DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT

RICE LAKE
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
SCOTT COUNTY, MINNESOTA

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RICE LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT

EXECUTIVE SUMMARY

Rice Lake is a shallow floodplain lake located on the right bank of the Minnesota River approximately 16.7 miles above the confluence of the Minnesota and Mississippi Rivers. Rice Lake lies within the Minnesota Valley National Wildlife Refuge. The lake covers about 170 acres, and ranges is depth from 18 inches to 3 feet during most growing seasons. Rice Lake provides habitat for migratory waterfowl, other migratory birds, and aquatic furbearers.

Rice Lake can experience highly variable water levels from year to year, much of which is the result of high water events on the Minnesota River. During years of high water, the water in Rice Lake is too deep for the growth aquatic vegetation, especially emergent vegetation. During years of low water, emergent vegetation chokes the lake, reducing habitat value for waterfowl and other wildlife. It is estimated that currently, optimal water level conditions for aquatic vegetation occur about 3 out of 10 years. There is no capability at this time for the Refuge to manage water levels in Rice Lake to improve this situation.

The Refuge has recently purchased a 40-acre agricultural field adjacent to Rice Lake. The opportunity exists to plant trees in this field in manner that will accelerate its reforestation and promote reforestation with a species mix similar to the native floodplain forest in this region.

A short distance below Rice Lake is a 70-acre emergent marsh that is a perched wetland, maintained by a natural river levee. Erosion from interior drainage has created a breach in the natural levee, which if left unchecked, would result in drainage and a reduction is size of this wetland. The Refuge has constructed a temporary berm on the inside of the natural levee to stop the drainage of this wetland.

The plan formulation process considered a number of alternatives for the habitat problems and opportunities in the Rice Lake area. For Rice Lake itself, the alternatives focused on providing the capability for the Refuge to manage water levels in Rice Lake to promote optimal growth of aquatic vegetation, especially emergents. Alternatives were identified and evaluated that would allow the Refuge to both draw down Rice Lake and to impound water in Rice Lake.

For the agricultural field a number of planting options were considered ranging from species composition to measures that would enhance survival and growth of the trees, such as pretreating planting sites and the use of tree tubes, mats, and mulch. For the breaching of the natural levee two alternatives were identified. The first was to stabilize the river bank and

the natural levee through the use of riprap, while the second was to reconstruct the temporary berm constructed by the Refuge to make it a more permanent solution.

The alternatives that achieved habitat objectives in the most cost effective manner were selected for the recommended plan. The recommended plan for Rice Lake is the excavation of a 2,530 feet long channel in and adjacent to the lake which would provide the Refuge the capability to draw down Rice Lake for habitat management purposes. At the outlet of the channel, a stop log control structure would provide the Refuge with the capability to raise Rice Lake water levels for habitat management purposes. It is estimated that with this water management capability, the Refuge will be able to optimize aquatic vegetation growth for migratory waterfowl and other wildlife approximately 3 out of 4 years, versus the estimated 3 out of 10 years that occurs now under unregulated conditions.

The recommended plan for the agricultural field is to plant 2-year old seedlings of floodplain forest tree species. The species mixture would be an approximation that which occurs in the natural floodplain forest in this area. Some measures would be used on a limited basis to enhance survival and growth of the trees. These include mechanical and chemical pre-treatment of planting sites, and the use of tree tubes, mats, and mulch for a limited number of trees.

The recommended plan for the natural levee is to reconstruct the temporary berm previously constructed by the Refuge to make it more permanent. An overflow spillway would be provided in the berm to prevent overtopping of the berm by interior drainage.

Total direct construction costs for the selected plan are $358,000. Costs for plans and specifications and construction management bring the total implementation cost to $463,000. Because the project is located entirely within the Minnesota Valley National Wildlife Refuge, the construction cost of the project would be 100 percent Federal, in accordance with Section 906(e) of the Water Resouces Development Act of 1986, as amended. Average annual operation and maintenance costs are estimated to be $2,876. The operation and maintenance requirements would be the responsibilty of the U.S. Fish and Wildlife Service.

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INTRODUCTION

1.1 AUTHORITY

The authority for this report is provided by Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The proposed project would be funded and constructed under this authorization. Section 1103 is summarized as follows:

Section 1103. UPPER MISSISSIPPI RIVER PLAN

(a)(1) This section may be cited as the Upper Mississippi River Management Act of 1966.

(2) To ensure the coordinated development and enhancement of the Upper Mississippi River system, it is hereby declared to be the intent of the Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system....The system shall be administered and regulated in recognition of its several purposes.

(e)(1) The Secretary, in consultation with the Secretary of the Interior and the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, is authorized to undertake, as identified in the Master Plan -

(A) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement....

1.2 PARTICIPANTS AND COORDINATION

Participants in the planning for the Rice Lake project include the Minnesota Valley National Wildlife Refuge and the Region 3 Offices of the U.S. Fish and Wildlife Service (USFWS) and the St. Paul District, Corps of Engineers.

The following individuals played an active role in the planning and design of the Rice Lake project. For St. Paul District personnel, the discipline and contribution of the individual planning team members are listed. For resource agency personnel, the individual's position title is listed.

ST. PAUL DISTRICT, CORPS OF ENGINEERS

Name	Discipline	Contribution
Gary Palesh	Fishery Biologist	Study Manager
Pete Fasbender	Wildlife Biologist	Environmental analyses, NEPA doc., HEP eval.
Sissel Johannessen	Archaeologist	Cultural resources
Jon Hendrickson	Hydraulic Engineer	Hydraulic analyses
Chris Schmitz	Civil Engineer	Hydraulic analyses
Joel Face	Civil Engineer	Geotechnical analyses
Gerald Blomker	Civil Engineer	Design and layout
Gary Smith	Civil Engineer	Cost estimating

U.S. FISH AND WILDLIFE SERVICE

Name	Position
Keith Beseke	Habitat Projects Coordinator
Terry Schreiner	Refuge Assistant Manager

1.3 PROJECT PURPOSE

1.3.1 RESOURCE PROBLEMS/OPPORTUNITIES

The purpose of this Definite Project Report is to document existing habitat conditions, predict future habitat conditions, identify existing and future habitat deficiencies, define specific objectives, identify alternative plans that would address the objectives, and recommend a selected plan for implementation.

1.3.2 PROJECT BOUNDARIES

The Rice Lake project is located on the right descending bank of the Minnesota River, approximately 17 river miles above its confluence with the Mississippi River (plate 1). The study area encompasses about a 400-acre area that incluces Rice Lake and the surrounding area (plate 2).

GENERAL PROJECT SELECTION PROCESS

2.1 ELIGIBILITY CRITERIA

A design memorandum (or implementation document) did not exist at the time of the enactment of Section 1103. Therefore, the North Central Division, U.S. Army Corps of Engineers, completed a "General Plan" for implementation of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP) in January 1986. The U.S. Fish and Wildlife Service, Region 3, and the five affected States (Illinois, Iowa, Minnesota, Missouri, and Wisconsin) participated through the Upper Mississippi River Basin Association. Programmatic updates of the General Plan for budget planning and policy development are accomplished through Annual Addendums.

Coordination with the States and the USFWS during the preparation of the General Plan and Annual Addendums led to an examination of the Comprehensive Master Plan for the Management of the Upper Mississippi River System. The Master Plan, completed by the Upper Mississippi River Basin Commission in 1981, was the basis of the recommendations enacted into law in Section 1103. The Master Plan report and the General Plan identified examples of potential habitat rehabilitation and enhancement techniques. Consideration of the Federal interest and Federal policies has resulted in the conclusions below:

a. (First Annual Addendum). The Master Plan report... and the authorizing legislation do not pose explicit constraints on the kinds of projects to be implemented under the UMRS-EMP. For habitat projects, the main eligibility criterion should be that a direct relationship should exist

between the project and the central problem as defined by the Master Plan; i.e., the sedimentation of backwaters and side channels of the UMRS. Other criteria include geographic proximity to the river (for erosion control), other agency missions, and whether the condition is the result of deferred maintenance....

b. (Second Annual Addendum).

(1) The types of projects that are definitely within the realm of Corps of Engineers implementation authorities include the following:

- backwater dredging
- dike and levee construction
- island construction
- bank stabilization
- side channel openings/closures
- wing and closing dam modifications
- aeration and water control systems
- waterfowl nesting cover (as a complement to one of the other project types)
- limited acquisition of wildlife lands (allowed per a 30 November 1994 letter from the Headquarters, U.S. Army Corps of Engineers)

(2) A number of innovative structural and nonstructural solutions which address human-induced impacts, particularly those related to navigation traffic and operation and maintenance of the navigation system, could result in significant long-term protection of UMRS habitat. Therefore, proposed projects which include such measures will not be categorically excluded from consideration, but the policy and technical feasibility of each of these measures will be investigated on a case-by-case basis and the measures will be recommended only after consideration of system-wide effects.

2.2 PROJECT SELECTION

Projects are nominated for inclusion in the District's habitat program by the respective State natural resource agency or the U.S. Fish and Wildlife Service based on agency management objectives. To assist the District in the selection process, the States and USFWS have agreed to use the expertise of the Fish and Wildlife Work Group (FWWG) of the River Resources Forum (RRF) to consider critical habitat needs along the Mississippi River and prioritize nominated projects on a biological basis. The FWWG consists of biologists responsible for managing the river for their respective agency. Meetings are

held on a regular basis to evaluate and rank the nominated projects according to the biological benefits that they could provide in relation to the habitat needs of the river system. The ranking is forwarded to the RRF for consideration of the broader policy perspectives of the agencies involved. The RRF submits the coordinated ranking to the District, and each agency officially notifies the District of its views on the ranking. The District then formulates and submits a program that is consistent with the overall program guidance as described in the UMRS-EMP General Plan and Annual Addendums and supplemental guidance provided by the North Central Division.

Projects consequently have been screened by biologists closely acquainted with the river. Resource needs and deficiencies have been considered on a pool-by-pool basis to ensure that regional needs are being met and that the best expertise available is being used to optimize the habitat benefits created at the most suitable locations.

The Minnesota Valley National Wildlife Refuge completed their Refuge Master Plan in the early 1980's. The Master Plan identified a number of fish and wildlife restoration and enhancement measures for the Refuge. With authorization of the UMRS-EMP, the Refuge through the U.S. Fish and Wildlife Service representative submitted a number of project for consideration under the UMRS-EMP. The Rice Lake project was one of those projects.

The Rice Lake project was ranked by the FWWG in 1987 in their initial ranking of projects. The Rice Lake project received a score of 28 and was ranked 20th in overall priority by the River Resources Forum (table 1-1). The Rice Lake project was the highest ranked project on the Minnesota Valley National Wildlife Refuge. As higher ranked projects were selected and studied, the Rice Lake project moved up in priority. The project was selected and programmed by the St. Paul District for study initiation in fiscal year 1993.

Table 1-1
FWWG Ranking of Projects in 1987*

Rank	Pool	Project	Score	Status
1	5	Spring Lake	39	1
2	5A	Polander Lake	38	2
3	8	Lower Pool 8 Island Creation	38	5
4	2	Spring Lake	38	11
5	7	Long Lake	37	10
6	9	Harper's Slough Islands	37	8
7	9	Capoli Slough	37	5
8	3	Sturgeon Lake	37	10
9	8	Head of East Channel	35	5
10	6	Blackbird Slough	35	9
11	6	Trempealeau NWR	27	3
12	8	French and Smith Sloughs	31	5
13	-	Miss. River Bank Stabilization	29	5
14	MN R.	Minn. River Bank Stabilization	31	11
15	8	Wildcat Landing	31	7
16	4	Bay City	30	11
17	8	Root River Sediment Trap	29	11
18	9	Old Raft Channel	29	9
19	4	Wabasha Slough	29	10
20	MN R.	Rice Lake	28	5

* as approved by the River Resources Forum (formerly Channel Maintenance Forum)

Status Code
1 - Construction completed
2 - Under construction
3 - Construction approved but not initiated
4 - Study completed and awaiting construction approval
5 - Under study
6 - Completed in conjunction with Winters Landing project
7 - Completed in conjunction with Pool 8 Islands Phase I project
8 - Study scheduled
9 - Study unscheduled
10 - Project in deferred status
11 - Project no longer under consideration under EMP

ASSESSMENT OF EXISTING RESOURCES

3.1 PHYSICAL SETTING

The Minnesota River drains much of southwestern Minnesota, and flows northeastward into the Twin Cities metropolitan area towards its confluence with the Mississippi River. The Minnesota River valley in the metropolitan area is 1 to 2 miles wide and is bordered by bluffs which, in some locations, extend a few hundred feet in elevation above the river.

Most of the river floodplain is a mosaic of bottomland forest and marsh habitats. In limited areas, portions of the floodplain are farmed. Development in the form of grain terminals, quarries, and landfills are present in the floodplain, and a number of highways and railroads bisect the area. As this reach of the river is within the Twin Cities metropolitan area, much of the upland area bordering the river valley is developed or rapidly becoming so.

The Minnesota Valley National Wildlife Refuge (Refuge) covers about 13,000 acres of the river valley, extending from river mile 4 to river mile 35 on the Minnesota River. The Refuge was established in 1976, and is one of the few national wildlife refuges located within a major metropolitan area.

3.2 WATER RESOURCES

3.2.1 RICE LAKE

Rice Lake is a floodplain lake located on the right bank of the Minnesota River at approximately river mile 16.7, and is separated from the river by higher ground. At its closest point, Rice Lake is about 1,000 feet from the river. The lake has no defined inlet, and outlets to the Minnesota River via an unnamed creek (plate 2). Rice Lake is shallow with maximum water depths of 18 inches to 3 feet during most growing seasons. The size of the lake varies with water depths. At a water surface elevation of 696.0, the lake is about 170 acres in size. The drainage area of the lake has been estimated at 650 acres (Sunde, 1975).

During a "normal" hydrologic season, Rice Lake will rise in elevation during the spring runoff period. This rise will usually be caused by snowmelt and precipitation runoff, and/or high water on the Minnesota River either blocking outlet flow or backing up into Rice Lake via the outlet creek. Spring floods on the Minnesota River need only rise above elevation 702-703 to inundate Rice Lake.

Once the spring high water recedes, the water surface elevation of Rice Lake declines during the summer due to outlet discharges and evapotranspiration. However, groundwater inflows in the range of 4-5 acre feet per day (Sunde, 1975) help maintain the lake during the summer period. For example, during the summer of 1975, the surface elevation of the lake declined only about 1.5 feet from late May to late August.

No water quality data is available for Rice Lake. However, given its physical characteristics, the following can be assumed. Due to its shallow, fertile nature, the lake undoubtedly goes anoxic during the winter. Diel dissolved oxygen depletion also probably occurs during the summer months. Minnesota River flooding would introduce suspended sediments and produce turbid conditions during the spring and other high water periods. During the summer suspended material would settle out and the water in Rice Lake probably becomes clearer. No water quality problems have been identified that adversely affect the quality of Rice Lake as habitat for migratory birds and aquatic mammals.

3.2.2 MINNESOTA RIVER

The Minnesota River is a major tributary of the Mississippi River that drains more than 16,000 square miles of southern and southwestern Minnesota. The Minnesota River watershed is primarily agricultural. This, along with urban development along the river, results in water quality degradation. The most visible water quality problem is turbidity caused by high levels of suspended sediments. Other water quality problems have been associated with cultural contaminants such as agricultural chemicals and coliform bacteria.

3.2.3 EAGLE CREEK

Eagle Creek rises from Boiling Springs, located about one mile south of Rice Lake (plate 2). The creek flows north-northeast to the Minnesota River, passing about one-half mile to the east of Rice Lake. The outlet creek for Rice Lake flows into Eagle Creek shortly before Eagle Creek enters the Minnesota River. The distance between the confluence of the outlet creek with Eagle Creek and the confluence of Eagle Creek with the Minnesota River is less than one hundred feet.

Eagle Creek, a trout stream, has good water quality because it is primarily fed by springs. The higher quality trout habitat is located near its headwaters. At the point where the Rice Lake outlet creek enters, the habitat quality of Eagle Creek for trout is greatly diminished.

3.3 GEOLOGY AND SOIL/SUBSTRATE

The region surrounding the Rice Lake area was glaciated extensively during the Pleistocene Epoch. Advancing and retreating glaciers laid down thick deposits of unsorted till and outwash sand that today form a hummocky, poorly-drained plain dotted with numerous marshes and small lakes. The glacial drift can reach thicknesses of between 200 and 250 feet, and it overlies dolomitic limestone and sandstone of the Prairie du Chien and Jordan Formations.

The wide valley of the present Minnesota River was carved by Glacial River Warren, which carried large volumes of water discharging from the now-extinct Glacial Lake Agassiz located in western Minnesota and eastern North Dakota. Glacial River Warren cut deeply into bedrock, scouring and reworking an earlier valley filled with outwash, stratified drift, and till. Episodic increases in flow caused Glacial River Warren to cut lower into the older valley, leaving remnants of higher channel bottoms as terraces. When Lake Agassiz eventually ceased to drain to the south, the Minnesota River was formed by local drainage and established its present floodplain in the valley.

Three alluvial and bedrock terraces rise above the Minnesota River floodplain and form regionally prominent benches which parallel the river valley. The lower terrace is 30 to 50 feet above the floodplain, the middle terrace is 75 to 115 feet above the floodplain, and the upper terrace is between 120 and 180 feet above the floodplain. The walls of the river valley form a bluff that grades into a hummocky, poorly-drained regional highland.

3.4 HABITAT TYPES AND DISTRIBUTION

The lower Minnesota River valley is dominated by a northern floodplain forest plant community located in the prairie-forest transition zone. As the steep bluffs and wetlands of the Refuge made it unsuitable for development and agriculture, it provides some of the largest acreages of natural vegetation in the metropolitan area.

The original survey data indicates the lower Minnesota River valley was 30% bottomland forest, 30% marsh, and 40% wet meadow. Curently the marsh and aquatic habitat type comprises the largest portion of the Refuge at approximately 32%. The vegetation composition of this habitat type is mainly river bulrush, softstem bulrush, cattail, bur-reed, water lily, smartweed, arrowhead, wild rice, and lotus.

Bottomland hardwoods make up 26% of the Refuge and is dominated by elm, silver maple, cottonwood, willow, and basswood. Understory vegetation is willow shrubs, red-oiser dogwood, alder, sumac, little bluestem, and field

thistle. Wet meadow habitat occurs on 12% of the refuge and is dominated by common reed, reed canary grass, and prairie cordgrass.

Upland portions of the Refuge occur on approximately 10% of the area. The dominant tree species are elm, oak, boxelder, aspen, and cottonwood. The shrubs include roundleaf and grey dogwoods, sumac, hazel, chokecherry, sage, rose, prickly ash, and prickly ribes. The dominant forb and grasses are prairie bush clover, field thistle, yellow sweet clover, yarrow, common milkweed, little and big bluestem, Indian grass, Canada wild rye, and switchgrass. Habitat types dominated by human intervention (orchards, agriculture, etc.) occur on 20% of the Refuge lands.

Rice Lake is 170 acres at 696 msl with 3 miles of shoreline. During normal water conditions, the water supply is from natural springs and seepage. The lake outlets into Eagle Creek at its confluence with the Minnesota River. It is a palustrine system and in certain years is dominated by emergent vegetation in nearly 100% of the lake basin. In other years, vegetation is less dense or absent in coverage. It has an average water depth of 1 foot, with a maximum depth of 3 feet. The surface substrate contains a large portion of loose organic fragments over mud.

3.5 FISH AND WILDLIFE

The wildlife present in the lower Minnesota River valley occur there because of the interspersion of the habitat types. Predominant species in the area include waterfowl, wading birds (herons, egrets, and rails), pheasant, white-tailed deer, muskrat, raptors, and songbirds. About 50% of the area is dabbling duck breeding and feeding habitat, but less than 25% is suitable nesting habitat. Wood duck nesting habitat is less than 5% but feeding habitat occurs on 40% of the area.

There have been 275 species of birds recorded within the river valley during migration, 100 of which nest within the refuge. The diverse habitats within the floodplain support a large number of birds during migration. The river valley provides wildlife with food, shelter, and breeding pair habitat during migration. Even though migratory use of the refuge is the most visible and intensive, wildlife production is good due to the diversity of habitats and the isolation within an urban area.

Forty-nine species of fish were collected within the Minnesota Valley National Wildlife Refuge in a recent survey (Yess 1993). Many of the lakes adjacent to the Minnesota River have a maximum water depth of 5 feet and are prone to winter kill situations limiting their fishery potential. The Minnesota River contains a diverse fish assemblage, but due to water quality

conditions fish consumption advisory are in place.

Rice Lake is probably important as a spawning and nursery area if water conditions provide access and egress for adult fish and egress for the young-of-the-year fish. It was estimated Rice Lake would be inundated by high water conditions in 17 out of 50 years. Most of these high water conditions would occur in the spring during the spawning season. In these conditions, spawning activity would take place. Fish egress would be a problem when the lake is at or below normal water level conditions. If spring water conditions do not overtop the banks to flood Rice Lake, it is unlikely any spawning activity occur due to the absence of fish because of winterkill conditions. Because of these factors, Rice Lake does not substantially contribute to sustaining local fish populations.

3.6 CULTURAL RESOURCES

The Minnesota River valley shows evidence of human occupation for thousands of years. Many archaeological sites are known along the river valley, including Late-Middle and Late Woodland period (A.D. 300-1700) habitation and mound sites, village sites of the Oneota (A.D. 900-1700), and historic Dakota village and burial sites. Sites occur both on the uplands overlooking the river valley and within the valley on or near the floodplain. There is a major concentration of known sites near the Rice Lake project area. Eight sites are within one mile of Rice Lake, including the Bloomington Ferry site (21 HE 17), orginally consisting of 95 mounds, and determined eligible for the National Register of Historic Places.

The present route of County Highway 18 and the Bloomington Ferry Bridge across the Minnesota River just north of Rice Lake is a river crossing of considerable antiquity. The Minnesota Valley Trail of the Red River oxcart routes forded the river here in the 1820s-50s, en route to Fort Snelling and St. Paul. The ford had reportedly been long used by Indians. A ferry was established at this crossing in 1852. The ferry was located just east of the bridge that put the ferry out of operation in 1890. The existing Bloomington Ferry Bridge was built in 1977, replacing the original center-pivot swing bridge, the second to be built over the Minnesota River in the metropolitan area.

The potential for sites in the floodplain in the Rice Lake area is shown by two small sites (21 SC 36 and 21 SC 37) just west of Rice Lake near the Highway 18 - Highway 101 interchange. These sites, with Late Woodland and early historic components, were determined eligible for the National Register of Historic Places. Also, an eroding human skeleton and adjacent agricultural field containing artifacts have been reported on the north bank of the river

about five miles upstream of the study area (Section 31, T116N, R22W).

A cultural resources survey of the project area, including surface reconnaissance and sub-surface testing, revealed no archaeological or historic properties in the immediate project area.

PROJECT OBJECTIVES

4.1 PROBLEM IDENTIFICATION

4.1.1 RICE LAKE

4.1.1.1 Existing Habitat Conditions

Rice Lake is a 170 acre lake with maximum water depths typically ranging from 18 to 36 inches during the growing season. The aquatic vegetation within Rice Lake can be described as cyclic. Some years, the emergent vegetation coverage can be close to 100%, while in other years it is absent. For example, in 1993 (a very wet year), the lake was devoid of vegetation due to high water levels except around the lake perimeter. In 1994, the lake was choked with emergent vegetation to the point where there was little or no open water present.

The dominant emergent vegetation species at Rice Lake are river bulrush, softstem bulrush, and broad-leaved arrowhead. The drier sites are dominated by giant reed grass, reed canary grass, and jewelweed. Upland portions around Rice Lake are dominated by timothy, brome, various sedge species, asters, stinging nettle and milkweed. The forested portions contain green ash, silver maple, American elm, cottonwood, and willow with an open understory in much of the area comprised mainly of wood nettle, reed canary grass, foxtail barley.

The Rice Lake basin has little bathymetric relief. During high water conditions sedimentation has been deposited evenly throughout the lake. There are two main factors that dictate vegetation composition within an aquatic system: water depth and substrate type. Flooding is reponsible for depositing layers of homogonous alluvium. Because there is neither different sediment types or bathymetric change in Rice Lake, the vegetation has low diversity.

Waterfowl use of Rice Lake is presently limited because dabbling ducks prefer wetlands with a open water to emergent vegetation ratio of 1:1. Sediment conditions are typical of a basin with stable water conditions. After a period of prolonged flooding the soils become flocculent and often float in suspension, making it difficult for aquatic plants to take root and grow.

Rice Lake is inundated by high water events on the Minnesota River. An analysis of hydrographs for seven years during the period 1975-1992 indicates that the lake was inundated during the spring runoff 6 of the 7 years evaluated. In 6 of the 7 years the lake was also inundated by summer high water occurring during June-July. In 3 of the 7 years the lake was inundated by fall high water occurring during September-October. The incidence of summer

and fall flooding is higher than what would be expected under natural conditions. It is believed that because of the extensive land use changes that have occurred in the Minnesota River watershed, runoff is more rapid, and a higher frequency of summer and fall high flows is occurring.

4.1.1.2 Historically Documented Changes in Habitat

Although general habitat changes can be inferred from the historic habitat conditions stated above, specific habitat changes have not been thoroughly documented. Hydrological changes are responsible for much change within the Minnesota River valley. The attempt to control flows of the Minnesota River has affected the area wetlands in a number of ways and the clearing of forest habitat has also changed the pattern of alluvial deposition.

4.1.1.3 Estimated Future Habitat Conditions

Without any modifications to Rice Lake, habitat conditions would not improve for fish and wildlife. Water levels within Rice Lake would be controlled by either high water events from the Minnesota River or normal summer conditions. Drawdowns or other planned water level management to benefit habitat conditions would not be possible. A natural drawdown is unlikely to occur here because of the high input of water from springs and natural elevation controls. The aquatic vegetation would continue to be cyclic, limiting long-term fish and wildlife use of the area.

4.1.2 FARM FIELD

4.1.2.1 Existing Habitat Conditions

The 40-acre farm field lying north of Rice Lake, between the lake and the Minnesota River (plate 3), was recently purchased by the U.S. Fish and Wildlife Service and incorporated into the Minnesota Valley National Wildlife Refuge. In 1993, the field was still used for crop production. On the Minnesota River side (north), the field is separated from the river by a band of mature bottomland forest ranging in width from 50 to 100 feet. At the eastern end of the field this riparian strip of forest has been lost to erosion and the field abuts the river.

Rice Lake lies to the south of the field. To the west, separated from the field by a narrow band of mixed forest, is old County Road 18. East of the field is a stand of bottomland forest. Historically, this field has been used for crops such as corn and soybeans. The field's wildlife habitat value is low. This area has been in a corn and soybean rotation since 1900. Its value to wildlife during the growing season would have been as marginal cover for a variety of birds and mammals. Use would have increased in the field from harvest to spring planting as wildlife feed in the area. In 1994 the field was left fallow and became overgrown with a variety of pioneer grass and forb species.

4.1.2.2 Historically Documented Changes in Habitat

Upon settlement, the river valley was primarily forested with interspersed marsh habitats. Today there is a fragmented forest valley interspersed with riparian wetland habitat and agricultural fields. This 40 acre field was converted from riparian wooded habitat dominated by cottonwood, American elm, silver maple, willow, and basswood to an agricultural field used in corn and soybean rotation. Historic fish and wildlife use decreased once the bottomland forest and the associated understory were cleared. Forest dwelling wildlife do not use the area for any life requisite except feeding. Spawning habitat has also been eliminated so fish use during high water conditions is incidental.

4.1.2.3 Estimated Future Habitat Conditions

With no active management, the farm field would progress through the natural stages of vegetative succession, with the climax community eventually being mature bottomland forest. The field would initially be revegetated with plant invader species (i.e. weedy species). These species would dominate the field until either grasses or saplings would become established. The tree species that would most likely become established would be the cottonwood

because of its habit of dispersing light and numerous seeds. Mast producing species are not likely to grow in this area naturally for many years. This is because the mast is not dispersed effectively without help from wildlife, especially squirrels. Use of the field by squirrels would not occur until the forest becomes reestablished. Also, mast producing trees usually have slower growth habits than cottonwoods. Naturally occurring mast saplings will be outcompeted by the faster growing cottonwoods.

How long it would take to develop a mature forest on this site through natural succession is difficult to predict. Observations of natural succession on other areas of the Refuge indicate that after 20 years, the field will likely be fully vegetated by brush and tree saplings. Succession to a mature bottomland forest would probably take another 80 to 100 years, or 100 to 120 years from the present.

4.1.3 MINNESOTA RIVER BANK

4.1.3.1 Existing Habitat Conditions

Starting at the upsteam end of the study area, the Minnesota River bank consists of the riparian strip of mature bottomland forest noted above. The predominant tree species is cottonwood. Also as noted above, at the eastern end of the farm field, this riparian strip of forest is gone and the field abuts the river.

East of the field for approximately 900 feet, the river bank is vegetated by mature bottomland forest. This wooded area extends back from the river bank for several hundred feet. It is in this area that Eagle Creek and the Rice Lake outlet creek merge and enter the Minnesota River.

Continuing downriver, the top of the river bank is vegetated by willows and tree saplings. In one place, the natural levee has been breached. This breaching has occurred from the interior, i.e., the return of overbank flood waters to the river has eroded a breach in the soft soils of the natural levee.

Lying behind the natural levee in this area is a 70-acre floodplain marsh. This marsh is perched, and the breaching of the natural river levee noted above threatens to drain the marsh. The U.S. Fish and Wildlife Service has constructed a low temporary berm behind the natural levee to prevent this drainage. At the lower end of the study area and beyond, the river bank is again vegetated by mature bottomland forest.

Thoughout the study reach, the river bank is a steep and eroding, extending 8-12 feet above the river. The slope of bank ranges from 1V:2H to 1V:4H. The slopes of the banks are not vegetated.

4.1.3.2 Historically Documented Changes in Habitat

The banks of the river are steep and unvegetated. A comparison of 1937, 1964, 1984, and 1994 aerial photographs using computer technology indicate that the river banks in the study area during the period 1937-94 eroded back 15 to 45 feet depending on location. While the steep, raw banks give the impression of significant erosion, it appears that in this particular reach the river channel has remained relatively stable during this time period with little lateral migration.

The natural levee in the lower portions of the study reach has been breached. The breaching appears to have been primarily caused by water overflowing from the wetland towards the river, probably following a high

water event. These flows back to the river have eroded a cut in the soft river bank soils. The narrowing of the natural levee over time by bank erosion may have contributed to this by narrowing the natural levee to the point where a low spot transversed the entire levee, allowing the concentration of overflow back to the river in that spot.

Left unchecked, this would have led to the drainage of the perched 70-acre wetland lying behind the natural levee. The Refuge has constructed a low berm behind the natural levee to prevent the drainage of this wetland. This berm was constructed as a stop gap measure and would have to be upgraded to serve as a long-term solution.

4.1.3.3 Estimated Future Habitat Conditions

The Minnesota River Bank would continue to erode. Based on the rate of bank loss observed during the 1937-94 period, it is estimated that during the next 50 years an additional 25-50 feet of bank could be lost, along with the mature bottomland forest growing there.

In the lower reaches of the study reach, breaching of the natural levee will like continue in the future. This levee is highly vulnerable to cutting from water flowing from the wetland towards the river. This occurs after the entire floodplain is inundated by a high water event. The river level drops and water flows from the wetland towards the river. This problem will likely occur at a somewhat greater frequency in the future as bank erosion slowly narrows the natural levee. The low berm constructed by the Refuge will slow down this process, but is not considered a long-term solution as it has an uneven profile and no armored overflow spillway.

4.2 PROJECT OBJECTIVES

4.2.1 INSTITUTIONAL FISH AND WILDLIFE MANAGEMENT GOALS

Fish and wildlife management goals and objectives for the area fall under those defined more broadly for the Minnesota National Refuge, and those designated specifically in the Refuge Master Plan. The management objectives of the Minnesota Valley National Wildlife Refuge which apply most directly to the study area are discussed below.

4.2.1.1 General Objectives

The general Refuge objective is to manage the natural resources in order to perpetuate wildlife species and ecological communities' natural diversity and abundace, as well as provide opportunities for wildlife-oriented recreation and an educational center for the study of natural systems. The intent is to restore and/or maintain the naturally occurring plant communties with the idea that if the habitats are present and healthy, the wildlife will be there.

4.2.1.2 Wilkie/Rice Lake Unit Objectives

Rice Lake is part of a larger management unit on the Refuge called the Wilkie/Rice Lake unit. This management unit covers about 2,100 acres and extends along the south bank of the Minnesota River for approximately 4 miles. The main objective in this unit is to restore and/or maintain the unique valuable wildlife habitats and provide for public use.

Managers will focus on the protection and study of the heron rookery; the restoration and protection of oak savanna, floodplain forests and prairies; and management of water levels in the marsh complexes.

Water control structures will be installed to allow wetland management of Blue, Fisher, and Rice Lakes. Rice Lake in particular, is heavily dominated by emergent vegetation with over 90% of the surface area covered in many years. Water level manipulation will be needed to create a desirable interspersion of open water and emergent vegetation.

Areas of oak savanna, floodplain forest and prairie will be restored and/or maintained in native species.

Because the study area is within the Minnesota Valley National Wildlife Refuge, these management objectives, together with input from State and Federal agency natural resource managers, were used to guide the development of specific project objectives.

4.2.2 PROJECT GOALS AND OBJECTIVES

4.2.2.1 Rice Lake

General Habitat Goals

The habitat goal for Rice Lake is to maintain the lake as a shallow floodplain lake/marsh to provide high quality habitat for migratory birds and aquatic wildlife. This goal is in accordance with the overall Refuge goals and objectives, and the more specific management objectives of the Wilkie/Rice Lake management unit.

Water levels in Rice Lake are influenced to a large degree by Minnesota River levels. Minnesota River levels in the study area no longer follow a natural pattern because of the drainage and development that has taken place in the watershed.

Specific Project Objectives

Objective RL1 - Provide the ability to draw down water levels in Rice Lake.

The ability to draw down Rice Lake would increase management capability to meet the habitat goal of providing high quality habitat for migratory birds and aquatic wildlife. Summer drawdowns in certain years would compact and settle the muck layer, and would enhance oxidation and decay of the organic material. Settling of the sedimentation would also diversify the basin topography, increasing vegetative heterogeniety. Drawdowns usually result in excellent growth of moist soil species, such as smartweeds, millets, sedges, etc.

Objective RL2 - Provide the ability to raise and maintain water levels in Rice Lake.

The ability to raise and maintain water levels in Rice Lake would increase management capability to meet the habitat goal of providing high quality habitat for migratory birds and aquatic wildlife. Higher water levels than normal could be maintained in certain years to benefit submergent vegetation and to improve the open water to emergent vegetation ratio. In addition, sustained high water levels can be used to control encroachment by woody vegetation and by exotic species such as purple loosestrife.

4.2.2.2 Farm Field

General Habitat Goals

The general habitat goal for the farm field is to restore the site to mature bottomland forest habitat with the species variety typically found under natural conditions.

Specific Project Objectives

Objective FF1 - Revegetate 40 acres of farm field in a manner that will accelerate the vegetation succession process as much as practicable, and promote succession to a diversity of native species that provide high quality wildlife habitat.

This objective was devloped to meet the goal of establishing bottomland forest habitat on this field in a manner faster than the estimated 100 - 120 years it would take to accomplish this under natural succession. This objective would also meet the goal of reestablishing the diversity of vegetation that would be expected under natural conditions, and to take advantage of the opportunity available to revegetate with species of value to wildlife. Because of past agricultural use, the topography of the field is flat. Under natural succession, the field would be more likely to revegetate in a monotypic stand of a species such as cottonwoods.

4.2.2.3 Minnnesota River Bank

General Habitat Goals

One of the primary habitat goals of maintaining the Minnesota River bank in the study area is to prevent the loss of a 70-acre floodplain marsh due to breaching of the natural levee. In addition, maintaining the river bank will reduce the loss of mature bottomland forest and other floodplain habitats that provide fish and wildlife habitat.

Specific Project Objectives

Objective MRB1 - Maintain 1,300 feet of natural levee between river miles 15.40 and 15.65.

This objective was developed to meet the goal of preventing the loss of the perched wetland created by the natural river levee along this reach of the river bank.

Objective MRB2 - Maintain 1,300 feet of river bank between river miles 15.65 and 15.90.

This objective was established to prevent the loss of riparian bottomland forest and the habitat values it provides.

ALTERNATIVES

5.1 PLANNING OPPORTUNITIES

Wildlife habitat mitigation measures currently being implemented as part of the construction of the new County Road 18 bridge include water control and outlet facilities that can be used to discharge water from Rice Lake.

The farm field lying between Rice Lake and the Minnesota River was still cropped in 1993. Thus, the opportunity exists to manage this field in any manner desired, without any constraints imposed by encroaching brush and saplings.

5.2 PLANNING CONSTRAINTS

5.2.1 INSTITUTIONAL

Any habitat improvement measures developed must be consistent with Minnesota Valley National Wildlife Refuge management goals and objectives.

5.2.2 ENGINEERING

The invert elevations of the culverts installed in the reconstruction of County Road 18 are set at 693.1. This would be the lower limit of drawdown capability if Rice Lake water is discharged to the Minnesota River via the drainage along County Road 18.

5.2.3 ENVIRONMENTAL

No specific environmental constraints have been identified.

5.2.4 CULTURAL

Cultural resource surveys of the project area have identified no constraints from a cultural resource perspective.

5.2.5 SOCIOECONOMIC/RECREATIONAL

The Minnesota Valley National Wildlife Refuge is located within an urban area. Any habitat restoration measures considered must take into consideration the high level of public use that takes place on the Refuge and the visibility to the public.

5.3 ALTERNATIVES IDENTIFIED

5.3.1 NO ACTION

The no action alternative is defined as no implementation of a project under the UMRS-EMP to modify habitat conditions in the Rice Lake area of the Minnesota Valley National Wildlife Refuge.

5.3.2 RICE LAKE

5.3.2.1 Objective RL1

The following alternatives were identified that would meet the project objective of providing the capability to draw down Rice Lake.

West Outlet (Channel to Cty Road 18)

With this alternative, a channel would be excavated from the low point in Rice Lake in a northwesterly direction to old County Road 18. Water draining via this channel would enter existing water control facilities at old County Road 18 and eventually drain to the Minnesota River.

East Outlet (Channel to and along Natural Outlet)

With this alternative, a channel would be excavated from the low point in Rice Lake in a east-southeasterly direction to the lake's natural outlet. It is likely that some excavation in the outlet creek would be necessary to insure the capability to draw the lake down to the desired elevation.

Pumping Facilities

Construction of pumping facilities that would allow Rice Lake to be drawn down by pumping. Minimum facilities would consist of at least a channel in the lake, a sump, portable pumps, and discharge hoses or pipes. More elablorate facilities in the form of a fixed pumping station could be required.

5.3.2.2 Objective RL2

The following alternative was identified that would meet the project objective of providing the capability to raise and maintain Rice Lake water levels.

Outlet Controls

This alternative would involve placing a sill or plug on the existing natural outlet and adding a control structure to the culvert under old County Road 18.

5.3.3 FARM FIELD

Innumerable revegetation alternatives could have been developed for the farm field to accelerate vegetation succession towards a mature bottomland forest community. The most practical approach was to develop a plan that meets project objectives, and to then modify the plan as needed to make it cost effective.

5.3.4 MINNESOTA RIVER BANK

The project objectives are to maintain 2,600 feet of the Minnesota River bank and/or natural levee from river mile 15.40 to 15.90. The reach of river bank under study was broken down into distinct segments based on site conditions. Each segment was evaluated independently. The segments are shown on plate 3 and were defined as follows:

Segment A - A 1,300-feet reach from river mile 15.40 to river mile 15.65. This reach encompasses that portion of the river where erosion is threatening the natural levee that sustains the 70-acre perched wetland behind it.

Segment B - A 500-feet reach from river mile 15.65 to river mile 15.75. This reach covers an area where the bank is vegetated by bottomland forest and includes the mouth of Eagle Creek.

Segment C - An 800-feet reach from river mile 15.75 to river mile 15.90. This reach includes the lower portion of the riparian forest strip separating the farm field from the river and also that portion of the farm field abutting the river.

Within segments B and C, it was determined that the only practical method to use to stabilize the river bank was rock protection. The banks in these segments are steep and extend down to 15 feet or more below normal river levels. In addition, these bank segments are located at and immediately adjacent to an outside bend of the river with high current velocities.

The purpose of stabilizing the river bank in segment A is different from that in segments B and C. In this reach, the primary purpose is to prevent the breaching of the natural levee and the subsequent drainage of the perched wetland behind it. Rock protection would stabilize the river bank and prevent the loss of the natural levee. However, since flow from behind the levee towards the river appears to be the primary cause of the current breach in the levee, preventing breaching of the natural levee would also be possible from the backside. This could be done through reconstruction of the berm constructed by the Refuge and providing an outlet for interior drainage overflows in a manner that would not cause erosion of the natural levee.

5.4 ALTERNATIVES ELIMINATED DURING PLANNING

5.4.1 RICE LAKE

5.4.1.1 East Outlet

With this alternative, the excavated channel within Rice Lake would be 2,500 to 3,000 feet long as compared to a 1,000 to 1,500-feet long in-lake channel with the west outlet alternative. Thus, the cost of an outlet to the east would likely be double that of the west outlet channel in excavation costs alone.

Under the east outlet alternative, a portion of the excavated channel would have to go through a marsh on the east side of Rice Lake. Any excavation in the outlet creek would likely require some clearing activity for construction access. Therefore, there would be substantially more adverse environmental impact associated with construction of the east outlet alternative.

Because of the expected higher cost and greater environmental impact, the east outlet alternative was eliminated from further consideration during initial alternatives screening.

5.4.1.2 Pumping Facilities

An initial evaluation indicated that the cost of pumping facilities for lake drawdown would cost as much or more than a gravity outlet to the west. With this option, a channel would still be required from the low spot in the lake to the west shore of the lake to convey the water to a pump sump. Thus, the only potential savings would be from not having to excavate a channel from the shoreline to old County Road 18, an estimated $30,000 -$40,000. These costs would be more than offset by the costs to construct a sump and purchase a pump of sufficient capacity (11,000 gpm) to draw the lake down. In addition, the pumping option would require considerable operation and maintenance expense. Therefore, the pumping facility alternative for lake drawdown was eliminated from further consideration during initial alternatives screening.

5.4.2 FARM FIELD

Because development of a planting plan for the farm field was an iterative process, no specific alternative was eliminated from detailed evaluation. As various planting options and measures were identified, some were eliminated or reduced, primarily because they were considered too costly for the benefits they might produce.

The initial reforestation plan developed was to plant trees at a rate of approximately 600 per acre over the 40-acre field, requiring 24,000 trees. Of this total, 22,200 trees would be 2-year old seedlings and 1,800 tree would be 1" dbh and 2.5" dbh trees. The larger trees would be used to diversify the age structure to some degree. Included within this plan to promote tree survival was the mechanical and chemical pre-treatment of approximately 13,200 individual planting sites, the installation of approximately 7,200 tree tubes and 3,600 tree mats, and the placing of mulch around 7,200 trees. The nature of this plan essentially required all 24,000 trees to be hand planted. The estimated cost of implementing this plan was approximately $335,000. This cost was considered excessive for the potential benefits to be achieved.

The following measures were taken to reduce the cost of the planting plan:

a. The use of measures to enhance tree growth and survival were substantially scaled back. This not only reduced the material and labor costs associated with these specific measures, it allowed the majority of the trees to be machine planted, another cost saving measure.

b. Planting densities were reduced from 600 to 400 tree per acre where measures to enhance tree survival would be employed.

c. The planting of 1" and 2.5" dbh trees was eliminated because of the high individual costs of purchasing and planting these larger trees.

5.4.3 MINNESOTA RIVER BANK

An initial design and cost estimate showed that to stabilize the river bank in segment B using standard rock protection would cost approximately $135,000, or $270 per running foot of river bank. The average annual cost would be $11,035. Stabilization of this reach would prevent, at most, the loss of about 1.15 acres of riparian habitat over the next 50 years. Assumming a maximum habitat value (HSI = 1.0), the maximum benefits that could be provided would be .575 average annual habitat units (AAHU). The cost/benefit of stabilizing this river bank would be approximately $19,191/AAHU. Even if the maximum acreage and habitat value assumptions were to hold true under more detailed evaluation, a cost of $19,191/AAHU was not considered even remotely justifiable. Following this initial review, no further evaluation of bank stabilization in segment B was conducted and this alternative was eliminated from further consideration.

A similar evaluation was conducted for segment C. The results were an implementation cost of $208,000; an average annual cost of $17,000; $298 per running foot of river bank stabilized; a maximum of 1.6 acres of riparian habitat preserved; a maximum benefit of .8 AAHU; and a best possible cost/benefit of $21,250/AAHU. This cost was not considered even remotely justifiable, and the alternative of stabilizing the river bank in segment C was eliminated from further consideration.

5.5 ALTERNATIVES CONSIDERED IN DETAIL

5.5.1 NO ACTION

Under the no action alternative, no project would be implemented under the UMRS-EMP to modify habitat conditions in the Rice Lake area of the Minnesota Valley National Wildlife Refuge.

