

AD-A120 869

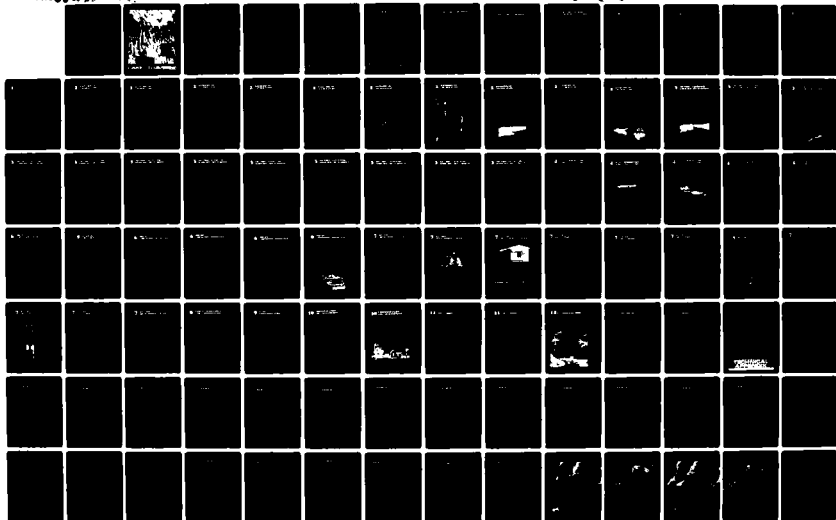
MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE  
MANAGEMENT LAKE TRAVERSE MINNESOTA - SOUTH DAKOTA(U)  
CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT MAY 79

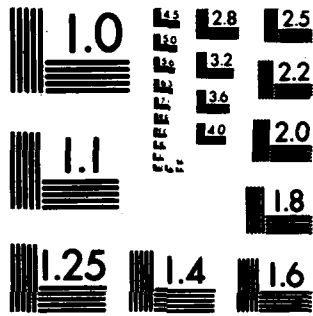
1/2

UNCLASSIFIED

F/G 1Q/2

NI





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

ADA 120869

TO KEEP

DTIC  
ELECTE  
OCT 29 1982  
S H D

DISTRIBUTION STATEMENT A  
Approved for public release;  
Distribution Unlimited

82 10 29 056

# LAKE

# TRAVERSE

MASTER PLAN FOR PUBLIC USE DEVELOPMENT & RESOURCE MANAGEMENT  
ST. PAUL DISTRICT

☆ U.S.GPO: 1978-665-055/59 Region No. 6

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE   |                                     | READ INSTRUCTIONS<br>BEFORE COMPLETING FORM                    |
|---|-------------------------------------|--|
| 1. REPORT NUMBER  | 2. GOVT ACCESSION NO.<br>AD-A120869 | 3. RECIPIENT'S CATALOG NUMBER                                  |
| 4. TITLE (and Subtitle)<br>MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE<br>MANAGEMENT, LAKE TRAVERSE, MINNESOTA - <del>NORTH</del><br>DAKOTA SOUTH   |                                     | 5. TYPE OF REPORT & PERIOD COVERED<br>Master plan              |
| 7. AUTHOR(s)  |                                     | 6. PERFORMING ORG. REPORT NUMBER                               |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>U.S. Army Engineer District, St. Paul<br>1135 U.S. Post Office and Custom House<br>St. Paul, MN 55101  |                                     | 8. CONTRACT OR GRANT NUMBER(s)                                 |
| 11. CONTROLLING OFFICE NAME AND ADDRESS   |                                     | 10. PROGRAM ELEMENT, PROJECT, TASK<br>AREA & WORK UNIT NUMBERS |
| 14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)   |                                     | 12. REPORT DATE<br>May 1979                                    |
|   |                                     | 13. NUMBER OF PAGES<br>82                                      |
|   |                                     | 15. SECURITY CLASS. (of this report)<br>Unclassified           |
|   |                                     | 16. DECLASSIFICATION/DOWNGRADING<br>SCHEDULE                   |
| 18. DISTRIBUTION STATEMENT (of this Report)<br><br>Approved for public release; distribution unlimited  |                                     |  |
| 17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)  |                                     |  |
| 19. SUPPLEMENTARY NOTES<br><br>Environmental assessment Lake Traverse September 1978  |                                     |  |
| 20. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br><br>Environmental assessment<br>Resource Management<br>Lake Traverse  |                                     |  |
| 21. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>Completed in 1941, the Lake Traverse-Bois de Sioux project consists of two pools, Lake Traverse and Mud Lake, with a combined length of 29 miles. It is operated for the dual purposes of flood control and water conservation. The installation of water supply systems and replacement, vault-type restroom facilities are high priorities for the existing public use areas. To ease pressure on and restore wildlife habitat, wildlife management programs must be increased. Water quality is currently the most serious problem; it is recommended that the Corps eliminate grazing and/or farming to the lake's edge and establish a vegetative buffer. |                                     |  |

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

[The following text is extremely faint and largely illegible due to the quality of the scan. It appears to be a multi-paragraph document.]

11 1000 11 11

[This section contains several lines of text, which are also very faint and difficult to read. It appears to be a continuation of the document's content.]

---

FINAL PRINTING

MASTER PLAN FOR PUBLIC USE DEVELOPMENT  
AND RESOURCE MANAGEMENT  
LAKE TRAVERSE  
MINNESOTA - SOUTH DAKOTA

U.S. ARMY CORPS OF ENGINEERS  
ST. PAUL DISTRICT  
1135 U.S. POST OFFICE AND CUSTOM HOUSE  
ST. PAUL, MINNESOTA 55101

May 1979

---

**DISTRIBUTION STATEMENT A**  
Approved for public release;  
Distribution Unlimited

---

# PREFACE

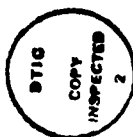
---

## PREFACE

This master plan provides a guide by which lands administered by the Corps of Engineers in the Lake Traverse area can be managed to their maximum potential. The report evaluates environmental and land use data relating to Lake Traverse - Mud Lake, recommends land uses and management practices, and provides estimates of costs for proposed development. The information contained in the master plan must be assembled so that it can be used by the Planner, the Designer, and the Resource Manager, in accordance with regulations, and can serve as a guideline within which ongoing development can occur.

The master plan is presented to the public (agencies, interest groups, and individuals) in an effort to gain their comments on the proposed plan. Ongoing public interaction and comments are an essential part of the planning process.

An environmental assessment has been prepared that examines and documents the potential environmental effects that may result from implementing the proposed master plan. Single copies of the draft master plan and the assessment are available at the Corps of Engineers, St. Paul District Office, 1135 U.S. Post Office and Custom House, St. Paul, Minnesota, 55101.



|                    |                                     |
|--------------------|-------------------------------------|
| Accession For      |                                     |
| NTIS GRA&I         | <input checked="" type="checkbox"/> |
| DTIC TAB           | <input type="checkbox"/>            |
| Unannounced        | <input type="checkbox"/>            |
| Justification      |                                     |
| By _____           |                                     |
| Distribution/      |                                     |
| Availability Codes |                                     |
| Dist               | Avail and/or<br>Special             |

**A**

C

---

# TABLE OF CONTENTS

---

DRAFT  
LAKE TRAVERSE  
MASTER PLAN FOR PUBLIC USE DEVELOPMENT  
AND RESOURCE MANAGEMENT

TABLE OF CONTENTS

| <u>Section</u>  | <u>Page</u> |
|---|-------------|
| Project Data  | v           |
| Section One--Introduction                             | 1           |
| Project Authorization                                 | 1           |
| Authority for Study                                   | 1           |
| Purpose of Study                                      | 2           |
| Scope of Study  | 2           |
| Prior Design Memoranda                                | 2           |
| Section Two--Background Information                   | 3           |
| Prehistory and History                                | 3           |
| Construction History                                  | 5           |
| Project Status  | 7           |
| Project Description                                   | 7           |
| Public Use  | 10          |
| Project Management                                    | 11          |
| Reservoir Operation                                   | 11          |
| Section Three--Factors Affecting Resource Development | 13          |
| General   | 13          |
| Land Character  | 13          |
| Fish and Wildlife                                     | 14          |
| Water Quality   | 15          |
| Real Estate   | 16          |
| Cultural Resources                                    | 16          |
| Access  | 18          |
| Population  | 18          |
| Employment and Income                                 | 19          |
| Recreation at Lake Traverse                           | 22          |
| Competing Recreation                                  | 23          |
| Section Four--Site Description and Evaluation         | 25          |
| White Rock Dam Recreation Area                        | 25          |
| Reservation Highway Recreation Area                   | 27          |
| Brown's Valley Dike Recreation Area                   | 28          |
| Potential Recreation Areas                            | 28          |
| Section Five--Resource Use Objectives                 | 29          |

---

# TABLE OF CONTENTS

---

| <u>Section</u>                                     | <u>Page</u> |
|--|-------------|
| Section Six--Project Visitation Estimates          | 30          |
| General  | 30          |
| Visitation Projections                             | 30          |
| Conclusions  | 34          |
| Section Seven--Revised Recreation Development Plan | 35          |
| General  | 35          |
| Assumptions  | 35          |
| Site Development                                   | 35          |
| White Rock Dam                                     | 35          |
| Reservation Highway                                | 39          |
| Brown's Valley Dike                                | 39          |
| Land Use Allocation                                | 42          |
| Project Operations                                 | 42          |
| Operations: Recreation--Intensive Use              | 42          |
| Operations: Recreation--Low Density Use            | 42          |
| Operations: Wildlife Management                    | 42          |
| Water Quality                                      | 44          |
| Cultural Resources                                 | 44          |
| Wildlife Management                                | 44          |
| Section Eight--Public Involvement and Coordination | 46          |
| Section Nine--Plan Implementation                  | 47          |
| General  | 47          |
| Development Schedule                               | 47          |
| Cost Estimate--Facility Development                | 47          |
| Section Ten--Administration and Management         | 48          |
| Section Eleven--Conclusions                        | 50          |
| Section Twelve--Recommendations                    | 52          |
| Footnotes  | 53          |

---

# LIST OF FIGURES, EXHIBITS & PLATES

---

## LIST OF FIGURES

| <u>Figure</u> |   | <u>Page</u> |
|---------------|---|-------------|
| 1             | Project Location  | 6           |
| 2             | Project Area  | 8           |
| 3             | Typical Cross-Section of Lake Traverse  | 9           |
| 4             | Population: 5-County Area   | 19          |
| 5             | Median Age and Proportion of the<br>Population Over 62 Years of Age                         | 20          |
| 6             | Median Family Income for Traverse<br>County, Minnesota, and Roberts<br>County, South Dakota | 22          |
| 7             | Competing Recreation Facilities   | 24          |
| 8             | Projected Visitation 1980-2030  | 33          |
| 9             | Proposed Restroom--Elevations   | 37          |
| 10            | Proposed Restroom--Plan View  | 38          |
| 11            | Water Supply System--Elevation  | 40          |
| 12            | Fishing Platform  | 41          |
| 13            | Revised Development Plan  | 43          |

## LIST OF EXHIBITS

| <u>Exhibit</u> |  | <u>Page</u> |
|----------------|--|-------------|
| 1              | Letter of Authorization                              | A-1         |
| 2              | Announcement of Public Workshop                      | A-6         |
| 3              | Summary of Comments from Public<br>Workshop          | A-12        |
| 4              | Letter of 14 June 1978 to Work-<br>shop Participants | A-13        |
| 5              | Mailing List for Draft Master<br>Plan                | A-15        |
| 6              | Interagency Review Letters                           | A-18        |

## LIST OF PLATES

|   |                     |
|---|---------------------|
| 1 | Real Estate         |
| 2 | Land Use Allocation |
| 3 | Existing Facilities |
| 4 | Proposed Facilities |

---

# PROJECT DATA

---

## PROJECT DATA

### LAKE TRAVERSE AND RESERVATION DAM

#### Reservoir

|  |                   |
|--|-------------------|
| Flowage rights to elevation                  | 983.0 feet        |
| Water-surface elevation at full pool         | 981.0 feet        |
| Water-surface elevation at design flood      | 982.0 feet        |
| Capacity at full pool (981.0)                | 164,500 acre-feet |
| Capacity at maximum pool (982.0)             | 177,500 acre-feet |
| Capacity at conservation pool (976.0)        | 106,000 acre-feet |
| Reservoir area at conservation pool (976.0)  | 10,925 acres      |
| Reservoir area at full pool (981.0)          | 12,425 acres      |
| Reservoir area at maximum pool (982.0)       | 12,700 acres      |
| Reservoir length at conservation pool        | 16.5 miles        |
| Maximum reservoir width at conservation pool | 1 3/4 miles       |
| Average depth                                | 13.2 feet         |

#### Dam

|   |                     |
|---|---------------------|
| Type  | Rolled earth fill   |
| Crest elevation                             | 980.0 feet          |
| Total length of earth embankment (spillway) | 9,100 feet          |
| Top width (roadway)                         | 26 feet             |
| Maximum height                              | 14.5 feet           |
| Total volume of earth dam                   | 188,000 cubic yards |

#### Spillway

|                                    |   |
|------------------------------------|---|
| Type                               | Grouted riprap weir                         |
| Crest elevation                    | 974.0 feet                                  |
| Net length of spillway crest       | 101.5 feet                                  |
| Number of stop log sections        | 17  |
| Width of sections (clear opening)  | Fifteen, 6 by 2 feet<br>Two, 5.75 by 2 feet |
| Elevation top of stop logs         | 976.0 feet                                  |
| Maximum discharge (design flood)   | 5,600 cfs                                   |
| Elevation of walkway over spillway | 981.0 feet                                  |

---

# PROJECT DATA

---

## Outlet conduits

|  |  |
|--|--|
| Size and length (plugged with removable plugs)     | Two 24-inch by 14-foot corrugated metal pipe |
| Invert elevation (intake and outfall)              | 970.0 feet                                   |
| Discharge capacity with pool at conservation level | 80 cfs total                                 |
| Control (inoperative)                              | Two Calco slide gates                        |

## Stilling basin

|                              |                       |
|------------------------------|-----------------------|
| Type                         | Grouted derrick stone |
| Length                       | 27.5 feet             |
| Maximum width at end section | 150 feet              |

## MUD LAKE AND WHITE ROCK DAM

### Reservoir

|  |                  |
|--|------------------|
| Flowage rights to elevation                  | 983.0 feet       |
| Water surface elevation at full pool         | 981.0 feet       |
| Water surface elevation at maximum pool      | 982.0 feet       |
| Capacity at full pool (981.0)                | 85,000 acre-feet |
| Capacity at maximum pool (982.0)             | 95,500 acre-feet |
| Capacity at conservation pool (972.0)        | 6,500 acre-feet  |
| Reservoir area at conservation pool (972.0)  | 3,850 acres      |
| Reservoir area at full pool (981.0)          | 10,550 acres     |
| Reservoir area at maximum pool (982.0)       | 10,725 acres     |
| Reservoir length at conservation pool        | 7.5 miles        |
| Maximum reservoir width at conservation pool | 2.5 miles        |

### Dam

|  |                     |
|--|---------------------|
| Type   | Rolled earth fill   |
| Crest elevation                              | 980.0 feet          |
| Total length of earth embankment             | 14,400 feet         |
| Top width (roadway)                          | 26 feet             |
| Maximum height                               | 16 feet             |
| Freeboard above spillway design flood height | 4.0 feet            |
| Total volume of earth dam                    | 329,200 cubic yards |

---

---

## PROJECT DATA

---

### Spillway

|  |                                      |
|--|--------------------------------------|
| Type                                       | Gated concrete sill                  |
| Crest elevation                            | 965.0 feet                           |
| Length of spillway crest                   | Three 13-foot bays                   |
| Elevation top of tainter gates<br>(closed) | 981.0 feet                           |
| Design discharge                           | 5,600 cubic feet<br>per second (cfs) |

### Stilling basin

|                                |                                   |
|--------------------------------|-----------------------------------|
| Type                           | Concrete apron with dentated sill |
| Length                         | 34.07 feet                        |
| Maximum width at end sill      | 47 feet                           |
| Elevation of still basin floor | 960.0 feet                        |

### BROWNS VALLEY DIKE AND CULVERT

|  |                                  |
|--|----------------------------------|
| Type                                     | Rolled earth fill                |
| Crest elevation (earth dike<br>section)  | 987.0 feet                       |
| Crest elevation (culvert<br>section)     | approximately 986.5 feet         |
| Total length of earth embankment         | 3,700 feet                       |
| Top width                                | 10.0 feet                        |
| Maximum height                           | 16.0 feet                        |
| Freeboard above spillway<br>design flood | 5.0 feet                         |
| Total volume earth dike                  | approximately 93,000 cubic yards |

### Culvert

|   |                             |
|---|-----------------------------|
| Type  | Concrete bay                |
| Size  | Three 6- by 9-foot openings |
| Length  | 68.75 feet                  |
| Invert elevation (east or<br>reservoir side)              | 971.0 feet                  |
| Invert elevation (west or Little<br>Minnesota River side) | 974.0 feet                  |

---

# I INTRODUCTION

---

## 1.0 INTRODUCTION

1.1 Project Authorization - Authorization for Federal participation in the Lake Traverse-Bois de Sioux flood control project was provided by the Flood Control Act of 22 June 1936, and by the formation of the Tri-State Waters Commission, which provides for local cooperation by the States of Minnesota, North Dakota, and South Dakota. The Flood Control Act of 28 June 1938 made operation and maintenance of civil works projects a Federal responsibility.

1.2 Authority for Study - Public use development at Lake Traverse was made possible by the enactment of two Federal laws:

1. Section 4 of the Flood Control Act of 1944, as amended by Section 207 of the Flood Control Act of 1962, which authorizes the Chief of Engineers to construct, maintain, and operate public park and recreation facilities at water resource development projects under the control of the Department of the Army.

2. The Federal Water Project Recreation Act of 1965 (Public Law 89-72) which requires non-Federal cooperation and cost sharing for recreation and fish and wildlife enhancement at reservoir projects. This act establishes development of recreational potential at Federal water resources projects as a full project purpose.

1.3 Other pertinent Federal laws which affect the planning and design of public-use development follow.

1. The Fish and Wildlife Coordination Act of 1958 which requires that appropriate water resource development by Federal agencies be coordinated with the United States Fish and Wildlife Service, Department of the Interior.

2. The Federal Water Resources Planning Act of 1965 which created the National Water Resources Council and authorized the heads of Federal agencies and departments to provide necessary information to this council.

---

# I INTRODUCTION

---

3. The National Environmental Policy Act of 1969 (Public Law 91-190) which requires a detailed five-point statement describing all major Federal actions which might significantly affect the quality of the human environment. Therefore, potential impacts of major public use developments must be evaluated in an Environmental Impact Statement or an Environmental Assessment.

1.4 Purpose of Study - The purpose of this report is to provide guidance for the conservation, development and management of project resources at the Lake Traverse-Bois de Sioux project.

1.5 Scope of Study - This report discusses resource factors that have an immediate effect on recommendations for resource development and management. The background information on the lands and structures involved in the Lake Traverse-Bois de Sioux project includes an analysis of current conditions, a survey of land use, and a description and an evaluation of three recreation sites. In addition, this report proposes a course of action for the allocation of all Federal land administered by the Corps of Engineers and plans for the revision of the three recreation sites. Design criteria for proposed facilities, estimated construction costs, and plan implementation are presented for the recreation areas. This report and its appendixes will produce a coordinated and manageable system of recreation development and resource management. Appendixes A, C, and E have been approved; and appendixes B and D will be completed in 1980.

1.6 Prior Design Memoranda - No approved Master Plan exists for the Lake Traverse-Bois de Sioux project. Construction of the existing recreation areas is approved by the letter report dated 21 June 1965 (exhibit 1).

# 2

## BACKGROUND INFORMATION

---

### 2.0 BACKGROUND INFORMATION

2.1 Prehistory and History - Evidence of nomadic big game hunters, often referred to by archaeologists as Paleo-Indians, has been found near Lake Traverse and Brown's Valley. Excavated materials consist of a human skeleton, Brown's Valley man, in association with distinctive stone knives and projectile points that date to about 6,000 B.C. This is the only site in Minnesota that has been definitely attributed to the Paleo-Indians, the earliest occupants of the Great Plains.

2.2 Following a climatic change to more moderate temperatures, a number of new food resources became available to prehistoric people. Communities appear to have been less nomadic and subsistence patterns were based on locally available foods. The archaeological record indicates greater cultural diversity resulting from adaptations to different environments. These adaptations to local resources are considered part of a widespread cultural pattern known as the Archaic tradition, which dates from about 5,000 B.C. to 1,000 B.C. It was during this period that the use of copper for fashioning weapons, tools and ornaments originated in the Upper Great Lakes region and spread to the Red River Valley. There are a number of Archaic sites known to exist along the former beaches of glacial Lake Agassiz. It is likely that similar Archaic sites exist in the Lake Traverse area.

2.3 The next period, known as the Woodland, is distinguished from the Archaic by the appearance of pottery and the construction of burial mounds. The use of copper became less common and bone and antler tools are often found. A number of burial sites of this time, including the Round Mound, Fire Mound, K. Mound, Wilson Mound, and Shady Dell site on the eastern side of Lake Traverse and the De Spiegler site near Big Stone Lake were excavated by archaeologists 20 to 40 years ago. Several of these sites contain components of the enigmatic Arvilla Complex which seems to have spread from Wisconsin across central Minnesota and along the Red River Valley during the period from 500 A.D. to 900 A.D.

2.4 About 1,000 A.D., the Woodland tradition was replaced in many areas by the Mississippian tradition, which

# 2

## BACKGROUND INFORMATION

---

developed and spread along the Mississippi and tributary river valleys. The Mississippian presence is evident at the Round Mound site which has a second occupation dated at about 1,300 A.D. The Mississippian tradition is distinguished by the intensive cultivation of maize and beans which made a sedentary village complex possible.

2.5 The Cheyenne Indians reportedly lived in the Lake Traverse area as agriculturists. With the introduction of the horse and the displacement of Indian groups from the east, the Cheyenne moved onto the plains of the Dakotas and dramatically changed their lifestyle to that of nomadic buffalo hunters. The Teton, Yanktonai, Sisseton and Wahpeton Sioux also occupied historic villages along the Upper Minnesota River. The Sisseton and Wahpeton still live on the former reservation on the west bank of Lake Traverse. The government Indian agency building was located about 15 miles west of Brown's Valley.

2.6 There were active fur trading operations in the Lake Traverse area starting early in the 19th century. One of the early fur posts was established by Robert Dickson for the English Northwest Fur Company. Dickson had been appointed superintendent of the western Indians for the British government. His influence was such that he led several groups of the Dakotas against the U.S. at Prairie du Chien during the War of 1812. His post was located on the southeast shore about 6 miles from Brown's Valley and consisted of several buildings. In 1823, the Columbia Fur Company, founded by Joseph Renville, established a post known as Fort Washington in the same area. The American Fur Company established a post in 1824 with Henry Fisher in charge. In 1844, the American Fur Company established another post on Big Stone Lake.

2.7 Following the Sioux Uprising in 1862, the United States government decided to build a fort near the Indian reservation. The fort was called Fort Wadsworth but the name was later changed to Fort Sisseton. It was located about 24 miles west of the present town of Sisseton. From the time the fort was built until 1871, when the railroad reached Morris, the Wadsworth Trail was used for transporting supplies to the fort and reservation. This trail passed from St. Cloud to Sauk Center, to Glencoe, Gager's Station, Frisbys Grove, Tocqua, Brown's

# 2

## BACKGROUND INFORMATION

---

Valley, the Indian Agency, Buffalo Spring, and Fort Wadsworth. One of the central figures in the development of southwestern Minnesota was Joseph R. Brown. He served as administrator of Indian affairs at Fort Wadsworth. In 1866 he moved his house from the fort to a site which became the first post office at Lake Traverse. In 1871 his son, Samuel Brown, moved this post office to its present location in Memorial State Park and named the new location Brown's Valley. It was in the same year that the area was opened up by the government for settlement.

2.8 Construction History - Initial interest in Lake Traverse and the Bois de Sioux River was related to navigation, but with settlement and the eventual development of the area, the problem of flooding arose. Flood damage began to occur as cities and towns grew and as the floodplains were developed for agriculture.

2.9 In 1922 the Department of Agriculture published a report on drainage and prevention of overflow in the valley of the Red River of the North in which corrective measures were discussed. In 1933 the Public Works Administration requested the Chief of Engineers to report on an application for flood control works on Lake Traverse and the Bois de Sioux River, based on the plan proposed by the Department of Agriculture in 1922. At that time, the District Engineer held that the proposed plan for the improvements set forth in the application was adequate in its engineering aspects and was economically justified in view of the benefits to be derived. He noted that, because of State law, none of the States involved could legally undertake construction, operation, and maintenance of the proposed project. At that time no Federal interest was authorized to undertake the project. Enactment of the 1936 Flood Control Act and formation of the Tri-State Waters Commission by the States of Minnesota, North Dakota, and South Dakota (accomplishing the local cooperation) made Federal participation in the project possible. The Flood Control Act of 28 June 1938 relieved local interests of responsibility for acquisition of lands and payment of damages in connection with the project, and made maintenance and operation responsibilities of the Federal Government.

