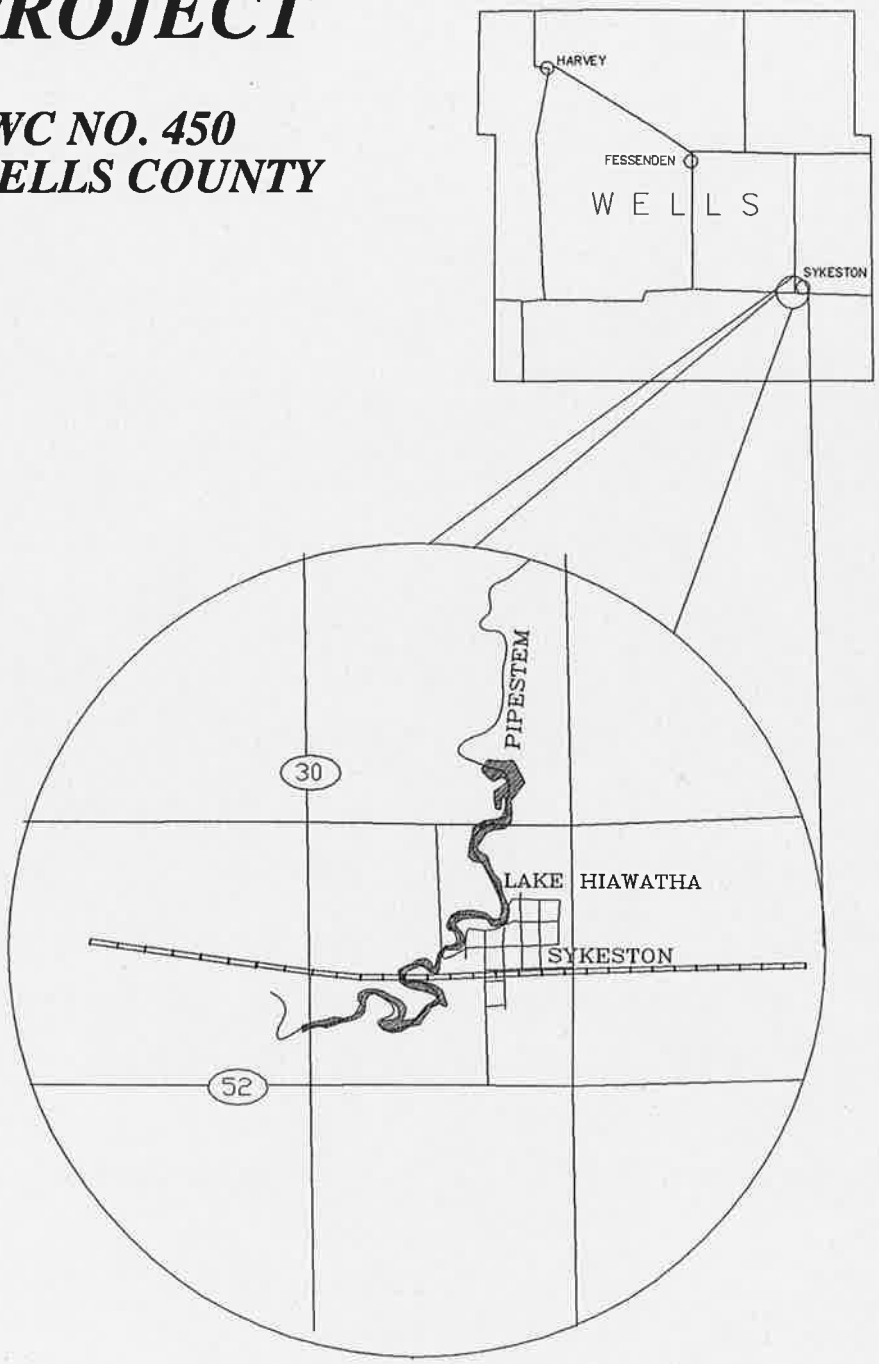
PRELIMINARY ENGINEERING REPORT

LAKE HIAWATHA RECREATION PROJECT

SWC NO. 450
WELLS COUNTY



NORTH DAKOTA STATE WATER COMMISSION
August 1992

PRELIMINARY ENGINEERING REPORT

Lake Hiawatha Recreation Project

SWC Project #450

North Dakota State Water Commission
900 East Boulevard
Bismarck, North Dakota 58505-0850

Prepared by:

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Submitted by:

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David A. Sprynczynatyk

David A. Sprynczynatyk, P.E.
State Engineer

TABLE OF CONTENTS

Tables

Figures

Appendices

I. PURPOSE AND SCOPE

In May of 1991, the North Dakota State Water Commission (SWC) entered into an agreement with the Wells County Water Resource District (WRD) to investigate the feasibility of modifying the Lake Hiawatha recreation area. The proposed modifications include the construction of fishing piers, a swimming area, and an island for wildlife habitat. The investigation will also provide alternatives for cattail control along the shoreline. A copy of the agreement is included in Appendix A.

This report contains a history of activity related to Lake Hiawatha, a description of the study area, information on potential modifications and improvements, an environmental assessment, and finally a statement of conclusions and recommendations regarding the project. The potential modifications and improvements include the excavation of sediment, the construction of an island, the installation of a low-leveled drawdown structure, the construction of fishing piers, and alternatives for cattail control. A cost estimate will be provided for each modification.

II. BACKGROUND

Sykeston Dam was constructed around 1908 by Mr. Sykes, the founder of Sykeston, and by the Northern Pacific Railroad on the Pipestem Creek, a tributary of the James River. Originally the reservoir was maintained by the railroad for water supply. In approximately 1936, the dam was rebuilt with the railroad furnishing the materials and the WPA furnishing the labor. Since that time, the city has become the major user of the reservoir and has assumed responsibility for the dam.

By 1960, the dam was leaking severely, and it was decided to build a new dam about 1/2-mile downstream in Section 12, Township 146 North, Range 69 West. The new dam was constructed by the SWC, the Wells County WRD, and the North Dakota State Game and Fish Department (G&F). The earth work for the new embankment began in November, 1962, and the final cleanup work was completed in May, 1963. The old dam was breached in July of 1964.