5.5.2 RICE LAKE

5.5.2.1 Alternative O-1 (West Outlet)

Alternative O-1 is the construction of an outlet channel to old County Road 18 to provide the capability drawn down Rice Lake. The outlet would be constructed from the low spot in Rice Lake approximately 1,730 feet in a westerly direction to the west shoreline of the lake (plate 4). From there, the channel would follow an existing drainage way approximately 800 feet to old County Road 18.

The channel in the lake would be excavated to elevation 692.5, would have a bottom width of 10 feet, and side slopes of 4H:1V (plate 5). It is estimated that 3,300 cubic yards would be excavated from the lake to create the channel.

The channel between the lake and old County Road 18 would have the same general cross-section (plate 5). However, in this reach a maintenance road would be constructed along one side of the channel. It is estimated that 4,400 cubic yards would be excavated to create the channel in this reach. Approximately 350 cubic yards of this material would be used to construct the maintenance road.

All excess material from the channel excavations would be placed on the farm field.

Under this alternative, the Minnesota Department of Transportation, as part of mitigation for the construction of new County Road 18, would install a 24-inch culvert under old County Road 18 with an invert low enough to facilitate the drawdown of Rice Lake.

The estimated implementation cost of alternative O-1 is $192,000 (table 5-1). The average annual cost at the current discount rate of 7 3/4 percent would be $15,245.

Table 5-1
Cost Estimate for Alternative O-1*

Feature	Cost
Construction	$ 18,000
mobilization	125,000
channel construction	6,000
maintenance road	29,000
Planning, Engineering and Design	14,000
Construction Management	
Total	$192,000

* April 1995 price levels

5.5.2.2 Alternative O-2 (Outlet Controls)

Alternative O-2 is the modification of the outlets to Rice Lake to provide the capability to raise and maintain water levels in Rice Lake. This alternative consists of two features. The first feature is the construction of an earthen plug in the natural outlet of Rice Lake (plate 4). Plate 5 contains a plan view and typical cross section of this plug. The primary purpose of this plug is to permit control of Rice Lake water levels at the west end of the lake. The plug would require approximately 365 cubic yards of earthen fill material. The plug would be topsoiled and seeded.

The second feature is replacing an existing 72 x 54-inch oval CMP under old County Road 18 with a 42-inch round CMP (plate 4). A stop log structure would be placed on the Rice Lake end of the culvert to provide the capability to raise and hold Rice Lake elevations up to about elevation 698.0 (plates 6 and 7). The estimated implementation cost of alternative O-2 is $112,000 (table 5-2). The average annual cost would be $8,893.

Table 5-2
Cost Estimate for Alternative O-2*

Feature	Cost
Construction	
mobilization	$ 18,000
outlet channel plug	20,000
42-inch culvert	29,000
stop log control structure	20,000
Planning, Engineering and Design	17,000
Construction Management	8,000
Total	$112,000

* April 1995 price levels

5.5.2.3 Alternative O-3 (West Outlet and Outlet Controls)

Alternative O-3 is the combination of alternatives O-1 and O-2. Under this combination alternative, it would not be necessary for MnDOT to install the 24-inch culvert under old County Road 18, as the invert of the new 42-inch culvert would be set low enough to facilitate drawdown of Rice Lake. The estimated implementation cost of alternative O-3 is $285,000 (table 5-3). The average annual cost would be $22,629.

Table 5-3
Cost Estimate for Alternative O-3*

Feature	Cost
Construction	$ 21,000
mobilization	125,000
channel construction	6,000
maintenace road	20,000
outlet channel plug	29,000
42-inch culvert	20,000
stop log control structure	42,000
Planning, Engineering and Design	22,000
Construction Management	
Total	$285,000

* April 1995 price levels

5.5.3 FARM FIELD

The planting plan for the farm field was developed by the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources. Seeds from the Minnesota River floodplain within the Refuge or other suitable areas would be collected, grown in a nursery for two years, and then planted on the site. The projected composition of the trees to be planted is as follows:

silver maple	46 %
green ash	18 %
American elm (native)	16 %
American elm (Dutch elm disease resistant)	16 %
boxelder	2 %
bur oak	1 %
hackberry	1 %

The majority of the trees would be planted using a mechanical planter. Between 5 and 10% of the trees would receive site preparation and other treatments to enhance growth and survival. These measure would include mechanical site preparation, chemical site preparation, wood chip mulch, tree mats, and tree tubes. These measures would be employed in various combinations to evaluate their effectiveness in this type of setting.

The estimated cost of the farm field reforestation plan is $44,000 (table 5-4). The average annual cost would be $3,494.

Table 5-4
Cost Estimate for Farm Field Reforestation*

Feature	Cost
Construction	
seed collection	$ 4,000
nursery growing	9,000
site preparation	12,000
tree tubes, mats, and mulch	2,000
tree planting	9,000
Planning, Engineering and Design	4,000
Construction Management	4,000
Total	$44,000

* April 1995 price levels

5.5.4 MINNESOTA RIVER BANK

5.5.4.1 Alternative A-1

Alternative A-1 would prevent the breaching the natural levee in segment A (river mile 15.40 to river mile 15.65) by using rock protection to stabilize the river bank. A minimum 30-inch layer of rock would be placed on the bank with only limited bank shaping. An estimated 8,587 cubic yards of rock would be required to stabilize this 1,400 foot reach of river bank. The estimated implementation cost of alternative A-1 is $535,000 (table 5-5). The average annual cost would be $42,479.

Table 5-5
Cost Estimate for Alternative A-1*

Feature	Cost
Construction	
mobilization	$ 23,000
bank shaping	32,000
rock	360,000
Planning, Engineering and Design	80,000
Construction Management	40,000
Total	$535,000

* April 1995 price levels

5.5.4.2 Alternative A-2

Alternative A-2 is would prevent breaching of the natural levee in segment A by reconstructing the temporary berm constructed by the U.S. Fish and Wildlife Service on the interior side of the natural levee (plates 8 and 9). In addition, a rock lined overflow section (plates 8 and 9) would be constructed to prevent erosion of the berm. The estimated implementation cost of alternative A-2 is $101,000 (table 5-6). The average annual cost would be $8,019. The cost estimate assumes that no portion of the existing berm will be salvagable for use in construction of the new berm.

Table 5-6
Cost Estimate for Alternative A-2*

Feature	Cost
Construction	
mobilization	$ 23,000
berm	24,000
rock/bedding	31,000
Planning, Engineering and Design	16,000
Construction Management	7,000
Total	$101,000

* April 1995 price levels

EVLALUATION OF ALTERNATIVES

6.1 NO ACTION

By definition no action would entail no expenditure of Federal funds under the UMRS-EMP HREP program to address habitat concerns in the Rice Lake area. If the habitat concerns are not addressed under the UMRS-EMP HREP program, it is unlikely that any substantive measures would be undertaken by the U.S. Fish and Wildlife Service in the foreseeable future due to fiscal constraints.

The no action alternative would not satisfy any of the project objectives. Habitat conditions would change as described under earlier sections entitled "Estimated Future Habitat Conditions."

6.2 RICE LAKE

6.2.1 ALTERNATIVE O-1 (WEST OUTLET)

Alternative O-1 would provide the capability to draw down Rice Lake on an as needed basis to consolidate sediments and manage aquatic vegetation growth within the lake for the benefit of migratory waterfowl and other migratory birds. It is estimated that under current conditions, water levels in Rice Lake are sufficiently high enough during 1 out of 3 growing seasons to substantially reduce the growth of aquatic vegetation in the lake. It is estimated that with draw down capability, the occurence of vegetation retarding high water conditions in the lake could be limited to 1 out of 7 years.

Habitat evaluation procedures were used to quantify the habitat benefits associated with providing the capability to draw down Rice Lake on a periodic basis (see attachment 4, HEP appendix, for details). It is estimated that the O-1 alternative would provide 20.74 average annual habitat units (AAHU) of benefit.

The estimated implementation cost of the O-1 alternative is $192,000. The average annual cost would be $15,245 at the current discount rate of 7 3/4 percent.

The cost/quantifiable benefits of the O-1 alternative would be approximately $735/AAHU.

6.2.2 ALTERNATIVE O-2 (OUTLET CONTROLS)

Alternative O-2 would provide the capabiity to impound waters in Rice Lake on an as needed basis for the purposes of managing aquatic vegetation growth within the lake for the benefit of migratory waterfowl and other migratory birds. Under current conditions, water levels in Rice Lake during 2 out of 5 growing seasons are sufficiently low enough such that emergent aquatic vegetation chokes the lake. It is estimated that with impoundment capability, excessive vegetation would occur in only about 1 out of 8 years.

Habitat evaluation procedures were used to quantify the habitat benefits associated with providing the capability to impound water in Rice Lake on a periodic basis. It is estimated that the O-2 alternative would provide 13.05 AAHU of benefit (see attachment 4, HEP appendix, for details).

The estimated implementation cost of the O-2 alternative is $112,000, with an average annual cost of $8,893. The cost/quantifiable benefits of the O-2 alternative would be approximately $681/AAHU.

6.2.3 ALTERNATIVE O-3 (COMBINATION PLAN)

Alternative O-3 is a combination of the features of alternative O-1 and alternative O-2. This plan would provide the capability both to draw down Rice Lake and impound water within Rice Lake for aquatic vegetation management. It is estimated that the O-3 alternative would provide 33.79 AAHU of benefit (see attachment 4, HEP appendix, for details).

The estimated implementation cost of the O-3 alternative is $285,000, with an average annual cost of $22,629. The cost/quantifiable benefits of the O-3 alternative would be approximately $670/AAHU.

6.3 FARM FIELD

Tree plantings at the farm field would accelerate the reforestation of this field by years verses natural succession. In addition, a species composition consistent with the composition of naturally occurring bottomland forest communities in the Minnesota River floodplain would be achieved. Habitat evaluation procedures were used to quantify the habitat benefits of this plan (see attachment 4, HEP appendix, for details). It is estimated that the revegetation plan would provide 5.34 AAHU of benefits.

The estimated implementation cost of the reforestation alternative is $44,000, with an average annual cost of $3,494. The cost/quantifiable benefits of the reforestation alternative would be approximately $655/AAHU.

6.4 MINNESOTA RIVER BANK

6.4.1 ALTERNATIVE A-1

Alternative A-1 would stabilize the Minnesota River bank and and prevent breaching of the natural levee through the use of rock bank stabilization. The primary benefit of this plan is the prevention of the breaching the natural levee that would lead to the drainage of a 70-acre perched wetland. Habitat evaluation procedures were used to quantify the habitat benefits of this plan (see attachment 4, HEP appendix, for details). It is estimated that the A-1 alternative would provide 21.63 AAHU of benefits.

The estimated implementation cost of the A-1 alternative is $535,000, with an average annual cost of $42,479. The cost/quantifiable benefits of the A-1 alternative would be approximately $1,964/AAHU.

6.4.2 ALTERNATIVE A-2

Alternative A-2 would prevent the breaching of the natural levee along this portion of the Minnesota River bank by reconstructing the man-made berm behind the natural levee and providing an over-flow spillway for the discharge of interior drainage to the river. As with A-1 alternative, the primary benefits of this plan is the prevention of the breaching the natural levee that would lead to the drainage of a 70-acre perched wetland. Habitat evaluation procedures were used to quantify the habitat benefits of this plan (see attachment 4, HEP appendix, for details). It is estimated that the A-2 alternative would provide 21.63 AAHU of benefits.

The estimated implementation cost of the A-2 alternative is $101,000, with an average annual cost of $8,019. The cost/quantifiable benefits of the A-2 alternative would be approximately $371/AAHU.

6.5 INCREMENTAL ANALYSIS

Because each of three elements of the overall Rice Lake project are independent of each other, they were considered separately when conducting an incremental analyis.

6.5.1 RICE LAKE

The O-1 and O-2 alternatives are distinctly separate increments under the O-3 alternative. The O-1 alternative allows the drawdown of Rice Lake, while the O-2 alternative allows the raising of Rice Lake water levels. When combined as part of the O-3 alternative, the O-2 alternative is considered first in place because it is the more cost effective of the two. The cost of the O-1 increment under the O-3 alternative is $173,000 (ave. annual cost = $13,736). The incremental cost/AAHU is $662. Table 6-1 contains the incremental analysis for the Rice Lake alternatives.

Table 6-1
Incremental Analysis of Rice Lake Outlet Alternatives

Alternative/ Increment	AAHU Gain	Total Cost	Ave An Cost*	Cost/AAHU
O-1	20.74	$192,000	$15,245	$735
O-2	13.05	$112,000	$ 8,893	$681
O-3	33.79	$285,000	$22,629	$670
"O-2 Increment"	13.05	$112,000	$ 8,893	$681
"O-1 Increment"	20.74	$173,000	$13,736	$662

* at the current discount rate of 7 3/4 percent

As is readily evident from the table, the implementation of the O-1 feature becomes more cost effective when implemented as part of the combination alternative O-3. This is due to savings in mobilization costs.

6.5.2 FARM FIELD

Incremental analysis is not a meaningful exercise in this particular situation because there is a single planting plan designed to meet project objectives. The cost/benefit of revegetating one-third, one-half, or two-thirds of the field could be compared, but since the benefits are primarily acre based, the cost per habitat unit would be approximately equal for all increments. Such a comparison would be of no practical value.

6.5.3 MINNESOTA RIVER BANK

Incremental analysis is not applicable in this particular situation because there at two distinct alternatives, each producing habitat benefits at a distinct cost/AAHU. Therefore, plan selection primarily comes down to which of the alternatives provides these benefits at the lowest cost.

6.6 SUMMARY COMPARISON OF ALTERNATIVES

6.6.1 MEETING PROJECT OBJECTIVES

Table 6-2 summarizes how the various alternatives would contribute to project objectives. A plus 3 indicates that the alternative would fully meet the project objective. A plus 2 indicates a substantial contribution while a plus 1 incidates a minor contribution. A zero (0) indicates no appreciable effect.

Table 6-2
Contribution of Alternatives to Project Objectives

	Objectives					
Alternatives	RL1	RL2	FF1	MRB1	MRB2	Total
Rice Lake						
O-1	+3	0	0	0	0	+3
O-2	0	+3	0	0	0	+3
O-3	+3	+3	0	0	0	+6
Farm Field						
Planting Plan	0	0	+3	0	0	+3
Minnesota River Bank						
A-1	0	0	0	+3	0	+3
A-2	0	0	0	+3	0	+3

The O-1 alternative meets objective RL1 by providing the capability to draw down Rice Lake for management of aquatic vegetation. The O-2 alternative meets objective RL2 by providing the capability to raise Rice Lake water levels for management of aquatic vegetation. The O-3 combination alternative meets both objectives.

The planting plan meets the reforestation objective for the farm field.

Both the A-1 and A-2 alternatives meet objective MRB1 in that they both would prevent the breaching of the natural levee along the "A" segement of the Minnesota River bank, and prevent the drainage of the perched wetland behind the levee.

The MRB2 objective will be unmet because it was determined that it would be prohibitively expensive to stabilize the Minnesota River bank in the "B" and "C" segments.

6.6.2 COSTS AND BENEFITS

Table 6-3 compares the costs and benefits of the various plans. It needs to be pointed out that the comparison and selection of a plan for Rice Lake water level management is not dependent or related in any way to comparison and selection of a plan to stabilize the natural levee along the Minnesota River.

Table 6-3
Comparison of Costs and Benefits

Alternative	Cost	Average Annual Cost	AAHU Gained	Cost/ AAHU
Rice Lake Plans				
O-1	$192,000	$15,245	20.74	$ 735
O-2	$112,000	$ 8,893	13.05	$ 681
O-3	$285,000	$22,629	33.79	$ 670
Farm Field Reforestation				
FF	$ 44,000	$ 3,494	5.34	$ 655
Minnesota River Bank Plans				
A-1	$535,000	$42,479	21.63	$1,964
A-2	$101,000	$ 8,019	21.63	$ 371

6.7 PLAN SELECTION AND JUSTIFICATION

The selected plan is the O-3 alternative for Rice Lake, the planting plan for the farm field reforestation, and the A-2 alternative for the Minnesota River bank.

6.7.1 RICE LAKE

The O-3 alternative will provide the Refuge with the capability to both draw down and impound Rice Lake waters for the management of aquatic vegetation to provide improved habitat conditions for migratory waterfowl and other migratory birds. This 170-acre shallow lake is an important habitat component of the Minnesota Valley National Wildlife Refuge. The ability to manage water levels in Rice Lake to improve habitat conditions for migratory waterfowl and other migratory birds will contribute substantially to the goals and objectives of the Refuge.

The O-3 alternative meets both project objectives for Rice Lake, while the O-1 and O-2 each only meet one of the project objective. In addition, the O-3 alternative produces quantifiable habitat benefits at a lower cost per AAHU than either the O-1 or O-2 alternative. Therefore, the O-3 was selected as the recommended plan over the O-1 and O-2 alternatives. The O-3 alternative will provide quantifiable habitat benefits well within the range considered reasonable and prudent for habitat projects of this nature.

6.7.2 FARM FIELD

The planting plan for the farm field will accelerate the reforestation of this field to a bottomland forest community natural to this area of the Minnesota River floodplain. This will provide habitat for a wide variety of species that use bottomland forest habitat. The cost of the quantifiable habitat benefits that will result from this plan ($655/AAHU) are considered reasonable for the benefits to be obtained. For this reason, the planting plan for the farm field was selected as the recommended plan versus the no action alternative.

6.7.3 MINNESOTA RIVER BANK

Both the A-1 and A-2 alternatives will prevent the further breaching of the natural levee along the Minnesota River and prevent the drainage of the perched 70-acre wetland behind it. The A-2 alternative would accomplish this at far less cost than the A-1 alternative. The advantage of the A-1 alternative is that it would prevent the erosion of 1-2 acres of riparian land over the next 50 years, and is probably a more permanent solution to the problem, lasting beyond the 50-year project life. However, preserving the 1-

temporary road, most likely trucked in sand. It is possible that some of the material excavated from the first 800 feet of channel between the lake and the road could be used for this purpose.

Approximately 3,300 cubic yards of material would have to be excavated from the lake portion of the channel. For cost estimating and disposal site planning purposes, it was assumed that approximately 3,300 cubic yards of material would be required to build a temporary construction road within the channel alignment.

All excavated material, channel and temporary road material, would be disposed of on the farm field. Total volume of material to be disposed of would be approximately 11,000 cubic yards. This material would be placed on a 8-acre portion of the field and planted with trees in conjuction with the plans to reforest this field.

7.1.2 RICE LAKE OUTLET PLUG

To provide the ability to raise Rice Lake water levels, two measures are necessary. The first is to plug the existing natural outlet. The plug would be placed in the general location shown on plate 4, where access can be obtained with a minimal amount of tree clearing. A design for the plug is shown on plate 5. It is estimated that 365 cubic yards of fill material would be needed to build this plug. This fill material may come from outlet channel construction between Rice Lake and old County Road 18.

The current design calls for topsoiling and seeding of the plug. During advanced design it will be determined if the material used to construct the plug is suitable for growing vegetation. If it is, there may be no need to topsoil the plug.

7.1.3 RICE LAKE OUTLET CULVERT/STOP LOG STRUCTURE

The second feature needed to raise Rice Lake water levels is a control structure on the outlet culvert under old County Road 18. Analysis indicated that it would be more practical to replace the existing 72" x 54" oval culvert with a round culvert that could accomodate a bolt-on or welded on stoplog control structure, than to attempt to design and retrofit a control structure for this odd shaped culvert. Off-the-shelf stop log control structure designs can be used with a round culvert, whereas placing a control structure on the oval culvert would require a new design effort.

Hydraulic analyses indicated that a 36-inch culvert would suffice to meet requirements to allow flood waters out of Rice Lake in a timely manner. A 42-inch culvert size was selected to provide for a margin of error and to provide

additional management capability. Larger sizes were not considered because downstream culverts through which discharged water must drain to the Minnesota River are 42-inches in diameter.

This structure would provide the ability to raise and maintain water levels to approximately 698.0, at which elevation the lake would begin to overflow to the Eagle Creek drainage.

7.3 FARM FIELD

The 40-acre farm field would be planted reforested according to the following plan. Seeds and acorns would be collected from the Minnesota River floodplain and planted in a nursery. After two years, the trees would be transplanted at the field at a rate of about 600 trees per acre over about 32 acres of the field. Spacing of the trees would be variable from 6 to 16 feet. On about 6 acres the trees would be planted at an approximate rate of 400 per acre. This density of planting would be used in those areas where additional measures would be employed to enhance tree survival.

The majority of the field would be planted using a mechanical planter. The only pre-treatment this area will likely require will be mowing. In some selected areas, various pre-treatments would be employed on a selective basis to enhance tree survival and growth.

In selected locations, mechanical spot treatment of an approximately 4'x 4' foot area by scraping or tilling would be employed. Another pre-treatment method that would be used on a selective basis is chemical treatment of the 4'x 4' planting area. The most likely chemical to be used would be Rodeo because it is registered for aquatic sites.

Some of the trees would be given protection, either in the form of tree mats, wood chip mulch, tree tubes, or some combination of all three.

7.4. MINNESOTA RIVER BANK

The selected plan for the Minnesota River Bank is to reconstruct the berm constructed earlier by the Refuge. The reconstructed berm would be located adjacent to the existing berm on its landward side. Approximately 2,300 cubic yards of fill material, most likely obtained from a commercial source, would be required for the berm reconstruction. During further design, a determination will be made whether any portion of the existing berm and/or its materials can be used in the reconstruction.

2 acres and the permanent nature of the solution would not justify the approximately $434,000 cost difference between the two plans. Therefore, the A-2 alternative was selected as the recommended plan.

Maintaining the natural levee and the wetland will allow the continued existence of this wetland and the habitat benefits it provides to a wide variety of wildlife. Other wetland values provided by the wetland will also be maintained. The cost of the quantifiable habitat benefits of the A-2 alternative ($371/AAHU) are considered reasonable and prudent for the benefits to be achieved, especially considering the additional non-habitat values associated with maintaining this 70-acre wetland.

SELECTED PLAN WITH DETAILED DESCRIPTION/ DESIGN AND CONSTRUCTION CONSIDERATIONS

7.1 RICE LAKE

The selected plan (O-3) for Rice Lake involves the excavation of an outlet channel for the lake, the plugging of the lake's natural outlet, and the installation of a culvert with stop log controls to manage lake water levels. Appropriate erosion control measures as required by the Minnesota Pollution Control Agency's waiver of water quality certification would be incorporated into the final project design.

7.1.1 RICE LAKE OUTLET CHANNEL

The outlet channel to permit the drawdown of Rice Lake would extend from the low spot in the lake approximately 1,730 feet to the west shoreline of Rice Lake (plate 4). The final 800 feet of channel from the shoreline to old County Road 18 would follow the path of an existing drainage to minimize excavation requirements.

The channel would have a 10 foot bottom width, with 1V:4H side slopes (plate 5). The channel would be excavated to a depth of 692.5, 0.6 feet below the invert elevation on the outlet culvert which is 693.1. A minor amount of overdepth excavation is proposed to account for sloughing.

The 800 foot reach between the lake and the road would have a 10 foot wide maintenance road alongside the channel. It is expected that material excavated from the channel in this reach would be suitable for maintenance road construction.

Some stumps would have to be removed in this area. They would be placed in the adjacent wooded areas to provide cover habitat for small mammals.

Because of the relatively solid ground adjacent to the existing drainage, the first 800 feet of channel could be constructed by normal excavation techniques. It is estimated that about 4,400 cubic yards of material would be excavated from this reach, with about 350 cubic yards of this material being used for the maintenance road.

To construct the in-lake portion of the channel it is assumed that the contractor would have to build a temporary road into the lake within the channel alignment. Then the contractor would excavate the channel as he backed out, excavating the temporary road along with the channel material. The contractor would be required to provide the material to construct the

Within the berm would be an overflow section to convey waters flowing towards the river via an overflow spillway (plate 8). The purpose is to prevent erosion of the berm by sheet flows. The overflow spillway would be placed in an area where flows from the perched wetland to the Minnesota River have already eroded a cut in the river bank. This cut would be graded and lined with 250 cubic yards of bedding and 500 cubic yards of rock (plate 9).

The eastern portion of the berm would be topped with gravel so that the berm could also serve as a maintenance road to the overflow spillway. An estimated 150 cubic yards of gravel would be required.

ENVIRONMENTAL EFFECTS

An environmental assessment has been conducted for the proposed action, and a discussion of the impacts follows. As specified by Section 122 of the 1970 Rivers and Harbors Act, the categories of impacts listed in the Environmental Impacts Matrix (table 8-1) were reviewed and considered as part of the environmental assessment. In accordance with Corps of Engineers regulations (33 CFR 323.4(a)(2)), a Section 404(b)(1) evaluation was prepared and is included as attachment 3. State of Minnesota water quality certification under Section 401 of the Clean Water Act has been waived by the Minnesota Pollution Control Agency, subject to compliance with stated conditions (attachment 9).

8.1 RELATIONSHIP TO ENVIRONMENTAL REQUIREMENTS

The proposed project complies fully with applicable environmental statutes and Executive Orders for the current stage of planning. Among the more pertinent are the National Environmental Policy Act of 1969, as amended; the Fish and Wildlife Coordination Act of 1958, as amended; the Clean Water Act of 1977; the Clean Air Act, as amended; the National Historic Preservation Act of 1966, as amended; the National Wildlife Refuge System Administration Act; the Endangered Species Act of 1973, as amended; the Land and Water Conservation Fund Act of 1965, as amended; Executive Order 11990 - Protection of Wetlands; Executive Order 11988 - Floodplain Management; and USACE ER 1105-2-100.

8.2 NATURAL RESOURCE EFFECTS

8.2.1 TERRESTRIAL HABITAT

The dredged material from channel excavation activities would be placed on 8 acres of the 40 acre abandoned agricultural field. Approximately 11.000 cubic yards of sediment would be placed at a thickness of about 10 inches. The 3,300 cubic yards of material dredged from Rice Lake is 82% fines and 18% sand. The 4,400 cubic yards of material excavated between the lake bed and County Road 18 is 61% fines and 39% sand. The material was tested for bulk chemistry and was found to be clean from metals and PCB's. Both locations contained pesticide contaminants in the samples. Within the lake sample, 9.9 parts per billion (ppb) 4,4-'DDE, 52 ppb 4,4'-DDD, and 5.3 ppb 4,4'-DDT were found in the sample. Within the upland sample, 9.5 parts per billion (ppb) 4,4-'DDE, 17 ppb 4,4'-DDD, and 27 ppb 4,4'-DDT were found in the sample. The source of contamination is unknown at this time, but based on sediment samples from an adjacent lake in 1985 by the U.S. Fish and Wildlife Service, contamination is expected to be widespread in this system. By removing the

Table 8-1

ENVIRONMENTAL IMPACT ASSESSMENT MATRIX
RICE LAKE HREP PROJECT
NAME OF PARAMETER

TABLE EA-1

	MAGNITUDE OF PROBABLE IMPACT						
	← INCREASING BENEFICIAL IMPACT			NO APPRECIABLE EFFECT	INCREASING ADVERSE IMPACT →		
A. SOCIAL EFFECTS	SIGNIFICANT	SUBSTANTIAL	MINOR		MINOR	SUBSTANTIAL	SIGNIFICANT
1. Noise Levels					X		
2. Aesthetic Values					X		
3. Recreational Opportunities				X			
4. Transportation				X			
5. Public Health and Safety				X			
6. Community Cohesion (Sense of Unity)				X			
7. Community Growth & Development				X			
8. Business and Home Relocations				X			
9. Existing/Potential Land Use				X			
10. Controversy				X			
B. ECONOMIC EFFECTS							
1. Property Values				X			
2. Tax Revenues				X			
3. Public Facilities and Services				X			
4. Regional Growth				X			
5. Employment				X			
6. Business Activity				X			
7. Farmland/Food Supply				X			
8. Commercial Navigation				X			
9. Flooding Effects				X			
10. Energy Needs and Resources				X			
C. NATURAL RESOURCE EFFECTS							
1. Air Quality				X			
2. Terrestrial Habitat				X			
3. Wetlands			X				
4. Aquatic Habitat			X				
5. Habitat Diversity and Interspersion			X				
6. Biological Productivity				X			
7. Surface Water Quality			X				
8. Water Supply				X			
9. Groundwater				X			
10. Soils				X			
11. Threatened or Endangered Species				X			
D. CULTURAL EFFECTS							
1. Historic Architectural Values				X			
2. Pre-Hist & Historic Archeological Values				X			

material from the aquatic area, breakdown of the material would be accelerated by exposing it to the air. All dredged material would be incorporated into the field by plowing or grading. Based on the amount of contamination present within the sediment, the nature of the surrounding area, and extensive coordination with the U.S. Fish and Wildlife Service's Twin City Field Office, it was determined this material would not have significant biological effects in the placement area.

The project would convert 40 acres of abandoned agricultural land to bottomland forest and provide management options to Rice Lake. The species selected for restoration are silver maple, American elm, green ash, bur oak, hackberry, and boxelder. All species selected naturally occur within the area, and since seeds will be collected from the immediate area, no changes to the genetic pool would occur. Biological production would increase at this site as succession occurs. The fish and wildlife species in the project area would benefit from restoration activities.

8.2.2 AQUATIC RESOURCES

The changes within the Minnesota River Valley (i.e. wetland drainage, increased suspended loads) have also changed wetland characteristics in the lower reaches of the floodplain. By installing the control structure and excavating the outlet channel, water level manipulations on Rice Lake would be possible to counteract the effects the Minnesota River has on Rice Lake. Habitat conditions would improve due to management capabilities. In dry and wet growing seasons, water levels could be manipulated to provide optimum conditions for the growth of aquatic vegetation. Winter drawdowns could be performed to create winterkill conditions for rough fish. Optimum vegetation conditions would benefit waterfowl and furbearers during the growing season, and provide winter cover for resident wildlife. Occasional summer drawdowns would improve water quality conditions by consolidating flocculent bottom substrate. It would also create conditions that would allow aquatic plants to rejuvenate through seed germination.

The existing outlet channel from Rice Lake would be plugged approximately 700 feet above its confluence with Eagle Creek. The outlet channel area would change in habitat composition due to the plug. The portion immediately downstream of the structure would be a dry ditch during normal water levels. In high water events, water would be backed up to the structure. The lower portion of the outlet channel would remain backwater habitat with no flows during normal water conditions. This area would likely become vegetated with time due to the lack of flows. The production of aquatic vegetation would likely increase the production of aquatic invertebrates. The plug would also cause the loss of water movement in the existing channel upstream of the structure. This would provide deep water habitat in an area where it is quite

limited. Based on the area, no substantial impacts are expected.

Excavating the outlet channel from the aquatic site benefits the immediate area by removing 3,300 cubic yards of contaminated material. The layer of sediment that would be exposed by the excavation is uncontaminated material, which would leave the site chemically cleaner than is present. It is possible contaminants would be released into the water column during construction, but this would not cause significant impacts, since in all probability the entire area has pesticide contamination. No increase in pesticide contamination within the project area is expected from the project. During drawdown events, breakdown of contaminants would be accelerated by exposure of the lake bed to aerobic conditions. The in-lake portion of the channel would eliminate aquatic vegetation growth due to increased depths. The loss of shallow aquatic habitat would be offset by a gain in deeper water habitat, which increases habitat diversity. Additional shallow water habitat would be created by the construction of the outlet channel.

8.2.3 WATER QUALITY

Detailed effects of the project on water quality are described in the Section 404 (b)(1) evaluation (attachment 3). Potential construction related negative effects on water quality would be from the construction of the outlet channel at Rice Lake. The bedding and rock riprap used for bank construction would reduce impacts on water quality and would be clean in nature. Local turbidity plumes would be generated from the construction of the outlet channel and bank protection. The release of contaminants during excavation should not be a problem because the entire area is probably composed of similar material. Excavation and placement of material would be done mechanically. No long-term impacts on water quality are expected from these activities.

The existing outlet channel would be plugged and loss of water flow would occur both upstream and downstream from the structure. Dissolved oxygen levels may decline locally due to the lack of flow. Presently Rice Lake outlets to Eagle Creek and then to the Minnesota River. Rice Lake degrades the water quality of Eagle Creek at the present time. By eliminating flows from the existing channel, a minor improvement of water quality would occur. The new channel would eventually join the outlet from Fisher Lake, which then flows into the Minnesota River approximately 1 mile upstream from the existing Rice Lake/Eagle Creek outlet. The water quality properties of Rice and Fisher Lakes are similar. No outflow problems are expected from combining outflows from Rice and Fisher Lakes upon the Minnesota River since the total outflow from these two lakes are minor contributors to the total flow of the Minnesota River.

8.2.4 FISH AND WILDLIFE

By restoring 40 acres of bottomland hardwoods, wildlife use of the area would be increased. Wildlife diversity is also expected to increase by this phase of the project. Currently, there is a narrow corridor of bottomland hardwoods along the river bank. This corridor would be widened, which would provide a safer travel route for a variety of wildlife species. A contiguous bottomland forest would create less edge area between cover types. Decreasing the amount of edge type habitat would benefit neotropical migrant species habitat. The water level control structure and outlet channel would providing management potential within Rice Lake, enabling managers to manipulate water levels to optimize aquatic vegetation production. Numerous species of waterfowl, songbirds, and furbearers would benefit from these improved vegetative conditions. Increased deepwater habitat provided by the channel excavation adds to the habitat diversity of the area.

Rice Lake provides nesting habitat for a variety of bird species associated with the wetland habitat. Species of concern using this area include Forster's tern, black tern, American bittern, least bittern, and northern harrier. The terns and bitterns occupy similar habitat types, namely stands of emergent vegetation including deep-marsh associations. They select nest sites over water, and are therefore sensitive to water level fluctuations. A summary of nesting records on the Minnesota Valley National Wildlife Refuge for 1990 follows. There were six breeding adult Forster's terns surveyed at Rice Lake in 1990. No young were fledged from the nests. Fifty breeding adult black terns were present at Rice Lake during 1990. Only 13 young were fledged from the active nests. Based on this low recruitment, any negative impacts to these species resulting from this project are unlikely. Lake level fluctuation was a likely influence on the nesting success of these species. The northern harrier nests in sites ranging from deep-marsh zones to upland habitat. Wetland nests are usually found in emergent stands of cattail or bulrush over water ranging up to 2.5 feet in depth. The control structure proposed for this project is likely to reduce present water level fluctuations, thereby improving overall habitat conditions for these species.

Negative impacts to the fisheries resource within Rice Lake during drawdown conditions are expected. This impact is expected to be minor based on the present fisheries resources within Rice Lake. Fish winterkills are common in Rice Lake due to shallow depths. In most years the impact of a drawdown would be negligible due to the absence of fish. Fish stranding could also occur in years where a drawdown would follow either a mild winter when no winterkill occurs, or when high water events allow fish passage into Rice Lake. Many of the fish would likely egress during the drawdown via the control structure. Fish stranded would be used by a number of local predators.

Plugging the existing outlet channel from Rice Lake would prevent fish movement up this channel except in extreme high water conditions. It may also create stagnated water which would limit its use by fish due to dissolved oxygen depletions. The elimination of this channel from fish movement and possible stagnation would be off-set by the construction of the outlet channel on the west side of the lake.

8.2.5 THREATENED AND ENDANGERED SPECIES

Two federally protected species can be found in the general project area: the bald eagle (Haliaetus leucocephalus), and the peregrine falcon (Falco peregrinus). The peregrine falcon may be present periodically in the project area. Bald eagle nesting has been documented in the project area, but no nests are located in the immediate vicinity of the project site. No project related impacts to either species are expected. The St. Paul District is awaiting concurrence from the U.S. Fish and Wildlife Service.

8.2.6 AIR QUALITY

The proposed actions would have minor negative impacts on air quality. Exhaust emissions from construction equipment would degrade air quality slightly for short periods. This temporary change in air quality could disturb people using adjacent areas of the refuge, but the overall effects on people, vegetation, and wildlife would be negligible.

8.3 CULTURAL RESOURCE EFFECTS

The known existing historic properties in the project area (Bloomington Ferry Mound site, river crossing site, and the now mitigated floodplain sites 21 SC 36 and 37) are outside the project's area of effect. In accordance with Section 106 of the National Historic Preservation Act, a cultural resources survey was made of the project areas where unknown cultural resources may exist. Field survey testing and an interview with a local informant revealed no historic properties in the project's area of effect. A report on the survey (attachment 7) was reviewed by the Fish and Wildlife Service and the Minnesota State Historic Preservation Office. Both concurred that no cultural properties will be affected by the Rice Lake project (attachment 7).

8.4 SOCIOECONOMIC EFFECTS

Due to the nature of the recommended project and its relatively isolated location on the Refuge, no appreciable socioeconomic effects are anticipated.

SUMMARY OF PLAN ACCOMPLISHMENTS

The habitat benefits of the selected plan have been discussed in earlier sections of this report. In capsulized form they are as follows.

The outlet channel and outlet controls on Rice Lake would provide water level management capability on this 170-acre shallow lake. This would provide the Refuge with the capability to manage water levels to optimize the growth of aquatic vegetation for the benefit of migratory waterfowl. It is estimated that without this management capability, optimal conditions for aquatic vegetation occur approximately 3 out of 10 years. With the project, it is estimated that optimum conditions can be provided 3 out of 4 years. Habitat evaluation analysis projects that this portion of the project will provide an estimated 33.79 AAHU of waterfowl habitat benefits.

The planting plan will accelerate the reforestation of the 40-acre farm field. In addition, the planting plan is designed to promote reforestation with the diversity of species found in the natural bottomland forest community in the Minnesota River floodplain. Habitat evaluation analysis projects that this portion of the project will provide an estimated 5.34 AAHU of woodland habitat benefits.

The berm and overflow spillway feature will prevent the drainage of a 70-acre perched wetland via breaching of the natural river levee. Preservation of this wetland will allow this wetland to continue to provide habitat for wetland dependent wildlife such as waterfowl, furbearers, wading birds, and marsh birds. In addition, the wetland would also continue to provide other wetland functional values such as floodwater retention and water filtration. Habitat evaluation analysis projects that this portion of the project will provide an estimated 21.63 AAHU of wetland habitat benefits.

OPERATION AND MAINTENANCE

10.1 GENERAL

Upon completion of construction, the U.S. Fish and Wildlife Service would accept responsibility for operation and maintenance of the Rice Lake project in accordance with Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580, and subsequent Annual Addendums. Specific operation and maintenance features would be defined in a project operation and maintenance manual which would be prepared by the Corps of Engineers and coordinated with the U.S. Fish and Wildlife Service.

10.2 OPERATION

The feature of the project that would require operation by the U.S. Fish and Wildlife Service is the stop log structure on the outlet culvert. It is estimated that the stop logs in this structure would have to changed an average of twice a year. The frequency in any given year could range from 0 to 4 times. The estimated operation costs are included in table 10-1.

10.3 MAINTENANCE

Maintenance requirements would primarily center on cleaning the outlet channel of debris and woody vegetation, maintenance and repair of the control structure, and replacement of rock at the berm/overflow spillway. A breakdown of projected operation and maintenance costs is contained in attachment 2 and summarized in table 10-1.

Table 10-1
Estimated Average Annnual Operation and Maintenance Costs

Item	Amount
a. outlet channel (clear woody debris)	$ 143
b. outlet channel (control woody plants)	$ 127
c. control structure operation	$ 863
d. control structure maintenance	$ 386
e. bedding/rock replacement	$ 237
f. reporting	$1,120
Total annual amount	$2,876

PROJECT PERFORMANCE EVALUATION

A monitoring plan for project evaluation was designed to directly measure the degree of attainment of the selected project objectives. The plan is summarized in tables 11-1 through 11-3.

TABLE 11–1
PROJECT OBJECTIVES AND ENHANCEMENT FEATURES

Objective	Project Accomplishment	Potential Enhancement Feature	Units	Enhancement Potential		
				Existing	Future Without	Future With
Be able to draw down Rice Lake to elevation 693.1	Improve aquatic vegetation management on 170–acre shallow lake	Channel	years with drawdown capability	0 years	0 years	10 years
Be able to impound Rice Lake to elevation 698.0	Improve aquatic vegetation management on 170–acre shallow lake	Control Structure	years with impoundment capability	0 years	0 years	12 years
Reforest farm field to native bottomland forest species	Reforest farm field to native bottomland forest	Tree Plantings	trees/acre of desired species	0	100	200
Protect and maintain natural levee along the Minnesota River	Maintain 70–acre perched wetland	Berm with an Overflow Spillway	acres	70 acres	35 acres	70 acres

TABLE 11–2
UMRS–EMP Monitoring and Performance Evaluation Matrix

Type of Activity	Purpose	Responsible Agency	Implementing Agency	Funding Source	Remarks
Problem Analysis	System–wide problem definition. Evaluate planning assumptions.	NBS	NBS (EMTC)	LTRM	Lead into pre–project monitoring; define desired conditions for plan formulation.
Pre–project Monitoring	Identify and define problems at specific sites.	Sponsor	Sponsor	Sponsor	Should attempt to begin defining baseline.
Baseline Monitoring	Establish baselines for performance evaluation.	Corps	Field stations or sponsors thru Cooperative Agreements, or Corps.*	LTRM ***	Should be over several years to reconcile pertubations.
Data Collection for Design	1. Identify project objectives. 2. Design of project. 3. Develop Performance Evaluation Plan.	Corps	Corps	HREP	After fact sheet. Data may aid in defining baseline.
Construction Monitoring	Assure permit conditions met.	Corps	Corps	HREP	
Performance Evaluation Monitoring	Determine success of projects.	Corps	Field stations or sponsors thru Cooperative Agreements, sponsor thru O&M**, or Corps.*	LTRM ***	After construction.
Analysis of Biological Responses to Projects	1. Determine critical impact levels, cause–effect relationships, and long–term losses of significant habitat.	NBS	NBS (EMTC)	LTRM	Biological Response Study tasks beyond scope of Performance Evaluation, Problem Analysis, and Trend Analysis.
	2. Demonstrate success or response of biota.	Corps	Corps/NBS (EMTC)/Others	HREP	

*Choice depends on logistics. When done by the States under a Cooperative Agreement, the role of the EMTC will be to: (1) advise and assist in assuring QA/QC consistency, (2) review and comment on reasonableness of cost estimates, and (3) be the financial manager. If a private firm or State is funded by contract, coordination with the EMTC is required to assure QA/QC consistency.

**Some limited reporting of information for some projects (e.g., waterfowl management areas) could be furnished by on–site personnel as part of O&M.

*** Requires a transfer of allocations from the Habitat Project account to the LTRM account.

TABLE 11–3
PRE – AND POST–CONSTRUCTION MEASUREMENTS

Goal	Project Objective	Enhancement Feature	Unit of Measure	Measurement Plan	Monitoring Interval	Projected Cost/Effort
Enhance the value of Rice Lake for migratory waterfowl	Provide drawdown capability	channel	years	Monitor number of years drawdown is successfully used to manage vegetation	annually	$200
	Provide cability to raise lake levels	control structure outlet channel plug	years	Monitor number of years impoundment is successfully used to manage vegetation	annually	$200
Reforest farm field to bottomland forest	Revegetate to accelerate natural succession to desired species	plantings	trees/acre of desired species	Count number of trees of desired species within 20 permanent circular plots	annually for five years, every five years thereafter	$1,000
Maintain 70–acre perched wetland	Prevent breaching river levee	berm overflow spillway	acres	Measurements from aerial photographs	1994 photographs for pre–construction every 10 years post–construction	$200

COST ESTIMATE

The total project cost for the selected plan at the fully funded level is estimated to be $463,000. This cost does not include prior allocations of $155,000 for general design (planning). A detailed cost estimate is contained in attachment 2. A summary of costs is shown in table 12-1. It should be noted that the costs that appear in table 12-1 are not exactly the same as those presented earlier in this report. The costs presented earlier for alternative evaluation and plan selection are April 1995 costs. As indicated, the cost estimate presented here is the fully funded estimate.

Table 12-1
Summary of Total Project Costs

Feature	Cost
Construction	$358,000
mobilization	(45,000)
channel construction	(142,000)
outlet channel plug	(21,000)
42-inch culvert	(33,000)
stop log control structure	(22,000)
reforestation	(37,000)
berm	(25,000)
rock-lined spillway	(33,000)
Planning, Engineering, and Design	69,000[1]
Construction Management	36,000
Total	$463,000

[1] This does not include prior allocations of $155,000 for general design (planning).

REAL ESTATE REQUIREMENTS

This habitat rehabilitation and enhancement project is located along the Minnesota River in Scott County, Minnesota. The project will be constructed entirely upon lands owned and operated by the United States of America and managed by the U.S. Department of the Interior's Fish and Wildlife Service as the Minnesota Valley National Wildlife Refuge.

SCHEDULE FOR DESIGN AND CONSTRUCTION

A schedule for review and approval, major work tasks, and project construction follow:

Requirement	Scheduled Date
Submit final Definite Project Report to North Central Division, U.S. Army Corps of Engineers	Jul 1995
Obtain construction approval by North Central Division, U.S. Army Corps of Engineers	Sep 1995
Complete Plans and Specifications	Feb 1996
Advertise for bids	Mar 1996
Award Contract	May 1996
Complete Construction	Sep 1997
Complete Plantings	Jun 1998

IMPLEMENTATION RESPONSIBILITIES

The responsibilities of plan implementation and construction fall to the Corps of Engineers as the lead Federal agency. After construction of the project, project operation and maintenance would be required for features of the project as outlined in the OPERATION AND MAINTENANCE section of this report. These actions would be the responsibility of the U.S. Fish and Wildlife Service.