# 2

## BACKGROUND INFORMATION

2.10 Construction of the project began the latter part of 1939 and was completed by the end of 1941. At that time, no survey report or design memorandum was prepared. Therefore, reports following project authorization have been limited to annual reports to the Chief of Engineers on improvements of civil works in the St. Paul District.

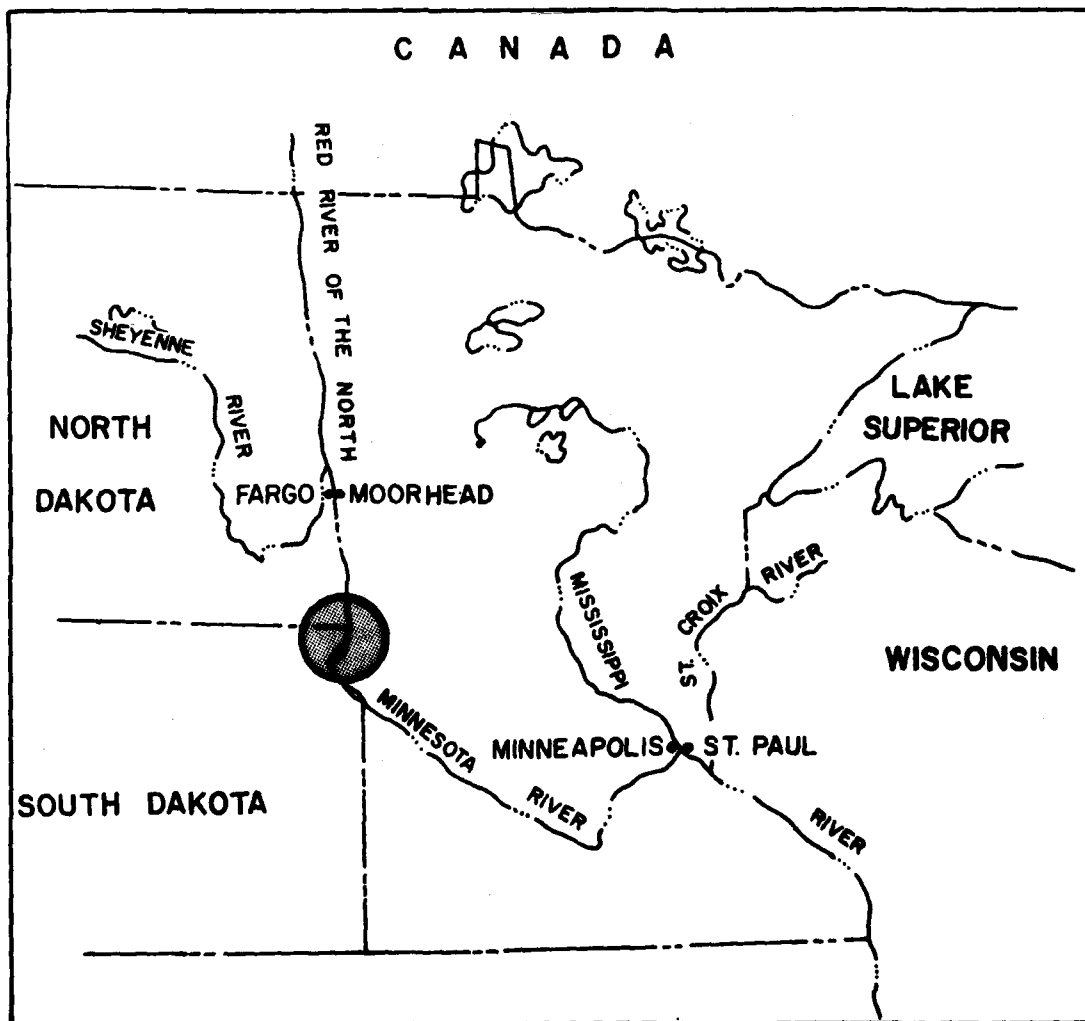


Figure 1

Project Location

# 2

## BACKGROUND INFORMATION

2.11 Project Status - Lake Traverse was completed in 1941 and began operation on December 1 of that year. Only limited recreation facilities have been installed since project construction. Parking areas at White Rock Dam and Reservation Highway were approved in May 1966 and completed the same year (see exhibit 1). Parking facilities were planned and constructed at Brown's Valley in 1972.<sup>1</sup> To protect the resource and provide for the health and safety of visitors, existing restroom facilities and picnic areas were provided.

2.12 Project Description - The Lake Traverse-Bois de Sioux project is located on the State boundary between Minnesota and South Dakota, in the outlet of glacial Lake Agassiz (see figure 1). The project extends from Brown's Valley, Minnesota, the southern extent, to approximately 6 miles south of Breckenridge, Minnesota, its northern extent. Lake Traverse is the headwaters of the Bois de Sioux River, the main tributary of the Red River of the North. The main tributaries of the Bois de Sioux and Lake Traverse are Rabbit Creek and Mustinka River (see figure 2).

2.13 Surrounded by prairie that terminates in a series of bluffs created by the outflow of glacial Lake Agassiz, Lake Traverse-Mud Lake provides an area of recreation activity and visual interest. Land character in the lake area is varied, ranging from agricultural and grazing lands to marsh and bottomland vegetation suitable for wildlife habitat. Land uses surrounding the lakes and extending to the foot of the bluffs consist of agriculture and grazing (see figure 3).

2.14 The Lake Traverse project consists of two pools, Lake Traverse and Mud Lake, with a combined length of 29 miles. Mud Lake with its associated wetlands extends approximately 7½ miles south from the White Rock Dam to the Reservation Highway control structure. Its orientation is north-northeast and the average depth is 1.7 feet. Beginning at the Reservation Highway control structure, Lake Traverse extends approximately 16 miles in a northeast-southwest direction to Brown's Valley Dike. The average width is 1½ miles, with an average depth of 13.2 feet (during normal water levels). Mud Lake is characterized by shallow water 1 foot to 2 feet

# 2

## BACKGROUND INFORMATION

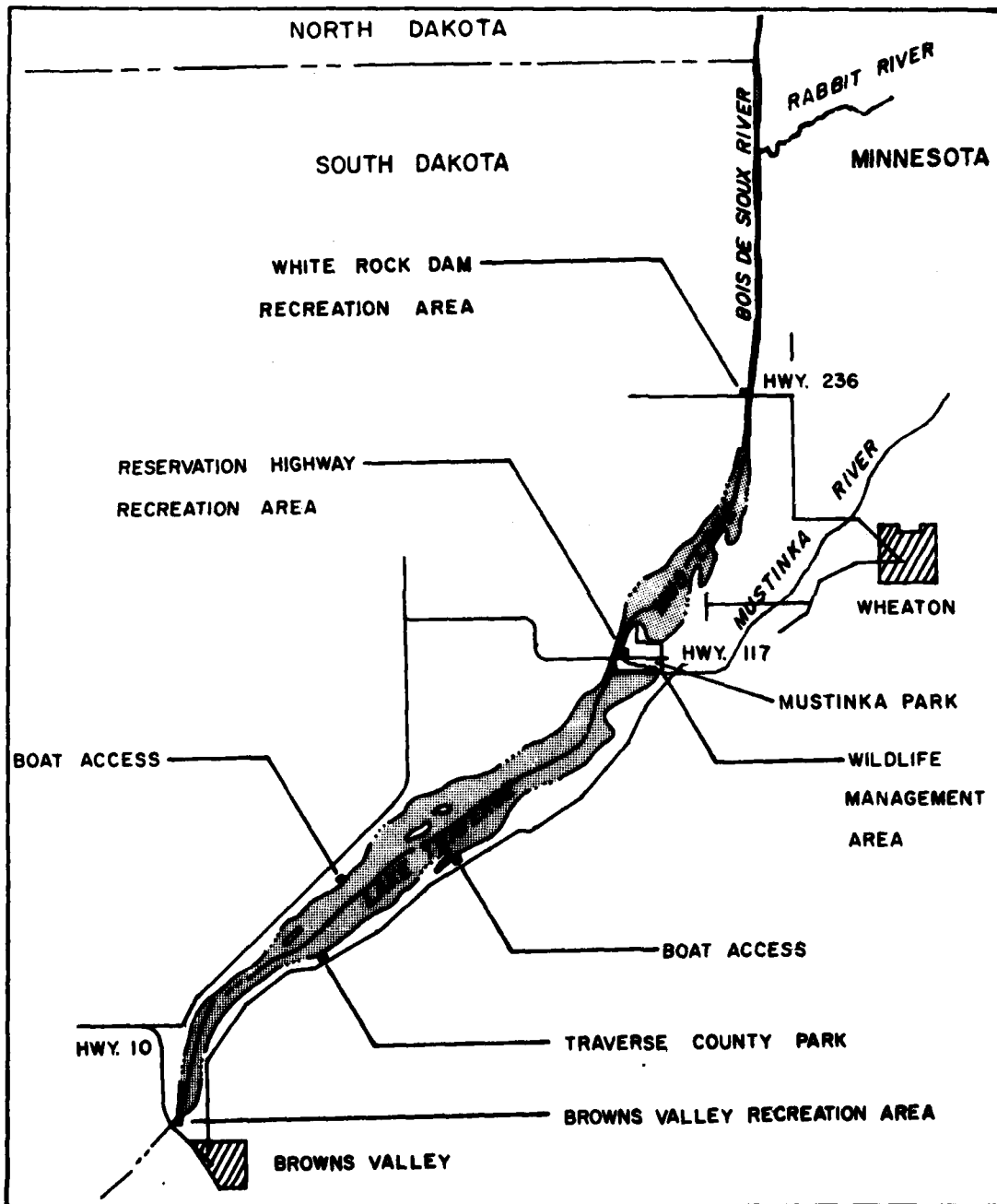


Figure 2

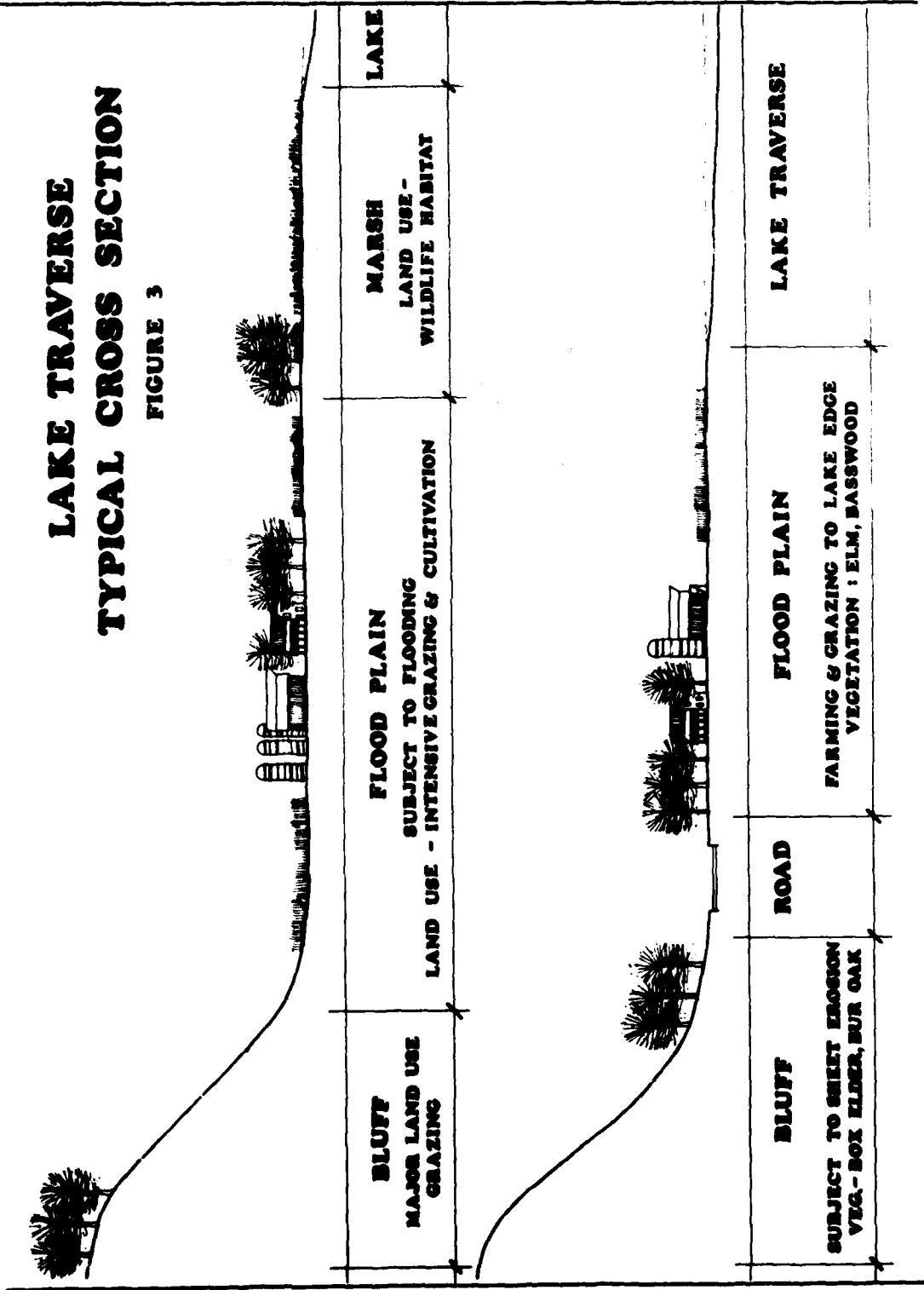
Project Area

# 2

## BACKGROUND INFORMATION

### LAKE TRAVERSE TYPICAL CROSS SECTION

FIGURE 3



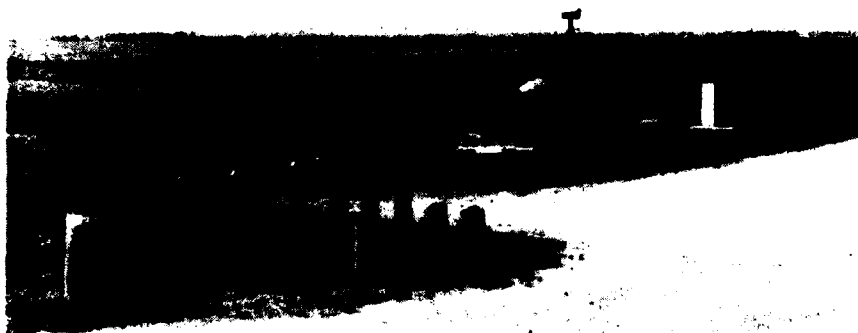
# 2

## BACKGROUND INFORMATION

in depth, interspersed with a dense marsh habitat consisting of cattails and bulrushes. It has excellent potential as wildlife habitat and is presently serving as an important resting spot for migratory waterfowl.<sup>2</sup> Lake Traverse is an elongated open-water lake surrounded by land uses devoted to agriculture and grazing. The north and south ends of the reservoir are exceptions, with marsh and willow-cottonwood vegetation creating the lake's edge. (See figure 3.)

2.15 The Bois de Sioux River Channel was straightened and enlarged by dragline. The total length of the channel is approximately 24 miles, starting at White Rock Dam and continuing to near the cities of Breckenridge and Wahpeton. The channel bottom is 60 feet wide with side slopes of 1 foot of rise along 3 feet of run.

2.16 Public Use - Recreation facilities operated and maintained by the Corps at Lake Traverse-Mud Lake are located in three developed areas: White Rock Dam Recreation Area, Reservation Highway Recreation Area, and Browns Valley Dike Recreation Area. White Rock Dam Recreation Area, the northernmost area, is located on Minnesota State Highway 236. Reservation Highway Recreation Area, between Mud Lake and Lake Traverse, is located on Minnesota State Highway 117. The southernmost area, Browns Valley Dike Recreation Area, is located on South Dakota State Highway 10 (see figure 2). Another public use area called Mustinka Park is leased by the Corps to Traverse County.



White Rock Dam Recreation Area

# 2

## BACKGROUND INFORMATION

---

2.17 Project Management - Corps-managed land adjacent to Lake Traverse consists of 1,144 acres in fee ownership. As stated in ER1165-2-400 (Water Resource Policies and Authorities--Recreation Planning, Development, and Management Policies): "The developed and natural resources of Civil Works projects are the public property of both present and future generations. Corps resource management activity is directed toward the continued enjoyment and maximum sustained use by the public of lands, waters, forests, and associated recreation resources, consistent with their carrying capacity and their aesthetic and biological values, and to allow such other new and innovative uses of the project that are not detrimental thereto. Maintenance and administration of recreation areas, where they remain under Corps jurisdiction, are part of the overall management objective to preserve and protect the quality of project resources."

2.18 Additionally, management of Corps-administered waters and related lands is coordinated with those agencies and individuals who share use and/or have an interest in the lakes and recreation facilities for which the Corps of Engineers does not have responsibility.

2.19 Reservoir Operation - Lake Traverse is operated primarily for dual purposes of flood control and water conservation. During floods, excess water is passed from Lake Traverse to Mud Lake as rapidly as possible by removal of stop logs in Reservation Dam to prevent a material rise in the reservoir pool until the pool levels are equalized. Thereafter, both pools will rise in unison.

2.20 The spring breakup occurs later on the Red River of the North than in the Lake Traverse watershed. Therefore, to avoid increasing downstream flood heights, a release of flood storage when necessary from White Rock Dam is not made until conditions are favorable, usually about the first of May. When such releases are made, emergency conditions downstream govern the rate of discharge except during emergency conditions in the reservoir.

2.21 The key point for operation of the reservoir is at the cities of Wahpeton and Breckenridge where the published flood stage on the U.S. Geological Survey gage is 10.0 feet. However, flooding of park facilities at both

# 2

## BACKGROUND INFORMATION

Wahpeton and Breckenridge begins at a stage of 7.5 feet, and minor flooding of the Wahpeton sewage pumping plant occurs when the stage is over 7.0 feet. Except for large floods, the discharge from White Rock Dam can be restricted to rates which will not exceed the latter stage. As soon as the reservoir level drops to 976.5, the stop logs are replaced in the Reservation Dam structure in order to hold the conservation level of the upper pool at 976.0. The discharge from White Rock Dam is then gradually reduced until the pool level is down to 972.0. This stage is then maintained by reducing outflow to equal inflow. If at any time it should become evident that a flood will exceed reservoir capacity, the gates in the White Rock Dam will be fully opened regardless of downstream conditions. No drawdown of the pools during the winter months is necessary since evaporation loss by freeze-up usually amounts to 2 feet or more in Mud Lake and about 1 foot in Lake Traverse.

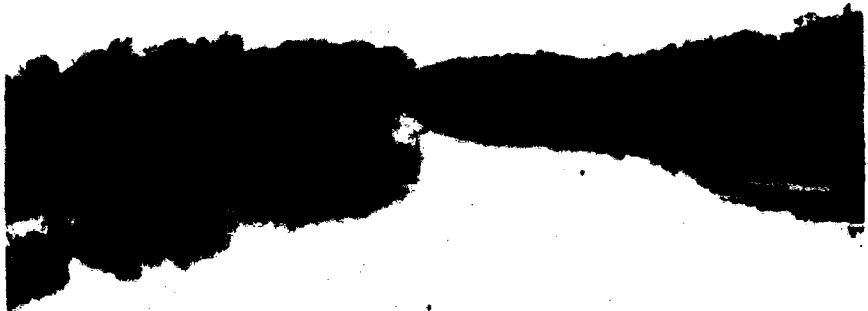


3

### 3.0 FACTORS AFFECTING RESOURCE DEVELOPMENT

3.1 General - There are many factors that determine a resource development and management strategy. These factors or project resources can be divided into two categories, natural resources and man-made resources. The interrelationships of these elements direct the development of the resource as a whole.

3.2 Land Character - Federal land around the Lake Traverse project may best be described as floodplain. The majority of land is low and subject to periodic flooding. Much of the land is wet and consists of marsh and bottomland hardwood vegetation. Sections of land that appear to be dry are open, lack vegetation, and are not visually pleasing. The only area suitable for recreation development or expansion is adjacent to Brown's Valley Dike where adequate vegetation, drained soils, and a stable shoreline are present. Soil, water, and vegetation factors could impose constraints on development. Soils in general are



Mustinka River

# **3 FACTORS AFFECTING RESOURCE DEVELOPMENT**

---

wet and subject to erosion. Periodic flooding is a problem. The lack of substantial vegetation and the resulting open character of the land discourage recreation development due to exposure and its lack of visual amenity.

3.3 Fish and Wildlife - Prior to project construction, Lake Traverse and Mud Lake supported a vast marsh. Upon project completion, a large portion of the marsh habitat has deteriorated. Fluctuation of lake level, water turbidity caused by winds, and the general shallowness of the lake have also contributed to a loss of wildlife habitat.<sup>4</sup> As a result, hunting quality and activity have decreased. Through management of leased lands, the Minnesota DNR has begun to reverse the changes in habitat. The preservation of existing habitat and the creation of potholes in Mud Lake marsh areas have improved habitat.<sup>5</sup> Additional measures to restore wildlife habitat and improve water quality are necessary if the wildlife population and resulting hunting are to be significantly improved.

3.4 Fishing is an important activity at Lake Traverse. Because of its status as a boundary water, Lake Traverse receives considerable early fishing pressure and provides valuable local fishing for Minnesotans and South Dakotans. The lake is very productive and contains a large population of rough fish, predominantly carp, buffalo fish, bullheads and sheepshead. Fishing is best in spring and fall when the summer algal blooms can be avoided.<sup>6</sup> Fishing is considered good for white bass, crappie, and bullheads; and fair to poor for walleye and northern pike.<sup>7</sup>

3.5 The States of Minnesota and South Dakota participate in a program that removes rough fish and stocks walleye, northern pike and crappie, but problems exist that directly affect the fishing and overall recreation use of Lake Traverse. Periodic winterkill is a problem, resulting in the natural selection of rough fish. Water quality due to algal blooms, and lake turbidity caused by wave and wind action tend to limit habitat and suitable spawning sites for game and pan fish.<sup>8</sup> Until water quality is improved, fishing can be expected to decrease in quality, with rough fish predominant.

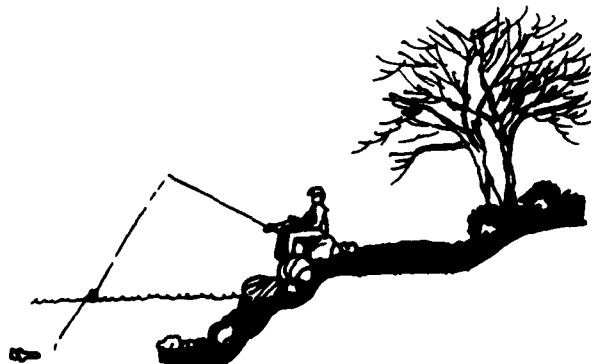
# 3 FACTORS AFFECTING RESOURCE DEVELOPMENT

3.6 Water Quality - Water quality at Lake Traverse is poor. Future development on Lake Traverse must consider siltation due to runoff from construction sites. During construction, sediment-holding ponds and proper construction techniques can effectively eliminate siltation from construction sites. Proposed expansion of Corps facilities will not adversely affect water quality.

3.7 The most significant problem contributing to poor water quality in Lake Traverse is algal production due to high levels of nutrients. As a result, eutrophication is a problem and has advanced to the stage of algal blooms occurring in summer and early fall. Major causes of eutrophication and the resulting algal blooms may be attributed to:

- a. Erosion and the inflow of nutrients from adjacent land.
- b. Direct access by livestock to the lake and runoff from the cattle yards adjacent to the lake.
- c. Sewage wastes from municipalities and private residences; specifically the transportation of sewage effluent and cattle wastes by the Mustinka River into Lake Traverse.<sup>9</sup>

Without proper measures to correct these problems, water quality and the surrounding lake environment will continue to deteriorate. Toxic properties in algae are a possibility and "a potential threat to the well-being of domestic animals and man."<sup>10</sup> Sedimentation and algal problems will continue to decrease the usefulness of the lake. Fishing quality has begun to decrease significantly and water contact sports in shallow water areas are no longer safe due to poor water quality.



---

# 3 FACTORS AFFECTING RESOURCE DEVELOPMENT

---

3.8 Real Estate - Corps land around Lake Traverse consists of 1,144 acres in fee ownership, approximately 217 acres of additional lands formed by reliction, and 6,172 acres in flowage easement (see plate 1). Of the lands, 945 acres are leased to the Minnesota Department of Natural Resources (DNR) for wildlife management, 401 are leased to local farmers for cultivation and grazing, and 10 acres are leased to Traverse County for recreation.<sup>12</sup> The land leased to the Minnesota DNR is located adjacent to the Reservation Highway and consists of marsh and stands of willow and cottonwood. The land leased to local residents lacks any substantial vegetation and has little visual or physical interest. Approximately 5 acres are devoted to the three public use areas at Brown's Valley Dike, Reservation Highway, and White Rock Dam.

