6 acres parking

Car Parking Spaces
at Causeway for
Cartop Boats =

75 boating parties/day ÷ 1.5
turnover rate = 50 car parking
spaces (0.5 acres)

Car Parking Spaces
at the Marina =

150 boating parties/day ÷ 1.5
turnover rate = 100 car parking
spaces (1.0 acres)

Car/Trailer Spaces
at Campground (see
Camping Note below) =

250 (state limitation) campsites x
.45 (% campers bringing boats) =
115 double spaces. Area required
1.6 acres

NOTE: Apart from the demand for additional campsites as determined in this report, the Ohio Department of Natural Resources has indicated that it would not construct, at least in the foreseeable future, more than 250 campsites (total) at West Branch State Park. This is in accordance with the state's criteria of not developing more than 30% of any park's available land and the limitations of existing available supervisory and maintenance personnel. For master planning purposes, this limitation was adopted for this report in order to comply with the state's criteria. It should be noted, however, that unless policy changes, the demand for campsites will always far exceed those available.

6.2.3.2 Camping (See Note)

Parties Tent or
Trailer Camping = Design-day load for camping
(2,040) ÷ load factor (4) = 510
campsites or camping parties (-100
campers in group camp, a 25-camp-
site equivalent) = 485 campsites
required for family camping

Acres of Tent
Camping = Number of campsites (485) ÷ num-
ber of sites/acre (4) = 122 acres
approximately

Extra Car Spaces at
the Campground = 250 (state limitation) campsites x
.20 (2 car camping parties) equal
20% of total) = 50 spaces @ 100
spaces/acre = .5 acres

6.2.3.3 Picnicking

Parties Picnicking = Design-day load for picnicking
(2,550) ÷ load factor (4) ÷
turnover rate (1.75) = 365 par-
ties or picnic tables and 365
parking spaces and 90 grills
(1 grill per 4 parties)

Acres of Picnicking = 365 sites ÷ 16 sites/acre = 23
acres

Acres of Parking = 365 spaces ÷ 100 spaces/acre =
3.7 acres

6.2.3.4 Sightseeing

Parties Sightseeing = Design-day load for sightseers
(7,140) ÷ load factor (3.5) ÷
turnover rate (5) = 408 parties

Parties Requiring
Parking = 408 parties x percent requiring
parking spaces (10%) = 41 spaces
(in addition to all facility
related spaces)

6.2.3.5 Swimming

Swimmers = Design-day load for swimmers
(3,570) ÷ turnover rate (1.5) =
2,380 swimmers

Swimmers on beach = 75% x 2,380 =
1,785

Swimmers in water = 25% x 2,380 =
595

Beach Area = 100 sq ft/swimmer on beach (1,785)
= 4.1 acres

Water Area = 100 sq ft/swimmer in water (595) =
1.4 acres

Parking Spaces = Swimmers (2,380) ÷ load factor
(3) = 795 parking spaces

6.2.3.6 Hiking

Miles of Hiking
Trails = Design-day load for hikers (680)
÷ turnover rate (5) ÷ 20
hikers/mile = 6.8 miles of hiking
trail

6.2.3.7 Nature Program. Although facilities such as a Visitors Center and hiking trail system are provided at the project, such facilities are not provided based on design-day loading. These facilities are provided to meet specific needs and are closely related to the particular local activities desired and the unique attributes of various areas of the project site.

6.2.3.8 Horseback Riding. Because of sporadic use, demand for these facilities are not quantified. Twenty miles of trails have been provided: 5 miles west of Rock Spring Road and 15 miles east of Rock Spring Road.

6.2.3.9 Winter Sports. Twenty-five miles of snowmobile trails attain high winter usage during periods of retained snowfall. Records indicate that facilities available are adequate. Actual demand has not been determined.

6.2.3.10 Fishing (without boats). By the year 2070, projected use of the project area by shore fishermen will rise from 850 to 1,150, an increase of 300 fishermen. At some point, a fishing pier might be considered

for additional access to the water surface. At present, there appears to be sufficient usable shoreline near parking areas for good fishing.

Parking spaces = Design-day load for shore fishermen (850) ÷ load factor (1.5)
 ÷ turnover rate (2) = 285 parking spaces for shore fishermen.
 Deduct 50% for those already parked for some other activity--
 principally camping = 145 parking spaces for shore fishermen.

6.3 PROJECT FACILITY NEED COMPARISON. Table 6-6 compares the facilities existing at the project with those projected to be needed by 1980, 2000, and 2070 in order to give the extent of the facilities which will need to be constructed to meet the demand in these years. The difference between existing facilities and projected need equals the facilities needed for each design year. The year 1980 is the initial Master Plan year, and 2070 is the ultimate Master Plan year.

The year 2000 is also shown, because the facilities needed by the year 2000 may realistically become the ultimate development level for all activities. This is based on the Maximum Practical Use calculations which indicate that the reservoir water surface will rapidly be approaching the saturation point for boating. It is assumed that curtailing further development of boating facilities beyond this saturation point will result in slowing the growth rate of demand for other facilities, since the major attraction of the project is the reservoir.

Table 6-6. Project Facility Need Comparison.

Activity	Existing Facilities	Need Projected For 1980	Additional Facilities Needed By 1980	Need Projected For 2000	Additional Facilities Needed By 2000	Need Projected For 2070	Additional Facilities Needed By 2070
Boating							
launch ramp/lanes	7 ^a	10 ^b	3	11 ^b	4	11 ^b	4
car/trailer spaces	205	270	65	300 ^b	95	300 ^b	95
car spaces(causeway)	35	50	15	50 ^b	15	50 ^b	15
marina parking	100	100	-0-	100	-0-	100	-0-
Camping ^c							
campsites	103 ^d	250	147	250	147	250	147
extra car spaces	40	50	10	50	10	50	10
Picnicking							
picnic tables	220	365	145	390	170	495	275
grills	52	90	38	100	48	125	78
parking spaces	282	365	83	390	108	495	213
Sightseeing							
parking spaces	205	41	-0-	44	-0-	55	-0-
Swimming							
beach area (acres)	6.3	4.1	-0-	4.4	-0-	5.6	-0-
water area (acres)	2.3	1.4	-0-	1.5	-0-	1.9	-0-
parking spaces	960	795	-0-	850	-0-	1,075	115
Trails							
hiking trails (mi.)	7.4	6.8	-0-	7.3	-0-	9.2	1.8
snowmobile (mi.)	25	25	-0-	25	-0-	25	-0-
bridle trails (mi.)	20	20	-0-	20	-0-	20	-0-
Shore Fishing							
marina parking	30	30	-0-	30	-0-	30	-0-
picnic ^e	-0-	115	115	120	120	160	160

a Gravel lot near causeway where fishermen launch cartop boats not counted.

b The calculations of need are based on the Upper Bound on Boaters. For comparative purposes, see Table 6-5, which gives the facilities required if the reservoir were not to reach capacity until 2070 or later.

c The calculations of need are based on the state limit of 250 campsites. For comparative purposes, see Table 6-5, which gives the facilities required if the state set no campsite limits.

d Does not include group campsite which can accommodate three groups or a maximum of 100 people.

e See Table 8-1 for distribution in picnic areas.

SECTION 7 PLANNING CONSIDERATIONS

7.1 GENERAL. The recreational resources of Kirwan Dam and Reservoir serve a wide range of interests, including boating, picnicking, camping, fishing, swimming, water skiing, and hunting. The primary recreational use of the project is by persons engaged in water-associated activities. Existing facilities of the project are used extensively, and the results of studies by the Ohio Department of Natural Resources indicate that similar water-associated facilities, as now exist, should be featured in any future development. Since most visitors prefer sites near the water, the Master Plan will provide for new facilities near the water wherever practicable.

7.2 EXISTING ACTIVITIES/FACILITIES

7.2.1 Federal Administrative Area - Project Operations. At the present time, the Corps of Engineers maintains only the dam, the road on the dam, the access road to the dam from Wayland Road to the vicinity of the reservoir manager's dwelling, a sightseeing parking area, and the control tower as public facilities. Parking area for approximately eight vehicles is provided at the control tower access gate. Non-public areas include the maintenance complex below the dam and the reservoir manager's duplex dwelling. All of these facilities are shown on Plate 11. Development considerations are discussed below.

7.2.1.1 Interpretation and Sightseeing. A small parking area for sightseers exists off Wayland Road, north of the West Branch Mahoning River Bridge. This lot of approximately 10,000 square feet was constructed by Corps personnel for access to the outlet works. The base of the lot is a gravel-and-sand mixture with a crushed stone surface. Consideration should be given to its eventual paving. The undefined lot has a capacity of 20 to 25 vehicles (see possible layout, Plate 11), somewhat in excess of estimated demand. Several existing hiking trails to the outlet structure have been upgraded and new hiking trails have been added, including five rustic footbridges, for a total trail system of about one mile. The trail surface is of wood chips, and small wood benches are provided (Figure 7-1 and 7-2, also see Figure 8-4).

7.2.1.2 Winter Sports Area. Because of the availability of non-vegetated slopes and easy access off County Road 177, a portion of the dam embankment north of the spillway is used in winter as an informal sledding area. This area will be posted, and these activities pursued at an individual's own risk.



Figure 7-1 Wayland Road Convenience Parking Area
(under construction).



Figure 7-2 Newly constructed Hiking Trail to
Outlet Works from Wayland Road.

7.2.1.3 Maintenance and Service Area. (See Section 2.5.1.)

7.2.1.4 Considerations. Federal facilities, such as a dam overlook and visitors center, typical to many Corps projects, are lacking at the Michael J. Kirwan Dam and Reservoir. With the exception of the aforementioned sightseeing parking area, the most recent development of recreational facilities in the park has been state-initiated, and most of these facilities were oriented toward intensive use recreation.

As one of the initial points of visitor contact with the project, the visitors center, now under construction, will provide project information about the purpose and influence of the dam in the region and general directional guidance to the project area. Reasons for not developing the dam overlook are discussed in Section 4.6.1.

7.2.2 West Branch State Park The state park area consists of all other project lands and waters not directly related to dam operations. A brief description of each existing facility follows, including developmental considerations where appropriate.

7.2.2.1 Boating. Based on existing and projected use, power boating and especially water skiing on the reservoir are, and will continue to be, major recreational activities served by the reservoir. Currently, boats with motors having unlimited horsepower are allowed everywhere on the lake, although speeds and usage are controlled by zoning (see Section 8.3.3 Water Use Categories). If the increased demand for boating should exceed the "practical capacity" of the lake as determined by the calculated upper bound of boaters' based on acres per boat (see Section 6, Program Development), the need for boating constraints, in the form of horsepower or access limitations, may develop. The existing boating facilities include a marina, two paved boat-launching ramps on the south shore, and an informal fishermen's car-top and small trailer facility at the causeway. These facilities are shown on Plate 13.

7.2.2.1.1 Marina. In 1971, a marina was built along the south shore at the location shown on Plate 13. The facility includes 257 boat slips (Figure 7-3), a refueling dock, 9 courtesy docks, a 335-space paved parking lot, and a concession-operated snack bar building (Figure 7-4). Of the 257 boat slips, 30 are reserved for the private rental boat concession, 214 are rented on a yearly basis to private boat owners, 11 are used as courtesy docks for short-term use by non-marina boats, and 2 are operated for state park patrol boats. Although the present demand

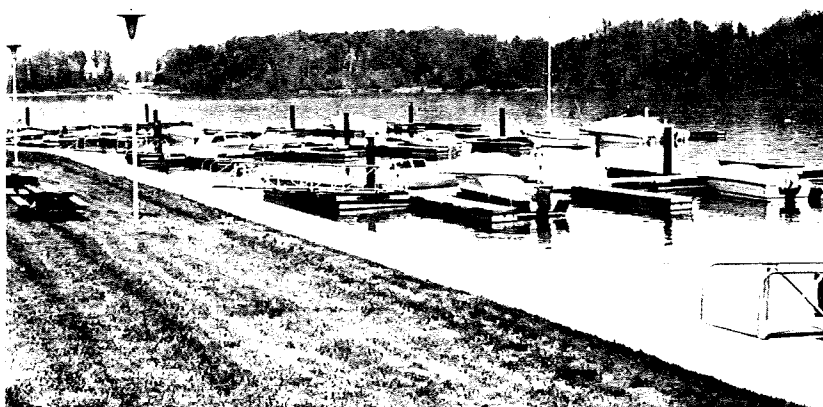


Figure 7-3 Marina - east half.

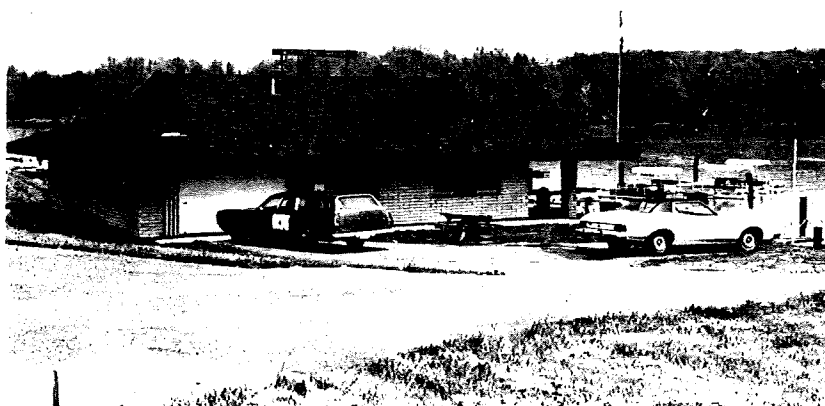


Figure 7-4 Marina Concession Building.

for rental slips would indicate a need to increase the marina size, such a development would probably lead to the practical capacity of the reservoir being exceeded, and, therefore, no expansion is proposed.

Restroom facilities at the marina are serviced by the sewage treatment plant, and water is provided by the park's pressurized system.

7.2.2.1.2 Boat Launching Ramps. The east ramp (Figure 7-5) and west ramp (Figure 7-6) consist of five and four launch lanes, respectively. Each was effectively reduced by one lane in 1977 as a result of the installation of new courtesy docks.

The ramp lanes and courtesy docks at both installations are lighted and in excellent condition. Although long waits are experienced during peak loading and off-loading periods, these facilities are adequate, and, in fact, help to control the overcrowding of the reservoir. No changes are recommended.

7.2.2.1.2.1 Car/Trailer Parking. The present car/trailer parking capacity is 205 spaces: 117 spaces at the east launch ramp and 88 spaces at the west launch ramp (Figure 7-7). In addition, room is available for approximately 35 additional cars at the informal gravel-surfaced causeway boat launching area for those with car-top boats (Figure 7-8). Present peak demand periods create congestion, and due to the lack of adequate spaces, parking lot and access road berms are often used for car/trailer parking. The spaces provided, however, do meet the current state requirement of 25 car/trailer spaces per launching lane. This parking policy assists in curtailing the number of boats using the launching facility and thus, by limiting convenience, prevents overuse and crowding on the water. Based on design-day load criteria, 65 additional car/trailer spaces will be required to meet the demand.

7.2.2.2 Picnicking. Five picnic areas exist on the south side of the lake and one on the north side. Four of these have number designations that are used by West Branch State Park for administrative purposes (Figures 7-9 to 7-12).

Picnic Area 1 is located adjacent to the east boat-launching ramp. It has a total of 50 picnic tables and 12 grills. Forty parking spaces are provided, in addition to the 117 car/trailer spaces. Facilities include water-borne flush toilets, a septic system with subsurface sand filter (Plate 13), and a pressurized (gravity) well-water system.



Figure 7-5 East Boat Launching Area



Figure 7-6 West Boat Launching Area



Figure 7-7 West Launching Area
Parking



Figure 7-8 Causeway Boat launching
Area & Picnic Area 4.



Figure 7-9 Picnic Area.

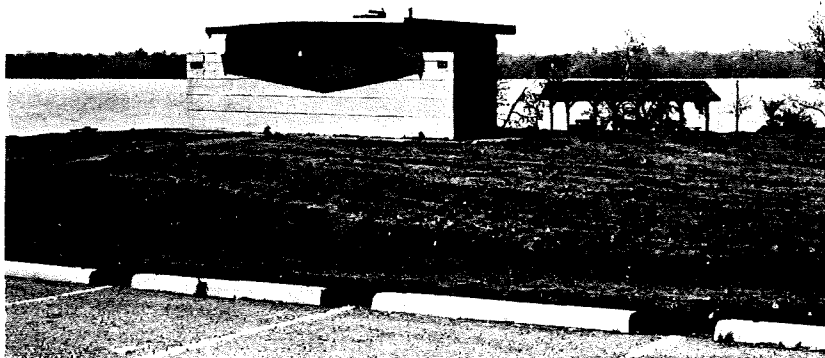


Figure 7-10 Typical Picnic Area Restrooms.



Figure 7-11 Picnic Area 2A.



Figure 7-12 Picnic Area 2B.

Picnic Areas 2A and 2B lie off the road to the marina. Picnic Area 2A consists of 40 picnic tables and 10 grills. Picnic Area 2B consists of 30 picnic tables and seven grills. These areas have parking for 72 and 80 cars, respectively. The restroom facilities at both areas are accommodated by the sewage treatment plant, as are the facilities at the beach and the marina. A pressurized water system provides potable water.

Picnic Area 3, adjacent to the west boat-launching ramp, consists of 30 picnic tables and 8 grills. Parking for 40 cars, in addition to 88 car/trailer spaces, is provided. Facilities include a vault-type toilet and pumped well water.

The beach picnic area, is the only unnumbered area and it has 50 tables and 10 grills. Parking is provided as a function of the beach requirement, since that is the primary use for the area. Sanitary facilities are provided in the bathhouse.

Picnic Area 4 is the only picnic area north of the reservoir and is located at the causeway boat launching area. It consists of 20 picnic tables and 5 grills. This area is primarily for fishing access, and parking needs are determined under that category. Vault type toilets are provided. Picnic areas are shown on Plate 13.

Of the 365 picnic tables projected to satisfy user demand by 1980, only 220 are presently provided. A deficit of 145 tables indicates that consideration be given to the expansion of this popular activity (see Proposed Development for picnic areas in Section 8.4.2.2).

7.2.2.2.1 Considerations. Based on the design-day load requirements, the calculated shortage of 145 picnic tables by 1980 and 275 tables by the year 2070 emphasizes the need for expansion. At present, day-use activities including picnicking are concentrated generally in the southeast quadrant of the project. Additional picnic areas should also be located there for convenience and ease of access.

7.2.2.3 Swimming. A 1,000-foot swimming beach (Figure 7-13) is located near the junction of Cable Line Road and Alliance Road as shown on Plate 13. The facility includes a 1,000-car paved parking lot, a service building containing a bathhouse with restrooms connected to a sewage treatment plant, changing rooms, and a snack bar (Figure 7-14). Total demand for the facility in 1977 was approximately 100,000 persons. The average peak weekend demand is approximately 4,000 people per day or 2,670 at any one



Figure 7-13 Beach.



Figure 7-14 Beach Bathhouse.

time. Since the facility is capable of accommodating 3,660 persons at any time, by virtue of its projected adequacy, no expansion is recommended. Since the projected parking demand for 890 spaces is provided for adequately, no expansion is projected for parking. However, a demand does exist for bus parking, which is not provided at present (see Section 8.6.3.3).

7.2.2.4. Interpretation and Sightseeing. A review of activity participation at Michael J. Kirwan/West Branch State Park during 1977 indicates that approximately 43% of the total park visitation was made up of visitors interested in sightseeing. This assumes that a large portion of these sightseers also participate in one or more other day-use activities, such as boating, swimming, or picnicking. Presently, no areas are formally developed for sightseeing. Although sightseers would generally benefit from those facilities provided for other activities, one special area is proposed to accommodate this specific purpose: the Silver Creek overlook. This development is described in Section 7.3.2.

7.2.2.4.1 Nature Center. The state park nature center is located on the north side of the lake on Esworthy Road, the access road into the camping area as shown on Plate 14 and Figure 7-15. It offers programs which include slide talks, motion pictures, and displays, and it is the hub of the hiking trail system on the north side of the lake. Restroom facilities inside are connected to a small septic system. This facility is considered adequate, and no changes are proposed.

7.2.2.4.2 Trails. The use of trails, as shown on the Facilities Development Plan, Plate 10, is an important recreational feature of West Branch State Park. It is estimated that about two percent of all park users participate in this activity. The four types of trails include:

7.2.2.4.2.1 Hiking. Along the north shore near the campground are four existing, interconnected, short hiking trails. These trails, between .6 and 1.0 mile long, can be taken individually or combined as a 3.4-mile loop (see Plate 14). They are accessible from the controlled camping area only. A four-mile spur of the cross-state Buckeye Trail, shown on Plate 10, passes through the park, beginning at the intersection of SR 14 and Cable Line Road, crossing the lake at the causeway, and ending at the park's nature center.

7.2.2.4.2.2 Bridle Trails. Fifteen miles of existing bridle trails lie east of Rock Spring Road between the reservoir and the railroad on the north. An additional



Figure 7-15 Nature Center.



Figure 7-16 Existing Camper Check-in.

five miles of existing bridle trails are developed west of Rock Spring Road. These trails, shown on Plate 10, combine to provide ample facilities for this use.

7.2.2.4.2.3 Snowmobile Trails. Fourteen miles of snowmobile trails are located on the south side of the reservoir, as shown on Plate 10. These will be affected somewhat with proposed development for this area, however, replacement has been proposed.

7.2.2.4.2.4 Bicycle Trails. At the present time there are no trails in the park which are designed expressly for bicycles. Bicycles presently use existing road rights-of-way which will probably continue for some time. However, in light of public recommendations, evaluative studies including a regional needs analysis, site selection, site analysis, and cost estimates should be initiated to determine the feasibility of such a proposal.

7.2.2.5 Park Office. The state park office is housed on the access road into the camping area, near the campground. The structure is a converted residence and not well-suited for the function. General information concerning park activities and facilities may be obtained here. The restroom facilities are presently connected to a septic system. The camper check-in booth (Figure 7-16) is located near the office on the park campground entrance drive. This facility is to be replaced by a new park office and camper check-in near Rock Spring Road at the entrance to the campground, as shown on Plate 16 and discussed in Section 7.3.5.

7.2.2.6 Camping. All camping is presently located north of the reservoir off Esworthy Road. Its location on a peninsula provides an ideal campground setting for both the camper and for campground control.

7.2.2.6.1 Family Camping (Tent/Trailer). One hundred-three Class "B" campsites are located on a peninsula on the north side of the lake as shown on Plate 13 and Figure 7-17. Facilities include vault-type restrooms and hand-pumped water. All camping lots are marked. The campground has no central sewage dump station for self-contained campers and no electrical hookups. Some of these deficiencies are currently in violation of recent state health standard changes. The proposed facilities in this master plan would eliminate these violations. The following items are required to bring the campground up to code: construction of a sewage dump station, two additional pit latrines in the group camping area, four additional wastewater drains, and covered trash receptacles.



Figure 7-17 Existing Campground.



Figure 7-18 Shelter - Horsemen's Camp.

7.2.2.6.2 Group Camping. In the past, the group camping activity has been limited to 100 persons by the state, and the proposed plan continues this trend. A new group-camping area shown on Plate 16, is proposed to replace the one which will be displaced by family campground expansion. The existing group camp location is shown on Plate 13.

7.2.2.6.3 Horsemen's Camp. The hub of the bridle trail system is the informal equestrian camp accessible to car and trailer from the main camping access road. Well water and hand pumps are provided, as is a pit latrine. Sometime in the future, the state intends to upgrade this facility. See discussion of proposal in Section 8.4.2.5.

7.2.2.7 Hunting. Although the actual demand for hunting has not been measured, hunter counts and 'duck-blind' demand indicate a more-than-casual interest in this activity. (It is estimated that about one percent of all park users participate in this activity.) Deer hunting is especially popular. The "old orchard" areas of the park, designated as wildlife management areas, are especially suited to this activity. For proposed development, see Section 8.4.2.7. No special facility development is proposed.

7.2.2.7.1 Parking. Parking for hunting access and access to the areas mentioned in Section 7.2.2.7 now occurs along Cable Line Road at informal pull-offs. These areas should be upgraded in accordance with good roadside management practice and possibly more formal parking provided.

7.2.2.8 Fishing. Because of continuous fish stocking by the state, fishing from both shore and boat is an extremely popular activity at Michael J. Kirwan Reservoir. Improved shoreline access for fishermen, should increase this popularity.

7.2.2.9 Winter Sports Area. The present winter sports area is limited to snowmobiling on designated trails (see Section 7.2.2.4.2.3) and some nonregulated cross-country skiing. Sledding is done near the dam (see Section 7.2.1.2). The reservoir usually has ice which is too rough for skating, but some ice fishing is done in the bays and inlets around the periphery. Ice fishing in the open water areas is not recommended due to generally unstable ice conditions.