Should rehabilitation of the Rice Lake project which exceeds the annual maintenance requirements be needed (as a result of a specific storm or flood), the Federal share of rehabilitation would be the responsibility of the Corps of Engineers. Performance evaluation, which includes monitoring of physical and chemical conditions and some limited biological parameters, would be a Corps responsibility. Attachment 8 contains a draft copy of the formal agreement that would be entered into by the Corps of Engineers and the U.S. Fish and Wildlife Service. The Memorandum of Agreement formally establishes the relationships between the Department of the Army, represented by the Corps of Engineers, and the U.S. Fish and Wildlife Service in constructing, operating, and maintaining the proposed Rice Lake project.

COORDINATION, PUBLIC VIEWS, AND COMMENTS

A preliminary draft of the Definite Project Report/Environmental Assessment was coordinated with the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources. The U.S. Fish and Wildlife Service has provided a Refuge Comapatibility Determination for the Rice Lake Project (attachment 8).

The draft Definite Project Report/Environmental Assessment was sent to Congressional interests; Federal, State, and local agencies; special interest groups; interested citizens; and others listed in attachment 9.

Comments were received on the draft Definite Project Report/Environmental Assessment from the U.S Fish and Wildlife Service, the National Park Service, the Natural Resource Conservation Service, the Minnesota Department of Natural Resources, and the Minnesota Pollution Control Agency (attachment 9).

The U.S. Fish and Wildlife Service supports the project and provided their agencies Finding of No Significant Impact. The National Park Service (NPS) supports the proposed project, especially the decision to protect the Minnesota River bank with a berm instead of riprap. The NPS indicated that the project may affect the "Minnesota Valley Trail." Subsequent coordination with the Minnesota Department of Natural Resources led to the conclusion that the trail would not be impacted by the project (attachment 9).

No Natural Resource Conservation Service programs would be affected by the project. As no land acquisition is proposed, no Farmland Policy Protection Act site assessment is required.

As indicated by their letter, the concerns of the Minnesota Department of Natural Resources were addressed during project planning and coordination. The Minnesota Pollution Control Agency waived Section 401 water quality

certification subject to compliance with certain conditions. These conditions will be met as no wetlands will be filled or drained by the project, and an erosion control plan will be incorporated into the final project design.

CONCLUSIONS

The Rice Lake habitat rehabilitation and enhancement project provides the opportunity to maintain and improve habitat for migratory birds, aquatic mammals and other forms of wildlife indigenous to the lower Minnesota River valley. Lack of water control facilities limits the ability to manage water levels in Rice Lake for the benefit of migratory birds and aquatic mammals. A recently purchased tract of agricultural land offers the opportunity for enhancement of wildlife habitat through planned reforestation. The breaching of the natural levee along a portion of the Minnesota River threatens the long-term survival of a 70-acre perched wetland.

A number of measures are aimed at correcting existing habitat problems and providing improved wildlife management capabilities in the Rice Lake area. Providing the capability to both draw down Rice Lake and impound water in the lake will increase the number of years Refuge Managers will be able to optimize water levels for habitat purposes from a current 15 out of 50 years (30 percent) to 38 out of 50 years (75 percent).

Planting trees on the agricultural land will provide wildlife habitat benefits both by accelerating the rate of reforestation and by promoting reforestation with the diversity of species found in naturally occurring bottomland forests in this area. The construction of a berm behind the eroding natural levee will prevent the drainage of the 70-acre perched wetland, preserving its wildlife habitat and other functional wetland values.

RECOMMENDATION

I have weighed the accomplishments to be obtained from the Rice Lake habitat project against its cost and have considered the alternatives, impacts, and scope of the proposed project. In my judgment, the cost of the project is a justified expenditure of Federal funds. I recommend that higher authority approve construction of the habitat rehabilitation and enhancement features of the Rice Lake, Minnesota, project at a total estimated cost of $463,000, which would be a 100-percent Federal cost according to Section 906(e)(3) of the 1986 Water Resource Development Act, as amended.

For James T. Scott
Colonel, Corps of Engineers
District Engineer

Planning and Engineering Division
Evaluation and Management Branch

FINDING OF NO SIGNIFICANT IMPACT

In accordance with the National Environmental Policy Act of 1969, the St. Paul District, Corps of Engineers has assessed the environmental impacts of the following project:

RICE LAKE
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
SCOTT COUNTY, MINNESOTA

There are three main purposes of the proposed work. The first is to maintain Rice Lake as a shallow floodplain marsh to provide high quality habitat for migratory birds and aquatic wildlife. The second is to restore a farm field to mature bottomland forest habitat with species found under natural conditions. The third is to maintain and protect a reach of the Minnesota River natural levee to prevent the loss of a 70 acre floodplain marsh and mature bottomland forest.

Rice Lake is a floodplain lake located on the right bank of the Minnesota River at river mile 16.7. At its closest point, Rice Lake is 1,000 feet from the river. It is shallow with maximum water depths between 18 and 36 inches during most growing seasons. The size of the lake varies with water depth, but averages 170 acres. Habitat types within Rice Lake is dependent on the varying water conditions. High water years aquatic vegetation is absent. During dry years, the vegetation coverage is 100%. A control structure with an outlet channel are proposed for construction enabling water control and providing more stable habitat conditions. Approximately 7,700 cubic yards (CY) of material would be excavated for the 2,500 foot long outlet channel. An outlet channel on the east side of Rice lake would be plugged with 365 CY of fill material. The excavated material would be deposited on the 40 acre farm field. The field would be restored to bottomland forest through a tree planting plan. The natural levee on the Minnesota River would be protected through reconstruction of an existing berm and placing an overflow spillway in the reconstructed berm. About 200 CY gravel bedding and 400 CY riprap would be used to armor the spillway, of which half would be placed below the normal high water mark.

The project area is part of the Minnesota Valley National Wildlife Fish Refuge, and is compatible with the goals and objectives established for the refuge. The U.S. Fish and Wildlife Service has concurred with the determination that there would be no impacts to threatened or endangered species or their habitat based on the nature of the project, its location, and the habitat requirements of the species in the area. There would be no significant impacts to aquatic areas or water quality. This project has been coordinated with the National Park Service and the Minnesota State Historic Preservation Office. The State Historic Preservation Officer has concurred that the project would not affect any significant cultural resources.

Our environmental review indicates that the proposed actions do not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, an environmental impact statement will not be prepared.

11 July 1995
Date

For James T. Scott
Colonel, Corps of Engineers
District Engineer

BIBLIOGRAPHY

Sunde, Gerald M. 1975. Hydrologic Study of the James W. Wilkie Regional Park. 39 pp.

Yess, Scott. 1993. U.S. Fish and Wildlife Service. Unpublished report.

ATTACHMENT 1

PLATES

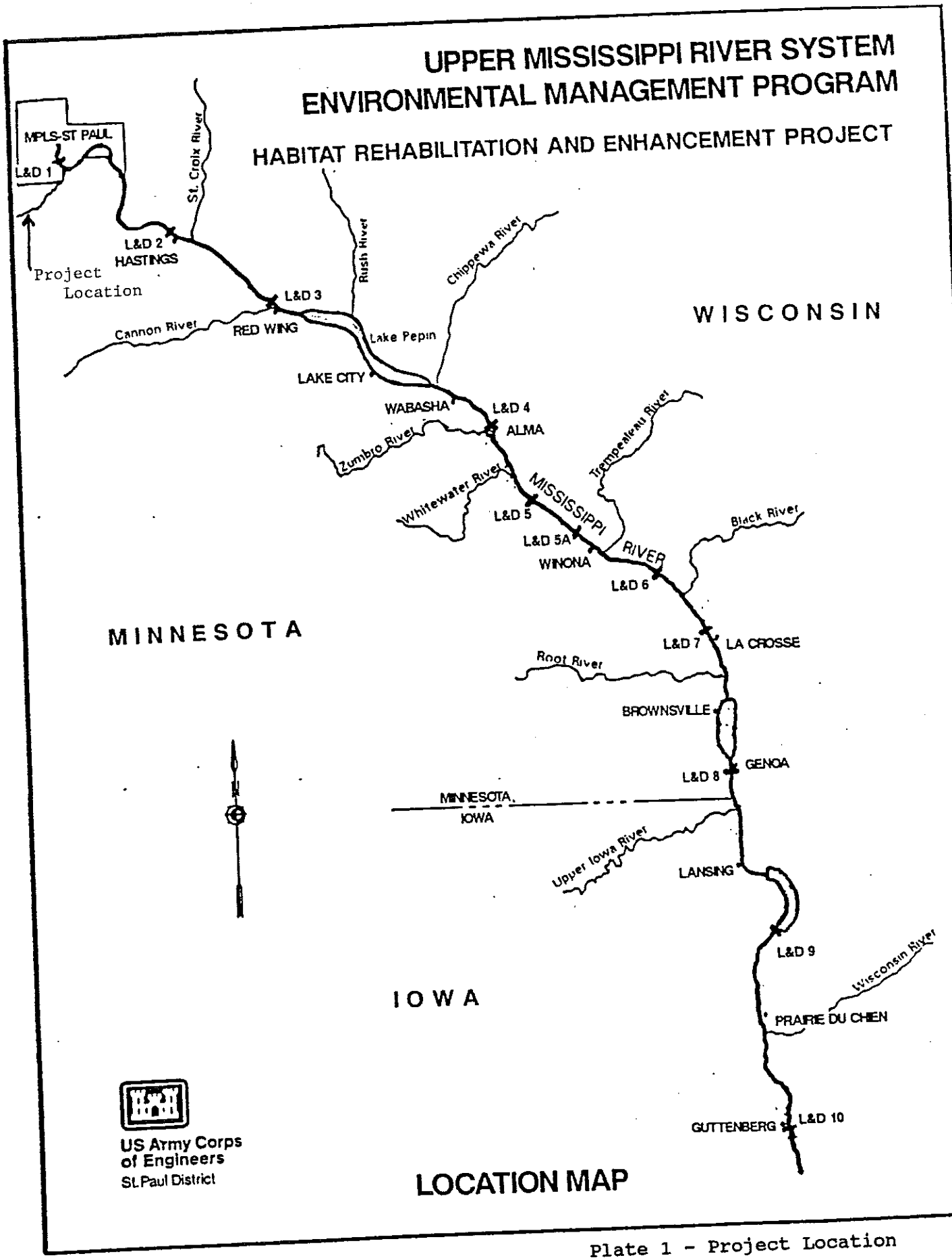


Plate 1 - Project Location

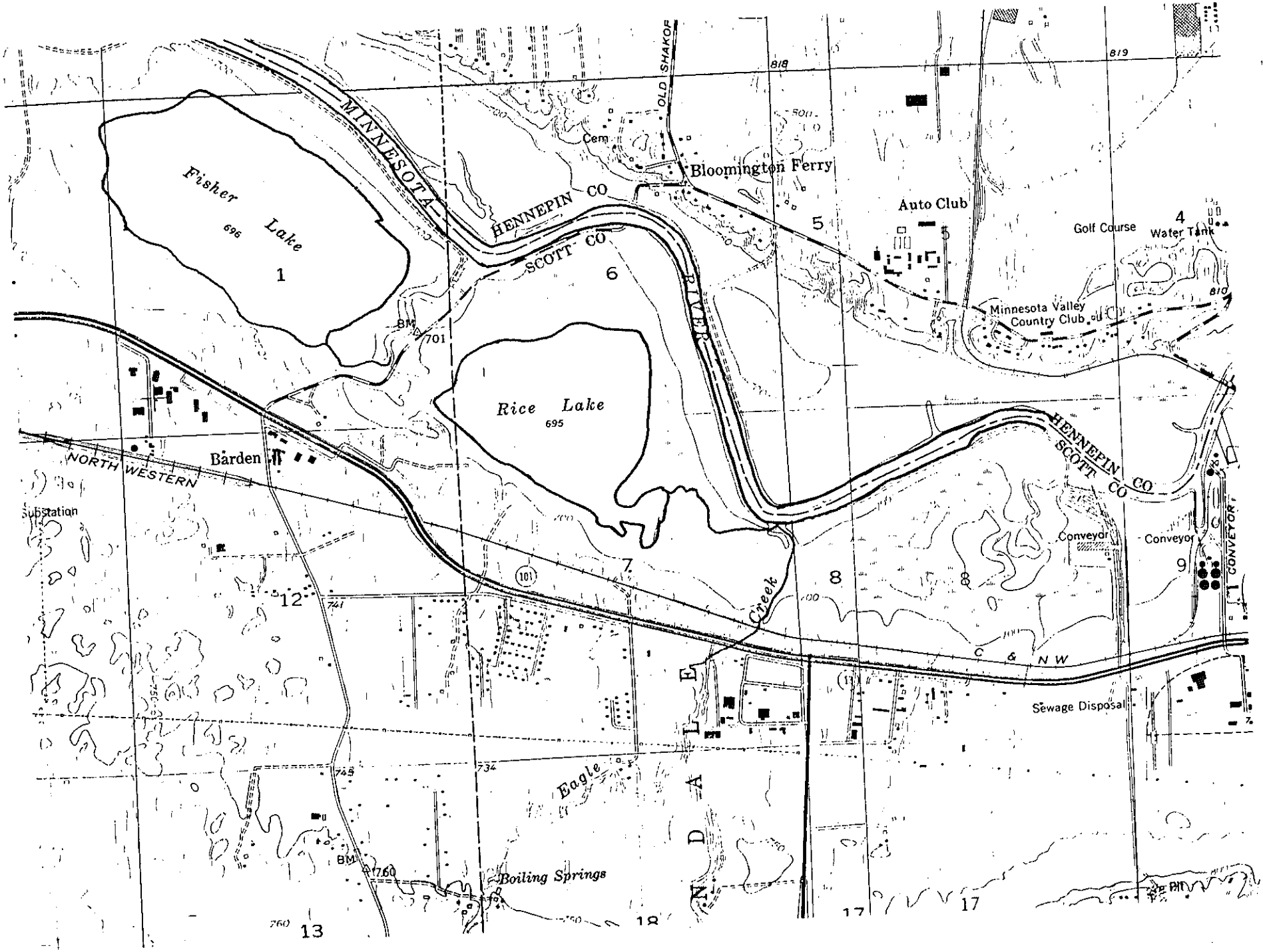


Plate 2 - Study Area

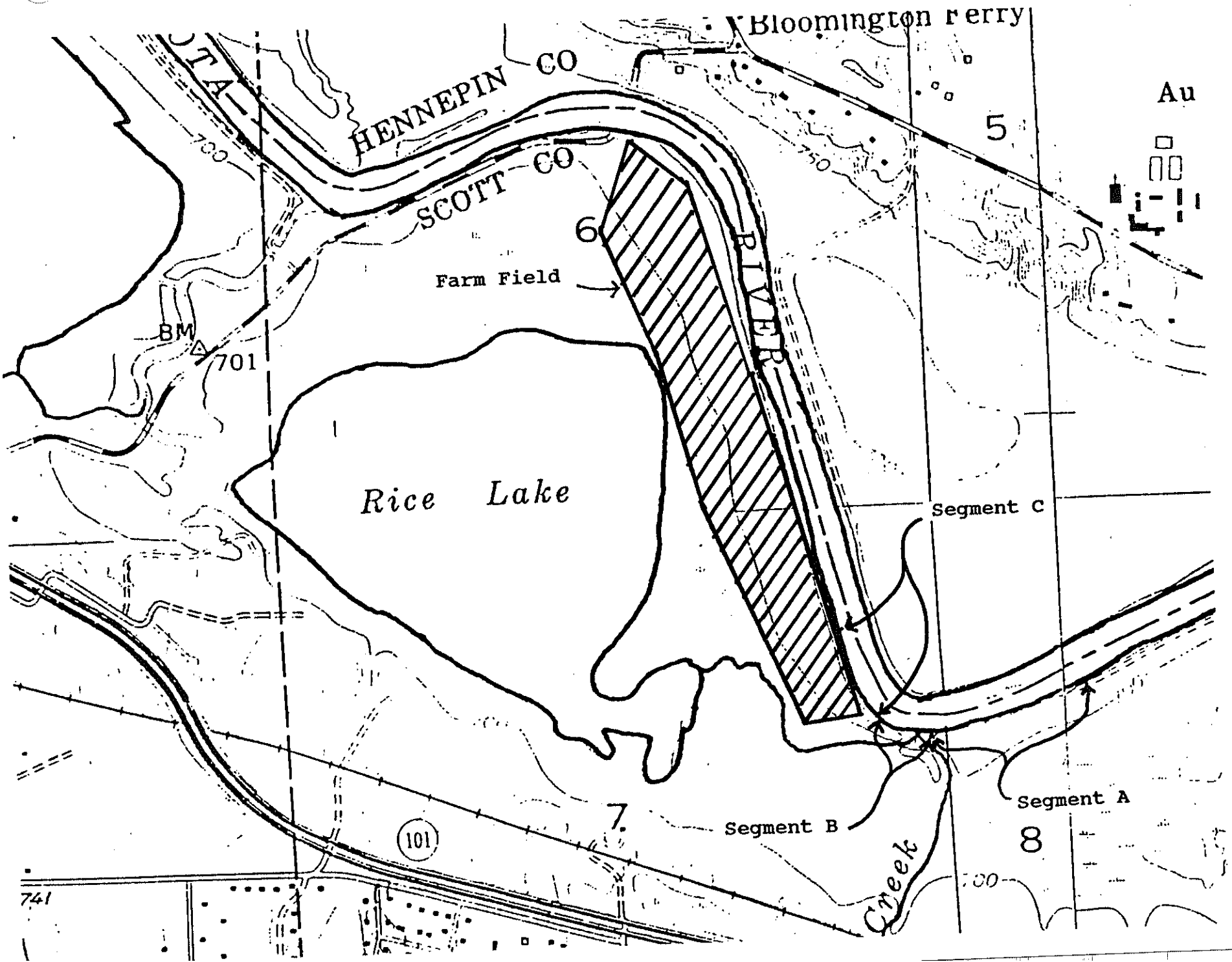


Plate 3 - Location of Farm Field/Minnesota River Bank Segment

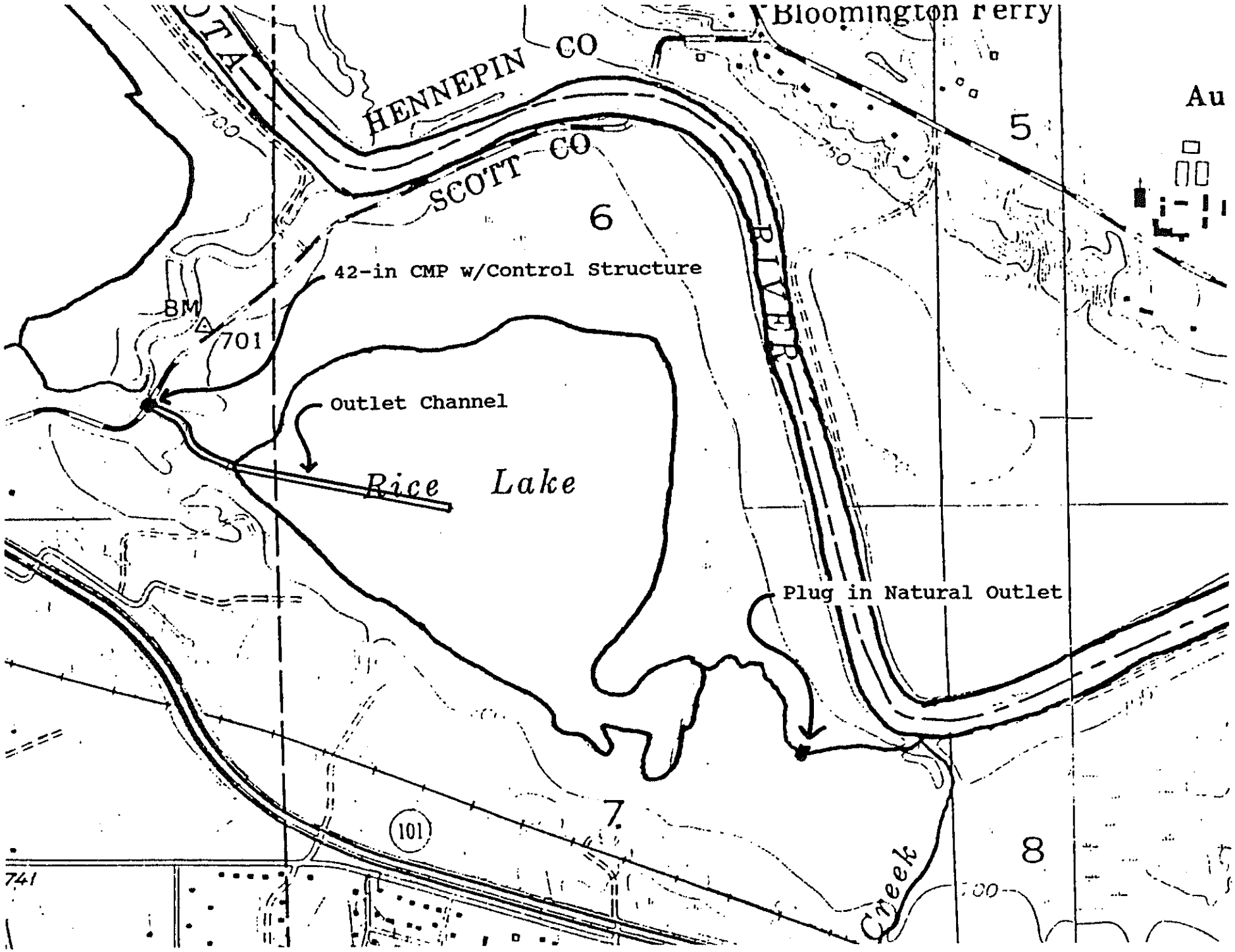
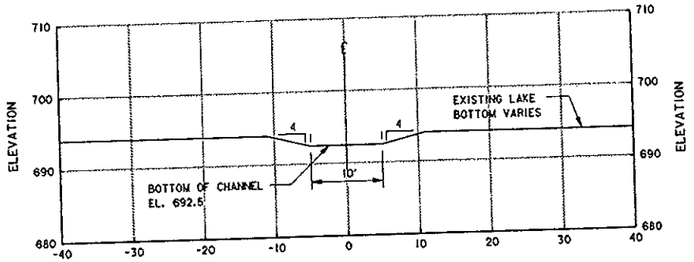
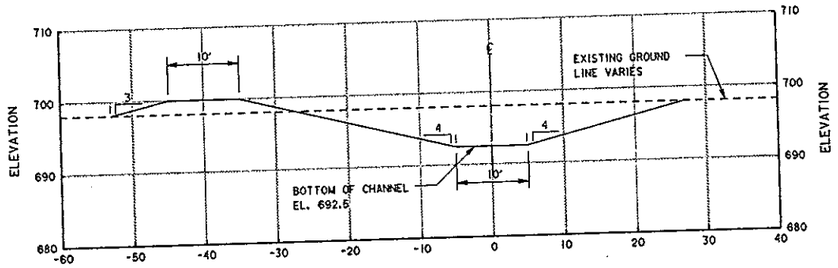


Plate 4 - Proposed Outlet Channel/Outlet Controls



TYPICAL SECTION
CHANNEL WITHIN RICE LAKE



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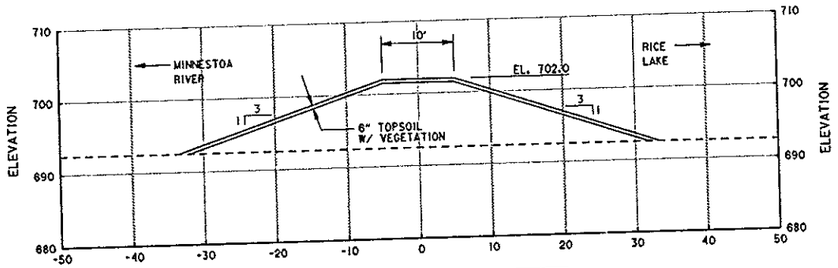
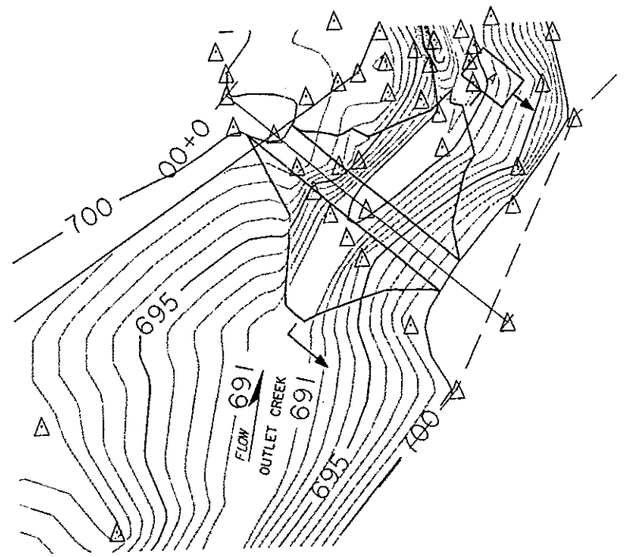
CHANNEL BETWEEN RICE LAKE AND CTY. RD. 18



TYPICAL SECTION
RICE LAKE OUTLET
CHANNEL PLUG

A



PLAN VIEW
RICE LAKE OUTLET
CHANNEL PLUG

GEN ENG
HYD
HYDR
GEOTECH
STR ENG
MEA

SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

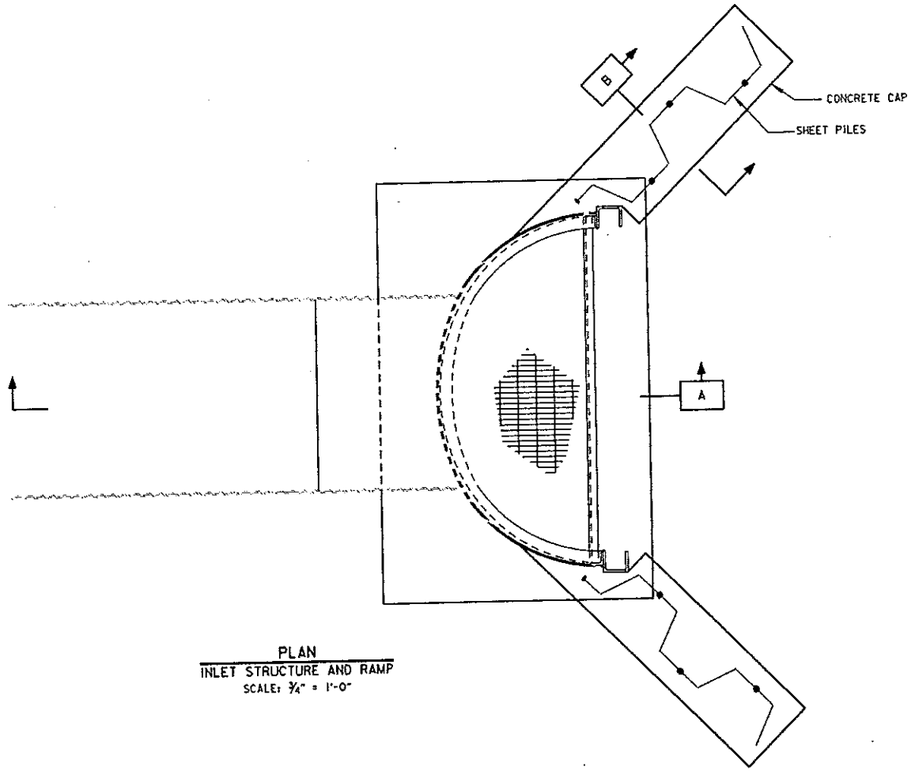
AE APPROVING OFFICIAL:

RICE LAKE
HABITAT REHABILITATION
AND ENHANCEMENT PROJECT

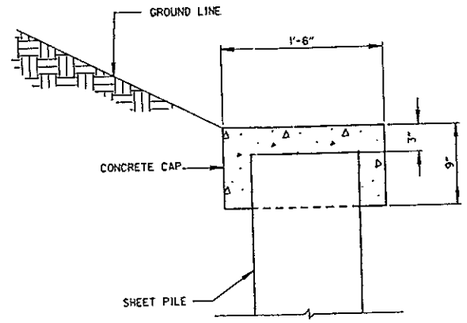
ED-D
DESIGNED: GRB
CHECKED: GRB
DRAWN: DPF
ED-DR
DESIGNED:
CHECKED:
DATE: 10/25/94

CAD FILE NAME: TYPICAL.DGN
SPEC NO:
DRAWING NUMBER:
SHT
OF

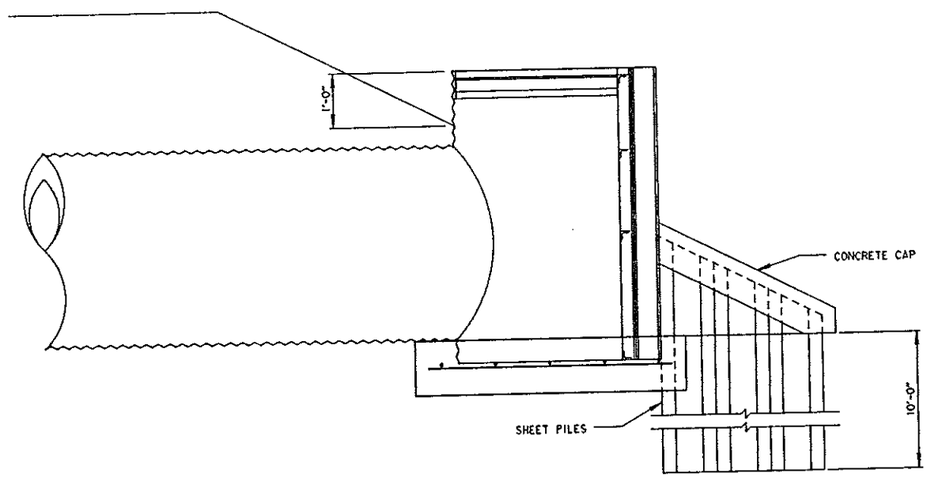
Plate 5 -- Outlet Channel and Outlet Plug Details



PLAN
INLET STRUCTURE AND RAMP
SCALE: 3/4" = 1'-0"



SECTION
SHEET PILE CONCRETE CAP
SCALE: 1 1/2" = 1'-0"
B



SECTION
INLET STRUCTURE AND RAMP
SCALE: 3/4" = 1'-0"
A

NOTES:

1. ALL BOLTS FOR METAL CONSTRUCTION AND ANCHORS SHALL BE ASTM A325, GALVANIZED AS SPECIFIED.
2. ALL CMP CONNECTING BANDS AND SEALS SHALL MEET MIN-DOT REQUIREMENTS FOR HIGHWAY CONSTRUCTION.

1 6" 0 1 2
SCALE: 3/4" = 1'-0"

GEN ENG
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GEOTECH
STR ENG
MEA

SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

AE APPROVING OFFICIAL:

PROJECT REPORT
RICE LAKE HREP

RICE LAKE, MINNESOTA
ENVIRONMENTAL IMPROVEMENT PROGRAM
STOPLOG CLOSURE STRUCTURE
PLAN AND SECTIONS

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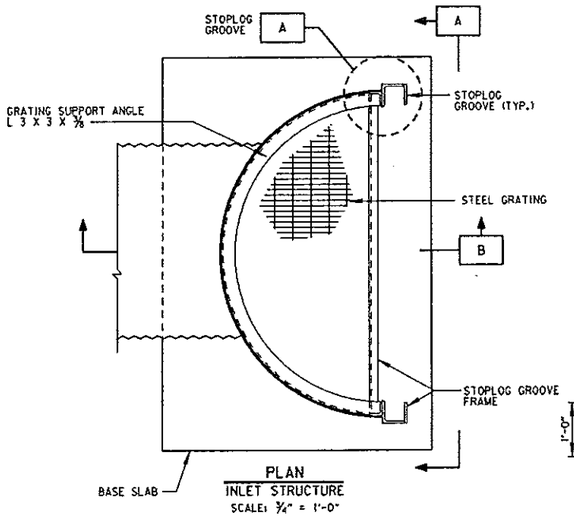
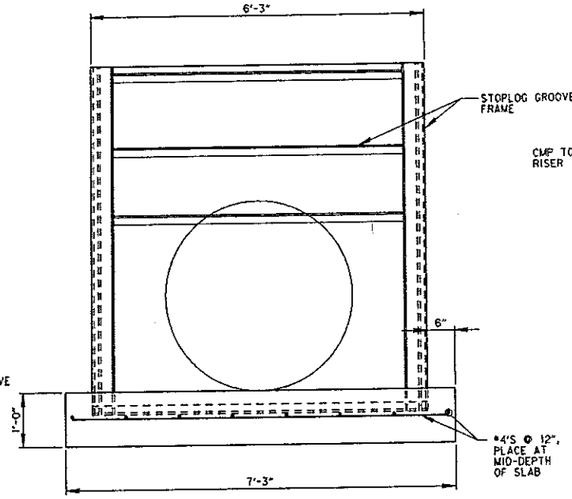
ED-GH: DESIGNED:; CHECKED:
DATE: 11-29-94
CAD FILE NAME: RICELK1.DGN
SPEC NO:
DRAWING NUMBER:
SHT
OF

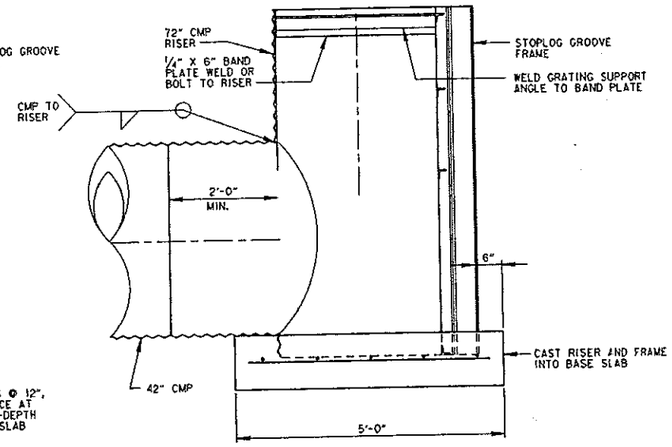
Plate 6 - Control Structure Plan and Sections



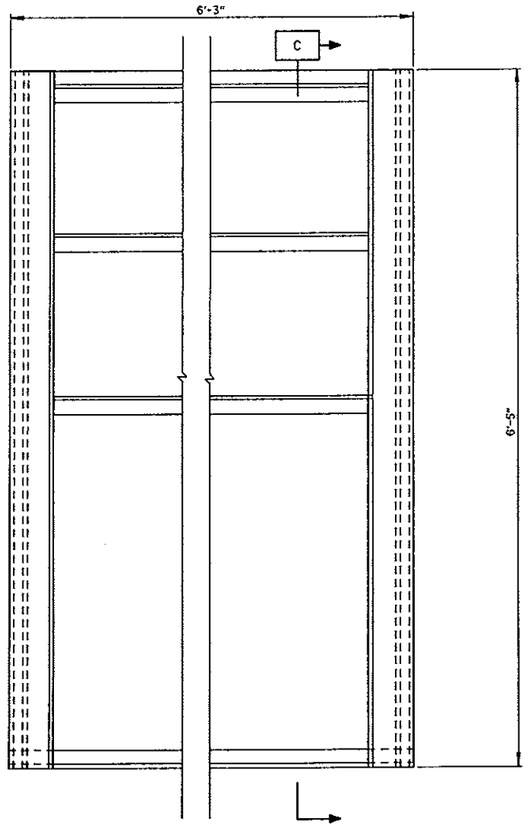
PLAN
INLET STRUCTURE
SCALE: ¾" = 1'-0"



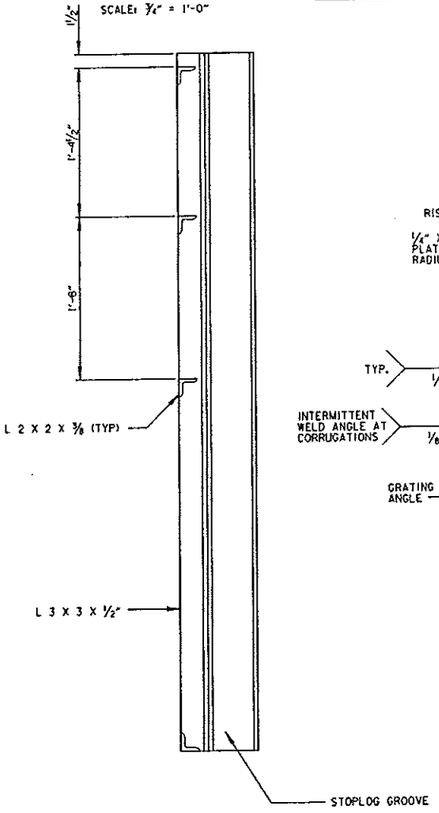
SECTION
INLET STRUCTURE
SCALE: ¾" = 1'-0"
A



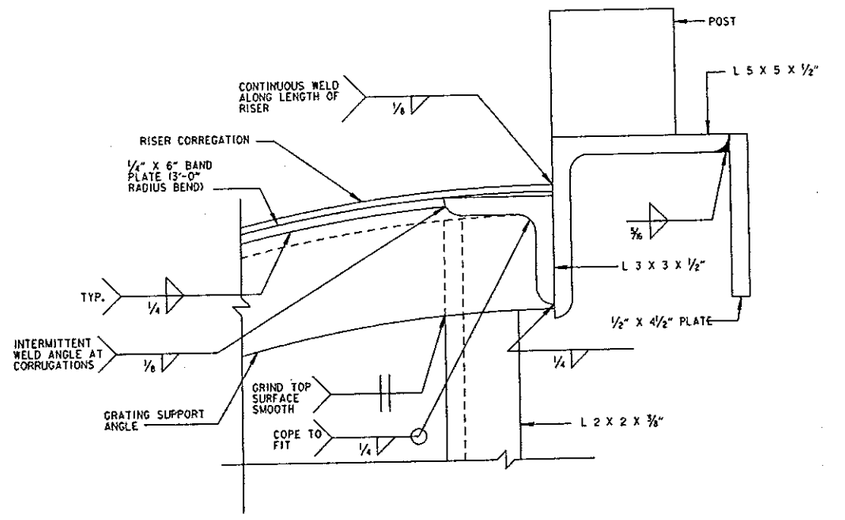
SECTION
INLET STRUCTURE
SCALE: ¾" = 1'-0"
B



ELEVATION
STOPLOG GROOVE FRAME
SCALE: 1½" = 1'-0"



SECTION
STOPLOG GROOVE FRAME
SCALE: 1½" = 1'-0"
C



DETAIL
STOPLOG GROOVE
SCALE: 6" = 1'-0"
A

NOTES:

1. CMP AND RISER SHALL BE ALUMINIZED WITH 2 2/3" X ½" CORREGATIONS, 36" CMP SHALL BE 14 GUAGE THICKNESS AND RISER SHALL BE 8 GUAGE THICKNESS.
2. ALL ALUMINIZED SURFACES IN CONTACT WITH CONCRETE SHALL BE COATED WITH AN APPROVED BITUMINUS MATERIAL
3. ALL STEEL SECTIONS AND PLATES SHALL BE ASTM A36, GALVANIZED AFTER FABRICATION AS SPECIFIED
4. REPAIR OF GALVANIZED COATING SHALL BE CONDUCTED AFTER WELDING AS SPECIFIED

0 6" 1 2
SCALE: ¾" = 1'-0"

SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

AE APPROVING OFFICIAL:

PROJECT REPORT
RICE LAKE HREP

RICE LAKE — RICE LAKE, MINNESOTA
ENVIRONMENTAL IMPROVEMENT PROGRAM
STOPLOG CLOSURE STRUCTURE
PLAN, ELEVATION, SECTIONS AND DETAIL

ED-D: DESIGNED: PWS; CHECKED:; DRAWN: LAR
ED-H: DESIGNED:; CHECKED:
DATE: 11-29-94
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DRAWING NUMBER:
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GEOTECH
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Plate 7 - Control Structure Details

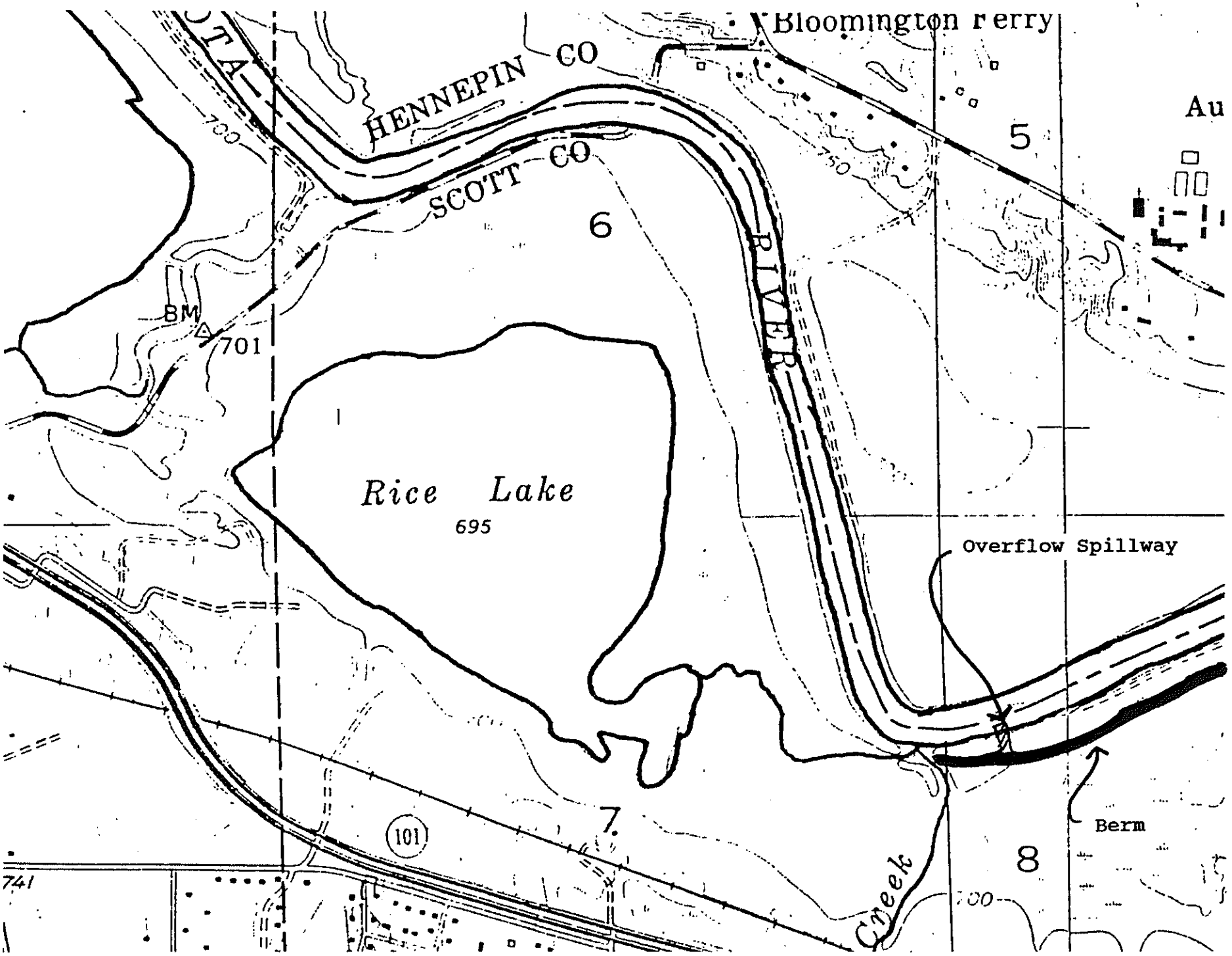
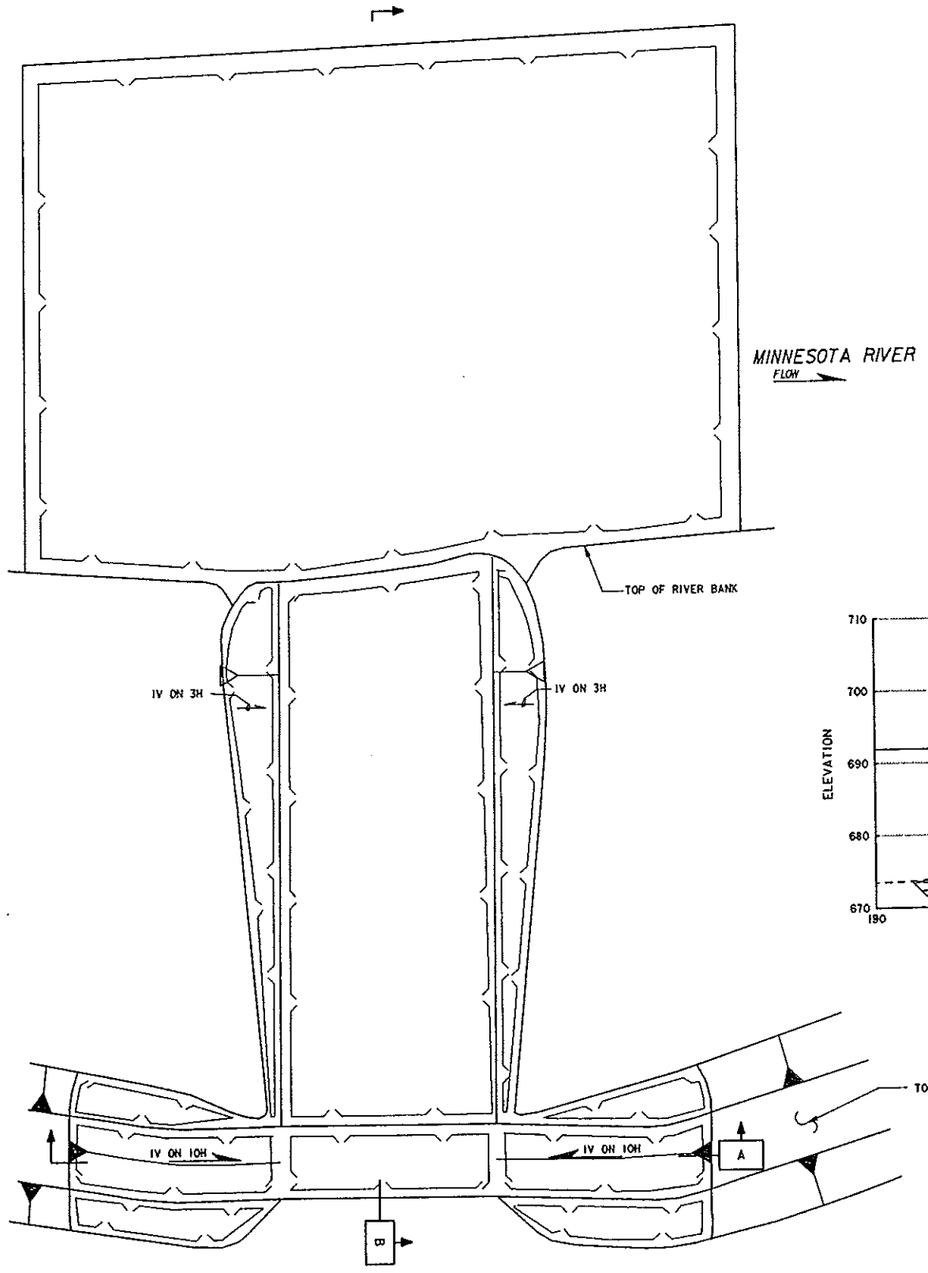


Plate 8 - Location of Berm and Overflow Spillway



PLAN VIEW
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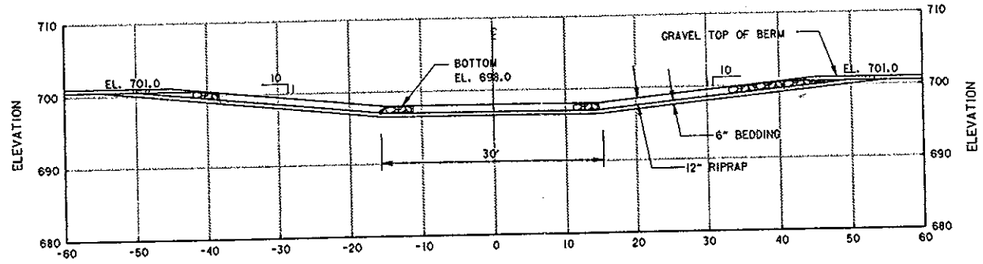

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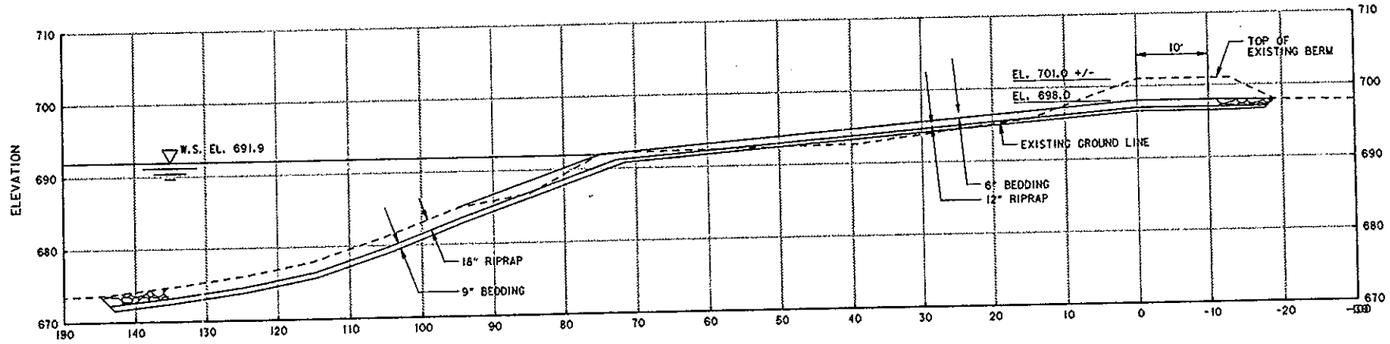

SECTION
NO SCALE
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GEOTECH
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SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

AE APPROVING OFFICIAL:

RICE LAKE
HABITAT REHABILITATION
AND ENHANCEMENT PROJECT

DESIGNED: GRB			
CHECKED: GRB			
DRAWN: DPF			
DESIGNED:			
CHECKED:	CAD FILE NAME: TYPICAL.DGN	DRAWING NUMBER:	SHT
DATE: 10/25/94	SPEC NO:		OF

Plate 9 - Berm and Overflow Spillway

ATTACHMENT 2

COST ESTIMATE

DETAILED COST ESTIMATE

TABLE OF CONTENTS

DETAILED COST ESTIMATE

E.1 GENERAL

1. This appendix contains the detailed project cost estimate prepared for the construction of the Rice Lake HREP project at Rice Lake near Chaska, Minnesota. The estimate has been prepared using the MCACES computer program. Results are presented on a spread sheet showing costs and contingencies. This write-up is prepared to explain cost relationships and development of the contingencies. Guidance for preparation of this appendix was obtained from ER 1110-2-1150, Engineering and Design for Civil Works Projects, and ER 1110-2-1302, Civil Works Cost Engineering. The estimate is in the Civil Works Breakdown Structure format as directed by ER 1110-2-1302.