3.9 Upon initial investigation, real estate practices (specifically, the leasing of Corps land) seem to limit development possibilities by removing a substantial amount of Corps land from direct Corps control and, thus, development consideration. Upon further investigation, however, these lands appear to be unsuitable for any type of recreation development. This is due to land constraints (types of soil and lack of substantial vegetation) and the lack of natural characteristics which might lend themselves to recreation development.

3.10 Cultural Resources - Under the mandate of Executive Order 11593 for Protection and Enhancement of the Cultural Environment, the Corps is required to locate, inventory, and nominate to the Secretary of the Interior all sites, buildings, districts, and objects under its jurisdiction or control which appear to qualify for listing on the National Register of Historic Places. These tasks have

# 3

## FACTORS AFFECTING RESOURCE DEVELOPMENT

not yet been accomplished in the Lake Traverse area. However, the limited data that exist suggest that diverse groups of prehistoric and historic peoples have inhabited the region.

3.11 The artifacts and site materials which are the tangible cultural resource base of an area are significant to public use development in two major ways. First, the Corps is explicitly responsible for the protection and preservation of cultural resources located within areas of its jurisdiction and impact. Second, cultural resources have development potential. Fulfilling the first responsibility will often be the first step toward realizing the development potential of the resource base.

3.12 Prior to any new construction of recreational facilities, cultural resource investigations (including review of documents, site surveys and test excavations) will be carried out in order to locate the resources and to assess their significance to present and future generations. Once known, the cultural materials can be evaluated for their suitability for incorporation into interpretive facilities such as self-guided walking trails, education displays, and reconstructed buildings and sites.

3.13 On the basis of current information about cultural resources, it can be anticipated that a wide variety of significant prehistoric, historic and geologic features occur in the Lake Traverse area. Though their potential is yet to be realized, it seems likely that many sites may be suitable for public interpretation.

3.14 As of 1977, only the Ancient River Warren Channel has been formally recognized as a Registered Natural Landmark. Both Minnesota and South Dakota have erected highway markers to commemorate this geological feature. Regulations require that any Corps project in the vicinity of the Ancient River Warren be evaluated in terms of its impacts on the natural landmark.

3.15 There are 17 known prehistoric sites in the Lake Traverse area, including petroglyphs, burial mounds,

# 3

## FACTORS AFFECTING RESOURCE DEVELOPMENT

rock cairns, earthworks, and habitation sites. The historic sites are fur posts, the Sisseton Sioux Indian Agency, a major military trail, military forts, and settlement sites. These sites have been identified from early survey records, settlers' reports and from artifacts which appeared when the ground was disturbed by agricultural and construction activity. Many of the sites, though recorded, have not been located on the ground. When systematic surveys are completed, the scientific and educational potential of the cultural resource base will be assessed and procedures will be established for its protection and development.

3.16 Access - Access to the project area is provided by a system of Federal, State, and county highways. These roads are adequately maintained and capable of accommodating the visiting public. No relocation or supplement to public roads is necessary as a result of proposed development. Circulation problems do exist at present Corps facilities.

3.17 Population - The population of the five-county area has shown a large decline since 1960 (see figure 4). The factors contributing to this decline and to the current composition of the population may have impacts on the recreational needs and preferences of people in the study area.

3.18 Three factors appear to have contributed to this decline during the decade 1960-70. The first of these factors is a significant aging due to a marked increase in proportion over 62 years old (figure 5). The second factor is the out-migration of those young adults between the ages 20 and 39. The third factor is a decline in birth rate. An example of this is evident in Big Stone County, Minnesota, where the number of children under 5 years declined by 42.1%. The data warranting this three-part interpretation of the population decline in the study area are available in the 1970 General Population Characteristics of the U.S. Bureau of the Census.

# 3 FACTORS AFFECTING RESOURCE DEVELOPMENT

Figure 4 POPULATION: 5-COUNTY AREA

|                      | <u>1960 Pop.</u> | <u>1970 Pop.</u> | <u>% Change</u> |
|----------------------|------------------|------------------|-----------------|
| Roberts County, S.D. | 13,190           | 11,678           | -11.5           |
| Grant County, S.D.   | 9,913            | 9,005            | -9.2            |
| Traverse County, MN  | 7,504            | 6,254            | -16.6           |
| Stevens County, MN   | 11,262           | 11,218           | -0.4*           |
| Big Stone County, MN | 8,954            | 7,941            | -11.3           |

\*This small decline, compared to the other counties, is at least partially due to the expansion of the University of Minnesota at Morris.

Source: 1970 Population Characteristics Publication of the U.S. Bureau of the Census.

3.19 Usually, recreation use will increase when population is constant because people generally acquire more leisure time and higher income. However, in the Lake Traverse area, typical increases in recreation use will probably not offset the decline in population because the decline is occurring in an age group (20-39) with a high usage of recreation facilities. Therefore, recreation use will probably decline.

3.20 Major communities providing basic services to the surrounding area are: Morris, Minnesota (1970 pop. 5366), Sisseton, S.D. (1970 pop. 3094), and Wheaton, Minnesota (1970 pop. 2029).

3.21 Employment and Income - Employment data for the area reflect the population trends discussed in a previous section. Combined employment in Traverse and Roberts Counties, the two counties in which Lake Traverse lies, fell from 7,603 in 1940 to 6,101 in 1970. The labor force participation rate for males 14 and over fell sharply after 1950, and by 1970 was well below the State averages for Minnesota and South Dakota. A more refined labor force participation measure for 1970, which excludes the institutional population and covers only the 16-64 age groups, shows a participation rate for males of only 89.3 percent for Traverse County, compared with 94.2 percent for the State of Minnesota. This suggests a relatively high incidence of disguised unemployment in the form of withdrawal from the labor force. The rate for Roberts County is even lower (82.3 percent), as is the rate for all of South Dakota (83.5 percent). The low figure in Roberts County is partially a reflection of the relatively large Indian population in the county (13.4 percent), part of which lives on the Sisseton reservation.

# 3

## FACTORS AFFECTING RESOURCE DEVELOPMENT

Figure 5: MEDIAN AGE AND PROPORTION OF THE POPULATION  
OVER 62 YEARS OF AGE

|                      | MEDIAN AGE(yrs) |             | % of pop. over 62 |             |
|----------------------|-----------------|-------------|-------------------|-------------|
|                      | <u>1960</u>     | <u>1970</u> | <u>1960</u>       | <u>1970</u> |
| Roberts County, S.D. | 29.0 yrs.       | 31.0 yrs.   | 14.2%             | 18.5%       |
| Grant County, S.D.   | 29.5            | 31.0        | 14.9              | 18.3        |
| Traverse County, MN  | 30.3            | 34.2        | 15.1              | 20.0        |
| Stevens County, MN*  | 27.6            | 24.9        | 12.9              | 14.5        |
| Big Stone County, MN | 30.5            | 34.6        | 15.8              | 19.8        |
| South Dakota         | 27.7            | 27.4        | --                | 14.6        |
| Minnesota            | 28.6            | 26.8        | --                | 13.1        |

\*The decline in median age and lower proportion of persons 62 years and older is at least partially due to expansion of the University of Minnesota at Morris.

Source: 1970 General Population Characteristics Publication of the U.S. Bureau of the Census.

3.22 Labor force participation rates for women increased significantly between 1940 and 1970--as they did for Minnesota and South Dakota and the nation as a whole--so that total female employment in Traverse and Roberts counties almost doubled. Nevertheless, the female participation rates for the two counties were still well below the averages for the respective states.

3.23 Open unemployment rates in Traverse County have been lower than average rates for Minnesota. In Roberts County, however, they have equalled or exceeded the South Dakota average since 1940, with the only exception being the female unemployment rate in 1970.

3.24 Between 1940 and 1970, farm employment in Traverse County fell from 62 percent of the total to 31 percent; in Roberts County the decline was from 64 percent to 36 percent. Nevertheless, agriculture remains by far the largest occupational category in both counties, and it is of much greater importance to these counties than to their respective states. In both counties, the largest percentage gains occurred in the service occupations. Significant increases also occurred for sales and clerical employees and, in Roberts County, for craftsmen.

# **3 FACTORS AFFECTING RESOURCE DEVELOPMENT**

---

3.25 An examination was also made of employment by industry group, with the hope that this would give some clues to the growth of recreational services in the two counties, part of which might be attributed to Lake Traverse. Unfortunately, census data are insufficiently disaggregated to provide a clear picture, though several observations can be made. First of all, employment in entertainment and recreation services in the two counties fell from 52 in 1940 to 40 in 1970. This contrasts with an increase in this employment category in both states. Employment in hotels and lodging places fell from 54 in 1940 to 39 in 1950. Thereafter, this category is lumped together with other personal services. The combined employment category has grown steadily in Traverse County since 1950, and its relative importance is now greater in the county than in the state. In Roberts County, however, employment in personal services fell between 1950 and 1960, though the 1950 level was recovered in 1970. These data suggest only modest gains have been made from recreation and tourism; but because the data are highly aggregated, this is difficult to determine with any reasonable degree of certainty without recourse to field surveys.

3.26 The median family income in Traverse County fell from 80 percent of the state average in 1949 to 62 percent in 1959, then rose to 69 percent in 1969 (figure 6). Median family income is even lower in Roberts County, where in 1949 it amounted to only 62 percent of the average for the State of South Dakota. It then fell to 53 percent in 1959, following a pattern typical of rural counties during the 1950's. By 1969 it had recovered slightly to 57 percent. It should be pointed out that these figures understate relative real incomes in Traverse and Roberts counties since they exclude imputed income from agricultural production consumed on the farm and other types of income in kind. Since agriculture is much more important in these counties than in their respective states, imputed income in the two counties is probably relatively high.

3.27 The incidence of poverty in Traverse County is more than double the Minnesota average, with 18 percent of the population below the poverty line (figure 6). In Roberts County the figure is 20 percent. Changes in income, like those in employment, can probably be explained almost entirely by broad trends in the regional economy. The impact of Lake Traverse on income in the two counties seems to have been very minor.

# 3 FACTORS AFFECTING RESOURCE DEVELOPMENT

Figure 6: MEDIAN FAMILY INCOME FOR TRAVERSE CTY., MN AND ROBERTS CTY., S.D.

|                               | <u>1949</u> | <u>1959</u> | <u>1969</u> |
|-------------------------------|-------------|-------------|-------------|
| Traverse County-Median Income | \$2528      | \$3449      | \$6858      |
| -% of State Average           | 79.9%       | 69.9%       | 69.1%       |
| Roberts County-Median Income  | \$1953      | \$2957      | \$5360      |
| -% of State Average           | 61.7%       | 53.1%       | 56.7%       |

Source: U.S. Bureau of the Census

3.28 Recreation at Lake Traverse - The current condition of water quality at Lake Traverse severely limits development and use of recreational resources. The deteriorating water quality also has a number of impacts on the social well-being of three different groups of people in the study area.

3.29 The first of these groups is the private resort owners, bait shop operators, and other people who rely - at least in part - on the recreational use of the reservoir for their livelihood. These people originally invested in recreation services on what were, at the time, prudent grounds. Now, however, continuing degradation of the sport fishery and the deteriorating water quality of the reservoir adversely affect this group's ability to maintain sufficient economic return on their investment. It should be noted that while many groups of people in the area (e.g., farmers, the city of Wheaton) contribute to the degradation of water quality at Lake Traverse, the resort owners, bait shop owners, etc., bear an unequal proportion of the adverse economic effects.

3.30 The second group being adversely affected is people in the area who have used and would like to continue to use the reservoir for recreation. Due to the present water quality conditions, however, these people are left with two choices: 1) forego quality recreation, or 2) travel to other areas for their recreation. When some prospective recreationists perceive the inconvenience of travelling elsewhere as outweighing their desire to recreate, a loss in total area recreation will result. Those people willing to travel elsewhere will have to spend extra time and money for recreation of similar quality.

3.31 The third group being adversely affected is people living near the reservoir. The water quality at Lake Traverse sometimes causes a foul odor. Besides being extremely unpleasant for these residents, this odor may affect the property value of their homes.

# 3

## FACTORS AFFECTING RESOURCE DEVELOPMENT

---

3.32 Resolution of the water quality problem at Lake Traverse would be of tangible, quantifiable benefit to these three groups of people. As the Corps does not have control over all the contributing factors, such as sewage wastes in the Mustinka River and agricultural runoff, resolving the problem would require a cooperative effort among Federal, State, and local agencies, and area residents. In the meantime, development of a master plan for recreation can only be done on a short-term, small-scale basis.

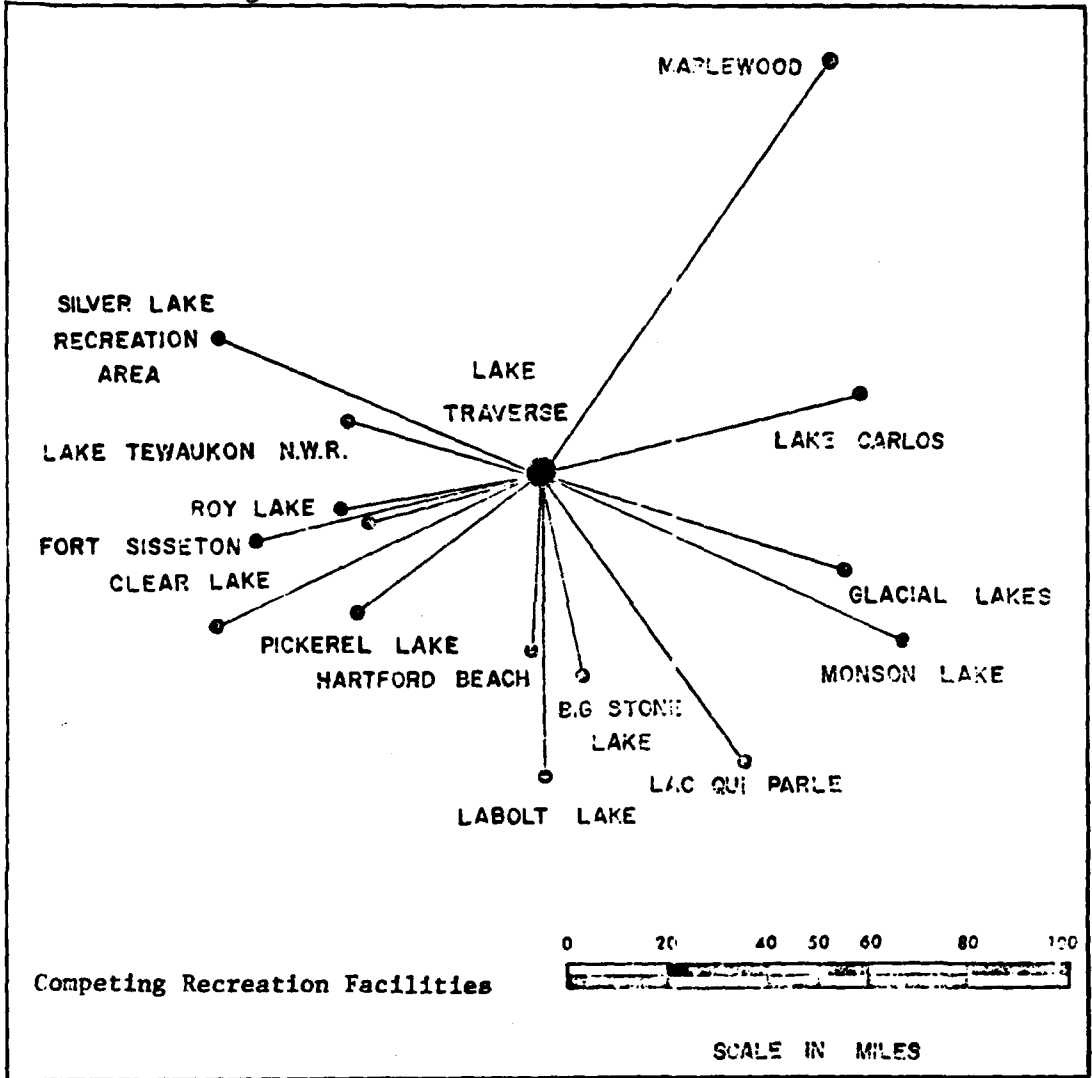
3.33 Competing Recreation - Numerous competing recreation facilities exist within the project study area (see figure 7). The closest, consisting of private resorts and county facilities, are located on Lake Traverse. Traverse County, Minnesota, operates a county park of 10 to 15 acres. Facilities include three picnic shelters, numerous picnic tables, an unimproved boat ramp, and sanitary facilities in need of replacement. The recreation potential of the park is high due to its location on high ground, convenient access from Highway 27, convenient access to the lake, and the wooded nature of the site. Other competing recreation areas on Lake Traverse include a boat access point in Traverse County, consisting of a concrete boat ramp and no other facilities; a boat access point in Roberts County, South Dakota, consisting of an unimproved boat ramp and no other facilities; and several private resorts in Minnesota and South Dakota, consisting of boat ramps, campsites, and resort cottages.

3.34 The majority of the remaining competing recreation is to the east within Minnesota Planning Region 4. The region is a major recreation area which provides waterbased recreation consisting of camping, boating, fishing, picnicking and swimming. Developed recreation areas include Big Stone Lake State Park, Lac Qui Parle Park, Monson Lake State Park, Glacial Lakes State Park, and numerous private resorts.<sup>13</sup> To the west in South Dakota and North Dakota, competing recreation areas include Pickerel State Park, South Dakota; Clear Lake State Park, South Dakota; Roy Lake State Park, South Dakota; Labolt Lake Recreation Area, South Dakota;<sup>14</sup> Lake Tewaukon National Wildlife Refuge, North Dakota; and Silver Lake Recreation Area, North Dakota.<sup>15</sup>

3.35 Private and county recreation areas located on Lake Traverse have the greatest influence upon recreation use and development at Corps facilities on the lake. The present scope of Corps recreation facilities seems to be appropriate in relationship to competing recreation areas.

# 3 FACTORS AFFECTING RESOURCE DEVELOPMENT

Figure 7 Competing Recreation Facilities



# 4

## SITE DESCRIPTION AND EVALUATION

### 4.0 SITE DESCRIPTION AND EVALUATION

4.1 General - The intent of this section is to identify alterations in the natural resource and to evaluate their effects on resource use, character and quality. To accomplish this, the site is evaluated through a developed set of criteria which include:

- a. the relationship of pedestrian circulation to use areas.
- b. the relationship of vehicular circulation to use areas.
- c. the functional relationship between use areas.
- d. vehicular access to the site.
- e. site aesthetics and character of natural elements such as vegetation and topography.

4.2 The facilities and character of each of the three public use areas at Lake Traverse-Mud Lake are similar. The land character of each of the three sites varies slightly but it is predominantly floodplain in nature. The sites are low, bordered by marsh or open water, and lack substantial vegetation (except Brown's Valley Dike Recreation Area). Their potential for future development is restricted, by the size and nature of the sites and their surroundings.

4.3 Facilities consist of restrooms, parking, picnic areas, and bank fishing improvements. The existing facilities seem adequate and are compatible with land constraints. The following are detailed descriptions and critiques of the individual public use areas (see plate 3).

4.4 White Rock Dam Recreation Area - This recreation area is surrounded by valuable Corps wildlife lands which are currently being managed for wildlife. Because this site is best suited for this use, the recreation facility at White Rock Dam has the least potential for expansion of the 3 Corps recreation areas. It is an area of approximately

# 4

## SITE DESCRIPTION AND EVALUATION

---

3 acres created by fill and bordered by Minneosta State Highway 236, the Bois de Sioux River, and Big Slough, which empties into the Bois de Sioux River. At present, there is very little dry suitable area remaining in which to expand facilities. Future expansion would require significant amounts of fill and associated stabilization practices.



White Rock Dam Recreation Area

4.5 There is a balanced relationship between parking space and activity space, preventing overuse of the resource. There is parking for approximately 20 cars but the parking lot is a dead end, creating potential circulation problems. Entrance to the parking area is down a steep incline from Minnesota State Highway 236. Sight distance when leaving the site is somewhat obstructed due to the incline - a potentially hazardous situation. There is a lack of vegetation and other elements of visual interest at the site. Facilities consist of restrooms, a picnic area, a bank fishing area, a playground, water supply, and access to hunting areas (see plate 3).

# 4

## SITE DESCRIPTION AND EVALUATION

---

4.6 Reservation Highway Recreation Area - The Reservation Highway Recreation Area is an area of approximately 3 acres located next to the control structure which forms the main conservation reservoir of Lake Traverse. It is an area of high visual interest. Bordered by open water and marsh, the recreation area has a wide view of the surrounding bluffs.



Reservation Highway Recreation Area

4.7 In recent years, a portion of this area has been filled to accommodate a local State Highway job. As a result of this filling some additional dry lands are now available for recreation endeavors. On peak use weekends fishermen use this area beyond its design capacity which has led to parking cars and trailers along the highway. This is a very hazardous situation. Circulation within the parking area is poor. The lot is a dead end, creating problems when the recreation area receives maximum use. Limited sight distance while exiting creates another potentially hazardous situation. Existing facilities lack a water supply.

# 4

## SITE DESCRIPTION AND EVALUATION

4.8 Facilities at the recreation area consist of restrooms, a picnic area, bank fishing, parking space for 16 cars, and playground equipment. If overuse can be controlled, Reservation Highway Recreation Area will remain a viable recreation area.

4.9 Browns Valley Dike Recreation Area - Of the three Corps recreation areas on Lake Traverse, Browns Valley Dike Recreation Area has the greatest potential for expansion. The dike area paralleling the wooded shoreline provides opportunity for expansion of parking and day-use facilities. Enhanced by the bluffs and marsh, views from Browns Valley Dike down Lake Traverse provide an additional recreation resource.

4.10 This area is currently used by many bank fishermen. On peak use weekends, fishermen use this area beyond its design capacity which results in the parking of many cars and trailers along the adjacent highway. This is a potential safety hazard. If potential use areas paralleling the dike are not developed, crowding and deterioration of existing resources will occur. The present parking lot accommodates 15 cars and is a dead end design. Limited sight distance while exiting and the dead end feature of the parking lot can create circulation problems. A water supply system is lacking and existing sanitary facilities are minimal (see plates 3 and 4 for facilities information).

4.11 Potential Recreation Areas - Potential recreation areas adjacent to Lake Traverse are few in number and generally low in recreation potential. On Corps-administered lands, an area of approximately 3 acres has development potential as a day-use recreation area. Located on the west bank of the Mustinka River and adjacent to Minnesota Highway 117 (see plate 3), the site is low, subject to flooding, and would require fill to develop recreation facilities. The partially wooded character of the site, its location on the Mustinka River, the fair to good fishing on the river (when water levels are adequate), and the site's accessibility from Highway 117 create an area with substantial day-use recreation potential.

---

# **5 RESOURCE USE OBJECTIVES**

---

## 5.0 RESOURCE USE OBJECTIVES

5.1 Resource use objectives are defined as "clearly written statements, specific to a given project, which specify the attainable, publicly acceptable options for resource use determined from study and analysis of resource capabilities and public needs."<sup>16</sup>

5.2 The following are resource use objectives for Lake Traverse-Mud Lake. They are based on resource capacity, identified problems, and the judgment of planners.

- a. To provide for wildlife management on Corps-administered lands which will enhance feeding and nesting habitat for waterfowl and general habitat for up-land wildlife.
- b. To provide balance between public use facilities, user demand and basic resource potential.
- c. To establish and maintain opportunities for high quality recreation while insuring the safety and health of the users, as well as accessibility by the handicapped.
- d. To manage Corps-administered land so as to minimize any further decrease in water quality and to cooperate fully in any interagency efforts to improve water quality.
- e. To interpret for the visiting public the significant historic, archaeological, and natural features and/or events in the Lake Traverse area.

# 6

## PROJECT VISITATION ESTIMATES

### 6.0 PROJECT VISITATION ESTIMATES

6.1 General - As generally recognized in recent years, there has been a dramatic increase in leisure time and demand for recreation resources and facilities. As a result, overcrowding of facilities is often a problem. The recreation areas on Lake Traverse are no exception. Because of the popularity of fishing, often picnic areas and parking lots are overcrowded. During 1975, recreation days of use (R.D.U.) at Corps areas at Lake Traverse totaled 89,700.<sup>17</sup> The breakdowns of attendance and the participation percentages of visitors in various activities are as follows:

White Rock Dam Recreation Area - 29,920 R.D.U.<sup>18</sup>  
Reservation Highway Recreation Area - 28,990 R.D.U.  
Brown's Valley Dike Recreation Area - 25,590 R.D.U.  
Mustinka Park (leased to Traverse County)-5,200 R.D.U.