7.2.2.10 Outdoor Education. This is described in Section 4.3.1.4.

7.2.2.11 Park Roads. These are described in Section 4.2.3.

7.2.2.12 Maintenance and Service Areas. The present facility on Rock Spring Road near the southerly boundary of the park property, as shown on Plate 10, has recently been expanded to include an equipment storage area to replace a portion of that facility located on Esworthy Road next to the state park manager's residence. This expanded facility includes all shops necessary for the maintenance of the park. (See Figure 7-19.)

7.2.2.13 Potable Water Systems. The existing water treatment plant is located on the south side of the reservoir, near the marina. (See Figure 7-20.) Its capacity is 100,000 gallons per day, using water drawn from the reservoir. The treatment process is by slow sand filters with chlorination. Water is stored for use in an elevated tank with a capacity of 150,000 gallons. Water levels within the tank fluctuate 33 feet between high and low water levels. The static head is approximately 100 feet.

An 8-inch, raw-water line and pump facility provides water to the treatment plant. An 8-inch distribution main runs from the elevated storage tower to the end of the treatment plant road where it ties into a 6-inch submain line. All existing facilities are served from this 6-inch line.

This system presently serves the marina, picnic areas 2A and 2B, and the public beach facility. As the system is not metered, individual facility consumption data is not available. The distribution system is shown on Plate 13. The excess capacity in this system can accommodate the proposed upgrading and expansion of the camping area, using a new pipeline across the reservoir. However, expansion of the water treatment plant would be required for the development of the lodge/cabin/golf-course complex.

7.2.2.14 Sewage Disposal. The existing sewage treatment plant is located next to the water treatment facility. Capacity of this plant is 100,000 gallons per day. Effluent discharges into the reservoir.

This facility presently serves the marina, Picnic Areas 2A and 2B, and the public beach facility and is shown on Plate 13. Although a new facility is proposed for the camping area, expansion of this plant may be necessary to accommodate the entire lodge/cabin/golf-course complex.

All sanitary lines, with the exception of a short segment of 4-inch force-main and a 6-inch line serving the marina, are 8 inches in size. Potential access into this system



Figure 7-19 State Maintenance Complex

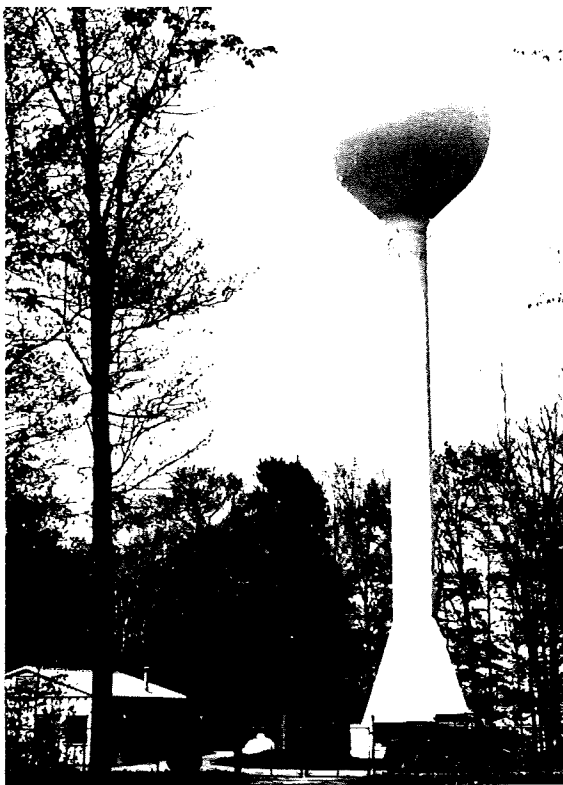


Figure 7-20
Water Treatment Plant
and Storage Tower

would be either through manhole 1-A or manhole 10 (shown on Plate 17). Flow to the existing lift station (inv. elevation 977.89) would be thus:

<u>Manhole</u>	<u>Invert</u>	<u>Pipe Size</u>	<u>Slope</u>	<u>Capacity</u>
1A	982.50	6"	0.67%	0.295 mgd
10	990.12	8"	0.40%	0.480 mgd

7.2.2.15 Electric Power Distribution and Telephone Service. The project is served electrically by Ohio Edison Company. Distribution at the dam is overhead at 12.0 KV, 3 PH, with balance of the facility's smaller loads served overhead at 4,160 volts, single phase. For development requirements, see Section 8.4.2.9.3.

Telephone service and distribution is provided by two phone companies: Ohio Bell Telephone (west of the marina) and United Telephone Company (east of the marina). Existing phone service is minimal and will be modified and expanded to accommodate facility development where proposed.

7.3 NEW OPPORTUNITIES. New opportunities are described as those activities and facilities which are proposed or are being considered for development by the State of Ohio, or, are long-range options which are not supported or required based on standard visitation projections or other calculated needs basis. In essence, they are amenities which complement the required recreational uses and are provided for the convenience of the recreationist. They are all further described in Sections 8.4.2.6 and 8.6.6. These include:

7.3.1 Specialized Activities.

7.3.1.1 Lodge. The State of Ohio Department of Natural Resources has proposed the development of a lodge on the south side of the reservoir, west of Silver Creek. The lodge will have 100 guest rooms with parking for 450 cars.

7.3.1.2 Cabins. Development of up to 25 cabins is proposed by the State of Ohio for the south shore of the reservoir near the lodge site.

7.3.1.2.1 Water Supply. Water would be supplied by extension and possible upgrading of the pressurized system in the beach area. An additional demand of approximately 50,000 gallons per day will be required for the lodge and cabins. Extension of these utilities would require a relatively shallow sub-aqueous crossing of Silver Creek.

7.3.1.2.2 Sewage Disposal. The additional sewage generated by the lodge, cabin complex, clubhouse and picnic area No. 5 will require expansion of the existing sewage treatment plant and the installation of new gravity and force-main sewer systems as shown on Plates 17 and 19 (see Table 7-1).

7.3.1.3 Golf Course. The golf course would be developed in conjunction with the lodge and cabin development as a source of additional recreation. A full 18-hole, par 72 course is proposed.

7.3.1.3.1 Clubhouse. A two-story building is proposed, sited on the slope of the hill near the golf course entrance. This building will have approximately 6,000 square feet of space.

7.3.1.3.2 Winter Sports Area. In conjunction with the golf course and clubhouse, a skating pond and sledding/toboggan run is proposed here to encourage winter use. The golf course could also be used for cross-country skiing.

7.3.2 Interpretation and Sightseeing. The area of the Silver Creek ledges with its intense geological and ecological interest has no formal access at present, and automobiles are forced to park along County Road C-135 (Alliance Road). A Standard Oil Co. high-pressure gas pipeline traverses the site and, because of the required vegetative clearing, makes the upper edge of the cliff easily accessible along this utility easement. Some informal trails exist along the face of the cliff, but this trail system could be expanded further. This is an excellent location for the use of interpretive media.

7.3.2.1 Silver Creek Overlook and Trails Proposed Development. A small paved parking area is proposed adjacent to Alliance Road immediately north of the gas pipeline easement. Parking will be provided for 12 cars. New hiking trails would then be developed along the cliff face and to two adjacent upland wetland habitat areas of ecological interest.

7.3.3 Campers' Boat Launching Ramp. The demand for additional launch lanes could best be met by providing a new launching facility adjacent to the camping area.

Two boat launching lanes will be constructed. The average demand on this facility would be about 29 boats per day, with an average camping stay of three days. This facility would service an average of about 88 boats at any one time.

Table 7-1. Additional Sewage Flows to Treatment Plant Resulting from New Development.

	<u>Gallons per Day</u>
LODGE	
100 rooms @ 3 occupants/room at 100 gpcd (gallons per capita per day) including restaurants	
$100 \times 3 = 300 \times 100 =$	30,000
CABINS	
25 units @ 4 occupants/cabin at 50 gpcd including kitchens and toilet facilities	
$25 \times 4 = 100 \times 50 =$	5,000
GOLF COURSE	
96 parking spaces @ 1.5 persons/car @ turnover rate of 2.0 @ 0.6 conversion factor (60 percent of participants expected to use restrooms & dining) @ 30 gpcd.	
$96 \times 1.5 = 144 \times 2.0 = 288$ $\times 0.6 = 173 \times 30 =$	5,200
PICNIC AREA NO. 5	
50 tables at 4 persons per table, turnover rate of 1.75 @ 0.6 conversion factor @ 8 gpcd.	
$50 \times 4 = 100 \times 1.75 = 175$ $\times 0.6 = 105 \times 8 =$	840

7.3.3.1 Car-Trailer Parking. Parking will be provided at the new campers' boat launching area to accommodate 45% of the 250 expanded camping parties that are expected to bring boats, or 113 spaces. In addition, a 30 space parking lot is provided here for those campers bringing more than one car. This joint parking facility will be located at the launching area so that it is within walking distance of the campground.

7.3.3.2 Night Lighting. Night lighting should be provided at the ramps and especially the parking areas for security and safety of those campers required to park here and walk into the campground after dark.

7.3.4 Campers' Swimming Beach. Although swimming beach facilities in general, are considered adequate, a new swimming beach for camper use on the north side of the reservoir is proposed. This beach, located on Lake Jay Bay, would eliminate the present five-mile drive from the campground to the existing beach (see Section 8.4.2.3).

7.3.4.1 Beach Area. The beach will be separated from the parking area by a vegetative buffer. A minimum of 30 feet of sand will be provided above the waterline, whenever possible.

7.3.4.2 Water Area. Designated areas will be provided for swimming. Underwater areas will be graded.

7.3.4.3 Parking. Parking will be developed to initially accommodate 25 automobiles, with expansion potential to 100 spaces.

7.3.5 Park Office and Campers' Check-in Complex. A new park office and camper check-in complex is proposed by the state to replace the existing facilities described in Section 7.2.2.5. This facility will be located along Copeland Road just east of Rock Spring Road. Its location will eliminate non-camper traffic from the camping area and increase security.

SECTION 8 COMPREHENSIVE DEVELOPMENT PLAN

8.1 GENERAL. In order to provide a comprehensive plan for the integration and development of new facilities at Michael J. Kirwan Dam and Reservoir/West Branch State Park, having first determined the facility needs through the year 2070, it is necessary to establish a framework for development by first identifying the Resource Use Objectives. These Resource Use Objectives are both general and activity specific and identify and provide broad guidelines for the resource use options of the project in order to meet public needs.

Another element in establishing this framework for development is the preparation of the master land-use zoning plan. This plan, the first of two components of the physical plan of development, reflects existing facility development and delineates areas of land dedication for potential development, based on the synthesis of various ecological considerations and other natural resource studies in the project area. The area under study encompasses all lands and waters purchased by the Army Corps of Engineers and the State of Ohio for operational, as well as recreational, purposes. Previous planning effort on the part of the Ohio Department of Natural Resources has been recognized and incorporated in this plan, when consistent with present study considerations.

8.2 RESOURCE USE OBJECTIVES. These Resource Use Objectives have been formulated from a detailed analysis and evaluation of resource information given in Sections 2, 3, and 4; opportunities in the region expressed in Section 4 and derived from data provided by coordinating agencies as listed in Section 5; and from information received through interviews and public hearings.

Objective 1 To maintain the high quality and to improve diversified recreational development of the project.

1. The Ohio Department of Natural Resources has already provided a wide range of these facilities at the project, and has established the pattern of diversification as opposed to specific use emphasis.
2. An unsatisfied demand exists within the market area for many different types of facilities including camping, power boating and water skiing, fishing, hunting, picnicking, and a variety of winter sports.

3. Land area exists for expansion for intensive recreational development.
4. The reservoir provides the opportunity to expand water-oriented activities.
5. If the needs of the area are to be met, local park access must be improved and facilities must be provided to satisfy latent demand.

Objective 2. To provide adequate boat launching facilities to support the existing marina and to meet boating demands while not exceeding the practical capacity of the reservoir. This capacity is based on boating effects on environmental quality and the recreational experience.

1. Five launch lanes and an informal fishermen's boat launching area are presently provided.
2. Three more boat launching lanes are required based on current program development.
3. The demand for boat launching from the campground area has not been met.
4. The reservoir boating capacity is being reached without additional launching facilities and only a portion of the existing boating demand can be met without adverse effects.

Objective 3. To maintain or improve all forms of camping, including family camping, group camping, and horsemen's camping.

1. The demand for all types of camping at the project has been very high.
2. Current camping demand in terms of number and/or quality is not being met. Present need is for 485 sites, and only 103 sites are provided.
3. The proximity of major metropolitan areas (Cleveland, Akron, Canton, and Youngstown) increase the demand for short-trip overnight facilities. Fuel shortages or high fuel costs are important considerations.
4. Land area necessary for expansion of quality facilities is available.

Objective 4. To provide a year-round recreation opportunity through construction of facilities such as cabins and

a lodge, with supporting recreational facilities (such as tennis courts, golf course, and winter sports area).

1. Many people from the market area utilize lodge and cabin facilities for vacations, weekend getaways, and business functions. Those unable to obtain lodging who are not deterred altogether are forced to use facilities "down-state" or go out-of-state.
2. Year-round recreational activities must be promoted jointly to sustain a year-round lodging facility and enhance the economic viability of such a project.
3. The project is a suitable and proven location for both destination or vacation type recreational development.
4. Land area is available for development of such a project.
5. Such a facility would produce steady revenues for maintenance and operations and would create new jobs, many of them suitable for unskilled labor.

Objective 5. To maintain and improve existing swimming facilities.

1. A high proportionate demand for swimming exists at the project.
2. Existing facilities are excellent for day-use, but the need for swimming near the campground has not been met.

Objective 6. To maintain and expand adequate picnicking facilities.

1. There is great demand for these facilities.
2. Program development indicates present shortages of 145 tables indicating that additional areas must be developed.
3. Land is available to expand this activity.

Objective 7. To maintain and improve the present trail systems to meet the various user needs. These include hiking (designated park and Buckeye trail systems), equestrian trails, and snowmobile trails.

1. All forms of hiking, bicycle riding, horseback riding, and snowmobiling are popular in the project's market area.
2. Bicycle trails should be provided to meet the demand.
3. Land is available for development of bicycle trails which could double for either hunter access and snowmobiles, or cross-country skiing.
4. The varied topography of project lands provides an ideal environment for all types of trail development.

Objective 8. To maintain and improve the scenic and aesthetic qualities of the project's land and water.

1. There is a significant demand for sightseeing within the project.
2. The project provides a high level of aesthetic value that deserves protection from decimation by claimants of unpurchased mineral rights.
3. Variations in topography and plant cover enhance the aesthetic experience.

Objective 9. To provide an educational experience through various information and interpretive facilities.

1. Present facilities are limited to the park's nature center.
2. There is an opportunity to provide a visitor center to explain the dam's use and operations.
3. Trails and overlooks can be enhanced with interpretive materials.
4. Ecologically sensitive areas can be protected from encroachment and be used for interpretive study.

Objective 10. To preserve and utilize historic resources whenever possible for project purposes or visitor enjoyment.

1. Protect areas of historical significance, or having the potential of being significant, from development, encroachment, and public misuse.
2. Develop access to these significant areas after inventory and evaluations have been made.

Objective 11. To improve access to and through the park.

1. Problems involving maintenance of park access roads (generally county or township roads) including state vs. local issues of responsibility must be resolved.
2. Improve direct access to intensive recreation day-use areas by reopening and improving Cable Line Road.
3. Construct new bridge on Rock Spring Road over the Baltimore and Ohio Railroad to replace the existing decrepit timber structure and improve vehicular sight-distance from SR 5 (see Figure 4-2).

8.3 ZONING PLAN. In order to provide a plan for the logical and efficient use of the various resources of the project, land and water areas have been zoned. Because of the extent of various existing facilities at West Branch State Park, present use patterns have significant influence on the development of the Zoning Plan, as shown on Plate 9. Based on the planning criteria discussed in Section 7, it has been determined that these facilities are, for the most part, appropriately located. The extent of existing development, one which provides a full range of recreational activities, needs little augmentation to meet the projected 90-year demand, as shown in Section 4.7. Certain optional facilities, such as a lodge, cabins, and golf course are included, consistent with state plans, to enhance the total recreational experience and to meet the needs and demands of a wider market. Major constraints to the plan have been identified as potential disruption of ecologically sensitive areas, the limited and poor quality of park access and circulation, and the limiting factor of pool depth in the upper reaches of the reservoir in terms of both visual impact and use. Other limiting factors which could be controlled include regulated camping expansion and the approach to capacity of lake boating uses. Adjacent shoreline recreational uses, topography, and the potential resource of fish and wildlife enhancement play an important role in the project's existing water zoning.

8.3.1 Ownership and Control. Five classifications of ownership and control are shown on Plate 2. These are: federally-owned and -managed project land;; the reservoir (summer pool), acquired by the Corps of Engineers and leased to the State of Ohio;; operational lands acquired by the Corps and leased to the state; recreation lands acquired by the Corps and leased to the state; and land acquired by the state for recreational purposes.

8.3.2 Land-Use Categories. All project lands have been allocated land-use categories in accordance with those outlined in ER 1120-2-400, however land zoning is further developed to provide a comprehensive area guide for all federally-owned land, managed by either the Corps or the state, and all state-owned lands at the project. This land zoning is proposed to provide for sound development and resource management practices which are based on the highest and best possible use for these lands. These categories, as discussed below, are shown on Plate 9. They are:

8.3.2.1 Natural Areas. These are lands which are allocated for the preservation of ecologically sensitive areas and managed to protect the habitat of potentially rare and endangered species of flora and fauna. These areas also provide prime opportunities for nature study and interpretation.

8.3.2.2 Wildlife Management. These lands are designated primarily as habitat for fish and wildlife. This includes all lands not specifically zoned for high-density recreational use and, generally, those lands which are open to hunting (state-regulated.) These lands are also available for non-consumptive wildlife and other low-density recreational uses. No lands in the project area have been specifically acquired or funded for intensive fish and wildlife management or for any use other than public outdoor recreation. The entire project area is included within a grant project under the Land and Water Conservation Fund Act, as amended, and the state has received prior development assistance under this Act, which precludes non-recreational use.

8.3.2.3 Recreation - Low Density Use. These are lands designated for low-density recreational activities for the visiting public and include winter sports areas for sledding, tobogganning, cross country skiing, and ice skating; trails for hiking, snowmobiling, and horseback riding; and sites for primitive camping. This land is generally required for open space between intensive recreational developments or to serve as a buffer zone between intensive recreational development and land which by virtue of its use would be incompatible with such recreational development. Generally, incompatible land is that land adjacent to the project, and the park buffer areas are generally designated for low-density recreational use.

8.3.2.4 Recreation - Intensive Use. These are lands designated for use as developed public-use areas for intensive recreational activities by the visiting public.

8.3.2.5 Project Operations. This land is managed by the Corps for the operation and maintenance of the dam and related structures.

8.3.2.6 Outdoor Education and Research. Land leased by Kent State University as an Outdoor Education Center (see Section 4.3.1 and Section 5.6.1).

8.3.3 Water Use Categories. The state's boating regulations, as promulgated by the Department of Natural Resources, are generally reflected in the water zones shown on Plate 9. Water area is zoned according to the following categories.

8.3.3.1 Unlimited Speed and Water Skiing Zone. This area includes all of that water, except that designated as "NO WAKE" east of the causeway to the face of the dam.

8.3.3.2 Idling "NO WAKE" Speed Zone. This zone is defined as an area of water extending outward from the shoreline and causeway for a distance of 300 feet including all natural coves. Warning buoys identify extended areas such as the marina, beach, and launch ramps. This zone also encompasses all water west of the causeway. Boating conditions in this area are greatly affected by reservoir drawdown exposing submerged hazards, such as tree stumps and sand bars, during low water periods only.

8.3.3.3 Danger Zone. This zone, an underwater hazard area, is located at the upper reach of the reservoir and identified by warning buoys. Water here is a maximum of eight feet deep in the old river channel, but is characterized by many timber stumps, both visible and submerged, as well as mud flats. Boating is allowed in this area, but not encouraged.

8.3.3.4 Boating Prohibited. A small area around the intakes and control structure is prohibited for boating. The area is identified by marker buoys.

8.3.4 Interim Land Use

8.3.4.1 Wildlife Management. If agriculture must be considered an interim use, then such a use exists in the wildlife management area and includes about 120 acres of sharecropping. The state's 10% share provides food and cover for wildlife.

8.3.4.2 Recreation - Intensive Use. For areas designated for intensive recreation use, the interim use in

all cases will be low-density recreational use, or basically, land left in its natural state available for informal use by the casual recreationist.

8.3.4.3 Outdoor Education and Research. Until the Kent State University parcel is developed as proposed in Section 4.3.1, the area will be used by Kent State students and faculty to the extent it would qualify as an area for low-density recreational use.

8.4 FACILITIES DEVELOPMENT PLAN. This is the second of the two components which comprise the physical plan of development and specifies the actual facilities required over the life of the project. The following is a discussion of the proposed public use facilities at Michael J. Kirwan Dam and Reservoir/West Branch State Park. This discussion includes a description of the facility, planning considerations, and recommendations. Cost estimates for the development are included as Exhibit A. The Development plan is shown on Plate 10.

8.4.1 Federal Administrative Area. Proposed as well as existing Corps development is shown on Plate 11.

8.4.1.1 Manager's Complex and Visitors' Center. A new facility is being constructed immediately north of the federal facilities access road off Wayland Rd. This facility will include paved parking for 11 cars, 3 vehicles for the handicapped, and 6 car/trailers or buses. The building complex would house a small display area and information desk, offices, small conference room, toilets, and 10 personnel parking spaces. A garage and fenced storage area addition will be added when the existing maintenance garage is removed or considered inadequate.

It is estimated that the cost of the manager's complex and visitors center including engineering, design, supervision, and administration will be approximately \$307,600, as shown on Cost Table 1.

Potable water would be supplied from an on-site well source, and sanitary waste would be accommodated by a septic system and sand filtering field. For electrical needs see Section 8.4.2.9.3.1.

8.4.1.2 Signage. Orientation for project visitors in the form of signs, either for directing, identifying, or general information, should be provided throughout the project area. Signs should identify the visitors' location, give directions to primary public-access recreational facilities, and identify points of interest, special

natural features, points of historic importance, and all other features developed for public use and viewing. Signs should be provided and constructed in accordance with Engineer Regulation 1130-2-400, "Project Operation," as well as the guidelines set forth in, "A Manual for the Production and Use of Standard and Typical Signs," prepared May 1972, by the Ohio Division of Parks. A new signage system is proposed (see Plate 23) which departs somewhat in style from "traditional" Corps sign manual signage, but could be used by both the federal facilities and the state as an attempt to unify the separate areas of jurisdiction. Signage designs are shown on Plate 23. The signage design is meant to complement the architectural character established by the park structures. By using the vertical, rough-sawn cedar as the background for the information, and capping the sign with the "shed"-shaped top member, the design statement is reinforced and reemphasized in its simplest terms. The information presented should be organized in the most concise manner possible. The use of international symbols, in addition to clarifying the messages, adds visual interest to the signage. All directional signs should include a project plan for orientation. It is estimated that the cost of the signage program including engineering, design, supervision, and administration will be approximately \$75,400, as shown on Cost Table 15. This is a potential cost-shared project.

8.4.2 West Branch State Park Area. The state park area consists of all federal and state lands and waters at the project with the exception of the operations area at the dam. A brief description of each proposed state park facility follows including developmental considerations; applicable proposals for development; estimated demands for electric power/telephone, water, and sanitary service; and design criteria.

8.4.2.1 Boat Launching Ramp Parking. With the car/trailer parking provided at the new, campers' boat launching area, the deficit of 65 spaces has been eliminated, and therefore, no changes are proposed to either east or west boat launching areas in terms of parking provisions.

8.4.2.2 Picnicking. Four new picnic areas are proposed. These are designated Areas 5 through 8 as listed on Plate 10 and shown in greater detail on Plates 17 and 18. Each of the areas would be provided with a shelter and restrooms (see Section 7.3.7). In addition, existing picnic areas 2A and 2B would be expanded.

Of the 145 tables required to meet the 1980 needs, 50 will go to existing picnic areas and 95 to new areas. They will

be distributed with 20 going to area 2A, 30 to area 2B, 50 going to area 5, and 45 to area 6. Future picnic area development will take place as needed with 60 tables eventually going to area 7 and 70 to area 8.

Table 8-1. Ancillary Picnic Facilities.

<u>PICNIC AREA #</u>	<u>TABLES</u>	<u>GRILLS</u>	<u>PARKING SPACES</u>	
2A	+20	+ 5	(None required for 2A-2B)	
2B	+30	+ 8	<u>Cars</u>	<u>Buses</u>
5	50	13	60	4
6	45	11	60	2
7	60	15	90	4
8	70	18	100	4
	<u>275</u>			

The cost of providing additional facilities at Picnic Areas 2A and 2B is estimated to be approximately \$20,800 as shown on Cost Table 8. Estimated costs for development of Picnic Areas 5, 6, 7, and 8 are \$508,000, \$322,100, \$346,300, and \$401,400, respectively, as shown on Cost Tables 20, 21, 22, and 23.