E.2 PRICE LEVEL

1. Estimated costs are based on April 1995 price levels. Indirect costs including overhead, profit, and bond have been added to the prices to obtain the unit costs. These costs are considered fair and reasonable to a prudent and capable contractor. Estimated costs on the Total Project Cost Summary Sheet are rounded to the nearest $1,000.00.

E.3 PROJECT DESCRIPTION

1. The Fish and Wildlife Service will be able to manage the Rice Lake water levels to benefit wildlife with the construction of these project features. A 2,530 foot long channel will be constructed from old County Road 18 to the center of the low spot in Rice Lake. It will have a 10 foot bottom width and 1 on 4 side slopes.

2. To provide the ability to raise the lake level, two measures are necessary. The first is to plug the existing outlet with an earth plug. The second feature is the construction od a 130 foot long 42" cmp under old County Road 18. A bolt on stop log structure with access ramp will be built on the Rice Lake end of the culvert.

3. In addition to the work associated with the management of the water levels in the lake, a farm field will be reforested. This will involve collection of tree seeds native to the area, growing the trees in a nursery, and transplanting the trees to the site. Various methods of tree protection and site preparation will be used.

4. Another problem at the site includes the erosion of a natural berm adjacent to the Minnesota River. The levee provides protection for a perched wet land. Frequent overtopping of the levee and subsequent drainage of water back to the river over the top of the levee has caused the levee to erode. If allowed to continue, the perched wet land could be naturally drained. To prevent this from occurring, the levee will be upgraded and provided with a protected drainage notch.

E.4 CONSTRUCTION METHODS

1. Access to the site is readily available and normal construction procedures will be used.

2. Construction of the outlet channel will be accomplished by a hydraulic excavator. The lake is too deep for an excavator to work in and to shallow for an excavator to be floated in on a barge. A practical method of providing access to the site in the lake is to build a temporary road out into the lake. An excavator could work off the road to excavate the channel and the road from the lake to the shoreline. All material excavated for the channel will be disposed of on about 4 acres of farm field a distance of approximately one mile away. Trucks will haul the material to the site and dozers will be used to spread the material.

E.5 COST RELATIONSHIPS

1. It is assumed that all of the major features of work will be accomplished by a general contractor. Costs for mobilization and demobilization are estimated and included as an item of work. All costs are based on a specific crew and duration or productivity rate for each item of work.

E.6 CONTINGENCIES

1. Generally contingencies are based on:

   a. 5% to 20% for unit pricing,

   b. 10% to 20% for unanticipated work,

   c. 5% to 10% for quantities.

2. Feature 30, Planning, Engineering and Design. Costs and contingencies are provided by each separate engineering function and are based on experience with similar type projects.

3. Feature 31, Construction Management. Costs and contingencies are based on experience with similar type projects.

TOTAL - RICE LAKE HREP - DPR

**** TOTAL PROJECT COST SUMMARIES ****

PREPARED BY: GARY SMITH , CENCS-PE-C

PROJECT: RICE LAKE HREP - HREP

LOCATION: RICE LAKE NEAR CHASKA, MN

SELECTED PLAN

REVIEWED AND APPROVED BY: ALLEN L. GEISEN , CHIEF, PE-C

DATE PREPARED: 02 NOVEMBER, 1994, REVISED: 20 APRIL 1995

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	OMB INDEX TO %	AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	269,000	65,000	24%	334,000	1.5%	339,000	MAY 97	5.50%	288,000	70,000	358,000
	TOTAL CONSTRUCTION COSTS =====>	269,000	65,000	24%	334,000		339,000			288,000	70,000	358,000
01---	LANDS AND DAMAGES	0	0									
30---	PLANNING, ENGINEERING AND DESIGN	54,000	11,000	20%	65,000	2.2%	66,000	JUNE 96	3.80%	57,000	12,000	69,000
31---	CONSTRUCTION MANAGEMENT	27,000	5,000	19%	32,000	2.2%	33,000	MAY 97	8.00%	30,000	6,000	36,000
	TOTAL PROJECT COSTS ======>	350,000	81,000		431,000		438,000			375,000	88,000	463,000

NOTES:

1. Prices are at April 1995 price levels.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	CHANNEL AND CULVERT	JOB	1	14,674	14,674	2,935	20.00%	3
06.03.01.--	UPGRADE BERM	JOB	1	19,020	19,020	3,804	20.00%	3
06.03.01.--	REFORESTATION	JOB	1	914	914	183	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	1 CHANNEL AND CULVERT (O-3)							
06.03.73.02	1 DRY LAND EXCAVATION							
06.03.73.02	1 EXCAVATION	CY	5,060	4.38	22,163	5,541	25.00%	1,2,4,7
06.03.73.02	2 STUMP REMOVAL	EA	20	91.03	1,821	455	25.00%	1,2,4,7
06.03.73.02	2 LAKE EXCAVATION							
06.03.73.02	1 ROAD CONSTRUCTION	CY	3,795	9.97	37,836	9,459	25.00%	1,2,4,7
06.03.73.02	2 LAKE EXCAVATION	CY	3,795	4.70	17,837	4,459	25.00%	1,2,4,7
06.03.73.02	3 ROADWAY EXCAVATION	CY	3,795	4.70	17,837	4,459	25.00%	1,2,4,7
06.03.73.02	3 SHAPING AT DISPOSAL SITE	CY	11,000	0.35	3,850	962	25.00%	1,2,4,7
							25.00%	1,2,4,7
06.03.73.02	4 ROAD CONSTRUCTION	CY	350	12.76	4,466	1,117	25.00%	1,2,4,7
06.03.73.02	5 CHANNEL PLUG							
06.03.73.02	1 STRIPPING	CY	49	11.36	557	139	25.00%	1,2,4,7
06.03.73.02	2 CLEARING AND GRUBBING	JB	1	9,098.00	9,098	2,275	25.00%	1,2,4,7
06.03.73.02	3 FILL	CY	419	4.10	1,718	429	25.00%	1,2,4,7
06.03.73.02	4 GEOTEXTILE	SY	122	2.69	328	82	25.00%	1,2,4,7
06.03.73.02	5 18" ROCK	CY	47	60.11	2,825	706	25.00%	1,2,4,7
06.03.73.02	6 6" TOPSOIL	CY	32	17.40	557	139	25.00%	1,2,4,7
06.03.73.02	7 SEED	SF	10,000	0.09	900	225	25.00%	1,2,4,7
06.03.73.02	6 42" CMP							
06.03.73.02	1 REMOVE BITUMINOUS SURFACE	SY	96	7.91	759	190	25.00%	1,2,4,7
06.03.73.02	2 EXCAVATION	CY	1,000	1.91	1,910	478	25.00%	1,2,4,7
06.03.73.02	3 42" CMP	LF	130	94.62	12,301	3,075	25.00%	1,2,4,7
06.03.73.02	4 BACKFILL	CY	1,000	6.46	6,460	1,615	25.00%	1,2,4,7
06.03.73.02	5 RESTORE ROADWAY	SY	96	21.66	2,079	520	25.00%	1,2,4,7
06.03.73.02	6 DISPOSE EXISTING CMP	JB	1	256.00	256	64	25.00%	1,2,4,7
06.03.73.02	7 SITE RESTORATION	JB	1	537.00	537	134	25.00%	1,2,4,7
06.03.73.02	7 STOPLOG CONTROL STRUCTURE							
06.03.73.02	1 STOP LOG STORAGE STRUCTURE	JB	1	1,293.00	1,293	323	25.00%	1,2,4,7
06.03.73.02	2 TIMBER STOPLOGS	EA	10	26.79	268	67	25.00%	1,2,4,7
06.03.73.02	3 INLET STRUCTURE	JB	1	9,182.00	9,182	2,296	25.00%	1,2,4,7
06.03.73.02	4 STOPLOG LIFTING HOOKS	EA	2	125.00	250	63	25.00%	1,2,4,7
	5 WING WALLS	JB	1	5,305.00	5,305	1,326	25.00%	1,2,4,7
06.03.73.02	2 UPGRADE BERM (A-2)							
06.03.73.02	1 UPGRADE BERM	CY	2,300	7.04	16,192	4,048	25.00%	1,2,4,7

RICE LAKE - HREP, SELECTED PLAN

PE-C(GRS)

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
06.03.73.02	2 GRAVEL SURFACE	CY	150	17.79	2,669	667	25.00%	1,2,4,7
06.03.73.02	3 OVERFLOW SECTION							
06.03.73.02	1 BEDDING	CY	250	32.57	8,143	2,036	25.00%	1,2,4,7
06.03.73.02	2 RIPRAP	CY	500	33.57	16,785	4,196	25.00%	1,2,4,7
06.03.73.02	3 REFORESTATION							
06.03.73.02	1 SEED COLLECTION	EA	27,000	0.11	2,970	743	25.00%	1,2,4,7
06.03.73.02	2 NURSERY GROWING	EA	27,000	0.28	7,560	1,890	25.00%	1,2,4,7
06.03.73.02	3 SITE PREPARATION							
06.03.73.02	1 MECHANICAL	EA	1,467	3.72	5,457	1,364	25.00%	1,2,4,7
06.03.73.02	2 CHEMICAL	EA	1,467	1.70	2,494	623	25.00%	1,2,4,7
06.03.73.02	3 MOWING	AC	36	23.31	839	210	25.00%	1,2,4,7
06.03.73.02	4 TREE PLANTING							
06.03.73.02	1 TREE TUBES	EA	400	3.15	1,260	315	25.00%	1,2,4,7
06.03.73.02	2 TREE MATS	EA	200	0.76	152	38	25.00%	1,2,4,7
06.03.73.02	3 WOOD CHIP MULCH	EA	400	0.31	124	31	25.00%	1,2,4,7
06.03.73.02	4 TREE PLANTING BY HAND	EA	2,400	2.23	5,352	1,338	25.00%	1,2,4,7
06.03.73.02	5 TREE PLANTING BY MACHINE	EA	19,200	0.08	1,536	384	25.00%	1,2,4,7
06.03.73.02								

SUBTOTAL CONSTRUCTION COSTS		$268,532
SUBTOTAL CONTINGENCIES	24.4%	$65,403
TOTAL 06. FISH AND WILDLIFE FACILITIES		$333,934

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	53,706	53,706	10,741	20.00%	7

SUBTOTAL CONSTRUCTION COSTS		$53,706
SUBTOTAL CONTINGENCIES	20.0%	$10,741
TOTAL 30. PLANNING, ENGINEERING AND DESIGN		$64,448

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	26,853	26,853	5,371	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$26,853			
	SUBTOTAL CONTINGENCIES			20.0%		$5,371		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$32,224		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.

ED-C(GRS)

OPERATION AND MAINTENANCE ESTIMATE ... RICE LAKE HREP

*Life Cycle 100 Yrs
*Rate of Return 6.500%

ITEM	ESTIMATED O&M CYCLE	O&M and MAJOR REPLACEMENT COSTS: QUANTITY UNIT	UNIT PRICE	AMOUNT	EQUIVALENT AVERAGE ANNUAL O&M / MAJOR REPLACEMENT VALUE: PRESENT VALUE	ANNUAL COST	COMMENTS
06.-.-.- FISH AND WILDLIFE FACILITIES							
OUTLET CHANNEL							
CLEAR WOODY DEBRIS	5			815.00	2,198	143	Clearing snags and other debris deposited by the Minnesota River flood waters. Work done by refuge staff.
LABOR		32 HRS	25.00	800			
MILEAGE		60 MI	0.25	15.00			
CONTROL WOODY PLANTS	3			407.50	1,956	127	Clearing brush and tree saplings between the lake and the road. Work done by refuge staff.
LABOR		16 HRS	25.00	400			
MILEAGE		30 MI	0.25	7.50			
TOTAL OUTLET CHANNEL					4,154	271	
CONTROL STRUCTURE							
OPERATION	1			862.50	13,245	863	Changing stoplogs to manage water levels. Work done by refuge staff, 3 times per year, 8 hrs labor per time.
LABOR		24 HRS	35.00	840			
MILEAGE		90 MI	0.25	22.50			
ROUTINE MAINTENANCE	1			207.50	3,186	208	Inspection and misc repairs. Work done by refuge staff. Labor is 8 hrs per year.
LABOR		8 HRS	25.00	200			
MILEAGE		30 MI	0.25	7.50			
MAJOR MAINTENANCE	5			1,015.00	2,738	178	Extensive maintenance, painting, replace parts. Labor is 2 days for 2 people every 5 years.
LABOR		32 HRS	25.00	800			
MILEAGE		60 MI	0.25	15.00			
MATERIALS		1 LS	200	200.00			
TOTAL CONTROL STRUCTURE					19,169	1,248	

OPERATION AND MAINTENANCE ESTIMATE ... RICE LAKE HREP

*Life Cycle 100 Yrs
*Rate of Return 6.500%

ITEM	ESTIMATED O&M CYCLE	O&M and MAJOR REPLACEMENT COSTS QUANTITY	UNIT	UNIT PRICE	AMOUNT	EQUIVALENT AVERAGE ANNUAL O&M / MAJOR REPLACEMENT VALUE PRESENT VALUE	ANNUAL COST	COMMENTS
MINNESOTA RIVER ALT A-1								
REPLACE RIPRAP	5	429	CY	45	19,321	52,110	3,393	Assume 5% is replaced every 5 years under contrac
MINNESOTA RIVER ALT A-2	5				1,350.00	3,641	237	Assume 5% is replaced every 5 years under contrac
REPLACE BEDDING		10	CY	45	450			
REPLACE RIPRAP		20	CY	45	900			
TOTAL MINNESOTA RIVER ALT A-2						3,641	237	
REPORTING	1	32	HR	35	1,120	17,199	1,120	Annual reporting and other staff requirements.

TOTAL - RICE LAKE HREP - DPR

**** TOTAL PROJECT COST SUMMARIES ****

PREPARED BY: GARY SMITH , CENCS-PE-C

PROJECT: RICE LAKE HREP - HREP
LOCATION: RICE LAKE NEAR CHASKA, MN
DATE PREPARED: 02 NOVEMBER, 1994

ALTERNATIVE PLAN O-1

REVIEWED AND APPROVED BY: W. MICHAEL OSTERBY , CHIEF, PE-C

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	%	OMB INDEX TO AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	120,000	29,000	24%	149,000							
	TOTAL CONSTRUCTION COSTS =====>	120,000	29,000	24%	149,000							
01---	LANDS AND DAMAGES	0	0									
30---	PLANNING, ENGINEERING AND DESIGN	24,000	5,000	21%	29,000							
31---	CONSTRUCTION MANAGEMENT	12,000	2,000	17%	14,000							
	TOTAL PROJECT COSTS ======>	156,000	36,000		192,000							

NOTES:

1. Prices are at April 1995 price levels.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	MOBILIZATION/DEMOBILIZATION	JOB	1	14,674	14,674	2,935	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	SITE WORK							
	1 DRY LAND EXCAVATION							
	1 EXCAVATION	CY	5,060	4.38	22,163	5,541	25.00%	1,2,4,7
	2 STUMP REMOVAL	EA	20	91.03	1,821	455	25.00%	1,2,4,7
06.03.73.02	2 LAKE EXCAVATION							
	1 ROAD CONSTRUCTION	CY	3,795	9.97	37,836	9,459	25.00%	1,2,4,7
	2 LAKE EXCAVATION	CY	3,795	4.70	17,837	4,459	25.00%	1,2,4,7
	3 ROADWAY EXCAVATION	CY	3,795	4.70	17,837	4,459	25.00%	1,2,4,7
06.03.73.02	3 SHAPING AT DISPOSAL SITE	CY	11,000	0.35	3,850	962	25.00%	1,2,4,7
06.03.73.02	4 ROAD CONSTRUCTION	CY	350	12.76	4,466	1,117	25.00%	1,2,4,7

SUBTOTAL CONSTRUCTION COSTS		$120,483
SUBTOTAL CONTINGENCIES	24.4%	$29,387
TOTAL 06. FISH AND WILDLIFE FACILITIES		$149,869

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	24,097	24,097	4,819	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$24,097			
	SUBTOTAL CONTINGENCIES		20.0%			$4,819		
	TOTAL 30. PLANNING, ENGINEERING AND DESIGN					$28,916		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	12,048	12,048	2,410	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$12,048			
	SUBTOTAL CONTINGENCIES			20.0%		$2,410		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$14,458		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

**** TOTAL PROJECT COST SUMMARIES ****

TOTAL - RICE LAKE HREP - DPR

PREPARED BY: GARY SMITH , CENCS-PE-C

PROJECT: RICE LAKE HREP - HREP

ALTERNATIVE PLAN O-2

REVIEWED AND APPROVED BY: W. MICHAEL OSTERBY , CHIEF, PE-C

LOCATION: RICE LAKE NEAR CHASKA, MN

DATE PREPARED: 02 NOVEMBER, 1994

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	OMB INDEX TO AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	70,000	17,000	24%	87,000						
	TOTAL CONSTRUCTION COSTS =====>	70,000	17,000	24%	87,000						
01---	LANDS AND DAMAGES	0	0								
30---	PLANNING, ENGINEERING AND DESIGN	14,000	3,000	21%	17,000						
31---	CONSTRUCTION MANAGEMENT	7,000	1,000	14%	8,000						
	TOTAL PROJECT COSTS ======>	91,000	21,000		112,000						

NOTES:

1. Prices are at April 1995 price levels.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	MOBILIZATION/DEMOBILIZATION	JOB	1	14,674	14,674	2,935	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	SITE WORK							
	1 CHANNEL PLUG							
	1 STRIPPING	CY	49	11.36	557	139	25.00%	1,2,4,7
	2 CLEARING AND GRUBBING	JB	1	9,098.00	9,098	2,275	25.00%	1,2,4,7
	3 FILL	CY	419	4.10	1,718	429	25.00%	1,2,4,7
	4 GEOTEXTILE	SY	122	2.69	328	82	25.00%	1,2,4,7
	5 18" ROCK	CY	47	60.11	2,825	706	25.00%	1,2,4,7
	6 6" TOPSOIL	CY	32	17.40	557	139	25.00%	1,2,4,7
	7 SEED	SF	10,000	0.09	900	225	25.00%	1,2,4,7
06.03.73.02	2 42" CMP							
	1 REMOVE BITUMINOUS SURFACE	SY	96	7.91	759	190	25.00%	1,2,4,7
	2 EXCAVATION	CY	1,000	1.91	1,910	478	25.00%	1,2,4,7
	3 42" CMP	LF	130	94.62	12,301	3,075	25.00%	1,2,4,7
	4 BACKFILL	CY	1,000	6.46	6,460	1,615	25.00%	1,2,4,7
	5 RESTORE ROADWAY	SY	21	21.66	460	115	25.00%	1,2,4,7
	6 DISPOSE EXISTING CMP	JB	1	256.00	256	64	25.00%	1,2,4,7
	7 SITE RESTORATION	JB	1	537.00	537	134	25.00%	1,2,4,7
06.03.73.02	3 STOPLOG CONTROL STRUCTURE							
	1 STOP LOG STORAGE STRUCTURE	JB	1	1,293.00	1,293	323	25.00%	1,2,4,7
	2 TIMBER STOPLOGS	EA	10	26.79	268	67	25.00%	1,2,4,7
	3 INLET STRUCTURE	JB	1	9,182.00	9,182	2,296	25.00%	1,2,4,7
	4 STOPLOG LIFTING HOOKS	EA	2	125.71	251	63	25.00%	1,2,4,7
	5 WING WALLS	JB	1	5,305	5,305	1,326	25.00%	1,2,4,7

SUBTOTAL CONSTRUCTION COSTS		$69,639
SUBTOTAL CONTINGENCIES	23.9%	$16,676
TOTAL 06. FISH AND WILDLIFE FACILITIES		$86,315

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS

RICE LAKE - HREP, ALTERNATIVE O-2

PE-C(GRS)

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON

9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

4. UNIT PRICES
5. LEGAL COSTS

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	13,928	13,928	2,786	20.00%	7

SUBTOTAL CONSTRUCTION COSTS		$13,928
SUBTOTAL CONTINGENCIES	20.0%	$2,786
TOTAL 30. PLANNING, ENGINEERING AND DESIGN		$16,713

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

RICE LAKE - HREP, ALTERNATIVE O-2

PE-C(GRS)

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	6,964	6,964	1,393	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$6,964			
	SUBTOTAL CONTINGENCIES			20.0%		$1,393		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$8,357		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

TOTAL - RICE LAKE HREP - DPR **** TOTAL PROJECT COST SUMMARIES ****

PREPARED BY: GARY SMITH , CENCS-PE-C

PROJECT: RICE LAKE HREP - HREP
LOCATION: RICE LAKE NEAR CHASKA, MN ALTERNATIVE PLAN O-3
DATE PREPARED: 02 NOVEMBER, 1994

REVIEWED AND APPROVED BY: W. MICHAEL OSTERBY , CHIEF, PE-C

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	OMB INDEX TO % AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	177,000	44,000	25%	221,000						
	TOTAL CONSTRUCTION COSTS =====>	177,000	44,000	25%	221,000						
01---	LANDS AND DAMAGES	0	0								
30---	PLANNING, ENGINEERING AND DESIGN	35,000	7,000	20%	42,000						
31---	CONSTRUCTION MANAGEMENT	18,000	4,000	22%	22,000						
	TOTAL PROJECT COSTS =====>	230,000	55,000		285,000						

NOTES:
1. Prices are at April 1995 price levels.

03.WK1

20-Apr-95

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	MOBILIZATION/DEMOBILIZATION	JOB	1	14,674	14,674	2,935	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	SITE WORK							
	1 DRY LAND EXCAVATION							
	1 EXCAVATION	CY	5,060	4.38	22,163	5,541	25.00%	1,2,4,7
	2 STUMP REMOVAL	EA	20	91.03	1,821	455	25.00%	1,2,4,7
	2 LAKE EXCAVATION							
	1 ROAD CONSTRUCTION	CY	3,795	9.97	37,836	9,459	25.00%	1,2,4,7
	2 LAKE EXCAVATION	CY	3,795	4.70	17,837	4,459	25.00%	1,2,4,7
	3 ROADWAY EXCAVATION	CY	3,795	4.70	17,837	4,459	25.00%	1,2,4,7
	3 SHAPING AT DISPOSAL SITE	CY	11,000	0.35	3,850	962	25.00%	1,2,4,7
							25.00%	1,2,4,7
	4 ROAD CONSTRUCTION	CY	350	12.76	4,466	1,117	25.00%	1,2,4,7
	5 CHANNEL PLUG							
	1 STRIPPING	CY	49	11.36	557	139	25.00%	1,2,4,7
	2 CLEARING AND GRUBBING	JB	1	9,098.00	9,098	2,275	25.00%	1,2,4,7
	3 FILL	CY	419	4.10	1,718	429	25.00%	1,2,4,7
	4 GEOTEXTILE	SY	122	2.69	328	82	25.00%	1,2,4,7
	5 18" ROCK	CY	47	60.11	2,825	706	25.00%	1,2,4,7
	6 6" TOPSOIL	CY	32	17.40	557	139	25.00%	1,2,4,7
	7 SEED	SF	10,000	0.09	900	225	25.00%	1,2,4,7
06.03.73.02	6 42" CMP							
	1 REMOVE BITUMINOUS SURFACE	SY	96	7.91	759	190	25.00%	1,2,4,7
	2 EXCAVATION	CY	1,000	1.91	1,910	478	25.00%	1,2,4,7
	3 42" CMP	LF	130	94.62	12,301	3,075	25.00%	1,2,4,7
	4 BACKFILL	CY	1,000	6.46	6,460	1,615	25.00%	1,2,4,7
	5 RESTORE ROADWAY	SY	96	21.66	2,079	520	25.00%	1,2,4,7
	6 DISPOSE EXISTING CMP	JB	1	256.00	256	64	25.00%	1,2,4,7
	7 SITE RESTORATION	JB	1	537.00	537	134	25.00%	1,2,4,7
06.03.73.02	7 STOPLOG CONTROL STRUCTURE							
	1 STOP LOG STORAGE STRUCTURE	JB	1	1,293.00	1,293	323	25.00%	1,2,4,7
	2 TIMBER STOPLOGS	EA	10	26.79	268	67	25.00%	1,2,4,7
	3 INLET STRUCTURE	JB	1	9,182.00	9,182	2,296	25.00%	1,2,4,7
	4 STOPLOG LIFTING HOOKS	EA	2	125.71	251	63	25.00%	1,2,4,7
	5 WING WALLS	JB	1	5,305	5,305	1,326	25.00%	1,2,4,7
06.03.73.02								

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
	SUBTOTAL CONSTRUCTION COSTS				$177,067			
	SUBTOTAL CONTINGENCIES			24.6%		$43,533		
	TOTAL 06. FISH AND WILDLIFE FACILITIES					$220,600		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	35,413	35,413	7,083	20.00%	7

SUBTOTAL CONSTRUCTION COSTS		$35,413
SUBTOTAL CONTINGENCIES	20.0%	$7,083
TOTAL 30. PLANNING, ENGINEERING AND DESIGN		$42,496

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	17,707	17,707	3,541	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$17,707			
	SUBTOTAL CONTINGENCIES			20.0%		$3,541		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$21,248		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

**** TOTAL PROJECT COST SUMMARIES ****

TOTAL - RICE LAKE HREP - DPR

PREPARED BY: GARY SMITH , CENCS-PE-C

PROJECT: RICE LAKE HREP - HREP

ALTERNATIVE PLAN FARM FIELD REFORESTATION

LOCATION: RICE LAKE NEAR CHASKA, MN

REVIEWED AND APPROVED BY: W. MICHAEL OSTERBY , CHIEF, PE-C

DATE PREPARED: 02 NOVEMBER, 1994

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	OMB INDEX TO %	AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	29,000	7,000	24%	36,000							
	TOTAL CONSTRUCTION COSTS =====>	29,000	7,000	24%	36,000							
01---	LANDS AND DAMAGES	0	0									
30---	PLANNING, ENGINEERING AND DESIGN	3,000	1,000	33%	4,000							
31---	CONSTRUCTION MANAGEMENT	3,000	1,000	33%	4,000							
	TOTAL PROJECT COSTS ======>	35,000	9,000		44,000							

NOTES:

1. Prices are at April 1995 price levels.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	MOBILIZATION/DEMOBILIZATION	JOB	1	914	914	183	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	SITE WORK							
06.03.73.02	1 SEED COLLECTION	EA	27,000	0.11	2,970	743	25.00%	1,2,4,7
06.03.73.02	2 NURSERY GROWING	EA	27,000	0.28	7,560	1,890	25.00%	1,2,4,7
06.03.73.02	3 SITE PREPARATION							
06.03.73.02	1 MECHANICAL	EA	1,467	3.72	5,457	1,364	25.00%	1,2,4,7
06.03.73.02	2 CHEMICAL	EA	1,467	1.70	2,494	623	25.00%	1,2,4,7
06.03.73.02	3 MOWING	AC	36	23.31	839	210	25.00%	1,2,4,7
06.03.73.02	4 TREE PLANTING							
06.03.73.02	1 TREE TUBES	EA	400	3.15	1,260	315	25.00%	1,2,4,7
06.03.73.02	2 TREE MATS	EA	200	0.76	152	38	25.00%	1,2,4,7
06.03.73.02	3 WOOD CHIP MULCH	EA	400	0.31	124	31	25.00%	1,2,4,7
06.03.73.02	4 TREE PLANTING BY HAND	EA	2,400	2.23	5,352	1,338	25.00%	1,2,4,7
06.03.73.02	5 TREE PLANTING BY MACHINE	EA	19,200	0.08	1,536	384	25.00%	1,2,4,7

SUBTOTAL CONSTRUCTION COSTS		$28,658
SUBTOTAL CONTINGENCIES	24.8%	$7,119
TOTAL 06. FISH AND WILDLIFE FACILITIES		$35,777

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	2,866	2,866	573	20.00%	7

SUBTOTAL CONSTRUCTION COSTS		$2,866
SUBTOTAL CONTINGENCIES	20.0%	$573
TOTAL 30. PLANNING, ENGINEERING AND DESIGN		$3,439

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	2,866	2,866	573	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$2,866			
	SUBTOTAL CONTINGENCIES			20.0%		$573		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$3,439		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

**** TOTAL PROJECT COST SUMMARIES ****

TOTAL - RICE LAKE HREP - DPR

PREPARED BY: GARY SMITH , CENCS-PE-C

PROJECT: RICE LAKE HREP - HREP
LOCATION: RICE LAKE NEAR CHASKA, MN
DATE PREPARED: 02 NOVEMBER, 1994

ALTERNATIVE A-1

REVIEWED AND APPROVED BY: W. MICHAEL OSTERBY , CHIEF, PE-C

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	OMB INDEX TO %	AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	333,000	82,000	25%	415,000							
	TOTAL CONSTRUCTION COSTS =====>	333,000	82,000	25%	415,000							
01---	LANDS AND DAMAGES	0	0									
30---	PLANNING, ENGINEERING AND DESIGN	67,000	13,000	19%	80,000							
31---	CONSTRUCTION MANAGEMENT	33,000	7,000	21%	40,000							
	TOTAL PROJECT COSTS ======>	433,000	102,000		535,000							

NOTES:

1. Prices are at April 1995 price levels.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	MOBILIZATION/DEMOBILIZATION	JOB	1	19,020	19,020	3,804	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	SITE WORK							
	1 BANK SHAPING	LF	1,398	18.22	25,472	6,368	25.00%	1,2,4,7
	2 ROCK	CY	8,587	33.57	288,266	72,066	25.00%	1,2,4,7
	SUBTOTAL CONSTRUCTION COSTS				$332,757			
	SUBTOTAL CONTINGENCIES			24.7%		$82,238		
	TOTAL 06. FISH AND WILDLIFE FACILITIES					$414,995		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	66,551	66,551	13,310	20.00%	7

SUBTOTAL CONSTRUCTION COSTS		$66,551	
SUBTOTAL CONTINGENCIES	20.0%		$13,310
TOTAL 30. PLANNING, ENGINEERING AND DESIGN			$79,862

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	33,276	33,276	6,655	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$33,276			
	SUBTOTAL CONTINGENCIES			20.0%		$6,655		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$39,931		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

TOTAL - RICE LAKE HREP - DPR **** TOTAL PROJECT COST SUMMARIES ****

PROJECT: RICE LAKE HREP - HREP
LOCATION: RICE LAKE NEAR CHASKA, MN
DATE PREPARED: 02 NOVEMBER, 1994

ALTERNATIVE A-2

PREPARED BY: GARY SMITH , CENCS-PE-C

REVIEWED AND APPROVED BY: W. MICHAEL OSTERBY , CHIEF, PE-C

ACCOUNT NUMBER	ITEM DESCRIPTION	ESTIMATED COST($) (EPD)	CONTINGENCY AMOUNT($)	%	TOTAL EST COST (EPD)	%	OMB INDEX TO AMOUNT	MID POINT OF FEATURE	OMB (%) INDEX (+/-)	INDEXED COST AMOUNT ($)	INDEXED CONTG. AMT. ($)	FULLY FUNDED COST
06---	FISH AND WILDLIFE FACILITIES	63,000	15,000	24%	78,000							
	TOTAL CONSTRUCTION COSTS =====>	63,000	15,000	24%	78,000							
01---	LANDS AND DAMAGES	0	0									
30---	PLANNING, ENGINEERING AND DESIGN	13,000	3,000	23%	16,000							
31---	CONSTRUCTION MANAGEMENT	6,000	1,000	17%	7,000							
	TOTAL PROJECT COSTS =======>	82,000	19,000		101,000							

NOTES:

1. Prices are at April 1995 price levels.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
06.--.--.--	FISH AND WILDLIFE FACILITIES							
06.03.--.--	WILDLIFE FACILITIES AND HABITAT							
06.03.01.--	MOBILIZATION/DEMOBILIZATION							
06.03.01.--	MOBILIZATION/DEMOBILIZATION	JOB	1	19,020	19,020	3,804	20.00%	3
06.03.73.--	HABITAT AND FEEDING FACILITIES							
06.03.73.02	SITE WORK							
06.03.73.02	1 UPGRADE BERM	CY	2,300	7.04	16,192	4,048	25.00%	1,2,4,7
06.03.73.02	2 GRAVEL SURFACE	CY	150	17.79	2,669	667	25.00%	1,2,4,7
06.03.73.02	3 OVERFLOW SECTION							
06.03.73.02	1 BEDDING	CY	250	32.57	8,143	2,036	25.00%	1,2,4,7
06.03.73.02	2 RIPRAP	CY	500	33.57	16,785	4,196	25.00%	1,2,4,7

SUBTOTAL CONSTRUCTION COSTS		$62,808	
SUBTOTAL CONTINGENCIES	23.5%		$14,751
TOTAL 06. FISH AND WILDLIFE FACILITIES			$77,559

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT APRIL 1995 PRICE LEVEL.
B. EARTHWORK QUANTITIES ARE INCREASED 15% TO ACCOUNT FOR LOOSE VOLUME.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	CONTINGENCIES REASON
30.--.--.--	PLANNING, ENGINEERING AND DESIGN							
	PLANNING, ENGINEERING AND DESIGN	JOB	1	12,562	12,562	2,512	20.00%	7

SUBTOTAL CONSTRUCTION COSTS		$12,562
SUBTOTAL CONTINGENCIES	20.0%	$2,512
TOTAL 30. PLANNING, ENGINEERING AND DESIGN		$15,074

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

ACCOUNT CODE	ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT	CONTINGENCIES AMOUNT	CONTINGENCIES PERCENT	REASON
31.--.--.--	CONSTRUCTION MANAGEMENT (S&I)							
31.23.--.--	CONSTRUCTION CONTRACTS							
31.23.11.--	SUPERVISION AND ADMN	JOB	1	6,281	6,281	1,256	20.00%	7
	SUBTOTAL CONSTRUCTION COSTS				$6,281			
	SUBTOTAL CONTINGENCIES			20.0%		$1,256		
	TOTAL 31. CONSTRUCTION MANAGEMENT (S&I)					$7,537		

REASONS FOR CONTINGENCIES

1. QUANTITY UNKNOWNS
2. SITE CONDITIONS
3. HAUL DISTANCE
4. UNIT PRICES
5. LEGAL COSTS
6. LAND PRICES
7. PRODUCTION/DURATION
8. MATERIALS
9. INSIGNIFICANT AMOUNT
10. NOT APPLICABLE

NOTES

A. UNIT PRICES AT JANUARY 1994 PRICE LEVEL.

ATTACHMENT 3

SECTION 404 (B) (1) EVALUATION

SECTON 404(b)(1) EVALUATION
RICE LAKE HABITAT REHABILITATION AND ENHANCEMENT PROJECT
ENVIRONMENTAL MANAGEMENT PROGRAM
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
SCOTT COUNTY, MINNESOTA

I. Project Description

A. Location - The Rice Lake project is located on the right descending bank of the Minnesota River, approximately 17 miles above its confluence with the Mississippi River (see report plate 1). The study area encompasses about 400 acres including Rice Lake and the surrounding area (see report plate 2).

B. General Description - The project involves replacing an existing oval culvert under County Road 18 with a 42-inch round culvert with a stop log control structure. To provide the capability to draw down water levels in Rice Lake, an outlet channel would be excavated from old County Road 18 to the low elevation of the lake. To provide for construction access, a road would be constructed into the lake with the dimensions of the channel and removed during the excavation of the channel. To provide the ability to raise Rice Lake water levels, an outlet channel would have to plugged. An eroding bank on the Minnesota River downstream of Rice Lake would also be stabilized with riprap.

C. Authority and Purpose - This project is proposed under the authority of Section 1103 of the Water Resources Development Act of 1986 (Public Law 99-662). The overall purpose of this project is to rehabilitate, enhance, and maintain diverse riverine habitat for fish and wildlife.

D. General Description of Dredged and Fill Material

1. Physical Characteristics - The 3,300 cubic yards of material dredged from Rice Lake is 82% fines and 18% sand. The 4,400 cubic yards of material excavated between the lake bed and County Road 18 is 61% fines and 39% sand. Approximately 365 CY of this material would be used for construction of the outlet channel plug. The 3,300 CY of temporary road fill would be coarse sand. All rock riprap would be sized in the 18 inch class.

2. Chemical Characteristics - All sand, gravel, and rock riprap would be quarry run and would be clean in nature. The material that would be excavated from the channel was tested for bulk chemistry and was found to be clean from metals and PCB's. Both locations contained pesticide contaminants in the surface samples. Within the lake sample, 9.9 parts per billion (ppb) 4,4-'DDE, 52 ppb 4,4'-DDD, and 5.3 ppb 4,4'-DDT were found in the sample. Within the upland sample, 9.5 parts per billion (ppb) 4,4-'DDE, 17 ppb 4,4'-DDD, and 27 ppb 4,4'-DDT were found in the sample. The source of contamination is unknown at this time, but based on sediment samples from an adjacent lake in 1985 by the U.S. Fish and Wildlife Service (FWS), contamination is expected to be widespread in this system. The material that

would be exposed after excavation was shown to have relatively low or undetectable levels of metals, PCB's, and pesticides.

3. Quantity of Dredged and Fill Material - About 800 feet of the outlet channel construction would take place along the existing drainage channel between Rice Lake and the county road, while the remaining 1,730 feet of channel would be excavated from Rice Lake. Approximately 4,400 cubic yards (CY) of material would be excavated from the first 800 feet, and 3,300 CY would be removed from the lake bed. The temporary road would be construction into the lake using 3,300 CY sand. The road would be built first, then removed during the excavation of the channel. The outlet channel on the east side of Rice lake would be plugged with 365 CY of fill material. The eroding bank on the Minnesota River would be stabilized with 250 CY gravel bedding and 500 CY riprap, of which half would be placed below the normal high water mark.

E. Description of Proposed Dredged Material Disposal Site - Approximately 365 yards of the material excavated from the upland portion of the outlet channel would be deposited at the east outlet of Rice Lake to provide the plug. The remainder of the material would be transported to the abandoned agricultural field. The material would be disposed at a thickness of about 10 inches over 8 acres of the field. Once the material would settle and dry, it would be incorporated into the existing topsoil by plowing. The total area of this field is 40 acres. It has been recently acquired by the FWS. This field had historically been used in a corn and soybean rotation. Since the FWS acquired this property, it has been allowed to succeed into field dominated by annual weeds and grasses, and bottomland forest species. The channel plug would be constructed approximately 200 yards upstream of its confluence with Eagle Creek. The outlet channel is approximately 4 feet wide and is located within 70 feet banks. The bank is steep (>1:1) in many areas. The bank itself is not vegetated due to unstable soil conditions. The top of the banks in this reach are vegetated with bottomland forest species.

F. Timing and Duration of Dredged Material Disposal and Fill Activities - The project is scheduled for construction in the spring of 1997. The project would be completed by the fall of 1997. All project activities would be performed mechanically.

G. Description of Fill and Dredged Material Disposal Methods - The material would be obtained from the area outlined on report plate 4. Dredging and filling activities would be performed mechanically.

II. Factual Determinations

A. Physical Substrate Determinations

1. Substrate Elevation and Slope - The normal lake elevation of Rice Lake is 695 mean sea level (msl). Maximum depth under normal conditions is two feet. The outlet channel would be excavated to a depth of 692.5, or 0.6 feet below the invert elevation on the outlet culvert. The channel would extend 2,530 feet from old County Road 18 to the low spot in Rice Lake. The channel would have a 10 foot bottom width, with 1V:4H side slopes. The east channel plug would be raised to elevation 702 msl, and side slopes of 1V:3H.

The upstream side would have 18 inch rock riprap protection, while the downstream side would be topped with fines and vegetated. In the berm rehabilitation area, fill would be placed to elevation 701 msl. To minimize erosion of the berm when it is overtopped, a riprap overflow section in the natural breach would be constructed. This section has a bottom width of 30 feet with side slopes of 1V:10H.