Percentages of Visitor Activity in:

|             |            |         |            |
|-------------|------------|---------|------------|
| Picnicking  | 40 percent | Boating | 5 percent  |
| Swimming    | 5 percent  | Fishing | 65 percent |
| Sightseeing | 15 percent |         |            |

Due to the multiplicity of activities in which the average recreation visitor engages, the total activity use reported would be greater than 100 percent of the recreation days of use.<sup>19</sup>

6.2 Visitation Projections - To estimate future visitation at Lake Traverse, three assumptions were necessary. It was assumed that the zone of influence or market area was defined by a 50-mile radius around Lake Traverse, that 80 percent of the annual visitation at Lake Traverse originated from within this zone, and that improving the quality and/or quantity of facilities will not affect participation rates. The following is the procedure used to determine projected project visitation (see figure 8).

1. Determine annual visitation.

89,700 - taken from the 1975 Recreation Resource Management System (RRMS)

2. Determine percentages of visitor activity - taken from 1975 RRMS

# 5

---

## RESOURCE USE OBJECTIVES

---

### 5.0 RESOURCE USE OBJECTIVES

5.1 Resource use objectives are defined as "clearly written statements, specific to a given project, which specify the attainable, publicly acceptable options for resource use determined from study and analysis of resource capabilities and public needs."<sup>16</sup>

5.2 The following are resource use objectives for Lake Traverse-Mud Lake. They are based on resource capacity, identified problems, and the judgment of planners.

- a. To provide for wildlife management on Corps-administered lands which will enhance feeding and nesting habitat for waterfowl and general habitat for upland wildlife.
- b. To provide balance between public use facilities, user demand and basic resource potential.
- c. To establish and maintain opportunities for high quality recreation while insuring the safety and health of the users, as well as accessibility by the handicapped.
- d. To manage Corps-administered land so as to minimize any further decrease in water quality and to cooperate fully in any interagency efforts to improve water quality.
- e. To interpret for the visiting public the significant historic, archaeological, and natural features and/or events in the Lake Traverse area.

# 6

## PROJECT VISITATION ESTIMATES

|             |            |
|-------------|------------|
| Picnicking  | 40 percent |
| Swimming    | 5 percent  |
| Sightseeing | 15 percent |
| Boating     | 5 percent  |
| Fishing     | 65 percent |

No camping facilities are provided at the four recreation areas on a Corps-administered land. All of the visitor activity use is day-use recreation.

3. Define market area - 50-mile radius around Lake Traverse.

4. Assume 80 percent of annual activity use originates within the zone of influence.

5. Population projections for zone of influence. Base population was taken from OBERS series E population projections, State projections, and historic trends.

|               |
|---------------|
| 1970 - 84,800 |
| 1980 - 84,700 |
| 1990 - 83,100 |
| 2000 - 82,000 |
| 2010 - 81,200 |
| 2020 - 81,100 |
| 2030 - 81,100 |

6. From the RRMS it was estimated that:

100 percent of recreation activity is day use  
100 percent of visitation = 89,700

7. Determine visitation originating within the zone of influence.

80 percent of visitation originates within the zone of influence  
day use visitation from within the zone of influence = 71,760

8. Calculate per capita day use.

# 6

## PROJECT VISITATION ESTIMATES

$$\text{per capita day use} = \frac{\text{day use } 71,760}{1970 \text{ population } 84,810} = .846$$

within zone of influence

9. The per capita use rate must be adjusted to reflect projected activity use increases. It is an average of the projected increases (1973-1990) of the three States within the zone of influence.

|            | <u>N.D.</u> <sup>20</sup> | <u>S.D.</u> <sup>21</sup> | <u>MINN.</u> <sup>22</sup> | <u>Average</u>                   |
|------------|---------------------------|---------------------------|----------------------------|----------------------------------|
| picnicking | 6%                        | 10%                       | 5%                         | 7%                               |
| fishing    | 2.5%                      | 7%                        | 2.5%                       | 4%                               |
| swimming   | 10%                       | 10%                       | 10%                        | 10%                              |
| boating    | 11%                       | 20%                       | 7%                         | 13%                              |
|            |                           |                           |                            | 8.5% day use<br>average increase |

$$\begin{aligned} \text{Increase in per capita day use} &= 8.5 \text{ percent} \\ \text{Adjusted per capita day use} &= .917 \end{aligned}$$

10. Determine future visitation within zone of influence

future visitation within zone of influence = adjusted per capita use x future population within zone of influence

### Future Day Use Visitation<sup>23</sup> Within the Zone of Influence

|      |        |
|------|--------|
| 1980 | 77,700 |
| 1990 | 76,200 |
| 2000 | 75,200 |
| 2010 | 74,500 |
| 2020 | 74,400 |
| 2030 | 74,400 |

# 6

## PROJECT VISITATION ESTIMATES

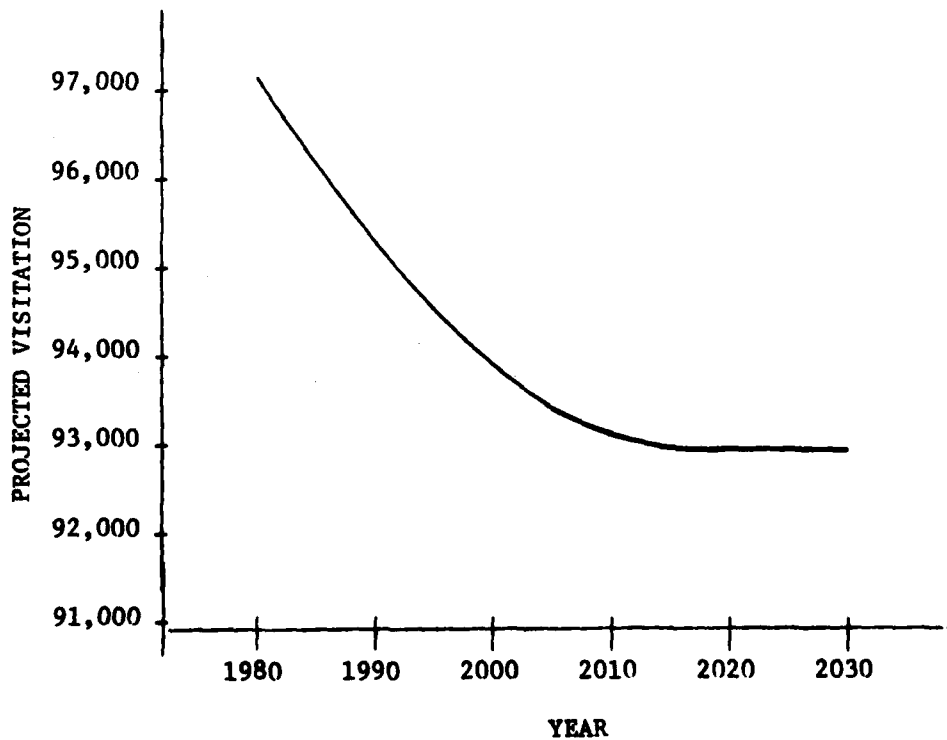
11. Adjust to reflect total future visitation

total visitation = visitation from both within and outside of the zone of influence

|      | 80%    | + | 20%    | = | total(100 %) |
|------|--------|---|--------|---|--------------|
| 1980 | 77,700 |   | 19,400 |   | 97,100       |
| 1990 | 76,200 |   | 19,000 |   | 95,200       |
| 2000 | 75,200 |   | 18,800 |   | 94,000       |
| 2010 | 74,500 |   | 18,600 |   | 93,100       |
| 2020 | 74,400 |   | 18,600 |   | 93,000       |
| 2030 | 74,400 |   | 18,600 |   | 93,000       |

Figure 8

Projected Visitation 1980-2030



# 6

## PROJECT VISITATION ESTIMATES

6.3 Conclusions - As previously stated, the trend in visitation at recreation sites on Lake Traverse has been generally upward in recent years. However, due to two major factors, recreation activity at Lake Traverse dramatically declined in 1976 and 1977.<sup>24</sup> Severe drought conditions and deteriorating water quality combined to significantly affect recreation resources. Combined with trends identified by the projected visitation curve (a decline in visitation after 1980, see figure 8), these factors indicate no need for expansion of recreation facilities. Limited modification of facilities is necessary for the health and safety of users and will be discussed in Section 7.



# 7

## REVISED DEVELOPMENT PLAN

### 7.0 REVISED RECREATION DEVELOPMENT PLAN

7.1 General - Construction of the Lake Traverse project was completed in late 1941. No design memorandum for recreation development was prepared. As a result, there is a lack of documented information pertaining to existing conditions at the time of construction and no development plan to structure future expansion.

7.2 Assumptions - The Corps of Engineers will be responsible for operation and maintenance of areas presently under its jurisdiction. Due to the projected increase in visitation for the next few years and for better efficiency in usability and management, some modification of recreation facilities is necessary.

7.3 Site Development - The following concepts are recommended for future development of the three public use areas at Lake Traverse.

7.4 White Rock Dam - Modification of facilities at White Rock Dam will be confined to the provision of replacement restroom facilities, the provision of facilities for the handicapped, and the signing of the potentially hazardous entrance to warn visitors of the safety problem.

7.5 Three types of waste disposal systems were considered when choosing restroom design; water-borne sewerage system, septic system, and vault-type. Because they require connection to an approved sewage disposal system, water-borne facilities are impracticable at Lake Traverse where the public use areas lack potential connection to a sewage disposal system. Septic systems require approximately 6 to 8 feet of vertical distance above the water table. The topographic character of the public use areas makes this alternative impractical. Vault-type restrooms, due to the flexibility inherent in the waste disposal system, appear to be the solution (see figures 9 and 10). Vault-type restrooms require only 2- to 4-foot elevation above annual

---

# 7 REVISED DEVELOPMENT PLAN

---

flood stage and do not require constant water supply or consideration of water table fluctuations.



Picnic Area at  
White Rock Dam Recreation Area

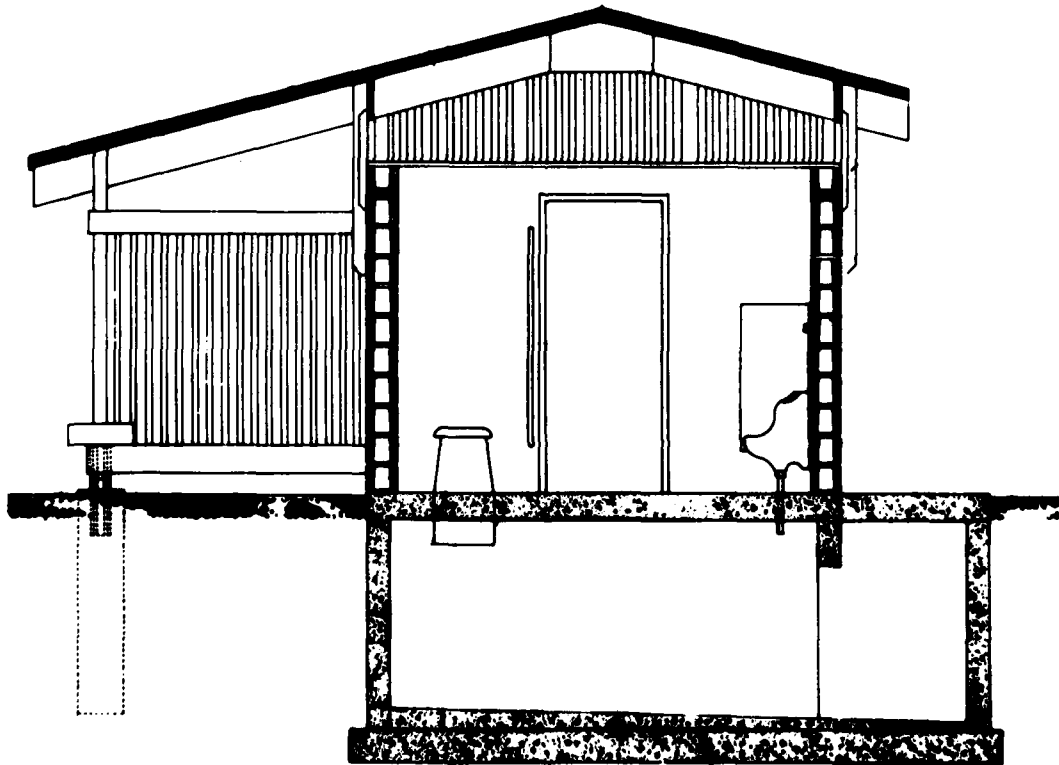
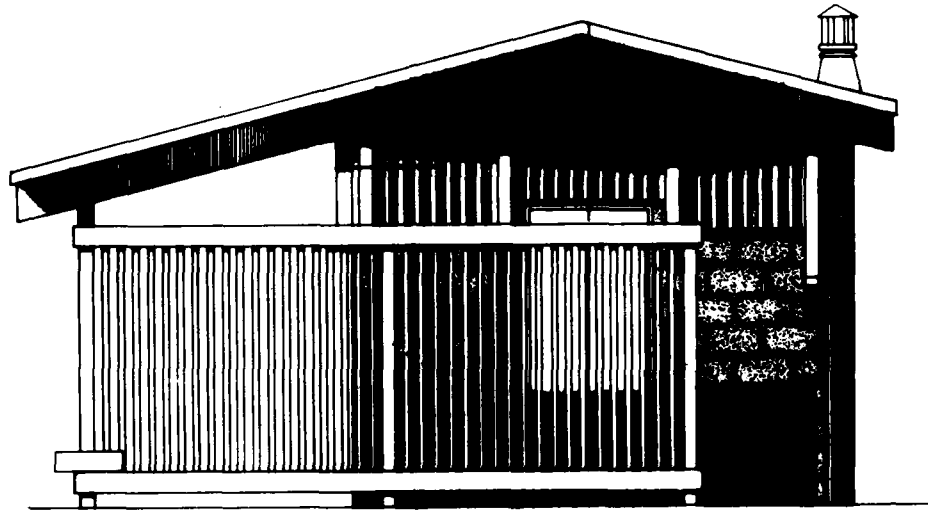
7.6 Facilities for the handicapped will consist of surfaced pathways and ramps to facilitate movement between use areas. (See "Barrier Free Site Design" - Department of Housing and Urban Development, for details and specifications.) Restroom facilities will also be designed so as to be accessible to the handicapped.

7.7 Functional landscaping of the site will be implemented to provide visual screens, shade, windbreaks, and improved wildlife habitat.

# 7 REVISED DEVELOPMENT PLAN

Figure 9

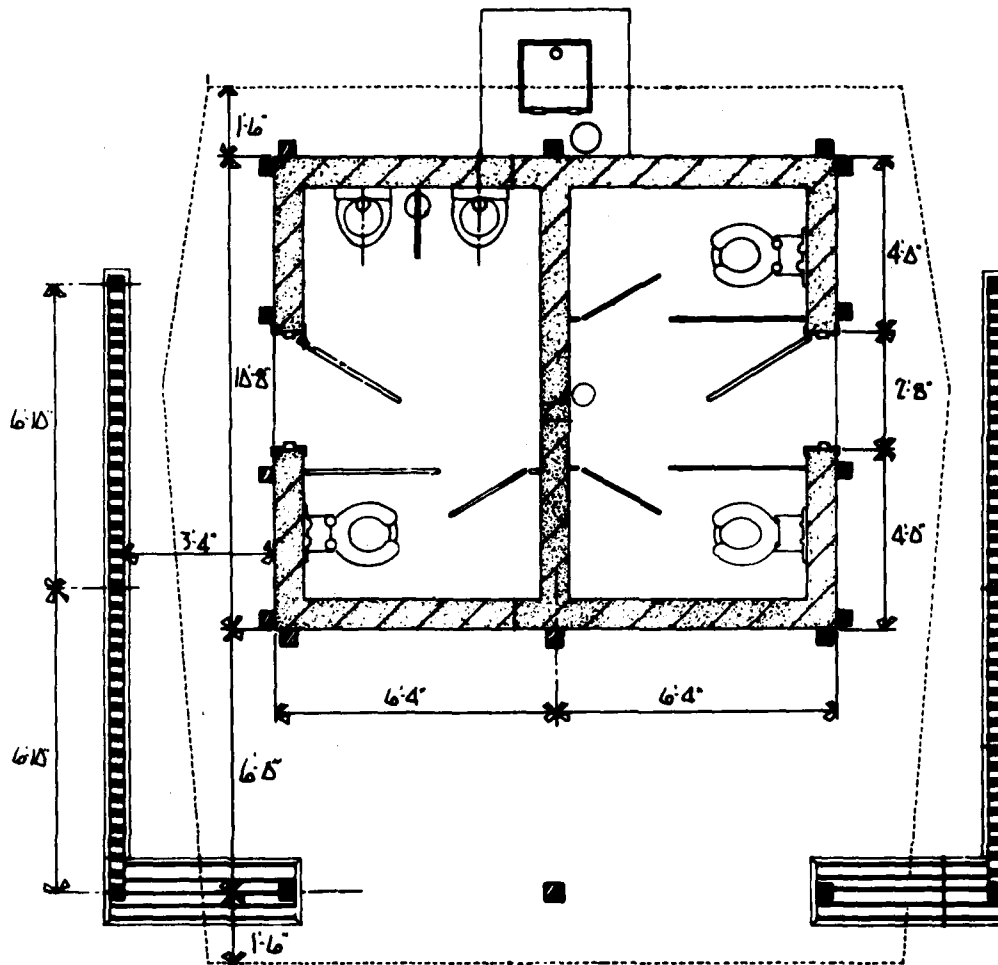
Proposed Restroom Elevations



# 7 REVISED DEVELOPMENT PLAN

Figure 10

Proposed Restroom  
Plan View



\*NOTE: This facility will be designed in such a manner so as to facilitate use by handicapped persons.

# 7

## REVISED DEVELOPMENT PLAN

---

7.8 Reservation Highway - Recommendations for the Reservation Highway site include the following:

1. parking expansion (see plate 4) to minimize parking along the highway.
2. installation of a containerized water supply system (see figure 11).
3. bank fishing facilities for the handicapped (see plate 4).
4. installation of warning signs at the entrance to the parking lot for visitors safety.
5. installation of replacement restroom facilities (see figures 9 and 10).

7.9 Proposed parking expansion will double the capacity of the existing parking lot and improve circulation. The parking lot will remain surfaced with gravel. The water supply system will be a closed system consisting of storage tanks filled with drinking water. Bank fishing facilities will consist of a platform designed to accommodate the handicapped. The platform will be incorporated in the reconstruction of bank riprap below the Reservation Highway control structure. Restroom facilities will be vault-type. Trees will be planted to delineate use areas and provide shade, and to improve the visual character of the site.

7.10 Browns Valley Dike - Modification of facilities at Browns Valley Dike will include picnic area and parking expansion, installation of a water supply system, installation of permanent vault-type restroom facilities, bank fishing platforms to aid the handicapped, and a boardwalk access to the picnic area and playground equipment. The boardwalk leading to the picnic area will be a floating type to eliminate fills. The parking lot will remain surfaced with gravel. The water supply system will be a closed system consisting of storage tanks filled with drinking water.

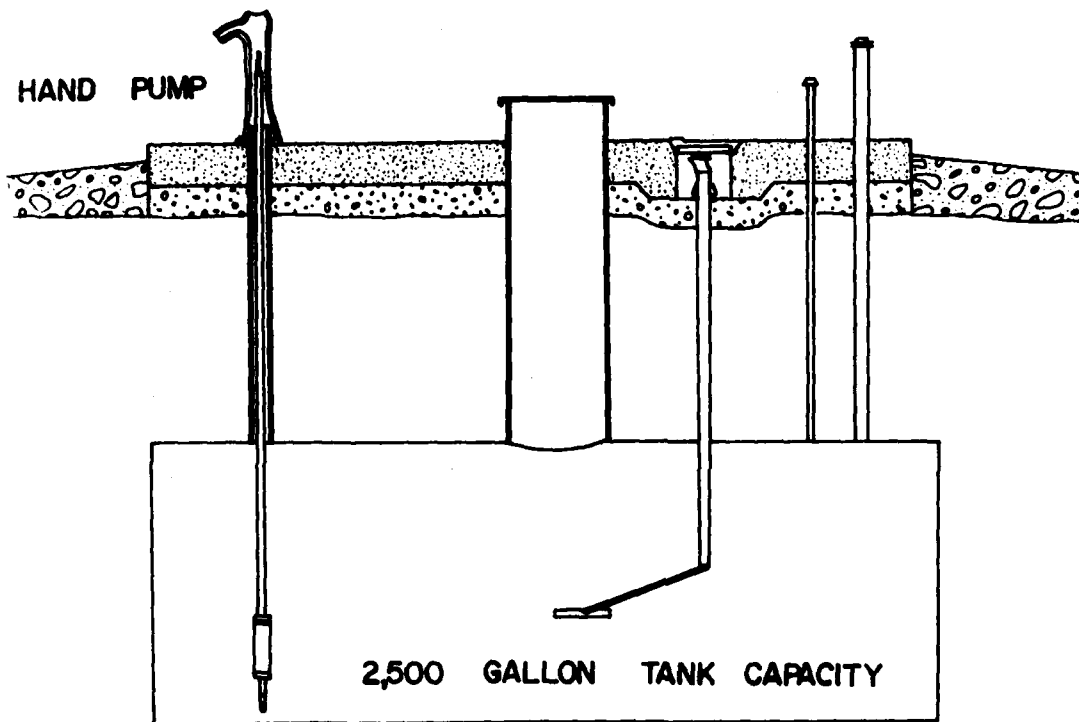
7.11 Functional landscaping of the site will be implemented to provide visual screens, shade, windbreaks, and improved wildlife habitat.

# 7

## REVISED DEVELOPMENT PLAN

Figure 11

Water Supply System  
Elevation

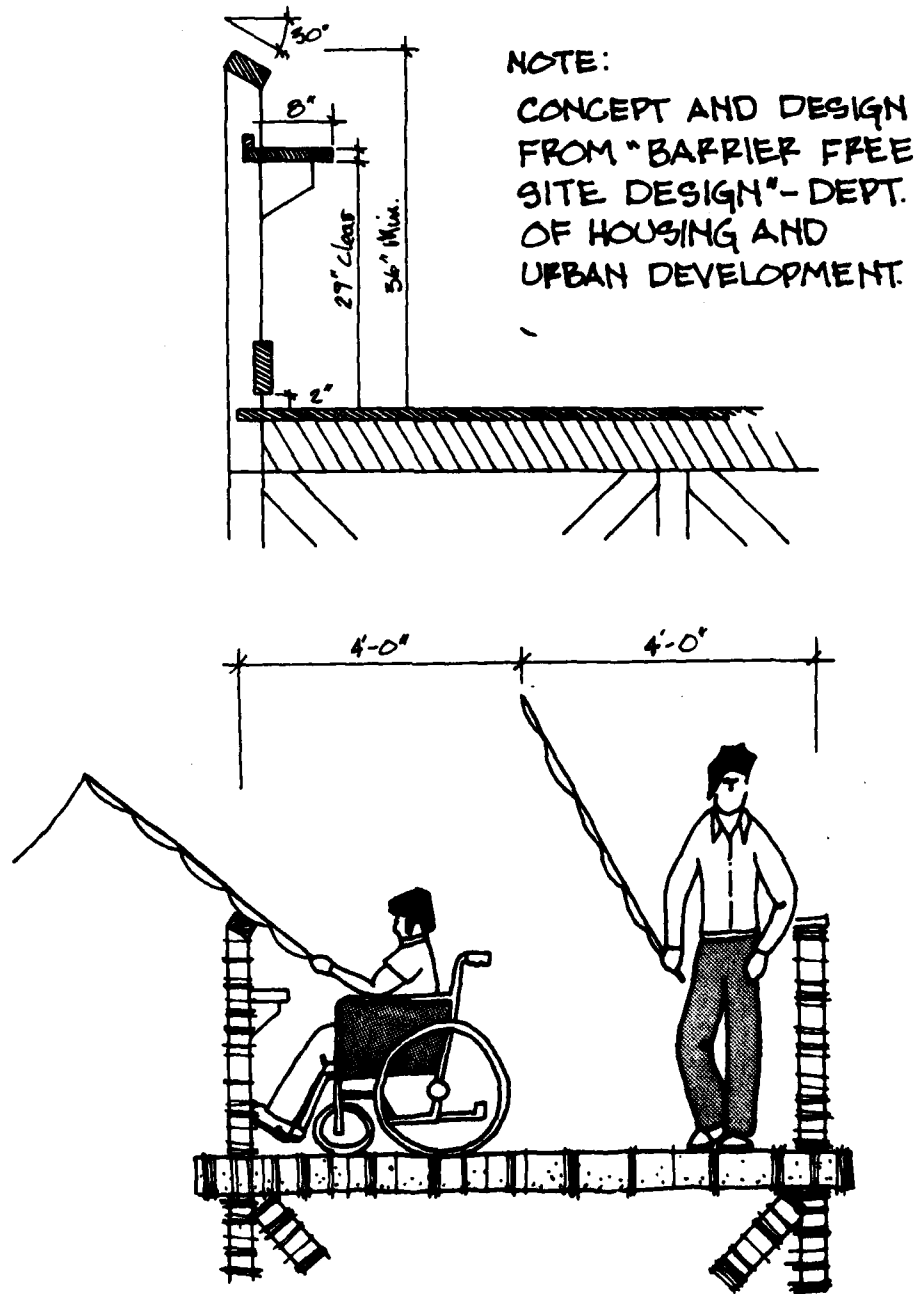


# 7

## REVISED DEVELOPMENT PLAN

Figure 12

Fishing Platform



# 7

## REVISED DEVELOPMENT PLAN

---

7.12 Land Use Allocation - Nine land use allocation categories are described in ER 1120-2-400. Only four of these categories apply to the public lands managed by the Corps at Lake Traverse. The applicable categories are described in the following paragraphs taken from ER 1120-2-400.

