



Report of
NORTH DAKOTA STATE WATER CONSERVATION COMMISSION
 1301 State Capitol
BISMARCK, NORTH DAKOTA

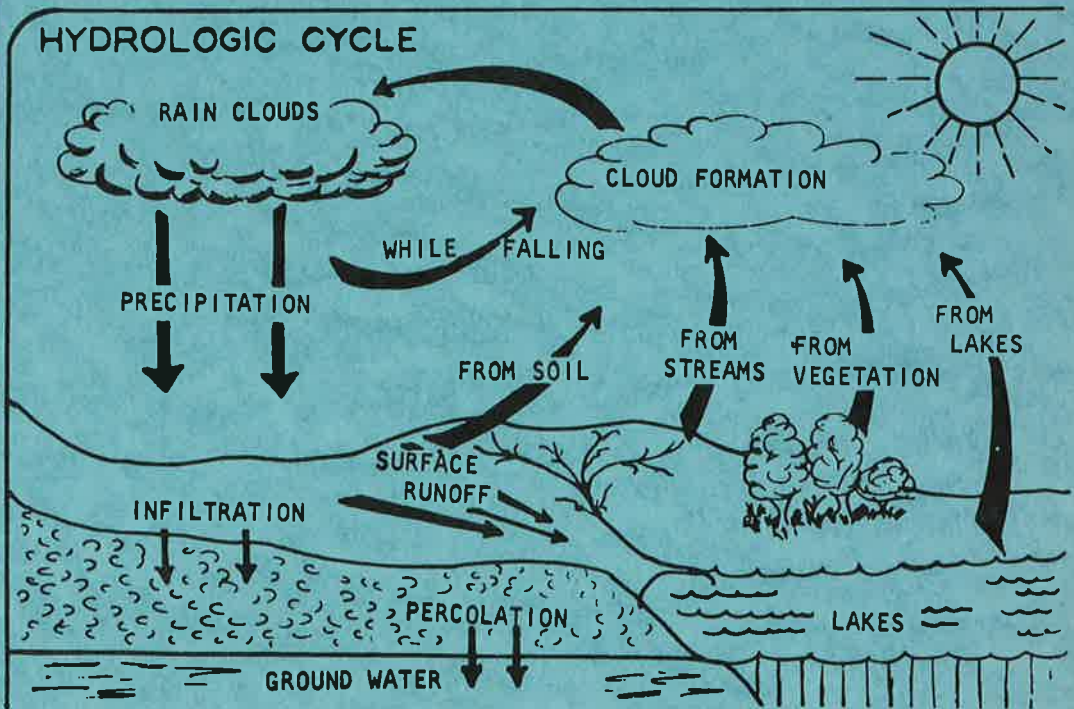
Harvey Dam and Recreation Area
 Wells County

SORA Project #52-7 (SWC Project #671)

Prepared in Cooperation with the
 North Dakota State Game & Fish Department
 North Dakota State Outdoor Recreation Agency
 Wells County Water Management District
 City of Harvey

May 27, 1966

HYDROLOGIC CYCLE



North Dakota State Water Commission

1301 State Capitol

223-8000 Ext. 251

Bismarck, North Dakota 58501

May 31, 1966

Mr. John Greenslit,
State Liaison Officer
State Outdoor Recreation Agency
State Capitol
Bismarck, North Dakota

RE: Harvey Dam and Recreation Area, SWC Project #671, SORA Project #52-7

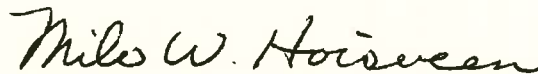
Dear Mr. Greenslit:

Enclosed are seven (7) copies of the Harvey Dam and recreation area project proposal prepared in our office in cooperation with the Wells County Water Management District and the State Game and Fish Department.

Copies of the proposal are being provided the District, the Department, and Agricultural and Labor Commissioner Dahl for their information.

We would appreciate your keeping all interested agencies advised of the proposal's progress as it is submitted to the Bureau of Outdoor Recreation for a Federal grant.