2. Substrate Changes - Minor changes in substrate would occur through the channel excavation. The substrate exposed from the excavating the sandy lean clay would be lean silt. The Minnesota River bank area proposed for protection would be changed from the current silt substrate to 12-18 inch rock riprap. The outlet channel plug on the upstream side would also be changed to 18 inch rock riprap protection.

3. Dredged/Fill Material Movement - Fill material movement should be more stable than present conditions within the abandoned agriculture field. Conditions would be stabilized by the bottomland forest restoration proposed at this 40 acre site. Presently, the bare field is exposed to high water events. Reforestation efforts would protect the soil from erosion. The erosion occurring on the bank of the Minnesota River would be reduced by the riprap protection proposed.

B. Water Circulation and Fluctuations

1. General Water Chemistry - The general water chemistry of the project area would not be modified by the proposed dredging and disposal activities. Even though sediment analysis revealed pesticide contamination, the problem is probably widespread throughout the project area. Through the excavation, cleaner material would be exposed. This would have a minor impact to changes in the water quality as less pesticides would be exposed.

2. Current Patterns and Circulation - The dredging of the channel would have no effect on the current patterns and circulation during normal water level conditions due to the lack of flows within Rice Lake. During high water conditions, the channel may create eddies in the flows. The channel plug would stop flows below 701 msl. Any water conditions above 701 msl, would rise over the banks and flows would be similar to present conditions. The Minnesota River bank protection may also create small eddy flows.

3. Sedimentation Patterns - Substantial sediment pattern changes in the project area are not expected to occur due to project implementation. There may be subtle changes in sedimentation patterns by extending the outlet channel during high water conditions. Since the 8 acre disposal area would be raised only about 10 inches, no changes are expected here.

C. Suspended Particulate/Turbidity Determinations

1. Suspended Particulates and Turbidity - Small, localized turbidity plumes would be generated by the dredging activities. No long-term or significant impacts would occur due to the these activities.

2. Effects on Physical and Chemical Properties of the Water Column

a. Light Penetration - Light penetration could be temporarily suppressed because of the construction activities and the disturbance of any fine sediments present by dredging activities. No long-term impact is expected.

b. Dissolved Oxygen - The existing outlet channel would be plugged and loss of water flow would occur both upstream and downstream from the structure. Dissolved oxygen levels may decline locally due to the lack of flow. No significnat adverse effects on dissolved oxygen should occur from the project construction.

c. Toxic Metals and Organics - Since the contamination is assumed to be widespread within the area, construction related impacts on water quality should minimal.

d. Pathogens - Pathogenic organisms are not likely to impact the physical and chemical properties of the water column.

D. Contaminant Distribution Determinations - Although sampling revealed the sediment to be excavated was contaminated with low levels of organic pesticides, the contamination is probably widespread and present at the disposal site due to the characteristics of the Minnesota River floodplain. Based on quality of the dredged material and the disposal site, the potential for redistribution of contaminants is minimal.

E. Aquatic Ecosystem and Organism Determinations

1. Effects on Plankton - Planktonic activity in the construction area in Rice Lake may be slightly suppressed during the construction because of elevated suspended solids levels.

2. Effects on Benthos - Benthos located within the excavation area would be destroyed by the dredging activities. Project impacts are expected to be minor since the quality of the sediment to benthic organisms is marginal, and the area proposed for excavation is so small relative to the available habitat. The long-term impacts of the project would benefit benthic organisms by optimizing habitat conditions within the area.

3. Effects on Fish - Plugging the existing outlet channel from Rice Lake would prevent fish movement up this channel except in extreme high water conditions. It may also create stagnated water which would limit its use by fish due to dissolved oxygen depletions. The elimination of this channel from fish movement and possible stagnation would be off-set by the construction of the outlet channel on the west side of the lake. Current fish use of Rice Lake is limited by shallow water depth. Significant impacts on fish from the proposed dredging and filling activities are not expected.

4. Effects on Wildlife - Increased deepwater habitat provided by the channel excavation adds to the habitat diversity of the area which would have a minor positive impact on area wildlife species.

5. Effects on Aquatic Food Web - The dredging and filling proposed should not produce any effects on the aquatic food web.

6. Effects on Special Aquatic Sites

a. Sanctuaries and Refuges - The dredging and disposal activities would occur on the Minnesota Valley National Wildlife Refuge. No negative impacts are expected as a result of this project.

b. Wetlands, Mud Flats, and Vegetated Shallows - Approximately 1.4 acres of emergent aquatic vegetation would be dredged for the outlet channel. This area would be dredged to approximately three feet deep, which would probably prohibit emergent vegetation growth in the outlet channel. In years when water clarity is high during spring, submergent vegetation is expected to grow within areas of the dredged channel. The existing outlet channel would be plugged and loss of water flow would occur both upstream and downstream from the structure. Dissolved oxygen levels may decline locally due to the lack of flow. Presently Rice Lake outlets to Eagle Creek and then to the Minnesota River. Rice Lake degrades the water quality of Eagle Creek at the present time. By eliminating flows from the existing channel, a minor improvement of water quality would occur. The new channel would eventually join the outlet from Fisher Lake, which then flows into the Minnesota River approximately 1 mile upstream from the existing Rice Lake/Eagle Creek outlet. The water quality properties of Rice and Fisher Lakes are similar. No outflow problems are expected from combining outflows from Rice and Fisher Lakes upon the Minnesota River since the total outflow from these two lakes are minor contributors to the total flow of the Minnesota River.

7. Threatened and Endangered Species - Two federally protected species can be found in the general project area: the bald eagle (Haliaetus leucocephalus), and the peregrine falcon (Falco peregrinus). The St. Paul District has determined neither species would be affected since diurnal perches, roost sites, food sources, or other preferred habitat would not be affected. The St. Paul District is awaiting concurrence from the FWS (attachment 1).

8. Actions Taken To Minimize Impacts - Efforts are being taken to minimize water quality impacts. Dredging activities would be limited to mechanical methods and a silt curtain would be used during dredging to confine suspended particulates to the immediate construction area. The disposal area would be stabilized by the proposed bottomland forest restoration.

F. Proposed Disposal Site Determinations

1. Mixing Zone - Due to the characteristics of the construction activities, the mixing zone at the various deposition sites would be very limited.

2. Compliance with Applicable Water Quality Standards - The proposed action should not directly violate State standards for fish and aquatic life or recreation. The amount of suspended sediment produced should be minimal. The St. Paul District has requested water quality certification and approval for the proposed work in Minnesota waters from the Minnesota Pollution Control Agency.

3. Potential Effects on Human Use Characteristics

a. Municipal and Private Water Supply - Based on the present and projected human use characteristics, the existing physical conditions, and the proposed construction methods, this proposed action would have no significant effects on human use characteristics. No municipal or private water supplies would be affected by the proposed fill activities.

b. Recreational and Commercial Fisheries - The project should have no effects on fish and other wildlife habitat, which would not affect the recreational or commercial fisheries.

c. Water Related Recreation and Aesthetics - The aesthetic quality of the area would be reduced during the construction because of the presence and operation of construction equipment. Recreational use in the immediate area would be minimally affected during construction.

d. Cultural Resources - The known existing historic properties in the project area (Bloomington Ferry Mound site, river crossing site, and the mitigated floodplain sites 21 SC 36 and 37) are outside the project's area of effect. In accordance with Section 106 of the National Historic Preservation Act, a cultural resources survey was made of the project areas where unknown cultural resources may exist. Field survey testing and an interview with a local informant revealed no historic properties in the project's area of effect. A report on the survey was reviewed by the Fws and the Minnesota State Historic Preservation Office. Both concurred that no cultural properties would be affected by the Rice Lake project.

G. Cumulative and Secondary Effects on the Aquatic Ecosystem - Implementation of the proposed action would cause no significant adverse cumulative impact on the aquatic ecosystem. Completion of the project would allow improved management capability to produce positive effects on the aquatic ecosystem as well as increase the habitat diversity of the area.

III. Findings of Compliance or Noncompliance with Restrictions on Discharge

A. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge that Would Have Less Impact Upon the Aquatic Ecosystem (40 CFR 230.10(a))

1. No Action - Under this alternative, present conditions would remain and there would be no constructed related impacts. Present habitat conditions within Rice Lake would remain marginal and unmanageable. The potential habitat gains realized by project implementation would be lost.

Within 20 years, enough of the natural levee protecting the 70 acre wetland would be breached. It was estimated half of the wetland would be lost in the event of a breach and the quality of the remaining wetland would be degraded.

2. Alternative A - Alternative A involved operating a pumping facility to drawdown water levels in Rice Lake. Channel excavation would still be required from the low spot in the lake to the west shore of the lake to convey the water to the sump pump. The only potential savings would be from eliminating channel excavation from the shoreline to old County Road 18, an estimated $40,000 - $50,000. The cost to construct a sump and purchase a pump of sufficient capacity would exceed this cost. In addition, the pumping option would require considerable operation and maintenance expense. Therefore, the pumping facility alternative for lake drawdown was eliminated from further consideration.

3. Alternative B - This alternative would have the outlet channel originate from the east side of Rice Lake. The initial review indicated the channel within Rice Lake would be 2,500 to 3,000 feet long compared to a 1,700 feet long in-lake channel with the west outlet alternative. The cost of this channel would be double that of the west outlet channel in excavation costs alone. Additional excavation for installation of a outlet structure would be necessary on the outlet creek. Also a portion of the channel would have to go through a marsh on the east side of Rice Lake. Any excavation in the outlet creek would likely require some clearing for construction access. It was determined there would be substantially more adverse environmental impacts associated with construction of the east outlet alternative, and it was eliminated from further evaluation.

B. Compliance with Applicable State Water Quality Standards (40 CFR 230.10(b)(1)) - The project would not violate Minnesota standards for fish and aquatic life or recreation. The amount of suspended sediment produced should be minimal. Water quality certification for the proposed work has been waived by the Minnesota Pollution Control Agency, subject to implenting efforts to control erosion and avoiding the draining or filling of wetlands.

C. Compliance with Section 307 of the Clean Water Act (40 CFR 230.10(b)(2)) - The proposed action would not violate any applicable effluent standard or prohibition under Section 307 of the Clean Water Act.

D. Compliance with the Endangered Species Act (40 CFR 230.10(b)(3)) - The project is being coordinated with the FWS, relative to endangered or threatened species. The St. Paul District has determined there would be no impacts to threatened or endangered species, and are awaiting FWS determination.

E. Evaluation of the Extent of Degradation of Waters of the United States (40 CFR 230.10(c))

1. The proposed project would not have any significant adverse effects on human health and welfare.

2. The proposed project would not have any significant adverse

effects on life stages of aquatic life or any other wildlife dependent upon aquatic ecosystems.

3. The proposed project would not have any significant adverse effects on aquatic ecosystem diversity, productivity, or stability.

4. The proposed project would not have any significant adverse effects on recreational, aesthetic, cultural, or economic values.

F. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem (40 CFR 230.10(d)) - The project was designed to minimize adverse effects, while reaching the stated goals and objectives. Appropriate erosion control measures as required by the Minnesota Pollution Control Agency waiver of water quality certification would be incorporated into the final project design.

G. Compliance with the Guidelines for the Discharge of Dredged or Fill Material - Based on this evaluation, I have determined that the proposed action complies with the requirements of these guidelines, with the inclusion of appropriate and practicable conditions to minimize pollution or adverse effects to the aquatic ecosystem.

11 July 1995
Date

FOR James T. Scott
Colonel, Corps of Engineers
District Engineer

ATTACHMENT 4

HABITAT EVALUATION PROCEDURES APPENDIX

HABITAT EVALUATION PROCEDURE
RICE LAKE ENVIRONMENTAL MANAGEMENT PROGRAM PROJECT

MODEL SELECTION

Based on the habitat characteristics and management objectives of Rice Lake, the habitat evaluation procedure (HEP) was performed using the June 1978 draft of the blue-winged teal wetland habitat suitability index (HSI) model. The draft was used instead of the final because it recognized individual wetland components, rather than the number of wetlands within a square mile. Even though the objectives for this project are clearly not for the sole purpose of blue-winged teal management, this model was used because it considers habitat conditions essential for a myriad of species. The refuge staff is committed to the management of habitat for the entire area. No single species management is practiced on the Minnesota Valley National Wildlife Refuge. Muskrat, terns, and bitterns require the same general habitat types as described in the blue-winged teal model. All these species require shallow to deep vegetated aquatic habitat, and this model provides for this habitat evaluation.

This model has three components for determining the HSI. The **food value** considers the average depth of the water and the amount interspersion between emergent vegetation and open water. The **cover value** is made up of emergent vegetation and open water interspersion, the amount of bulrush and cattail in emergent vegetation, and wetland size. The **reproductive value** is the distance to grassland, amount of vegetative ground cover on shoreline, average height of herbaceous vegetation in grassland, amount of herbaceous ground cover in grassland, and wetland size. The HSI is the lowest of these three values in this model. Since nesting cover is not considered the limiting factor for waterfowl production in the project area, the **reproductive value** component was not used in calculating HSI.

Rice Lake - Water Level Control

There are basically three habitat conditions that dominate Rice Lake in a given year. **Optimum conditions** occur when moisture regime is at or about normal. Lake levels would range from 1.5 to 2 feet of water. With these water levels throughout the growing season, the emergent vegetation to open water ratio approximates 50:50, with fairly good interspersion of vegetation and open water. Submergent vegetation would also be present at this condition, providing additional invertebrate substrate. The HSI value calculated for optimum habitat conditions is 0.71 (see attached table). **High water conditions**, obviously occur in the high moisture regime. Lake levels are usually deeper than three feet. At these depths, emergent vegetation is absent within the lake. Growth is prohibited by both excessive water depths and increased suspended loads from the Minnesota River. A wetland with no aquatic vegetation has little, if any, value to blue-winged teal, and has a HSI value of 0.0. Even though the model gives these conditions a HSI value of 0.0, the area would still have some value to blue-winged teal, so a HSI value of 0.1 is used instead. **Low water conditions** occur in dry moisture regimes.

Lake levels average less than one foot. Emergent vegetation dominates the entire lake bed with 100% coverage. Submergent vegetation does not grow due to the dominance of the emergent species. The HSI value in this scenario is 0.39.

The habitat conditions above are determined by the moisture regime, and even though these conditions are impossible to predict, an estimation of the frequency of occurrence of these conditions follow. This estimation is based on observed habitat conditions on Rice Lake in the past 15 years. All 3 conditions were present during this period since all moisture conditions were also present. It was estimated that optimum habitat conditions occurred four times in this period. Conditions other than optimum occurred the other years. Based on these observations, it is estimated that under existing conditions (without project features), optimum habitat could be expected to present 15 times within the next 50 years. Low water conditions would be present 18 years in the next 50, and high water present 17 years in the next 50. The overall HSI value calculated for Rice Lake under current conditions is 0.38, or 65.86 AAHU. This is calculated by averaging the HSI values for each scenario:

$$\begin{aligned} 15 \times 0.71 &= 10.65 \\ 17 \times 0.10 &= 1.70 \\ 18 \times 0.39 &= \underline{6.84} \\ & 19.19 \div 50 = 0.38 \end{aligned}$$

The HSI value of 0.38 represents the average habitat conditions expected in the next 50 years under current conditions. These conditions are expected because there is no way to control water levels in dry or wet years. This phase of the project would involve two features: a control structure to manipulate water levels, and channel dredged to allow drawdowns of lake levels. There are three alternatives to this phase: (1)construction of a control structure; (2) construction of the dredged channel; and (3) construction of a control structure and dredged channel. With alternative (1), water could be held at higher levels, but high water could not be released without the outlet channel dredged. In alternative (2), high water would be released without control. And with (3), the water control structure and outlet channel would be constructed enabling managers to hold water back into Rice Lake on the dry years, and release water in the wet years.

In alternative (1), it is estimated that in the 18 years that are too dry, enough water could be held back in 12 of these to provide optimum conditions. There would be 6 years when conditions are too dry to provide optimum conditions. The 17 years of high water would still be present since the outlet channel would not be present in this alternative. This alternative has 78.91 AAHU calculated by:

$$\begin{aligned} 27 \times 0.71 &= 19.17 \\ 17 \times 0.10 &= 1.70 \\ 6 \times 0.39 &= \underline{2.34} \\ & 23.21 \div 50 = 0.46 \end{aligned}$$

In alternative (2), it is estimated in the 17 years that are too wet, enough water could be released in 10 of these to provide optimum conditions. There would be 7 years when conditions would be too wet to provide optimum conditions. The 18 years of low water could not be prevented since there is no control structure present in this alternative. This alternative has 86.60 AAHU calculated by:

$$\begin{aligned} 25 \times 0.71 &= 17.75 \\ 7 \times 0.10 &= .70 \\ 18 \times 0.39 &= \underline{7.02} \\ & 25.47 \div 50 = 0.51 \end{aligned}$$

In alternative (3), it is expected that in the dry years, enough water can be held back 12 of the 18 years to provide optimum conditions. In the wet years, enough water could be released 10 of the 17 years to provide optimum conditions. By operating the control structure, in conjunction with the outlet channel, optimum habitat conditions could be attained 37 years of the 50. Seven years would still be too dry, and 6 too wet. This alternative has 99.65 AAHU calculated by:

$$\begin{aligned} 37 \times 0.71 &= 26.27 \\ 7 \times 0.00 &= 0.00 \\ 6 \times 0.39 &= \underline{2.34} \\ & 28.61 \div 50 = 0.57 \end{aligned}$$

The current and future habitat conditions without project implementation has an HSI value of 0.38. The HSI value could be increased to 0.57 with alternative (3). This increase is due to optimizing two current limiting factors, namely average water depth and the amount of interspersion between emergent vegetation and open water. This increases the total AAHU for the alternative by 33.79.

Bank Protection - Reach A

The project objective in this phase would be to stabilize a natural river levee to prevent the eventual loss of a 70 acre wetland. For this analysis, two assumptions have been made. The habitat conditions for this wetland are assumed to have an HSI value of 0.71. There is a high interspersion of habitats here and water levels are more consistent. This is because it is located higher on the floodplain and the Minnesota River has less of an influence upon its water levels. This wetland is also fed by groundwater so water quality is also higher. It is also assumed that with no bank protection, that erosion would breach the natural levee and drain the wetland in 20 years. The HSI value for the last 30 years would be 0.39 since emergent vegetation coverage would be 100%. It was estimated the size of the wetland would also decrease from the current 70 acres to 35 acres because of the breach. With the stabilization of the natural levee, erosion would be prevented and habitat conditions and wetland size would remain as present conditions. The calculation of habitat value for with and without project conditions follows:

Without Project

20 x 0.71 = 14.2
30 x 0.39 = 11.7

14.2 x 70 acres = 994 HU
11.7 x 35 acres = 409.5 HU
1403.5 ÷ 50 = 28.07 AAHU

With Project

50 x 0.71 = 35.5

35.5 x 70 acres = 2485 ÷ 50 = 49.70 AAHU

By project implementation, 21.63 AAHU are gained over the no action alternative.

Bottomland Hardwood Restoration

This phase of the project involves converting a 40 acre agricultural field to bottomland hardwoods. It is proposed to plant 1 inch and 2.5 inch diameter trees at 600 trees per acre. Species to be used in the planting are silver maple, American elm, green ash, bur oak, hackberry, and boxelder. The intent of this phase is to accelerate succession.

For the HEP analysis, 5 target years (0, 1, 10, 25, 50) were identified for with and without project implementation. For this analysis, the HSI model selected was for the black-capped chickadee. This model was selected because the black-capped chickadee is a common inhabitant of bottomland forests, and the model was easy to show successional trends. There are two life requisites in this model: food and reproduction. The food requisite includes the tree canopy closure and the height of overstory trees as variables. The reproduction requisite variable considers the presence or absence of snags. The HSI determination is equal to the lowest life requisite value. For this analysis, the reproduction value was eliminated from the analysis because this project is a bottomland restoration and there would be very few snags present in the early stages of succession. Also, the field is adjacent to old forest growth where snags are present. For without project implementation, or natural succession, the following values were assigned:

Target Year	Acres	HSI	Habitat Units
0	40	0.00	0.00
1	40	0.00	0.00
10	40	0.45	18.00
25	40	0.71	28.40
50	40	0.85	34.00

For with project implementation the following values were assigned:

Target Year	Acres	HSI	Habitat Units
0	40	0.00	0.00
1	40	0.45	18.00
10	40	0.71	28.00
25	40	0.90	36.00
50	40	0.90	36.00

The average annual habitat units for without and with project conditions are 24.00 AND 29.34, respectively. The planting plan would give the area an increase of 5.34 AAHU's over natural succession.

ATTACHMENT 5

HYDRAULICS APPENDIX

ATTACHMENT 5

HYDRAULIC DESIGN

TABLE OF CONTENTS

TABLES

PLATES

GENERAL

1. Rice Lake is located in Scott County, Minnesota (See Plate B-1). The lake is a floodplain lake located along the right bank of the Minnesota River at approximately River Mile 16.7. It is separated from the river by natural levee. A close-up of the area in its existing condition is shown on Plate B-2. To the west of Rice Lake is Scott County Road 18, and to the east is Eagle Creek. Highway 101 runs along south of the lake. The drainage area of the lake which has been estimated at 650 acres (Reference 3) includes residential, light industrial, and commercial activity. There is no defined inlet to Rice Lake, but a creek outlets Rice Lake to the Minnesota River. Rice Lake is a shallow lake with depths from 18" to 3-feet. The size of the lake varies with water depths. At a water surface elevation of 696.0, the lake is about 170 acres in size.

2. The right bank of the Minnesota River between River Mile 15.4 and River Mile 15.65 shares the natural river levee with a perched wetland located to the east of Eagle Creek. The natural levee was breached from the wetland, and a cut has eroded in the bank of the Minnesota River at approximately River Mile 15.55. The river banks are steep with slopes averaging about 1V:2H. There is no stable vegetation growth along the bank slopes.

3. The proposed project has two main objectives. The first one is to be able to manage Rice Lake for the enhancement of waterfowl. This portion of the project consists of installing a 42" culvert with control structure, constructing a channel from Rice Lake to the 42" culvert, and building a plug in the creek that outlets Rice Lake to the Minnesota River. These features are shown on Plate B-3. The project will be managed by the U.S. Fish and Wildlife Service (FWS). By maintaining Rice Lake as a shallow lake, high quality habitat is provided for migratory birds and aquatic wildlife. This will be accomplished by operating the control structure on the culvert to obtain the desired water surface elevation.

4. The second objective is to protect the perched wetland from completely draining and the Minnesota River bank from eroding. This portion consists of raising the existing gravel road and creating a spillway for the wetland by protecting the natural low spot (See Plate B-3). The erosion was caused from the wetland flowing out through the cut that it created. The Minnesota River bank was looked at using Geographic Information Systems (GIS) which indicated that there was minimal river bank erosion between 1937 and 1984. This is why the plan is to raise the road and direct the flow from the wetland to the protected area. The protection will prevent the erosion that's occurring from the wetland and therefore protect the wetland from draining completely. The wetland will be able to drain out when it's water surface elevation is above 698.0. The wetland's water surface elevation is maintained approximately at elevation 697.5.

HYDROLOGIC MASS BALANCE

5. The hydrologic mass balance analysis was performed for future conditions in Rice Lake. The purpose of this analysis was to determine two things: if the culvert at Scott County Road 18 would be sufficient in the draw down of Rice Lake and the impacts of a proposed plug in the creek where Rice Lake outlets to the Minnesota River. An existing mass balance model developed using the 20/20 spread sheet computer program was modified for Rice Lake and used in the analysis. This model is based on continuity as applied to the lake, ie.

$$Rv + Pv - Ev - dS - Og + G = 0 \qquad (1)$$

where

Rv - volume of runoff from watersheds draining into the lake as determined from measured precipitation using Soil Conservation Service (SCS) methods;

Pv - volume of direct precipitation onto the lake;

Ev - volume of evaporation from the open water areas, as estimated from pan evaporation measurements at University of Minnesota, St. Paul;

dS - change in storage of Rice Lake;

Og - gravity outflow (or inflow) through the culvert located at Scott County Road 18 when open (= 0 when structure is closed);

G - groundwater exchange.

All of the above can be determined, either by direct measurement or indirectly through calculation, from field measurements.

6. Measured hydrologic data used in the mass balance analysis were daily precipitation, daily pan evaporation, and total drainage area. Daily precipitation measured at the Minneapolis/St. Paul Airport was used to estimate daily runoff using procedures given in the SCS Engineering Handbook (Reference 2). Precipitation for a given day and the 4 preceding days were added, and an antecedent moisture condition (AMC) was estimated using the following criteria:

5-day accumulated precip. < 1.4"	AMC=1	CN=46
1.4 < 5-day accumulated precip. < 2.1"	AMC=2	CN=66
5-day accumulated precip. > 2.1"	AMC=3	CN=82.

The SCS curve number (CN) was estimated for AMC=2 by determining the land use and the hydrologic soil group of each sub area in the tributary and calculating a weighted curve number. The curve numbers for AMC=1 and AMC=3 were taken from a table in the SCS Engineering Handbook (Reference 2) based on the CN for AMC=2. The daily runoff was then calculated using the following relation:

$$r = \begin{cases} 0 & p <= Ia \\ \{p-0.2*[Ia]\}^2/\{p+0.8*[Ia]\} & p > Ia \end{cases} \qquad (2)$$

where: r - daily runoff in inches;
p - daily precipitation in inches;
CN - SCS runoff curve number;
Ia - initial abstraction, given by Ia=0.2*[(1000/CN)-10].

The water surface elevation of Rice Lake, el. 696.0, was based on a bathymetry map from Hennepin County and measurements from the Hydrologic Study of the James W. Wilkie Regional Park (Reference 3). A relationship between lake elevation and the corresponding surface area and volume was established. From this, the direct precipitation volume Pv, in acre-feet per day, was calculated by multiplying the water surface area by the daily precipitation with appropriate unit conversions. Contributing drainage area in acres was calculated by subtracting the water surface area from the total drainage area as determined by grid method. The runoff volume Rv, in acre-feet per day, was then found by multiplying the contributing drainage area by the computed daily runoff, r, computed in equation (2) and appropriate unit conversions. Daily pan evaporation measured at University of Minnesota, St. Paul was used to calculate the evaporation volume Ev, in acre-feet per day, using the relation:

Ev = 0.74 * Ep * water surface area * unit conversions

where Ep - pan evaporation in inches. The gravity outflow Og consisted of two parts: creek flow and channel flow. The creek flows were taken from the Hydrologic Study of the James W. Wilkie Regional Park (Reference 3). The creek flow was zero with the plug. The channel flow was calculated at the culvert. This was determined as the smaller value calculated between inlet control and outlet control. Inlet control was calculated assuming an orifice (a constant multiplied by the area and the square root of the product of 2g and the head difference on the culvert). Outlet control was calculated using a nomograph equation for culverts flowing full (Reference 4). The groundwater exchange G was from the Hydrologic Study of the James W. Wilkie Regional Park (Reference 3). Once these five volume quantities were known, the change in Storage dS was found using Equation (1), rearranged

as

$$dS = G - Ev + Pv + Rv - Og$$

The change of Storage was computed by the 20/20 mass balance model.

7. Two periods of record were chosen for study using the 20/20 mass balance model. These were 1 May through 31 October, 1991 and 1 May through 31 October, 1992. These periods were chosen based on data availability. Two additional models were ran using the 1992 as a base. The difference with these models was the daily Minnesota River water levels were increased by 1 and 2-feet. These brought the Minnesota River peaks at the natural levee elevation.

DESIGN OF HYDRAULIC FEATURES

8. CULVERT. A corrugated metal pipe (CMP) culvert equipped with a stop log closure will be placed under Scott County Road 18. The culvert will be used for the purpose of flow exchange between Rice Lake and the Minnesota River. The design details of this conduit are given in Table B-1 and the profile is on Plate B-4. The culvert was originally sized by Minnesota Department of Transportation (MNDOT) as a 24" CMP, and they intended on leaving the existing 54" x 72" oval CMP pipe in place. The existing pipe will be removed since it will not be cost efficient to put a control structure on it. The culvert was designed as a 36" pipe because of the removal of the existing pipe and the construction of the plug in the outlet creek (See Paragraph 10). The culvert was increased in size to a 42" pipe to give management flexibility.

9. CHANNEL. The channel will connect Rice Lake to the 42" culvert that will be placed under County Road 18. Plate B-3 shows the approximate location of the channel. This will allow Rice Lake to drain by way of the culvert which will be operated by the FWS. The channel has a 10-foot bottom width and a channel invert at elevation 692.5. The cross-section for this design is shown on Plate B-4. The channel invert which is 0.6-feet below the invert of the culvert will allow for some sedimentation to occur without influencing the operation of the culvert.

10. PLUG. The plug will be located at the downstream end of the outlet creek from Rice Lake, but upstream of the outlet creek's confluence with Eagle Creek (See Plate B-3). This plug cuts off the flow to the Minnesota River through the outlet creek. The top of the plug will be at elevation 702.0 and have a 10-foot width. The cross-section is shown on Plate B-5. The plug will tie into high ground on either side of the outlet creek. On the right side of the outlet, the plug may need to bend and tie in near the confluence of the outlet creek with Eagle Creek. Because this plug will be higher than the natural levee, there will be no need for rock protection. However, topsoil and seeding will be used to promote vegetation growth.

11. EROSION PROTECTION. Erosion protection was looked at along the right bank of the Minnesota River from River Mile 15.4 to River Mile 15.9. It was broken down into three segments as follows:

segment A - River Mile 15.4 to River Mile 15.65
segment B - River Mile 15.65 to River Mile 15.75
segment C - River Mile 15.75 to River Mile 15.90

Segment B and C were dismissed due to high costs that were not justifiable. Segment A is very costly but could be justified. A second alternative to riprapping the bank for a quarter of a mile is to protect the cut at River Mile 15.55. 100' of erosion protection will be required along the bank at the cut. The gravel road that runs along the top of the bank will be raised to elevation 701.0. The gravel road will tie into high ground approximately at River Mile 15.4 and River Mile 15.65. At the natural low spot of the gravel road, a rock lined spillway will be constructed at elevation 698.0. The 30-foot rock lined width will continue down the Minnesota River bank. The plan view and cross-sections are shown on Plate B-6. The rock protection will control the erosion at this cut and thus protect the wetland which is located on the opposite side of the natural levee. Factors which were considered in this design were:

- that the erosion protection along the Minnesota River bank creates a hard point which will help prevent future erosion;
- that the existing low spot was rock lined thus not changing the path of the water.

- that the existing low spot was rock lined thus not changing the path of the water.

PLAN OF OPERATION

12. The main management goal of Rice Lake is to manage Rice Lake for the enhancement of migratory birds and aquatic wildlife. This will be done through the abilities to raise and draw down the water levels on Rice Lake. The control structure on the culvert will be operated by the FWS. The structure will remain open unless the FWS would like to flood the lake (get rid of undesired plant growth) or dry it out (begin new plant growth).

REFERENCES

1. Problem Appraisal Report for Rice Lake Habitat Rehabilitation and Enhancement Project, U. S. Army Corps of Engineers, St. Paul district, June 1994.

2. National Engineering Handbook, Section 4, Hydrology (NEH-4), Soil Conservation Service, U. S. Department of Agriculture, June 1986.

3. Sundee, Gerald M. 1975. Hydrologic Study of the James W. Wilkie Regional Park. 39 pp.

4. Design of Small Dams, Bureau of Reclamation, U.S. Department of the Interior. 1977.

TABLE B-1

DETAILS OF THE CULVERT DESIGN

Culvert	Number of Culverts	Size	Length	U/S Invert (1929)	D/S Invert (1929)
under Scott County Rd 18	1	42" diam.	130'	693.1	693.0

TABLE B-2

DETAILS OF THE CHANNEL DESIGN

Invert (NGVD 1929)	Bottom Width (FT)	Side Slope	Erosion Protection
692.5	10'	1V:4H	topsoil and plantings or natural revegetation

TABLE B-3

DETAILS OF THE PLUG DESIGN

Crest Elev. (NGVD 1929)	Top Width (FT)	Side Slope	Erosion Protection
702.0	10'	1V:3H	topsoil and plantings or natural revegetation

TABLE B-4

DETAILS OF THE CUT DESIGN

Length (FT)	Invert (NGVD 1929)	Bottom Width (FT)	Side Slope	Erosion Protection
10'	698.0	30'	1V:10H	12" RIPRAP
90'	698.0	30'	1V:3H	12" RIPRAP
65'±	691.9 673.0±	100'	existing	18" RIPRAP

TABLE B-5

MINIMUM EROSION PROTECTION REQUIREMENTS FOR THE MINNESOTA RIVER

LAYER		GRADATION			
		LA		LB	
Thickness Inches	Gradation	pct finer by weight	wt limits in pounds	pct finer by weight	wt limits in pounds
12	LA	100	86-35	100	169-67
18	LB	50	26-17	50	50-34
		15	13-5	15	25-11

TABLE B-6

SAMPLE CALCULATION FOR RICE LAKE FOR 1991

RICE LAKE EMP
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
OUTLET CHANNEL MANAGEMENT - ONE SEASON OF HISTORIC DATA
5/1 THROUGH 10/31, 1991
3.90 CFS = BASEFLOW INTO RICE LAKE

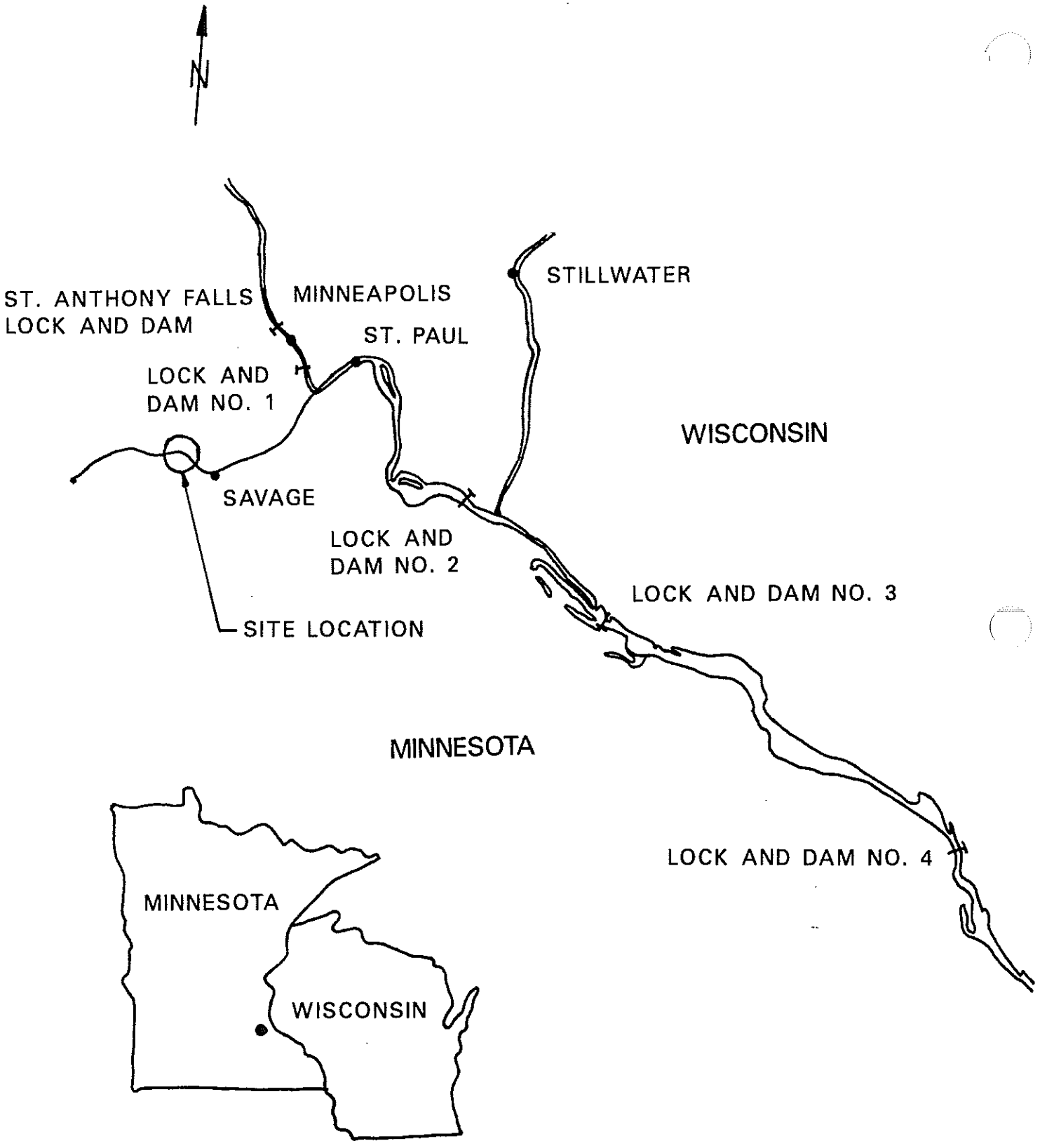
700.00

	DATE	RICE LAKE ELEV.	DAILY PRECIP INCHES	5-DAY TOTAL PRECIP INCHES	AMC	SCS C.N.	RUNOFF INTO LAKE ACFT/D	PAN EVAP INCHES	LAKE EVAP LOSS ACFT/D	CULVERT OPEN? 1=YES 0=NO	PUMP ON? 1=YES 0=NO	culvert flow cfs pro-equa non-equa	CREEK FLOW ACFT	VOLUME CHANGE RICE LK ACFT	NEW RICE LK VOLUME ACFT	NEW RICE LAKE ELEV.	MINN. RIVER MILE 17	S	adj. new rice lake elev	adj new rice lk volume acft
0	5/1	696.00	0.00	0.00	1	46	0.00	0.09	1.17	1	0	30.99	0.00	-54.89	97.08	695.65	693.65	11.74	695.65	97.08
1	2	695.65	0.00	0.00	1	46	0.00	0.18	1.66	1	0	27.13	0.00	-47.73	49.35	695.30	694.34	11.74	695.30	49.35
2	3	695.30	0.55	0.55	1	46	0.00	0.08	0.50	1	0	20.70	0.00	-29.15	20.20	695.05	694.66	11.74	695.05	20.20
3	4	695.05	0.03	0.58	1	46	0.00	0.08	0.38	0	0	-18.76	0.00	44.77	64.96	695.45	695.69	11.74	695.45	64.96
4	5	695.45	1.84	2.42	3	82	25.02	0.00	0.00	0	0	-24.66	0.00	99.71	164.67	696.00	696.41	2.20	696.00	164.67
5	6	696.00	0.03	2.45	3	82	0.00	0.05	0.65	0	0	-29.28	0.00	65.68	230.35	696.50	697.28	2.20	696.50	230.35
6	7	696.50	0.00	2.45	3	82	0.00	0.06	0.88	0	0	-35.78	0.00	77.82	308.17	697.25	698.98	2.20	697.25	308.17
7	8	697.25	0.02	1.92	2	66	0.00	0.08	1.38	0	0	-37.68	0.00	81.56	389.73	698.00	699.37	5.15	698.00	389.73
8	9	698.00	0.00	1.89	2	66	0.00	0.06	1.18	0	0	-36.78	0.00	79.50	469.23	698.75	700.02	5.15	698.75	469.23
9	10	698.75	0.00	0.05	1	46	0.00	0.24	5.33	0	0	-34.52	0.00	70.88	540.11	699.50	700.53	11.74	699.50	540.11
10	11	699.50	0.00	0.02	1	46	0.00	0.26	6.43	0	0	-32.73	0.00	66.23	606.34	700.00	701.10	11.74	700.00	606.34
11	12	700.00	0.00	0.02	1	46	0.00	0.27	7.13	0	0	-30.84	0.00	61.77	668.11	700.75	701.42	11.74	701.42	721.87
12	13	701.42	0.13	0.13	1	46	0.00	0.36	9.50	1	0	5.18	5.03	-7.40	714.47	701.00	701.38	11.74	701.38	721.87
13	14	701.38	0.00	0.13	1	46	0.00	0.36	9.50	1	0	6.85	5.03	-15.35	706.52	701.00	701.31	11.74	701.31	721.87
14	15	701.31	0.10	0.23	1	46	0.00	0.28	7.39	1	0	5.79	5.03	-7.57	714.30	701.00	701.26	11.74	701.26	721.87
15	16	701.26	0.48	0.71	1	46	0.00	0.12	3.17	1	0	10.35	5.03	1.16	723.03	701.25	701.10	11.74	701.25	723.03
16	17	701.25	0.18	0.89	1	46	0.00	0.17	4.49	1	0	25.49	5.03	-40.88	682.15	700.75	700.28	11.74	700.75	682.15
17	18	700.75	0.01	0.77	1	46	0.00	0.17	4.49	1	0	27.87	5.03	-51.68	630.47	700.25	699.59	11.74	700.25	630.47
18	19	700.25	0.00	0.77	1	46	0.00	0.12	3.17	1	0	34.47	5.03	-63.81	566.66	699.75	698.48	11.74	699.75	566.66
19	20	699.75	0.00	0.67	1	46	0.00	0.19	4.86	1	0	29.67	0.00	-55.96	510.69	699.25	698.44	11.74	699.25	510.69
20	21	699.25	0.07	0.26	1	46	0.00	0.17	4.06	1	0	20.21	0.00	-34.15	476.54	698.75	698.64	11.74	698.75	476.54
21	22	698.75	0.09	0.17	1	46	0.00	0.25	5.55	1	0	30.29	0.00	-55.19	421.35	698.25	697.38	11.74	698.25	421.35
22	23	698.25	0.39	0.55	1	46	0.00	0.19	3.90	1	0	22.41	0.00	-29.79	391.56	698.00	697.50	11.74	698.00	391.56
23	24	698.00	0.00	0.55	1	46	0.00	0.17	3.35	1	0	17.74	0.00	-30.80	360.76	697.75	697.53	11.74	697.75	360.76
24	25	697.75	0.28	0.83	1	46	0.00	0.08	1.51	1	0	15.31	0.00	-17.00	343.76	697.75	697.40	11.74	697.75	343.76
25	26	697.75	0.49	1.25	1	46	0.00	0.03	0.57	1	0	15.53	0.00	-11.13	332.62	697.50	697.39	11.74	697.50	332.62
26	27	697.50	0.36	1.52	2	66	0.00	0.20	3.61	0	0	-4.88	0.00	22.59	355.21	697.75	697.54	5.15	697.75	355.21
27	28	697.75	0.97	2.10	2	66	0.00	0.29	5.47	1	0	17.02	0.00	-6.77	348.44	697.75	697.32	5.15	697.75	348.44
28	29	697.75	0.00	2.10	2	66	0.00	0.29	5.47	1	0	22.85	0.00	-43.05	305.38	697.25	696.97	5.15	697.25	305.38
29	30	697.25	0.21	2.03	2	66	0.00	0.13	2.24	0	0	-15.08	0.00	40.29	345.67	697.75	697.59	5.15	697.75	345.67
30	31	697.75	0.12	1.66	2	66	0.00	0.22	4.15	0	0	-5.45	0.00	17.46	363.13	697.75	697.79	5.15	697.75	363.13
31	6/1	697.75	0.02	1.32	1	46	0.00	0.10	1.89	0	0	-16.11	0.00	38.31	401.45	698.25	698.14	11.74	698.25	401.45
32	2	698.25	0.00	0.35	1	46	0.00	0.19	3.90	0	0	-12.43	0.00	28.49	429.94	698.50	698.48	11.74	698.50	429.94
33	3	698.50	0.00	0.35	1	46	0.00	0.23	4.92	0	0	-11.30	0.00	25.24	455.17	698.75	698.69	11.74	698.75	455.17
34	4	698.75	0.00	0.14	1	46	0.00	0.32	7.11	1	0	6.85	0.00	-12.95	442.22	698.50	698.68	11.74	698.50	442.22
35	5	698.50	0.00	0.02	1	46	0.00	0.23	4.92	0	0	-20.88	0.00	44.22	486.45	699.00	699.15	11.74	699.00	486.45
36	6	699.00	0.00	0.00	1	46	0.00	0.30	6.92	0	0	-9.91	0.00	20.49	506.93	699.25	699.15	11.74	699.25	506.93
37	7	699.25	0.00	0.00	1	46	0.00	0.26	6.21	0	0	-6.85	0.00	15.10	522.04	699.25	699.32	11.74	699.25	522.04
38	8	699.25	0.00	0.00	1	46	0.00	0.30	7.17	0	0	-17.82	0.00	35.92	557.96	699.50	699.72	11.74	699.50	557.96
39	9	699.50	0.08	0.08	1	46	0.00	0.33	8.16	0	0	-22.68	0.00	47.23	605.19	700.00	700.27	11.74	700.00	605.19
40	10	700.00	0.04	0.12	1	46	0.00	0.31	8.18	0	0	-27.37	0.00	55.27	660.45	700.50	701.12	11.74	700.50	660.45
41	11	700.50	0.00	0.12	1	46	0.00	0.32	8.45	0	0	-33.03	0.00	64.80	725.25	701.25	702.13	11.74	702.13	803.29
42	12	702.13	0.00	0.12	1	46	0.00	0.29	7.66	0	0	-26.53	0.00	52.69	855.98	702.00	703.18	11.74	703.18	803.29
43	13	703.18	0.01	0.13	1	46	0.00	0.31	8.18	0	0	-19.74	0.00	39.06	842.35	702.00	703.76	11.74	703.76	803.29
44	14	703.76	0.12	0.17	1	46	0.00	0.17	4.49	0	0	-12.56	0.00	32.44	835.73	702.00	704.00	11.74	704.00	803.29
45	15	704.00	0.00	0.13	1	46	0.00	0.30	7.92	1	0	6.59	4.60	-13.25	790.04	701.75	703.93	11.74	703.93	803.29
46	16	703.93	0.00	0.13	1	46	0.00	0.32	8.45	1	0	15.86	4.60	-32.17	771.12	701.50	703.56	11.74	703.56	803.29
47	17	703.56	0.00	0.13	1	46	0.00	0.34	8.98	1	0	17.34	4.60	-35.62	767.67	701.50	703.11	11.74	703.11	803.29
48	18	703.11	0.05	0.17	1	46	0.00	0.25	6.60	1	0	17.43	4.60	-31.65	771.64	701.50	702.65	11.74	702.65	803.29
49	19	702.65	0.46	0.51	1	46	0.00	0.26	6.86	1	0	17.54	4.60	-17.51	785.78	701.75	702.20	11.74	702.20	803.29
50	20	702.20	0.04	0.55	1	46	0.00	0.23	6.07	1	0	15.81	4.60	-28.26	775.03	701.50	701.82	11.74	701.82	776.15
51	21	701.82	0.22	0.77	1	46	0.00	0.09	2.38	1	0	13.74	4.60	-14.05	762.10	701.50	701.54	11.74	701.54	749.01
52	22	701.54	0.00	0.77	1	46	0.00	0.20	5.28	1	0	13.45	4.60	-24.21	724.80	701.25	701.27	11.74	701.27	721.87
53	23	701.27	0.00	0.72	1	46	0.00	0.29	7.66	1	0	12.61	4.60	-24.94	696.93	701.00	701.03	11.74	701.03	694.73
54	24	701.03	0.00	0.26	1	46	0.00	0.19	5.02	1	0	11.62	4.60	-20.33	674.40	700.75	700.83	11.74	700.83	667.59
55	25	700.83	0.00	0.22	1	46	0.00	0.30	7.92	1	0	4.57	4.60	-9.25	658.34	700.50	700.80	11.74	700.50	658.34
56	26	700.50	0.02	0.02	1	46	0.00	0.39	10.30	0	0	-14.60	0.00	27.12	685.46	700.75	700.82	11.74	700.75	685.46
57	27	700.75	0.00	0.02	1	46	0.00	0.34	8.98	0	0	-10.95	0.00	20.49	705.94	701.00	700.93	11.74	700.93	667.59
58	28	700.93	0.00	0.02	1	46	0.00	0.25	6.60	0	0	-12.41	0.00	25.75	693.34	700.75	701.16	11.74	700.75	693.34
59	29	700.75	0.03	0.05	1	46	0.00	0.31	8.18	0	0	-19.81	0.00	39.91	733.25	701.25	701.34	11.74	701.25	733.25
60	30	701.25	1.48	1.53	2	66	1.65	0.18	4.75	0	0	-9.60	0.00	76.47	809.73	702.00	701.39	5.15	702.00	809.73
61	7/1	702.00	0.10	1.61	2	66	0.00	0.12	3.17	1	0	20.28	4.03	-32.08	777.64	701.75	701.39	5.15	701.39	721.87
62	2	701.39	0.00	1.61	2	66	0.00	0.36	9.50	0	0	-12.56	0.00	23.15	745.02	701.25	701.62	5.15	701.62	749.01
63	3	701.62	0.13	1.74	2	66	0.00	0.24	6.34	1	0	9.65	4.03	-13.11	735.90	701.25	701.48	5.15	701.48	721.87
64	4	701.48	0.10	1.81	2	66	0.00	0.19	5.02	1	0	11.21	4.03	-15.94	705.93	701.00	701.29	5.15	701.29	721.87
65	5	701.29	0.00	0.33	1	46	0.00	0.18	4.75	1	0	3.35	4.03	-3.67	718.20	701.00	701.28	11.74	701.28	721.87
66	6	701.28	0.00	0.23	1	46	0.00	0.33	8.71	1	0	9.39	4.03	-19.59	702.28	701.00	701.15	11.74	701.15	694.73
67	7	701.15	0.11	0.34	1	46	0.00	0.22	5.81	1	0	14.15	4.03	-22.22	672.51	700.75	700.85	11.74	700.85	667.59
68	8	700.85	0.00	0.21	1	46	0.00	0.23	6.07	1	0	18.01	4.03	-34.06	633.53	700.25	700.36	11.74	700.36	613.31
69	9	700.36	0.06	0.17	1	46	0.00	0.20	5.28	1	0	21.12	4.03	-37.29	576.02	699.75	699.70	11.74	699.75	576.02
70	10	699.75	0.00	0.17	1	46	0.00	0.23	5.88	1	0	22.20	0.00	-42.18	533.84	699.50	699.01	11.74	699.50	533.84
71	11	699.50	0.56	0.73	1	46	0.00	0.21	5.19	1	0	30.24	0.00	-38.73	495.11	699.00	698.13	11.74	699.00	495.11
72	12	699.00	0.00	0.62	1	46	0.00	0.19	4.38	1	0	34.23	0.00	-64.54	430.57	698.50	697.25	11.74	698.50	430.57
73	13	698.50	0.00	0.62	1	46	0.00	0.23	4.92	1	0	35.64	0.00	-67.88	362.69	697.75	696.60	11.74	697.75	362.69
74	14	697.75	0.00	0.56	1	46	0.00	0.21	3.96	1	0	31.37	0.00	-58.45	304.24	697.25	696.28	11.74	697.25	304.24
75	15	697.25	0.00	0.56	1	46	0.00	0.29	4.99	1	0	26.23	0.00	-49.28	254.97	696.75	696.22	11.74	696.75	254.97
76	16	696.75	0.00	0.00	1	46	0.00	0.36	5.59	1	0	16.64	0.00	-30.86	224.10	696.50	696.34	11.74	696.50	224.10
77	17	696.50	0.47	0.47	1	46	0.00	0.39	5.73	1	0	1.55	0.00	8.26	232.36	696.50	696.50	11.74	696.50	232.36
78	18	696.50	0.36	0.83	1	46	0.00	0.34	4.99	0	0	-7.50	0.00	24.76	257.12	696.75	696.58	11.74	696.75	257.12
79	19	696.75	0.00	0.83	1	46	0.00	0.33	5.12	1	0	5.02	0.00	-7.34	249.78	696.75	696.71	11.74	696.75	249.78
80	20	696.75	0.13	0.96	1	46	0.00	0.39	6.05	1	0	4.69	0.00	-4.89	244.90	696.75	696.72	11.74	696.75	244.90
81	21	696.75	0.22	1.18	1	46	0.00	0.21	3.26	1	0	12.33	0.00	-15.37	229.52	696.50	696.52	11.74	696.50	229.52
82	22	696.50	0.06	0.77	1	46	0.00	0.20	2.94	1	0	19.35	0.00	-32.39	197.13	696.25	695.94	11.74	696.25	197.13
83	23	696.25	0.00	0.41	1	46	0.00	0.36	4.98	1	0	25.64	0.00	-48.10	149.03	695.95	695.27	11.74	695.95	149.03
84	24	695.95	0.00	0.41	1	46	0.00	0.28	3.49	1	0	29.80	0.00	-54.87	94.16	695.60	694.62	11.74	695.60	94.16
85	25	695.60	0.00	0.28	1	46	0.00	0.21	1.82	1	0	25.32	0.00	-44.30	49.86	695.30	694.64	11.74	695.30	49.86
86	26	695.30	0.00	0.06	1	46	0.00	0.17	1.07	1	0	16.91	0.00	-26.87	23.00	695.05	694.87	11.74	695.05	23.00