7.13 Project Operations. Lands acquired and allocated to provide for safe, efficient operation of the project for those authorized purposes other than recreation and fish and wildlife. In all cases, this will include, but not be limited to, the land on which project operational structures are located. Lands on navigation projects which are required for industrial and public port terminals will be included in this allocation. Agricultural use of these lands will be permitted on an interim basis when not in conflict with use for authorized purposes, recreation use, or wildlife habitat.

7.14 Operations: Recreation--Intensive Use. Lands acquired for project operations and allocated for use as developed public use areas for intensive recreational activities by the visiting public, including areas for concession and quasi-public development. No agricultural uses are permitted on these lands except on an interim basis for terrain adaptable for maintenance of open space and/or scenic values.

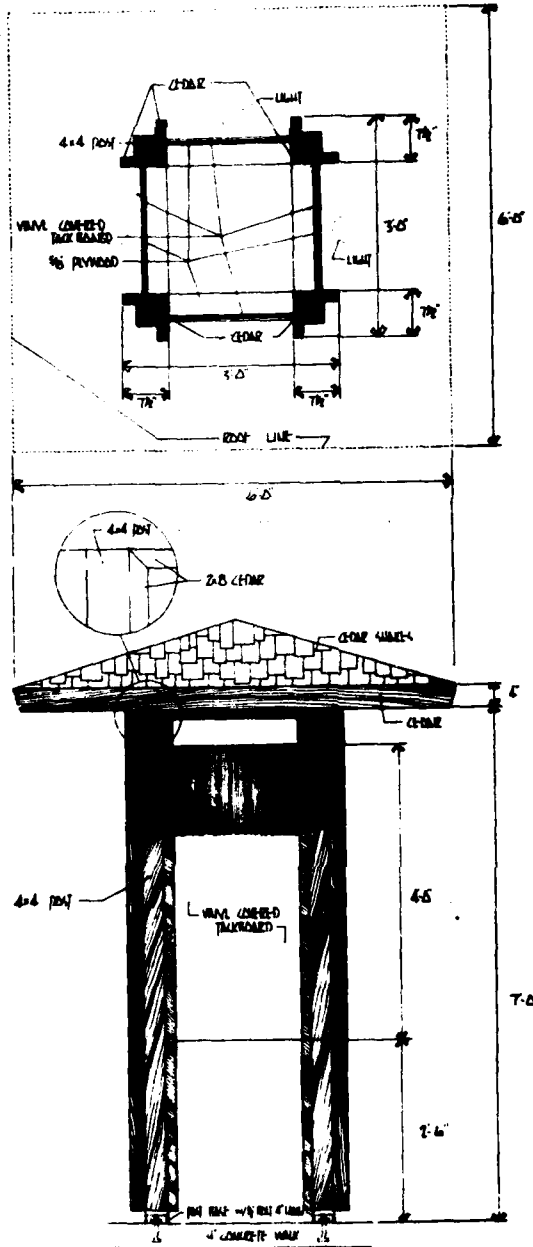
7.15 Operations: Recreation--Low Density Use. Lands acquired for project operations and allocated for low density recreation activities by the visiting public as required as open space between intensive recreational developments or between an intensive recreational development and land which, by virtue of use, is incompatible with the recreational development and would detract from the quality of public use. Such incompatible land may be located either on the project or adjacent to the project. Land required for ecological workshops and forums, hiking trails, primitive camping, or similar low density recreational use available for a significant role in shaping public understanding of the environment will be under this allocation. No agricultural uses are permitted on this land except on an interim basis for terrain adaptable for maintenance of open space and/or scenic values.

7.16 Operations: Wildlife Management. Lands acquired for project operations and allocated as habitat for fish and wildlife or for propagation of such species. Such lands should be continuously available for low density recreational activities. Grazing leasing on such lands is done on a temporary short-term basis and should be terminated as better wildlife management programs are implemented.

# 7 REVISED DEVELOPMENT PLAN

Figure 13

CULTURAL DISPLAY  
PLAN VIEW



# 7

## REVISED DEVELOPMENT PLAN

---

7.17 Plate 2 illustrates the land use allocations for lands administered by the Corps at the Lake Traverse project.

7.18 Water Quality - In an effort to improve the water quality, Corps-administered lands would be managed to eliminate farming to the lake's edge. A buffer zone of vegetation adjacent to the lake would be created to improve wildlife habitat and help eliminate runoff containing nutrients. Access by livestock from Corps-administered lands to Lake Traverse, Mud Lake, Bois de Sioux River, and their tributaries would be eliminated.

7.19 Cultural Resources - A structure similar to the one in figure 13 would be located at one of the three recreation areas. The display panels will describe the significant archaeological, historic, and geologic events of the Lake Traverse area. (See paragraphs 2.1-2.7 and 3.10-3.15.) A car tour route with a pamphlet can be developed to describe points of interest such as burial mounds, the Ancient River Warren Channel, and settlement sites located in the Lake Traverse area.

7.20 Wildlife Management - The Corps-administered lands delineated "Operations: Wildlife Management" on Plate 2 will be managed to provide wildlife habitat. Tracts D and F (see plate 1) are presently leased to the Minnesota Department of Natural Resources (DNR) for wildlife management purposes. Tracts A, B, C, and E (see plate 1) are leased to private individuals for agriculture and grazing and the remainder of the land is managed by the Corps. As the agricultural and grazing leases expire on tracts A, B, C, and E, wildlife management measures will be initiated. As a whole, these areas do not have potential as a refuge (closed area); therefore, they will afford public access. The boundaries of the affected land will be delineated and all livestock grazing will be eliminated. This would improve the upland nesting cover sites for waterfowl and other ground-nesting birds such as pheasants.

---

# **7 REVISED DEVELOPMENT PLAN**

---

7.21 Tract A will be managed as cover habitat interspersed with food plots, to provide winter food and cover for deer and pheasants. This is important because in most winters food and cover are critical. Some of the low sites on Tracts B, C and E will be improved for waterfowl and aquatic furbearers by the construction of shallow wildlife dugouts. These dugouts will complement the larger water areas in the vicinity by providing additional satellite water areas important to nesting ducks.

7.22 These general recommendations provide guidelines for management of the lands delineated "Operations: Wildlife Management." More specific recommendations will be included in appendix D, Fish and Wildlife Management, to be completed in 1980.

# 8

## PUBLIC INVOLVEMENT AND COORDINATION

---

### 8.0 PUBLIC INVOLVEMENT AND COORDINATION

8.1 The master planning effort recognizes the needs and desires of those persons or agencies associated with or affected by the Corps facilities. Coordination and communication with these parties is an integral part of all master plans.

8.2 On 9 March 1978, a public workshop was held in Wheaton, Minnesota, with the public and interested agencies to present information on the existing conditions of the public use areas and to receive comments on resource management guidelines. The letter of invitation to the workshop and comments recorded are found in exhibits 2 and 3.

8.3 One of the major concerns expressed at the public workshop was the possibility of installing a fish screen at the Reservation Dam control structure. A letter responding to this issue was sent to all who attended the public workshop (exhibit 4).

8.4 The Federal, State, and local agencies listed in exhibit 5 will be provided a copy of the draft master plan for their review and comment.

# 9

## PLAN IMPLEMENTATION

### 9.0 PLAN IMPLEMENTATION

9.1 General - All facilities at existing areas are to be operated and managed by the Corps of Engineers. Development of proposed facilities will be in accordance with the priorities discussed below.

9.2 Development Schedule - Development priorities are based on perceived needs, availability of funds, coordination with the resource manager, and judgment of planners.

#### Development Priorities:

1. Water supply at Reservation Highway and Brown's Valley Dike.
2. Replacement of restroom facilities and functional landscaping at Browns Valley Dike, Reservation Highway, and White Rock Dam.
3. Facilities for the handicapped, including walkways, ramps, and fishing platforms at Brown's Valley Dike and Reservation Highway, and White Rock Dam.
4. Parking expansion at Reservation Highway and Browns Valley Dike.
5. Display structure to describe cultural and other resources.
6. Implementation of wildlife management on Corps lands currently leased for cultivation and grazing.

9.3 Cost Estimate - Facility Development - The following are cost estimates for facility development. Prices are based on May 1978 price levels.

#### Summary Cost Estimates:

| <u>Site</u>         | <u>Cost</u> |
|---------------------|-------------|
| Brown's Valley Dike | \$47,000    |
| Reservation Highway | \$50,000    |
| White Rock Dam      | \$29,800    |
| Cultural Display    | \$ 1,200    |
| TOTAL               | \$128,000   |

---

# 10 ADMINISTRATION AND MANAGEMENT

---

## 10.0 ADMINISTRATION AND MANAGEMENT

10.1 Project management practices will be consistent with the established resource use objectives discussed in section 5. Efforts will be made to provide complete recreational, educational, and interpretive opportunities where their implementation is feasible. All resource management policies will be continually evaluated to assess their effectiveness.

10.2 Appendix A, Project Resource Management Plan, contains detailed policies and practices regarding the administration, operation, and maintenance of project resources. Appendix C, Fire Protection Plan, describes the organization and training of personnel for fire prevention and suppression techniques. Procedures for the fire fighting and coordination with other fire fighting agencies are also discussed. Appendix E, Project Safety Plan, defines programs and guidelines relative to employee and visitor safety together with procedures to follow in the event of accidents. Appendixes A, C, and E have been prepared and approved. They will be updated in 1982.

10.3 Forestry resources on project lands include grasslands as well as woodlands. Woodlands comprise approximately 10 percent of project lands and are almost entirely included in a tract of land leased to the Minnesota DNR for wildlife habitat management. The majority of project grasslands are leased to local residents for grazing purposes on an interim basis. Appendix B, Forestry Management, will be prepared in 1980 and will include a grassland management plan.

10.4 Appendix D, Fish and Wildlife Management, will be completed in 1980. Project lands in Minnesota suitable for fish and wildlife management are presently under lease to the Minnesota DNR for purposes of wildlife habitat management. In South Dakota, some project lands which are leased for grazing have potential for wildlife habitat improvement. These leased lands will be discussed in the Fish and Wildlife Management Plan.

10.5 Presently the States of Minnesota and South Dakota cooperate in a fisheries management program, including rough fish removal, monitoring of lake oxygen levels, winter rescue operations, and stocking of walleye, northern pike, and crappie. 25

---

# 10 ADMINISTRATION AND MANAGEMENT

---

10.6 Management policies are directed toward providing the public with a safe, more enjoyable, and diverse experience while maintaining the integrity of the resource. The consistent design elements and the area reorganizations discussed in this plan will reduce many of the operational tasks now performed. Personnel can then be better utilized in the areas of resource management and protection and in visitor-related activities.



C

---

# II CONCLUSIONS

---

## 11.0 CONCLUSIONS

11.1 The following are conclusions developed through analysis and investigation of information gathered to prepare the Master Plan for Public Use Development and Resource Management at Lake Traverse.

11.2 Project visitation estimates for Lake Traverse indicate that public use will peak in 1980 and then begin to decline within the next few years (see figure 8). Because visitation increases appear to be short term, present project land area should be sufficient to accommodate increased recreation use. However, limited modification of public use facilities is necessary. Replacement of, and minor additions to, existing facilities will improve the overall quality of public use areas while avoiding expansion that encourages overuse. Installation of water supply systems and replacement, vault-type restroom facilities are high priorities for the existing public use areas.

11.3 Due to the loss of wildlife habitat, pressure upon the remaining wildlife habitat at Lake Traverse has increased. To ease pressure and restore habitat, it will be necessary to increase the activities and land in wildlife management programs. Regulating water levels in Mud Lake to increase aquatic and shoreline vegetation may provide additional feeding and nesting resources for waterfowl. Creation of a buffer of vegetation on Corps administered lands along the lake edge may begin development of natural biotic communities creating valuable wildlife habitat. With the support of the Minnesota Department of Natural Resources, the South Dakota Department of Wildlife Parks, and Forestry, and the Corps of Engineers, a program of this nature could be extended to private land. The visual character of the lake would be improved, wildlife habitat increased, recreational opportunity created and improved, and property values increased.

---

# II CONCLUSIONS

---

11.4 In an effort to improve water quality at Lake Traverse this document recommends that the Corps eliminate grazing and/or farming to the lake's edge and that establishment of a vegetative buffer be initiated along the shoreline to stabilize the banks and capture nutrients from runoff. The Corps recently began a program to actively monitor the water quality at Lake Traverse in an effort to understand the natural physical and chemical characteristics of the lake. It is hoped that information gathered from this program will result in implementation of improvement in the Lake's recreation potential and fishery production through improved water quality.

Water quality is currently the most serious problem at Lake Traverse. Without proper measures to correct the problem, water quality and the lake environment will continue to deteriorate. Recreation activity will continue to decrease and social well-being will be adversely affected. This report proposes an on-going program to find ways to improve water quality at Lake Traverse. Cooperation from Federal, State, and local agencies and area residents is a necessity if water quality at Lake Traverse is to be improved.

---

# 12 RECOMMENDATIONS

---

## 12.0 RECOMMENDATIONS

12.1 It is recommended that this Master Plan for Public Use Development and Resource Management be approved as the basis for development and management of both present and future recreation facilities at Lake Traverse. It is further recommended that the site plans and utility plans as presented in this report be approved as a basis for development of detailed construction drawings and specifications.



---

# FOOTNOTES

---

## FOOTNOTES

1. Department of the Army, Corps of Engineers, Annual Report Chief of Engineers on Civil Works Activities, Vol. II, 1972, page 27-15.
2. Center for Environmental Studies, Tri College University, Fargo, North Dakota. Environmental Assessment of Lake Traverse, 1975. Contract No. DACW37-74-C-0050, U.S. Army Corps of Engineers, St. Paul District, St. Paul, Minnesota.
3. Real Estate Section, U.S. Army Corps of Engineers, St. Paul District, St. Paul, Minnesota.
4. Center for Environmental Studies, Tri College University, Fargo, North Dakota. Op. Cit.
5. Ibid.
6. Ibid.
7. Larson, John, Minnesota DNR, Personal Communication.
8. Center for Environmental Studies, Tri College University, Fargo, North Dakota. Op. Cit.
9. Ibid.
10. Ibid.
11. Ibid.
12. Real Estate Section, U.S. Army Corps of Engineers, St. Paul District, St. Paul, Minnesota.
13. Bureau of Environmental Planning and Protection, Minnesota Department of Natural Resources, Minnesota State Comprehensive Outdoor Recreation Plan, 1975.
14. South Dakota Division of Parks and Recreation, South Dakota Comprehensive Outdoor Recreation Plan, 1975.
15. North Dakota Outdoor Recreation Agency. North Dakota State Comprehensive Outdoor Recreation Plan, 1975.

---

## FOOTNOTES

---

16. Engineer Circular 1105-2-65; Resource Use: Establishment of Objectives, paragraph 3a.
17. 1975 Recreation Resource Management System (RRMS)
18. R.D.U. - Recreation Days of Use, 1975 RRMS
19. Engineer Regulation 1130-2-114; Project Operation: Recreation Resource Management System, Appendix D, Page 2.
20. North Dakota State Outdoor Recreation Agency, North Dakota State Comprehensive Outdoor Recreation Plan, 1975.
21. South Dakota Division of Parks and Recreation, South Dakota State Comprehensive Outdoor Recreation Plan, 1975.
22. Minnesota Department of Natural Resources, Minnesota State Comprehensive Outdoor Recreation Plan, 1974.
23. Projections assume that participation rates over time will remain constant.
24. Kress, Glenn, Reservoir Operator, Lake Traverse, Army Corps of Engineers. Wheaton, Minnesota, Personal Communication, 1976.
25. Center for Environmental Studies Tri College University, Fargo, North Dakota. Op. cit.



---

# EXHIBITS

---

COPY

U.S. ARMY ENGINEER DISTRICT, ST. PAUL  
CORPS OF ENGINEERS  
1217 U.S. Post Office and Custom House  
St. Paul, Minnesota 55101

NSCED-B

21 June 1965

SUBJECT: Public-Use Facilities at White Rock and Reservation Highway  
Damsites, Lake Traverse, Minnesota

TO: Division Engineer  
U.S. Army Engineer Division, North Central  
Chicago, Ill. 60605

## 1. AUTHORITY

Public-use facilities at White Rock and Reservation Highway dam-sites are authorized by the general authority contained in EM 1130-2-302, dated 28 April 1959. The general location and the proposed developments are shown on plates 1 through 3.

## 2. PURPOSE

This proposal presents a plan for providing two public-use parking areas in the vicinity of Lake Traverse, one on the left bank of the Bois de Sioux River downstream of Minnesota Highway 236, and the other upstream of Minnesota Highway 117. The great use pressure in these areas and the safety hazard created by uncontrolled parking on the highway rights-of-way make provision of these facilities desirable prior to completion of the Lake Traverse master plan.

## 3. GENERAL PLAN

At the sites proposed for development the only parking areas available to the public are small undeveloped areas with very poor access, including limited space along the highway rights-of-way. The proposed master plan will provide for improving the existing sites but, in order to accommodate the ever-increasing demand for parking space, it is proposed to construct at this time parking areas adjacent to the highways as shown on plates 2 and 3. Since Construction, General funds (code 710-Recreation) will not be available until fiscal year 1968 or later, it is proposed to construct two 20-car parking areas including accesses from the highway, using Operation and Maintenance funds. Guard posts will be installed to limit parking to the parking areas only. At the Reservation Highway site a section of the parking area will also be used to store material and equipment used at the control structure. Further development of the public-use areas such as the provision of water, toilet, and picnic facilities will be included in the development proposed in the pending master plan.

---

# EXHIBITS

---

COPY

NCSEFD-B  
SUBJECT: Public-Use Facilities at White Rock and Reservation Highway  
Damsites, Lake Traverse, Minnesota

21 June 1965

#### 4. DESIGN

Specifications applicable to similar parking areas constructed earlier will be used. Plans in addition to those shown on plates 2 and 3 for the construction of the parking areas and entrances are not considered necessary for advertising. Since these facilities will be complete in themselves, there will be no duplication when the public-use areas are expanded.

#### 5. JUSTIFICATION

No monthly visitation counts have been made, but annual recreation reports show the estimated combined attendance at White Rock and Reservation Highway damsites to have increased from 16,000 in 1955 to 32,400 in 1964. Since the attendance at the two sites is estimated to be about equal, the attendance at each site can be expected to have increased from 8,000 in 1955 to 16,200 in 1964. Based on a recreation season of about 105 days and 4 persons per car the present estimated average number of cars per day at each site is 38. Considering the increase in population as well as the participation rates and the opportunity factors, the projected use can be expected to increase to about 45 cars per day by 1973. The above visitation indicates the advisability of providing adequate parking facilities as soon as possible to protect the health and welfare of visitors. However, since a maximum of about 20 cars is expected to be in each area at any one time, a parking area to accommodate 20 cars will be provided at each site until greater use warrants additional parking space.

#### 6. COST ESTIMATE

The estimated cost of the proposed parking areas is tabulated below.

| <u>Item</u>                               | <u>Unit</u> | <u>Quantity</u> | <u>Unit cost</u> | <u>Total cost</u> |
|---|-------------|-----------------|------------------|-------------------|
| <u>Parking area at White Rock damsite</u> |             |                 |                  |                   |
| Clearing and grubbing                     | Acre        | 0.2             | \$750.00         | \$150             |
| Entrance road, gravel, 12-foot wide       | LF          | 300             | 4.20             | 1,260             |
| Parking area, 20 cars                     | SY          | 670             | 3.00             | 2,010             |
| Guard posts                               | Each        | 110             | 8.00             | 880               |
| Contingencies, 15 percent                 |             |                 |                  | <u>650</u>        |
| Total construction cost                   |             |                 |                  | 4,950             |
| Engineering and design                    |             |                 |                  | 475               |
| Supervision and administration            |             |                 |                  | <u>475</u>        |
| Total White Rock damsite parking area     |             |                 |                  | 5,900             |

---

# EXHIBITS

---

COPY

NCSFD-B 21 June 1965  
SUBJECT: Public-Use Facilities at White Rock and Reservation Highway  
Damsites, Lake Traverse, Minnesota

| <u>Item</u>  | <u>Unit</u> | <u>Quantity</u> | <u>Unit cost</u> | <u>Total cost</u> |
|--|-------------|-----------------|------------------|-------------------|
| <u>Parking area at Reservation Highway damsite</u>   |             |                 |                  |                   |
| Clearing and grubbing                                | Acre        | 0.2             | \$750.00         | \$150             |
| Entrance road, gravel, 12-foot wide<br>with turnouts | LF          | 70              | 4.20             | 290               |
| Parking area, 20 cars                                | SY          | 1,110           | 3.00             | 3,330             |
| Guard posts  | Each        | 110             | 8.00             | 880               |
| Contingencies  |             |                 |                  | <u>700</u>        |
| Total construction cost                              |             |                 |                  | 5,350             |
| Engineering and design                               |             |                 |                  | 525               |
| Supervision and administration                       |             |                 |                  | <u>525</u>        |
| Total Reservation Highway damsite parking area       |             |                 |                  | 6,400             |
| Total parking areas                                  |             |                 |                  | 12,300            |

## 7. SCHEDULE FOR CONSTRUCTION

Operation and Maintenance funds are expected to be available to permit construction during the first quarter of fiscal year 1966. Construction is expected to be started in the beginning of the first quarter of fiscal year 1966 so that the parking areas will be available during a portion of the current recreation season as well as the 1965 hunting season.

## 8. RECOMMENDATIONS

Since use of the areas requires the public to park cars along the highway rights-of-way creating an unsafe and hazardous situation, construction of parking areas, including entrances, as early as possible using Operation and Maintenance funds is recommended.

3 Incl  
1. Pl 1  
2. Pl 2  
3. Pl 3

LESLIE B. HARDING  
Lt. Col., Corps of Engineers  
District Engineer

---

# EXHIBITS

---

COPY

NCDED-C (21 Jun 65-NCSED-B) 1st Ind  
SUBJECT: Public-Use Facilities at White Rock and Reservation Highway  
Damsites, Lake Traverse, Minnesota

DA, North Central Div, CofEngrs, Chicago, Illinois 7 March 1966

TO: Chief of Engineers, ATTN: ENGCW-0

1. Forwarded recommending approval.
2. The proposed parking areas are features of the Lake Traverse Master Plan now being prepared. Both parking areas are located in the immediate vicinity of principal project structures and it would not be appropriate to outgrant the sites to any other agency. The principal consideration is the matter of public safety.
3. It is now proposed to construct both parking areas in the fourth quarter, Fiscal Year 1966, with available Operation and Maintenance funds.

FOR THE DIVISION ENGINEER:

2 Incl  
nc

E.M. FRY  
Colonel, Corps of Engineers  
Deputy Division Engineer

Copy furnished:  
St. Paul District

---

# EXHIBITS

---

COPY

ENGW-OM (21 Jun 65) 2nd Ind  
SUBJECT: Public-Use Facilities at White Rock and Reservation Highway  
Damsites, Lake Traverse, Minnesota

DA, CofEngrs, Washington, D.C., 20315, 18 May 1966

TO: Division Engineer, North Central Division

The proposal to construct public parking areas at subject dam  
site areas is approved as recommended in the preceding 1st Indorsement.

FOR THE CHIEF OF ENGINEERS:

3 Incls  
w/d

WENDELL E. JOHNSON  
Chief, Engineering Division  
Civil Works

NCDED-C (21 Jun 65) 3rd Ind

DA, North Central Div, CofEngrs, Chicago, Illinois 20 May 1966

TO: District Engineer, St. Paul District

For appropriate action.

FOR THE DIVISION ENGINEER:

C. F. MAC NISH  
Chief, Engineering Division

C

---

# EXHIBITS

---



DEPARTMENT OF THE ARMY  
ST. PAUL DISTRICT, CORPS OF ENGINEERS  
1135 U. S. POST OFFICE & CUSTOM HOUSE  
ST. PAUL, MINNESOTA 55101

REPLY TO  
ATTENTION OF:  
NCSED-FR

21 February 1978

## RESCHEDULED

(This public workshop planned for  
9 March 1978 replaces the 26 January  
1978 workshop that was cancelled be-  
cause of bad weather.)