8.4.2.3 Swimming Beach. Although this facility has been shown to be adequate in all respects, no provision is presently made for the parking of buses.

8.4.2.3.1 Parking. Add additional paved area for eight buses, adjacent to the perimeter drive, as shown on Plate 17 estimated cost for this development including engineering, design, supervision, and administration, is approximately \$12,000, as shown on Cost Table 18.

8.4.2.4. Camping

8.4.2.4.1 Family Camping (Tent/Trailer). Revisions to the existing campground, plus proposed additional sites, will bring the total number of campsites to 250, as presently limited by the state. The first phase of development will eliminate six existing sites, while providing 104 new sites, for a total of 201 sites. Future expansion of 49 additional sites will fulfill the requirement. A new pressurized potable water system is proposed, as well as a sanitary collection system and treatment facility and dump station. The plan provides for a centralized wash house (laundry and showers) and toilet facilities both with and without showers (see Plates 25 and 26). Electrical hookups will be provided in both the new

campground area and with the rehabilitation of the older area.

The first phase of the state's campground development is currently in an accelerated planning stage, and budget requests were submitted by the Pittsburgh District for that portion of the work to be cost-shared with the State of Ohio Department of Natural Resources.

The estimated cost for new development and renovation of the camping area is: State area \$1,511,100 (Cost Table 9), water supply \$772,800 (Cost Table 11), Federal/state development approximately \$1,400,400 (Cost Tables 13 and 14).

8.4.2.4.2 Group Camping. The group campground is designed to accommodate three groups or a maximum of 100 persons, whichever is less. Shelters will be provided at each group site, together with tables, trash receptacles, grills, and a fire circle. Water will be provided by extension of the campground system, and pit latrines will be provided. Road access and parking surfaces will be gravel. The proposed development is shown on Plate 16. The estimated cost of group camping development, including engineering, design, supervision, and administration is \$455,800, as shown on Cost Table 6.

8.4.2.5 Horsemen's Camp. The horsemen's camp is proposed to be upgraded to include 14 camping units, vault toilets, hand-pumped water, picnic shelter, and horse exercise area. This area will continue to be served by an existing gravel road which originates at the juncture of Copeland and Esworthy Roads with gate controlled access at that point (see Plate 16). The development of the Horsemen's Camp including engineering, design, supervision, and administration is estimated by the Ohio Department of Natural Resources to be \$177,740.

8.4.2.6 New Opportunities

8.4.2.6.1 Lodge. The State of Ohio Department of Natural Resources has proposed the development of a lodge on the south side of the reservoir, west of Silver Creek. The lodge will have a gross floor area of approximately 50,000 square feet, with 100 guest rooms. Parking for 450 cars will be provided. Other facilities to be included are: dining room (263 seats); meeting rooms (435 seats); coffee shop (160 seats); office, gift shop, and indoor pool.

No timetable has been established for this development, and no construction plans have, as yet, been prepared.

Demand on other state lodge facilities by vacationers from northeast Ohio appears to warrant priority consideration.

8.4.2.6.2 Cabins. Development of up to 25 cabins is proposed by the State of Ohio for the south shore of the reservoir near the lodge site. Parking would be provided at a ratio of 2 spaces per cabin.

This development is anticipated to alleviate demands for this type of facility by vacationers from this region.

8.4.2.6.2.1 Water Supply. Water would be supplied by extension and possible upgrading of the pressurized system in the beach area. An additional demand of approximately 500,000 gallons per day will be required for the lodge and cabins. Extension of these utilities would require a relatively shallow sub-aqueous crossing of Silver Creek.

8.4.2.6.2.2 Sewage Disposal. The additional sewage generated by the lodge, cabin complex, clubhouse and picnic area No. 5 will require expansion of the existing sewage treatment plant and the installation of new gravity and force-main sewer systems as shown on Plates 17 and 19 (see Table 7-1).

8.4.2.6.3 Golf Course. The golf course would be developed in conjunction with the lodge and cabin development as a source of additional recreation. A full 18-hole, par 72 course is proposed. Access to the clubhouse is off Porter Road C-54, with a paved parking lot provided for 96 cars. Construction of the clubhouse and golf course must be coordinated with the location of the existing Standard Oil Co. high-pressure gas line which traverses this site.

8.4.2.6.3.1 Clubhouse. The proposed clubhouse should provide the necessary spaces for cafeteria dining; a large lounge around a stone fireplace; a shop for golfing equipment and cart rental that could also be used in winter for the rental of cross-country skis, ice skates, or toboggans; and men's and women's locker rooms and toilets. Decks should be used to extend the interior space on pleasant days (both summer and winter) for use and as outdoor dining/lounge space. A two-story building is proposed, sited on the slope of the hill near the golf course entrance. This building of approximately 6,000 square feet should provide adequate space. Utilities would be provided as for the lodge, above. The club house location is shown on Plate 19.

8.4.2.6.3.2 Winter Sports Area In conjunction with the golf course and clubhouse, a skating pond and

sledding/toboggan run is proposed here to encourage winter use. The golf course could also be used for cross-country skiing.

8.4.2.6.4 Interpretation and Sightseeing. The area of the Silver Creek ledges with its intense geological and ecological interest has no formal access at present, and automobiles are forced to park along County Road C-135 (Alliance Road). A Standard Oil Co. high-pressure gas pipeline traverses the site and, because of the required vegetative clearing, makes the upper edge of the cliff easily accessible along this utility easement. Some informal trails exist along the face of the cliff, but this trail system could be expanded further. This is an excellent location for the use of interpretive media.

8.4.2.6.4.1 Silver Creek Overlook and Trails Proposed Development. A small paved parking area is proposed adjacent to Alliance Road immediately north of the gas pipeline easement. Parking is provided for 12 cars. The open cut of this easement to the cliff edge would be used for access to the overlook (see Figure 8-1). The overlook would be constructed of stone and concrete with concrete paving. Benches would be provided as an integral part of the overlook design. New hiking trails would then be developed along the cliff face and to two adjacent upland wetland habitat areas of ecological interest. Selective pruning and thinning may be required to open up the view of Silver Creek. Plate 16 includes a plan and section through the proposed overlook. Cost Table 19 indicates estimated development costs of approximately \$50,400 which includes engineering, design, supervision, and administration.

8.4.2.6.5 Campers' Boat Launching Ramp. The demand for additional launch lanes could best be met by providing a new launching facility adjacent to the camping area. This would provide boating access presently lacking on the north side of the reservoir, which would eliminate a three-mile drive from the campground and free the other two launch areas on the south side of the reservoir to meet increasing day-use demands on these facilities. Presently, about 45% of all campers also bring boats. This proposed facility (Figure 8-2), located inside the campground control area, would, therefore, be for the exclusive use of these campers.

Two boat launching lanes will be constructed. The average demand on this facility would be about 29 boats per day, with an average camping stay of three days. This facility would service an average of about 88 boats at any one



Figure 8-1 Access to Silver Creek Overlook



Figure 8-2 Camper's Boat Launching Area
(temporary trailer parking)

time. This demand figure compensates for the 10% of the campers who car-top their boats and would use the causeway launch area.

Based on actual recorded pool fluctuation levels (Figure 4-8), the worst condition for 31 October, the end of the boating season, was a pool elevation of about 975.0. This occurred in 1967, the first year of operations (reservoir filling) and again in 1971. The highest recorded pool level for this same date was elevation 982.0 in 1976. The average for the 15-year operating history is about elevation 979.2. Using this average, and allowing for four feet of water under the boat, a maximum bottom elevation of 975.2 would be required. Soundings taken 14 August 1978 show the bottom elevation at approximately 100 feet from the waterline at summer pool and thus coinciding with the approximate toe of the proposed launch ramp to be at elevation 973.0, or 2.2 feet greater water depth than would be required. However, data shown for the "worst-year" condition to date (1971) would indicate that some dredging might be required, to provide boating to 31 October. Therefore, a minimal amount of dredging and reshaping during construction of this facility would guarantee its use through 31 October of any year. Additional soundings would be required prior to design to determine the actual extent of any required excavation.

The location of the campers' boat launching area is shown on Plate 14 with an enlargement showing parking configurations on Plate 15. The cost of the campers' boat launching facility is shown in Section 9.

8.4.2.6.5.1 Car-Trailer Parking. Parking will be provided at the new campers' boat launching area to accommodate 45% of the 250 expanded campground parties that are expected to bring boats, or 113 spaces. Deducting the 25 campers (10%) who car-top their boats, this equals a lot requirement of 88 spaces. This is 38 spaces in excess of the 25 spaces per launch ramp considered optimum by the state, but, as noted, the proposal is based on a storage requirement for all campground boats. In addition, a 30 space parking lot is provided here for those campers bringing more than one car. This joint parking facility is located at the launching area so that it is within walking distance of the campground.

8.4.2.6.5.2 Night Lighting. Night lighting should be provided at the ramps and especially the parking areas for security and safety of those campers required to park here and walk into the campground after dark.

8.4.2.6.6 Campers' Swimming Beach. Although swimming beach facilities in general, are considered adequate, a new swimming beach for camper use on the north side of the reservoir is proposed (see Figure 8-3). This beach, located on Lake Jay Bay, would eliminate the present five-mile drive from the campground to the existing beach (see Section 8.4.2.3). With the exception of the group camp access, this proposed facility is located within easy walking distance of all the proposed family campsites. A small parking area (expandable) is provided for those who drive to the beach. The beach access road turnaround becomes the terminus of the main camping access road. The beach location is shown on Plate 14 with an enlargement of the development shown on Plate 15. Design is based on accommodating 605 users at any one time (55% of anticipated campground population).

8.4.2.6.6.1 Beach Area. Fifty square feet of sand and/or turf will be provided per person for sunbathing, based on 60% of total demand. The beach will be separated from the parking area by a vegetative buffer. A minimum of 30 feet of sand will be provided above the waterline, whenever possible.

8.4.2.6.6.2 Water Area. Thirty square feet of water for swimming will be provided per person, in a designated area (buoyed). Underwater areas will be graded to a maximum of 4% slope.

8.4.2.6.6.3 Parking. Parking will be developed to initially accommodate 25 automobiles, with expansion potential to 100 spaces. This area will be paved with bituminous concrete pavement; stalls will measure 10 feet by 20 feet, with wheelstops. Aisles will be 14-feet wide.

8.4.2.6.7 Park Office and Campers' Check-in Complex. A new park office and camper check-in complex is proposed by the state to replace the existing facilities described in Section 7.2.2.5. This facility will be located along Copeland Road just east of Rock Spring Road. Its location will eliminate non-camper traffic from the camping area and increase security.

According to preliminary studies conducted by Dalton·Dalton·Newport, the facility will consist of the general park offices, a check-in and check-out area for all camping with necessary roads and parking.

Roads will allow for one- and two-way traffic, laid out to provide smooth circulation through the facility. Parking will be provided for 10 cars and 10 car/trailer combinations near the check-in area. Parking will also be provided for office staff.



Figure 8-3 Site of proposed Camper's Beach

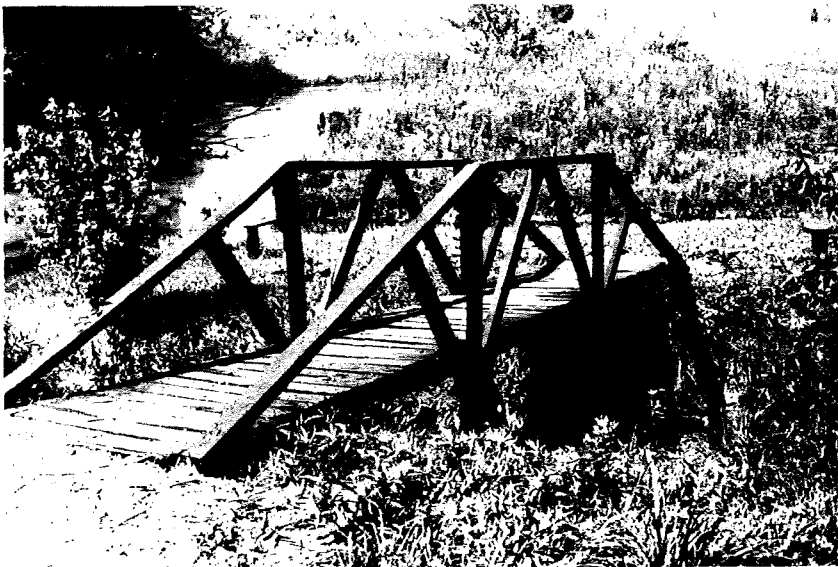


Figure 8-4 Newly constructed footbridge, part of the Outlet Works hiking trail

The facility is planned to be served by an extension of the campground water and sanitary sewer systems.

8.4.2.7 Hunting

8.4.2.7.1 Parking Access. Existing pull-offs and shoulder parking along Cable Line Road used for hunting access, will be formalized in accordance with good roadside management practice. A small gravel parking lot capable of holding 10 cars will be developed for this purpose at the intersection of Cable Line Road and Rock Spring Road. This development is shown on Plate 10. Cost of this development should be less than \$2,500.

8.4.2.8 Roads

8.4.2.8.1 Road Access - Proposed Development. The facilities development plan (Plate 10) proposes an upgraded Cable Line Road for access from the west, which is presently lacking. This system is designed to facilitate vehicular distribution and control, and by so doing, to reduce the dependency on county and township roads for park user travel.

Main entrances will be the current entrance off Wayland Road at the dam and Cable Line Road (County Road 120) from the east; an upgraded entrance and roadway on Cable Line Road from SR 14 on the west side, as mentioned above; and Rock Spring Road from the north and south.

The present access onto Rock Spring Road from SR 5 is hampered by the required crossing of the railroad bridge. (See Figure 4-2.) This bridge is presently in poor condition with excessive grades and inadequate sight distances, and its need for reconstruction is imminent. Excellent alternative north-south routes are SR 225 and SR 14, both with access to SR 5 on the north, and I-76 on the south. Rock Spring Road will remain the primary north-south park access road as all camping traffic must use this road.

Upon completion, Kirwan Dam and Reservoir/West Branch State Park will have five entrances, two at the east end, one on the west end, one north, and one south.

8.4.2.8.2 Internal Circulation. Internal circulation will be achieved by a redeveloped major roadway on the Cable Line Road alignment along the south side of the reservoir, connecting the SR 14 entrance with Porter Road. Portions of existing Porter Road, Calvin Road, and Alliance Road will also be used. Access to the north side of the reservoir is gained by using the existing Rock Spring Road over the causeway. This roadway system will

connect with access roads to all park facilities. These connections to park activities will provide access to safe, congregate parking locations for day-use activities. Parking will not be allowed on main park roads which provide major access to the park for emergency vehicles. Concentrated parking for cars and car/trailers also facilitates ease of surveillance by park patrols for the prevention of vandalism.

8.4.2.9 Utilities - Federal Administrative Area. To maintain and enhance the natural park atmosphere, it is recommended that all utilities systems including both electrical and telephone distribution systems be installed underground with few exceptions. This could be accomplished in phases as areas are either renovated or developed.

8.4.2.9.1 Electric Power Distribution. To accommodate future power demands as expressed above, major service changes will be required on both the north and south sides of the reservoir. These necessary changes are a result of a new demand for 3-phase service where none presently exists. Resolution of this problem includes:

8.4.2.9.1.1 North Shore Power Source. There are two alternatives to providing the required power to the campground area, in particular, to the Sewage Treatment Plant and laundry/wash-house. Both methods will incur costs of about \$40,000. First, the existing 4160-volt, single-phase service can be reinforced to handle the increased loads, and with the installation of a conversion unit, 3 phase-service can be obtained. Inherent in this conversion process, however, is an efficiency loss of 20% to 30%, resulting in a greater electrical demand and, hence, higher operating costs. The second alternative involves the extension of existing 3-phase service from the intersection of Newton Falls Road and Rock Spring Road, a distance of about three miles to the campground. As this alternative appears to be more reliable as well as energy- and cost-efficient, it is the preferred procedure.

8.4.2.9.1.2 South Shore Power Source. There is existing 3-phase service at both Hughes Road east of Rock Spring Road, and at the intersection of Alliance Road and Cable Line Road. Extension of either service to the lodge, cabin complex, and clubhouse area is practical and feasible. Because of the ultimate loads required and the potential revenue derived from this service, it is assumed Ohio Edison will sustain all costs, and, therefore, no project cost related to transmission line extension is anticipated.

Additional requirements for electric power, resulting from expansion or modification of existing facilities and installation of new facilities, will require rebuilding and extending the existing distribution system to accommodate the proposed additional load.

8.4.2.9.2 Telephone Service. Both Ohio Bell Telephone (west of the marina) and United Telephone Company (east of the marina) will be involved in any rework and expansion of existing facilities.

8.4.2.9.3 Facilities Requiring Service. Following are some of the specific facilities which will require additional power and telephone service:

8.4.2.9.3.1 Resident Manager's Office and Visitors' Center. A 45 KVA transformer will be required. This will include 150-ampere, 208/120 Volt, 3-phase, 4-wire service. The load would consist of work-area service, indoor-outdoor lighting, air conditioning, electric heating, hot water tank, hand dryers in lavatories, and display lighting. Telephones for staff and public telephone pay stations will be provided as required. Both services will be underground.

8.4.2.9.3.2 Park Office and Camper Check-In Building. This proposed facility will require a 30 KVA transformer with a 100-ampere secondary 208/120 volt, 3-phase, 4-wire underground service. This will provide for indoor and outdoor lighting, air conditioning, electric heat, and electric hot water storage tank. Telephone service will be provided underground as required.

8.4.2.9.3.3 Nature Center (Esworthy Road). A 45 KVA transformer with a 208/120 volt, 3-phase, 4-wire underground service will be required to serve this building. Included in the load will be indoor lighting, air conditioning, heating, electric hot water tank, electric hand dryers for the lavatories, drinking fountains and display lighting. Telephone service (underground) would also be provided to serve staff phones and public pay phones.

8.4.2.9.3.4 Laundry/Wash-House. The facility will be built to house automatic washing machines and electric dryers. It will require a 150 KVA (3-50 KVA) bank of transformers with a 500-ampere, 208/120 volt, 3-phase, 4-wire, underground service. This will provide indoor and outdoor lighting, electric heating, ventilation, quick-recovery hot water tank, washing machines, dryers, and vending machines. Underground telephone service will also be provided to serve public pay telephones.

8.4.2.9.3.5 Camping Area Expansion (eleven restrooms). 110 KVA in transformation will be required to serve these facilities. Each restroom will be served from a 10 KVA transformer at 115/230 volt, single phase, 3-wire, 60-ampere underground service. The electric load will include indoor and outdoor lighting, electric heating, ventilation, hot water tank, and electric hand dryers. Depending on the layout, these eleven services would be served from one or more transformers and main distribution panels.

8.4.2.9.3.6 Sewage Treatment Plant (proposed, adjoining camping area). 150 KVA in transformation with a 225 ampere 480/277 volt, 3-phase, 4-wire service will be required to serve pumps, filters, agitators, de-aerators, heating, and indoor-outdoor lighting. This service will be installed underground.

8.4.2.9.3.7 Picnic Area No. 5. A 10 KVA transformer, with 115/230 volt, single-phase, 3-wire, 60-ampere service will be required to serve the restrooms and low level lighting. In addition, phone service will be extended to this area.

8.4.2.9.3.8 Clubhouse and Golf Course. This facility will include a snack bar, a pro-shop, registration office, and lounge. 150 KVA in transformation with a 500 ampere, 208/120 volt, 3-phase, 4-wire, service requirement, will provide indoor-outdoor lighting, air conditioning, electric heat, hot water tank, cafeteria, kitchen equipment, and vending machines. Staff telephones and public pay stations will be provided. Both power and phone lines will be underground.

8.4.2.9.3.9 Lodge. 500 KVA in transformation will be required to serve the lodge. Typical loads would include but not be limited to indoor-outdoor lighting, central air conditioning, heating, hot water tank, restaurant equipment, swimming pool, mechanical equipment, etc. In conjunction with the lodge will be 100 guest rooms (approximately 62,400 sq. ft.). This portion of the project will require 250 KVA additional, or a total of 750 KVA, to serve the entire facility. Thus, we propose a 750 KVA pad-mounted transformer with a 208/120 volt, 3-phase, 4-wire secondary distribution system.

In addition, there will also be a lighted parking lot to accommodate approximately 350 cars. This lighting (low level) would be fed from the lodge, and feeders would be installed underground (load is included in calculations for the lodge).

Underground phone service will be provided for the lodge to serve the telephone switchboard, staff phones, pay stations, and guest room phones.

8.4.2.9.3.10 Cabins - Twenty-five. 315 KVA in transformation will be required, consisting of 3-37.5 KVA and 8-25 KVA transformers. An allowance of 12.5 KVA per cabin will be required to serve the electric range, refrigerator, water heater, ventilation, base board heat, and lighting. A 60-ampere, 115-230 volt, single-phase, 3-wire service will be located underground for each cabin.

8.4.2.9.3.11 Picnic Areas 6, 7, and 8. Three 25-KVA transformers with 115/230 volt, single-phase, 3-wire, 100 ampere, underground service will be required to serve the restrooms and pumps.

8.4.2.9.3.12 Group Camp. Three 10-KVA transformers with 115/230 volt, single-phase, 3-wire, 60-ampere service will be required to serve the restrooms and shelter lighting.

8.5 PHASING OF DEVELOPMENT. Responsibility for the proposed development at Michael J. Kirwan Dam and Reservoir/West Branch State Park lies with the Corps of Engineers (Pittsburgh District) and the State of Ohio Department of Natural Resources. Any actions on the recommendations set forth in this Master Plan are contingent upon the appropriation of funds by one or both agencies, as well as on the status of federal cost-sharing programs at the time they are needed. To provide guidelines for the funding of these projects, facility development has been prioritized which reflects the calculated demand and needs outlined in Section 6. These expressed priorities, shown on Table 8-2, are based on 1980 development goals. These priorities should provide a logical path towards achievement of the entire development.

8.6 DESIGN CRITERIA. The proposed recreational facilities at Michael J. Kirwan Dam and Reservoir/West Branch State Park have been planned in conformance with accepted "Recreational Planning and Design Criteria," Appendix A of Engineer Manual 1110-2-400, as well as the general development guidelines, "Design of Recreation Sites, Areas and Facilities," Engineer Regulation 1110-2-400. All criteria used have been abstracted from these references. Where deviations occur, explanations are presented. The design criteria included herein pertain to such activities and facilities as: camping, tent/trailer; camping, group; camping, cabin; lodge; boating, swimming, picnicking, and supplemental activities. These standards are presented as guidelines only, with the understanding that they may be modified in unique situations.

Table 8-2. Development Priorities

<u>Facility</u>	<u>Priority</u>	<u>Potential for Partial Cost- Sharing</u>
<u>CORPS OF ENGINEERS FACILITIES</u>		
1. Resident Manager's Office and Visitor Center	Under const.	
<u>STATE FACILITIES - GENERAL</u>		
1. Institution of a coordinated signage program	1	X
<u>STATE FACILITIES (north of Reservoir)</u>		
1. Family Camping expansion and the upgrading of Utilities (First Phase)	1	X
(Second Phase)	1	X
2. Family Camping Beach development	1	X
3. Family Camping Boat Launch area	1	X
4. Group Camping area	1	
5. State Park Office and Camper Check-in	1	
<u>STATE FACILITIES (south of Reservoir)</u>		
6. Expansion of Beach Parking for Buses	2	X
7. Development of Silver Creek Overlook & Trail System	1	X
8. Development of Picnic Areas 5 and 6	1	X
9. Development of Picnic Areas 7 and 8	2	X
10. Provision for Additional Picnic Units, Areas 2A & 2B	1	X

Table 8-2. (Continued)

<u>Facility</u>	<u>Priority</u>	<u>Potential for Partial Cost- Sharing</u>
11. Development of Hunting Access Parking	2	
12. Lodge	3	
13. Cabin Complex	3	
14. Golf Course and winter sports area	3	
15. Replacement of snowmobile trails lost as a result of other facility development	3	

In terms of structures shown, this plan makes no effort to establish finite construction details, but presents only examples of what might be required, for costing purposes. Local conditions related to topography, soils, ground water, surface drainage patterns, vegetation, etc., will dictate actual design. Plate 21 illustrates several of these examples.

8.6.1 Boating. The extent and number of facilities to be developed for boating activities are directly related to the design day load, summarized in Section 6.2.3.1.

8.6.1.1 Campers Boat Launching Area. A boat launching ramp with two lanes will be constructed near the family campground area. The ramp will be constructed of 8-inch reinforced concrete with lane widths of 12 feet as shown on Plate 21. The slope of this ramp should not exceed 16% with 12% being the absolute minimum and 14% being optimum. The ramp will be constructed to elevation 973 N.G.V.D. which is 6.2 feet below the average end-of-boating-season pool level and 2 feet below worst condition (see Section 7.3.3). General layout of the ramp is shown on Plate 15, with details on Plate 21. These indicate vehicle access, turning, and parking; none of which interferes with launching operations.