Sincerely yours,



Milo W. Holsveen
Engineer-Secretary

MWH:JS:jd

Encl.

cc: G. F. Schroeder
Russell Stuart
Arne Dahl

Governor William L. Guy
Chairman
Richard P. Gallagher
Vice Chairman - Mandan

Harold Hanson
New England
Russell Dushinske
Devils Lake

Henry J. Steinberger
Donnybrook
Gordon K. Gray
Valley City

Arne Dahl, Ex-Officio Member
Comm. of Agriculture & Labor
Milo W. Holsveen, Secretary
Chief Engineer & State Engineer

NORTH DAKOTA STATE WATER COMMISSION

PROJECT REPORT

NAME: Harvey Dam and Recreation Area, Wells County
PROJECT NO.: SWC #671 - SORA #52-7
DATE: May 27, 1966

TABLE OF CONTENTS

1. Transmittal Letter
2. BOR Project Proposal - Acquisition (BOR form 8-90)
3. BOR Project Proposal - Development (BOR form 8-91)
4. Project justification report
 - a. Attachments
 1. State map
 2. U.S. Geological Survey quad delineating area and topography
 3. Preliminary design data and area capacity graph
 4. Soils investigation and map
 5. Cost estimate - main structure
 6. Recreation facilities cost estimate
 7. Economic feasibility report
 8. Agreements and Permit
 - (a) local assurances
 - (b) cost participation
 - (c) Highway Department - for construction and maintenance
 - (d) permit to construct dam
 9. Maps - as listed in project justification report

DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
PROJECT PROPOSAL - ACQUISITION

LEAVE BLANK FOR BOR USE ONLY

Date Received	Priority	Project Number
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Project Officer

Use this form for submission of individual projects for acquiring lands and waters or interests in lands and waters for public outdoor recreation purposes. If concurrent Development is being undertaken, check here

SECTION 1

1. State or Territory <u>North Dakota</u>	2. Name and address of agency responsible for project North Dakota State Game and Fish Department Bismarck, North Dakota 58501
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3. Project Title
Harvey Dam and Recreation Area, Wells County, SORA Proj. #52-7

4. Brief description of project
The Harvey Recreation Complex encompasses 1,271 acres; of which 140 acres are presently water area. The water area is to be increased to 250 acres by raising the existing dam 7½ feet. Located adjacent to the Harvey city limits, the land and water areas will have extensive use. Public use facilities are to be installed for various outdoor recreation activities. 480 acres are to be purchased in fee title and 791 acres are to be under easement.

No other Federal funds have been requested for this project. SMC Proj. #671

5. Duration of project from <u>10-1-64</u> <u>7-1-67</u>	6. Federal assistance requested <u>\$15,000</u>	7. Recommended priority <u>A</u>
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8. Name, Organization, and Title of individual having day-to-day responsibility for direction of project <u>G. F. Schroeder, Chairman</u> <u>Wells County Water Management District</u> <u>Harvey, North Dakota</u>	9. Name and Address to appear on check <u>Milo W. Hoisveen, State Fiscal Officer</u> <u>North Dakota State Outdoor Recreation Agency, 1301 State Capitol, Bismarck,</u> <u>North Dakota 58501</u>
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10. TERMS AND CONDITIONS: In submitting this Project Proposal, the State hereby accepts the Terms and Conditions set forth in the BOR Grants-in-Aid Manual, which will be a part of the Project Agreement for any grant awarded under this proposal.

11. CERTIFICATION: As the official designated to represent the State and act for the State for purposes of the Land and Water Conservation Fund Act, I recommend that assistance be made available from the Fund, when monies are available, in accordance with the recommended priority. No financial assistance has been given or promised under any other Federal program or activity with regard to the proposed project. The State or public agency to be responsible for the proposed project has the ability and	intention to finance its share of the costs of this project. The Applicant will not discriminate against any person on the basis of race, color, or national origin in the use of any property or facility acquired or developed pursuant to this proposal, and shall comply with the terms and intent of Title VI of the Civil Rights Act of 1964, P. L. 88-354 (1964), and of the regulations promulgated pursuant to such Act by the Secretary of the Interior and contained in 43 CFR 17.
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(Signature)