RICE LAKE EMP
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
OUTLET CHANNEL MANAGEMENT - ONE SEASON OF HISTORIC DATA
5/1 THROUGH 10/31, 1991
3.90 CFS = BASEFLOW INTO RICE LAKE

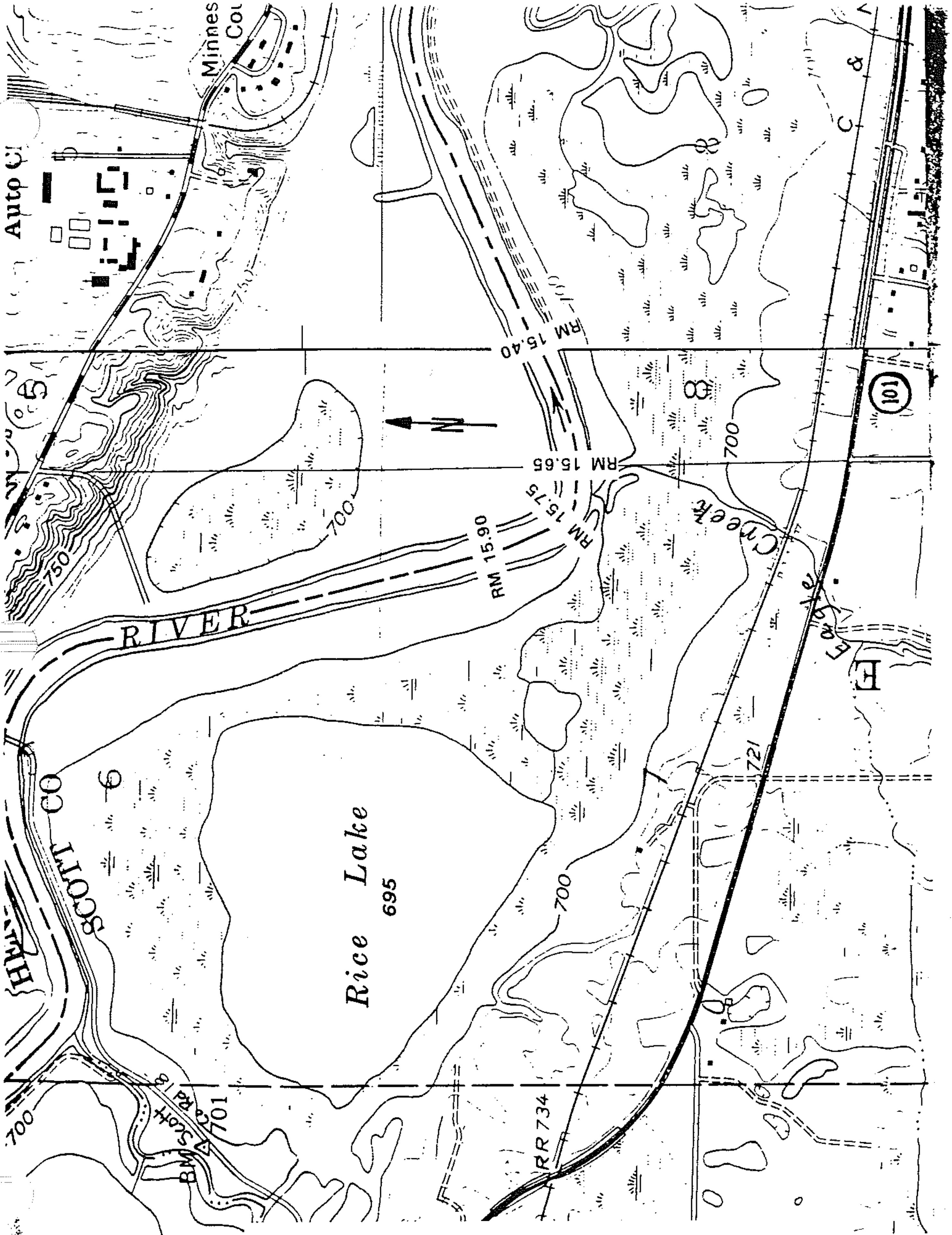
700.00

	DATE	RICE LAKE ELEV.	DAILY PRECIP INCHES	5-DAY TOTAL PRECIP INCHES	AMC	SCS C.N.	RUNOFF INTO LAKE ACFT/D	PAN EVAP INCHES	LAKE EVAP LOSS ACFT/D	CULVERT OPEN? 1=YES 0=NO	PUMP ON? 1=YES 0=NO	culvert flow cfs pro-equa non-equa	CREEK FLOW ACFT	VOLUME CHANGE RICE LK ACFT	NEW RICE LK VOLUME ACFT	NEW RICE LAKE ELEV.	MINN. RIVER MILE 17	S	adj. new rice lake elev	adj new rice lk volume acft
87	27	695.05	0.64	0.64	1	46	0.00	0.13	0.61	1	0	1.37	0.00	8.47	31.47	695.15	695.05	11.74	695.15	31.47
88	28	695.15	0.01	0.65	1	46	0.00	0.02	0.11	1	0	16.79	0.00	-25.59	5.87	694.70	694.73	11.74	694.70	5.87
89	29	694.70	0.00	0.65	1	46	0.00	0.08	0.18	1	0	11.31	0.00	-14.89	-9.01	694.50	694.35	11.74	694.50	0.00
90	30	694.50	0.00	0.65	1	46	0.00	0.21	0.18	1	0	3.90	0.00	-0.18	-0.18	694.50	693.93	11.74	694.50	0.00
91	31	694.50	0.00	0.65	1	46	0.00	0.33	0.29	1	0	3.90	0.00	-0.29	-0.29	694.50	693.29	11.74	694.50	0.00
92	8/1	694.50	0.15	0.16	1	46	0.00	0.24	0.21	1	0	3.90	0.00	-0.03	-0.03	694.50	693.02	11.74	694.50	0.00
93	2	694.50	0.85	1.00	1	46	0.00	0.11	0.10	1	0	3.90	0.00	0.90	0.90	694.50	692.93	11.74	694.50	0.00
94	3	694.50	0.00	1.00	1	46	0.00	0.10	0.09	1	0	3.90	0.00	-0.09	-0.09	694.50	693.15	11.74	694.50	0.00
95	4	694.50	0.00	1.00	1	46	0.00	0.18	0.16	1	0	3.90	0.00	-0.16	-0.16	694.50	693.26	11.74	694.50	0.00
96	5	694.50	0.00	1.00	1	46	0.00	0.24	0.21	1	0	3.90	0.00	-0.21	-0.21	694.50	693.06	11.74	694.50	0.00
97	6	694.50	0.04	0.89	1	46	0.00	0.17	0.15	1	0	3.90	0.00	-0.10	-0.10	694.50	692.72	11.74	694.50	0.00
98	7	694.50	0.80	0.84	1	46	0.00	0.10	0.09	1	0	3.90	0.00	0.85	0.85	694.50	692.55	11.74	694.50	0.00
99	8	694.50	0.17	1.01	1	46	0.00	0.03	0.03	1	0	3.90	0.00	0.17	0.17	694.50	692.76	11.74	694.50	0.00
100	9	694.50	0.00	1.01	1	46	0.00	0.16	0.14	1	0	3.90	0.00	-0.14	-0.14	694.50	693.04	11.74	694.50	0.00
101	10	694.50	0.00	1.01	1	46	0.00	0.18	0.16	1	0	3.90	0.00	-0.16	-0.16	694.50	693.89	11.74	694.50	0.00
102	11	694.50	0.00	0.97	1	46	0.00	0.21	0.18	0	0	-3.90	0.00	15.29	15.29	695.00	694.99	11.74	695.00	15.29
103	12	695.00	0.00	0.17	1	46	0.00	0.22	0.96	0	0	-17.89	0.00	42.26	57.55	695.35	695.76	11.74	695.35	57.55
104	13	695.35	0.00	0.00	1	46	0.00	0.21	1.39	0	0	-22.78	0.00	51.52	109.07	695.70	696.12	11.74	695.70	109.07
105	14	695.70	0.00	0.00	1	46	0.00	0.28	2.73	0	0	-21.36	0.00	47.37	156.44	696.00	696.38	11.74	696.00	156.44
106	15	696.00	0.00	0.00	1	46	0.00	0.18	2.34	0	0	-20.80	0.00	46.65	203.08	696.25	696.65	11.74	696.25	203.08
107	16	696.25	0.03	0.03	1	46	0.00	0.10	1.38	0	0	-17.98	0.00	42.58	245.66	696.75	696.73	11.74	696.75	245.66
108	17	696.75	0.06	0.09	1	46	0.00	0.19	2.95	1	0	14.53	0.00	-22.77	222.89	696.50	696.43	11.74	696.50	222.89
109	18	696.50	0.00	0.09	1	46	0.00	0.21	3.08	1	0	19.47	0.00	-33.96	188.93	696.25	695.93	11.74	696.25	188.93
110	19	696.25	0.00	0.09	1	46	0.00	0.16	2.22	1	0	28.82	0.00	-51.63	137.29	695.90	695.01	11.74	695.90	137.29
111	20	695.90	0.00	0.09	1	46	0.00	0.22	2.62	1	0	29.93	0.00	-54.26	83.03	695.55	694.35	11.74	695.55	83.03
112	21	695.55	0.00	0.06	1	46	0.00	0.22	1.79	1	0	25.92	0.00	-45.47	37.56	695.20	693.77	11.74	695.20	37.56
113	22	695.20	0.01	0.01	1	46	0.00	0.16	0.90	1	0	21.17	0.00	-35.08	2.48	694.55	693.45	11.74	694.55	2.48
114	23	694.55	0.82	0.83	1	46	0.00	0.15	0.18	1	0	5.66	0.00	-2.32	0.17	694.50	693.02	11.74	694.50	0.00
115	24	694.50	0.00	0.83	1	46	0.00	0.19	0.17	1	0	3.90	0.00	-0.17	-0.17	694.50	692.85	11.74	694.50	0.00
116	25	694.50	0.16	0.99	1	46	0.00	0.23	0.20	1	0	3.90	0.00	-0.01	-0.01	694.50	692.66	11.74	694.50	0.00
117	26	694.50	0.00	0.99	1	46	0.00	0.35	0.30	1	0	3.90	0.00	-0.30	-0.30	694.50	692.16	11.74	694.50	0.00
118	27	694.50	0.00	0.98	1	46	0.00	0.34	0.30	1	0	3.90	0.00	-0.30	-0.30	694.50	691.99	11.74	694.50	0.00
119	28	694.50	0.00	0.16	1	46	0.00	0.32	0.28	1	0	3.90	0.00	-0.28	-0.28	694.50	691.62	11.74	694.50	0.00
120	29	694.50	0.05	0.21	1	46	0.00	0.26	0.23	1	0	3.90	0.00	-0.17	-0.17	694.50	691.23	11.74	694.50	0.00
121	30	694.50	0.00	0.05	1	46	0.00	0.29	0.25	1	0	3.90	0.00	-0.25	-0.25	694.50	690.84	11.74	694.50	0.00
122	31	694.50	0.00	0.05	1	46	0.00	0.31	0.27	1	0	3.90	0.00	-0.27	-0.27	694.50	690.43	11.74	694.50	0.00
123	9/1	694.50	0.00	0.05	1	46	0.00	0.21	0.18	1	0	0.00	0.00	7.55	7.55	694.75	690.18	11.74	694.75	7.55
124	2	694.75	0.00	0.05	1	46	0.00	0.20	0.52	1	0	0.00	0.00	7.21	14.76	695.00	690.08	11.74	695.00	14.76
125	3	695.00	0.12	0.12	1	46	0.00	0.29	1.27	1	0	0.00	0.00	7.18	21.94	695.05	689.99	11.74	695.05	21.94
126	4	695.05	0.00	0.12	1	46	0.00	0.23	1.08	1	0	0.00	0.00	6.66	28.60	695.10	689.88	11.74	695.10	28.60
127	5	695.10	0.01	0.13	1	46	0.00	0.18	0.90	1	0	0.00	0.00	6.90	35.50	695.15	689.79	11.74	695.15	35.50
128	6	695.15	0.00	0.13	1	46	0.00	0.15	0.80	1	0	0.00	0.00	6.94	42.43	695.25	689.40	11.74	695.25	42.43
129	7	695.25	1.58	1.71	2	66	2.43	0.15	0.90	1	0	0.00	0.00	22.03	64.46	695.45	689.39	5.15	695.45	64.46
130	8	695.45	0.62	2.21	3	82	0.63	0.00	0.00	1	0	0.00	0.00	14.45	78.91	695.55	689.23	2.20	695.55	78.91
131	9	695.55	0.45	2.66	3	82	0.00	0.09	0.73	1	0	0.00	0.00	11.95	90.85	695.60	689.99	2.20	695.60	90.85
132	10	695.60	0.00	2.65	3	82	0.00	0.14	1.21	1	0	0.00	0.00	6.52	97.38	695.65	690.33	2.20	695.65	97.38
133	11	695.65	0.51	3.16	3	82	0.10	0.04	0.37	1	0	0.00	0.00	13.82	111.19	695.75	690.42	2.20	695.75	111.19
134	12	695.75	0.00	1.58	2	66	0.00	0.01	0.10	1	0	0.00	0.00	7.63	118.82	695.75	691.00	5.15	695.75	118.82
135	13	695.75	0.92	1.88	2	66	0.00	0.07	0.72	1	0	0.00	0.00	19.81	138.64	695.90	691.92	5.15	695.90	138.64
136	14	695.90	0.87	2.30	3	82	3.24	0.00	0.00	1	0	0.00	0.00	25.00	163.63	696.00	692.74	2.20	696.00	163.63
137	15	696.00	0.00	2.30	3	82	0.00	0.09	1.17	1	0	0.00	0.00	6.56	170.20	696.00	694.65	2.20	696.00	170.20
138	16	696.00	0.00	1.79	2	66	0.00	0.22	2.86	1	0	0.00	0.00	4.87	175.07	696.00	695.93	5.15	696.00	175.07
139	17	696.00	0.08	1.87	2	66	0.00	0.11	1.43	0	0	0.00	0.00	7.71	182.78	696.25	696.93	5.15	696.25	182.78
140	18	696.25	0.00	0.95	1	46	0.00	0.16	2.22	0	0	0.00	0.00	5.52	188.30	696.25	697.46	11.74	696.25	188.30
141	19	696.25	0.00	0.08	1	46	0.00	0.08	1.11	0	0	0.00	0.00	6.63	194.93	696.25	697.58	11.74	696.25	194.93
142	20	696.25	0.00	0.08	1	46	0.00	0.10	1.38	0	0	0.00	0.00	6.35	201.28	696.25	697.37	11.74	696.25	201.28
143	21	696.25	0.00	0.08	1	46	0.00	0.21	2.91	0	0	0.00	0.00	4.83	206.11	696.25	696.99	11.74	696.25	206.11
144	22	696.25	0.00	0.00	1	46	0.00	0.23	3.18	0	0	0.00	0.00	4.55	210.66	696.50	696.48	11.74	696.50	210.66
145	23	696.50	0.00	0.00	1	46	0.00	0.10	1.47	1	0	0.00	0.00	6.27	216.93	696.50	695.73	11.74	696.50	216.93
146	24	696.50	0.15	0.15	1	46	0.00	0.07	1.03	1	0	0.00	0.00	9.68	226.61	696.50	695.18	11.74	696.50	226.61
147	25	696.50	0.03	0.18	1	46	0.00	0.18	2.64	1	0	0.00	0.00	5.69	232.30	696.50	694.56	11.74	696.50	232.30
148	26	696.50	0.00	0.18	1	46	0.00	0.20	2.94	1	0	0.00	0.00	4.80	237.10	696.75	693.99	11.74	696.75	237.10
149	27	696.75	0.00	0.18	1	46	0.00	0.09	1.40	1	0	0.00	0.00	6.34	243.44	696.75	693.62	11.74	696.75	243.44
150	28	696.75	0.00	0.18	1	46	0.00	0.11	1.71	1	0	0.00	0.00	6.03	249.46	696.75	693.18	11.74	696.75	249.46
151	29	696.75	0.05	0.08	1	46	0.00	0.12	1.86	1	0	0.00	0.00	6.92	256.39	696.75	692.71	11.74	696.75	256.39
152	30	696.75	0.04	0.09	1	46	0.00	0.21	3.26	1	0	0.00	0.00	5.32	261.70	697.00	692.48	11.74	697.00	261.70
153	10/1	697.00	0.06	0.15	1	46	0.00	0.14	2.29	1	0	0.00	0.00	6.77	268.47	697.00	692.13	11.74	697.00	268.47
154	2	697.00	0.00	0.15	1	46	0.00	0.12	1.96	1	0	0.00	0.00	5.77	274.25	697.00	691.81	11.74	697.00	274.25
155	3	697.00	0.00	0.15	1	46	0.00	0.12	1.96	1	0	0.00	0.00	5.77	280.02	697.00	691.59	11.74	697.00	280.02
156	4	697.00	0.00	0.10	1	46	0.00	0.04	0.65	1	0	0.00	0.00	7.08	287.10	697.00	691.38	11.74	697.00	287.10
157	5	697.00	0.21	0.27	1	46	0.00	0.08	1.31	1	0	0.00	0.00	11.07	298.17	697.25	691.13	11.74	697.25	298.17
158	6	697.25	0.00	0.21	1	46	0.00	0.04	0.69	1	0	0.00	0.00	7.05	305.22	697.25	690.84	11.74	697.25	305.22
159	7	697.25	0.00	0.21	1	46	0.00	0.07	1.20	1	0	0.00	0.00	6.53	311.75	697.25	690.70	11.74	697.25	311.75
160	8	697.25	0.00	0.21	1	46	0.00	0.15	2.58	1	0	0.00	0.00	5.16	316.91	697.50	690.57	11.74	697.50	316.91
161	9	697.50	0.00	0.21	1	46	0.00	0.22	3.97	1	0	0.00	0.00	3.77	320.67	697.50	690.52	11.74	697.50	320.67
162	10	697.50	0.00	0.00	1	46	0.00	0.10	1.80	1	0	0.00	0.00	5.93	326.61	697.50	690.20	11.74	697.50	326.61
163	11	697.50	0.00	0.00	1	46	0.00	0.20	3.61	1	0	0.00	0.00	4.13	330.74	697.50	690.10	11.74	697.50	330.74
164	12	697.50	0.00	0.00	1	46	0.00	0.14	2.52	1	0	0.00	0.00	5.21	335.95	697.50	689.96	11.74	697.50	335.95
165	13	697.50	0.00	0.00	1	46	0.00	0.11	1.98	1	0	0.00	0.00	5.75	341.70	697.50	689.76	11.74	697.50	341.70
166	14	697.50	0.00	0.00	1	46	0.00	0.12	2.16	1	0	0.00	0.00	5.57	347.27	697.75	689.82	11.74	697.75	347.27
167	15	697.75	0.00	0.00	1	46	0.00	0.12	2.26	1	0	0.00	0.00	5.47	352.74	697.75	689.81	11.74	697.75	352.74
168	16	697.75	0.00	0.00	1	46	0.00	0.16	3.02	1	0	0.00	0.00	4.72	357.46	697.75	689.66	11.74	697.75	357.46
169	17	697.75	0.00	0.00	1	46	0.00	0.30	5.66	1	0	0.00	0.00	2.08	359.54	697.75	689.72	11.74	697.75	359.54
170	18	697.75	0.00	0.00	1	46	0.00	0.19	3.58	1	0	0.00	0.00	4.15	363.69	697.75	689.65	11.74	697.75	363.69
171	19	697.75	0.00	0.00	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	371.42	698.00	689.44	11.74	698.00	371.42
172	20	698.00	0.00	0.00	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	379.16	698.00	689.33	11.74	698.00	379.16
173	21	698.00	0.00	0.00	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	386.89	698.00	689.32	11.74	698.00	386.89
174	22	698.00	0.00	0.00	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	394.63	698.00	689.20	11.74	698.00	394.63
175	23	698.00	0.50	0.50	1	46	0.00	0.00	0.00	1	0	0.00	0.00	21.05	415.68	698.25	689.38	11.74	698.25	415.68
176	24	698.25	0.49	0.99	1	46	0.00	0.00	0.00	1	0	0.00	0.00	21.34	437.01	698.50	689.48	11.74	698.50	437.01
177	25	698.50	0.00	0.99	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	444.75	698.50	689.78	11.74	698.50	444.75
178	26	698.50	0.00	0.99	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	452.48	698.75	689.85	11.74	698.75	452.48
179	27	698.75	0.04	1.03	1	46	0.00	0.00	0.00	1	0	0.00	0.00	8.94	461.42	698.75	689.63	11.74	698.75	461.42
180	28	698.75	0.34	0.87	1	46	0.00	0.00	0.00	1	0	0.00	0.00	17.94	479.36	699.00	689.33	11.74	699.00	479.36
181	29	699.00	0.03	0.41	1	46	0.00	0.00	0.00	1	0	0.00	0.00	8.67	488.03	699.00	689.36	11.74	699.00	488.03
182	30	699.00	0.00	0.41	1	46	0.00	0.00	0.00	1	0	0.00	0.00	7.74	495.77	699.00	689.50	11.74	699.00	495.77
183	31	699.00	0.85	1.26	1	46	0.00	0.00	0.00	1	0	0.00	0.00	34.21	529.98	699.25	689.50	11.74	699.25	529.98



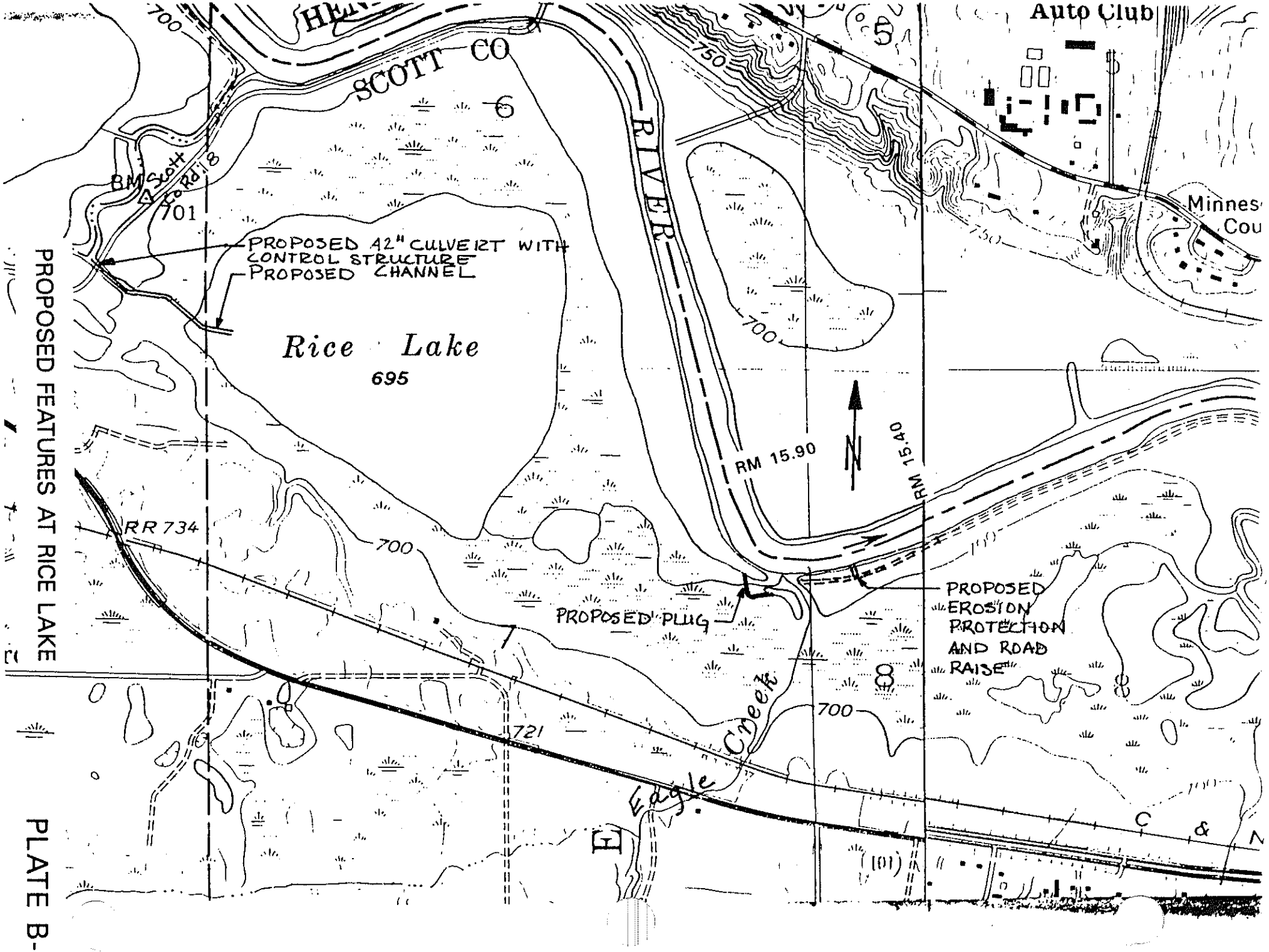
LOCATION OF RICE LAKE

PLATE B-1



EXISTING CONDITIONS AT RICE LAKE

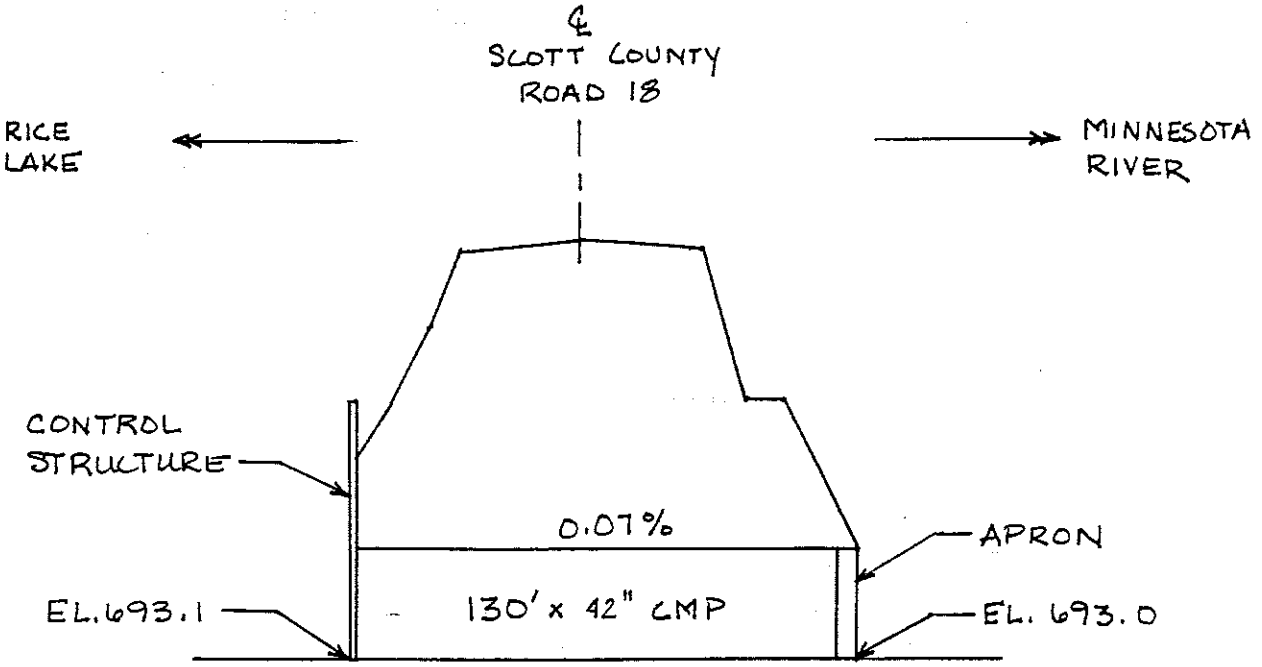
PLATE B-2



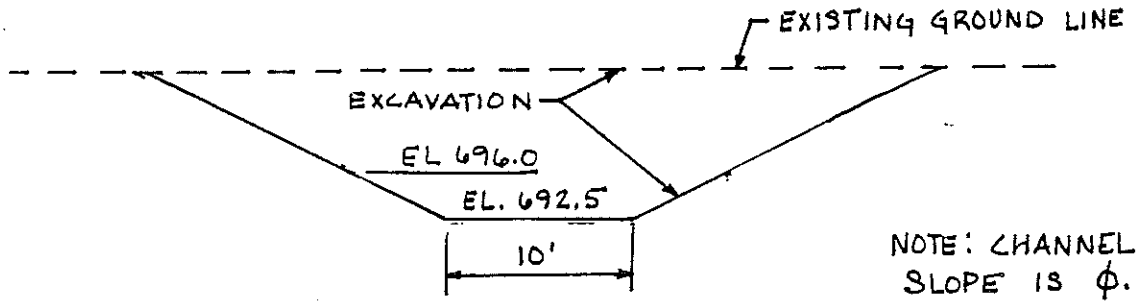
PROPOSED FEATURES AT RICE LAKE

PLATE B-3

US Army Corps of Engineers Saint Paul District	PROJECT TITLE: RICE LAKE	COMPUTED BY:	DATE:	SHEET:
	SUBJECT TITLE:	CHECKED BY:	DATE:	CONTRACT NO:

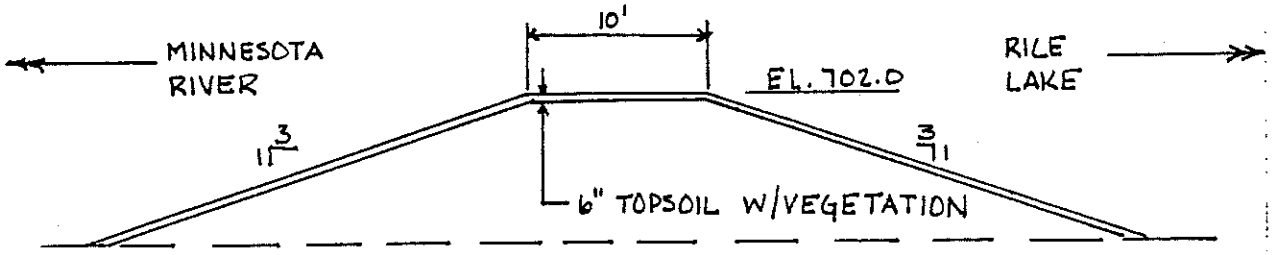


CULVERT PROFILE

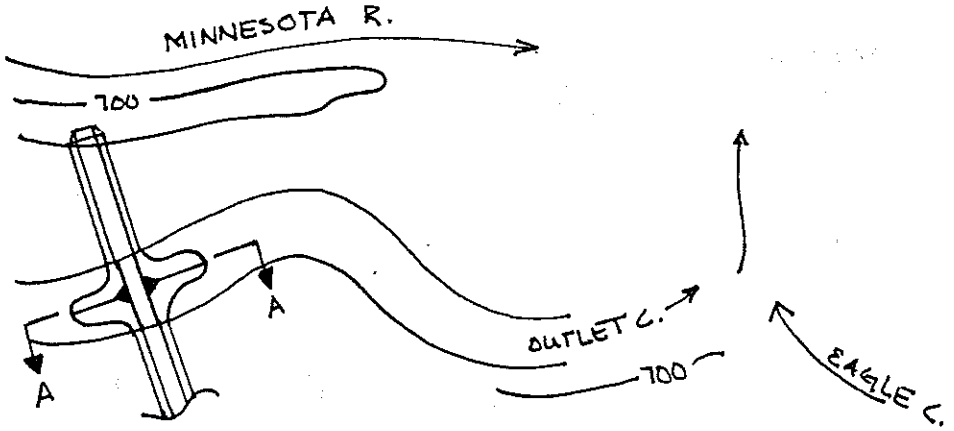


CHANNEL CROSS-SECTION

US Army Corps of Engineers	PROJECT TITLE:	COMPUTED BY:	DATE	SHEET
Saint Paul District	RICE LAKE EMP	CAS	10-4-94	
	SUBJECT TITLE:	CHECKED BY:	DATE:	CONTRACT NO:
	PLUG DESIGN (UPDATE)			



SECTION A-A

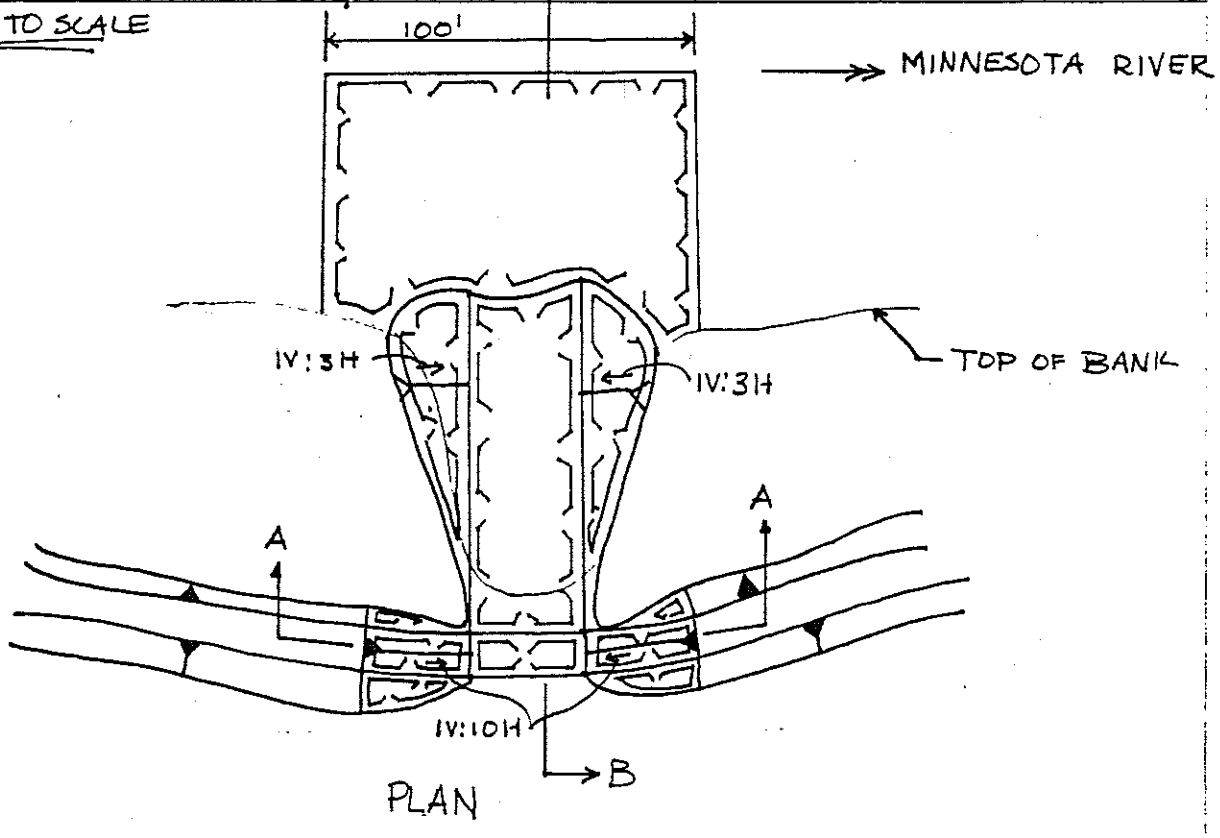


PLAN

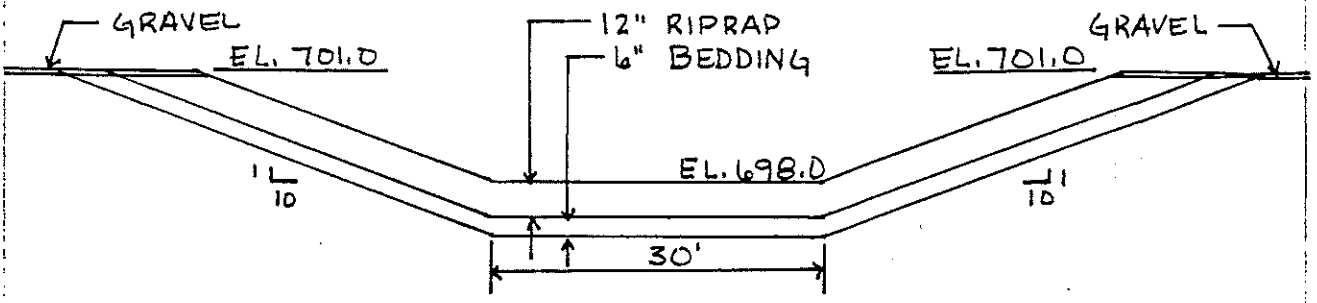
PLATE B-5

US Army Corps of Engineers Saint Paul District	PROJECT TITLE RICE LAKE EMP	COMPUTED BY CAS	DATE 10-17-94	SHEET
	SUBJECT TITLE EROSION PROTECTION DESIGN	CHECKED BY	DATE	CONTRACT NO