8.6.1.2 Courtesy Dock. A single courtesy dock 5 feet wide by 60 feet long will be provided, and shall conform in type and design to those installed at other launch areas on the reservoir.

8.6.1.3 Car/Trailer Parking. Parking areas at the campground launch area will be surfaced with bituminous pavement. Car/trailer spaces will measure 10 feet by 40 feet for 60-degree angled parking with 20-foot aisles. Two-way access roads are 24-feet wide. Initially, 88 spaces will be provided. An additional 45 single spaces will also be provided to accommodate campers with more than one automobile. These are located on the end of the lot nearest the campground.

8.6.2 Picnicking. The amount of picnicking provided will be based on the design day load. Each picnic area will contain a minimum of 10 tables with grills and trash receptacles. The maximum slope for picnic areas should not exceed 10%.

8.6.2.1 Tables. Tables, to be consistent with those that exist, will be of wood construction. A density of not more than 12 tables per acre will be used. Where site conditions permit, two or more tables may be placed together to accommodate groups.

8.6.2.2 Grills. Adjustable, pedestal-type charcoal grills will be provided in each picnic area. Based on existing state criteria, they will be provided at a ratio of 1 grill per 4 tables.

8.6.2.3 Trash Receptacles. One receptacle will be provided for each 3 to 5 tables, or as may be deemed sufficient for normal summer weekend use. All receptacle holders will be anchored in place.

8.6.2.4 Picnic Shelters. Picnic shelters as shown on Plate 26 shall be provided at all new picnic areas. Each shelter should be furnished with 8-10 tables and appropriate grills and trash receptacles in proximity.

8.6.2.5 Water Supply. Each picnic area will be furnished with one well or other water supply with at least one tap or spigot. A minimum of 2 gallons of water per user per day will be available where waterborne restrooms are not a part of the development. Water tap unit or well spacing should be 400 feet minimum, unless restricted by terrain. The water supply system shall be constructed in accordance with state public health regulations.

8.6.2.6 Restrooms. Toilets will be provided in accordance with existing state criteria. Vault-type toilets with 3 toilet units will be provided for each sex. Waterborne toilet facilities will include 3 toilets units and 3 lavatories for each sex. Waterborne facilities will be provided at new picnic area 5. Picnic Areas 6, 7, and 8 will have vault-type toilets or, with pressurized well water, a septic system, as extension of sanitary utilities to these sites is uneconomical. All vault systems should be provided with audio-visual alarm systems and disposal made at an approved sanitary treatment plant. Where utilities are provided to the lodge, site consideration should be given to their conversion. Restrooms will be sited at a minimum distance of 100 feet from the nearest table, with a maximum walking distance of 600 feet from any table. All facilities will be constructed in accordance with State public health regulations.

8.6.2.7 Parking. A minimum of one parking space (10 feet by 20 feet) will be provided for each picnic table. Excess parking is proposed in all situations to accommodate sightseers and fisherman. A minimal number of bus stalls have been included in each new picnic area. Parking areas will be surfaced with bituminous concrete paving.

8.6.3 Swimming. Although present facilities exceed projected demand, a swimming facility will be constructed

for exclusive camper use. For development criteria for this area see Section 7.3.4 Campers' Swimming Beach.

8.6.4 Interpretation and Sightseeing

8.6.5 Camping

8.6.5.1 Family Camping (Tent/Trailer). Two hundred-fifty tent/trailer camping spaces will be provided in accordance with the imposed limitation by the Ohio Department of Natural Resources. This is 235 fewer spaces than the 1980 estimated design load, and 415 fewer spaces than the estimated 2070 design load. The density of spaces should not exceed 5 per acre. Campsites should consist of one 60-degree angled bituminous paved or gravel spur, 10 feet wide by approximately 45 feet long as shown on Plate 21. Sites should be sequentially numbered and spaced approximately 75 feet on center. The space will have a maximum 2% side slope and a maximum 5% slope front to rear. The adjoining campsite area (minimum 15 feet by 15 feet) should be a complete unit to accommodate one family, including a picnic table, charcoal grill, fire ring, refuse container, site marker, electric hookup, and appropriate landscaping. Head-in parking should be avoided as it precludes the use of that site by a 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. Additionally, 90-degree-angle spurs should only be placed on the left side of roads because of visibility problems with backing a trailer. All sites should be field-adjusted to fit individual terrain characteristics and should be so sited as to cause minimal disturbance to forest and other vegetative cover. A dense landscaped planting will be maintained within the camping area whenever possible to provide camping sites with a sense of privacy. Boat mooring posts will be provided for those sites located adjacent to the water.

8.6.5.1.1 Laundry/Washhouse. One centrally located laundry/wash house will be provided, in the camping area to augment the restrooms described below. Washers and dryers may be a concession operation. Space for 8 units is provided in the proposed structure. Details of this facility are shown on Plate 26.

8.6.5.1.2 Restrooms-Showers. New, waterborne restrooms, with and without showers, will be provided for the entire campground. Where practical, restrooms will be located not more than 300 feet from any campsite. The Ohio Department of Natural Resources has indicated that no fewer

than 3 toilet units and 3 lavatories will be provided for each sex in any single structure. All facilities will be constructed in accordance with state public health regulations. They should be constructed as shown on Plate 25.

8.6.5.1.3 Sanitary Disposal Station. The one sanitary disposal station (dump station) to be provided for the camping area should include a water flushing device and should be constructed to conform to public health laws.

8.6.5.1.4 Water Supply. A new pressurized potable water system will be provided which uses either treated lake water from the facility near the marina or a well collection system in the campground with appropriate treatment. A minimum of one self-closing tap and spigot will be furnished for each 8 camping spaces. Where practical, spigots shall be placed not more than 150 feet from the farthest space. Anticipated demand, as determined by the Ohio Environmental Protection Agency, is about 30,000 gallons per day. Water treatment and distribution will be in accordance with state public health regulations.

8.6.5.1.5 Electric Power Distribution and Telephone Service.

8.6.5.1.5.1 Night Lighting. Night lighting should be provided as required for the safe use of all facilities, and should conform to American National Standards Institute standards for protective lighting. Of particular importance is the lighting of the laundry/washhouse, group camping shelters, and all project restrooms. The laundry/washhouse would have public telephones as would the camper-checkin station.

8.6.5.1.6 Wastewater Treatment. See Sections 7.2.2.14 and 7.3.1.2.2.

8.6.5.1.7 Campground Roads. Roads should be one way whenever possible to provide maximum safety in the campground and reduce development costs. Back-in spurs should be provided for ease of access and diversity. Ample turning radius should be provided for each spur, especially if terrain dictates spurs greater than 60° from the Campground Road.

8.6.5.2 Group Camping. One group camping area will be provided to accommodate a maximum of three groups or 100 persons in tents. Sites will be informal to better accommodate fluctuating demand. Buffer areas between group sites will be maintained.

8.6.5.2.1 Shelters. Shelters will be provided at each group site, together with tables, trash receptacles, grills, and a fire circle.

8.6.5.2.2 Restrooms. Vault toilets or low liquid flush toilets will be provided in the group-camp area, as extension of the campground sanitary system is uneconomical. Where practical, facilities will not be located in excess of 300 feet from any campsite. All facilities will be constructed in accordance with state public health regulations. Restrooms will be equipped with 3 toilets for each sex, as shown on Plate 25.

8.6.5.2.3 Water Supply. Water will be supplied by extension of the pressurized campground system west along Esworthy and Copeland Roads. A minimum of 2 self-closing taps and spigots should be provided in each group area.

8.6.5.2.4 Night Lighting. Night lighting should be provided at all shelters and restrooms and security lighting provided at all parking areas.

8.6.5.3 Horsemen's Camp. The proposed horsemen's camp is shown on Plate 14. Fourteen improved spurs will be developed, each with its own hitching post.

8.6.5.3.1 Shelters. One shelter will be provided and should conform to picnic shelters shown on Plate 26. The shelter will be provided with tables for group use, trash receptacles, grills, and a fire circle.

8.6.5.3.2 Restrooms. Vault toilets will be rebuilt to conform to those shown on Plate 25.

8.6.5.3.3 Water Supply. Water supply will be from at least one well with hand pumps.

8.6.6 New Opportunities.

8.6.6.1 Lodge. The lodge will have a gross floor area of approximately 50,000 square feet, with 100 guest rooms. Parking for 450 cars will be provided. Other facilities to be included are: dining room (263 seats); meeting rooms (435 seats); coffee shop (160 seats); office, gift shop, and indoor pool.

8.6.6.2 Cabins. Development of up to 25 cabins is proposed by the State of Ohio for the south shore of the reservoir near the lodge site. Parking would be provided at a ratio of 2 spaces per cabin.

8.6.6.3 Water Supply. Water would be supplied by extension and possible upgrading of the pressurized system in the beach area. A demand of approximately 400 gallons per day per cabin is anticipated. Extension of these utilities would require a relatively shallow sub-aqueous crossing of Silver Creek.

8.6.6.4 Sewage Disposal. The additional sewage generated by the lodge, cabin complex, clubhouse and picnic area No. 5 will require expansion of the existing sewage treatment plant and the installation of new gravity and force-main sewer systems as shown on Plates 17 and 19 (see Table 7-1).

8.6.6.5 Golf Course. The golf course would be developed in conjunction with the lodge and cabin development as a source of additional recreation. A full 18-hole, par 72 course is proposed. Access to the clubhouse is off the proposed, new, main park road, and a paved parking lot is provided for 96 cars. Construction of the clubhouse and golf course must be coordinated with the location of the existing Standard Oil Co. high-pressure gas line which traverses this site.

8.6.6.6 Clubhouse. The proposed club house should provide the necessary spaces for cafeteria dining; a large lounge around a stone fireplace; a shop for golfing equipment and cart rental that could also be used in winter for the rental of cross-country skis, ice skates, or toboggans; and men's and women's locker rooms and toilets. Decks should be used to extend the interior space on pleasant days (both summer and winter) for use and as outdoor dining/lounge space. A two-story building is proposed, sited on the slope of the hill near the golf course entrance. This building of approximately 6,000 square feet should provide adequate space. Utilities would be provided as for the lodge, above. The club house location is shown on Plate 19.

8.6.6.7 Winter Sports Area In conjunction with the golf course and clubhouse, a skating pond and sledding/toboggan run is proposed here to encourage winter use. The golf course could also be used for cross-country skiing. These areas will be posted and activities pursued at an individual's own risk.

8.6.6.8 Interpretation and Sightseeing. The area of the Silver Creek ledges with its intense geological and ecological interest has no access at present, and automobiles are forced to park along County Road C-135 (Alliance Road). This is an excellent location for the use of interpretive media.

8.6.6.8.1 Silver Creek Overlook and Trails Proposed Development. A small paved parking area is proposed adjacent to Alliance Road immediately north of the gas pipeline easement. Parking is provided for 12 cars. New hiking trails would then be developed along the cliff face and to two adjacent upland wetland habitat areas of ecological interest. Selective pruning and thinning may be required to open up the view of Silver Creek. Plate 16 includes a plan and section through the proposed overlook. Cost Table 19 indicates estimated development costs of approximately \$50,400 which includes engineering, design, supervision, and administration.

8.6.6.9 Campers' Boat Launching Ramp. Two boat launching lanes will be constructed. The average demand on this facility would be about 29 boats per day, with an average camping stay of three days which would maintain an average of about 88 boats at any one time. This demand figure compensates for the 10% of the campers who bring boats that car-top their boats and would use the causeway launch area.

Based on actual recorded pool fluctuation levels (Figure 4-8), the worst condition for 31 October, the end of the boating season, was a pool elevation of about 975.0. This occurred in 1967, the first year of operations (reservoir filling) and again in 1971. The highest recorded pool level for this same date was elevation 982.0 in 1976. The average for the 15-year operating history is about elevation 979.2. Using this average, and allowing for four feet of water under the boat, a maximum bottom elevation of 975.2 would be required. Soundings taken 14 August 1978 show the bottom elevation at approximately 100 feet from the waterline at summer pool and thus coinciding with the approximate toe of the proposed launch ramp to be at elevation 973.0, or 2.2 feet greater water depth than would be required. However, data shown for the "worst-year" condition to date (1971) would indicate that some dredging might be required, to provide boating to 31 October. Therefore, a minimal amount of dredging and reshaping during construction of this facility would guarantee its use through 31 October of any year. Additional soundings would be required prior to design to determine the actual extent of any required excavation.

The location of the campers' boat launching area is shown on Plate 14 with an enlargement showing parking configurations on Plate 15. The cost of the campers' boat launching facility is shown in Section 9.

8.6.6.10 Car-Trailer Parking. Parking will be provided at the new campers' boat launching area to

accommodate 45% of the 250 expanded campground parties that are expected to bring boats, or 113 spaces. Deducting the 25 campers (10%) who car-top their boats, this equals a lot requirement of 88 spaces. This is 38 spaces in excess of the 25 spaces per launch ramp considered optimum by the state, but, as noted, the proposal is based on a storage requirement for all campground boats. In addition, 30 more parking spaces are provided for those campers bringing more than one car. This joint parking facility is located at the launching area so that it is within walking distance of the campground.

8.6.6.11 Night Lighting. Night lighting should be provided at the ramps and especially the parking areas for security and the safety of those campers required to park here and walk into the campground after dark.

8.6.6.12 Campers' Swimming Beach. A new swimming beach for camper use will be provided on the north side of the reservoir. Design is based on accommodating 605 users at any one time (55% of anticipated campground population).

8.6.6.12.1 Beach Area. Fifty square feet of sand and/or turf will be provided per person for sunbathing, based on 60% of total demand. The beach will be separated from the parking area by a vegetative buffer. A minimum of 30 feet of sand will be provided above the waterline, whenever possible.

8.6.6.12.2 Water Area. Thirty square feet of water for swimming will be provided per person, in a designated area (buoyed). Underwater areas will be graded to a maximum of 4% slope.

8.6.6.12.3 Parking. Parking will be developed to initially accommodate 25 automobiles, with expansion potential to 100 spaces. This area will be paved with bituminous concrete pavement; stalls will measure 10 feet by 20 feet, with wheelstops. Aisles will be 14-feet wide.

8.6.6.13 Park Office and Camper Check-in Complex. A new park office and camper check-in complex is proposed by the state to replace the existing facilities described in Section 7.2.2.5. This facility will be located along Copeland Road just east of Rock Spring Road. Its location will eliminate non-camper traffic from the camping area and increase security.

Roads will allow one- and two-way traffic to provide smooth circulation through the facility. Parking will be provided for 10 cars and 10 car/trailer combinations near the check-in area. Parking will also be provided for office staff.

The facility is planned to be served by an extension of the campground water and sanitary sewer systems.

8.6.7 Maintenance and Service Areas. Adequate, visually buffered areas will be provided for offices, shops, and storage areas for both the Federal Administrative Area and the State Park. All service and storage areas will be fenced for security purposes.

8.6.8 Siting. Topography, area size, access potential, and relative location of each area were the major considerations which dictated the locations of all proposed recreation areas.

Only the most adaptable topography should be used for the siting of 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 existing 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 this Master Plan. Facility locations, facility numbers, and road alignments are flexible and must be considered preliminary in order to provide the project designer and field supervisor the latitude necessary to site adapt the construction plans.

8.6.8.1 Elevation Considerations.

8.6.8.1.1 Boat Launching Ramps. The boat launching ramps should be constructed to extend at least 4 feet below the average end of the boating season pool level of 979.2 feet NGVD to facilitate use at low water levels. Basins for marinas and boat service facilities should be excavated to 4 feet below the end of a dry boating season elevation of 971.0.

8.6.8.1.2 Facilities Susceptible to Damage. Habitable buildings, washhouses and restrooms, roads and parking lots, sanitary sewage and water systems (except "closed systems"), and other facilities subject to substantial damage from inundation should be designed to withstand water levels above the present full pool level of 993.0 feet NGVD. Service roads may extend to the five year flood pool elevation of 988.0

8.6.8.1.3 Wastewater Treatment Plants. Any package wastewater treatment plants should be located above the project full pool level of 993.0 feet NGVD.

8.6.8.2 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, geologic 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.

8.6.9 Landscape Planting. Hardy and tolerant plant material will be used in simple, naturalistic, yet functional design, with emphasis on low maintenance costs. Plantings will be provided for shade; control of undesirable wind, noise, dust and erosion; privacy screening and buffers; for enhancement of architectural features; for definition of areas and for the blending of new development with the surrounding environment. Species that occur naturally within the project area should be utilized for landscaping whenever possible. Particular care should be given to selecting native tree species that are suitable for the particular environmental characteristics of each site.

Because of the variety of environmental conditions that exist between each recreation area, it is not practical to prepare detailed planting plans at the master plan level; therefore, only mass areas of planting are shown on the site plans. Consideration should be given to the character of each site when actual site planning begins.

8.6.10 Roads. Roads will be provided for access to or circulation within all developed areas. The degree of steepness of cut slopes shall be varied in relation to the depth of the cut and the stability of the soil. All fills, berms and top and bottom of all cuts should be rounded with short-radius vertical curves. Minimum clearing and the preservation of vegetation should be emphasized in all roadwork. Roadway standards are shown in Table 8-3.

Road sections are shown on Plate 21.

8.6.10.1 Pavements. For costing purposes, all park roads except the main park road (type A) are considered to be constructed with a 6-inch granular sub-base, 6-inch compacted granular base, plus 3 inches of bituminous concrete surface in two courses. The main Park Road is proposed as having a 6-inch granular sub-base, 8-inch compacted granular base, and 3 inches of bituminous concrete surface in two courses. Actual field conditions,

Table 8-3. Roadway Design Criteria.

<u>Road Type</u>	<u>Pavmt. Width</u>	<u>Max. Grade (%)</u>	<u>Design Speed</u>	<u>Min. Shoulder Width (Ft.)</u>	<u>Min. Rad. (Ft.)</u>
Type 'A'					
Main Pk. Road	22	10	30	4	150
Type 'B'					
Campground/Access Rd.	20	10	30	4	150
Type 'C'					
Service/One-way Rd.	12	12	20	2	50

however, will dictate final required pavement composition depth and strength.

8.6.10.2 Alignment. The horizontal and vertical alignment of park roads will respect the terrain, using "grass root" grades so that these roads are laid lightly on the land and molded to it.

8.6.11 Parking. Parking facilities will 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 landscaping techniques should be utilized to screen parking areas from recreational facility areas. The visual character of all parking areas should be enhanced by providing planting islands and/or landscaped aisles wherever possible. All proposed parking lots should be physically separated from major access roads to minimize circulation conflicts. Diagonal parking will be used wherever possible.

8.6.11.1 Design Criteria.

8.6.11.1.1 Facility Parking Requirements. The number of parking spaces to be provided at various use areas are generally based on the following criteria.

- Waterfront Camp Unit - One car/trailer space/unit plus one boat mooring post/unit.
- Interior Camp Unit - One car/trailer space/unit.
- Group Camp Unit - Fifteen car spaces/unit.
- Picnic Unit - One car space/unit.
- Boat Launching Ramp - 25 car/trailer spaces/lane.
- Day-Use Areas - One car space/4 visitors.
- Marina - One car space/slip.

In addition, provisions for buses will be made at appropriate facilities.

8.6.11.1.2 Materials. All permanent parking areas should be constructed with compacted subgrade, gravel sub-base, asphaltic concrete base course, and asphaltic concrete surface course except the causeway boat launching

area which will have crushed stone parking lots and roads. The cost estimates for all new parking areas include paving materials, site preparation, grading, and labor.

8.6.11.1.3 Size. Car-trailer spaces should be 10 feet by 40 feet and car parking spaces should be 10 feet by 20 feet. Approximately 2% of the total number of spaces in each use area will be specifically designed and reserved for the use of physically disabled persons. These spaces should be 12 feet - 6 inches wide and conveniently located in relation to walkways, buildings, site impact areas, etc.

8.6.11.1.4 Other Features. All parking spaces, except pull-throughs, should be provided with wheel stops. Curbing and catch basins should be minimized; storm run-off will be surface drained wherever possible.

8.6.12 Electric Power and Telephone Service. These utilities should be provided for all major day-use recreation areas and all overnight areas, except for the horsemen's camp, which is relatively primitive. Installation should be underground wherever practical. Installation should be in accordance with the standards and criteria set forth in Engineering Manual 1110-2-400.

8.6.13 Water Supply. The potable water supply for the recreational facilities would either be provided from ground water sources or from treated lake water. Where economically feasible, extension of the present treated lake water system is proposed.

8.6.14 Sewage Disposal. Facilities for the collection, treatment, and disposal of sanitary wastes will vary from area to area, depending on usage and location. Where economically feasible, extension of the present system is proposed (see Section 7.2.2.14). A new treatment facility will be required to handle wastewater treatment of the expanded family camping area (see Section 7.2.2.6.1). Expansion of the existing system may be required for development of the lodge, cabins, and golf course. Where pressurized water is available in remote areas, septic systems will be used. Where there is no pressurized water system, vault-type systems will be used.

Law and policy require that innovative wastewater treatment methods, primarily land treatment alternatives, be evaluated against more traditional methods of disposal to assess the feasibility of their employment. A review of land treatment alternatives will be given thorough consideration prior to completion of plans and specifications to ensure that evaluations reflect the then-current state of technology. A cursory study of the potential for land

treatment at the Michael J. Kirwan Reservoir project indicates that such methods may not be practicable given the constraints of topography and soils.

For the purposes of this report, a traditional wastewater treatment system developed according to current Ohio EPA standards, providing tertiary treatment, has been utilized in plan development and cost estimating. Effluent would be piped to the main channel of the reservoir for discharge.

8.6.15 Architectural Character. The use of consistent design detailing throughout the park will be significant in developing its architectural character. Since the lodge is the most complex, as well as most significant structure, its design should establish the character for the rest of the development. The other buildings should be designed and detailed in that established vernacular.

It is important for the buildings to be sensitive and compatible with their environment. The materials selected (vertical, rough-sawn cedar siding and cedar trim, stained natural colors; and some earth-toned masonry and natural stone) will reflect this sensitivity.

8.6.15.1 Lodge. We recommend the use of the basic plans developed in 1976 for the Ohio Department of Natural Resources by Dalton, van Dijk, and Partners. However, the alternate elevations prepared with that proposal are preferred over the primary "institutional" concept, because they appear to be more rustic, and, therefore, more sensitive to the architectural needs of the total park development. The shed roof and vertical siding are complementary to the natural setting and allow the lodge to settle into its environment in a more peaceful manner. Every attempt should be made to deemphasize the lodge and to emphasize the natural beauty of the trees, land, and water. Care must be taken to shield the parking from the view of guests of the lodge, as well as from those driving through the park or viewing the park from the water. Expansion and extension of present water and sewage facilities near the marina will be required to accommodate this development.

8.6.15.2 Clubhouse. The clubhouse should be similar in construction to the lodge. Decks should be used to extend the interior space to outdoors. Utilities would be provided as for the lodge.

8.6.15.3 Cabins. Two-bedroom guest cabins of simple design should be as maintenance-free as possible. The bathroom/kitchen/mechanical space should be grouped to

minimize plumbing. Each cabin should have a stone/fireplace for heat source. A clerestory could be used to provide architectural interest, light, and additional ventilation for the living area. The exterior materials should be the vertical, rough-sawn cedar with asphalt shingles for the roof. A wide overhang at the front entrance could provide covered outdoor space for each unit. Approximately 575 square feet would be ample space for use by 6 or 8 people. A total of 25 cabins is proposed for ultimate development, as indicated on Plate 19.

8.6.15.4 Restrooms. As shown on Plate 25, three types of restrooms have been developed. They are all of similar design, using simple construction techniques and materials common to all of the proposed buildings. The clustering detail is used here for venting, thus eliminating roof penetrations which cause maintenance problems and which detract from the aesthetic appearance of the structures.

8.6.15.4.1 Vault Toilets. The structure would be built over a concrete sanitary vault that would be serviced by an exterior manhole. Four of these units would ultimately be constructed.

8.6.15.4.2 Toilets. Water borne or flush-type toilets with handwashing facilities would be constructed in the family campground, the dam overlook and Picnic Area 5. In the campground and picnic area, a pressurized water system and sewage treatment would be provided. The dam overlook would be serviced by a pressurized well-water system, and sanitary facilities would be serviced by a septic tank and tile field.

8.6.15.4.3 Toilets with Showers. These will be constructed in the campground in conjunction with those listed above.

8.6.15.5 Picnic Shelters. As shown on Plate 26, the shelters are constructed of wood columns, with wood trusses and wood deck. Asphalt shingles and rough-sawn cedar siding provide the architectural continuity required. A concrete slab on grade provides the shelter floor.