JOHN GREENSLIT (Name)

(Date)

State Liaison Officer

(Title)

12. For State use

- Dist.
- 6 BOR
- 1 SORA
- 8 WC
- 1 G & F
- 1 Wells Co. WMD

5/23/66

SECTION 11

1. Nature and Extent of Use - A. For entire area in which acquisitions are to be made:
 The area is in and adjacent to the Sheyenne River. Present recreation activities are limited due to the shallow water area. Farming and grazing are principal uses of land in the area.
 B. For area to be acquired:
 Pasture land adjacent to Sheyenne River.

2. BOR Classification of area 11	3. Check one <input type="checkbox"/> New Site <input checked="" type="checkbox"/> Addition to existing site	4. Location County <u>Wells</u> Town <u>Harvey</u> Town population <u>2365</u> Miles from Town <u>adjacent</u> to
5. Total acres to be acquired 480 fee. 791 easement	6. Cover, acres in A. Forest _____ B. Rock _____ C. Cutover _____ D. Swamp _____ E. Grass <u>1,131</u> F. Desert _____ G. Water <u>140</u>	
7. Topography, acres in A. Flat <u>300</u> B. Hilly <u>671</u> C. Rolling <u>200</u> D. Mountainous _____	8. Waterfront, feet on A. Ocean _____ B. Lake <u>13,200</u> C. Stream _____	9. Roadfront, feet on A. Dirt _____ B. Gravel _____ C. Paved _____ <u>Adjacent to State Hwy. #52.</u>

10. PARCELS TO BE ACQUIRED

PARCEL NUMBER	ACRES	ESTIMATED VALUE	NUMBER OF BUILDINGS	ESTIMATED VALUE	METHOD OF ACQUISITION	APPROX. DATE OF ACQUISITION	TOTAL VALUE
See Schedule attached.							

FOR CONCURRENT ACQUISITION AND DEVELOPMENT PROJECT SUBMISSIONS			TOTAL ESTIMATED VALUE \$		30,000
Total estimated acquisition value	\$30,000	Amount of Federal acquisition assistance requested		15,000	
Total estimated development costs	90,000	Source of remainder of funds		Wells County Water Management District North Dakota State Game & Fish Department	
TOTAL	\$120,000	"No other Federal funds have been requested for this project"			
Total amount of Federal assistance requested	60,000	Source of remainder of funds State Outdoor Recreation Agency, Wells County Water Management Dist., State Water Commission, Game and Fish Dept.			

SECTION 111 - ATTACHMENTS

Attach, by reference number, the following supplemental documents necessary to process this Acquisition Project Proposal:

- A-660-1 *Project Justification.* A. Description of how the proposed project is in accord with the State outdoor recreation plan and would help meet priority needs identified in the plan. Indicate how the natural beauty of the area will be preserved. B. Indicate other organizations consulted during formulation of this proposal. C. Plans for Operations and Maintenance.
- A-660-2 *Maps and Charts.* A. Simple plot plan or map showing the total area to be acquired and its relationship to the surrounding area. Annotate any plans for streets, highways, waterlines, sewers, etc. to be located on or near the involved area. (Key to show location within State, County, or city.) B. Description of any improvements on lands to be acquired. C. Description of all legal rights to be held by applicant and any other person or organization.
- A-660-3 *Agreements.* A. Agreements or arrangements made with other organizations for participating in the project, or in later operation and maintenance of the completed project.

The items shown below need *not* be submitted with the project proposal. However, during the course of execution of an approved project, the applicant should be prepared to submit them to the Bureau for review, as follows:

- A-660-4 Appraisal reports and other documentation of cost.
- A-660-5 Satisfactory evidence of title (such as an opinion by the State Attorney General) for each parcel.
- A-660-6 Five-year history of conveyances for each parcel listed in project proposal (name of parties involved, dates, interest conveyed and consideration).