In October 1987, the SWC entered into an agreement with the Wells County WRD to investigate a way to prevent flooding on privately owned land. The 1987 investigation recommended channel and spillway cleanout work and the acquisition of privately flooded land by fee title or through flood easements. The Wells County WRD cleaned the channel and spillway approach, but did not address acquiring the flooded land or obtaining flood easements.

III. DESCRIPTION OF AREA

Location and Basin Description:

Lake Hiawatha is located in Sections 12 and 13, Township 146 North, Range 69 West. The site is located on the north edge of the city of Sykeston. Figure 1 shows the location of Lake Hiawatha within the state. Lake Hiawatha was created by Sykeston Dam which lies across Pipestem Creek. Pipestem Creek flows into Pipestem Lake and then into the James River.

The drainage area above Sykeston Dam is 147 square miles. The Pipestem Creek watershed is made up of undulating prairies that slope gently northward. Short irregular slopes that rise to an elevation of 1950 msl in the southwest and gently slope off from 1 to 8 percent to the bottom lands in the northeast. Most of the upstream drainage area is under cultivation with the exception of pasture and hay land in low-lying marsh land.

Dam Description:

Sykeston Dam is a rolled, earth-filled embankment whose top elevation is 1629.4 msl. The 27.4-foot high embankment has a 2H:1V (2 horizontal to 1 vertical) downstream slope, and a 3H:1V upstream slope with riprap on the upstream slope. The top of the embankment is 1,020 feet long and 12 feet wide.

The principal spillway consists of an approach channel, concrete chute, and a plunge pool. A low-level drawdown pipe is not included as part of the structure. The approach channel

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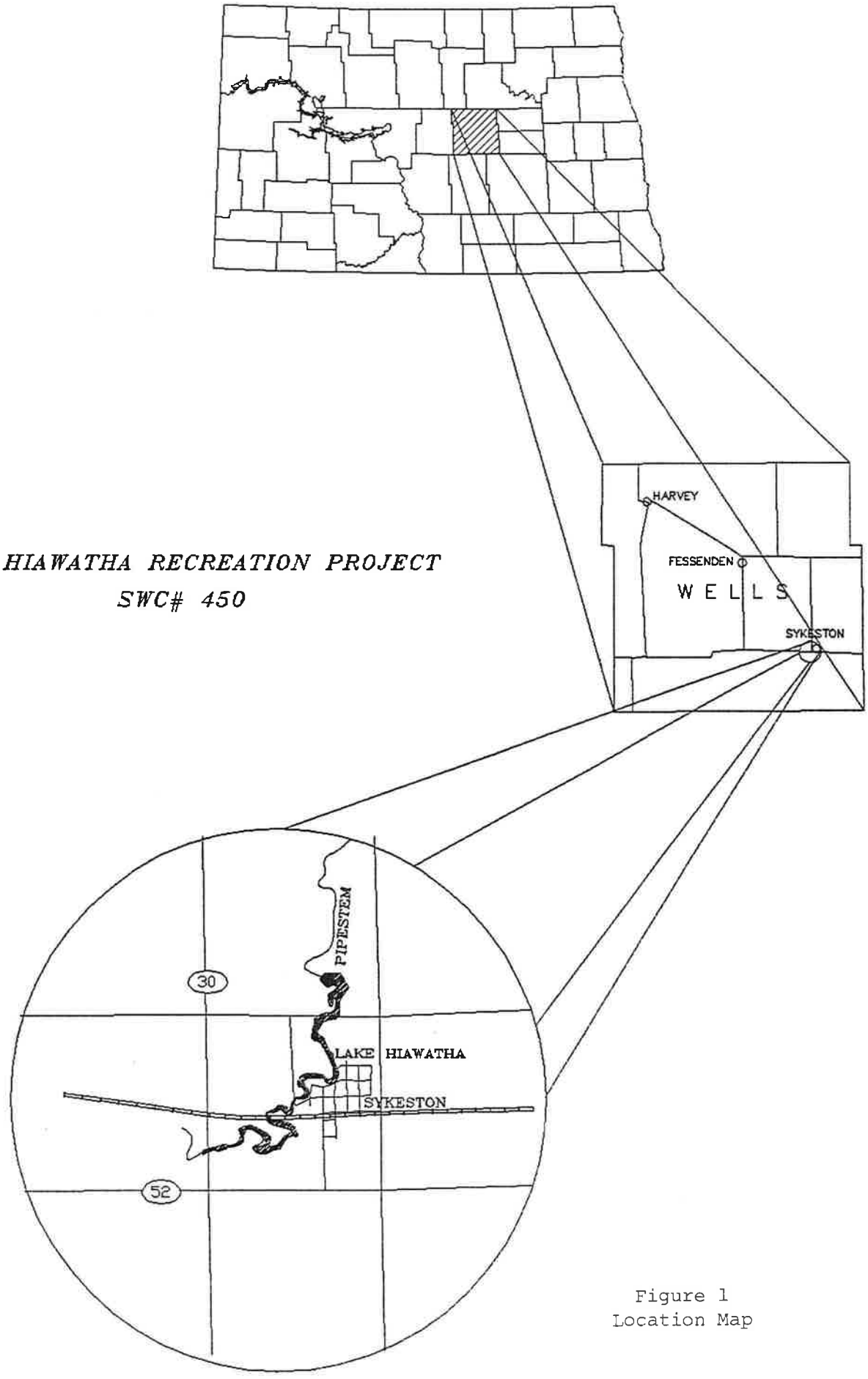

Figure 1
Location Map

consists of a flat, curved earth channel approximately 100 feet long at the same elevation as the principal spillway (1622.0 msl). The principal spillway is 20 feet wide with a 7-foot drop, and the floor extends downstream at a slope of 2H:1V to an elevation of 1601.0 msl. At the normal water level of 1622.0 msl, the reservoir covers 102 acres and has a capacity of 806 acre-feet. The average depth is 7.9 feet and the maximum depth is 20 feet.