8.6.15.6 Laundry/Toilet Building. The laundry building as shown on Plate 26 is located in the campsite development. It is constructed of wood stud and truss framing. Rough-sawn cedar siding and asphalt shingles continue the natural earth-tone colors used throughout the park. The clerestory design takes advantage of natural light and offers ventilation as well.

8.6.15.7 Manager's Complex and Visitors Center.

The architectural design for this complex is shown on Plate 24. The facility is made up of two parts. One, the Manager's Office and Visitors Center is constructed of wood stud and truss framing, sheathed with rough sawn cedar siding. This construction maintains structural continuity within the project and provides the desired human scale. The garage portion of the structure, which is attached, is constructed of concrete masonry units with steel bar joist and metal deck forming the roof. A clerestory of louvers and windows is used to provide natural light and ventilation for the garage space. If available funds permit, diagonal rough-sawn cedar siding should be considered as a covering on the masonry walls.

SECTION 9 COST ESTIMATES

9.1 COST TABLES. Cost tables for the proposed development at Michael J. Kirwan Dam and Reservoir/West Branch State Park are presented as Exhibit A. The costs, with the exception of main park road development and general signage, are shown by facility as a complete unit. Costs are allocated as 100% Corps of Engineers, 100% State, or potentially cost-shared.

9.1.1 Unit Costs. The unit costs shown are based on a cost level as of July, 1981, and include overhead and profit.

9.1.2 Adjustments to Costs. To obtain total construction costs, 15% of the estimated raw cost has been added for contingencies. An additional 20% of the total construction cost has been added for engineering and design (10%) and supervision and administration (10%). Costs given do not include adjustments for contract expansion. All cost subtotals and totals have been rounded to the nearest \$10.

9.1.3 Total Cost. The total cost for construction of all recreation facilities at the project as estimated is:

Corps of Engineers (100%)	\$	307,620
State of Ohio (100%)		21,327,370
Cost shared (potential)		3,578,440

TOTAL PROJECT COST	\$25,213,430
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For breakdown of included items, see Exhibit A, Summary of Costs.

SECTION 10 RESOURCES MANAGEMENT GUIDELINES

10.1 PROJECT RESOURCES MANAGEMENT PLAN

10.1.1 General. The Project Resources Management Plan, Appendix A to this Master Plan, was prepared in 1972 in accordance with ER 1130-2-400. The project name, originally West Branch Reservoir and later West Branch Lake, was changed on 31 December 1970 to Michael J. Kirwan Dam and Reservoir.

10.1.2 Project Authority, Purpose, and Collateral Functions. The project was authorized by the Flood Control Acts of 1958 for the primary purpose of alleviating floods along the lower West Branch Mahoning and the Mahoning Rivers. In addition, the project is intended to improve the water quality of the West Branch of the Mahoning River through flow augmentation by mechanisms discussed at length in Appendix A. The project may also contribute to recreation, fish and wildlife conservation, and forestry to the extent that these do not interfere with the primary purpose of flood control.

10.1.3 Operation Concept of the Project and Its Effect on Recreation. The operation concept of the project is to store water during floods and high runoff seasons and to release this water gradually after floods and during the dry season. Criteria and schedules for flow augmentation are discussed in Appendix A.

The drawdown of the lake each year in the summer dry season is probably the only adverse effect of the operational procedures on recreation at the Michael J. Kirwan Dam and Reservoir. Boat launching and operation may be affected by drawdown, since stumps exposed in shallow areas as the water level falls present navigational hazards.

High water levels may inundate certain areas and facilities. Particularly vulnerable areas are identified in Appendix A. Flow augmentation will improve recreation along 10 miles of the Mahoning River Valley by providing sufficient depth for water sports.

10.1.4 Land Acquisition Policy. Guidelines for the acquisition of land for this project are described in Appendix A.

10.1.5 Description of Public Use Areas. This section lists in detail the existing facilities at the eight recreation sites which have been developed at Michael J. Kirwan Dam and Reservoir and the West Branch State Park:

- Boat launching areas
- Camping area
- Picnic areas
- Fishermen's parking lot at the causeway
- Marina
- Swimming beach
- Horsemen's camp
- Trails

Fishing and boating are permitted, governed by the rules and regulations of the Ohio Department of Natural Resources (ODNR). Hunting is permitted in designated areas, subject to Ohio Game Commission rules and regulations.

Appendix A includes visitation records from 1967 through 1971 as Exhibit 2.

10.1.6 Maintenance Facilities. A maintenance complex was constructed in 1968. The shop housed in the complex is equipped with tools for the performance of all routine small jobs. In addition, two floors in the operations tower of the dam are used for maintenance and repair work on dam equipment which cannot be removed.

10.1.7 Storage Facilities. Storage space is provided in the maintenance complex, in the dam's operations tower, and in the garage between the two buildings. A fenced-in outdoor storage yard is situated at the rear of the maintenance building.

10.1.8 Office and Administration Facilities. The project supervisor's administrative office is in the dam's operating tower. In addition, a more centrally located administration office has been set up at the maintenance building. Appendix A details office and communications equipment at each of these offices.

10.1.9 Staffing and Organization. The Michael J. Kirwan Dam and Reservoir project is a unit of the Beayer Area, and is under the supervision of the area reservoir manager. Appendix A discusses in detail the staff and their skills. This project is staffed on site by a project supervisor and a maintenance man.

10.1.10 Administration of User Fee Areas. The user fee program established by Section 210 of Public Law 90-483 does not apply to the Corps at the project.

10.1.11 Resume of Cooperative Activities with Other Agencies. The State of Ohio leases virtually all of the land within and surrounding the Michael J. Kirwan Dam and

Reservoir. However, a variety of organizations and agencies work together on a cooperative basis at the project. The West Branch State Park officials are responsible for enforcement of ODNR regulations regarding boating and fishing. Corps personnel cooperate with the Ohio Fish Commission in various chores and periodically patrol the lake to ensure compliance with the Commission's rules and regulations. It is important that Corps personnel maintain a good relationship with state park staff and keep the park superintendent informed about Corps operations which might affect the operation of the park. In addition, the Corps should report any violations of park or Fish Commission rules and regulations to the appropriate authorities.

The Corps should also cooperate with local fire departments and game wardens and with state and local law enforcement agencies.

10.1.12 Ranger Activities - Land and Water. Ranger duties at Kirwan Reservoir are performed by the permanent maintenance personnel, with some ranger assistance from Berlin Lake, Mosquito Creek, or Shenango River Lakes. These responsibilities are detailed in Appendix A.

The project supervisor is to maintain good relations with the ODNR personnel, listed in Appendix A.

Appendix A includes the text of the notice which is posted in public use areas describing reporting procedures for various types of infractions.

10.1.13 Law Enforcement Arrangements and Procedures. The federal government shares jurisdiction for police protection and law enforcement on project lands with state and local authorities. Project personnel do not engage in law enforcement, although they are responsible for keeping the various cooperating agencies informed of operating procedures, personnel, problem areas, and vulnerabilities to facilitate the performance of their job. A current list of law enforcement agencies having jurisdiction at the project is maintained at the project office.

10.1.14 Safety - Visitors and Employees. This section of the plan briefly covers material detailed in Appendix E (the Project Safety Plan).

10.1.15 Concessionaire Activities. Concessions are located at the boat marina and at the beach.

10.1.16 Encroachments. No encroachments are known to exist at the project, as noted in Appendix A.

10.1.17 In-Service Training Program. On the district level for the Corps of Engineers, the project supervisor attends meetings and seminars at the district office, along with area reservoir managers, reservoir managers, and project supervisors from the entire Pittsburgh District.

On an area level, annual training programs are conducted by the Beaver Area Reservoir Manager. Internal policies and procedures are discussed during quarterly District seminars held at the Beaver Area office.

Training at the project level is to be provided by the project supervisor on a continuing basis. Additional training programs and prospects are also discussed in Appendix A.

10.1.18 Visitor Education and Interpretation. The interpretation program for the Michael J. Kirwan Dam and Reservoir is currently limited to directional signs and a sign at the entrance to the dam. Personal contact with the public is the primary means for communicating project purposes and recreational resources. Project personnel give dam tours and talks. Brochures explaining the project's purpose and operation and other information are available at the project office, the maintenance building, and through Corps personnel. A visitors' information center is presently under construction in the reservoir manager's complex. The Silver Creek Overlook facility proposed by the state will include geological interpretive information.

10.1.19 Pest Control Program. This program normally consists of the control of vegetation along guard rails, signs, in drainage ditches, on stone slope protection, and around structures. Control is accomplished by means of herbicides applied in accordance with ER 1130-2-332. Only herbicides registered by the Federal Commission on Pest Control are used. Appendix A lists hazards associated with the use of herbicides and precautions to be taken during their application.

10.2 FOREST, FISH, AND WILDLIFE MANAGEMENT PLAN

10.2.1 Purpose. The Forest, Fish, and Wildlife Management Plan is a statement of general policies and specific procedures to be applied in protecting and managing the biota of the lands and waters owned by the Corps of Engineers at the Kirwan Reservoir project. Specific recommendations for management, and suggested means for implementing them, are reviewed here.

10.2.2 Aquatic Management

10.2.2.1 General. Aquatic management at Kirwan Reservoir will involve an integrated program of optimal maintenance of water and aquatic organisms and their habitat resources.

10.2.2.2 Water Management Recommendations. The water management program will involve the following specific points:

- Seasonal water levels should be controlled to provide maximum advantage for fish survival and reproduction and for habitat improvement (particularly aquatic plant growth) within the limits prescribed by flood control and low-flow augmentation requirements.

Fishery biologists of the ODNR Division of Wildlife indicate that normal seasonal water levels and drawdown rates do not presently conflict with fisheries' management programs designed for the lake. Nevertheless, more stable water levels should contribute to the overall productivity of the reservoir.

- The feasibility of creating additional, small, permanent ponds and marshes within the existing project boundaries for the benefit of waterfowl and other water-oriented wildlife should be considered. The Ohio Division of Wildlife could construct small earthen dams in strategic spots or use explosives in vegetated marsh areas to create small ponds.
- Tributary streams to the lake, and the lake itself, should be monitored periodically to detect any possible pollution problems and to reveal the sources of any such pollution. A specific target of monitoring should be the detection of hydrocarbon residues from drilling of oil wells.

10.2.2.3 Aquatic Organism Management Recommendations. The aquatic organism management program will involve the following specific points:

- Enough variety of species should be maintained to provide a highly satisfactory level of recreational opportunity, with emphasis upon species which can achieve self-sustaining and self-regulating populations.

- Better access to the lake for anglers without boats will be considered. Better access means more efficient use of the fishery resource and better distribution of recreational pressures. Construction of secure parking areas, shoreline trails and, possibly, fishing piers would create better access.
- The sport fishery of the lake should be publicized in local and regional media so that the angling public can enjoy the maximum benefits of this recreational resource.
- The development of the fishery resource should be monitored through annual fish population surveys. These should include test-netting, trawling, and shore-seining.
- Self-sustaining and self-regulating populations of desirable sport fishes should be achieved, with enough variety of species to provide a highly satisfactory level of recreational opportunity.
- Fingerlings of tiger muskellunge, walleye, and striped bass should continue to be stocked until test data indicate the success of this management effort (i.e., sustained breeding of the introduced populations).
- Desirable aquatic organisms of significant scientific or educational value should be protected and preserved, particularly any species identified as "rare" or "endangered."
- The proliferation of zooplankton and other organisms used as food by fish should be enhanced by water management, and desirable forms, presently absent from reservoir waters, should be introduced.

10.2.2.4 Habitat Management Recommendations.

Management of aquatic organism habitat will involve the following points:

- As much natural cover (fallen trees, logs, stumps, and brush) as possible should be conserved for underwater habitat for sport fish and other desirable aquatic organisms. Where this material might pose a threat to the dam structure or its operation, it should be anchored to prevent drift during pool level fluctuations.

- The habitat could be further enhanced for fish and other aquatic organisms by providing artificial cover when convenient. Large rocks, brush, logs, and other cover items could be placed at strategic locations. Brush piles, securely tied together and weighted, could be gathered and positioned when the lake is ice-covered. Rocks and discarded Christmas trees could be dumped from the shoreline in convenient places. Logs and stumps could be towed into position with boats. These materials should be placed deep enough so that they do not constitute a hazard to boating.

Much of this work might be accomplished by sportsmen's clubs, Scouts, and other groups or individuals under the guidance of Division of Wildlife or Corps resource management personnel. Habitat enhancement through structure placement should be coordinated through all agencies involved to avoid reservoir-use conflicts.

- Protection should be provided for existing rooted aquatic plant beds by adopting a policy to limit future control of aquatic weeds to high-use areas only (e.g., boat launching ramps, docks, beaches, etc.).
- An effort should be made to introduce new, rooted aquatic plants in the reservoir. Species selected should have the capacity to survive reasonably long periods of inundation when water levels are high or exposure to drying when water levels are lowered.
- Consideration also should be given to the planting of willow and button-bush in shallow water areas which are exposed as mud flats for a large part of the year. This can be done by using cuttings taken in the early spring from the reservoir site's native stock.

10.2.3 Terrestrial Management

10.2.3.1 General. The project's lands have been divided into 31 land-use compartments. Their configurations represent a synthesis of (1) the ecological inventory, (2) geographical considerations (e.g., location of access roads and recreation areas, external land uses, etc.), and (3) management objectives.

The compartments are classified as follows:

- Natural Area Compartments
- Wild Area Compartments
- Aesthetic Management Compartments
- Game Management Compartments
- Special Preservation Compartments

Key management recommendations for the land-use compartments are outlined below.

10.2.3.2 Natural Area Compartments Management Recommendations. Natural Areas are places where human influences are relatively inconspicuous and where the plant and animal communities or geological features are in some way rare or outstanding. The feature that makes a place a Natural Area may be exceptional maturity of trees, presence of a rare plant or animal species, presence of an unusual geological phenomenon, unusual abundance of a particularly striking plant or animal species, or scarcity of ecologically similar sites elsewhere.

A Natural Area also must be large enough (1) to exhibit wilderness character (which means that works of man and severely altered or managed vegetation types should not be visible from its interior); (2) to enable protection of its natural qualities from alteration by artificial influences; and (3) to provide worthwhile educational and research opportunities.

Compartments designated as Natural Areas are sometimes what might be better termed "potential" natural areas. These are limits of land and vegetation which presently do not meet all the Natural Area criteria. However, they are close to Natural Area quality and, with proper protection, they should attain this condition in a relatively short period of time.

The following are specific management recommendations for Natural Area compartments in the project area:

- Compartment 5 contains 45 acres of several forest types. This tract is located on the south side of the reservoir. Federal lands designated as Wild Areas adjoin the compartment on the north and southwest. To the south is ODNR property. Gilbert Road forms the eastern boundary; immediately across the road is undeveloped private land. There is little or no drainage of runoff onto the compartment from the private property.

The tract's small size combined with the artificial influences of the lake and road and the risk of aesthetic degradation by development on adjacent private property somewhat limit the potential of this piece of land as a Natural Area. However, its ecological diversity, good scenic quality and accessibility make it a highly satisfactory site for nature interpretation and appreciation.

- The Sandstone Ridge - Silver Creek Natural Area (Compartment 12) contains approximately 112 acres of three different forest types. It is surrounded on all sides by Corps and ODNr property. The adjoining areas within the Corps property line have been designated as protective Wild Area buffers. The variety of ecotypes should qualify the area for dedication by the federal system of ecological preserves.

- The Beech Woods natural area (Compartment 25) is a small (25-acre) compartment with an outstanding tract of maturing to mature beech forest. The site is considered to have unusual beauty that is unsurpassed by any other natural feature of the project. Compartment 25 is well insulated against potentially incompatible, nearby land uses by topography and by a wide buffer zone designated as part of Wild Area Compartment 1. Because of the tendency of a few recreationists to disfigure beech tree bark with carved graffiti, the tract's isolation and the lack of developed access trails should be considered as assets and should be preserved. Presumably, there is a lower incidence of vandalism among those who are willing to walk some distance over rough terrain to visit a place of special natural charm.

10.2.3.3 Wild Area Compartments Management Recommendations. Wild Areas are places where the ecological communities will undergo natural succession without further intensive management, but which now lack the kind of unusual qualities or large acreages exhibited by sites designated as Natural Areas. Wild Areas often bear obvious marks of human influence. They are widely scattered across the project, often in small, isolated tracts.

Dispersed or non-intensive recreation activities are those where few, if any, developed facilities are provided and where individuals or small groups of recreationists tend

not to congregate but to seek maximum dispersion. Examples include hunting, hiking, nature study, and shore and stream fishing. All these activities are to be encouraged on Wild Areas within the project's recreation lands, except where prohibited by regulation or law.

An additional possible function for selected tracts of Wild Area land would be to provide research opportunities. Experimental or manipulative-type research--expressly forbidden on Natural Areas--could be conducted on Wild Areas as long as experiments are designed to safeguard aesthetics and environmental quality. Experiments could involve techniques such as the introduction of new plant species onto a test site, selective cutting procedures (not to include clearcutting of valuable large trees or vegetation protecting an erosion-prone site), wildlife manipulations, etc.

The following are management recommendations which apply to Wild Areas in the project.

Wild Areas surrounding and penetrating Aesthetic Management Compartments may require vegetative manipulations from time to time. This may range from the removal of rampant poison-ivy or brambles that have spread into campsites or picnic areas to the addition of shade-tolerant, lower canopy trees and shrubs to improve the screening effectiveness of a woodland buffer.

Conversion of the herb-dominated sections to tree and shrub cover could be accomplished with little or no interim aesthetic degradation. A mixture of a few selected native species compatible with the soil pH, moisture, and drainage characteristics could be planted in masses or clumps. These could be installed in phases over a period of years to help minimize cost and labor impacts.

One economical way of securing seedling stock would be to propagate plants from wild-gathered seeds and cuttings on a suitable site somewhere within the project.

An alternative, less expensive method of restoring woody vegetation to turfed Wild Area buffers would be to disk the sod on selected small areas just prior to the peak season for the dispersal of aspen and cottonwood seed.

Wildlife management activities on Wild Areas may involve planting trees. One example would be the planting in existing sunlighted openings of mast-producing native trees (black walnut, oaks, beech, hickories) for squirrels. Another example might be the addition near streams of beaver food-trees (aspen, poplar, cottonwood).

Non-vegetative wildlife manipulations may also be employed, such as the provision of squirrel dens in young stands of mast-producing trees, etc.

Scattered in several locations along the project's perimeters are areas under cultivation, in pasture, or under landscape management by adjoining residents. This practice illegally usurps publicly-owned resources (recreational and open space, soils, vegetation, wildlife habitat, etc.) for private purposes. Such illegal uses should be stopped.

These general management recommendations apply to the following specific compartments.

1. A mixture of forests, thickets, and meadows occupies the south shore between Silver Creek and the existing west boat launching ramp. Their diversity of ecological types, remoteness from access roads and other day-use activities, and proximity to the lake combine to make this area one of the more scenic sections of the facility.

2. Eleven acres of maturing forest tract on the peninsula directly south of Goose Island include a scenic stand of upland oaks with a diverse array of secondary woody components. A wide loop trail affords convenient access.

3. A 44-acre upland oak forest surrounds a small bay west of Silver Creek. The area is botanically and scenically attractive.

4. The Bixon Creek tract south of Cable Line Road contains 59 acres of upland oak forest and 21 acres of invaded bottomland thickets. The tract is considered to have outstanding potential for wildlife habitat management.

5. The area north of Kirwan Lake between the Spillway and Natural Area Compartment 25 comprises approximately 830 acres of the wooded zones. These are considered to be vital for maintaining the attractiveness and serene environment of the existing State Park camping area. This compartment also may provide opportunities for informal nature education and wildlife observation.

6. Thirty acres of maturing mixed mesophytic woods occur on the north shore, south of Esworthy Road, west of the existing State Park tent and recreational vehicle camping area. A marked trail has been developed through the area. Because of its good scenic quality, excellent interpretive possibilities, good accessibility, and proximity to the campground, this tract should be able to

absorb much of the demand in this part of the project for dispersed, day-use recreation.

7. The reservoir's two largest existing subimpoundments, totaling approximately 9 surface acres (3.6 hectares), are valuable remaining components of a system of ponds which formed the nucleus of a pre-project summer home complex known as Lake Jay. They have good growths of submerged and emergent aquatic plants and show evidence of use by beavers and other semiaquatic animals. Presumably fish and migratory waterfowl populations are substantial also.

8. The West Branch Mahoning River inflow valley includes a 60-acre tract of young-to-mature woodlands of various types.

9. The Kent State University Outdoor Recreation Area (Compartment 30) is used for outdoor recreation and study, and is considered to be a good location for experimental-type research and interpretive teaching. Project personnel should give their cooperation to university projects on this and other areas of the project property.

10.2.3.4 Recommendations for Aesthetic Management Compartments. The aesthetic management compartments include three categories: the dam and spillway complex, West Branch State Park recreation areas, and support facilities.

Past and present vegetation management on these compartments generally has been ecologically sound and of good quality. Specific recommendations are as follows:

- Mowed turf areas should be reduced adjacent to those areas which have been designated as Wild Areas.
- Shade trees should be planted in all existing picnicking areas. Treeless sites could be upgraded to the same standards of aesthetic attractiveness and comfort as the East Boat Launch Picnic Area by the addition of a few tall-growing trees selected to match soil conditions and exposure. It is desirable to retain units of treeless turf in picnicking areas for certain types of play. However, at least one or two shade trees in the vicinity of each picnic table is a good vegetative management criterion.

• Turf should be replaced on selected sites close to building foundations, near walls, and on steep slopes. This will reduce erosion and need for maintenance especially on steeper slopes at the dam and spillwater complex.

10.2.3.5 Recommendations for Game Management. Compartmentalization is recommended as a tool for intensive habitat management for game animals. The Game Management Compartments comprise 959 acres; these are mostly in cultivated and fallow fields, meadows, and brushlands. The major game species with potential to be actively managed on the project are cottontail, ring-necked pheasant, wood duck, mallard, black duck, tox squirrel, woodcock, and bob-white quail.

Cottontail rabbit habitat should be managed in Game Management Compartments by (1) mowing strips on fertile soils in fallow fields; (2) planting crops in strips near thicket-type cover; (3) planting cover in the form of shrubs, vines, and low-growing conifers; (4) cutting hawthorn, crab apple, and other selected trees to produce immediate brush cover and to release herbaceous cover plants and vines; and (5) controlled burning of selected types of woody and non-woody vegetation to favor new growth of aspens and other desired species which respond to this type of treatment. These management practices also benefit ring-necked pheasant, bob-white quail, and mourning dove.

Pheasant and bob-white populations also may be upgraded through stocking of wild-trapped birds from elsewhere in the state.

Most of the project's fox squirrel habitat is on land designated as Wild Areas. Some young woodland stands in Game Management Compartments may be suitable as squirrel habitat with the addition of artificial dens, or with selective cutting to release the mast-producing trees.

Woodcock management should include efforts to maintain cover of suitable age and composition by (1) planting hawthorns, sweet crab apple, aspens, alder, and gray dogwood on appropriate open fields with fairly high soil pH and moisture; (2) cutting over-mature hawthorns, crab apples, aspens, etc. which are too large to be of value to woodcock, and allowing stump sprouts to regenerate freely; and (3) removing from existing woodcock habitat the forest trees and other plants which do not benefit woodcock, and which compete excessively with the beneficial plants.

Waterfowl management should consist of managing existing ponds by planting emergent food plants, providing nesting structures, etc. Also it could include the creation of additional ponds or subimpoundments. The Game Management Compartments and Wild Areas contain many small drainage swales and tributary streams which would be suitable for this purpose. Ponds may be created by bulldozing earthen dams and by encouraging beaver activity along suitable tributaries.

10.2.3.6 Special Preservation Management Recommendations. There may be sites on the project which are found to be repositories of unique and irreplaceable scientific information. This may be genetic and ecological information in the form of an endangered plant or animal species and its habitat, it may be geological or paleontological information contained in an unusual rock formation, or it may be information about man's past in the remains of a prehistoric village or campsite.

Special preservation procedures for wildlife and plants are aimed at ensuring survival, prosperity, and reproductive success. Archaeological and historical sites need permanent protection from disturbance by artificial or natural agents in order to ensure opportunities for recovery of the information they contain.

Treatment of the project's unique resources also should include a continuous program to detect previously unknown occurrences of rare animals and plants, and archaeological and historical sites. Researchers should be given full cooperation in their survey work, habitat studies, protection efforts, archaeological excavations, etc.

10.2.4 Implementation of Environmental Management. According to the present lease arrangement, the vegetative and wildlife management responsibilities of the Corps will be limited to the 360 acres (145 hectares) contained in Compartments 2 and 3, and surrounding units of Compartment 1, except for the monitoring of environmental management activities undertaken by others under license and lease agreements.

Fish, vegetation, and wildlife management in the lake and on the other compartments will be the responsibility of ODNR Division of Parks and Recreation and Division of Wildlife.