Harvey Dam and Recreation Area

Schedule of Parcels to be Acquired

SORA #52-7

May 20, 1966

(Appendix to BOR form 8-90)

<u>Location and Owners</u>	<u>Method of Acquisition</u>	
	<u>Easement (Acres)</u>	<u>Purchase (Acres)</u>
B. B. Bennett E $\frac{1}{2}$ SE $\frac{1}{4}$ 31-150-72	8.6	
Orval and Wayne Roble S $\frac{1}{2}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ 31-150-72	20.0	
A. F. Hammargren N $\frac{1}{2}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ 31-150-72	20.0	
G. Graumann SE $\frac{1}{4}$ SW $\frac{1}{4}$ 31-150-72 (Except 5 acres on east side)	35.0	
Russell W. Olson SE $\frac{1}{4}$ SW $\frac{1}{4}$ 31-150-72 (5 acres on east side)	5.0	
Una Popejoy SW $\frac{1}{4}$ SE $\frac{1}{4}$ 31-150-72		20.0
City of Harvey In SE Corner of 31-150-72	1.91	
Barbara Muscha Lots 1-2-5 6-149-72	118.02	
G. Graumann Lots 3-4 6-149-72	55.0	
Tom Wood SW Corner of Lot 4, 6-149-72	8.0	
G. Stein SW $\frac{1}{4}$ NE $\frac{1}{4}$ 1-149-73	40.0	
SE $\frac{1}{4}$ NE $\frac{1}{4}$ 1-149-73	40.0	
Weil SE $\frac{1}{4}$ SW $\frac{1}{4}$ 1-149-73	40.0	40.0
NE $\frac{1}{4}$ SE $\frac{1}{4}$ 1-149-73		40.0
NW $\frac{1}{4}$ SE $\frac{1}{4}$ 1-149-73		40.0
SW $\frac{1}{4}$ SE $\frac{1}{4}$ 1-149-73		40.0

Harvey Dam and Recreation Area (cont.) -2-

<u>Location and Owners</u>	<u>Method of Acquisition</u>	
	<u>Easement (Acres)</u>	<u>Purchase (Acres)</u>
Gerber		
NW $\frac{1}{4}$ NE $\frac{1}{4}$ 12-149-73		40.0
NE $\frac{1}{4}$ NW $\frac{1}{4}$ 12-149-73	40.0	
NE $\frac{1}{4}$ SW $\frac{1}{4}$ 12-149-73	40.0	
E $\frac{1}{2}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ 12-149-73		20.0
SW $\frac{1}{4}$ NE $\frac{1}{4}$ 12-149-73		40.0
SE $\frac{1}{4}$ NW $\frac{1}{4}$ 12-149-73	40.0	
E. Seibel		
NW $\frac{1}{4}$ SE $\frac{1}{4}$ 12-149-73		40.0
SW $\frac{1}{4}$ SE $\frac{1}{4}$ 12-149-73		40.0
Albert Reisvig		
NW $\frac{1}{4}$ NE $\frac{1}{4}$ 13-149-73	40.0	
E $\frac{1}{2}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ 13-149-73	20.0	
E $\frac{1}{2}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ 13-149-73	20.0	
A. G. Seibel		
SW $\frac{1}{4}$ NW $\frac{1}{4}$ 13-149-73	40.0	
W $\frac{1}{2}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$ 13-149-73		20.0
Henry and LeRoy Bechthold		
NW $\frac{1}{4}$ SW $\frac{1}{4}$ 13-149-73		40.0
W $\frac{1}{2}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ 13-149-73		20.0
S $\frac{1}{2}$ SW $\frac{1}{4}$ 13-149-73		80.0
Henry and LeRoy Bechthold		
NE $\frac{1}{4}$ NW $\frac{1}{4}$ 24-149-73	40.0	
Daniel Schmaltz		
NW $\frac{1}{4}$ SE $\frac{1}{4}$ 24-149-73	40.0	
SE $\frac{1}{4}$ NW $\frac{1}{4}$ 24-149-73	40.0	
NE $\frac{1}{4}$ SW $\frac{1}{4}$ 24-149-73	40.0	
Total	791.53	480.00

Total Estimated Value - \$30,000

DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
PROJECT PROPOSAL - DEVELOPMENT