Dam Design Classification:

Dams are classified according to their potential hazard to property and potential for loss of life if they should suddenly fail. Sykeston Dam is located in a rural area where there is little probability of future residential development downstream of the dam site. Failure of the dam could result in damage to agricultural land and township roads; however, no loss of life would be expected. Therefore, Sykeston Dam is considered a low hazard dam. With an embankment height of 27 feet, Sykeston Dam is a class III structure, according to the North Dakota Dam Design Handbook.

Sedimentation:

The rate of sedimentation in reservoirs is dependent upon the amount of soil eroded from the watershed and transported into the reservoir. There are several factors which determine the amount of sediment that is carried by surface runoff. Among them are soil type, amount of runoff, slope of land, land use, and land conservation practices. Also contributing to the sediment

accumulation is the organic material that is generated within the reservoir itself.

There is limited data available on the total accumulation of sediment in Lake Hiawatha. An original topographic map of the lake has not been located to compare with the existing bottom elevations. Local residents have indicated that over the years sediment accumulation has been substantial.

Climate:

During normal years, precipitation in the Sykeston Dam basin is adequate for crop production, although occasionally the area suffers from periods of drought. The average annual precipitation is 17.0 inches, most of which occurs during the period of April through September. The average temperature is approximately 39°F.

IV. POTENTIAL MODIFICATIONS AND IMPROVEMENTS

Discussion:

Initially, the investigation was to look at the possibility of removing sediment from Lake Hiawatha to provide a swimming and beach area for the city park. Over the course of several meetings with the Wells County Water Resource District, the scope of the investigation was expanded to include the design of a low-level drawdown structure, design options for fishing piers, and an evaluation of methods to control cattail growth.

Existing Conditions:

In September of 1991, the SWC survey crew performed a field survey at Sykeston Dam. The crew took soundings on Lake Hiawatha to determine water depths. The soundings began at the bridge on the western edge of the city and proceeded to a point approximately 500 feet downstream from the northern boundary of the city park (see Figure 2). Through the field survey, the water surface elevation was found to be 1619.2 msl, and the lowest lake bottom elevation recorded was 1611.1 msl near the park.

Infrastructure associated with the city park includes picnic shelters, playground equipment, comfort stations, and a beach area. A walkway bridge spanning 75 feet provides access from the city to the park. The beach lies west of the walkway bridge. Last year (1991), the cattails were removed from the beach to provide access for swimming. The open area is approximately 50 feet wide by 80 feet long.

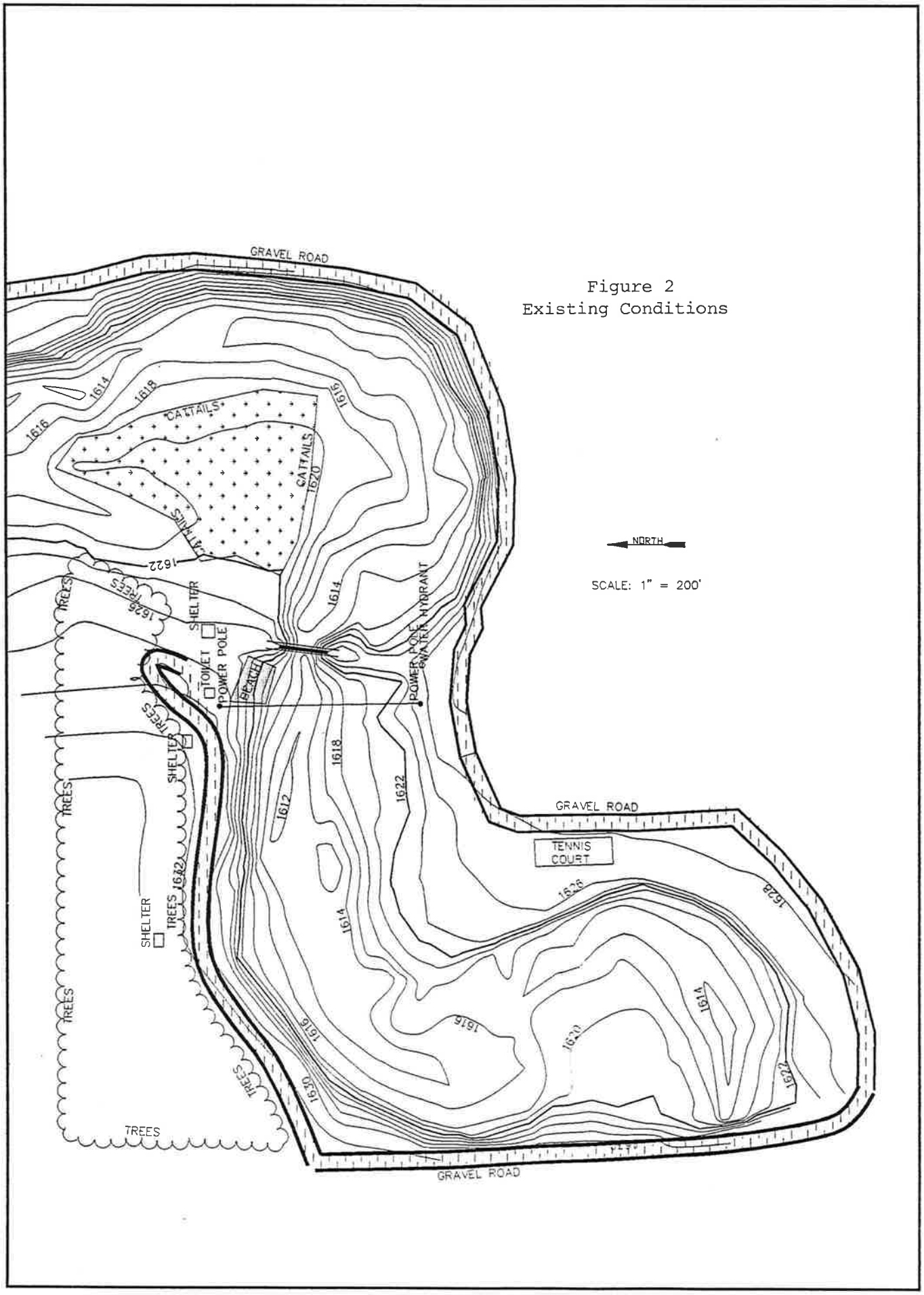

Figure 2
Existing Conditions

The lake's perimeter contains a dense growth of cattails that are presently limiting access to the lake. The heaviest area is located on the east side of the park and consists of 1.5 acres of cattails. The growth of cattails has caused an accumulation of sediment in this area limiting its recreational value.