Each year, the Resource Manager or Ranger is required to prepare a work plan outlining what is to be done to implement the Forest, Fish and Wildlife Management Plan, in

accord with ER 1130-2-400: "Recreation-Resource Management of Civil Works Water Resources Projects" (dated 28 May 1971). Annual work plans should include lists of materials which will be needed, schedules for season-related work (such as planting), maps and drawings if necessary, and a breakdown of estimated costs.

Upon approval of the annual work plan by the Chief of the Recreation-Resources Management Branch, the Resource Manager and District Staff Biologist are responsible to direct and supervise its implementation. Records should be kept of all environmental management work completed.

10.3 FIRE PROTECTION PLAN

10.3.1 General. The proposed scope of the Fire Protection Plan for the Michael J. Kirwan Dam and Reservoir (Appendix C to this Master Plan), is herein discussed. The Fire Protection Plan, as proposed, will comply with ER 1130-2-400 and will serve as a guide for the Resource Manager and his staff in the control and suppression of wild-fires on project land. Certain policies will be listed for carrying out this objective, but the Resource Manager is referred to the Fireman's Handbook and The Manual for Forest Fire Fighters for detailed guidance.

10.3.2 Fire History. This section gives a concise history of fires in the project area and their major causes.

10.3.3 Area and Facilities to be Protected. A map of the Michael J. Kirwan Dam and Reservoir is included in Appendix C along with a brief description of the land and facilities at the project. Most of the project area and the facilities thereon are under lease to ODNR.

10.3.4 Theory. Fire probability is analyzed in terms of fire hazard (fuel) and fire risk (presence and activity of causative agents). The Resource Manager is responsible for fire prevention by controlling fire risk and removing fire hazard.

10.3.5 Removing Hazards. The Resource Manager will remove fire hazards through a cleanup program and through slash treatment.

10.3.6 Controlling Risks. The Resource Manager should maintain an awareness of the dangers of forest fire among Corps personnel. In addition, through personal contact and signs, the Resource Manager should make the public aware of the Corps' role in preventing fires. Laws pertaining to fire prevention are listed in Appendix C.

Under the advice of the Resource Manager, formal closures of high hazard areas will be proclaimed by the District Office and enforced by the Resource Manager.

10.3.7 Wildfire Pre-Suppression.

10.3.7.1 Cooperative Agreements with Other Agencies. Appendix C includes a paragraph on cooperative agreements which defines the responsibilities of various agencies with regard to forest fire control on or adjoining the Corps lands.

10.3.7.2 Fire Protection Organization. Effective fire protection for the project will depend on coordination with federal, state, and local fire organizations. Most of the Michael J. Kirwan Dam and Reservoir is under the jurisdiction of either the Charlestown or the Edinburg Volunteer Fire Department. These organizations will respond to fires in any part of the project. The Ravenna Fire Department will respond to fires within the boundaries of Ravenna. The Paris Fire Department will respond to fires within the boundaries of Paris and Palmyra. The manpower, equipment, and capabilities of each of these organizations are given as a part of Appendix C.

10.3.7.3 Project Fire Equipment. A detailed list of equipment available at the project in case of fire is given in Appendix C.

10.3.7.4 Fire Danger Rating and Fire Season. The Appendix gives details regarding the fire rating of the project and its fire seasons.

10.3.7.5 Detection and Dispatching. Procedures for fire patrolling and dispatching are given in Appendix C.

10.3.7.6 Training. All permanent project employees will be involved in a fire training session before the spring fire season which will be arranged by the Resource Manager. The session should concentrate more on field experience than on classroom work.

10.3.7.7 Wildfire Suppression. All firefighters should know and understand the fundamentals of fire behavior. These are described in the Fireman's Handbook.

10.3.7.8 Ten Standard Firefighting Orders. All Corps personnel will follow these orders, which are listed in Appendix C.

10.3.7.9 Control, Mop-Up, and Patrol. Procedures and techniques for fire fighting are given as an Exhibit to Appendix C and more specific instructions in the Fireman's Handbook are referenced. If the state crew responds to a fire, Corps personnel will take orders from its members.

10.3.7.10 Safety. Precautions regarding travel to the fire, use of tools, and exposure to fire are given in Appendix C.

10.3.7.11 Welfare of the Crew. The effectiveness of the crew depends on the physical condition of its members as well as on their knowledge and equipment. Drinking water, food, and rest must be provided for in addition to proper tools and clothing. Appendix C discusses this aspect of firefighting in detail.

10.3.7.12 Fire Incident Investigation and Reporting. Procedures for action to discover, to investigate, and to report all incidents involving project lands are given in Appendix C, which also gives appropriate references to regulations.

10.3.7.13 Revision. The Resource Manager should review the Fire Protection Plan yearly and make changes, as necessary. The plan will be updated every five years and submitted to the Ohio River Division.

10.4 PROJECT SAFETY PLAN

10.4.1 General. Safety practices at the Michael J. Kirwan Dam and Reservoir are governed by the Project Safety Plan (Appendix E of this Master Plan) and are conducted in accordance with the standards set forth in General Safety Requirements, EM 385-1-1, and other requirements in the EM 385 series. The Project Safety Plan is intended to help project personnel to identify safety hazards, to establish standard emergency procedures, and to provide personnel with safety guidelines.

10.4.2 Safety of Dams. The primary concern of project personnel is the safety of the Michael J. Kirwan Dam. Exhibit A of Appendix E, the Project Safety Plan, contains information on the safety of dams. Exhibit B consists of an emergency evacuation plan and warning procedures. Procedures for daily inspection of the dam are described in the Appendix. In addition, the dam is inspected by District personnel periodically and by personnel from the Ohio River Division and the Pittsburgh District office every five years. These formal inspections begin on an annual basis until the dam is five to seven years old;

thereafter they are done every five years. The most recent of these five-year inspections is attached to the Appendix as Exhibit C. Exhibit D of the Appendix describes the safety reporting process.

10.4.3 Emergency Regulations. When it is impossible to obtain orders from the Pittsburgh District office, and when the dam or downstream communities are endangered, the project supervisor will assume emergency responsibilities. These responsibilities are outlined in Appendix E, along with procedures for both temporary and prolonged emergencies. In addition, the resource manager is charged with the responsibility to notify appropriate persons and organizations of high water levels or high discharges downstream.

10.4.4 Project Safety Officer. The project safety officer is responsible for the implementation of safety regulations (EM 385 Series), accident-prevention regulations, District safety programs, and the dissemination of safety information to all project personnel. Exhibit E of Appendix E lists current District safety regulations, and Exhibit F is a job hazard checklist.

10.4.5 Education and Training of Project Personnel. The project supervisor will maintain an education and training program for project personnel which will include first aid, emergency procedures, and safety indoctrination for new employees. Bulletin boards should be posted with emergency phone numbers (listed in Exhibit G), and materials from the District office. Weekly and monthly safety meetings are another of the safety officer's responsibilities, as are minutes of the monthly meetings. Exhibit H lists audio/visual aids available through the District office and the Western Pennsylvania Safety Council.

The operation of a government motor vehicle requires a valid state driver's license and a valid government operator's license for that type of vehicle. The project supervisor should arrange for the necessary employee training. A course in defensive driving is recommended for all employees. Employees are liable for costs resulting from their misuse of government vehicles, and may be subject to disciplinary action as well.

The use of pesticides and herbicides is restricted to persons holding a certificate of training for their use. Additional regulations regarding this subject are discussed in Section 15 of Appendix E.

10.4.6 Safety in Public Use Areas. Items particularly subject to inspection in the concessionaire facilities are listed in Appendix E, along with appropriate references, codes, and standards. Guidance is also given for the control of insects, poisonous snakes and plants, motorcycles and motorbikes, and off-the-road vehicles.

10.4.7 Water Safety Activities. The project supervisor should stimulate interest among local organizations in a water-safety council which will serve as a promotional and educational instrument for the water-safety practice. Project personnel should participate in National Safe Boating Week through the distribution of literature and through personal contact with the public.

Corps personnel should cooperate with the State of Ohio Division of Parks and Recreation in enforcing state boating laws and in their regular inspection for hazards to safe boating, and with the U.S. Coast Guard in its annual inspection of boating activities on the reservoir.

Buoys shall be placed around the control tower on or before May 1 of each year, and removed at the end of the boating season, but before the onset of cold weather, in coordination with the State Division of Parks and Recreation.

Corps personnel shall adhere to the rules of safe boating by observing boat capacity limitations and by providing the appropriate number of personal flotation devices on all Corps boats.

10.4.8 Safety Surveys and Administration and Maintenance Facilities. The project safety officer is responsible for inspecting employee working areas as often as possible. Appendix E includes a checklist of items to look for on these inspections.

10.4.9 Protective Clothing and Safety Equipment. Also in Appendix E is a checklist of protective clothing and safety equipment and the conditions under which they should be used.

10.4.10 Sanitation and Pollution Abatement. Water for the Corps facilities is drawn from a well and is subject, along with water from the State Park wells and beach area, to periodic sampling and testing. All areas for the handling of wastewater and sewage should be inspected periodically. Additional details about water supply and wastewater handling in the dam and reservoir area are given in Appendix E. In addition, guidelines for solid

waste handling are given. Corps personnel should be sensitive to the possibility of pollution, and should contact the appropriate agency if evidence of such pollution is discovered.

10.4.11 Emergency Operating Procedures. Outlined in Appendix E are procedures to be followed in case of accident or civil disturbance, and during search-and-rescue operations or severe weather warnings.

10.4.12 Law Enforcement as a Safety Measure. Corps personnel are expected to cooperate with the primary law enforcement agencies--local and state police--and to encourage the public to obey safety and health rules and regulations by enforcing Title 36 Code of Federal Regulations under the citation program.

10.4.13 Fire Protection. A brief list of fire precautions, equipment, and personnel duties is given in Appendix E. The detailed fire protection plan is provided as Appendix C of this Master Plan.

10.4.14 Contractor Safety. Contractors working on Corps property are subject to project rules and regulations. Inspections will be made at least weekly to ensure safe conduct by the contractor and his personnel.

10.4.15 Pesticide and Herbicide Precautions. Only registered and approved insecticides and pesticides shall be used, and then only under the supervision of a properly licensed or certified individual. A list of precautions to be taken during the handling, storage, and application of pesticides and herbicides is given in Appendix E, along with pertinent regulations.

10.4.16 Public Information and Education. The public shall be kept informed of emergency information, rules and regulations, and items of public interest through the use of bulletin boards, the mass media, and signs. Signs shall be made in accordance with the specifications of the Ohio River Division Sign Handbook, or as specified in this Master Plan.

10.4.17 Revision. The project safety plan is to be reviewed biannually and revised as necessary. The updated plan is subject to the approval of the Pittsburgh District office and must be submitted no later than February of the update year.

SECTION 11 CONCLUSIONS AND RECOMMENDATIONS

11.1 CONCLUSIONS. Based on the long-range projections of future facility demand, coupled with the determined adequacy or deficiency of existing facilities, certain conclusions were made related to the need, type, and location of additional recreational facilities, or modifications to those that exist. These are covered in detail in the preceding sections of this Master Plan. The conclusions briefly summarized are, as follows:

11.1.1 Recreational Facilities. With two exceptions (family camping and picnicking), the major recreational activities at Michael J. Kirwan Dam and Reservoir/West Branch State Park are more than adequately provided for in quality and number of facilities to meet the projected needs. Proposed optional facilities, such as a lodge, cabin complex, and golf course, will further enhance the recreational advantages of the park. With modest expansion of existing facilities, all future demands can be met.

11.1.2 Roadways. Roadway quality and existing vehicular circulation patterns and access are presently the most significant negative aspects of the park. Accessibility especially to day-use facilities from SR 14 must be improved. The reopening and improvement of Cable Line Road would do much to solve this access limitation.

11.1.3 Construction Materials, Design, Signage. The use of unifying elements should create a closer association between federally administered areas and those operated by the state. Such elements would include consistent roadway design, architecturally compatible structures, and signage.

11.1.4 Oil/Gas Leases. Consideration should be given to the termination or non-renewal of gas/oil leases, as the pumping equipment, above-ground storage, and tank truck hauling blight the landscape and are environmentally and aesthetically inconsistent and incompatible with the development of active and passive recreational uses. When private mineral rights are held on land within the park, more stringent controls on site access, drilling procedures, and environmental degradation must be adopted and enforced.

11.1.5 Boating. Reservoir boating must be rigidly monitored so that practical capacities are not exceeded. Overuse of this one activity would have a detrimental effect on all others.

11.1.6 Enforcement of Regulations. All regulations designed to preserve the benefits of safe and healthful recreational opportunities for the user should be stringently enforced. Continued cooperation between the Pittsburgh District Corps of Engineers and ODNR is essential in this regard.

11.1.7 Land Requirements. As a result of this study, it has been determined that no additional lands would be required to provide the needed facilities.

11.1.8 Day-use Development. The southeast quadrant of the project area has been more intensely developed than the other areas, and is more readily accessible to a larger number of people for day-use activities. Thus, the continued emphasis on development of these and like facilities in this particular area of the project best meets the expected needs.

11.1.9 Passive Activity Development. The remaining area, more natural in character and having limited development, lends itself to less intense activities. This area accommodates the expansion of overnight activities in the form of family camping, group camping, and the horsemen's camp, and provides the area for hiking and horse trails, naturalist activities, and hunting.

11.1.10 Impact of Implementation. The implementation of this Master Plan as a guide to recreational development, and the management of this recreational resource at Michael J. Kirwan Dam and Reservoir/West Branch State Park, will result in the long-term maintenance of a sound environment, and will ensure continued and increasing visitor benefits from the project.

11.2 RECOMMENDATION. It is recommended that this Master Plan be approved and adopted as the overall guide for the continued development and management of all lands and water of Michael J. Kirwan Dam and Reservoir/West Branch State Park.

John L. Richards
Lt. Colonel, Corps of Engineers
District Engineer

EXHIBIT A

LIST OF COST TABLES (EXHIBIT A)

<u>Table No.</u>	<u>Title</u>
1	Federal Area - Resident Manager's Complex and Visitor Center
2	State Area - Lodge and Sitework
3	State Area - Cabins and Sitework
4	State Area - Clubhouse and Sitework
5	State Area - Lodge, Cabin Complex, Clubhouse-Utilities System
6	State Area - Group Camping Area
7	State Area - Park Office-Camper Check-in
8	State Area - Expansion of Picnic Areas 2A and 2B
9	State Area - Camping Area 1-103 Sites
10	Water Supply - Alternative 1
11	Water Supply - Alternative 2
12	Water Supply - Alternative 3
13	Federal/State - Camping Area 2-104 Sites
14	Federal/State - Future Campground Development-49 Sites (Potential Cost Sharing)
15	Federal/State - General Signage (Potential Cost Sharing)
16	Federal/State - Campers' Boat Launching Area (Potential Cost Sharing)
17	Federal/State - Causeway Boat Launching Area (Potential Cost Sharing)
18	Federal/State - Beach Parking Expansion (Potential Cost Sharing)
19	Federal/State - Silver Creek Overlook (Potential Cost Sharing)

- 20 Federal/State - Proposed Picnic Area 5
(Potential Cost Sharing)
- 21 Federal/State - Proposed Picnic Area 6
(Potential Cost Sharing)
- 22 Federal/State - Proposed Picnic Area 7
(Potential Cost Sharing)
- 23 Federal/State - Proposed Picnic Area 8
(Potential Cost Sharing)
- 24 Summary of Costs

COST TABLE 1
FEDERAL AREA - RESIDENT MANAGER'S COMPLEX AND VISITOR CENTER
COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.5	Ac	1,800.00	900
Subgrade Preparation	2,200	S.Y.	1.00	2,200
Road Excavation	920	C.Y.	4.50	4,125
Paving - Access Road "B"	880	S.Y.	15.00	13,200
Paving - Service Road "C"	451	S.Y.	15.00	6,765
Paving - Parking Area	870	S.Y.	20.00	17,400
Wheelstops	15	EA.	35.00	530
Office and Visitor Center	L.S.	L.S.	105,000.00	105,000
Walkways, Bit. Conc. (2")	115	S.Y.	9.00	1,070
Water Well and Elect. Pump/Storage	1	EA.	25,000.00	25,000
Building and Tank Water Distribution Line	100	L.F.	9.00	900
Sanitary Septic System with Sand Filter	L.S.	L.S.	20,000.00	20,000
Electrical Service	L.S.	L.S.	1,500.00	1,500
Chain Link Fence (8')	360	L.F.	12.00	4,320
Landscaping/Signs	L.S.	L.S.	20,000.00	20,000
SUBTOTAL COST				222,910
15% CONTINGENCIES				33,440
20% ENG., DESIGN, ETC.				51,270
TOTAL DEVELOPMENT COST				\$307,620

COST TABLE 2
STATE AREA - LODGE AND SITEWORK
COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Estimated Development Costs (Excluding Utilities and Sitework) Costs as of July, 1981, (Dalton, Van Dijk, Johnson and Partners, Architects				9,623,000
Clearing and Grubbing	6.5	Ac.	1,800.00	11,700
General Excavation	10,000	C.Y.	4.50	45,000
Subgrade Preparation	21,383	S.Y.	1.0	21,383
Road Excavation	7,664	C.Y.	4.50	34,490
Paving - Access Road "B"	6,600	S.Y.	15.00	99,000
Paving - Service Road "C"	1,633	S.Y.	15.00	24,500
Paving - Parking Area	10,150	S.Y.	20.00	203,000
Tar and Chip - Parking Area	3,000	S.Y.	4.50	13,500
Site Drainage	L.S.	L.S.	10,000.00	10,000
Parking Area Lighting - 16 Units	L.S.	L.S.	12,000.00	12,000
Landscaping/Signs	L.S.	L.S.	60,000.00	60,000
SUBTOTAL COST				10,123,080
15% CONTINGENCIES				1,518,460
20% ENG., DESIGN, ETC.				2,328,310
TOTAL DEVELOPMENT COST				\$13,969,850

COST TABLE 3
 STATE AREA - CABINS AND SITEWORK
COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	3.9	Ac.	1,800.00	7,020
Subgrade Preparation	18,115	S.Y.	1.00	18,115
Road Excavation	7,550	C.Y.	4.50	33,965
Paving - Access Road "B"	15,890	S.Y.	15.00	238,330
Paving - Parking Area	2,225	S.Y.	20.00	44,500
Wheelstops	50	EA.	35	1,750
Cabins	25	EA.	21,000.00	525,000
Furniture	L.S.	L.S.	5,000.00	5,000
Site Drainage	L.S.	L.S.	4,500.00	4,500
Landscaping/Signs	L.S.	L.S.	25,000.00	25,000
SUBTOTAL COST				903,180
15% CONTINGENCIES				135,480
20% ENG., DESIGN, ETC.				<u>207,730</u>
TOTAL DEVELOPMENT COST				\$1,246,390

COST TABLE 4
 STATE AREA - CLUBHOUSE AND SITEWORK
 COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	1.4	Ac.	1,800.00	2,520
Subgrade Preparation	6,660	S.Y.	1.00	6,660
Road Excavation	2,772	C.Y.	4.50	12,480
Paving - Access Road "B"	3,180	S.Y.	15.00	47,700
Paving - Parking Area	3,475	S.Y.	20.00	69,500
Wheelstops	96	EA.	35.00	3,360
Clubhouse	1	EA.	400,000.00	400,000
Landscaping/Signs	L.S.	L.S.	25,000.00	25,000
Golf Course (18 Hole, Par 72)	L.S.	L.S.	725,000.00	725,000
Winter Sports Area	L.S.	L.S.	50,000.00	50,000
SUBTOTAL COST				1,342,220
16% CONTINGENCIES				201,330
20% ENG., DESIGN, ETC.				<u>308,710</u>
TOTAL DEVELOPMENT COST				\$1,852,260

COST TABLE 5

STATE AREA - LODGE, CABIN COMPLEX, CLUBHOUSE - UTILITY SYSTEMS

COST ESTIMATE FOR FACILITIES DEVELOPMENT

PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
<u>SANITARY</u>				
Expansion of Sewage Treatment Plant (50,000 GPD)	L.S.	L.S.	250,000.00	250,000
Grinder Pump	3	EA.	2,000.00	6,000
Clean Out Manholes	2	EA.	750.00	1,500
Manholes (4' dia.) Precast	29	EA.	2,000.00	58,000
Lift Station and Wet Well	L.S.	L.S.	45,000.00	45,000
8" V.C.P. Pipe	9,350	L.F.	18.00	168,300
4" Sub-aqueous Force Main, Ductile Iron	1,500	L.F.	30.00	45,000
4" Standard Force Main, Ductile Iron	2,700	L.F.	20.00	54,000
2" Standard Force Main, Ductile Iron	400	L.F.	18.00	7,200
1-1/2" P.V.C. Force Main (Pressure Pipe)	1,350	L.F.	10.00	13,500
Sub-Subtotal				648,500
<u>WATER</u>				
Expansion of Water Treatment Plant (50,000 GPD)	L.S.	L.S.	75,000.00	75,000
8" Ductile Iron Pipe	3,500	L.F.	24.00	84,000
6" Sub-aqueous Pipe, Ductile Iron	2,000	L.F.	40.00	80,000
6" Ductile Iron Pipe	4,500	L.F.	22.00	99,000
2" Galv. Iron Pipe	4,500	L.F.	6.00	27,000
3/4" Copper Waterline	1,875	L.F.	4.00	7,500
Misc. Line Valves, Tees, Boxes, Blowoffs, Air Release Valves, Etc.	L.S.	L.S.	30,000.00	30,000
Sub-Subtotal				402,500
			SUBTOTAL COST	1,051,000
			15% CONTINGENCIES	157,650
			20% ENG., DESIGN, ETC.	241,730
			TOTAL DEVELOPMENT COST	\$1,450,380

COST TABLE 6
 STATE AREA - GROUP CAMPING AREA
COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.8	Ac.	1,800.00	1,440
Road Excavation	1,670	C.Y.	4.50	7,500
Subgrade Preparation	4,000	S.Y.	1.00	4,000
Gravel Road (18' wide)	3,600	S.Y.	6.00	21,600
Gravel Parking Area (6")	400	S.Y.	7.00	2,800
Picnic Tables	18	EA.	250.00	4,500
Shelters (Complete)	3	EA.	12,000.00	36,000
Grills (Group)	3	EA.	500.00	1,500
Vault Toilets	3	EA.	12,000.00	36,000
Trash Receptacles	6	EA.	75.00	450
Water Supply				
6" Main	7,500	L.F.	25.00	187,500
2" Service	2,000	L.F.	9.00	18,000
Electrical Service	L.S.	L.S.	8,000.00	8,000
Landscaping/Signs	L.S.	L.S.	1,000.00	1,000
SUBTOTAL COST 15% CONTINGENCIES 20% ENG., DESIGN, ETC.				330,290 49,543 75,967
TOTAL DEVELOPMENT COST				\$455,800

COST TABLE 7
 STATE AREA - PARK OFFICE - CAMPER CHECK-IN
 COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	1.1	Ac.	1,800.00	1,980
Subgrade Preparation	5,095	S.Y.	1.00	5,100
Road Excavation	2,053	C.Y.	4.50	9,240
Paving - Access Road "B"	2,200	S.Y.	15.00	33,000
Paving - Parking Area	2,725	S.Y.	20.00	54,500
Walkways, Bit. Conc. (2")	170	S.Y.	6.00	1,020
Park Office Structure	L.S.	L.S.	50,000.00	50,000
Water Supply 2" Service	850	L.F.	9.00	7,650
Sanitary Septic System with Sand Filter	L.S.	L.S.	20,000.00	20,000
Electrical Service	L.S.	L.S.	1,500.00	1,500
Landscaping/Signs	L.S.	L.S.	20,000.00	20,000
SUBTOTAL COST				194,750
15% CONTINGENCIES				29,210
20% ENG., DESIGN, ETC.				44,790
TOTAL DEVELOPMENT COST				\$268,750

COST TABLE 8
 STATE AREA - EXPANSION OF PICNIC AREAS 2A AND 2B
COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Picnic Tables	50	EA.	250.00	12,500
Grills	13	EA.	125.00	1,625
Trash Receptacles	13	EA.	75.00	975
SUBTOTAL COST 15% CONTINGENCIES 20% ENG., DESIGN, ETC.				15,100 2,270 <u>3,470</u>
TOTAL DEVELOPMENT COST				\$20,840

COST TABLE 9
STATE AREA - CAMPING AREA 1 - 103 SITES
COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	4.0	Ac.	1,800.00	7,200
Road Excavation	4,160	C.Y.	4.50	18,710
Type "B" Road	6,845	S.Y.	15.00	102,670
Type "A" Road	3,133	S.Y.	15.00	47,000
Parking Lot	560	S.Y.	20.00	11,200
Gravel Trailer Pads } Campsites Complete }	104	EA.	1,800.00	187,200
Camping Unit				
Wheelstops (Beach)	25	EA.	35.00	870
Demo. - 6 Campsites & Road	L.S.	L.S.	10,000.00	10,000
Beach Development	L.S.	L.S.	60,000.00	60,000
Toilet/Shower Building	1	EA.	80,000.00	80,000
Waterborne Restroom	2	EA.	60,000.00	120,000
Laundry/Shower Building	1	EA.	100,000.00	100,000
Sewage Treatment Plant (30,000 GPD)	1	EA.	200,000.00	200,000
8" V.C.P.	900	L.F.	18.00	16,200
Manholes	4	EA.	2,000.00	8,000
8" Discharge Outlet (Submerge)	800	L.F.	25.00	20,000
<u>WATER DISTRIBUTION</u>				
4" P.V.C.	50	L.F.	10.00	500
3" P.V.C.	1,700	L.F.	10.00	17,000
2" P.V.C.	1,550	L.F.	8.00	12,400
3/4" - 1" P.V.C.	1,600	L.F.	8.00	12,800
Hose Bibs/Fountains	13	EA.	250.00	3,250
Landscaping/Signs	L.S.	L.S.	60,000.00	60,000
SUBTOTAL COST				1,095,000*
15% CONTINGENCIES				164,250
20% ENG., DESIGN, ETC.				251,850
TOTAL DEVELOPMENT COST				\$1,511,100

*Does not include water supply costs -- see Alternatives Cost Tables 10, 11, and 12.