LEAVE BLANK FOR BOR USE ONLY

Date Received	Priority	Project Number
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Project Officer

Use this form for submission of individual projects which will develop lands and waters to facilitate their use by the public for outdoor recreation. If concurrent Acquisition is being undertaken, check here

SECTION 1

1. State or Territory
North Dakota

2. Name and address of agency responsible for project
North Dakota State Game and Fish Department
Bismarck, North Dakota 58501

3. Project Title
Harvey Dam and Recreation Area, Wells County, SORA Proj. #52-7

4. Brief description of project The project is located adjacent to the Harvey (1960 pop. 2365) city limits in Wells County. The existing reservoir on the Sheyenne River is to be raised 7½ feet to increase its area from 140 to 250 acres. An 18 acre area will be developed for recreation activities such as picnicking, playing games, and wading. The reservoir is to be stocked with fish and will be open to the public for boating as well as fishing. Public hunting will also be permitted. It is estimated 40,000 persons annually will utilize the area, which is next to major State Highway #52. 13,860 persons reside in a 40 square mile radius of the project which is to be developed in a manner which will enhance and preserve the area's natural beauty.

SWC Proj. #671

5. Duration of project
from 10-1-64 to 7-1-67

6. Federal assistance requested
\$45,000

7. Recommended priority
A

8. Name, Organization, and Title of individual having day-to-day responsibility for direction of project
G. F. Schroeder, Chairman
Wells County Water Management District
Harvey, North Dakota

9. Name and Address to appear on check
Milo W. Hoisveen, State Fiscal Officer
North Dakota State Outdoor Recreation
Agency, 1301 State Capitol, Bismarck,
North Dakota 58501

10. TERMS AND CONDITIONS: In submitting this Project Proposal, the State hereby accepts the Terms and Conditions set forth in the BOR Grants-in-Aid Manual, which will be a part of the Project Agreement for any grant awarded under this proposal.

11. CERTIFICATION: As the official designated to represent the State and act for the State for purposes of the Land and Water Conservation Fund Act, I recommend that assistance be made available from the Fund, when monies are available, in accordance with the recommended priority. No financial assistance has been given or promised under any other Federal program or activity with regard to the proposed project. The State or public agency to be responsible for the proposed project has the ability and

intention to finance its share of the costs of this project. The Applicant will not discriminate against any person on the basis of race, color, or national origin in the use of any property or facility acquired or developed pursuant to this proposal, and shall comply with the terms and intent of Title VI of the Civil Rights Act of 1964, P. L. 88-354 (1964), and of the regulations promulgated pursuant to such Act by the Secretary of the Interior and contained in 43 CFR 17.

(Signature)

JOHN GREENSLIT (Name)

(Date)

State Liaison Officer

(Title)

12. For State use

Dist.
6 BOR
1 SORA
8 WC
1 G & F
1 Wells Co. WMD

5/23/66

SECTION 11 - TABULAR SUMMARY OF PROJECT ELEMENTS AND COSTS

Identify the phase or element of the Development Project suggested by the line items. Indicate additional breakdown of work elements necessary and desirable to allocate work assignments and costs.

	DATE OF		ESTIMATED COST	TOTAL ESTIMATED COST		\$ 90,000	
	BEGINNING	COMPLETION		Amount of Federal development assistance requested		45,000	
DEVELOP SITE PLANS & SPECIFICATIONS	10-1-64	5-1-66	600	Source of remainder of funds North Dakota State Game & Fish Department North Dakota State Water Commission, North Dakota State Outdoor Recreation Agency, and Wells County Water Management District			
A. Dam & reservoir							
B. Recreation area	12-1-65	5-1-66	500				
DEVELOP CONSTRUCTION PLANS AND SPECIFICATIONS				FOR CONCURRENT ACQUISITION AND DEVELOPMENT PROJECT SUBMISSIONS			
A. Dam & reservoir	10-1-64	7-1-66	1,000	Total estimated acquisition value	\$ 30,000		
B. Recreation area	2-1-66	2-1-67	2,100	Total estimated development costs	\$ 90,000		
PREPARE SITE				TOTAL		\$ 120,000	
A.				Total amount of Federal assistance requested	\$ 60,000		
B. Recreation area	7-1-66	7-1-67	12,000	Source of remainder of funds N. Dak. State Game & Fish Dept., N. Dak. State Water Comm., N. Dak. State Outdoor Recreation Agency and Wells County Water Management District			
UNDERTAKE CONSTRUCTION				No other Federal funds have been requested for this project			
A. Dam & reservoir	7-1-66	3-31-67	58,400	SIZE IN ACRES OF ENTIRE AREA OR PARK	SIZE IN ACRES OF AREA TO BE DEVELOPED UNDER THIS PROPOSAL		
B. Recreation area	7-1-66	7-1-67	15,400				
OTHER							
A.				Land	Water	Land	Water
B.				1,131	140	1,021	250