Sediment Excavation:

The first modification considered involves the excavation of sediment and vegetation near the shoreline to obtain a desirable swimming area. The proposed swimming area will be located on the east side of the Sykeston city park. The swimming area is approximately 250 feet wide, 350 feet long, and covers an area of 170,500 square feet or 3.91 acres (see Figure 3).

The sediment would be removed with a dragline. The dragline would need to be positioned on stable ground near the shoreline to enable it to swing its bucket out over the cut area. A work deck would need to be constructed and extended out from shore to enable the dragline to reach the outer edges of the cut area. The excavated sediment will contain high concentrations of phosphorus and nitrogen. Therefore, the sediment will be hauled to an upland disposal area. Trees on the east side of the park will need to be removed to provide an access road to dispose of the excavated sediment. The sediment would be spread out evenly across the disposal site and seeded to prevent erosion.

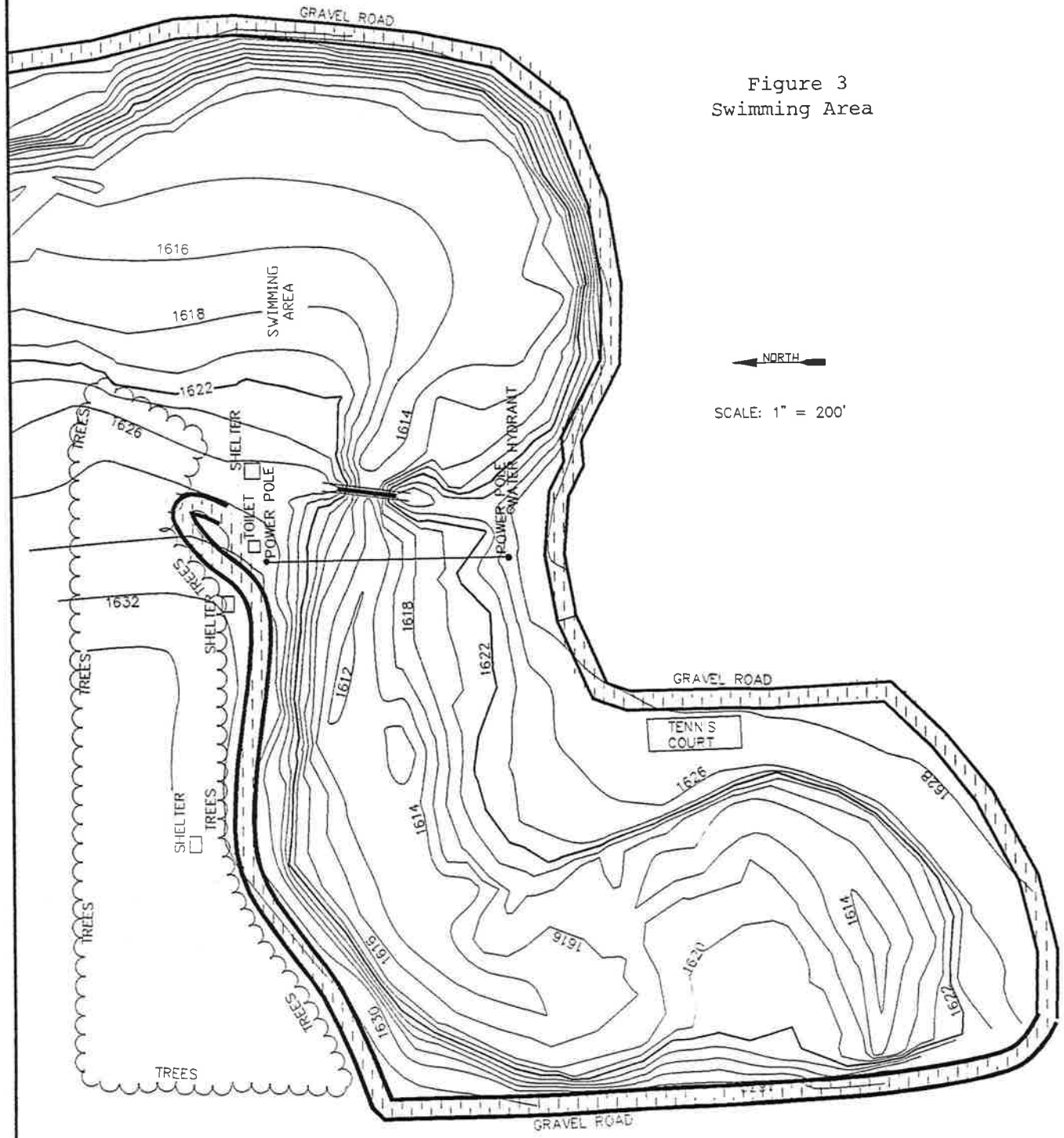

Figure 3
Swimming Area

The swimming area will gradually slope at 5 percent for the first 80 feet and then gradually slope to an elevation of 1613 msl which will be established as the bottom of the channel. Approximately 17,000 cubic yards of sediment would be removed with a maximum cut of 5 feet and an average cut of 2.7 feet. All of the excavation will be below the normal water surface elevation of 1622.0 msl.

The estimated unit cost for dragline excavation is $2.25 per cubic yard. This unit cost will be affected by the soil conditions on which the dragline operates. If the water surface is lowered to an elevation of 1616 msl, the working conditions for the equipment will greatly improve, resulting in a shorter working period and lower construction costs. Two options for lowering the water surface elevation are pumping or the construction of a low-level drawdown structure.

The estimated cost to remove sediment from the swimming area is $63,000. Table 1 gives a cost breakdown for the sediment excavation.