COST TABLE 10
WATER SUPPLY - ALTERNATIVE 1

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Water Supply: 8" pipeline across reservoir -- no pumps or standpipe required (acceptable only if working pressure at base of existing standpipe is adequate). (Provides no backup storage -- with storage, add \$150,000 to base cost.)				
Sub-aqueous Pipe (8")	2,500	L.F.	120.00	300,000
Ductile Iron Pipe (8")	2,000	L.F.	50.00	100,000
SUBTOTAL COST 15% CONTINGENCIES 20% ENG., DESIGN, ETC. TOTAL DEVELOPMENT COST				400,000 60,000 <u>92,000</u> \$552,000

COST TABLE 11
WATER SUPPLY - ALTERNATIVE 2

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Water Supply:				
6" pipeline across reservoir with pumps and standpipe (required if working pressure at base of existing standpipe is not adequate).				
Pump Station	L.S.	L.S.	45,000.00	45,000
Sub-aqueous Pipe (6")	2,500	L.F.	110.00	275,000
Ductile Iron Pipe (6")	2,000	L.F.	45.00	90,000
Standpipe (100,000 gal.)	L.S.	L.S.	150,000.00	150,000
SUBTOTAL COST				560,000
15% CONTINGENCIES				84,000
20% ENG., DESIGN, ETC.				<u>28,800</u>
TOTAL DEVELOPMENT COST				\$772,800

COST TABLE 12
WATER SUPPLY - ALTERNATIVE 3

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Water Supply:				
Campground wellfield with collection system, treatment pumps, and standpipe.				
Pumps (Well Submersible)	6	EA.	4,500.00	27,000
1-1/2" Pipe	2,575	L.F.	2.50	6,438
2" Pipe	1,100	L.F.	3.50	3,850
Water Treatment Plant (40,000 gal.)	1	EA.	150,000.00	150,000
Standpipe (100,000 gal.)	1	EA.	150,000.00	150,000
SUBTOTAL COST				337,290
15% CONTINGENCIES				50,590
20% ENG., DESIGN, ETC.				77,580
TOTAL DEVELOPMENT COST				\$465,460

Estimated Monthly Operating Costs

COST TABLE 13
FEDERAL/STATE - CAMPING AREA 2 - 104 SITES

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	2.5	Ac.	1,800.00	4,500
Road Excavation	2,850	C.Y.	4.50	12,825
Type "C" Road	3,967	S.Y.	15.00	59,500
Type "B" Road	2,872	S.Y.	15.00	43,085
Restroom/Shower Building	3	EA.	80,000.00	240,000
Waterborne Restroom	4	EA.	60,000.00	240,000
Existing Restroom	5	EA.	2,500.00	12,500
Dump Station	1	EA.	10,000.00	10,000
10" V.C.P.	1,500	L.F.	20.00	30,000
8" V.C.P.	2,100	L.F.	18.00	37,800
Manholes	14	EA.	2,000.00	28,000
4" P.V.C. Water	650	L.F.	10.00	6,500
3" P.V.C. Water	1,200	L.F.	10.00	12,000
2" P.V.C. Water	2,050	L.F.	8.00	16,400
3/4" - 1" P.V.C. Water	150	L.F.	8.00	1,200
Hose Bibs/Fountains	9	EA.	250.00	2,250
SUBTOTAL COST				756,560*
15% CONTINGENCIES				113,480
20% ENG., DESIGN, ETC.				174,010
TOTAL DEVELOPMENT COST				\$1,044,050

*Includes overhead and profit

COST TABLE 14

FEDERAL/STATE - FUTURE CAMPGROUND DEVELOPMENT - 49 SITES
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT

PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	1.5	Ac.	1,800.00	2,700
Road Excavation	1,280	C.Y.	4.50	5,760
Roads				
20' Bit., Type "B"	670	S.Y.	15.00	10,000
12' Bit., Type "C"	2,400	S.Y.	15.00	36,000
Restroom/Shower Building	1	EA.	80,000.00	80,000
8" V.C.P.	625	L.F.	18.00	11,250
Manholes	2	EA.	2,000.00	4,000
Camping Units	49	EA.	1,800.00	88,200
Waterline				
2" P.V.C.	600	L.F.	8.00	4,800
3/4" - 1" P.V.C.	500	L.F.	8.00	4,000
Hose Bib/Fountain	4	EA.	250	1,000
Landscaping/Signs	L.S.	L.S.	10,000.00	10,000
Pipe Culverts	5	EA.	100.00	500
SUBTOTAL COST				\$258,210
15% CONTINGENCIES				38,730
20% ENG., DESIGN, ETC.				<u>59,390</u>
TOTAL DEVELOPMENT COST				\$356,330

COST TABLE 15
FEDERAL/STATE - GENERAL SIGNAGE
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
U.S. Army Corps of Engineers Sign	1	EA.	2,900.00	2,900
State Park Sign	8	EA.	2,700.00	21,600
Building Sign	11	EA.	2,300.00	25,300
Main Entrance Sign	2	EA.	2,400.00	4,800
SUBTOTAL COST				\$54,600
15% CONTINGENCIES				8,190
20% ENG., DESIGN, ETC.				<u>12,560</u>
TOTAL DEVELOPMENT COST				\$75,350

COST TABLE 16
FEDERAL/STATE - CAMPERS' BOAT LAUNCHING AREA
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT

PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.9	Ac.	1,800.00	1,620
General Grading	2,000	C.Y.	4.50	9,000
Road Excavation	5,065	C.Y.	4.50	22,790
Subgrade Preparation	12,150	S.Y.	4.50	12,150
Paving - Access Road "B"	1,785	S.Y.	15.00	26,770
Paving - Parking Area	10,370	S.Y.	20.00	207,400
Launching Ramp (8" conc.)	400	S.Y.	40.00	16,000
Stone Protection (riprap)	110	C.Y.	40.00	4,400
Courtesy Dock (60 L.F.)	L.S.	L.S.	15,000.00	15,000
Wheelstops	29	EA.	35.00	1,020
Trash Receptacles	6	EA.	75.00	450
Landscaping/Signs	L.S.	L.S.	15,000.00	15,000
SUBTOTAL COST				\$331,600
15% CONTINGENCIES				49,740
20% ENG., DESIGN, ETC.				<u>76,270</u>
TOTAL DEVELOPMENT COST				\$457,610

COST TABLE 17
 FEDERAL/STATE - CAUSEWAY BOAT LAUNCHING AREA
 (POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.1	Ac.	1,800.00	180
Subgrade Preparation	340	S.Y.	1.00	340
Gravel Parking Area	340	S.Y.	6.00	2,040
Wheelstops	30	EA.	35.00	1,050
SUBTOTAL COST 15% CONTINGENCIES 20% ENG., DESIGN, ETC.				\$3,610 540 830
TOTAL DEVELOPMENT COST				\$4,980

COST TABLE 18
 FEDERAL/STATE - BEACH PARKING EXPANSION
 (POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Subgrade Preparation	400	S.Y.	1.00	400
Paving - Parking Area	400	S.Y.	20.00	8,000
Wheelstops	8	EA.	35.00	280
SUBTOTAL COST 15% CONTINGENCIES 20% ENG., DESIGN, ETC.				\$ 8,680 1,300 <u>2,000</u>
TOTAL DEVELOPMENT COST				\$11,980

COST TABLE 19
FEDERAL/STATE - SILVER CREEK OVERLOOK
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.2	Ac.	1,800.00	360
Subgrade Preparation	670	S.Y.	1.00	670
Paving - Parking Area	670	S.Y.	25.00	16,750
Wheelstops	12	EA.	35.00	420
Walkways, Bit. Conc. (2")	180	S.Y.	6.00	1,080
Overlook (Complete)	L.S.	L.S.	5,000.00	5,000
Trail Improvement	L.S.	L.S.	8,000.00	8,000
Trash Receptacles	3	EA.	75.00	225
Landscaping/Signs	L.S.	L.S.	4,000.00	4,000
SUBTOTAL COST				\$36,505
15% CONTINGENCIES				5,475
20% ENG., DESIGN, ETC.				<u>8,400</u>
TOTAL DEVELOPMENT COST				\$50,380

COST TABLE 20
 FEDERAL/STATE - PROPOSED PICNIC AREA 5
 (POTENTIAL COST SHARING)
COST ESTIMATE FOR FACILITIES DEVELOPMENT
 PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	1.6	Ac.	1,800.00	2,880
Subgrade Preparation	7,660	S.Y.	1.00	7,660
Road Excavation	3,190	C.Y.	4.50	14,360
Paving - Access Road "B"	4,890	S.Y.	15.00	73,350
Paving - Service Road "C"	1,167	S.Y.	15.00	17,500
Paving - Parking Area	1,600	S.Y.	20.00	32,000
Wheelstops	64	EA.	35.00	2,240
Shelter	1	EA.	12,000.00	12,000
Waterborne Restrooms	1	EA.	60,000.00	60,000
Sanitary Sewer (8" V.C.P.)	3,400	L.F.	18.00	61,200
Manholes	10	EA.	2,000.00	20,000
Water Distribution (2")	3,100	L.F.	8.00	24,800
Picnic Tables	50	EA.	250.00	12,500
Grills	13	EA.	125.00	1,625
Trash Receptacles	13	EA.	75.00	975
Electrical Service	L.S.	L.S.	10,000.00	10,000
Landscaping/Signs	L.S.	L.S.	15,000.00	15,000
SUBTOTAL COST				\$368,090
15% CONTINGENCIES				55,210
20% ENG., DESIGN, ETC.				<u>84,660</u>
TOTAL DEVELOPMENT COST				\$507,960

COST TABLE 21
FEDERAL/STATE - PROPOSED PICNIC AREA 6
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT

PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.9	Ac.	1,800.00	1,630
Subgrade Preparation	4,380	S.Y.	1.00	4,380
Road Excavation	1,826	C.Y.	4.50	8,220
Paving - Access Road "B"	1,711	S.Y.	15.00	25,670
Paving - Service Road "C"	622	S.Y.	15.00	9,330
Paving - Parking Area	2,050	S.Y.	20.00	41,000
Wheelstops	62	EA.	35.00	2,170
Shelter	1	EA.	12,000.00	12,000
Waterborne Restrooms	1	EA.	60,000.00	60,000
Sanitary Septic System with Sand Filter	L.S.	L.S.	20,000.00	20,000
Water Well and Electric Pump/Building and Storage Tank	L.S.	L.S.	25,000.00	25,000
Picnic Tables	40	EA.	250.00	10,000
Grills	10	EA.	125.00	1,250
Trash Receptacles	10	EA.	75.00	750
Electrical Service	L.S.	L.S.	2,000.00	2,000
Landscaping/Signs	L.S.	L.S.	10,000.00	10,000
SUBTOTAL COST				\$233,400
15% CONTINGENCIES				35,010
20% ENG., DESIGN, ETC.				<u>53,680</u>
TOTAL DEVELOPMENT COST				\$322,090

COST TABLE 22
FEDERAL/STATE - PROPOSED PICNIC AREA 7
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	0.8	Ac.	1,800.00	1,440
Road Excavation	1,830	C.Y.	4.50	8,230
Subgrade Preparation	4,390	S.Y.	1.00	4,390
Paving - Access Road "B"	611	S.Y.	15.00	9,170
Paving - Service Road "C"	622	S.Y.	15.00	9,330
Paving - Parking Area	3,155	S.Y.	20.00	63,100
Wheelstops	94	EA.	35.00	3,290
Shelter	1	EA.	12,000.00	12,000
Waterborne Restrooms	1	EA.	60,000.00	60,000
Sanitary Septic System	L.S.	L.S.	20,000.00	20,000
Water Well and Elect. Pump with Building and Storage Tank	L.S.	L.S.	25,000.00	25,000
Picnic Tables	60	EA.	250.00	15,000
Grills	15	EA.	125.00	1,875
Trash Receptacles	15	EA.	75.00	1,125
Electrical Service	L.S.	L.S.	2,000.00	2,000
Landscaping/Signs	L.S.	L.S.	15,000.00	15,000
SUBTOTAL COST				\$250,950
15% CONTINGENCIES				37,640
20% ENG., DESIGN, ETC.				<u>57,720</u>
TOTAL DEVELOPMENT COST				\$346,310

COST TABLE 23
FEDERAL/STATE - PROPOSED PICNIC AREA 8
(POTENTIAL COST SHARING)

COST ESTIMATE FOR FACILITIES DEVELOPMENT

PRICE LEVEL - JULY, 1981

DESCRIPTION OF WORK	QUANTITY	UNIT	UNIT COST	TOTAL COST
Clearing and Grubbing	1.3	Ac.	1,800.00	2,340
Subgrade Preparation	5,900	S.Y.	1.00	5,900
Road Excavation	2,460	C.Y.	4.50	11,070
Paving - Access Road "B"	1,833	S.Y.	15.00	27,500
Paving - Service Road "C"	622	S.Y.	15.00	9,330
Paving - Parking Area	3,450	S.Y.	20.00	69,000
Wheelstops	104	EA.	35.00	3,640
Shelter	1	EA.	12,000.00	12,000
Waterborne Restrooms	1	EA.	60,000.00	60,000
Sanitary Septic System with Sand Filter	L.S.	L.S.	20,000.00	20,000
Water Well with Electric Pump/Building and Storage Tank	L.S.	L.S.	25,000.00	25,000
Picnic Tables	70	EA.	250.00	17,500
Grills	18	EA.	125.00	2,250
Trash Receptacles	18	EA.	75.00	1,350
Electrical Service	L.S.	L.S.	4,000.00	4,000
Landscaping/Signs	L.S.	L.S.	20,000.00	20,000
SUBTOTAL COST				\$290,880
15% CONTINGENCIES				43,630
20% ENG., DESIGN, ETC.				<u>66,900</u>
TOTAL DEVELOPMENT COST				\$401,410

COST TABLE 24
SUMMARY OF COSTS

COST ESTIMATE FOR FACILITIES DEVELOPMENT
PRICE LEVEL - JULY, 1981

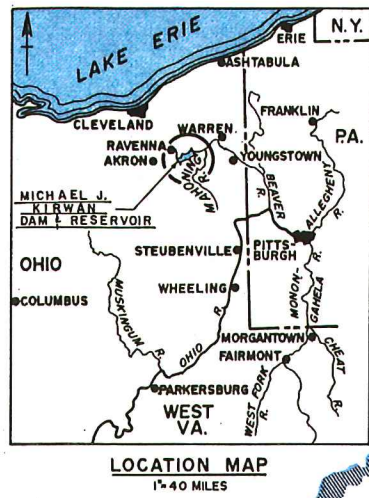
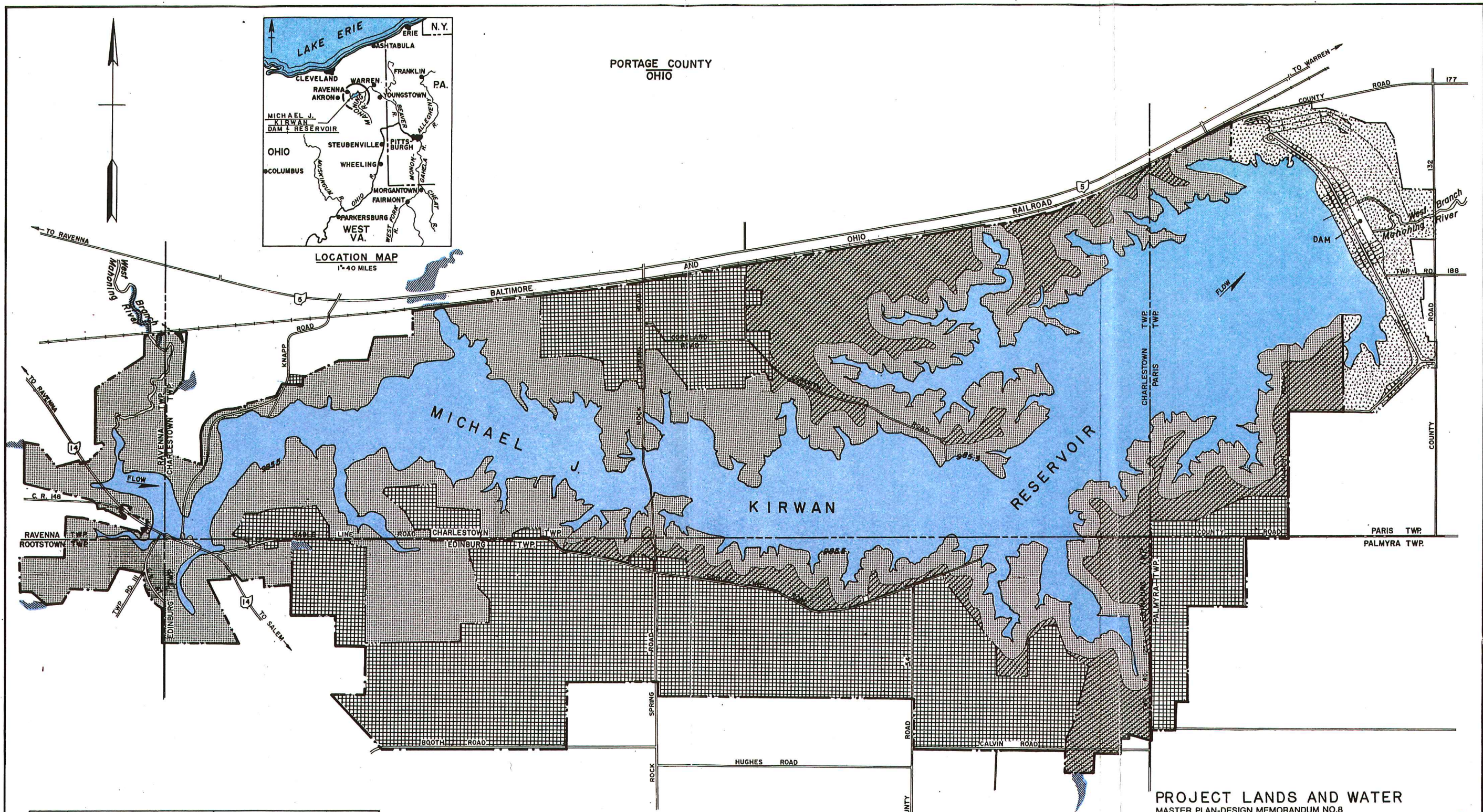
DESCRIPTION OF WORK			COST	TOTAL COST
<u>Federal Area</u>				
Resident Manager's Office and Visitor Center				307,620
<u>Total Federal Costs</u>				307,620
<u>State Area</u>				
Lodge and Sitework				13,969,850
Cabins and Sitework				1,246,390
Clubhouse and Sitework				1,852,260
Utilities System				1,450,380
Group Camp				455,800
Park Office - Camper Check-in				268,750
Expansion of Picnic Areas 2A & 2B				20,840
Camping Area No. 1				1,511,100
				552,000
Alt. 1 Water Supply				
Alt. 2 Water Supply			772,800	
Alt. 3 Water Supply			465,460	
<u>Total State Costs with Alt. 1</u> (Proposed)				21,327,370
Total State Costs with Alt. 2			21,548,170	
Total State Costs with Alt. 3			21,240,830	
<u>Federal/State - Potential Cost Sharing</u>				
Camping Area 1				1,044,050
Future Campground Development				356,330
General Signage				75,350
Campers' Launch Area				457,600
Fishermen Car-top Launch Area				4,980
Beach Parking Expansion				11,980
Silver Creek Overlook				50,380
Proposed Picnic Area 5				507,960
Proposed Picnic Area 6				322,090
Proposed Picnic Area 7				346,310
Proposed Picnic Area 8				401,410
<u>Total Potential Cost Sharing</u>				3,578,440
Total Development Cost				25,213,430
<p style="text-align: right;">SUBTOTAL COST 15% CONTINGENCIES 20% ENG., DESIGN, ETC. TOTAL DEVELOPMENT COST</p>				

APPENDICES

APPENDICES

These Appendices are separate documents and are not included herein. Resource Management guidelines based on these Appendices are presented in Section 10.