SECTION 111 - ATTACHMENTS

Attach, by reference number, the following supplemental documents necessary to process this Development Project Proposal:

- D-660-1 *Project Plan and Justification.* A. Description of how the proposed project is in accord with the State outdoor recreation plan and would help meet priority needs identified in the plan. B. Summary of area, its nature and relation of development to the area. Indicate how the natural beauty of area will be enhanced. C. Descriptive outline of proposed accomplishments with funds requested. Indicate contemplated other uses of the area. D. List of names of organizations which will undertake the development and how this will be performed. E. Economic feasibility data, or other types of data to indicate extent and kind of use to be made of the completed area or facility. F. Plans for operations and maintenance.
- D-660-2 *Maps and Charts.* A. Simple site plans or maps showing total area, in addition to area to be developed. Annotate to show plans for, or existing streets, highways, waterlines, sewers, etc. to be located on or near the area. (Key to allow location within State, County, or city.) Indicate uses now made of the area by applicant or other agencies or individuals. B. Description of all legal rights to the area to be held by applicant and any other person or organization.
- D-660-3 *Agreements.* A. Agreements or arrangements made with other organizations for participating in project, including operation and maintenance of completed facility.

The terms shown below need *not* be submitted with the project proposal. However, during the course of execution of an approved project, the applicant should be prepared to submit them to the Bureau for review, as follows:

D-660-4 *Plans.* A. Site plans, specifications and cost estimates. B. Construction plans, specifications and cost estimates. These *must* be submitted for review and approval before construction may proceed on a structure to cost in excess of \$100,000.

D-660-5 *Contracts.* A. Copies of pertinent contracts, as specifically required by the Bureau of Outdoor Recreation.

NORTH DAKOTA STATE WATER COMMISSION

Project Justification Report - Development

Harvey Dam and Recreation Area, Wells County

SORA Proj. #52-7

SWC Proj. #671

May 24, 1966

D-660-1. PROJECT PLAN AND JUSTIFICATION:

A. A significant gap is indicated for fishing and boating activities in North Dakota according to Table 3 shown in part 3, Volume 1 "Conclusions" of the North Dakota State Outdoor Recreation Plan. This project will provide a 250 acre reservoir to meet the demand for such activities. The local unmet demand for a park for city residents will be satisfied with development of a picnicking area and facilities for playing outdoor games.

Goals for outdoor recreation in North Dakota as shown in the initial State Plan include:

1. Further the development of an enjoyable urban and rural environment.
2. Encourage the preservation and development of open spaces in our communities and state which also provide inner space for recreation.
3. Stimulate the economy of our state through development of recreation resources to provide more permanent employment as well as part-time employment during the slack seasons of other industries and non-school months.
4. Support a favorable economic base that may enhance living conditions by providing for the recreation and vacation interests of the people of North Dakota and attracting out-of-state visitors.
5. Foster the maximum development of the best qualities of individuals.
6. Emphasize the interpretation of the State's resources to stimulate a greater appreciation of our history, culture, and ecology.
7. Support the constructive use of increased leisure time and increased disposable income of our citizens.
8. Co-ordinate geographic distribution of outdoor recreation facilities to make them available to all the people of the state.