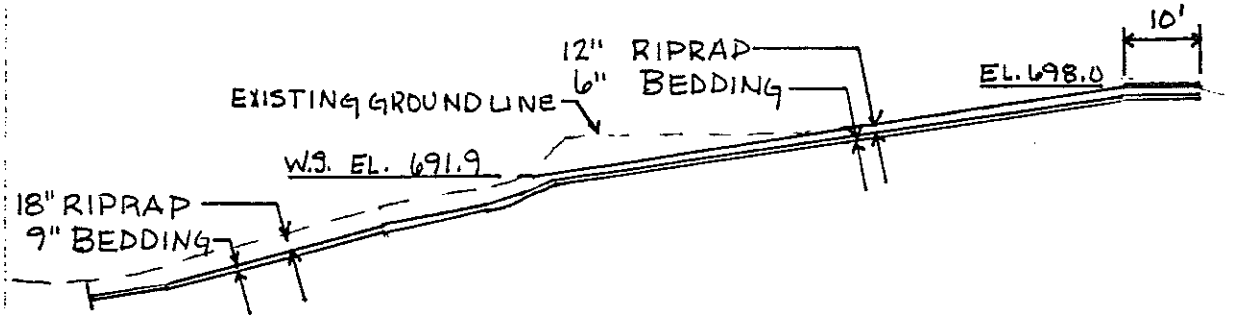
NOT TO SCALE



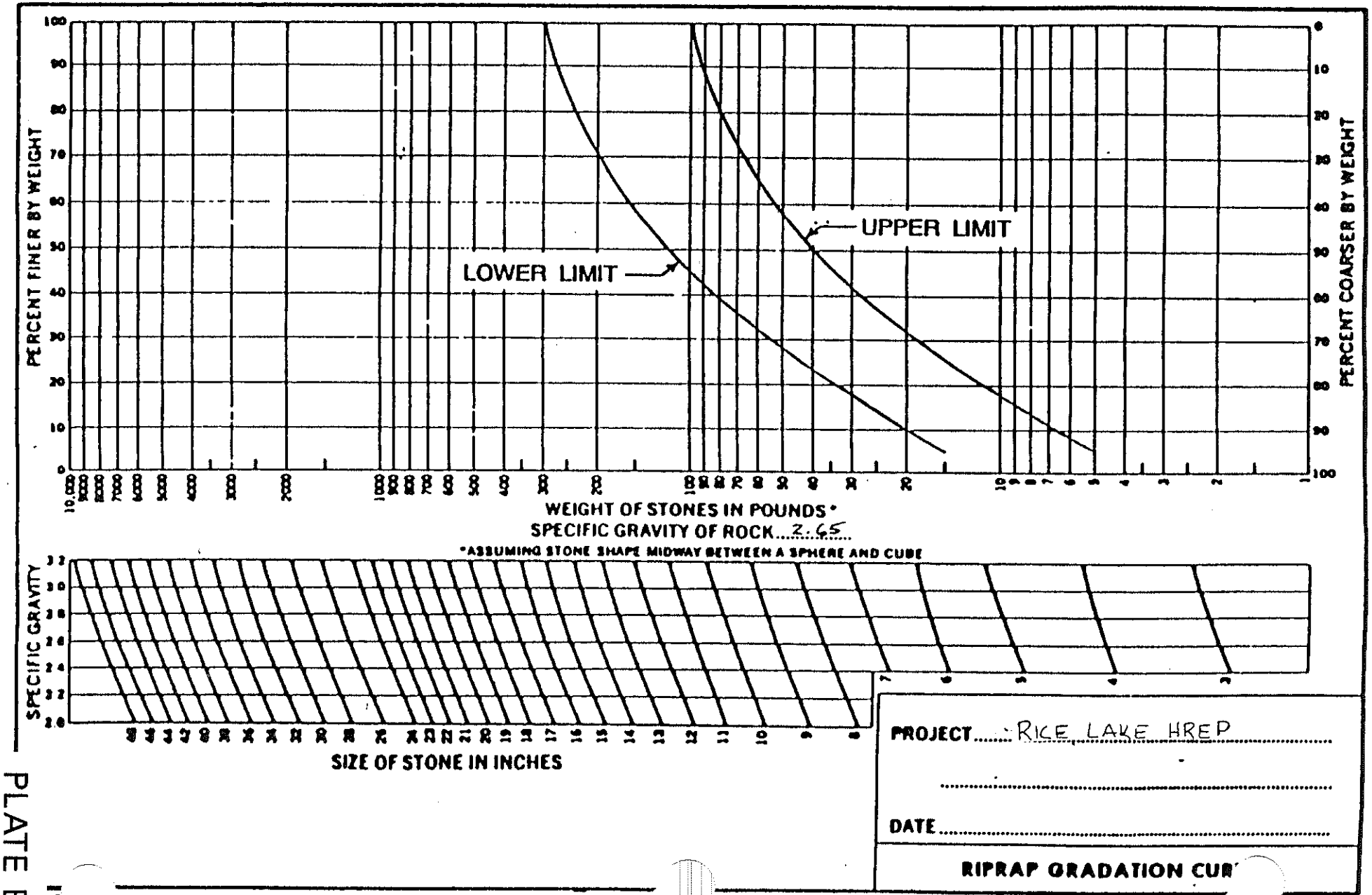
PLAN



SECTION A-A



SECTION B-B



PROJECT RICE LAKE HREP

DATE

RIPRAP GRADATION CUR

PLATE B-7

055

[T147] F (F2) IF (C147 < T0, Q147, IF (R147 < T0, Q147, IF (R147 >= 702, R147, IF (R148 > R147

View Plot Form Range Window Grid Order Title Subt Labels Heading Axis Name Quit

Display the graph

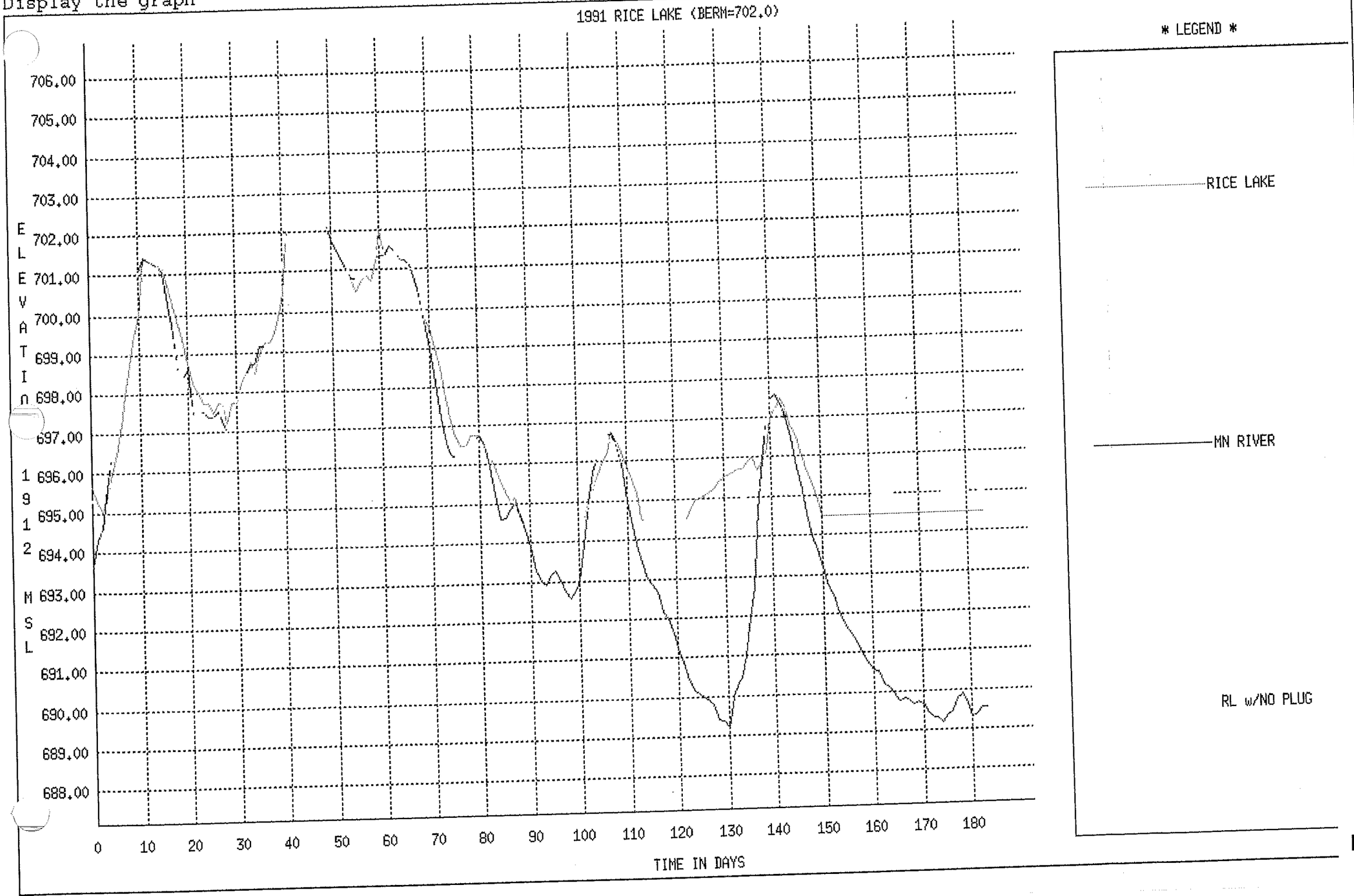


PLATE B-8

ATTACHMENT 6

GEOTECHNICAL APPENDIX

D R A F T

DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT

RICE LAKE
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
SCOTT COUNTY, MINNESOTA

ATTACHMENT 6
GEOTECHNICAL DESIGN

TABLE OF CONTENTS

1. **GENERAL:** This Appendix presents the geologic and geotechnical data, analysis, and computations for the Rice Lake EMP project. The geologic information was taken from "Hydrologic Study of the James W. Wilkie Regional Park" by Gerald Sunde written in 1975. The geotechnical data includes borings taken in the project area to define soil parameters. Analysis and computations made from these data include stability and settlement, judgements on borrow sites, and rockfill gradation analysis. Finally, the work that needs to be done in plans and specifications will be discussed.

2. **GEOLOGY:** Rice Lake is located between the towns of Savage and Shakopee on the floodplain of the Minnesota River Valley. The valley trends northeast and is approximately 2.5 miles wide in the vicinity of Rice Lake. The study area is characterized by extensive marshy areas and lakes.

3. The region surrounding the Rice Lake area was glaciated extensively during the Pleistocene Epoch. Advancing and retreating glaciers laid down thick deposits of unsorted till and outwash sand that today form a hummocky, poorly-drained plain dotted with numerous marshes and small lakes. The glacial drift can reach thicknesses of between 200 and 250 feet, and it overlies dolomitic limestone and sandstone of the Prairie du Chien and Jordan Formations.

4. The wide valley of the present Minnesota River was carved by Glacial River Warren, which carried large volumes of water discharging from the now-extinct Glacial Lake Agassiz located in western Minnesota and eastern North Dakota. Glacial River Warren cut deeply into bedrock, scouring and reworking an earlier valley filled with outwash, stratified drift, and till. Episodic increases in flow caused Glacial River Warren to cut lower into the older valley fill, leaving remnants of higher channel bottoms as terraces. When Lake Agassiz eventually ceased to drain to the south, the Minnesota River was formed by local drainage and established its present floodplain in the valley.

5. Three alluvial and bedrock terraces rise above this floodplain and form regionally prominent benches which parallel the river valley. The lower terrace is 30 to 50 feet above the floodplain, the middle terrace is 75 to 115 feet above the floodplain, and the upper terrace is between 120 and 180 feet above the floodplain. The walls of the river valley form a bluff that grades into a hummocky, poorly-drained regional highland.

6. **GENERAL GEOTECHNICAL DESIGN:** The following paragraphs describe the subsurface exploration, and the Geotechnical work expected to be completed for Plans and Specifications. The alignment of the proposed ditch and location of proposed plug of the natural outlet are shown on Plate 4 in the main report.

7. **SUBSURFACE EXPLORATION:** Three borings were taken along the ditch alignment to determine stable slopes for both the length within the lake and the length between the lake and the proposed outlet. Another boring was taken near the Minnesota River bank to determine what slope would be stable for any shaping which might have to be done if the alternative of riprapping this area was a part of the selected plan. Plate 6-1 shows the boring locations and the boring logs are shown on Plates 6-2 and 6-3. No testing was done on the samples taken from the borings. It was decided that for this project, considering its small scale and the consequences of being slightly conservative, that estimating strength parameters from Standard Penetration Test results would be adequate.

8. **STABILITY:** A stability analysis was completed on the Minnesota River bank to determine a stable slope for the riprap protection alternative. Assuming an undrained shear-test strength of 500 psf for cohesion and zero for an internal angle of friction, UTEXAS2 computed an end-of-construction safety factor of 1.3 for a slope of 1V on 3H. A stability plate on this analysis is not shown because this alternative is not a part of the selected plan.

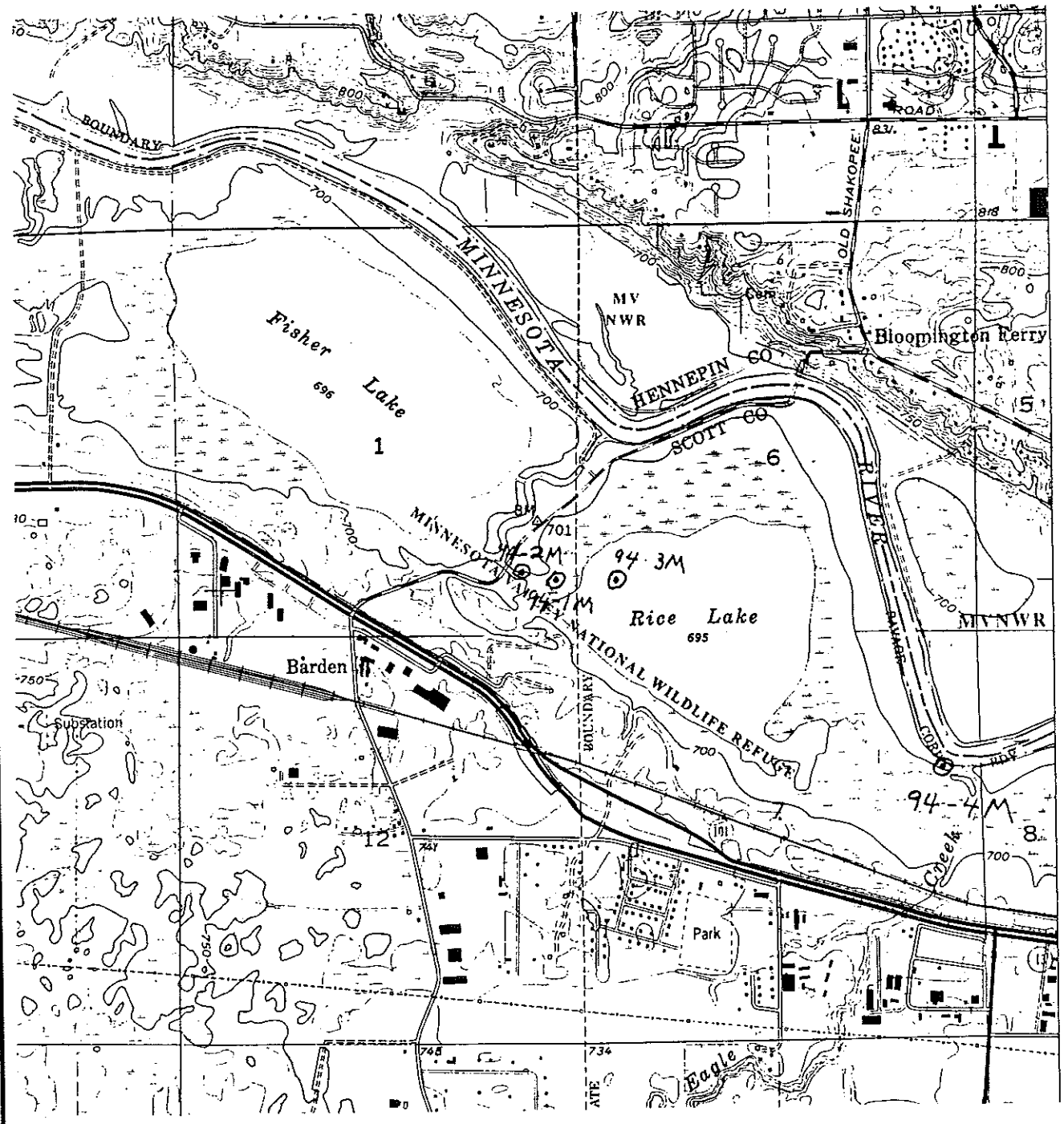
9. A stability analysis was also done on the ditch slope in the area between the lake and the proposed outlet. Plate 6-4 shows the parameters used and the results of this analysis. No stability analysis was necessary on the ditch for that portion that is along the lake bottom because it is only about 1.5 feet deep or less in that portion.

10. A boring was not taken near the plug because the location of the plug had not been set at the time the borings were completed. Boring 93-4M was used to complete a preliminary stability analysis. The parameters used and the results are shown on Plate 6-5.

11. **SETTLEMENT:** Substantial fill is needed to plug the natural outlet. Boring 93-4M was used to complete a preliminary settlement analysis. Assuming an initial void ratio of 1.0, a consolidation index of 0.5, and a coefficient of consolidation of 22 sq. ft. per year, a settlement of 1.8 feet was computed using the computer program CSETT. The assumed pararmeters were taken from the Trempealeau National Wildlife Refuge EMP Project because that areas geologic conditions are similar to the Rice Lake area.

12. The possibility of an access road being built along the lake-bottom portion of the channel was eliminated because of the very deep deposits of organic clay in the area. The large primary and secondary settlements of these deposits would make even a small embankment a yearly maintenance problem. The portion of the access road along the channel between the lake and the proposed outlet is a part of the selected plan. The proposed road is currently a 2 foot layer of gravel.

13. **PLANS AND SPECIFICATIONS:** A boring will be taken at the location of the proposed plug of the natural outlet. Results from laboratory testing will be used to calculate the total settlement and stability of the plug. In addition, this boring will will help determine constructibility. The gravel access road will be analyzed to see if geotextile placed beneath the gravel would be cost effective.



Rice Lake MVNWR

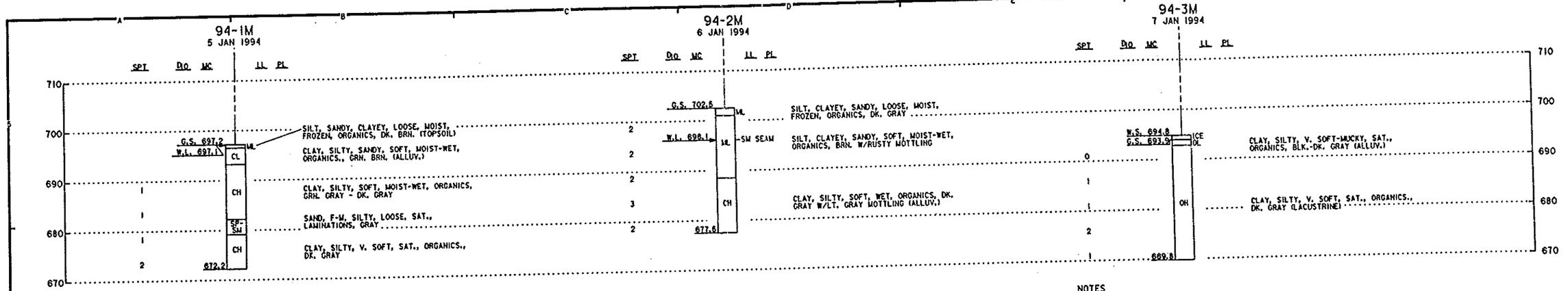
Boring Locations

HREP/EMP

0 2000 ft.

Scale

Plate 6-1



NOTES

1. WATER LEVEL DETERMINED AFTER 40 MINUTES:
   BOTTOM OF AUGER AT EL. 683.2
   BOTTOM OF HOLE AT EL. 682.2.
2. HOLLOW STEM AUGER SET TO EL. 683.2. HOLE STABILIZED WITH DRILLING MUD BELOW EL. 683.2.
3. SAMPLES FOR ENVIRONMENTAL ANALYSIS TAKEN IN OFFSET HOLE.
4. HOLE BACKFILLED WITH TREMMIED CEMENT-BENTONITE GROUT.

NOTES

1. WATER LEVEL DETERMINED AFTER 60 MINUTES:
   BOTTOM OF AUGER AT EL. 687.5
   BOTTOM OF HOLE AT EL. 687.5
2. HOLLOW STEM AUGER SET TO EL. 682.5
3. SAMPLES FOR ENVIRONMENTAL ANALYSIS TAKEN IN OFFSET HOLE.
4. HOLE BACKFILLED WITH BENTONITE CHIPS-PORTLAND CEMENT

NOTES

1. WATER LEVEL DETERMINED FROM LAKE LEVEL
2. 4" STEEL CASING SET TO 690.8. HOLE STABILIZED WITH DRILLING MUD BELOW EL. 690.8.
3. SAMPLES FOR ENVIRONMENTAL ANALYSIS TAKEN IN OFFSET HOLE.
4. PULLED CASING AND ALLOWED HOLE TO HEAVE.

GENERAL BORING LEGEND

84-1M — YEAR OF BORING-BORING NUMBER, BORING TYPE (E.G. M=MACHINE, A=AUGER, TP=TEST PIT, P=PIEZOMETER).

1 MAY 1984 — DATE OF BORING

G.S. 1020.2 — GROUND SURFACE ELEVATION AT BORING

GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURE, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND - SILT MIXTURES
SC	CLAYEY SANDS, SAND - CLAY MIXTURES
ML	INORGANIC SILTS, LIQUID LIMIT LESS THAN 50
MH	INORGANIC SILTS, LIQUID LIMIT GREATER THAN 50
CL	INORGANIC CLAYS, LOW TO MED. PLASTICITY, LIQUID LIMIT LESS THAN 50
CH	INORGANIC CLAYS, HIGH PLASTICITY, LIQUID LIMIT GREATER THAN 50
OL	ORGANIC SILTS OR CLAYS, LOW PLASTICITY, LIQUID LIMIT LESS THAN 50
OH	ORGANIC SILTS OR CLAYS, MED. TO HIGH PLASTICITY, LIQUID LIMIT GREATER THAN 50
PT	PEAT
SP-SM	BORDERLINE MATERIAL
SP&SM	STRATIFIED MATERIAL

1 — LOCATION AND SAMPLE NUMBER FOR UNDISTURBED SAMPLE

NO RECOVERY

W.L. 726.7 — WATER LEVEL ON DATE OF BORING

700.0 — ELEVATION AT BOTTOM OF BORING

GENERAL BORING NOTES

1. GENERAL: THE UNIFIED SOIL CLASSIFICATION SYSTEM IS USED TO IDENTIFY BASIC SOIL TYPE. THE LEGEND REPRESENTS ONLY THE BASIC SOILS. TO COMPLETE THE CLASSIFICATION, PERTINENT INFORMATION IS ADDED TO THE RIGHT OF THE BORING STAFF. NOTES PERTAINING TO A SPECIFIC BORING ARE SHOWN BELOW THE BORING STAFF.
2. MOISTURE CONTENT: THE NATURAL MOISTURE CONTENT IN PERCENT OF DRY WEIGHT (MC) IS SHOWN TO THE LEFT OF THE BORING STAFF.
3. BLOW COUNT (SPT): BLOW COUNTS ARE SHOWN TO THE LEFT OF THE BORING STAFF AND, EXCEPT AS NOTED, ARE THE NUMBER OF BLOWS NECESSARY TO DRIVE THE SAMPLER USED A DISTANCE OF 12". STANDARD BLOW COUNTS ARE FOR A STANDARD PENETRATION TEST (SPT) USING A 1⅜" X 2" SAMPLER, 140 LB. HAMMER AND A 30" DROP. FOR NON-STANDARD BLOW COUNTS, SAMPLER SIZE, HAMMER WEIGHT AND HEIGHT OF DROP ARE AS SHOWN.
4. ATTERBERG LIMITS: LIQUID LIMIT (LL) AND PLASTIC LIMIT (PL) ARE SHOWN TO THE RIGHT OF THE BORING STAFF.
5. D 10 SIZE: THE GRAIN SIZE IN MILLIMETERS OF WHICH 10% OF THE SAMPLE IS FINER IS SHOWN TO THE LEFT OF THE BORING STAFF.
6. ROD: ROCK QUALITY DESIGNATION (ROD) IS SHOWN TO THE LEFT OF THE PERCENT RECOVERY COLUMN. ROD IS THE PERCENT RECOVERY CONSISTING OF UNBROKEN PIECES LONGER THAN 4".
7. % RECOVERY: PERCENT CORE RECOVERY IS SHOWN TO THE LEFT OF THE BORING STAFF. PERCENT RECOVERY IS LENGTH OF CORE RECOVERED/LENGTH OF CORE CUT X 100. UNLESS SPECIFIED OTHERWISE, ALL CORE IS 4" DIAMETER.
8. ELEVATIONS REFERENCED TO N.G.V.D., 1929 ADJUSTED.
9. THE BORINGS SHOW SUMMARIES OF INFORMATION RECORDED ON THE ORIGINAL FIELD LOGS. THESE LOGS ARE AVAILABLE FOR INSPECTION AT THE ST. PAUL DISTRICT OFFICE. ARRANGEMENTS TO INSPECT LOGS CAN BE MADE BY CALLING (612) 290-5599.

GEN ENG
HYD
HYDR
GEOTECH
STR ENG
MEA

SYMBOL	DESCRIPTION	DATE	APPROVAL

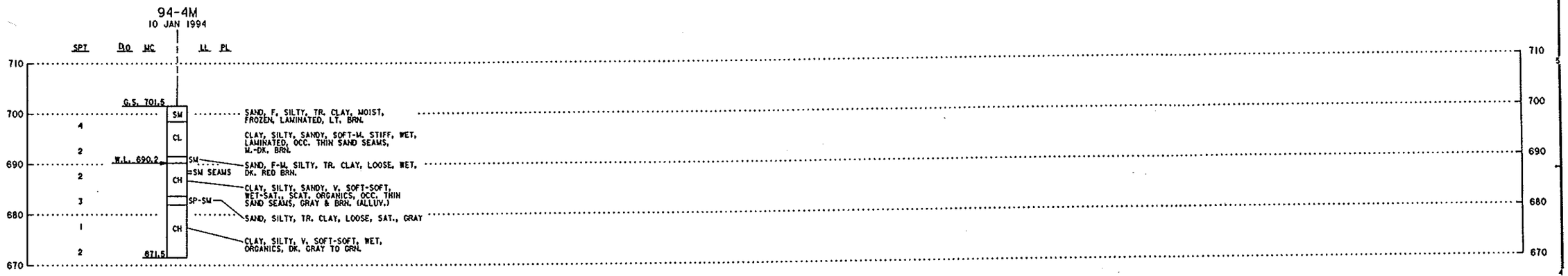
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

AE APPROVING OFFICIAL:

PE-D: DESIGNED: JJF; CHECKED: GAR; DRAWN: PAW
PE-H: DESIGNED: ; CHECKED:
DATE: DECEMBER 1994

DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
ENVIRONMENTAL MGMT. PROGRAM - MINNESOTA RIVER
RICE LAKE HREP — SCOTT CO., MINNESOTA
GEOLOGICAL DATA
BORING LEGEND, GENERAL NOTES AND BORING LOGS
94-1M THRU 94-3M

CAD FILE NAME: RICESHOI.DGN
DRAWING NUMBER: PLATE 2
SOL. NO.: DACW37-94-B-0000
SHT 1 OF 2



NOTES

1. WATER LEVEL DETERMINED AFTER 2 HOURS:
   BOTTOM OF AUGER AT EL. 691.5
   BOTTOM OF HOLE AT EL. 689.3
2. HOLLOW STEM AUGER SET TO EL. 687.5. HOLE STABILIZED WITH DRILLING MUD BELOW EL. 687.5.
3. HOLE BACKFILLED WITH TREMIED CEMENT-BENTONITE GROUT.

EN ENG
HYD
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EOTECH
TR ENG
MEA

SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

AE APPROVING OFFICIAL:

DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
ENVIRONMENTAL MGMT. PROGRAM - MINNESOTA RIVER
RICE LAKE HREP SCOTT CO., MINNESOTA
GEOLOGICAL DATA
BORING LEGEND, GENERAL NOTES AND BORING LOGS
94-4M

PE-D: DESIGNED: JJF; CHECKED: GAR; DRAWN: PAW
PE-H: DESIGNED:; CHECKED:
DATE: DECEMBER 1994

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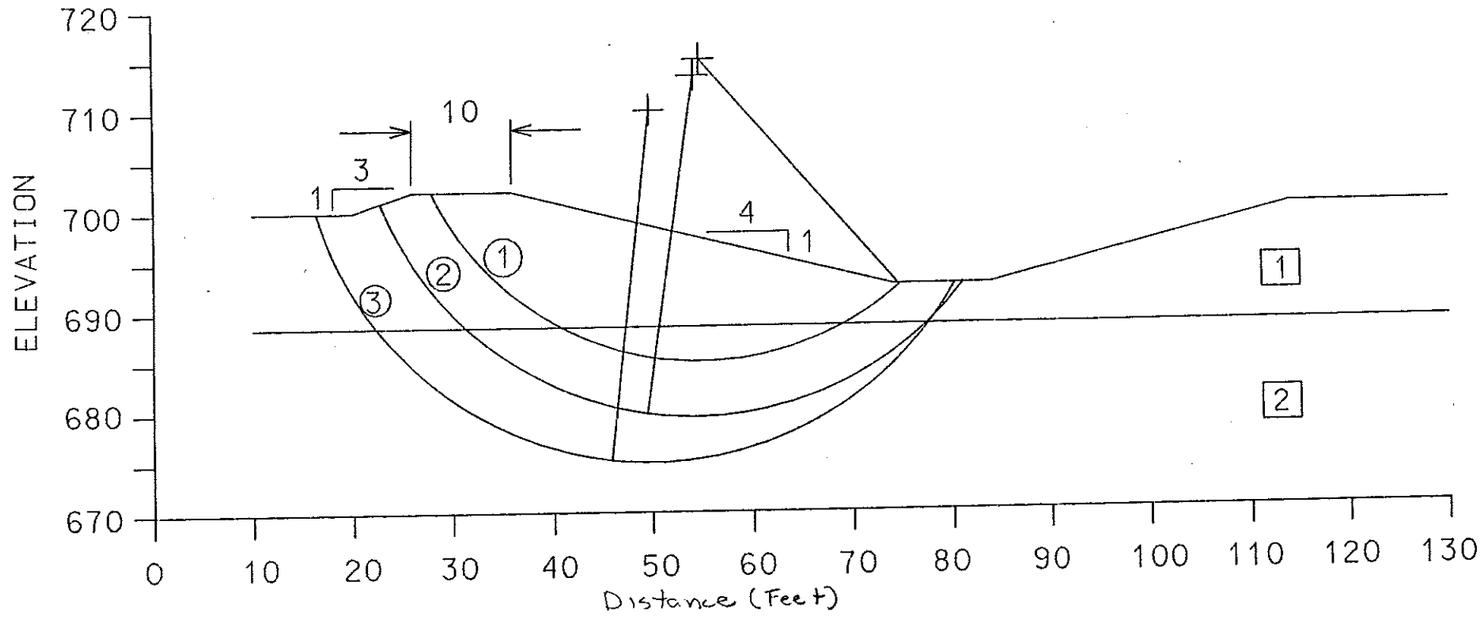
SOL. NO.: DACW37-93-B-0000
DRAWING NUMBER: PLATE 3
SHT 2 OF 2



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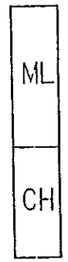

END OF CONSTRUCTION
TABULATION OF ARC DATA

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①	55.0	715.0	30.0	1.4
②	54.4	713.4	33.9	1.3
③	50.0	710.0	35.0	1.4

* - REQUIRED FACTOR OF SAFETY IS 1.3

SOIL PARAMETERS

SOIL NO.	DESCRIPTION	UNIT WEIGHT MOIST	UNIT WEIGHT SATURATED	ESTIMATED C(PSF)	Q-STRENGTH O(DEG)
1	SILT	110.0	115.0	180	0
2	CLAY	110.0	110.0	185	0

SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

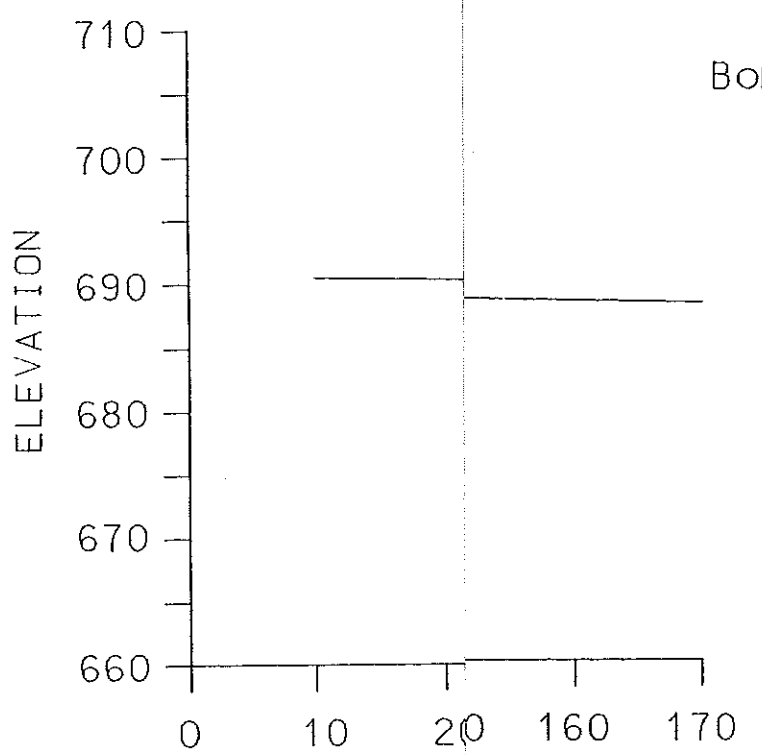
AE APPROVING OFFICIAL:

DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
ENVIRONMENTAL MGMT. PROGRAM - MINNESOTA RIVER
RICE LAKE HREP SCOTT CO., MINNESOTA

CHANNEL STABILITY

PE-D: DESIGNED: JJF; CHECKED:; DRAWN: JJF
M-CH: DESIGNED:; CHECKED:
DATE: 15 DEC. 1994
CAD FILE NAME:
SPEC NO:
PLATE NUMBER: 6-4
SHT KF

EN ENG
HYD
HYDR
EOTECH
TR ENG
MEA



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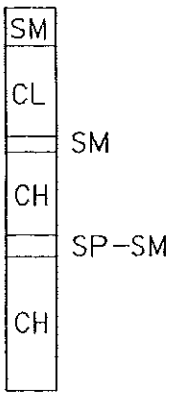


T PARAMETERS

ARC NO.	CENTER COORDINA X	Y	TED	ESTIMATED C(PSF)	Q-STRENGTH 0(DEG)
①	109.0	713.	5.0	0	28
②	108.0	708.	0.0	320	0
③	107.0	704.			

* - REQUIRED FA

SYMBOL	DESCRIPTION	DATE	APPROVAL

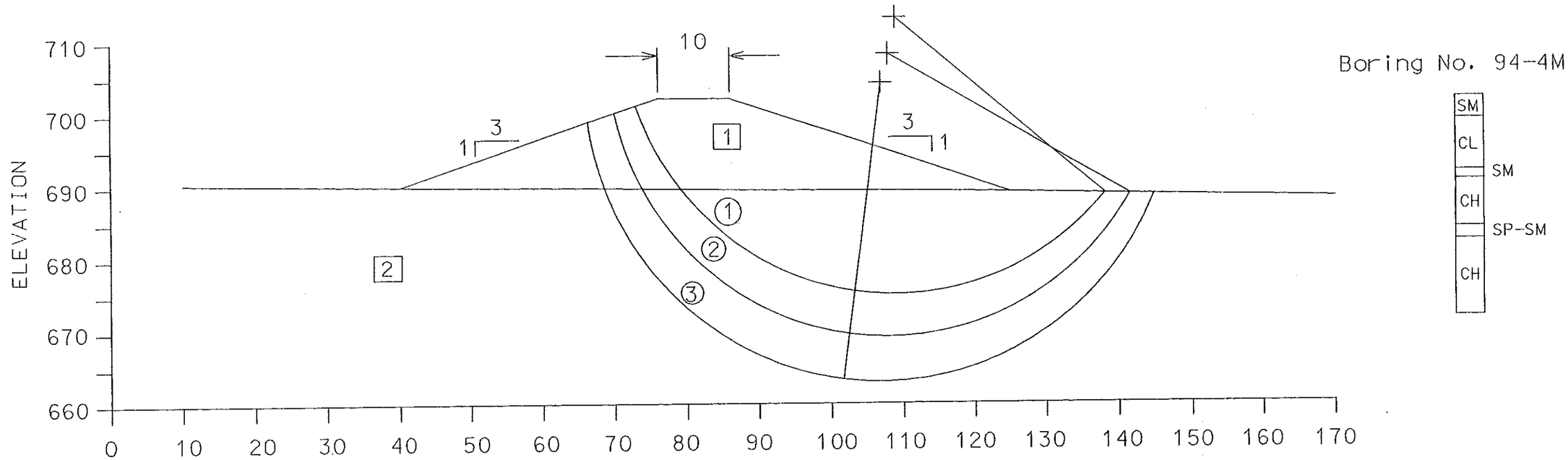
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

APPROVING OFFICIAL:

DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
ENVIRONMENTAL MGMT. PROGRAM – MINNESOTA RIVER
RICE LAKE HREP SCOTT CO., MINNESOTA

PLUG OF NATURAL OUTLET STABILITY

DESIGNED: JJF
CHECKED:
DRAWN: JJF
DESIGNED:
CHECKED:
CAD FILE NAME:
DATE: 15 DEC. 1994
SPEC NO:
PLATE NUMBER: 6-5
SHT
OF



Boring No. 94-4M

END OF CONSTRUCTION
TABULATION OF ARC DATA

ARC NO.	CENTER COORDINATES X	Y	RADIUS	FACTOR OF* SAFETY
①	109.0	713.0	38.0	1.32
②	108.0	708.0	38.8	1.30
③	107.0	704.0	41.0	1.35

* - REQUIRED FACTOR OF SAFETY IS 1.3

SOIL PARAMETERS

SOIL NO.	DESCRIPTION	UNIT WEIGHT MOIST	UNIT WEIGHT SATURATED	ESTIMATED C(PSF)	Q-STRENGTH Ø(DEG)
1	SANDFILL	120.0	125.0	0	28
2	CLAY	100.0	100.0	320	0

SYMBOL	DESCRIPTION	DATE	APPROVAL

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

AE APPROVING OFFICIAL:

DESIGNED: JJF
CHECKED:
DRAWN: JJF
CHECKED:
DATE: 15 DEC. 1994

DEFINITE PROJECT REPORT/ENVIRONMENTAL ASSESSMENT
MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE
ENVIRONMENTAL MGMT. PROGRAM – MINNESOTA RIVER
RICE LAKE HREP SCOTT CO., MINNESOTA

PLUG OF NATURAL OUTLET STABILITY

CAD FILE NAME:
SPEC NO:
PLATE NUMBER: 6-5
SHT
OF

ATTACHMENT 7

CULTURAL RESOURCES APPENDIX

A Phase I Cultural Resources Survey of the

Rice Lake Project, Minnesota River
Scott County, Minnesota

Environmental Management Program

DRAFT

Sissel Johannessen

Archaeologist
Environmental Resources Section
Planning and Engineering Branch
Corps of Engineers, St. Paul District
Army Corps of Engineers Centre
190 Fifth Street East
St. Paul , MN 55101-1638

Reports of Investigations
Number CENCS-PE-P-67
September 1994

A Phase I Cultural Resources Survey of the Rice Lake Project, Minnesota River
Scott County, Minnesota
Environmental Management Program

Introduction

The Minnesota Valley National Wildlife Refuge, the U.S. Fish and Wildlife Service, and the St. Paul District Corps of Engineers are planning a habitat rehabilitation project on the Minnesota river at Rice Lake. The project is within the Minnesota Valley National Wildlife Refuge administered by the U.S. Fish and Wildlife Service. The objective of the project is to maintain and improve habitat for wildlife. The project plans include three features: 1) a channel excavated from Rice Lake toward County Road 18 so that lake levels can be periodically drawn down; 2) the re-forestation of a former agricultural field that parallels the river, and 3) the stabilization of the river bank at an outside bend to prevent the loss of a floodplain marsh by breaching of the natural levee (project location and features are shown in Figure 1).

A number of historic and archaeological sites are known for nearby areas of the floodplain and bluffs, but the immediate project area has not been surveyed for cultural resources. On 26 July 1994, St. Paul District archaeologists conducted a Phase I cultural resources investigation of the project areas. The survey area is largely in the S1/2 of Section 6 and the NW1/4 of Section 7, T115N, R21W.

Background

The Minnesota River in the project area flows northeastward into the metropolitan area, through a wide valley (1-2 miles) bordered by bluffs. The wide valley of the Minnesota was carved by Glacial River Warren, which carried huge volumes of water discharged by glacial Lake Agassiz. at the end of the Pleistocene. Presently the floodplain vegetation, where preserved by the Wildlife Refuge, is a mosaic of bottomland forest and marsh habitats. Rice Lake is a floodplain lake on the right bank of the river, separated

from it by the higher ground of the natural levee. The neighboring lake to the northwest, Fisher Lake, is not shown in the original surveyors' plats (see Figure 2-- this area was platted in the 1850s and 60s), and may have developed in response to changed hydrologic conditions caused by the settlement, clearing, and urbanization of the area.

The Minnesota River valley shows evidence of human occupation for thousands of years. Many archaeological sites are known along the river, including late Middle Woodland and Late Woodland period habitation and mound sites, Oneota village sites, and historic Dakota village and burial sites. Sites occur both on the uplands overlooking the river valley and within the valley on or near the floodplain, and there is a major concentration of known sites near the Rice Lake project area. Eight sites are within one mile of Rice Lake, including the Bloomington Ferry site (21 HE 17), originally consisting of 95 mounds, and determined eligible for the National Register of Historic Places.

The present route of Hwy 18 and the Bloomington Ferry bridge across the Minnesota just north of Rice Lake is a river crossing of considerable antiquity. The Minnesota Valley Trail of the Red River oxcart routes forded the river here in the 1820s-50s, en route to and from Fort Snelling and St. Paul.[1] The ford had reportedly also been long used by Indians. A ferry was later established at this crossing (the trail and ferry crossing of the 1850s are shown in Figure 2). The ferry was started in 1852 by Joseph Dan and William Chambers. The ferry consisted of a wire cable spanning the river which guided a flatboat that could carry a wagon and team of horses. The ferry was located just east of the bridge that put the ferry out of operation in 1890. The existing Bloomington Ferry bridge, built in 1977, replaced the original center-pivot swing bridge that was the second to be built over the Minnesota River in the metropolitan area. All that remains of the original bridge are the piers and abutment.[2]

Nearby areas of the river floodplain (on higher ground formed by sand dunes just west of Rice Lake near the Hwy 18-Hwy 101 interchange) were surveyed in 1991 in advance of the bridge and road construction along County Road 18 [3] (see Figure 1). The potential

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[1] Rhoda R. Gilman, Carolyn Gilman, and Deborah M. Stultz. 1979. *The Red River Trails: Oxcart Routes Between St. Paul and the Selkirk Settlement 1820-1870.* Minnesota Historical Society, St. Paul.

[2] Final Environmental Impact Statement, County State Aid Highway 18. 1986. Page 118.

[3] Craig. M. Johnson. 1992. *Phase I and II Archaeological Investigations along the County Road 18 Reconstruction Project, Hennepin and Scott Counties, Minnesota.* Institute for Minnesota Archaeology, Reports of Investigations Number 197.

for sites in the floodplain in the Rice Lake area is shown by two small sites (21 SC 36 and 21 SC 37) discovered during the survey. These sites were determined eligible for the National Register of Historic Places. Phase III excavation of these two sites indicates that they were short-term episodic occupations with Late Woodland and probably Dakota affiliations.[4] Three sites (21 SC 18, 19, and 20) on the bluff overlooking the river valley border Eagle Creek, which crosses the floodplain and has an outlet to the Minnesota at the south end of the farm field.

In addition to these resources, an eroding human skeleton and adjacent agricultural field containing artifacts have been reported on the north bank of the river about five miles upstream of the project area (Section 31, T116N, R22W) (John Dobrovolny[5], personal communication). Due to the presence of floodplain prehistoric and historic sites in the area, it was decided that although much of the Rice Lake area is too low and wet to have cultural resources potential, the higher ground of the natural levee (the farm field) should be evaluated for its cultural resources potential by means of survey and assessment of the geomorphology (see correspondence).

There has been some previous geomorphological investigation of the area in connection with the Hwy 18 realignment. The following is taken from a letter (dated 31 October 1991) from the archaeological consultant Ted Lofstrom of Braun Intertec to Dennis Gimmestad of the State Historic Preservation Office:

> "Geotechnical borings completed between 1987 and 1990 along the bridge centerline indicated that the entire right-of-way was composed of fine sands, silts and mucks of alluvial and backwater origin.... Moreover. the history of agricultural development and increased run-off in the Minnesota River Valley suggests that the upper meter of silts is likely to be recent (post Euro-American settlement) in age...
>
> The geotechnical borings were made to assess the engineering characteristics of the floodplain sediments, and were not sufficiently detailed to allow identification of buried land surfaces that may have supported ancient campsites. Therefore, a series of four 2-inch diameter continuous cores were taken to a depth of approximately 15 feet along the right-of-way in August of 1991. The purpose of these cores was to allow identification of stable land surfaces within the river floodplain that might have supported Native American settlements. Consistent with the geotechnical borings, the cores documented a history of alluvial

[4]Craig M. Johnson. 1992 *Phase III Archaeological Investigations at Sites 21SC36 and 21SC37, Scott County, Minnesota*. Institute for Minnesota Archaeology, Reports of Investigations Number 219.

[5]Regional Historic Preservation Officer, US Fish and Wildlife Service, Ft. Snelling.

deposition. Evidence for two short term surfaces was noted in one core, and no indication of stable surfaces in the other three. No charcoal flecking or other evidence of cultural material was noted in any of the cores..."