ANNOUNCEMENT OF PUBLIC WORKSHOP  
FOR THE UPDATING OF THE MASTER PLAN  
FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT  
AT LAKE TRAVERSE-BOIS DE SIOUX PROJECT  
MINNESOTA-SOUTH DAKOTA

WORKSHOP TO BE HELD AT 7:30 PM  
ON 9 MARCH 1978  
AT AMERICAN LEGION POST  
WHEATON, MINNESOTA

The Corps of Engineers is in the process of updating the master plan for public use development and resource management for Lake Traverse and the Bois de Sioux project. We are at the point of reviewing the existing conditions of the public use areas and presenting resource management guidelines.

Before proceeding further, we would like to obtain your views and suggestions concerning future planning and resource problems in the Lake Traverse area. Comments received at the workshop will be incorporated in the draft plan. The draft master plan will be distributed for comment to regional, State and Federal agencies, and interested citizens.

Please bring this announcement to the attention of anyone you know who may be interested in the Lake Traverse-Bois de Sioux project. Additional copies of this announcement may be obtained at the Lake Traverse Project Office, White Rock Dam, Wheaton, Minnesota, or the St. Paul District Office of the Corps of Engineers.

---

# EXHIBITS

---



DEPARTMENT OF THE ARMY  
ST. PAUL DISTRICT CORPS OF ENGINEERS  
1135 U. S. POST OFFICE & CUSTOM HOUSE  
ST. PAUL MINNESOTA 55101

REPLY TO  
ATTENTION OF:  
NCSER-ER

11 January 1978

ANNOUNCEMENT OF PUBLIC WORKSHOP  
FOR THE UPDATING OF THE MASTER PLAN  
FOR PUBLIC USE DEVELOPMENT AND RESOURCE MANAGEMENT  
AT LAKE TRAVERSE-BOIS DE SIOUX PROJECT  
MINNESOTA-SOUTH DAKOTA

WORKSHOP TO BE HELD AT 7:30 PM  
ON 26 JANUARY 1978  
AT AMERICAN LEGION POST  
WHEATON, MINNESOTA

The Corps of Engineers is in the process of updating the master plan for public use development and resource management for Lake Traverse and the Bois de Sioux project. We are at the point of reviewing the existing conditions of the public use areas and presenting resource management guidelines. To acquaint you with the project, an information sheet and a location map are attached.

Before proceeding further, we would like to obtain your views and suggestions concerning future planning and resource problems in the Lake Traverse area. Comments received at the workshop will be incorporated in the draft plan. The draft master plan will be distributed for comment to regional, State and Federal agencies, and interested citizens.

Please bring this announcement to the attention of anyone you know who may be interested in the Lake Traverse-Bois de Sioux project. Additional copies of this announcement may be obtained at the Lake Traverse Project Office, White Rock Dam, Wheaton, Minnesota, or the St. Paul District Office of the Corps of Engineers.

---

# EXHIBITS

---

## BACKGROUND INFORMATION

### LAKE TRAVERSE-BOIS DE SIOUX PROJECT

#### SOUTH DAKOTA-MINNESOTA

The master plan provides a guide by which Lake Traverse-Bois de Sioux Project can be developed and managed to its maximum proper potential. The master plan evaluates environmental and land-use data relating to the Lake Traverse area, and recommends land uses and management practices for project resources. Public workshops with residents of the Lake Traverse area and concerned public agencies are an important part of the planning process.

Following is a brief description of the existing condition of public recreation areas, fish and wildlife habitat, water quality, and cultural resources of Lake Traverse and its surroundings.

Recreation Areas - The facilities and character of each of the three recreation areas at Lake Traverse-Mud Lake are similar. The land character of each of the three sites varies slightly, but it is predominantly floodplain in nature. The sites are low, bordered by marsh or open water and lack substantial vegetation (except Brown's Valley Dike Recreation Area). Their potential for future development is restricted because the size and nature of the sites and of their surroundings limit the amount of use that can be accommodated.

The White Rock Dam Recreation Area is located on approximately 3 acres of land created by fill. It is bordered by Minnesota State Highway 236, the Bois de Sioux River, and Big Slough, which empties into the Bois de Sioux River. Facilities consist of temporary restrooms, a picnic area, a bank fishing area, a playground, water supply, and access to hunting areas. The recreation area lacks natural vegetation because the area was constructed on fill. An effort is being made to plant trees that will shade the day-use facilities.

The Reservation Highway Recreation Area is an area of approximately 3 acres located next to the control structure which forms the main conservation reservoir of Lake Traverse. It is an area of high visual interest. Bordered by open water and marsh, the recreation area has a wide view of the surrounding bluffs. Facilities at the recreation area consist of temporary restrooms, a picnic area, bank fishing, and parking space. Existing facilities lack a water supply system.

Enhanced by the bluffs and marsh, views from Brown's Valley Recreation Area down Lake Traverse provide an attractive visual resource. The recreation area provides only limited day-use facilities. A water supply system is lacking and existing sanitary facilities are temporary. If the demand for additional recreation facilities can be justified, then the area paralleling the shoreline could provide the opportunity for expansion of the parking and day-use facilities.

---

# EXHIBITS

---

Fish and Wildlife - Fluctuation of lake level, water turbidity caused by winds, and the general shallowness of the lake have contributed to a loss of prime wildlife habitat.<sup>1</sup> As a result, hunting quality and activity have decreased. Through management of leased lands, the Minnesota DNR has begun to mitigate the effects of habitat change. The preservation of existing habitat and the creation of potholes in Mud Lake marsh areas have improved habitat.<sup>2</sup>

Fishing is an important activity at Lake Traverse. Because of its status as a boundary water, Lake Traverse receives considerable early fishing pressure and provides valuable local fishing for Minnesotans and South Dakotans. The lake is very productive and contains a large population of "rough" fish: predominantly carp, buffalo-fish, bullheads, and sheepshead. Fishing is best in spring and fall, when the summer algal blooms can be avoided.<sup>3</sup> Fishing is considered good for white bass, crappie, and bullheads; and fair to poor for walleye and northern pike.<sup>4</sup>

The States of Minnesota and South Dakota participate in a program that removes rough fish and stocks walleye, northern pike and crappie; but problems exist that directly affect the fishing and overall recreation use of Lake Traverse. Periodic "winterkill" is a problem, resulting in the natural selection of rough fish. Poor water quality due to algal blooms and lake turbidity caused by wave and wind action tend to limit habitat and suitable spawning sites for game and pan fish.<sup>5</sup> The quality of fishing can be expected to decline in response to the selectivity of conditions for "rough" fish. Since they are generally capable of withstanding the adverse conditions, catches of these poorer quality fish should remain abundant.

Water Quality - Water quality at Lake Traverse is poor. The most significant problem contributing to poor water quality in Lake Traverse is algal production due to high levels of nutrients. As a result, eutrophication is a problem and has advanced to the stage of algal blooms occurring in summer and early fall. Major causes of eutrophication and the resulting algal blooms may be attributed to:

1. Erosion and the inflow of nutrients from land use.
2. Direct access of livestock to the lake.
3. Sewage wastes from municipalities and private residences, specifically the transportation of sewage effluent and cattle wastes by the Mustinka River into Lake Traverse.<sup>6</sup>

Without proper measures to correct these problems, water quality and the surrounding lake environment will continue to deteriorate. Toxic properties in algae are a possibility and "a potential threat to the well-being of domestic animals and man." Sedimentation and algal problems will continue to decrease the usefulness of the lake at some times of

---

# EXHIBITS

---

the year. Fishing quality has begun to decrease significantly, and at certain times of the year, water contact sports are no longer safe in shallow water due to poor water quality.

Cultural Resources - On the basis of current information about cultural resources, it can be anticipated that a wide variety of significant prehistoric, historic, and geologic features probably occur in the Lake Traverse area. Although their potential is yet to be realized, it seems likely that many sites may be suitable for public interpretation.

As of 1977, only the Ancient River Warren Channel has been formally recognized as a Registered Natural Landmark. Both Minnesota and South Dakota have erected highway markers to commemorate this geological feature. Regulations require that any Corps project in the vicinity of the Ancient River Warren be evaluated in terms of its impacts on the natural landmark.

There are 17 known prehistoric sites in the Lake Traverse area, including petroglyphs, burial mounds, rock cairns, earthworks, and habitation sites. The historic sites are fur posts, the Sisseton Sioux Indian Agency, a major military trail, military forts, and settlement sites. These sites have been identified from early survey records, from settlers' reports, and from artifacts which appeared when the ground was disturbed by agricultural and construction activity. Many of the sites, though recorded, have not been located on the ground. When systematic surveys are completed, the scientific and educational potential of the cultural resources base will be assessed, and procedures will be established for its protection and development.

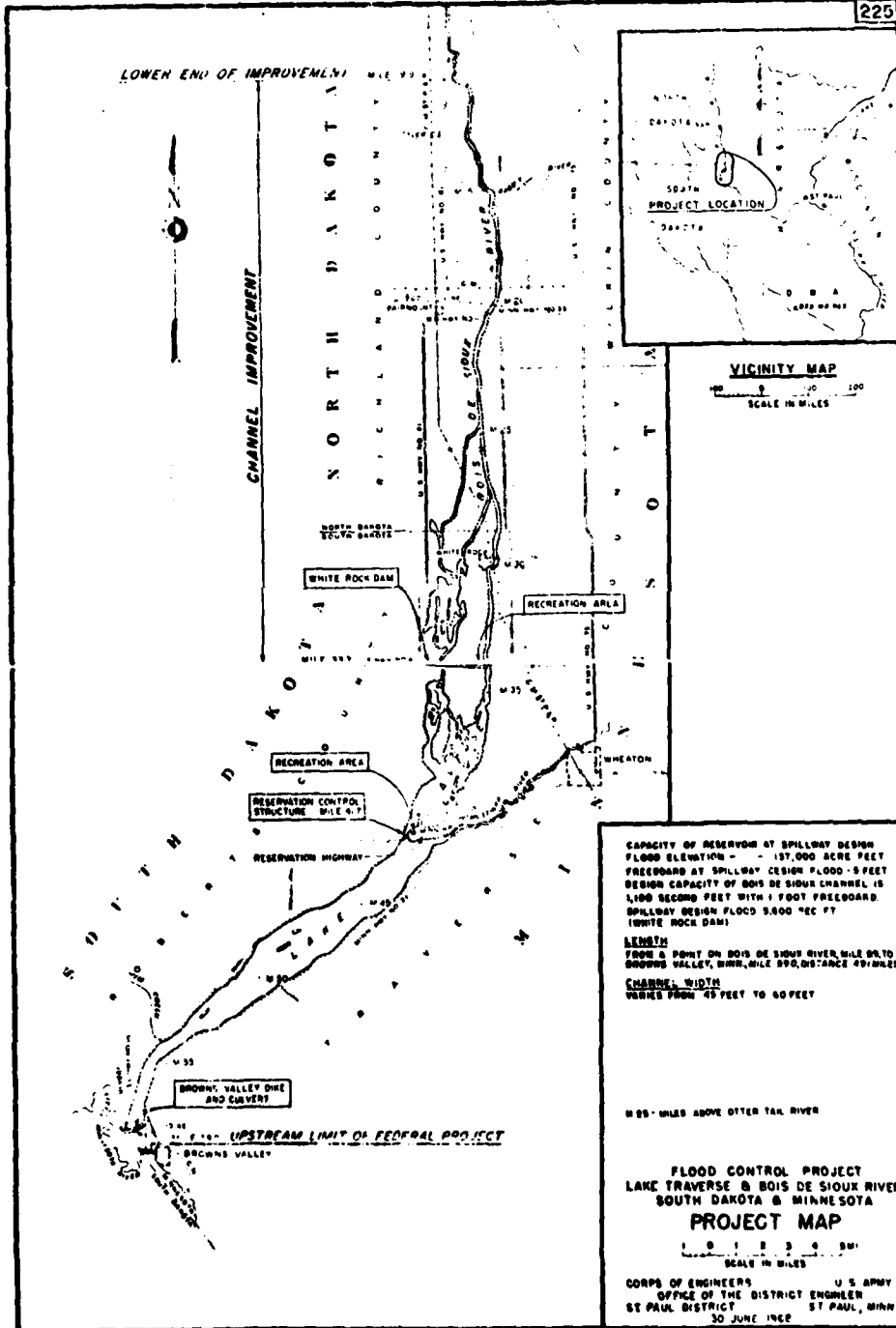
1. Center for Environmental Studies, Tri College University, Fargo, North Dakota. Environmental Assessment of Lake Traverse, 1975. Contract No. DACW37-74-C-0050, U.S. Army Corps of Engineers, St. Paul District, St. Paul, Minnesota.
2. Ibid.
3. Ibid.
4. Ibid.
5. Ibid.
6. Ibid.

# EXHIBITS

CORPS OF ENGINEERS

U S ARMY

225



---

# EXHIBITS

---

## SUMMARY OF COMMENTS FROM PUBLIC WORKSHOP

1. Great concern was expressed for the sport fish which go over the Reservation Dam control structure into Mud Lake. As water levels recede, these fish are trapped in Mud Lake, which frequently winterkills.
2. The following methods of controlling the loss of these fish were suggested by members of the public:
  - (a) Install a fish screen at the Reservation Dam control structure to prevent fish from going into Mud Lake.
  - (b) Build a fish ladder to allow fish to return to Lake Traverse from Mud Lake (other people who commented did not consider this feasible).
3. Great concern also was expressed over the decreasing fishing and water quality of Lake Traverse and how this affects resorts and lakeshore property. Some resort owners felt that the decreasing fishing and water quality were adversely affecting their businesses and that the Corps had some responsibility in this area.
4. A question was raised about procedures that could be used by local residents to instigate the clean-up of Lake Traverse. (i.e., what Federal and State agencies to contact, how to obtain funds for water quality improvement, etc.)
5. Questions were asked about the operation of the control structures at Reservation Dam and White Rock Dam.
6. It was suggested that higher water levels be maintained, particularly in Mud Lake.
7. Residents felt that sediment carried by the Mustinka River was rapidly filling in the north end of Lake Traverse and they asked how to curtail the inflow of sediment.
8. Among the suggestions from the public were the use of check dams to retain the sediments in the Mustinka River and diversion of the Mustinka River into Mud Lake so that the sediment would settle there rather than in Lake Traverse.
9. One resident submitted a letter with sketches that suggested land management techniques to reduce the amount of nutrients and sediments entering Lake Traverse.

---

# EXHIBITS

---



DEPARTMENT OF THE ARMY  
ST. PAUL DISTRICT CORPS OF ENGINEERS  
1135 U. S. POST OFFICE & CUSTOM HOUSE  
ST. PAUL, MINNESOTA 55101

REPLY TO  
ATTENTION OF:  
NCSSED-ER

14 June 1978

During the 9 March 1978 Public Workshop for Lake Traverse, many participants raised questions about a fish control structure in the outlet from Lake Traverse into Mud Lake. The purpose of this letter is to provide those who attended the workshop with more detailed information on this issue.

Over the past several years, sportsmen and resort owners have expressed concern about potential fish losses through the outlet control structure from Lake Traverse into Mud Lake, where fish are susceptible to winterkill. This outlet has been blamed for the declining game fish catches and increased population of rough fish in Lake Traverse. It has been suggested that a fish control structure be installed in the outlet to eliminate egress of fish from Lake Traverse. Our evaluation of the problem and recommendations for a possible solution follow.

Based on the limited data supplied by the South Dakota Game, Fish and Parks Department and the Minnesota Department of Natural Resources, it appears that the number of game fish entering Mud Lake from Lake Traverse is quite variable. No data are available on species population sizes in the lake, but we can reach some valid conclusions by using general information for bodies of water like Lake Traverse and data from Mud Lake rescue operations:

1. Assuming that there are 800 to 1,000 pounds of fish per acre in Lake Traverse and that 50 percent of the population is game fish (which may be exaggerated), there would be approximately 400 lbs/acre of game fish. Since the lake has a surface area of about 12,000 acres, one could assume a potential of 4.8 million pounds of game fish in the lake.
2. Data from South Dakota show that the highest number of fish rescued from Mud Lake was about 4,000 game fish in 1971. This included yellow perch, crappie, northern pike, bullhead, white bass, and walleye. Assuming an exceptional average of 1 to 2 pounds per fish, this would give only 8,000 pounds of game fish.

---

# EXHIBITS

---

NCSED-ER

14 June 1978

3. Although the above argument is merely based on speculation about the standing crop, it can be demonstrated that if there were 4.8 million pounds of game fish present in Lake Traverse, 8,000 pounds of fish moving into Mud Lake is quite insignificant - less than 1 percent of the game fish crop.


From another standpoint, if the standing crop of game fish were over-estimated, if there were only 2 million pounds of game fish in Lake Traverse, and if only 50% of the game fish in Mud Lake were rescued (16,000 pounds instead of 8,000), then there would still be less than 1 percent of the standing crop of game fish passing into Mud Lake. This argument would refute the idea that population declines have been caused by losses through the outlet structure.

The feasibility of installing a fish control structure at the outlet of Lake Traverse has been considered. The first problem is that most control structures have been designed for conditions drastically different from those at Lake Traverse, whether by size, function, or design of the supportive structure. Second, any type of screen installed would require considerable maintenance to remain functional. A screen would have to be removable during high flows to avoid potential damage to the entire structure. The nature of the present outlet structure may not allow installation of an effective screen without considerable structural modifications to the outlet.

Our determination, based on available data, is that there is not sufficient emigration of game fish from Lake Traverse into Mud Lake to adversely affect remaining population levels. Also, the costs of installing and maintaining a fish control structure would not be balanced by the values accrued from any fish prevented from moving through the outlet.

Thank you for your interest.

Sincerely,

  
FORREST T. GAY, III  
Colonel, Corps of Engineers  
District Engineer

---

# EXHIBITS

---

## MAILING LIST FOR DRAFT MASTER PLAN

Mayor Edward Barlage  
508 Second Ave. North  
Wheaton, MN 56296

Mr. Gordon Peterson  
Conservation Officer  
Minn. Dept. of Natural Resources  
11 - 14th Street S.  
Wheaton, Minnesota 56296

Clerk of Court  
Roberts County Courthouse  
Sisseton, SD 57262

Mr. Douglas Jones  
Conservation Officer  
Dept. Game, Fish and Parks  
Sisseton, So. Dak. 57262

Chairman  
West Central MN Resources & Con-  
servation Development Project  
Benson, MN 56215

Roberts County Historical Society  
Mr. R.B. Swanberg, Pres.  
122 1st Ave. West  
Sisseton, So. Dak. 57262

Town and Country Club  
Mr. David Olson, Pres.  
Browns Valley, MN 56219

Mayor Hugh Mikkelson  
City Hall  
203 North 5th Street  
Breckenridge, MN 56520

Mr. Wm. B. Nye  
Commissioner  
MDNR  
Centennial Office Building  
St. Paul, MN 55155

Mr. Jim Harrington, Commissioner  
Minnesota Highway Dept.  
411 Transportation Bldg.  
John Ireland Blvd.  
St. Paul, MN 55155

Ms. Sandra Gardebring  
Executive Director  
MPCA  
1935 West Cty. Rd. B-2  
Roseville, MN 55113

Mayor Paul J. Beithon  
City Hall  
Wahpeton, ND 58075

Minnesota Health Dept.  
717 Delaware Street SE  
Minneapolis, MN 55414

The Courier  
117 East Oak, Box 169  
Sisseton, SD 57262

---

# EXHIBITS

---

## MAILING LIST FOR DRAFT MASTER PLAN

The Enterprise  
Wilmot, SD 57279

Traverse County Commissioners  
Mr. John Huellenbach, Clerk  
Traverse County Courthouse  
Wheaton, Minnesota 56296

The Valley News  
Browns Valley, MN 56219

Wheaton Chamber of Commerce  
Mr. David Naatz, Pres.  
13 - 16th St. N.  
Wheaton, Minnesota 56296

The Gazette  
Wheaton, MN 56296

Wheaton Lion's Club  
Mr. L.E. Stewart, Sec.  
Rt. 1  
Wheaton, Minnesota 56296

Mr. Winfield Robbins  
Town President  
Pecover, SD 57257

Wheaton Jay Cee's  
c/o Mr. Jim Schoenrock  
Callup Trailer Court  
Wheaton, Minnesota 56296

Ms. Barbara Bernstein  
Mayor of Wilmot  
Wilmot, SD 57279

Bethlehem Covenant Church  
Rev. Maynard Anderson  
308 10th Street N.  
Wheaton, Minnesota 56296

Mayor Pete Arens  
Barry, MN 56210

Catholic Church Rectory  
Fr. John Eccleston  
201 9th Street S.  
Wheaton, Minnesota 56296

Mayor Douglas Frisch  
Dumont, MN 56236

St. Johns Lutheran Church  
Rev. W.D. Spengeler  
1603 Broadway  
Wheaton, Minnesota 56296

Secretary  
Dept. of Natural Resources  
Foss Office Building  
Pierre, SD 57501

Mr. Erling M. Weiberg, Administrative Sec.  
MN Water Resources Board  
555 Wabasha Street  
St. Paul, MN 55102

---

# EXHIBITS

---

## MAILING LIST FOR DRAFT MASTER PLAN

Mr. Dean Carlson  
Division Engineer  
Federal Highway Administration  
Suite 490, Metro Square Bldg.  
St. Paul, MN 55101

The Northern Star  
Graceville, MN 56225

Mr. Charles Kenow  
Environmental Quality Board  
100 Capital Square Building  
550 Cedar Street  
St. Paul, MN 55101

The News  
601 Dakota Ave.  
Wahpeton, ND 58075

Mr. Robert Hodgins, Dir.  
Dept. of Game, Fish and Parks  
State Capitol  
Pierre, SD 57501

Mr. Roger W. Pearson  
Mayor of Sisseton  
513 First Ave. East  
Sisseton, SD 57262

Mr. Homer Englehorn, Pres.  
South Dakota Water Dev. Assoc.  
Lock Drawer E  
Madison, SD 57042

Mayor Robert H. Layden  
Browns Valley, MN 56219

Intergovernmental Planning  
Minnesota State Planning Agency  
802 Capitol Square Building  
St. Paul, MN 55101

Mayor Bernard Diekman  
Beardsley, MN 56211

Mr. James Heltzer, Commissioner  
MN Dept. of Economic Development  
480 Cedar Street  
St. Paul, MN 55101

Mayor Martin Carlson, City Hall  
Graceville, MN 56240

Mr. Lynn Muchmore, Dir.  
State Planning Agency and Office  
of Budget  
State Capitol  
Pierre, SD 57501

Mr. Wally Klugman  
Clerk of Court  
Traverse County Courthouse  
Wheaton, Minnesota 56296

---

# EXHIBITS

---



## United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

Federal Building, Fort Snelling  
Twin Cities, Minnesota 55111

Mr. Roger G. Fast  
Chief, Engineering Division  
Department of the Army  
St. Paul District, Corps of Engineers  
1135 U.S. Post Office and Custom House  
St. Paul, Minnesota 55101

NOV 6 1978

Dear Mr. Fast:

This responds to your letter of October 6, 1978, requesting Service comments regarding the draft master plan and environmental assessment prepared by your agency on the improvements proposed for the Lake Traverse - Bois de Sioux River Project located on the boundary between Minnesota and South Dakota.

Based on our review of these documents we concur with your determination that the environmental impacts of these proposals will not significantly affect the quality of the human environment. In our opinion, the future developments proposed for the three public use areas at Lake Traverse will not have an adverse impact on fish and wildlife resources.

The resource management proposals discussed on page 7 of the environmental assessment should improve wildlife habitat conditions in these areas as well as improve the water quality of Lake Traverse. The proposed termination of farming and grazing on the Corps - administered lands and elimination of livestock access to Lake Traverse, Mud Lake, Bois de Sioux River, and their tributaries are particular actions that we believe will be in overall public interest and we compliment the Corps for this stand.

Thank you for providing the Service with the opportunity to review and comment on these proposals.

Sincerely yours,

*Donald F. LaSainte*

cc: U.S. EPA, Chicago, IL  
U.S. EPA, Mpls., MN  
MN DNR, St. Paul, MN  
Vernon A. Helbig,  
RO, Denver, CO

Regional Director

---

# EXHIBITS

---



IN REPLY REFER TO

ENV

United States Department of the Interior  
FISH AND WILDLIFE SERVICE

MAILING ADDRESS  
Post Office Box 35486  
Denver Federal Center  
Denver, Colorado 80235

STREET LOCATION:  
136 Union Blvd.  
Lakewood, Colorado 80226

OCT 25 1978

Colonel Forrest T. Gay, U.S.A.  
Division Engineer  
U.S. Army Corps of Engineers  
1135 U.S. Post Office and Custom House  
St. Paul, MN 55101

Dear Colonel Gay:

Reference is made to Mr. Roger Fast's letter of October 6, 1978, requesting our review and comment on the draft master plan and environmental assessment on the proposed improvements for the Lake Traverse-Bois de Sioux River Project.

We have no major comments on the reports, however, we are pleased to see that additional land in the project area will be devoted to wildlife management purposes. This appears to be the best use of such land and encourage this practice whenever possible.

We concur with your assessment that the improvements as proposed would not significantly affect the quality of the human environment and the preparation of an environmental impact statement on the proposal is unwarranted.