9. Encourage increasing quantity and quality of our natural, cultural, and recreational resources in such a manner that people will regard North Dakota with greater pride.

10. Enable the people of the state to enjoy the benefits of improved transportation systems which satisfy the scenic, amenity and capacity desires of travelers.

11. Promote the physical fitness and mental health of individuals through provision of suitable outdoor recreation resources.

12. Encourage the acquisition, protection, interpretation, development, and multiple-use management of natural and cultural resources.

13. Emphasize the preservation and conservation of wildlife, and scenic resources that are outstanding and unique in scientific and other values.

This proposed project will assist North Dakota in meeting these goals for outdoor recreation.

In accordance with the priority system outlined in Table 8, part 3, Volume 1, "Conclusions", North Dakota State Outdoor Recreation Plan, the proposed recreation complex would merit 90 points on the basis of its recreation use, the preservation of resources, and partial acquisition to enlarge and enhance an existing area.

B. Located adjacent to the Harvey (2,365 pop. 1960) city limits in Wells County and bordered by major State Highway #52, the Harvey Dam and recreation complex is situated on the Sheyenne River. Sufficient runoff in the stream at present and proposed developments upstream from the project will insure an adequate fresh water supply for the area.

Landscaping proposed for the land recreation area will enhance the natural beauty of the coulee entering the reservoir on the northwest side of the area. The present reservoir is of insufficient depth to sustain fish life and its shallow depth has contributed to undesirable algae growth in the reservoir. Increasing the reservoir depth by $7\frac{1}{2}$ feet and increasing the present water surface of 140 acres to 250 acres will make the area much more attractive

and increase its utilization to meet the outdoor recreation demands for water-based opportunities.

C. The project is to be developed by a cooperative local-state-federal endeavor for various outdoor recreation purposes. Costs of \$120,000 are allocated as follows:

	<u>Land</u>	<u>Dam</u>	<u>Recreation Facilities</u>	<u>Totals</u>
Water Commission	\$ -	\$10,000	\$5,000	\$15,000
State Outdoor Recreation Agency	5,000	-	2,500	7,500
Game and Fish Dept.	2,500	10,000	-	12,500
Wells Co. Water Manage- ment District	7,500	10,000	7,500	25,000
Bureau of Outdoor Recreation	<u>15,000</u>	<u>30,000</u>	<u>15,000</u>	<u>60,000</u>
Totals	\$30,000	\$60,000	\$30,000	\$120,000

1. The majority of preliminary engineering work was completed prior to the enactment of the Land and Water Conservation Fund Program. Completion of construction site plans and specifications for the dam and recreation area are included in the cost estimates for these items.

2. Funds for land acquisition are to be utilized in acquiring 480 acres of land in fee title and 791.53 acres by easement for an estimated \$30,000. Two hundred and fifty (250) acres will be water area and 1,021 acres will be for public access and other public uses.

3. Dam construction funds of \$60,000 will be used to raise the existing reservoir $7\frac{1}{2}$ feet to elevation 1550 creating a 250 acre water surface with an average depth of 8.8 feet and a capacity of 2,200 acre-feet maximum.

4. Recreation facilities estimated to cost \$30,000 are to be installed in accordance with the detailed cost estimate included with this proposal. In the picnic area 20 tables, 6 shelters, 10 fireplaces, 10 trash receptacles, and 2 comfort stations are to be provided and the city water main will be extended with 2 stop valves and a yard hydrant included. A 1,000 tonsand blanket is to be laid in thewading area.

A floating dock and loading ramp will be provided for boating participants. The playground area is to include 2 four-unit swing sets, a slide, seesaw, and merry-go-round. The access road will require 5,000 cubic yards of excavation and 900 tons of crushed gravel. Two hundred and fifty (250) barriers are to be installed in the parking area which will require 1,000 cubic yards of excavation and 700 tons of crushed gravel.

For the area's general development, trees and grass are to be planted, 19,000 cubic yards excavated and 6 lights installed. Engineering and indirect costs of \$4,160 will be incurred for this phase of the project's development.