- A. Project Resources Management Plan
- B&D. Forest, Fish and Wildlife Plan
- C. Fire Protection Plan
- E. Project Safety Plan



CODE	TYPE OF LAND	ACREAGE	
		CORPS OF ENGINEERS MANAGEMENT	STATE OF OHIO MANAGEMENT
	PROJECT LAND	420	—
	RESERVOIR SUMMER POOL LEASED BY THE STATE OF OHIO	—	2,650
	RECREATION LANDS ACQUIRED BY CORPS OF ENGINEERS AND LEASED TO THE STATE OF OHIO	—	628
	RECREATION LANDS ACQUIRED BY THE STATE OF OHIO	—	2,124
	OPERATIONAL LANDS ACQUIRED BY CORPS OF ENGINEERS AND LEASED TO STATE OF OHIO	—	2,600
	TOTAL ACREAGE	420	8,002

NOTE:
The reservoir pool as shown is the
Maximum Summer Flow Regulation Pool El. 985.5

- LEGEND**
- · — U.S. GOVERNMENT PROPERTY LINE
 - · — · — WEST BRANCH STATE PARK BOUNDARY LINE
 - STATE OF OHIO HIGHWAYS
 - EXISTING ROADS
 - FLOWAGE EASEMENTS

PROJECT LANDS AND WATER
MASTER PLAN-DESIGN MEMORANDUM NO.8
MICHAEL J. KIRWAN DAM & RESERVOIR /
WEST BRANCH STATE PARK

0 1000 2000 3000
Feet

Prepared for:
U.S. ARMY ENGINEER DISTRICT, PITTSBURGH, CORPS OF ENGINEERS
OFFICE OF THE DISTRICT ENGINEER, PITTSBURGH, PENNSYLVANIA

APPROVAL RECOMMENDED:
CHIEF, ENGINEERING DIVISION

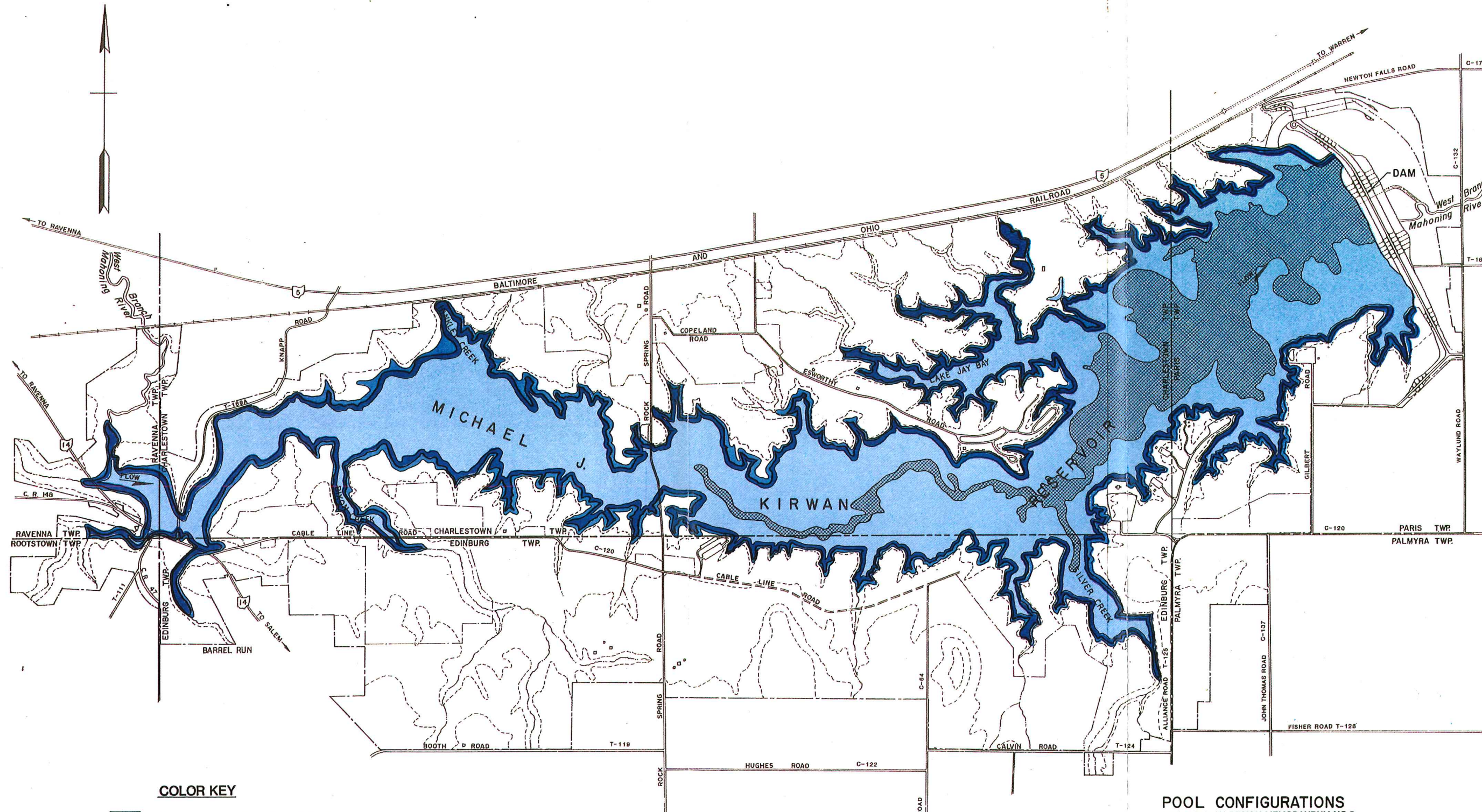
APPROVED:
LT. COLONEL, CORPS OF ENGINEERS, DISTRICT ENGINEER

DATE: _____

Prepared by:
DALTON • DALTON • NEWPORT

PREPARED BY:
CHECKED BY:

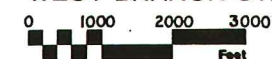
DRAWN BY:
PRINCIPAL IN CHARGE:



COLOR KEY

- MINIMUM POOL EL. 951.0
- AVERAGE LABOR DAY POOL EL. 981.0
- MAXIMUM SUMMER FLOW REGULATION POOL EL. 985.5
- FLOOD POOL EL. 993.0

POOL CONFIGURATIONS MASTER PLAN-DESIGN MEMORANDUM NO.8 MICHAEL J. KIRWAN DAM & RESERVOIR/ WEST BRANCH STATE PARK

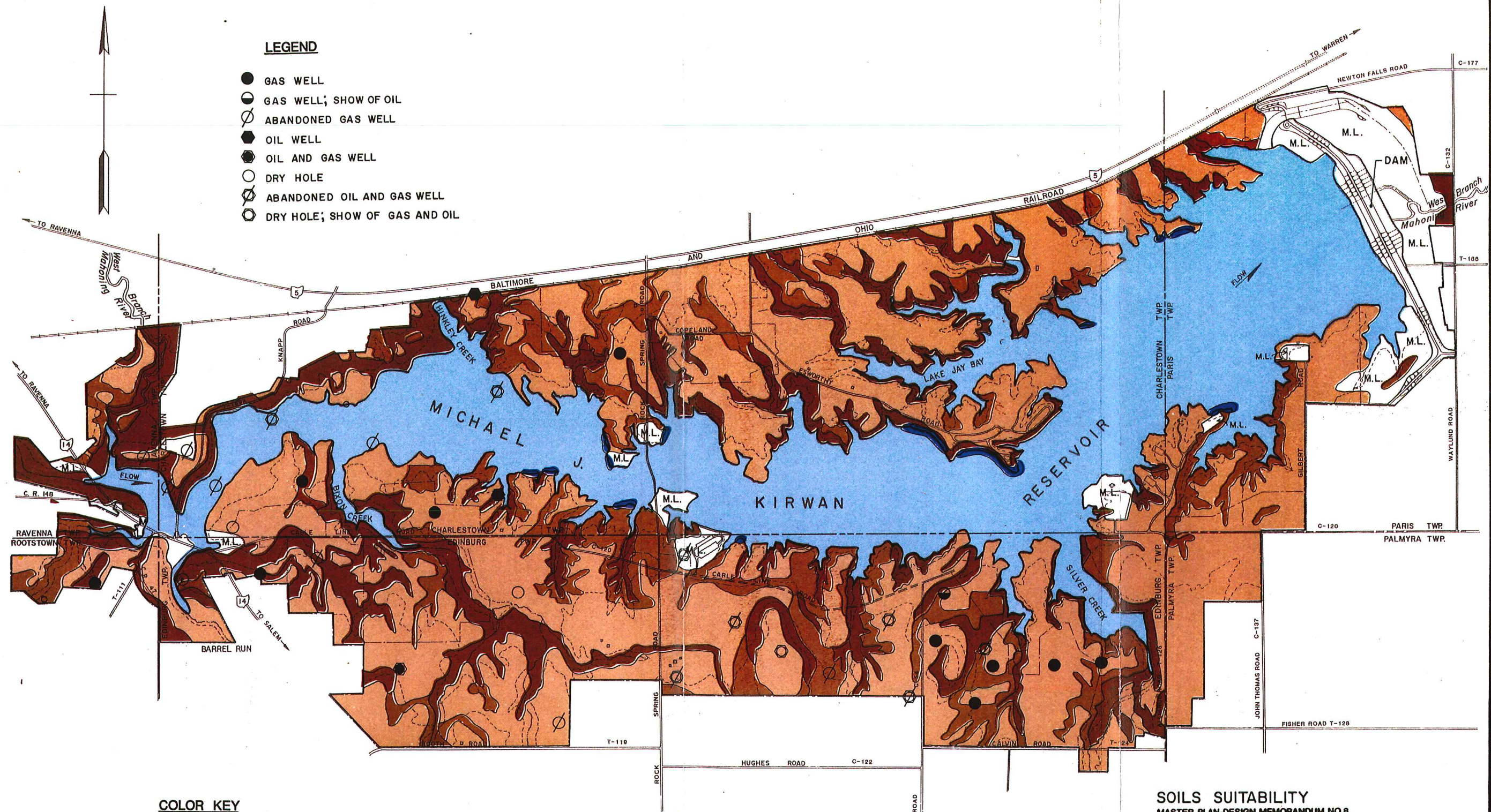


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CORPS OF ENGINEERS, DISTRICT ENGINEER

Prepared by:
DALTON • DALTON • NEWPORT

PREPARED BY: *[Signature]* DRAWN BY: *[Signature]*
CHECKED BY: *[Signature]* PRINCIPAL IN CHARGE: *[Signature]*



- LEGEND**
- GAS WELL
 - ◐ GAS WELL; SHOW OF OIL
 - ABANDONED GAS WELL
 - OIL WELL
 - ◐ OIL AND GAS WELL
 - DRY HOLE
 - ◐ ABANDONED OIL AND GAS WELL
 - DRY HOLE; SHOW OF GAS AND OIL

- COLOR KEY**
- SOIL EROSION PROBLEMS
 - SLIGHT SOILS HAZARD
 - MODERATE SOILS HAZARD
 - SEVERE SOILS HAZARD
 - M.L. MADE LAND (NON-NATURAL SOILS)

SOILS SUITABILITY
MASTER PLAN-DESIGN MEMORANDUM NO. 8
MICHAEL J. KIRWAN DAM & RESERVOIR/
WEST BRANCH STATE PARK

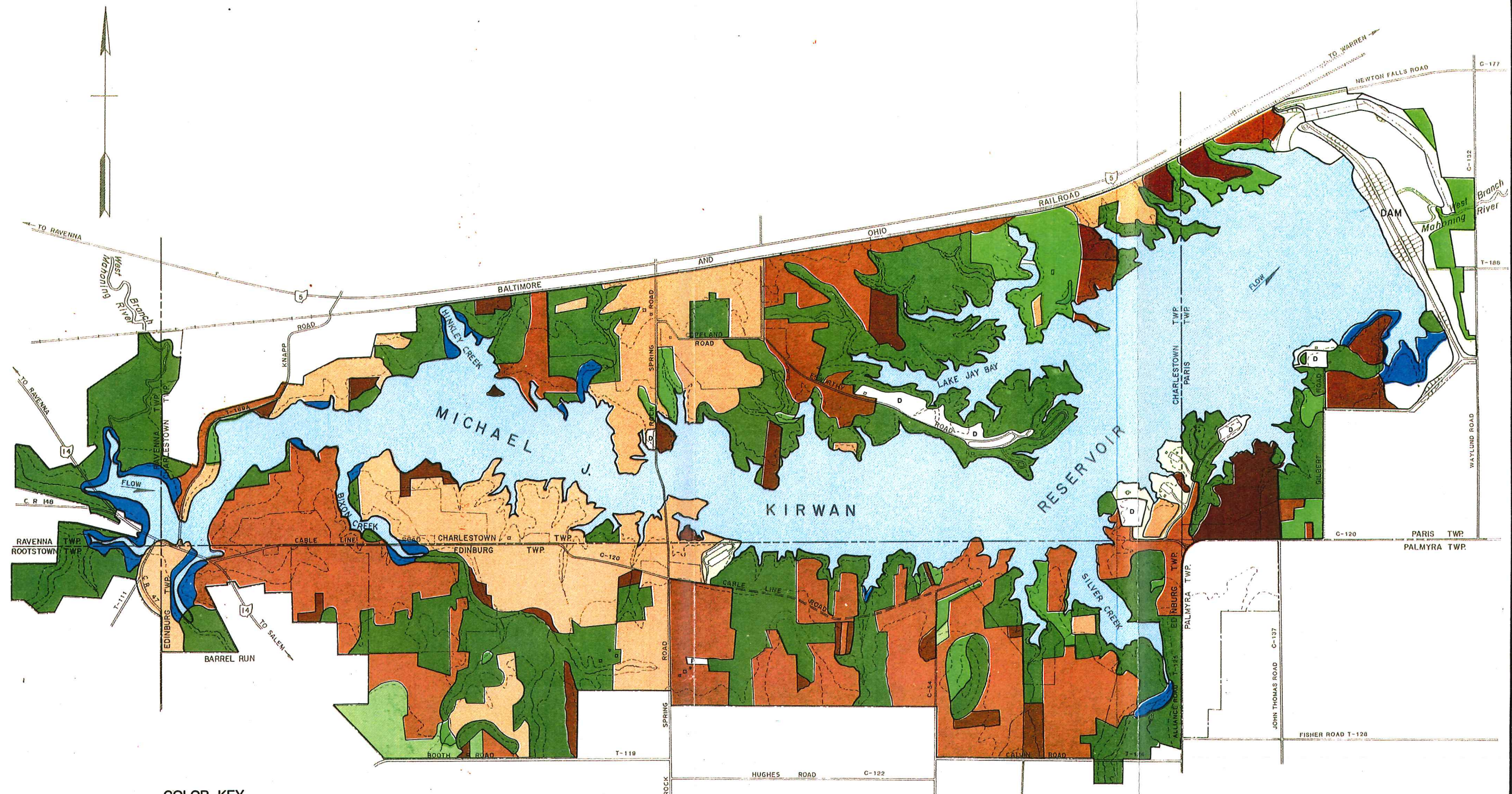
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 Feet

Prepared for:
 U.S. ARMY ENGINEER DISTRICT, PITTSBURGH, CORPS OF ENGINEERS
 OFFICE OF THE DISTRICT ENGINEER, PITTSBURGH, PENNSYLVANIA

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COLOR KEY

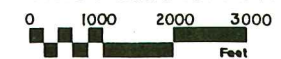
- WOODLANDS MATURE CANOPY
- WOODLANDS EARLY SUCCESSION
- GRASSED EMBANKMENTS
- OLD FIELD
- OLD FIELD 0-20 PER CENT COVER
- OLD FIELD 0-50 PER CENT COVER
- ORCHARD
- MUDFLATS & MARSH
- CULTIVATED FIELDS (SHARECROP)

LEGEND

- D DEVELOPMENT
- P TREE PLANTATION

VEGETATION

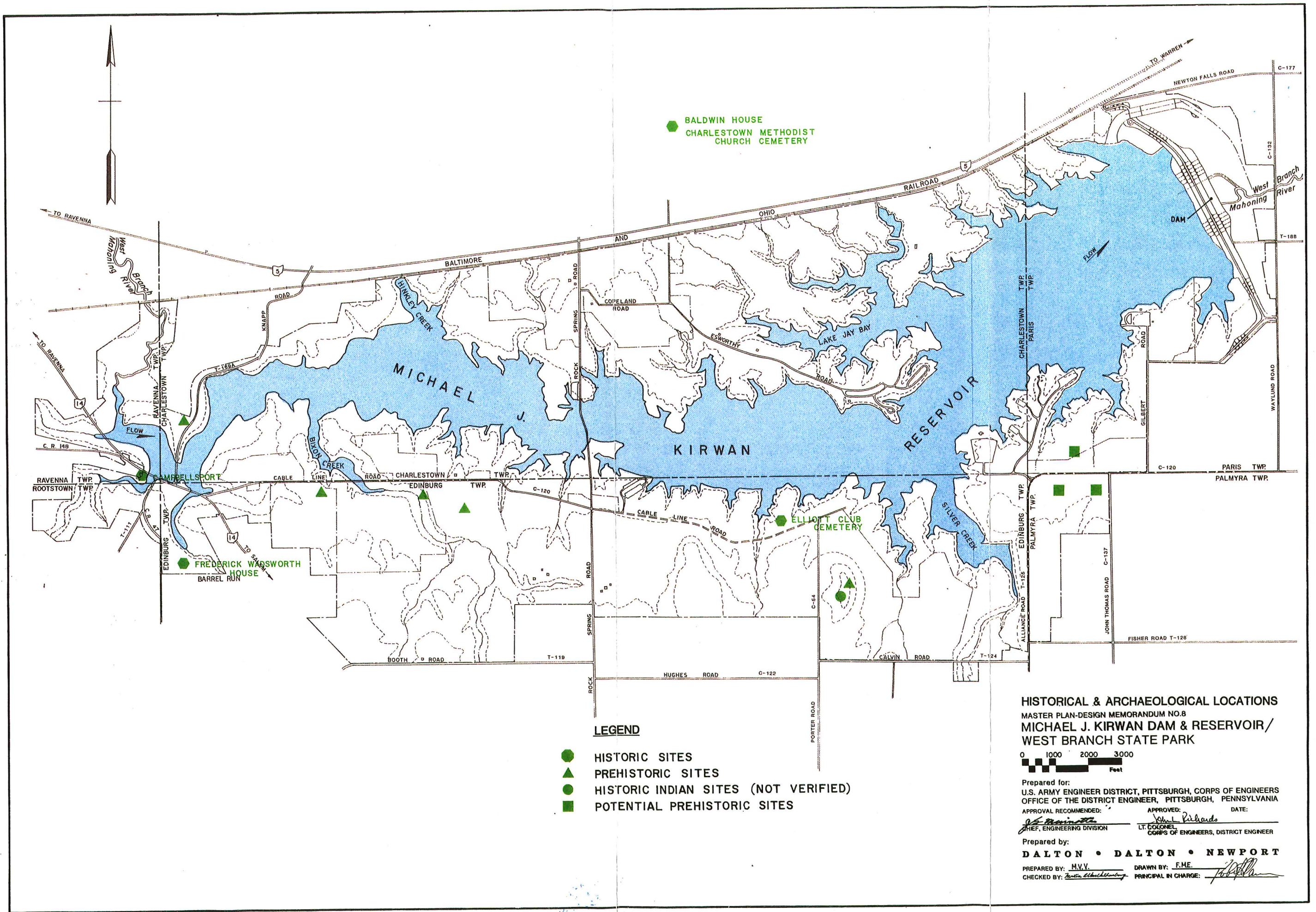
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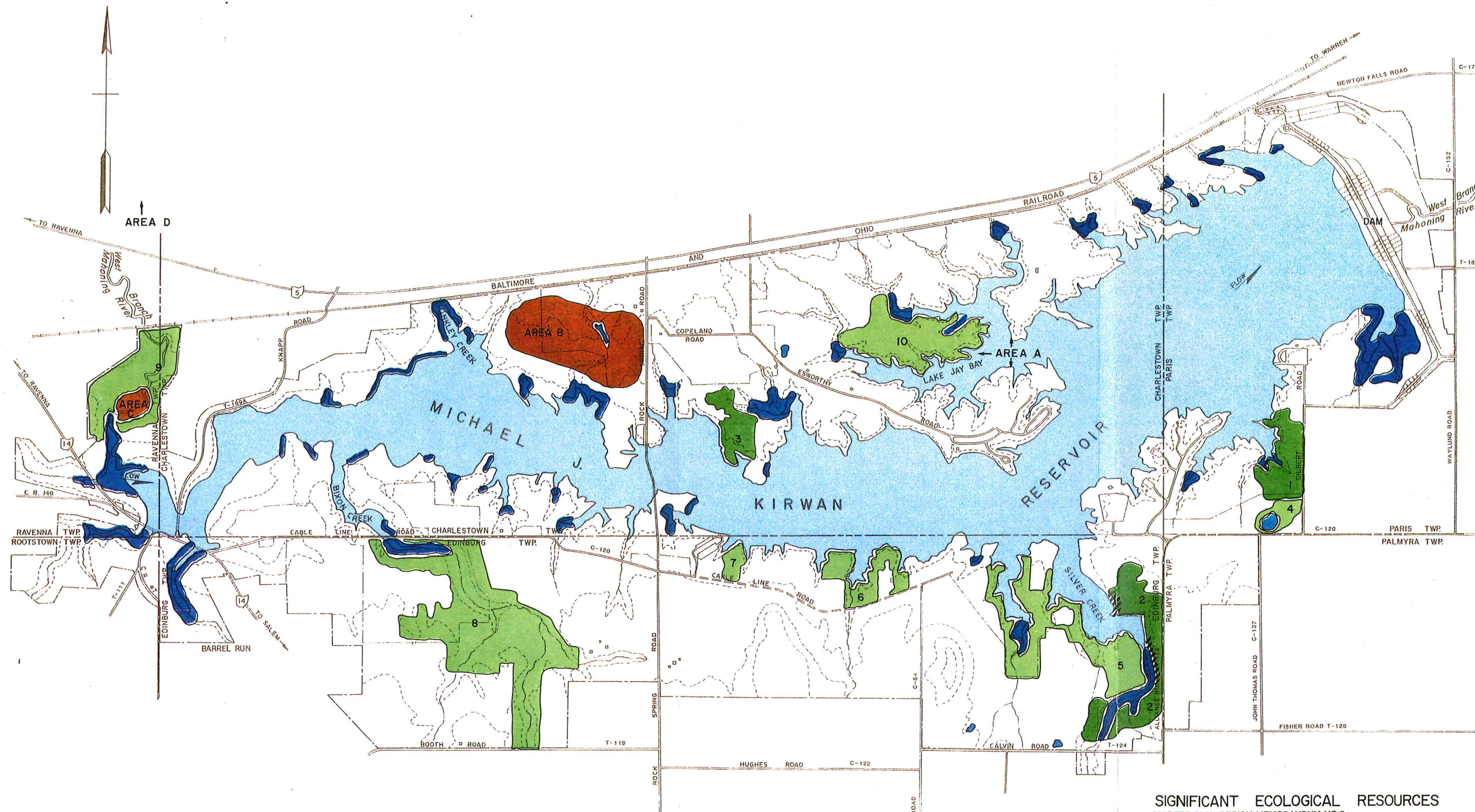


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CHIEF, ENGINEERING DIVISION LT. COLONEL
CORPS OF ENGINEERS, DISTRICT ENGINEER

Prepared by:
DALTON • DALTON • NEWPORT

PREPARED BY: M.V.V. DRAWN BY: F.M.E.
CHECKED BY: *[Signature]* PRINCIPAL IN CHARGE: *[Signature]*

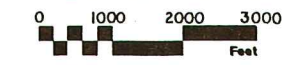




COLOR KEY

- NATURAL AREAS
- WETLANDS
- UPLAND WETLANDS
- WILD AREA
- GEOLOGICAL FEATURES
- SPECIES OF INTEREST

SIGNIFICANT ECOLOGICAL RESOURCES
 MASTER PLAN-DESIGN MEMORANDUM NO.8
**MICHAEL J. KIRWAN DAM & RESERVOIR/
 WEST BRANCH STATE PARK**

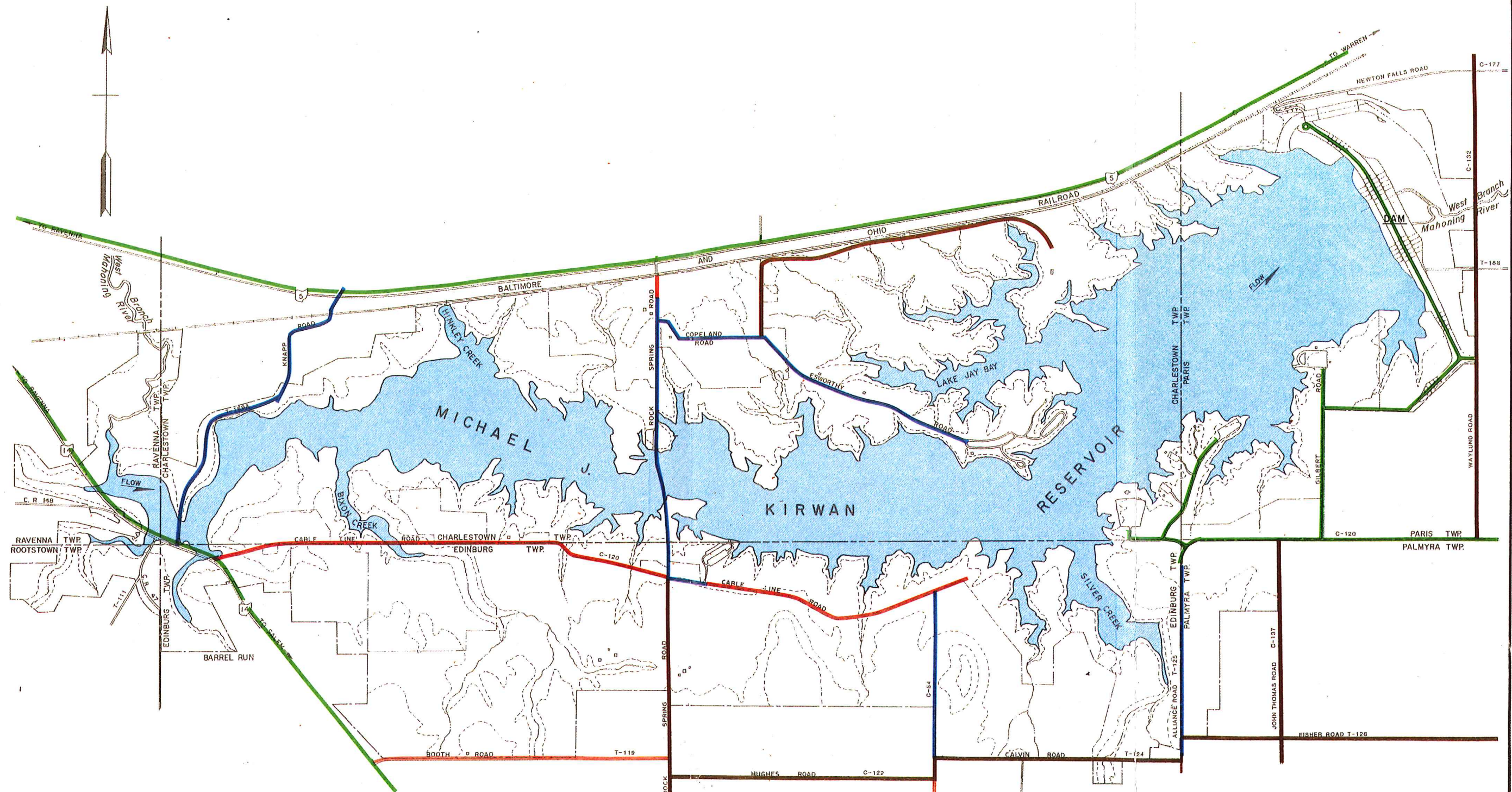


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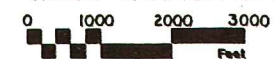
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 CHECKED BY: *[Signature]* PRINCIPAL IN CHARGE: *[Signature]*



COLOR KEY

- VERY GOOD
- GOOD
- FAIR
- POOR

ROAD CONDITIONS
 MASTER PLAN-DESIGN MEMORANDUM NO.8
**MICHAEL J. KIRWAN DAM & RESERVOIR/
 WEST BRANCH STATE PARK**



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