Table 1
Cost Estimate - Sediment Excavation

Project	Quantity	Unit	Unit Cost	Total
Mobilization	1	LS	$6,000.00	$ 6,000
Excavation	17,000	CY	2.25	38,250
Beach Sand	250	CY	15.00	3,750
Seeding	1	LS	500.00	500
	Subtotal			$48,500
	Engineering 10%			4,850
	Administration 10%			4,850
	Contingencies			4,800
	Total			$63,000

Island Construction:

To improve wildlife habitat near the park, an island is being proposed. The island will be constructed approximately 220 feet from the shoreline on the east side of the park (see Figure 4). The island will be oval shaped with a width of 70 feet and a length of 220 feet. The surface area at elevation 1622 msl will be 11,330 square feet. Approximately 2,000 cubic yards of fill material will be required to construct the island. The peak elevation of the island will be at 1625 msl.

To place fill material into a wetland, a Section 404 permit will need to be obtained from the Corps of Engineers. A 401 permit from the North Dakota State Health Department and Consolidated Laboratories will also need to be obtained. Both permits regulate the water quality effects of depositing fill material into a wetland.

The fill material for the island is required to be a nonorganic, subsurface material from an upland area. This type of material will provide stability to the island and have the least effect on the water quality. A layer of topsoil will be placed on the top of the island to provide a base for vegetative growth.

The cost to construct the island is $10,000. Table 2 gives a cost breakdown for the island construction.

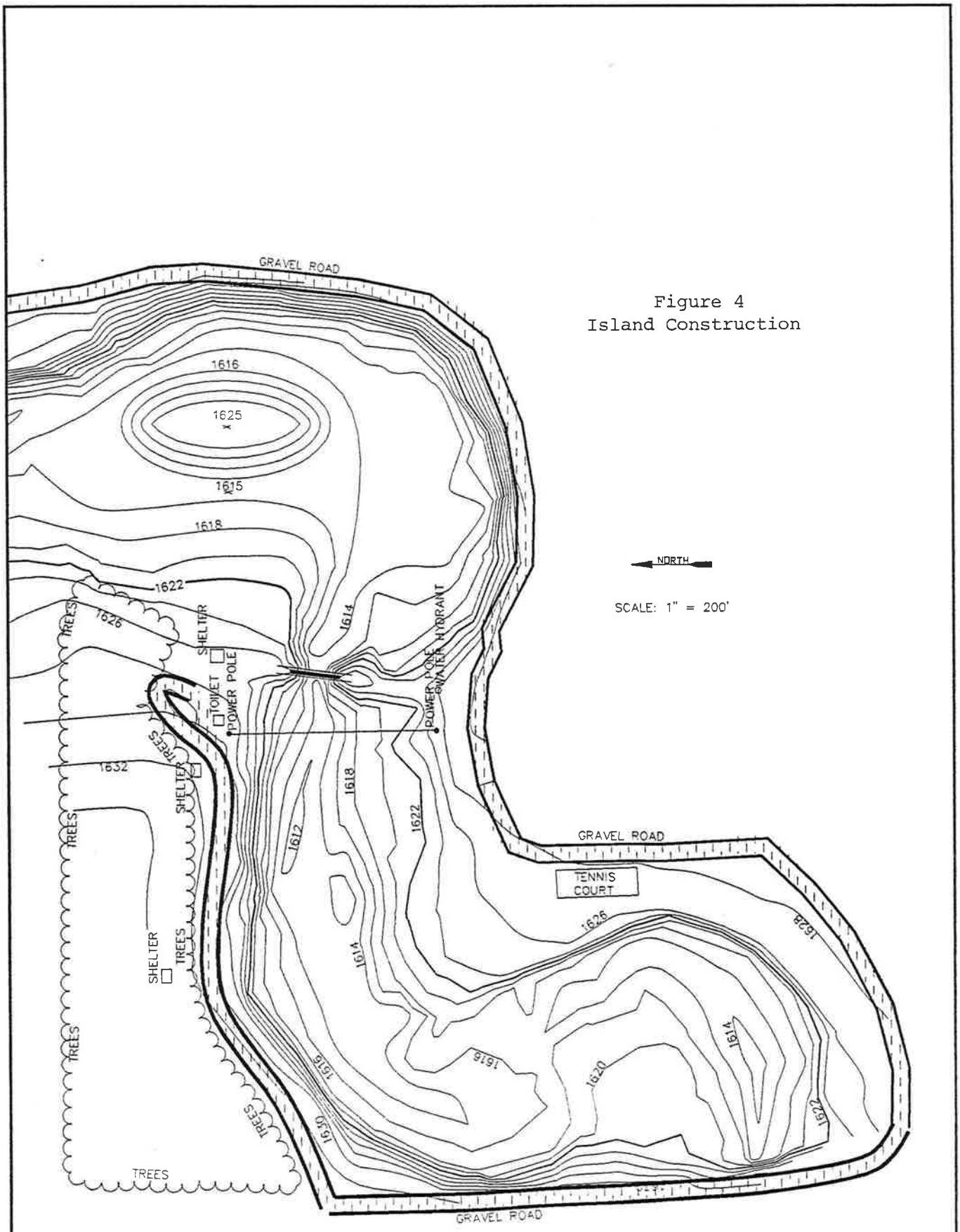

Figure 4
Island Construction

Table 2
Cost Estimate - Island Construction

Project	Quantity	Unit	Unit Cost	Total
Mobilization	1	LS	$2,000.00	$ 2,000
Fill Material	2,000	CY	1.50	3,000
Riprap	100	CY	25.00	2,500
Seeding	1	LS	250.00	250
Subtotal				$ 7,750
Engineering 10%				775
Administration 10%				775
Contingencies				700
Total				$10,000

Low-Level Drawdown Structure:

The low-level drawdown structure, also known as a cold water return or hypolimnetic discharge structure, is designed to counteract accelerated aging in reservoirs. The low-level drawdown structure removes nutrient-rich water from the bottom of a thermally stratified reservoir, leaving the better quality water behind, and thus increasing the usefulness and life span of the reservoir. Improved water quality conditions result in a positive benefit to the fishery and to all other recreational uses.

Several factors are considered in the operation and management of low-level drawdown structures. These include the amount of runoff coming into the reservoir, the amount of water available to be released, the best time to release the water, and the impact of the nutrient-rich discharge on downstream waters. The circumstances must be carefully analyzed, and in many cases, water quality and hydrological data must be obtained and used to help in making these decisions.