This opportunity to review and comment on these documents at this time is appreciated.

Sincerely yours,

JAMES C. TUTMAN  
Regional Director



Save Energy and You Serve America!

---

# EXHIBITS

---



UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION V  
230 SOUTH DEARBORN ST.  
CHICAGO, ILLINOIS 60604

NOV 1 1978

Mr. Roger Fast  
Chief, Engineering Division  
U.S. Army Engineer District, St. Paul  
1135 U.S. Post Office and Custom House  
St. Paul, Minnesota 55101


Dear Fast:

We have reviewed the Environmental Assessment and Master Plan for Recreational Development at Lake Traverse-Bois de Sioux River Project, Minnesota and South Dakota. Your letter of October 6, 1978, requested our views and comments on the proposed development.

Based upon the information provided, we have no objections to the recreational development. The proposed plans should result in an improvement in water quality.

We appreciate the opportunity to review this assessment and master plan. If you or your staff need to contact us in regard to this project, please call Mr. William D. Franz at 312/353-2307.

Sincerely yours,

  
Barbara J. Taylor, Chief  
Environmental Impact Review Staff  
Office of Federal Activities

---

# EXHIBITS

---



## Department of Natural Resource Development

OFFICE OF THE SECRETARY

Joe Foss Building, Pierre, South Dakota 57501

Phone 605/773-3151

October 17, 1978

Mr. Roger G. Fast  
Chief, Engineering Division  
St. Paul District, Corps of Engineers  
1135 U.S. Post Office & Custom House  
St. Paul, Minnesota 55101

Attention: NCSSED - ER

Dear Mr. Fast:

This office has reviewed the draft master plan and the environmental assessment on the proposed improvement for the Lake Traverse-Bois de Sioux River Project.

I have no objection to the proposed master plan and I would agree that the environmental impacts of the project are minimal and would not affect the quality of the human environment.

I do have a suggested change for the conclusions section of the master plan, on page 50 paragraph 11.3 the following statement is made-"With the support of the Minnesota Department of Natural Resources, the South Dakota Department of Natural Resources and the Corps of Engineers, a program of this nature could be extended to private land." I would recommend that the South Dakota Department of Natural Resources be replaced with the South Dakota Department of Wildlife, Parks and Forestry. The South Dakota Department of Wildlife, Parks and Forestry is the South Dakota agency that has jurisdiction over wildlife management programs and have various programs for working with private landowners to improve wildlife.

I would like to thank you for the opportunity to review the reports.

Very truly yours,

Vern W. Butler, Secretary

VWB:ms

---

# EXHIBITS

---



## MINNESOTA HISTORICAL SOCIETY

690 Cedar Street, St. Paul, Minnesota 55101 • 612-296-2747

3 November 1978

Colonel Forrest T. Gay  
District Engineer  
St. Paul District  
Corps of Engineers  
1135 U.S. Post Office and Custom House  
St. Paul, Minnesota 55101

Dear Colonel Gay:

RE: NCSED-ER  
Environmental Assessment and  
Master Plan for Public-Use  
Development, Lake Traverse  
Minnesota-South Dakota

MHS Referral File Number G519

Thank you for the copy of the above referenced Environmental Assessment and Master Plan. Noted on pages 16 and 17 of the Master Plan, and on page 17 of the Environmental Assessment is your awareness of the potential for diverse cultural resources in this region, and your intention of carrying out cultural resource investigations, including review of documents, site survey, and test excavations in order to locate unknown resources and assess their significance. We concur that surveys in the proposed development areas along the shoreline of Lake Traverse are needed, and that, no doubt, the additional sites discovered will add to our understanding of the prehistory and history of this area.

Thank you for your interest in preserving Minnesota's cultural resources.

Sincerely,

  
Russell W. Fridley  
State Historic Preservation Officer

RWF/fr

Founded 1849 • The oldest institution in the state

---

# EXHIBITS

---

DNR-8



STATE OF  
**MINNESOTA**  
DEPARTMENT OF NATURAL RESOURCES

PHONE: \_\_\_\_\_

November 2, 1978

Colonel Forrest T. Gay III  
District Engineer  
Corps of Engineers, St. Paul District  
1135 U.S. Post Office & Custom House  
St. Paul, Minnesota 55101

Dear Colonel Gay:

**LAKE TRAVERSE - BOIS DE SIOUX RIVER PROJECT**

The Department of Natural Resources has reviewed the draft Master Plan and the environmental assessment on the proposed improvements for Lake Traverse-Bois de Sioux River project.

We feel the Master Plan for Lake Traverse-Bois de Sioux project proposes a long needed course of action for the allocation of the Federal land administered by the Corps of Engineers.

Also, we are pleased with the background information and the assessment of the problems in the area, including the water quality problem. Indeed, the water quality at Lake Traverse is poor and continues to deteriorate; proper measures are desirable in order to continue to use the reservoirs for recreation, especially for sport fishing. The potential increase in public use of the proposed recreational facilities may not materialize without measures to provide a commensurate improvement in water quality.

We are aware that the proposed Corps actions will not improve the water quality and that the Corps may not have appropriate authority to do so; however, we feel the problem is urgent and needs attention.

We appreciate the opportunity you have given us to provide these concerns at this time.

Yours truly,

Joseph N. Alexander  
Acting Commissioner

cc: Sandra Gardebring - PCA

AN EQUAL OPPORTUNITY EMPLOYER



---

# EXHIBITS

---



United States Department of the Interior  
FISH AND WILDLIFE SERVICE

MAILING ADDRESS  
Post Office Box 25486  
Denver Federal Center  
Denver, Colorado 80225

STREET LOCATION:  
134 Union Blvd.  
Lakewood, Colorado 80228

IN REPLY REFER TO:

ENV

OCT 25 1978

Colonel Forrest T. Gay, U.S.A.  
Division Engineer  
U.S. Army Corps of Engineers  
1135 U.S. Post Office and Custom House  
St. Paul, MN 55101

Dear Colonel Gay:

Reference is made to Mr. Roger Fast's letter of October 6, 1978, requesting our review and comment on the draft master plan and environmental assessment on the proposed improvements for the Lake Traverse-Bois de Sioux River Project.

We have no major comments on the reports, however, we are pleased to see that additional land in the project area will be devoted to wildlife management purposes. This appears to be the best use of such land and encourage this practice whenever possible.

We concur with your assessment that the improvements as proposed would not significantly affect the quality of the human environment and the preparation of an environmental impact statement on the proposal is unwarranted.

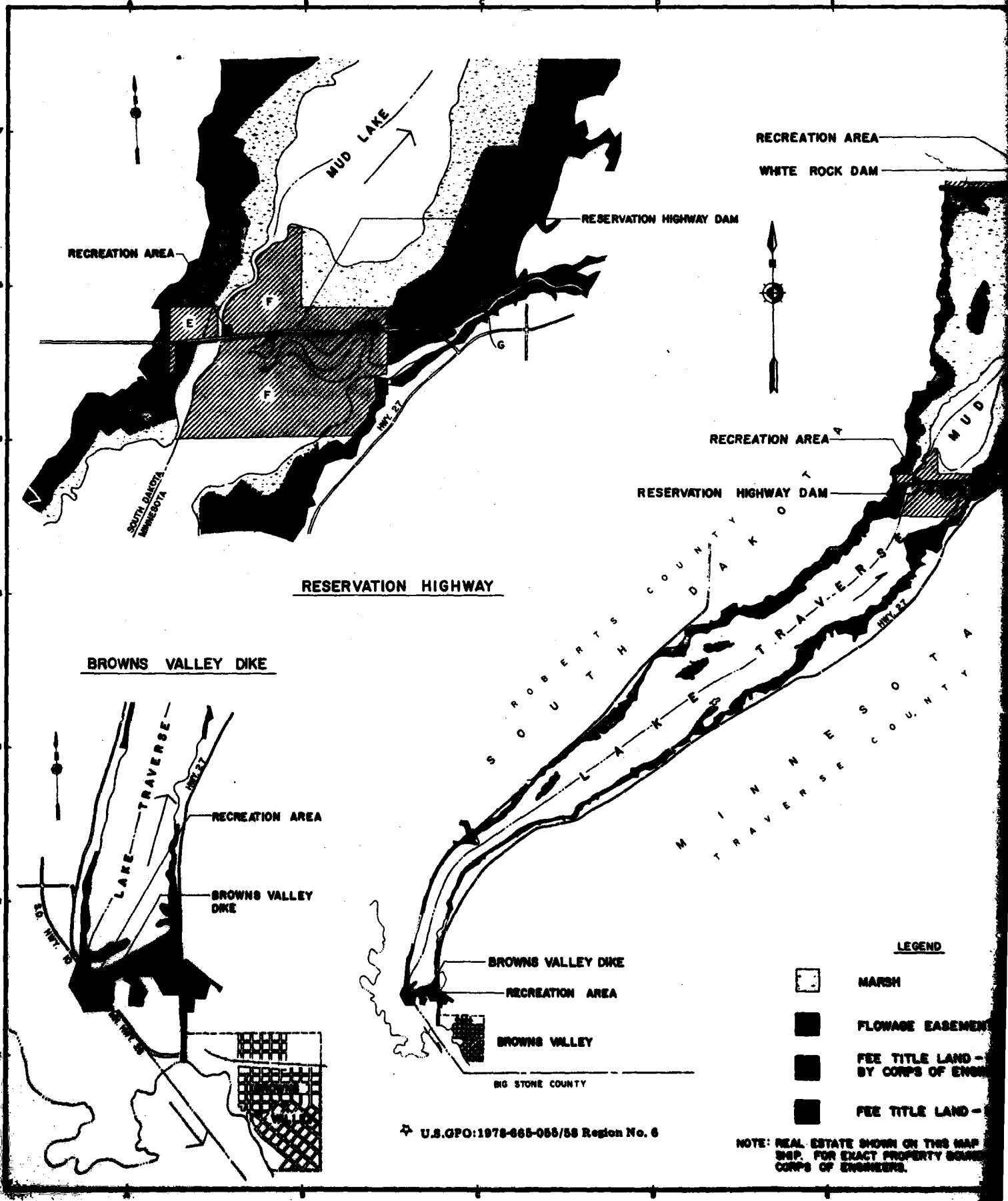
This opportunity to review and comment on these documents at this time is appreciated.

Sincerely yours,

JAMES P. SULMAN  
Regional Director



*Save Energy and You Serve America!*



RECREATION AREA

RECREATION AREA

WHITE ROCK DAM

RESERVATION HIGHWAY DAM

SOUTH BAKOTA  
MINNESOTA

RECREATION AREA

RESERVATION HIGHWAY DAM

RESERVATION HIGHWAY

BROWNS VALLEY DIKE

ROBERTS COUNTY  
LAKE TRAVERSE  
MINNESOTA  
MINNESOTA  
MINNESOTA

RECREATION AREA

BROWNS VALLEY  
DIKE





BROWNS VALLEY DIKE

RECREATION AREA

BROWNS VALLEY

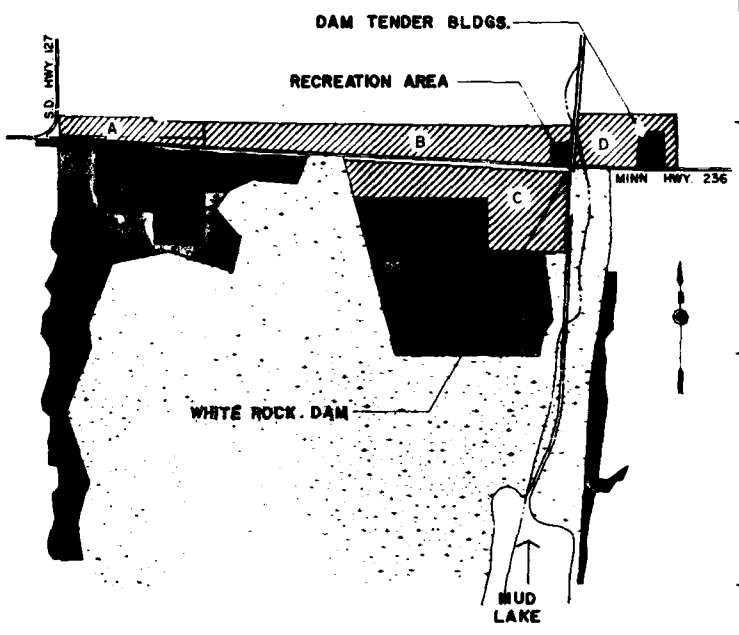
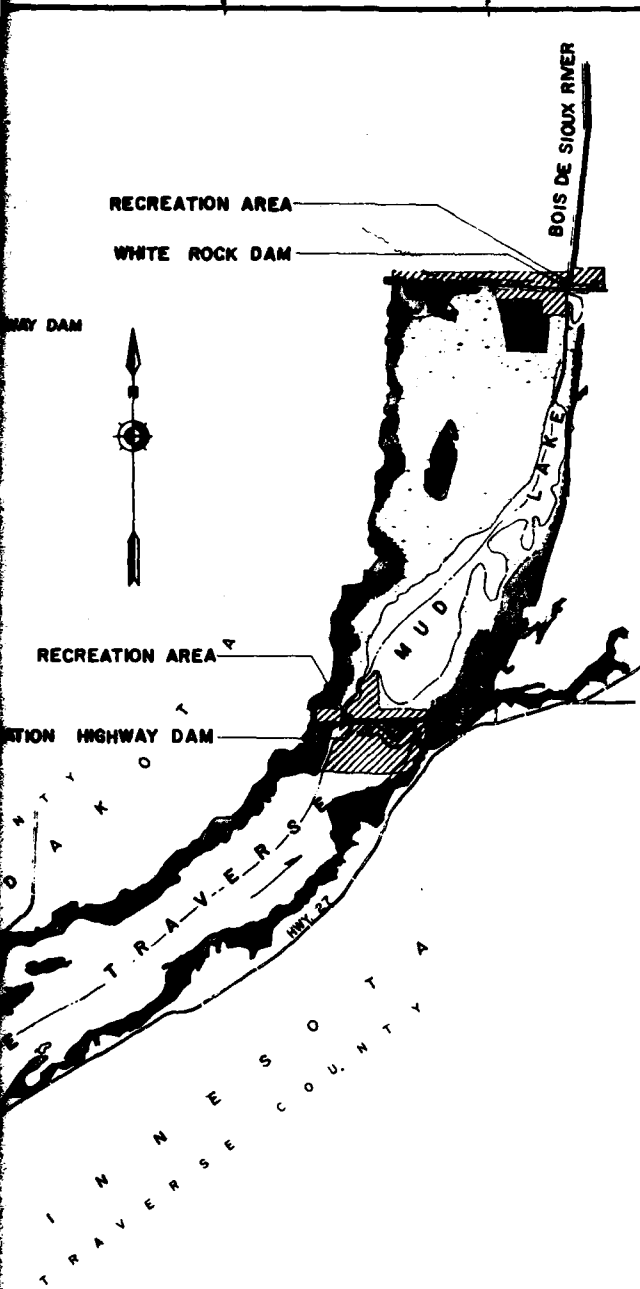
BIG STONE COUNTY

LEGEND

-  MARSH
-  FLOWAGE EASEMENT
-  FEE TITLE LAND - BY CORPS OF ENGRS
-  FEE TITLE LAND -

U.S.GPO:1978-665-055/58 Region No. 6

NOTE: REAL ESTATE SHOWN ON THIS MAP IS NOT FOR EXACT PROPERTY BOUNDARIES BY CORPS OF ENGINEERS.







**WHITE ROCK DAM**

| REAL ESTATE KEY     |                            |         |                  |
|---------------------|----------------------------|---------|------------------|
| TRACT               | STATUS                     | ACREAGE | LEASE EXPIRATION |
| WHITE ROCK DAM      |                            |         |                  |
| A                   | LEASED TO PRIVATE PARTY    | 40      | APRIL 20, 1980   |
| B                   | d.o.                       | 159     | MAY 31, 1979     |
| C                   | d.o.                       | 158     | FEB. 28, 1981    |
| D                   | LEASED TO MINNESOTA D.N.R. | 73.5    | JUNE 30, 1981    |
| RESERVATION HIGHWAY |                            |         |                  |
| E                   | LEASED TO PRIVATE PARTY    | 44      | APRIL 2, 1979    |
| F                   | LEASED TO MINNESOTA D.N.R. | 872     | DEC. 31, 1985    |
| G                   | LEASED TO TRAVERSE CO.     | 10      | APRIL 30, 1984   |

1. More lands are leased than are owned in fee title because the Corps also owns lands formed by reliction.

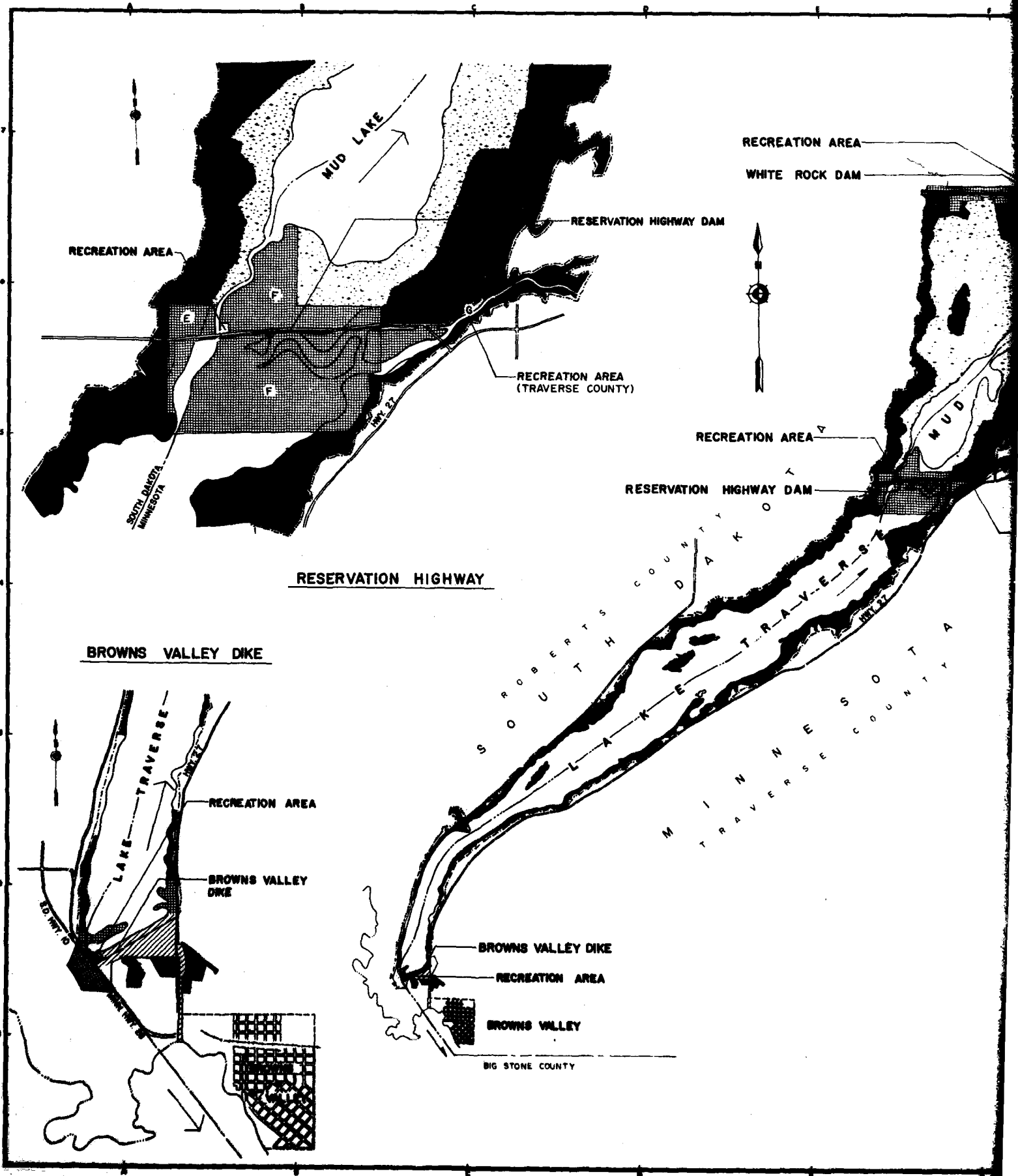
**LEGEND**

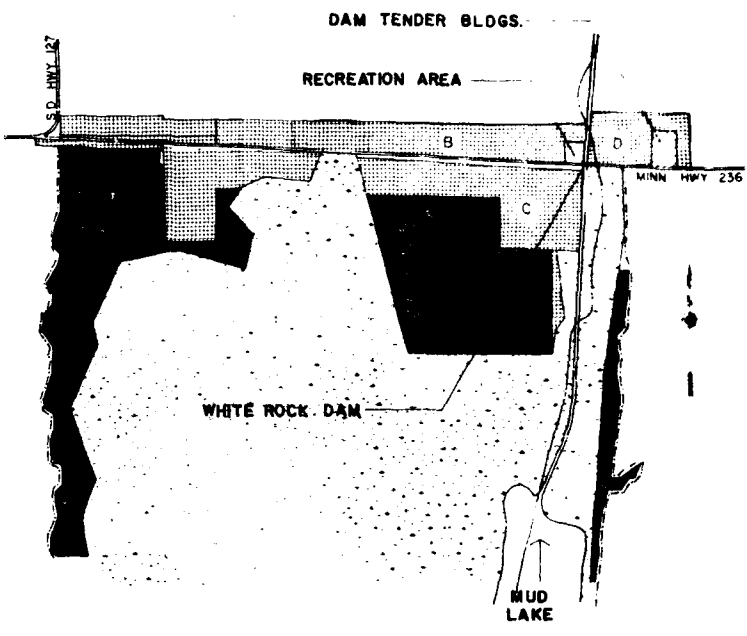
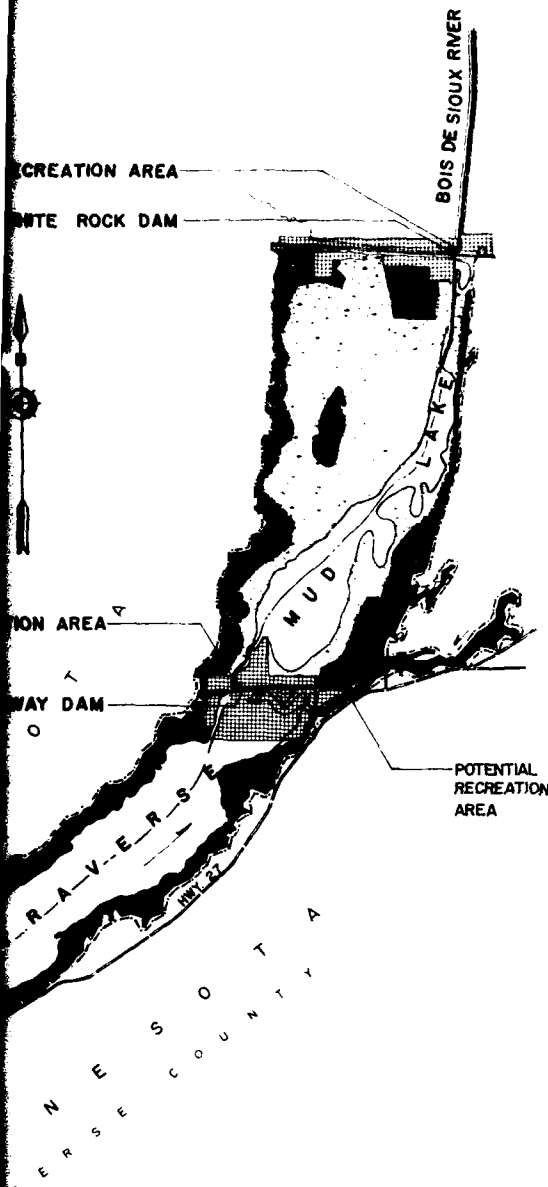
-  MARSH
-  FLOWAGE EASEMENT
-  FEE TITLE LAND - MANAGED BY CORPS OF ENGINEERS
-  FEE TITLE LAND - LEASED

NOTE: REAL ESTATE SHOWN ON THIS MAP IS ONLY A REPRESENTATION OF OWNERSHIP. FOR EXACT PROPERTY BOUNDARIES CONTACT THE ST. PAUL DISTRICT, CORPS OF ENGINEERS.

|  |  |                            |          |
|--|--|----------------------------|----------|
| SYMBOL   | DESCRIPTION  | DATE                       | APPROVAL |
| DEPARTMENT OF THE ARMY<br>ST. PAUL DISTRICT, CORPS OF ENGINEERS<br>ST. PAUL, MINNESOTA |  |                            |          |
| DESIGNED BY<br>DRAWN BY<br>CHECKED BY<br>SUBMITTED BY<br>APPROVED BY                   | <b>LAKE TRAVERSE<br/>         BOIS DE SIOUX RIVER, MN., S.D.<br/>         REAL ESTATE MAP</b><br>MASTER PLAN FOR PUBLIC USE<br>DEVELOPMENT AND RESOURCE MANAGEMENT |                            |          |
|  | DATE: JUNE 1978  |                            |          |
| PLATE I  |  | NO SCALE<br>DRAWING NUMBER |          |
|  |  | SHEET OF                   |          |