These studies confirm the low potential for archaeological deposits of the low-lying portions of the floodplain, including the low wet channel excavation area. However, since the farm field is at somewhat higher elevation, we decided it should be tested further.

Field Methods and Testing Results

On 18 May 1994, with verbal permission from Terry Schreiner, the Fish and Wildlife Service Refuge manager for the Rice Lake area, I visited the project area for reconnaissance and walk-over. The former farm field is relatively high ground (the natural levee) between Rice Lake and the Minnesota River, and is about a mile long and 500 feet wide (ca. 40 acres). The trend of movement of the river is evident since the center of the ridge of slightly higher ground is closer to the lake on the north end of the field (river building away from it), while at the southern end of the field at the outside bend, the river is cutting into the levee. This strip of higher ground has been a farm field since about 1900. The whole field is open, with short, sparse weeds. Visibility of the ground surface varies between about 20-50%. The southern 3/4 of the field still has corn stubble, and the northern 1/4 appears to have been in pumpkins. The field is separated from the river by a strip of woods 20-30 feet wide. An old field track runs the length of the field on the river side.

The soil is a loose dark fine sandy loam, and in some areas looks like recent flood deposit. In a couple of large gopher holes, the soils look the same down as far as can be seen (about two feet). I walked down the center of the field examining the surface and saw no cultural materials, in fact no material of any kind except a couple of small rocks. In the cutbank of the eroding portion of the outside bend of the river at the south end of the field (the cutbank is about 4-5 feet high), the soil is the same dark fine sandy loam all the way down. I saw an old boot sole sticking out of the bank about 20 cm below the surface, so there has been at least some recent flood deposition. I examined the cutbank along the outside bend and saw no cultural materials- only a few bits of clam shell and snail shell.

Terry Schreiner put me in touch with Mr. Ernie Hone, now retired, who farmed the land before it was sold to the Fish and Wildlife Service. Mr. Hone was very knowledgeable about the area, and had farmed the field since 1944-45. He said that before the "dam at Hastings," the river only used to flood once every 15-20 years, and lots of people used to live right down there on the floodplain. He told me that there was a house depression at the south end of the field across Eagle Creek, where a family named Cameron used to live. But he said after the 1940s there was too much flooding and everyone moved up off the floodplain. He said he had never seen any artifacts in the field when he was plowing, or heard of any one finding anything of that nature there.

On 26 July 1994, Corps archaeologists made a number of auger probes along the length of the farm field to test the archaeological potential. At this time the weeds were chest high and there was virtually no surface visibility. Eight probes were made at intervals along the top of the high ground "ridge," which runs from SE to NW across the field (see Figure 1). Tests were dug with a three-inch bucket auger, and all soils were screened through 1/4 inch mesh. Starting from the south end of the field the results were as follows:

Test #1. The topsoil is dark grey-brown fine silty loam, which changes gradually at about 40 cm to medium grey-brown fine silty loam. Very gradual transition to wet silty grey-brown clay to the bottom of the test at 192 cm. Absolutely no inclusions of any kind.

Test #2. 100 m north of test 1. dark grey-brown silty loam to about 47 cm, then transition to same soil but lighter in color. A slight sandy silt pocket at 70 cm. Slight gradual increase in clay content to 140 cm, then gradual increase in sand content, with a clay loam to 170 cm Water table and bottom of hole at 170 cm.

Test #3. 200 N of test 2. Topsoil to ca. 40 cm, same soil (dark grey-brown fine silt) but slightly more clay content here. At. 40 cm, gradual change to lighter color. Then same soils but gradually wetter and increasing clay content to 180 cm (bottom of hole). Same fine soil, basically the same grey-brown color all the way down. No abrupt changes, just gradually varying degrees of clay and fine sand. No inclusions of any kind.

Test #4. 200 m N of Test 3. Topsoil to 40 cm- dark grey-brown fine silty loam. Soil lightens in colour to medium grey-brown at ca. 40 cm. Gradual increase in sand content to

90 cm, then clay content increases to bottom of hole (very wet) at 180 cm. No inclusions except one small piece of clam shell and one gastropod shell.

Test #5. 200 m N of Test 4. Regular dark brown silt topsoil to about 40 cm, then lightens in color. Gradually increasing sand content after 120 cm, and also wetter to bottom of hole at 186 cm. Not much clay content here. No inclusions of any kind.

Test #6. 200 m N on high ground. Regular dark brown silty loam topsoil to 56 cm, then gradual transition to lighter color soils with higher sand content. From 119-195 cm grading down to slightly higher clay content. No inclusions.

Test #7. 200 m N along high ground. Same dark grey-brown silty loam topsoil to 60 cm, then lightens to medium grey-brown fine silt with gradually varying amounts of sand and clay to 176 cm (very wet, bottom of hole). No inclusions other than one gastropod shell.

Test #8. 200 m n along high ground. Same soil profile; gradual transition from dark topsoil to medium grey-brown subsoil at 55 cm. Bottom of hole at 155 cm; no inclusions.

Overall, the soil probes revealed a similar soil profile along the length of the field. Basically the soil is a fine grey-brown silty loam to the depth of the tests (about two meters), with a somewhat higher organic content in the top 40-50 cm, and a general gradual increase in clay content (or occasionally sand content) with increasing depth. The soil has almost no inclusions of any kind. The soil profile is consistent with the gradual accretion of alluvium from relatively slow-moving water. There are no buried soil horizons that would indicate a former stable surface, and no cultural material was encountered.

Conclusions and Recommendations

Previous investigation archaeological and historic studies in the area, an interview with a local farmer, and surface and subsurface field investigations yielded no evidence of any cultural resources within the area of effect of the Rice Lake Habitat Rehabilitation project.

The **channel excavation area** is at the lowest elevation of Rice Lake and is considered too low and wet to contain any cultural deposits. The **farm field** on the natural river levee was walked over under conditions of good visibility. The farmer who plowed the field for forty years said he never saw any cultural materials. Eight auger probes taken up the center of the field showed alluvium with no former stable surfaces down to about two meters. It is possible that this alluvium is relatively recent (post-Euro-American settlement), and that the ancient surfaces are more deeply buried. Even if this is so, the activities proposed for this area (slight surface contouring and tree planting) will not disturb any such deeply buried deposits.

The cutbank of the **outside bend** of the river was examined and consist of the same deep alluvial loams, with no cultural material encountered. This meander at the south end of the farm field has evidently been cutting back the shoreline for at least 150 years; the original survey map (Figure 2) shows the bend as less pronounced and the river farther away from Eagle Creek, which did not have an outlet in its present location at that time.

We conclude that the proposed habitat rehabilitation project will have **no effect** on any historic property, and that the project can proceed without need for further cultural resources investigations.

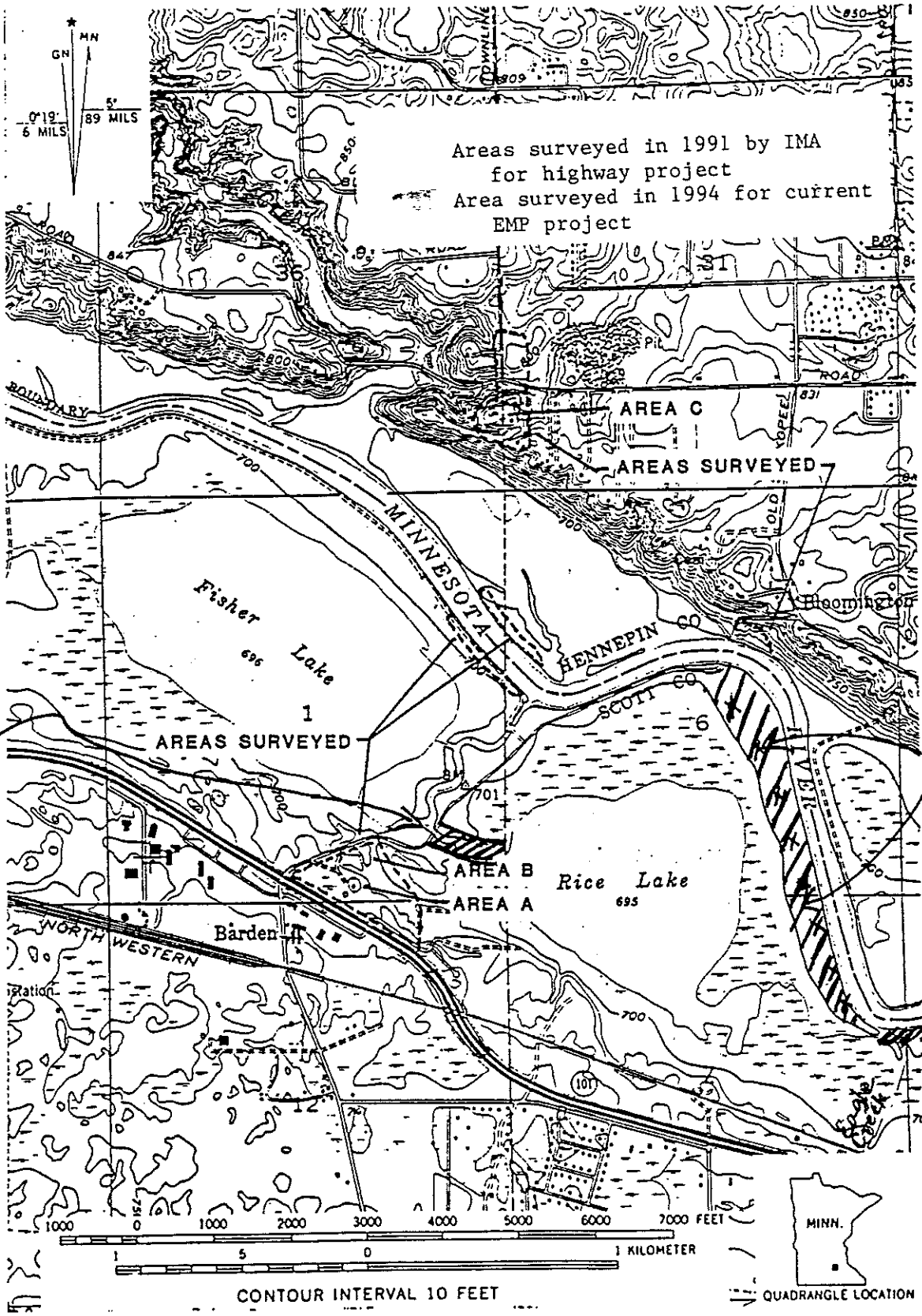
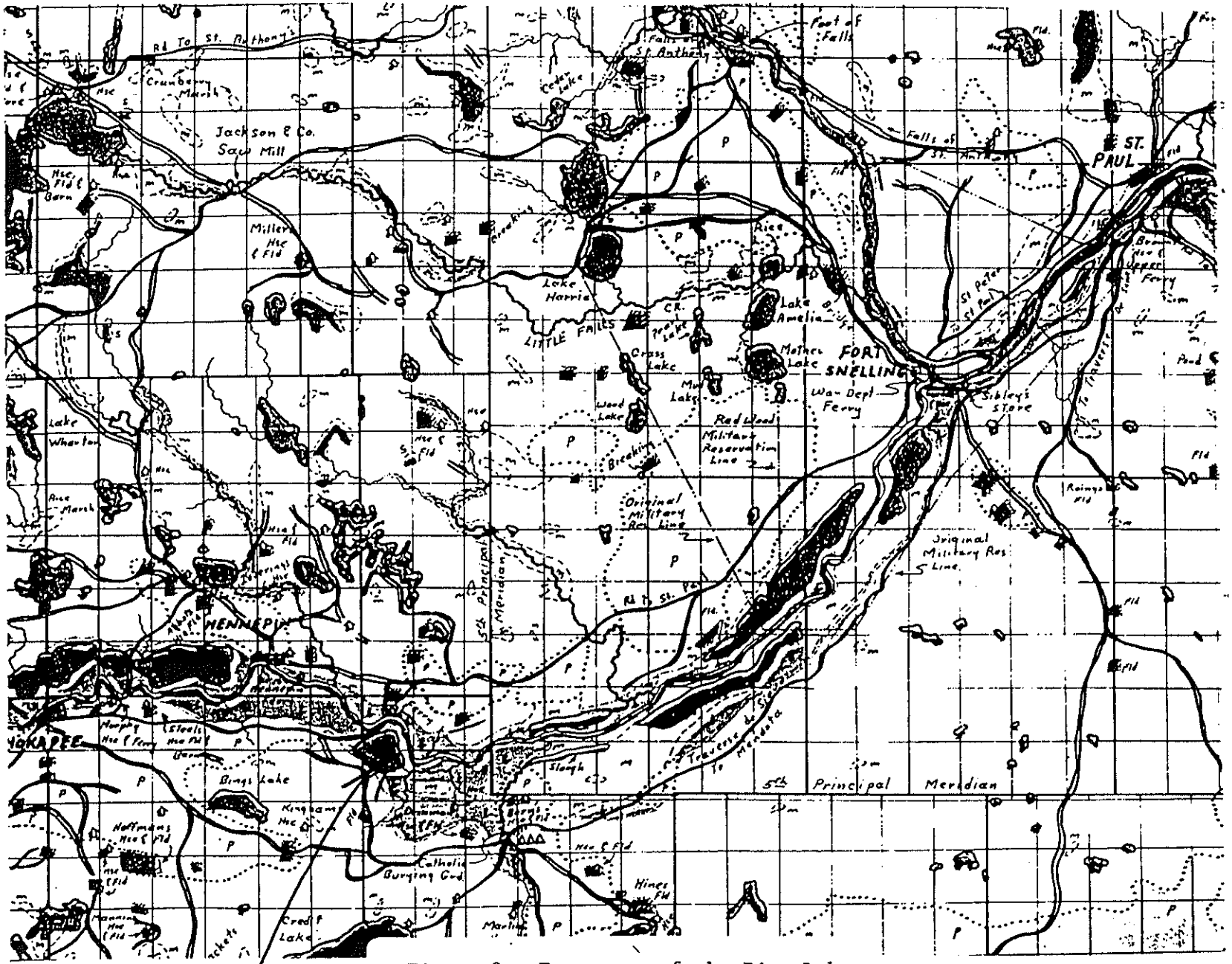


Figure 1. Location of the project area. Eden Prairie, MN (1967 photorevised 1972/1980) 7.5 minute USGS topographic quadrangle.



Rice Lake

Figure 2. Trygg map of the Rice Lake area and its trails in the 1850s (composite of original land surveyors pl and field notes)

PD-EK

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

FWS/ARW-SS

DEC 15 1993

Colonel James T. Scott
District Engineer
Saint Paul District, US Army Corps of Engineers
Army Corps of Engineers Centre
190 Fifth Street East
Saint Paul, Minnesota 55101-1638

Dear Colonel Scott:

We are responding to Mr. Robert Whiting's request for information we have about cultural resources in the vicinity of proposed Rice Lake projects on Minnesota Valley National Wildlife Refuge. The Corps of Engineers and the refuge are proposing to excavate a small channel, plant trees, and stabilize the river bank on the south side of the Minnesota River in the S/2, Section 6, and the NE/4, Section 7, extending into the SW/4 NW/4, Section 8, T.115N., R.21W., Scott County.

Our records indicate that the project areas have never been subjected to an archeological investigation. Investigations have been performed on the north side of the Minnesota River in Section 6; also in adjacent Sections 1 and 12, T.115N., R.22W. Surveys of transect #2 and of the Bloomington Ferry tract by G. Joseph Hudak in 1979 produced negative results. Surveys by the Institute for Minnesota Archaeology for the highway 18 bridge right-of-way produced negative results except for two archeological sites located in the SW/4 SE/4, Section 1.

Several other prehistoric and historic archeological sites have been reported in the vicinity, but none have been reported in the project areas. We have records of nine sites in Section 6, but all are on the north side of the river in Hennepin County. South of the river in Scott County we have records of four sites in Section 7, all south or west of the project areas.

The absence of reported archeological sites is, of course, no assurance that none exist in the project areas. Of special concern might be the agricultural field adjacent to the river. The potential for sites in the floodplain is shown by the two nearby sites A and B in Section 1 and the reported eroding human skeleton and adjacent agricultural field containing artifacts on the north bank of the river in Section 31, T.116N., R.22W. The archeological potential of these Rice Lake project areas needs to be considered further and resolved prior to ground disturbing activities.

Sincerely,

Jim Fitzinger

Acting Assistant Regional Director
Refuges and Wildlife

MINNESOTA HISTORICAL SOCIETY

January 19, 1993

Mr. Robert J. Whiting
Corps of Engineers, Environmental Resources Branch
190 Fifth Street East
St. Paul, Minnesota 55101

Dear Mr. Whiting:

Re: Rice Lake in Minnesota River National Wildlife Refuge improvements
Channel between Rice Lake and CH 18, planting trees, river stabilization
Scott County
SHPO Number: 94-0792

Sissel Johannessen of your staff has contacted us about our earlier review of the above reference project, and about the recent recommendation from the Fish and Wildlife Service that an archaeological survey of the project area be completed.

We note that the numerous known archaeological sites in the area are generally at higher elevations than those areas to be affected by the proposed project. For this reason, we would recommend that a geomorphological analysis of the project area be completed as a means of evaluating the need for further archaeological survey of the site. We would, of course, be interested in reviewing the results of such an analysis.

Please contact our Review and Compliance Section at 296-5462 if you have questions regarding our review of this project.

Sincerely,

Dennis A. Gimmestad
Government Programs and Compliance Officer

DAG:dmb

cc: Jim Litzinger, Fish and Wildlife Service
John Dobrovolny, Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:
FWS/ARW-SS

OCT 4 1994

Mr. Robert J. Whiting
Chief
Environmental Resources Section, Planning Branch
Army Corps of Engineers Centre
190 Fifth Street East
Saint Paul, Minnesota 55101-1638

Dear Mr. Whiting:

Thank you for providing us with a copy of the draft report "A Phase I Cultural Resources Survey of the Rice Lake Project, Minnesota River, Scott County, Minnesota," by Sissel Johannessen (September 1994: Saint Paul; 10 pages). We understand the investigation covered a proposed tree planting of an old farm field on a natural levee, part of an Environmental Management Program project on the Minnesota Valley National Wildlife Refuge. The investigation covered 40 acres of U.S. Fish and Wildlife Service fee title land in Sections 6 and 7, T.115N., R.21W. Additional project features in the area were determined too low and wet to warrant archeological investigation.

This investigation found no evidence of archeological sites. The report is a complete description of an appropriately executed field survey. No cultural resources being found, curation is not a concern.

In the event this report is prepared in a final version, we would appreciate receiving five copies of the final report for our own distribution requirements.

Sincerely,

Acting Assistant Regional Director
Refuges and Wildlife

MINNESOTA HISTORICAL SOCIETY

October 28, 1994

Mr. Robert J. Whiting
Corps of Engineers, Environmental Resources
190 East Fifth Street
St. Paul, Minnesota 55101

Dear Mr. Whiting:

Re: Rice Lake in Minnesota River National Wildlife Refuge improvements
Channel between Rice Lake and CH 18, planting trees, river stabilization
Scott County
SHPO Number: 94-0792

Thank you for the opportunity to review and comment on the above project. It has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36CFR800).

We have reviewed the results of your survey of the project area. Based on the results of this survey, we feel that the probability of any unreported properties being located in the area of potential effect is low. Therefore, we conclude that **no properties** eligible for or listed on the National Register of Historic Places are within the area of potential effect for the project.

Please contact Dennis Gimmestad at 612-296-5462 if you have any questions on our review of this project.

Sincerely,

Britta L. Bloomberg
Deputy State Historic Preservation Officer

BLB:dmb

cc: Jim Litzinger, Fish and Wildlife Service
John Dobrovolny, Fish and Wildlife Service

ATTACHMENT 8

REFUGE COMPATIBILITY DETERMINATION

and

MEMORANDUM OF AGREEMENT

COMPATIBILITY DETERMINATION

Station Name: Minnesota Valley National Wildlife Refuge

Date Established: October 8, 1976

Establishing and Acquisition Authorities:

Minnesota Valley National Wildlife Refuge, located in Carver, Dakota, Hennepin, and Scott Counties, Minnesota, was established by an Act of Congress on October 8, 1976 (Public Law 94-466, 90 Stat. 1993). Additional acreage and appropriations for land acquisitions were authorized for the Refuge by an Act of Congress on June 25, 1984 (Public Law 98-327, 98 Stat. 270). Additional lands have been acquired and incorporated into the Refuge under the authority of An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes (16 U.S.C. § 667b-667d), as amended.

Purpose for which Established:

For lands acquired under 90 Stat. 1993, dated October 8, 1976, "The Secretary shall develop and administer ... the refuge, in accordance with the National Wildlife Refuge System Act... The Secretary may also exercise any other authority available to him for the conservation and management of wildlife and natural resources, the development of wildlife recreational opportunities, wildlife interpretation, and environmental education, to the extent deemed by him to be appropriate... The Secretary shall construct, administer, and maintain... a wildlife interpretation and education center, ... to promote environmental education and to provide an opportunity for the study and enjoyment of wildlife in its natural habitat."

For lands acquired by transfer under An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes, 16 U.S.C. § 667b-667d, the purpose of acquisition is "...particular value in carrying out the natural migratory bird management program."

Applicable Laws, Regulations and Policies:

National Wildlife Refuge Administration Act of 1966 as amended (16 U.S.C. § 668dd-668ee), Minnesota Valley National Wildlife Refuge Act of 1976 as amended (Public Law 94-466, 90 Stat. 1993).

Description of Proposed Use:

The proposal is a Habitat Rehabilitation and Enhancement project authorized by the Water Resource Development Act of 1986 (Pub. L. 99-662). The purpose of the project will be to restore the Rice Lake unit wetlands by the addition of water control structures, reforestation of a 40 acre agricultural fields to bottomland forest communities, and berm construction to prevent drainage of a 70-acre perched wetland.

More details of the project, including maps and engineering drawings, are contained in the draft report entitled, "Upper Mississippi River System Environmental Management Program Definite Project Report With Integrated Environmental Assessment (SP-18) Rice Lake Habitat and Rehabilitation and Enhancement Project, Minnesota River, Scott County, Minnesota," prepared by the St. Paul District, Corps of Engineers.

Anticipated Impacts on Refuge Purpose:

Rice Lake is a shallow floodplain lake located on the right bank of the Minnesota River approximately 16.7 miles above the confluence of the Minnesota and Mississippi Rivers. Rice Lake lies within the Minnesota Valley National Wildlife Refuge. The lake covers about 170 acres, and ranges in depth from 18 inches to 3 feet during most growing seasons. Rice Lake primarily provides habitat for migratory waterfowl, other migratory birds, and aquatic furbearers.

Rice Lake can experience highly variable water levels from year to year, much of which is the result of high water events on the Minnesota River. During years of high water, the water in Rice Lake is too deep for the growth aquatic vegetation, especially emergent vegetation. During years of low water, emergent vegetation chokes the lake, reducing habitat value for waterfowl and other wildlife. There is no capability at this time for the Refuge to manage water levels in Rice Lake to improve this situation.

The outlet channel and outlet controls on Rice Lake in this project will provide water level management capability on this 170-acre shallow lake. This would provide the Refuge with the capability to manage water levels to optimize the growth of aquatic vegetation for the benefit of migratory birds. It is estimated that without this management capability, optimal conditions for aquatic vegetation occur approximately 3 out of 10 years. With the project, it is estimated that optimum conditions can be provided 3 out of 4 years.

In addition, to water control of Rice Lake this project will be replanting a recently purchased 40-acre agricultural field adjacent to Rice Lake into a bottomland forest community. The planting plan will accelerate the reforestation of the 40-acre

farm field. Also, the planting plan is designed to promote reforestation with the diversity of species found in the natural bottomland forest community in the Minnesota River floodplain.

A short distance below Rice Lake is a 70 acre emergent marsh that is a perched wetland, maintained by a natural river levee. Erosion from interior drainage has created a breach in the natural levee, which if left unchecked, would result in drainage and a reduction in size of this wetland. The Refuge has constructed a temporary berm on the inside of the natural levee to stop the drainage of this wetland. This project will construct a permanent berm with overflow spillway.

The berm and overflow spillway feature will prevent the drainage of this 70-acre perched wetland via breaching of the natural river levee. Preservation of this wetland will allow this wetland to continue to provide habitat for wetland dependant wildlife such as waterfowl, furbearers, wading birds, and marsh birds. In addition, the wetland would also continue to provide other wetland functional values such as floodwater retention and water filtration.

Justification:

This proposed project works toward the accomplishment of the stated objectives of the refuge outlined in the approved Minnesota Valley National Wildlife Refuge Master Plan and final Environmental Impact Statement.

The Rice Lake habitat rehabilitation and enhancement project provides the opportunity to maintain and improve habitat for migratory birds, aquatic mammals and other forms of wildlife indigenous to the lower Minnesota River valley. Lack of water control facilities limits the ability to manage water levels in Rice Lake for the benefit of migratory birds and aquatic mammals. A recently purchased tract of agricultural land offers the opportunity for enhancement of wildlife habitat through planned reforestation. The breaching of the natural levee along a portion of the Minnesota River threatens the long-term survival of a 70-acre perched wetland.

Providing the capability to both draw down Rice Lake and impound water in the lake will increase the number of years Refuge Managers will be able to optimize water levels for habitat purposes from a current 15 out of 50 years (30 percent) to 38 out of 50 years (75 percent). Planting trees on the agricultural land will provide wildlife habitat benefits both by accelerating the rate of reforestation and by promoting reforestation with the diversity of species found in naturally occurring bottomland forests in this area. The construction of a berm behind the eroding natural levee will prevent the drainage of the 70-acre perched wetland, preserving its wildlife habitat and other functional wetland values.

Determination:

The proposed use is X is not ___ compatible with the purposes for which the refuge was established.

Determined by: Richard D. Schultz Date: 1/30/95
Richard D. Schultz, Refuge Manager

Reviewed by: [signature] Date: 1/31/95
Wildlife Associate Manager

Concurred by: [signature] Date: 1/31/95
Assistant Regional Director

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DRAFT

MEMORANDUM OF AGREEMENT

BETWEEN

THE UNITED STATES FISH AND WILDLIFE SERVICE

AND

THE DEPARTMENT OF THE ARMY

FOR

ENHANCING FISH AND WILDLIFE RESOURCES

OF THE

UPPER MISSISSIPPI RIVER SYSTEM

AT

RICE LAKE

SCOTT COUNTY, MINNESOTA

I. PURPOSE

The purpose of this memorandum of agreement (MOA) is to establish the relationships, arrangements, and general procedures under which the U.S. Fish and Wildlife Service (USFWS) and the Department of the Army (DOA) will operate in constructing, operating, maintaining, repairing, and rehabilitating the Rice Lake separable element of the Upper Mississippi River System - Environmental Management Program (UMRS-EMP).

II. BACKGROUND

Section 1103 of the Water Resources Development Act of 1986, Public Law 99-662, authorizes construction of measures for the purpose of enhancing fish and wildlife resources in the Upper Mississippi River System. The project area is managed by the USFWS and is on land managed as a national wildlife refuge. Under conditions of Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, all construction costs of those fish and wildlife features for the Rice Lake project are 100 percent Federal, and pursuant to Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580, all costs of operation and maintenance for the Rice Lake project are 100 percent Federal.

III. GENERAL SCOPE

The project to be accomplished pursuant to this MOA shall consist of rehabilitating and improving the fish and wildlife habitat at Rice Lake on the Minnesota Valley National Wildlife Refuge. This would involve excavation of a channel in and adjacent to Rice Lake to permit the drawdown of Rice Lake for habitat management; the installation of a culvert with stop log controls to permit regulation of Rice Lake water levels for habitat management; tree plantings to promote revegetation of a former agricultural field; and the construction of a low berm with an overflow spillway to prevent drainage of a wetland adjacent to Eagle Creek.

IV. RESPONSIBILITIES

A. DOA is responsible for:

1. Construction: Construction of the project which consists of excavating a 1,730 feet channel in and adjacent to Rice Lake; installation of a 42-inch CMP with a stop log control structure through old County Road 18; placing an earthen plug in the natural outlet of Rice Lake; planting approximately 24,000 trees; and constructing a low berm with a rock lined overflow spillway between a 70-acre wetland and the Minnesota River.

2. Major Rehabilitation: The Federal share of any mutually agreed upon rehabilitation of the project that exceeds the annual operation and maintenance requirements identified in the Definite Project Report and that is needed as a result of specific storm or flood events.

3. Construction Management: Subject to and using funds appropriated by the Congress of the United States, and in accordance with Section 906(e) of the Water Resources Development Act of 1986, Public Law 99-662, DOA will construct the Rice Lake project as described in the Definite Project Report/Environmental Assessment, Rice Lake Habitat Rehabilitation and Enhancement Project, dated July 1995, applying those procedures usually followed or applied in Federal projects, pursuant to Federal laws, regulations, and policies. The USFWS will be afforded the opportunity to review and comment on all modifications and change orders prior to the

issuance to the contractor of a Notice to Proceed. If DOA encounters potential delays related to construction of the project, DOA will promptly notify USFWS of such delays.

4. Maintenance of Records. The DOA will keep books, records, documents, and other evidence pertaining to costs and expenses incurred in connection with construction of the project to the extent and in such detail as will properly reflect total costs. The DOA shall maintain such books, records, documents, and other evidence for a minimum of three years after completion of construction of the project and resolution of all relevant claims arising therefrom, and shall make available at its offices, at reasonable times, such books, records, documents, and other evidence for inspection and audit by authorized representatives of the USFWS.

B. USFWS is responsible for operation, maintenance, and repair: Upon completion of construction as determined by the District Engineer, St. Paul, the USFWS shall accept the project and shall operate, maintain, and repair the project as defined in the Definite Project Report/Environmental Assessment entitled "Rice Lake Habitat Rehabilitation and Enhancement Project," dated July 1995, in accordance with Section 107(b) of the Water Resources Development Act of 1992, Public Law 102-580.

V. MODIFICATION AND TERMINATION

This MOA may be modified or terminated at any time by mutual agreement of the parties. Any such modification or termination must be in writing. Unless otherwise modified or terminated, this MOA shall remain in effect for a period of no more than 50 years after initiation of construction of the project.

VI. REPRESENTATIVES

The following individuals or their designated representatives shall have authority to act under this MOA for their respective parties.

USFWS: Regional Director
U.S. Fish and Wildlife Service
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, Minnesota 55111-4056

DOA: District Engineer
U.S. Army Corps of Engineers, St. Paul District
Army Corps of Engineers Centre
190 Fifth Street East
St. Paul, Minnesota 55101-1638

VII. EFFECTIVE DATE OF MOA

This MOA shall become effective when signed by the appropriate representatives of both parties.

THE DEPARTMENT OF THE ARMY

BY: _____
(signature)
JAMES T. SCOTT
Colonel, Corps of Engineers
St. Paul District

DATE: _____

THE U.S. FISH AND WILDLIFE SERVICE

BY: _____
(signature)
WILLIAM F. HARTWIG
Regional Director
U.S. Fish and Wildlife Service

DATE: _____

ATTACHMENT 9

COORDINATION/CORRESPONDENCE

The draft Definite Project Report/Environmental Assessment and/or Public Notice was sent to the following agencies, interests, and individuals:

Congressional
Sen. Paul Wellstone
Sen. Rod Grams
Rep. James Ramstad

Federal
Environmental Protection Agency (Chicago)
Department of Transportation (Chicago, Des Plaines)
U.S. Coast Guard (St. Louis)
U.S. Geological Survey (Twin Cities)
National Park Service (Omaha)
Soil Conservation Service (St. Paul)
Advisory Council on Historic Preservation (Wash DC)
U.S. Fish and Wildlife Service - (S. Marler, C. Gibbons, L. Lewis, J. Dobrovolny, R. Schultz, T. Schreiner, K. Beseke)
National Biological Service (Onalaksa)

State of Minnesota

Department of Natural Resources (R. Sando, S. Johnson, T. Balcom, P. Lynch, B. Lueth)
Pollution Control Agency
Department of Administration
Department of Transportation
Department of Agriculture
Department of Health and Human Services
State Historic Preservation Office
Department of Energy, Economics, and Development
State Planning Agency
Water and Soil Resources Board

State of Wisconsin

Department of Natural Resources (T. Moe, J. Janvrin)

State of Iowa

Department of Natural Resources (K. Szcodronski)

Local

Scott County Commissioners
City of Savage (M. McNeil)
City of Bloomington (G. Ingraham)
City of Shakopee (L. Ekola)
Lower Minnesota Valley Watershed District (L. Samstad)

Other Interests

Minnesota-Wisconsin Boundary Area Commission (Hudson)
Upper Mississippi River Conservation Committee (Rock Island)
Sierra Club (Minneapolis, Madison)
Izaak Walton League (Minneapolis)
Upper Mississippi River Basin Association (St. Paul)
Nature Conservancy
Minneapolis Star Tribune
St. Paul Pioneer Press
Savage Public Library
Bloomington Public Library
Shakopee Public Library

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bishop Henry Whipple Federal Building
1 Federal Drive
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:
FWS/ARW-SS

JUN 20 1995

Colonel James T. Scott
District Engineer
Saint Paul District, US Army Corps of Engineers
Army Corps of Engineers Centre
190 Fifth Street East
Saint Paul, Minnesota 55101-1638

Dear Colonel Scott:

This letter is our statement of support for the Rice Lake Habitat Rehabilitation and Enhancement Project on the Minnesota Valley National Wildlife Refuge as described in the Draft Definite Project Report/Environmental Assessment (SP-18) dated April 1995.

The selected alternative contains three components to improve and protect wildlife habitat: construct a water level management facility in Rice Lake, restore floodplain forest, and prevent drainage of an emergent marsh. The environmental assessment presents the no action alternative and action alternatives, and describes existing conditions and probable future under the no action alternative as well as the likely environmental consequences of the preferred alternative. Enclosed is our signed Finding of No Significant Impact for the project.

The Agreement for Operation, Maintenance, and Rehabilitation will be signed upon receipt of the final version of that document. We look forward to continued progress on this project.

Sincerely,

WB Zimmerman

Acting Regional Director

Enclosure: FONSI

FINDING OF NO SIGNIFICANT IMPACT

For the reasons presented below and based on an evaluation of the information contained in the supporting references, I have determined that the Rice Lake Habitat Rehabilitation and Enhancement Project, part of the Environmental Management Program, is not a major Federal action that would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. An Environmental Impact Statement will, accordingly, not be prepared.

Reasons

The project involves improving and protecting wildlife habitat by constructing water level management facility in Rice Lake adjacent to the Minnesota River, restoring floodplain forest, preventing drainage of a 70-acre emergent marsh. The project has no significant environmental impacts. It protects floodplain wetlands, does not adversely affect floodplain values, will not affect threatened or endangered species, and will not affect historical properties.

Supporting References

1. Environmental Assessment (Rice Lake Habitat Rehabilitation and Enhancement Project Definite Project Report/ Environmental Assessment SP-18)
2. Compatibility Determination

Acting W B Zimmerman 6/20/95

Regional Director Date

United States Department of the Interior

NATIONAL PARK SERVICE
Midwest Region
1709 Jackson Street
Omaha, Nebraska 68102-2571

IN REPLY REFER TO:

L7619(MWR-PQ)
MN 1775

MAY 2 4 1995

Colonel James T. Scott
Corps of Engineers
St. Paul District
ATTENTION: CENCS-PE-M
190 Fifth Street East
St. Paul, Minnesota 55101-1638

Dear Colonel Scott:

Thank you for providing the draft Definite Project Report/Environmental Assessment (EA) for the Rice Lake Habitat Rehabilitation and Enhancement Project, Scott County, Minnesota, for our review. The EA considers alternatives for enhancing the wetland and floodplain habitat of Rice Lake.

We have the following comments:

Nationwide Rivers Inventory

Rice Lake is a floodplain lake located on the right bank of the Minnesota River. This segment of the Minnesota River is on the Nationwide Rivers Inventory (NRI). The NRI includes rivers selected on the basis of the degree to which they are free-flowing, the degree to which the rivers and their corridors are undeveloped, and the outstanding natural and cultural characteristics of the rivers and their immediate environments. The purposes of the inventory are several, including the identification of rivers which could round out the National Wild and Scenic Rivers System. The Minnesota River was included in the inventory because of its outstanding scenic, recreational, wildlife and historic values.

In the President's August 2, 1979, environmental message, Federal Agencies were directed to take care, as part of their normal planning and environmental review process, to avoid or mitigate adverse effects on rivers identified in the NRI. Therefore, the proposed project should be planned so as to avoid or minimize adverse impacts to the values of the Minnesota River.

In general, we believe the proposed project will enhance the values for which the Minnesota River was included on the NRI. However, we do have some concerns about the alternatives under consideration for repairing the breached natural levee adjacent to the river, which, if left unchecked, will drain a perched wetland. We support selection of the alternative which would construct a berm on the inside of the natural levee. The berm should be constructed so as to replicate the natural levee to the greatest extent practicable. We are not in favor of the alternative that would stabilize the riverbank and natural levee through the use

of riprap, as riprap would detract from the free-flowing quality and scenic value of the Minnesota River.

Land and Water Conservation Fund Sites

The proposed project may impact the "Minnesota Valley Trail," a recreation resource developed and acquired with monies from the Land and Water Conservation Fund (LWCF) program. The "Minnesota Valley Trail" is sponsored by the Minnesota Department of Natural Resources (MNDNR) and was developed and acquired under project numbers 27-00322, 27-00717, and 27-00744. The portion that may be impacted by the proposed project is located on the south and southwest side of Rice Lake. A total of 3,341 acres were acquired through project numbers 27-00322 and 27-00744. Recreational facilities include campgrounds, picnic areas, sports and playfields, fishing and boating facilities, trails, and support facilities.

A significant decline may occur to the Minnesota Valley Trail if any portion of the proposed enhancement project blocks or interferes with the site's present recreational use. If a significant change of use is determined to have occurred, the site could be declared converted requiring the MNDNR to provide appropriate replacement.

The Corps of Engineers should contact the State Liaison Officer noted below to determine whether the proposed project conflicts with Section 6(f)(3) of the LWCF Act (Public Law 88-578, as amended). Section 6(f)(3) of the LWCF Act states:

> **"No property acquired or developed with assistance under this section shall, without the approval of the Secretary (of the Interior), be converted to other than public outdoor recreation uses."**

The State Liaison Officer for the State of Minnesota is:

Mr. Dennis W. Asmussen
Director, Trails and Waterways Unit
Department of Natural Resources
500 Lafayette Road
Box 51
St. Paul, Minnesota 55155-4052

We appreciate the opportunity to provide comments. If you have any questions, please contact Ms. Jill Medland of my staff at 402-221-3481.

Sincerely,

Alan M. Hutchings

Alan M. Hutchings
Acting Associate Regional Director
Planning and Resource Preservation

cc:
Mr. Dennis W. Asmussen
Director, Trails and Waterways Unit
Department of Natural Resources
500 Lafayette Road
Box 51
St. Paul, Minnesota 55155-4052

CONVERSATION RECORD

TIME:

DATE: 12 June 1995

TYPE: ☐ VISIT ☐ CONFERENCE ☒ TELEPHONE ☒ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Joe Hiller	Trails & Waterways Unit Minn. Dept. Nat. Resour.	296-4591

ROUTING

NAME/SYMBOL	INT

SUBJECT: Rice Lake EAP
- Minnesota Valley Trail Impacts (NPS 24 May Letter)

SUMMARY

I faxed Joe Hiller the 24 May 1995 National Park Service letter on Rice Lake EAP and some project maps to put the project into perspective. Mr. H. Has coordinated with the Manager of the Minnesota Valley Trail System. Their conclusion was there are no project features that would impact the trail.

ACTION REQUIRED

None

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
PETER J. FASBENDER	Peter J. Fasbender	12 June 1995

ACTION TAKEN

SIGNATURE	TITLE	DATE

United States Department of Agriculture

Soil Conservation Service

FCS BLDG., SUITE 600
375 JACKSON STREET
ST. PAUL, MN 55101

May 3, 1995

IN REPLY
REFER TO: Rice Lake Habitat Rehabilitation and Enhancement Project, Scott County, Minnesota.

District Engineer
St. Paul District
Corps of Engineers
ATTN: CENCS-PE-M
190 Fifth Street East
St. Paul, MN 55151-1638

Natural Resources Conservation Service (NRCS) has reviewed the appropriate sections (wetlands and threatened and endangered species) for the above mentioned proposed project. The project sponsors are not USDA program benefit recipients, thus, the wetland conservation provisions of the 1985 Food Security Act, as amended are not applicable. It should be noted, however, that actions by a non-USDA participant third party (project sponsor) which impact wetlands owned or operated by USDA participants, may jeopardize the owner/operators USDA eligibility. If such impacts are anticipated, the owner/operator should contact the county Consolidated Farm Service Agency (CFSA) office to apply for a third party exemption.

Neither NRCS technical nor financial assistance is being provided in support of this project, thus, specific NRCS environmental policies are not applicable.

The following agencies may have federal or state wetlands, cultural resources, water quality or threatened and endangered species jurisdiction in the proposed project, and should be consulted.

Army Corps of Engineers
US Fish and Wildlife Service
Board of Water and Soil Resources
Minnesota Department of Natural Resources
Minnesota Pollution Control Agency
State Historic Preservation Officer/State Archaeologist

If through these impacts you are purchasing new or acquiring additional lands and if any federal monies are involved, it is a requirement that a Farmland Policy Protection Act (FPPA) site assessment be appropriately filed. These site assessments are, conducted by NRCS personnel to review the project for possible effects on unique, prime or statewide important farmland. Contact your local NRCS office for more information.

Roger A Musselman, Acting

WILLIAM HUNT
State Conservationist

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
500 LAFAYETTE ROAD • ST. PAUL, MINNESOTA • 55155-4010

DNR INFORMATION
(612) 296-6157

June 27, 1995

James T. Scott
Colonel, U.S. Army Corps of Engineers
District Engineer
190 Fifth Street East
St. Paul, MN 55101-1638

Attention: CENCS-PE-M

Re: Draft Definite Project Report/Environmental Assessment for the Rice Lake Habitat Rehabilitation and Enhancement Project, Scott County, Minnesota

Dear Colonel Scott:

The Minnesota Department of Natural Resources (DNR) has reviewed the draft Definite Project Report/Environmental Assessment for the Rice Lake Habitat Rehabilitation and Enhancement Project in Scott County. We offer the floowing comments for you consideration.

Early this spring several DNR staff were given a field review of this project by Refuge managers. We had expressed concerns after reviewing an earlier document which outlined the project's purpose and need. The field review and associated discussions addressed our concerns. The DNR feels the present document describes the project better than the previous draft. We have no concerns or comments at this time and wish you success with this project.

Thank you for the opportunity to review this project report/environmental assessment. If you have any questions regarding this letter, please contact Gail Fox from my staff at (612) 296-0731.

Sincerely,

Thomas W. Balcom

Thomas W. Balcom, Supervisor
Natural Resources Planning and Review Services

c: Steve Johnson
Steve Colvin
Lynn Lewis - U.S.F.W.
Conrad Christianson
Scot Johnson
Larry Zdon - PCA

FOX:ER2:COERICEL.doc
950265-01

Minnesota Pollution Control Agency

July 7, 1995

Mr. Charles E. Crist
Chief, Management and Evaluation Branch
Engineering and Planning Division
St. Paul District
U.S. Army Corps of Engineers
190 Fifth Street East
St. Paul, Minnesota 55101-1638

RE: Rice Lake Habitat Rehabilitation and Enhancement Project
U.S. Army Corps of Engineers - Draft Definite Project Report/Environmental Assessment
Draft Finding of No Significant Impact
Preliminary Section 404(b)(1) Evaluation.
Scott County, Minnesota

Dear Mr. Crist:

This letter is submitted by the Minnesota Pollution Control Agency (MPCA) under authority of Section 401 of the Clean Water Act (33 USC 1251 et seq.) and Minn. Stat. chs. 115 and 116. The referenced project involves a proposal to excavate a channel in Rice Lake, install a culvert control structure, implement a reforestation project and stabilizing a portion of the Minnesota River bank by reconstructing the man made berm and constructing an overflow spillway. The project is located on the right descending bank of the Minnesota River, approximately 17 river miles above its confluence with the Mississippi River.

The MPCA will waive certification of the project since the project's individual and cumulative impacts do not appear to be significant as defined by present water quality standards provided the following conditions are complied with:

1. An erosion control plan should be specifically designed and incorporated onto the proposed project at the excavation site and the disposal area that at a minimum will prevent sediment runoff by: 1)keeping exposed soil to a minimum; 2) using sediment barriers such as straw bales and fabric barriers/silt curtains in any drainage channels or outlets; 3) mulching and seeding appropriate areas after construction.

2. No wetlands will be drained or filled as part of the project effort.

The project impacts should be minimized in accordance with the requirements of Section 404(b)(1) guidelines. This action does not exempt the applicant from the responsibility of complying with all applicable local, state and federal requirements, nor does it grant any right to violate personal or property rights.

If you have any questions on this, please call Lawrence S. Zdon at (612) 297-8219.

Sincerely,

John N. Holck, Manager
Nonpoint Source Compliance Section
Water Quality Division

JNH:jmg

cc: Mr. Charles Orzehoskie, U.S. Environmental Protection Agency, Chicago
Ms. Lynn Lewis, Field Supervisor, U.S. Fish and Wildlife Service
Mr. Kent Lokkesmoe, Director, Division of Waters, MDNR
Mr. Steve Colvin, Ecological Services, Environmental Review, MDNR