A low-level drawdown structure can also be used to temporarily lower the water level of Lake Hiawatha. A lower lake level will reduce the unit cost of excavation and decrease construction time. A low-level drawdown structure will cost an estimated $25,000 to construct in the embankment of Sykeston Dam. A possible cost-share agreement could be arranged with the G&F, the SWC, and the WRD for construction costs of a low-level drawdown structure.

Fishing Piers:

The Lake Hiawatha shoreline over the life span of the dam has silted in and become overgrown with vegetation, limiting access for shoreline fishing. The construction of fishing piers along the shoreline will improve the access to fishing. The three types of piers, which include a precast concrete pier, a floating pier, and a rock structure pier, are evaluated in the following paragraphs.

A precast concrete pier can be extended out over the shoreline and supported by steel pilings that are driven into the lake bottom. The piers are 4 feet wide and 40 feet in length with a 13-foot tee on the end. This type of structure will cost an estimated $7,500. Precast concrete piers are virtually maintenance free, stable, and have a life expectancy of 30 years.

The next option is a floating pier. Floating piers are docks constructed with polyethylene material anchored with deadman anchors and 3/8-inch galvanized chain. The main advantage of using floating piers is that almost any design configuration can be

created. The disadvantages of this type of pier are high maintenance and stability. The piers will need to be maintained on a monthly basis to make sure it operates at the proper level. Due to the winter ice, the pier must be removed in the fall and reinstalled in the spring. Floating piers are 42 inches wide and cost approximately $85.00 per linear foot to construct.

The third option is a fishing pier constructed of earthfill and rock. This type of pier is permanent and requires very little maintenance. The pier has side slopes of 3H:1V and is riprapped for bank protection. The top of the pier is 3 feet higher than the normal water surface elevation with a 20-foot width and a length of 75 feet. Approximately 500 cubic yards of fill is required to construct each pier. An estimated 100 cubic yards of riprap is required for bank protection and stability for each pier. The estimated cost for a rock structure pier is $2,000.

Ideally, the piers should be constructed near deep water to help control vegetative growth and to provide habitat to attract game fish. The piers should also be handicap accessible. Two locations are being proposed for fishing piers. Fishing Pier 1 is located on the south bank, west of the tennis courts. Fishing Pier 2 is also located on the south shoreline approximately 150 feet west of the walkway bridge (see Figure 5).

The proposed fishing piers are located in heavily vegetated and silted areas. These areas can be excavated to a suitable depth

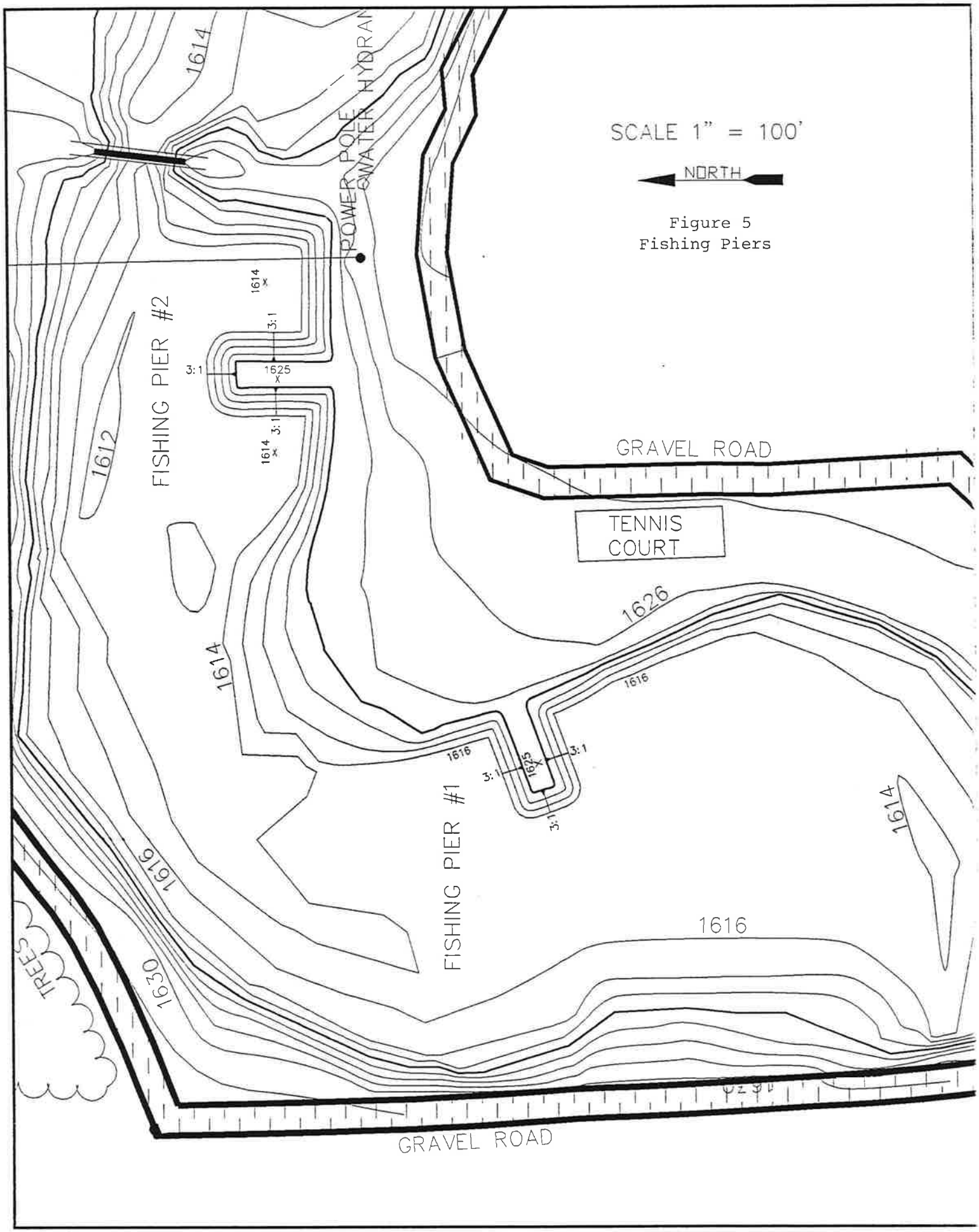

Figure 5
Fishing Piers

to provide habitat to attract game fish. Approximately 3,000 cubic yards of material is required to be excavated for each pier. The shoreline will be covered with rock for bank protection and certain areas adjacent to the rock will be seeded. The total estimated cost for excavating each area for fishing is $13,500. A cost estimate for the excavation is provided in Table 3.