1 2





**WHITE ROCK DAM**

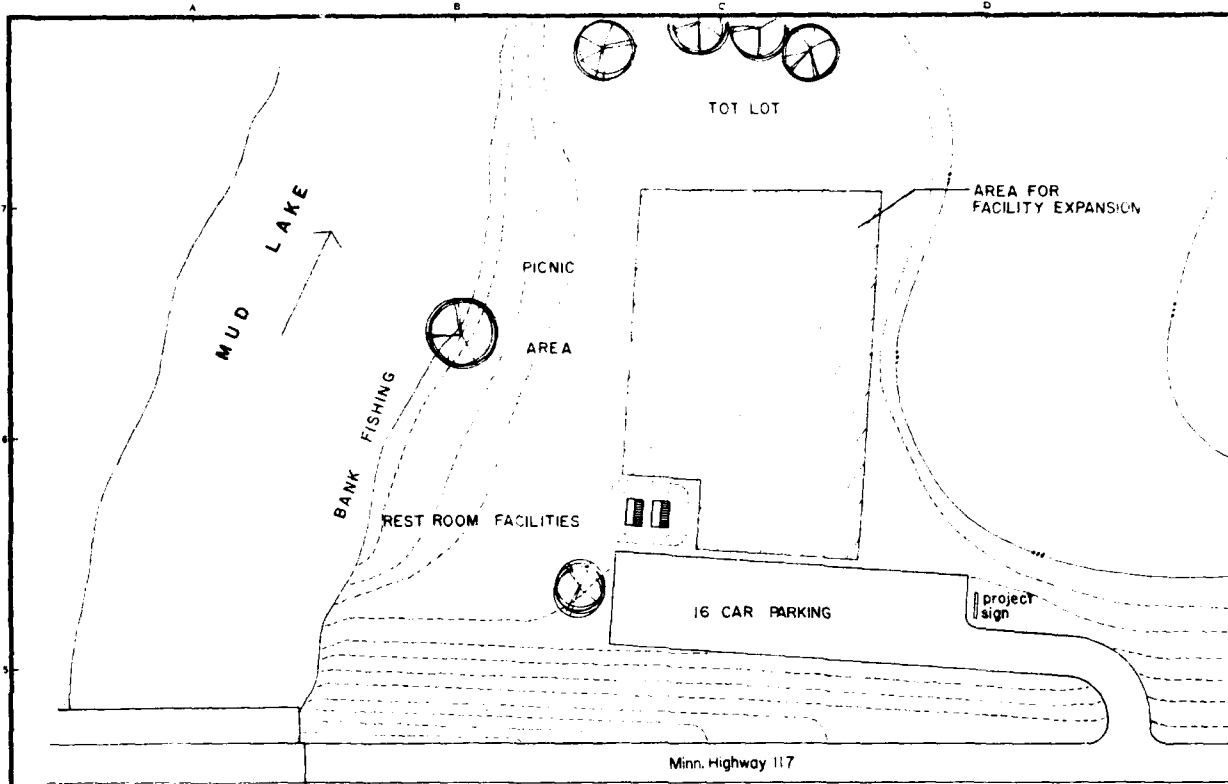
**LAND ALLOCATION CATEGORIES**

-  OPERATIONS: RECREATION INTENSIVE USE
-  OPERATIONS: WILDLIFE MANAGEMENT
-  PROJECT OPERATIONS
-  OPERATIONS: RECREATION LOW DENSITY USE
-  FLOWAGE EASEMENT
-  SEASONAL POOL ELEVATION - 976.0
-  FLOOD POOL ELEVATION - 982.0

- NOTES:**
1. REAL ESTATE SHOWN ON THIS MAP IS ONLY A REPRESENTATION OF OWNERSHIP. FOR EXACT PROPERTY BOUNDARIES CONTACT THE ST. PAUL DISTRICT CORPS OF ENGINEERS.
  2. LETTERED AREAS REFER TO REAL ESTATE TRACTS, SEE PLATE 1.

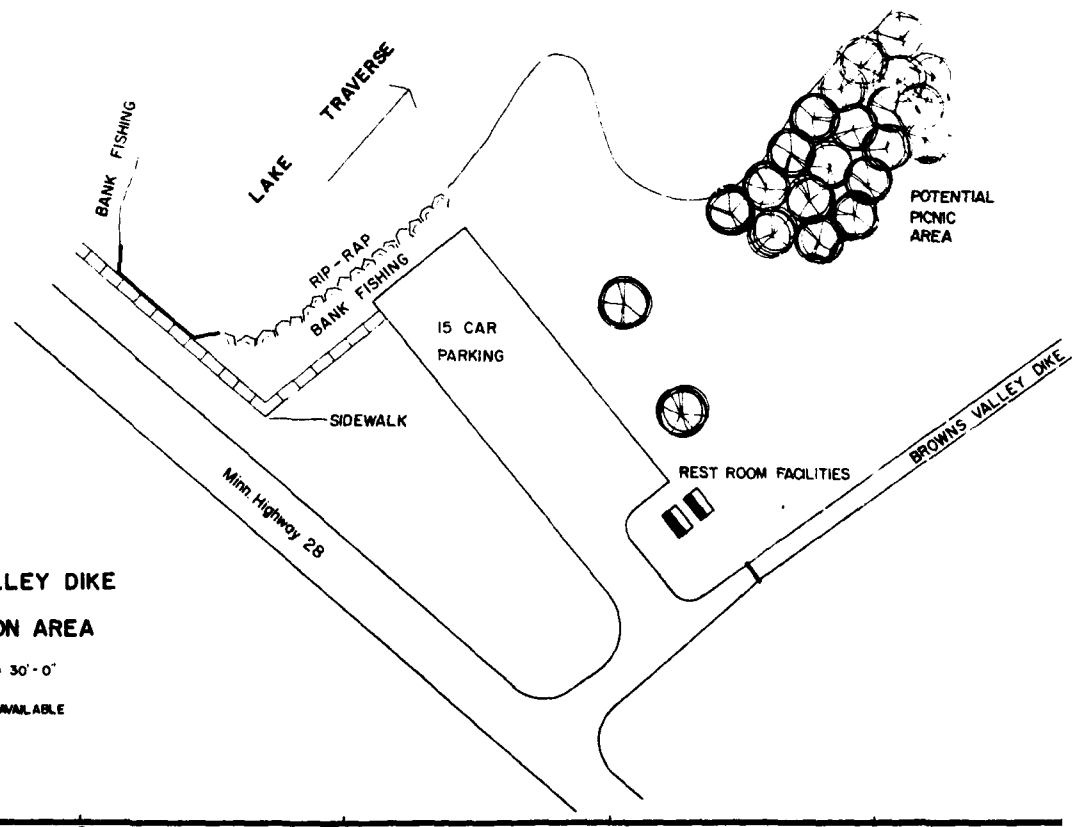
☆ U.S.GPO:1978-665-055/58 Region No. 6

|  |                    |      |          |
|--|--------------------|------|----------|
| SYMBOL   | DESCRIPTION        | DATE | APPROVAL |
| DEPARTMENT OF THE ARMY<br>ST. PAUL DISTRICT CORPS OF ENGINEERS<br>ST. PAUL, MINNESOTA  |                    |      |          |
| <b>LAKE TRAVERSE<br/>         BOIS DE SIOUX RIVER, MN., S.D.<br/>         LAND ALLOCATION MAP</b>  |                    |      |          |
| MASTER PLAN FOR PUBLIC USE<br>DEVELOPMENT AND RESOURCE MANAGEMENT  |                    |      |          |
| DESIGNED BY<br>DC-5G<br>DRAWN BY<br>DC<br>CHECKED BY<br>W.H.<br>SUBMITTED BY<br><i>Robert J. [Signature]</i><br>APPROVED<br><i>Robert J. [Signature]</i> | DATE:<br>JUNE 1978 |      |          |
| <b>PLATE 2</b>   |                    |      |          |
| NO SCALE<br>DRAWING NUMBER<br>SHEET OF   |                    |      |          |



SCALE 1" = 30'-0"

**RESERVATION HIGHWAY RECREATION AREA**



**BROWNS VALLEY DIKE  
RECREATION AREA**

SCALE 1" = 30'-0"

NO TOPOGRAPHY AVAILABLE

AD-A120 869 MASTER PLAN FOR PUBLIC USE DEVELOPMENT AND RESOURCE  
MANAGEMENT LAKE TRAVERSE MINNESOTA - SOUTH DAKOTA(U)  
CORPS OF ENGINEERS ST PAUL MN ST PAUL DISTRICT MAY 79

2/2

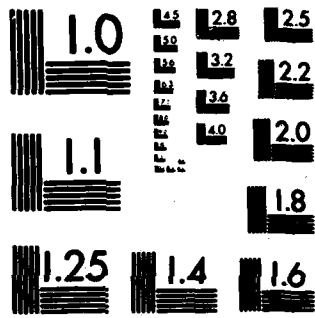
UNCLASSIFIED



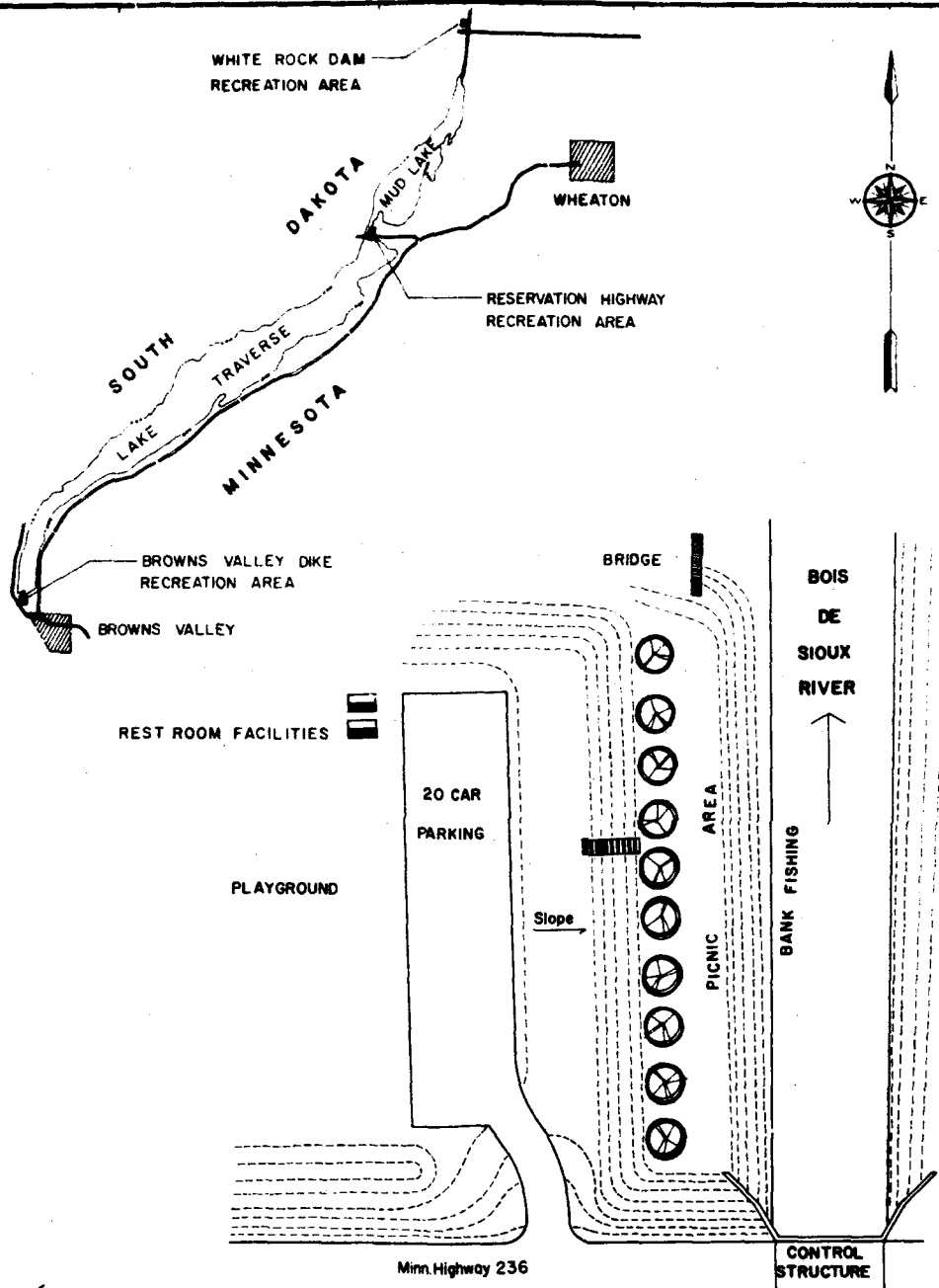
END  
DATE  
FORM  
DTIC

E/G 12/2

NI



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A



SCALE 1" = 30'-0"

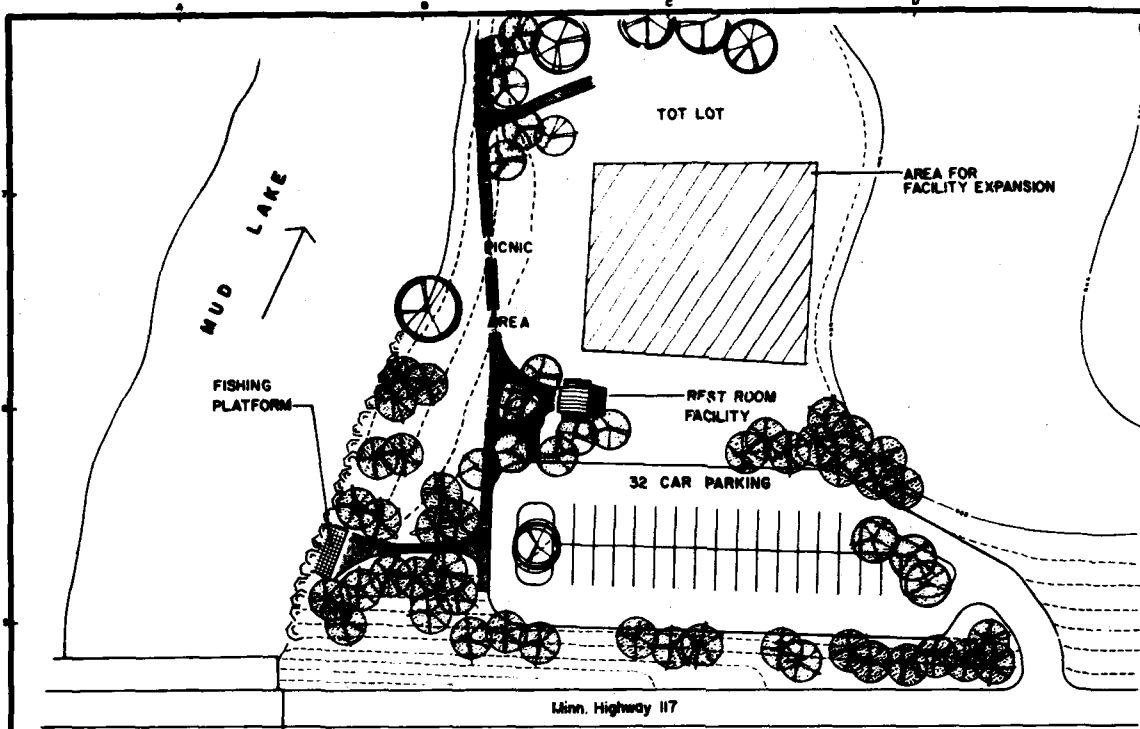
**WHITE ROCK DAM RECREATION AREA**

0 10 20 30 40 50 100  
 SCALE IN FEET

EXISTING VEGETATION

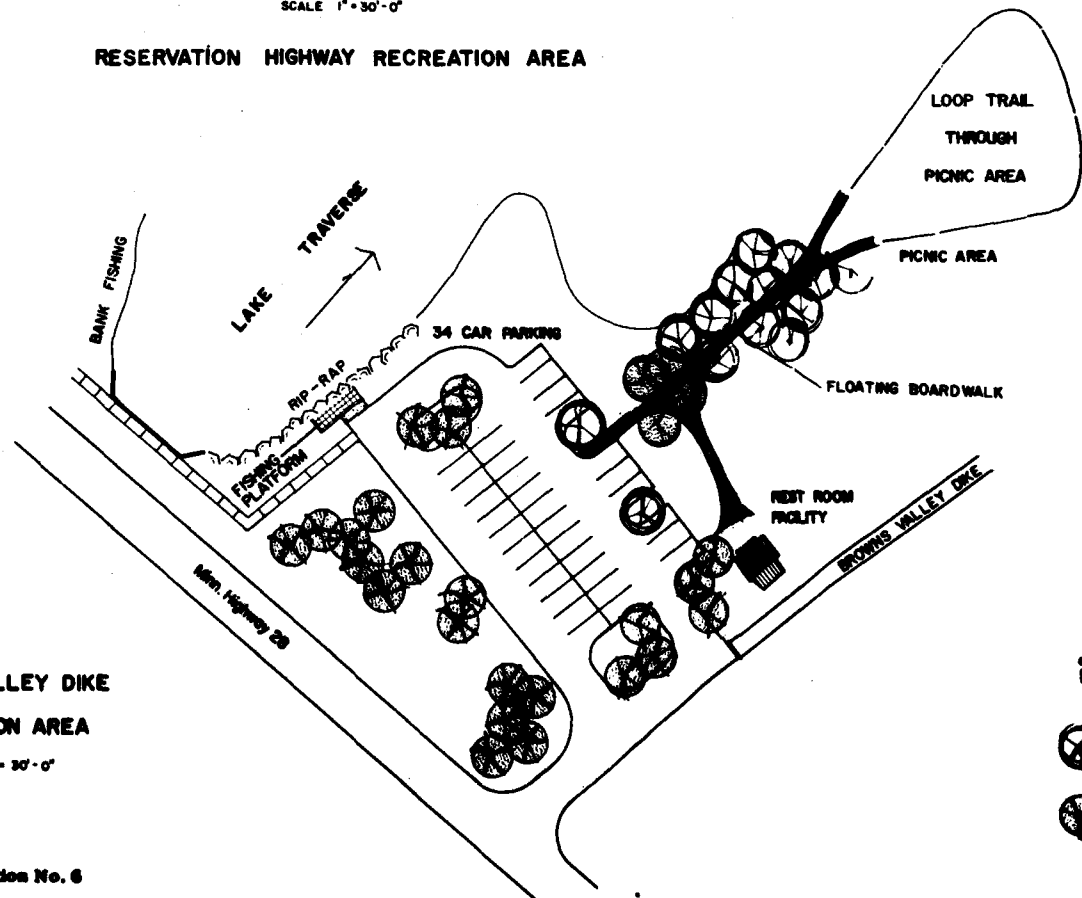
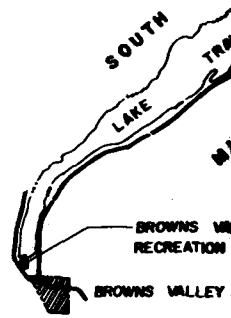
☆ U.S.G.P.O.:1978-665-055/58 Region No. 6

|   |   |                |          |
|---|---|----------------|----------|
| SYMBOL  | DESCRIPTION   | DATE           | APPROVAL |
| DEPARTMENT OF THE ARMY<br>ST PAUL DISTRICT CORPS OF ENGINEERS<br>ST PAUL, MINNESOTA |   |                |          |
| DESIGNED BY:  | LAKE TRAVERSE<br>BOIS DE SIOUX RIVER, MN., S.D.                   |                |          |
| DRAWN BY:   | EXISTING FACILITIES MAP   |                |          |
| CHECKED BY:   | MASTER PLAN FOR PUBLIC USE<br>DEVELOPMENT AND RESOURCE MANAGEMENT |                |          |
| APPROVED BY:  | DATE: JUNE 1978   |                |          |
| PLATE 3   |   | SCALE AS SHOWN | FIG. NO. |



SCALE 1" = 30'-0"

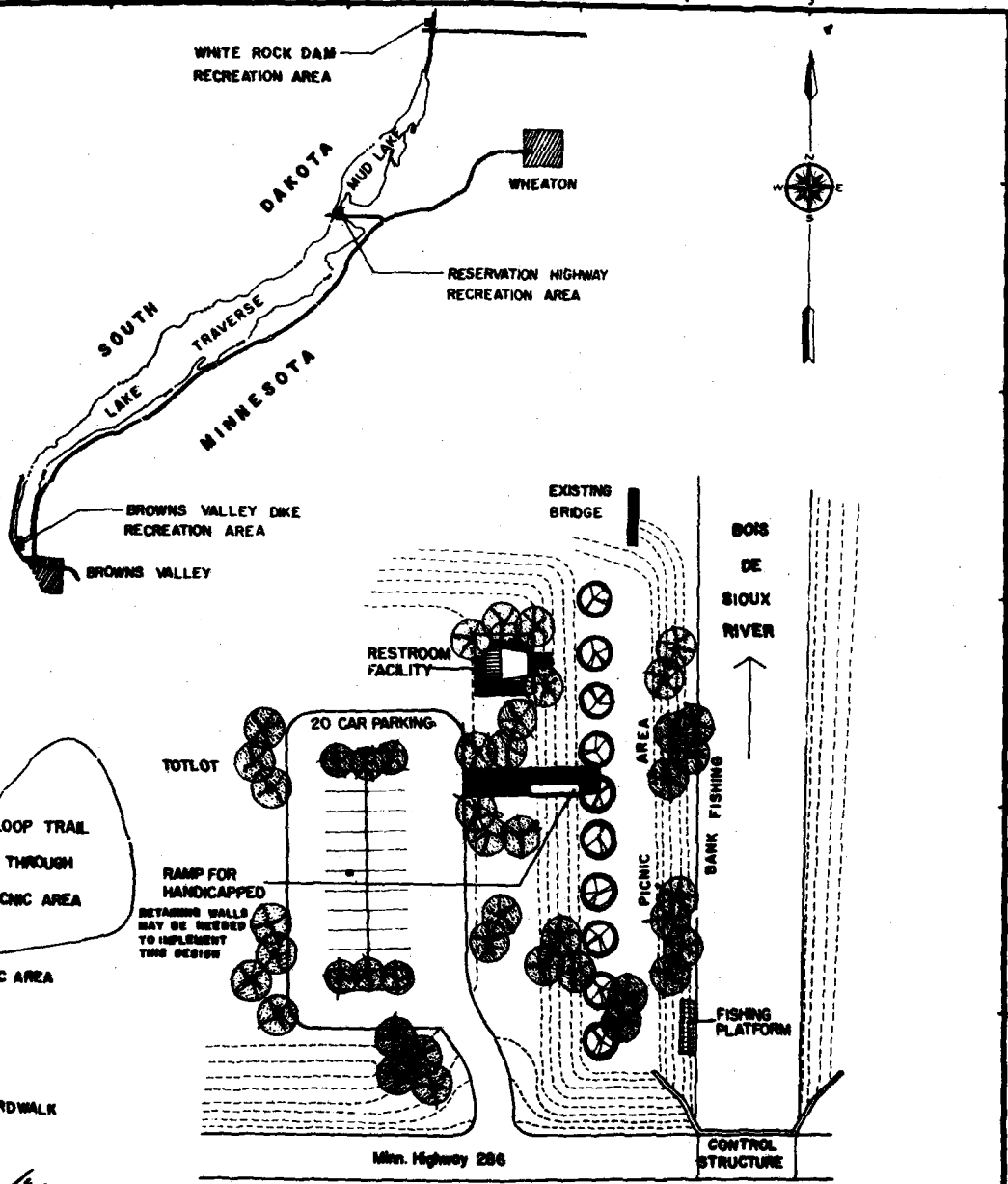
RESERVATION HIGHWAY RECREATION AREA



BROWNS VALLEY DIKE RECREATION AREA

SCALE 1" = 30'-0"







SCALE 1" = 30'-0"

**WHITE ROCK DAM RECREATION AREA**

0 10 20 30 40 50 100  
SCALE IN FEET

-  EXISTING VEGETATION
-  PROPOSED VEGETATION

|   |           |
|---|-----------|
| DATE  | APPROVED  |
| DEPARTMENT OF THE ARMY<br>ST PAUL DISTRICT CORPS OF ENGINEERS<br>ST PAUL, MINNESOTA |           |
| LAKE TRAVERSE<br>BOIS DE SIOUX RIVER, MINN., S.D.                                   |           |
| <b>PROPOSED FACILITIES MAP</b>  |           |
| MASTER PLAN FOR PUBLIC USE<br>DEVELOPMENT AND RESOURCE MANAGEMENT                   |           |
| DATE:   | JUNE 1976 |
| BY:   |           |
| CHECKED BY:   |           |
| DESIGNED BY:  |           |
| PLATE 4   |           |

2