Table 3
Cost Estimate - Fishing Pier Excavation

Project	Quantity	Unit	Unit Cost	Total
Mobilization	1	LS	$1,000.00	$ 1,000
Excavation	3,000	CY	2.25	6,750
Riprap	100	CY	25.00	2,500
Seeding	1	LS	100.00	100
	Subtotal			$10,350
	Engineering 10%			1,050
	Administration 10%			1,050
	Contingencies			1,050
	Total			$13,500

A major concern regarding fishing piers is the personal liability assumed by the project sponsors. Insurance companies are reluctant to insure facilities that allow diving into the water. Between the three types of piers, the rock structure pier would limit diving while precast concrete or the floating pier would be more susceptible to have diving and the potential for accidents.

The construction cost for a fishing pier is initially quite high, though they do provide a valuable access point to many people who do not have the luxury of a boat. The key is to invest in a structure that has a long, usable life of many years and requires

little or no maintenance. One must also be aware of the 504 (handicap accessible) rules and regulations and be sure that these structures are barrier free. The total cost for each fishing pier is listed in Table 4.

Table - 4
Total Cost for Fishing Piers

Fishing Pier	Pier Materials	Excavation	Total
Precast Concrete	$7,500	$ 13,500	$21,000
Floating	6,500	13,500	20,000
Rock Structure	2,000	13,500	15,500

Cattail Control:

The perimeter of Lake Hiawatha contains heavy vegetative growth. The majority of the vegetative growth is due to the presence of cattails. Cattail (Typha spp.) is a dominant plant in marshy areas and adapts readily to changes in the environment. They achieve rapid and widespread dominance in areas and provide for little or no use for wildlife. Cattails can also be a hindrance by limiting access to lake shore for people fishing and other recreational activities.

Due to the installation of water control structures on the lake, there has been little seasonal or annual change in water levels over the years. These stable levels result in formation of shallow areas that are invaded by cattails. There are three possible alternatives to control or eradicate cattails: water level manipulation, the use of a herbicide such as Rodeo, and the excavation of cattails.

Water level manipulation consists of releasing water from the lake in the fall to lower the water surface elevation. During the winter months the cattails can be sheared off by a front-end loader exposing the tops of the cattails. Cattails that have been sheared off below the water surface level are unable to receive oxygen and result in death. The ideal water depth for complete control of the cattail is 10 inches or greater.

One of the problems with cutting and crushing cattails is the limited mobility of the equipment in marshy areas. Cutting the cattails in early spring before the substrate thaws can eliminate this problem. Cattails can also be cut on the ice in winter, but unless the water rises in the spring to cover the cutoff ends of the cattail stalks, the method may not serve its purpose.

The second alternative for controlling cattails is through the use of a herbicide. A herbicide that has been tested and proven in cattail control is Rodeo (registered trademark of Monsanto Company, St. Louis, MO). Although there are other herbicides on the market, Rodeo was chosen to illustrate the effectiveness of a herbicide for cattail control.

The WRD should consult a qualified applicator for specific instructions on the use of a herbicide. For best results, treatment should be made from August up until first frost. Applying the herbicide at this time will maximize herbicide efficiency and avoid most young waterfowl broods.

After application the cattails will die off over the next two years and will take an additional 2 years to decompose completely. Burning dead cattails in the fall or spring following treatment may be an effective way of rapidly creating openings in treated areas. Reducing the amount of cattail litter in the water may lessen any adverse effects on water quality caused by the decomposition of large amounts of vegetation.

The third alternative and the most expensive for controlling cattails is through excavation. The excavation can be done by either a backhoe or dragline. The perimeter of the lake can be excavated by removing the cattails and the excess sediment. The excavated material can be placed on an upland area and reseeded to native grasses to prevent soil erosion.

The advantage excavation has over the other two alternatives is that it will rid the lake of dead vegetation. The dead vegetation or cattail litter will not be left to decompose in the water, enticing an anaerobic condition to occur on the lake.

Lake Hiawatha has 14,000 feet of shoreline that sustains cattail growth and can be excavated. The Board may wish to excavate along the shoreline of Lake Hiawatha or certain stretches to provide access for shoreline fishing.

V. ENVIRONMENTAL CONCERNS

The environmental impact to the area is an issue that needs to be considered during project development. The reservoir's water quality is an area of concern. The major pollutants to the reservoir are the nutrients contained in the silt. The primary source of these pollutants is nonpoint source pollution, primarily in the form of runoff from nonirrigated crop land, pasture land, and feed lots.

Excavation of the sediment may cause an internal nutrient cycle to the lake. This cycle may turn the lake anoxic by releasing significant amounts of phosphorus and reduced forms of nitrogen into the water column. The increased nutrient concentrations impair use by stimulating noxious weed growth and algal blooms. Soil testing of the lake sediment prior to excavation will assist in determining the effects on the reservoir's water quality. The ND State Health Department and Consolidated Laboratory should be contacted to provide information concerning testing and interpretation of the results.

Controlling the cattail growth along the lake shore is also an environmental issue. Using water manipulation or a herbicide for control will leave large amounts of dead cattails to decompose in the lake. Low dissolved oxygen concentrations may occur during winter months when accumulated organic matter decomposes creating an oxygen demand. Periodic fish kills could result from the low dissolved oxygen concentrations.

VI. SUMMARY

In recent years there has been a continued interest in increasing the recreational value of Lake Hiawatha. In its present condition, Lake Hiawatha offers limited recreational value due to shallow water depths and dense growth of cattails along the shoreline. To improve recreational activities near the city park, the Wells County WRD requested the SWC to investigate the feasibility of modifying the Lake Hiawatha recreation area. The proposed modifications include the constructing of fishing piers, a swimming area, and an island for wildlife habitat.

Lake Hiawatha was formed due to the construction of Sykeston Dam across Pipestem Creek. The normal water surface level of the lake is 1622.0 msl. The lake covers approximately 102 acres and has a capacity of 806 acre-feet. The lake has an average depth of 7.9 feet, a maximum depth of 20 feet, and a contributing drainage area of 147 square miles.

The lake's perimeter contains a dense growth of cattails that are presently limiting access to the lake. The heaviest area is located on the east side of the park and consists of 1.5 acres of cattails at an elevation of 1620.5 msl. The growth of cattails has caused an accumulation of sediment in this area limiting its recreational value.

The first modification considered involves the excavation of sediment and vegetation near the shoreline to obtain a desirable

swimming area. Located on the east side of the Sykeston city park, the swimming area is approximately 250 feet wide, 350 feet long, and covers an area of 3.9 acres. Approximately 17,000 cubic yards of sediment would be removed to develop a beach area for swimming. The total estimated cost for sediment excavation is $63,000.

Another modification would be the construction of an island approximately 200 feet from the shoreline on the east side of the park. The island would be oval shaped with a width of 70 feet and a length of 220 feet. The surface area at elevation 1622 msl would be 0.25 acres. The island would have a peak elevation of 1625 msl and require approximately 2,000 cubic yards of fill material to construct.

To place fill material into a wetland, a Section 404 permit would need to be obtained from the Corps of Engineers. Also, a 401 permit from the North Dakota State Health Department and Consolidated Laboratories would need to be obtained. Both permits regulate the water quality effects of depositing fill material into a wetland.

The fill material for the island would be required to come from an upland area. This type of material would provide stability to the island and have the least effect on the lake's water quality. The total estimated cost to construct the island is $10,000.

A low-level drawdown structure can be considered as an option in lowering the reservoir water surface elevation. By lowering the water surface to an elevation of 1616 msl, the working conditions for the equipment would improve resulting in a shorter working period and lower construction costs. A low-level drawdown structure is estimate to cost $25,000.

Lake Hiawatha has limited access to shoreline fishing due to sedimentation and vegetation growth. The construction of fishing piers would be a viable solution to provide shoreline fishing on Lake Hiawatha. The three alternatives for fishing piers are a precast concrete pier, a floating pier, and a rock structure pier.

Two fishing pier locations were proposed. Fishing Pier 1 would be located on the south bank, west of the tennis courts. Fishing Pier 2 would be located on the south shoreline approximately 150 feet west of the walkway bridge. Before the fishing pier would be constructed, the sediment and vegetative growth would be excavated. Approximately 3,000 cubic yards of material would be removed from each site to provide ideal fishing conditions for the piers. The estimated cost for excavating each area is $13,500.

The construction cost of a fishing pier is initially quite high, though they do provide a valuable access point to many people who do not have the luxury of a boat. The total cost to construct a fishing pier varies from $15,000 to $21,000, depending on the type of pier.

VII. RECOMMENDATION

The proposed modifications and improvements to Lake Hiawatha have the potential to bring additional recreation to the area. The SWC recommends improving the recreation area by constructing fishing piers at a cost of $15,500, and excavating an area for swimming at a cost of $63,000. Implementation of a low-level drawdown structure at a cost of $25,000 would help lower construction costs and provide a means to improve the water quality in future years. The total estimated cost for the project is $103,500.

It is not recommended that an island be constructed due to the possibility of erosion. The eroded soil would contribute to a poor water quality and could restrict water flow. The decision to proceed with one or more of the improvements is the responsibility of the Wells County WRD.

Appendix A - Agreement

SWC Project #450
May 10, 1991

A G R E E M E N T

Investigation to Dredge
Lake Hiawatha Recreation Area
(Sykeston Dam)

I. PARTIES

THIS AGREEMENT is entered into by the North Dakota State Water Commission, hereinafter Commission, through its Secretary, David A. Sprynczynatyk, hereinafter Secretary; and the Wells County Water Resource District, hereinafter District, through its Chairman, Norman Remboldt.

II. PROJECT, LOCATION, AND PURPOSE

The District wishes to increase the depth of Lake Hiawatha recreation area located in Section 13, Township 146 North, Range 69 West, Wells County, North Dakota. In order to improve conditions for swimming, the District wishes to investigate the feasibility of dredging Lake Hiawatha recreation area to depths which will sustain a swimming area and promote future recreational development.

III. PRELIMINARY INVESTIGATION

The parties agree that further information is necessary concerning the quantity of material to be removed, the cost of

dredging, and alternative ways of increasing the depth. Therefore, the Commission shall conduct the following:

1. A field survey of the Lake Hiawatha recreation area, to include an "as built" survey of the area and soundings of the existing and future swimming areas.

2. Consider alternative methods of increasing the depth of the swimming area;

3. Develop a preliminary cost estimate for the project; and

4. Prepare a preliminary engineering report containing the results of this study.

IV. DEPOSIT - REFUND

The District shall deposit a total of $300.00 with the Commission to partially defray the costs associated with this investigation.

V. RIGHTS-OF-ENTRY

The District agrees to obtain written permission from any affected landowners for field investigations by the Commission which are required for the preliminary investigation.

VI. INDEMNIFICATION

The District agrees to indemnify and hold harmless the State of North Dakota, the Commission, the Department, and all their employees and agents, for any damage to persons, property, or rights arising from the design, reconstruction, repair,

operation, or maintenance of the Project. In the event a suit is initiated or judgment is entered against the state of North Dakota, the Commission, the Department, or any of their employees or agents, the District shall indemnify them for all costs and expenses, including legal fees, and any judgment arrived at or satisfied or settlement entered.

VII. CHANGES TO THE AGREEMENT

Changes to any contractual provisions herein will not be effective or binding unless such changes are made in writing, signed by both parties, and attached hereto.

NORTH DAKOTA STATE WATER COMMISSION
By:

David A. Sprynczynatyk
Secretary

DATE:
14 May 91

WITNESS:
Dale L Frink

WELLS COUNTY WATER RESOURCE DISTRICT
By:

Norman Remboldt
Chairman

DATE:
21 May 91

WITNESS:
Richard P. Leinz