D. The following agencies are cooperating in the Harvey Project:

Wells County Water Management District
G. F. Schroeder, Chairman
Harvey, North Dakota

North Dakota State Game and Fish Department
Russell W. Stuart, Commissioner
Fort Lincoln
Bismarck, North Dakota

North Dakota State Water Commission
Milo W. Hoisveen, Chief Engineer
1301 State Capitol
Bismarck, North Dakota

North Dakota State Outdoor Recreation Agency
John Greenslit, Coordinator
State Capitol
Bismarck, North Dakota

The Wells County Water Management District is providing funds for land acquisition, dam construction, and recreation facilities installation and will supervise the facilities installations. The State Game and Fish Department is providing funds for land acquisition and dam construction and is cooperating with the Water Management District in acquiring necessary lands.

The State Water Commission is providing engineering services for the dam and recreation facilities and will supervise the dam's construction which will be accomplished through contract forces.

E. It is estimated the project will serve a 40 mile radius area which has a 13,860 population. Anticipated annual visitation is 40,000 with

an assumed value per visitation of \$1. Total investment, including land, is \$120,000 with an estimated 30 year life for the project. Annual operation and maintenance is estimated at \$4,000 and amortization at \$4,000 for total annual costs of \$8,000. With estimated annual benefits of \$40,000 less \$8,000 annual costs the average annual benefits are \$32,000.

Assuming the \$120,000 total costs were invested and compounded at 4% annually for 30 years, we would have a total product of \$389,208. With net annual benefits of \$32,000 for 30 years, we will receive total benefits of \$960,000 indicating a benefit-cost ratio for this project of 2.45 to 1. A "project economic feasibility report" is included with this proposal.

Harvey has been selected by the Bureau of Reclamation as the construction headquarters for the Garrison Diversion Irrigation Project. The project office is to be established in Fiscal Year 1967 and will add approximately 2,000 persons to the area population.

The local project sponsor, Wells County Water Management District, is a legal public entity whose jurisdiction covers the entire 1,287 square mile area of the county. The district may levy a maximum three mills ad valorem and may levy special assessments. Wells County has a taxable valuation (1964) of \$12,919,097. The total labor force participation rate is 50.1% compared to a state average of 53.1%. Median income per family is \$3,734 compared to a \$4,530 state average.

F. The Wells County Water Management District will operate and maintain the recreation area through an agreement with the State Game and Fish Department. The facility will be open for public use from 6 a.m. to 10 p.m. daily. There will be no charge for use of the facilities with the exception of required fishing licenses which apply uniformly to all parts of North Dakota.

The North Dakota State Game and Fish Department will manage the wildlife habitat and propagation area of the project. Technical assistance for maintaining the dam and appurtenant works will be supplied by the North Dakota State Water Commission.

G. Present ownership of the land is shown on the schedule attached to BOR form 8-90. All lands are in private ownership with the exception of a small parcel owned by the City of Harvey which will provide an easement for the project.

Flood easements for the existing reservoir in Section 6, Township 149 North, Range 72 West and Sections 1 and 12, Township 149 North, Range 73 West are presently filed in favor of the United States Secretary of Agriculture. These easements in turn are to be transferred to the North Dakota State Game and Fish Department.

H. Work is presently underway to obtain options and easements on the land acquisition phase of the project.

Most of the engineering investigations work on the project was completed prior to September 3, 1964 and no matching funds are requested.

Site plans for the dam, reservoir and recreation area completed during the period October 1, 1964 to May 1, 1966. Construction site plans and specifications will be completed by July 1, 1966 on the dam and by February 1, 1967 on the recreation area. Construction of the project is scheduled to start on July 1, 1966 and be completed by July 1, 1967.

D-660-2 MAPS AND CHARTS:

A. Maps and charts included with this application include:

1. State map showing project location
2. SWC #671-14 - "USGS quad locating proposed reservoir and recreation area"
3. SWC #5945-671-3A "Topography of lower end of reservoir, riprap location, and cross section"
4. SWC #5735-671-4 "Topography Sec. 1 and 12-149-73"
5. SWC #5736-671-5 "Topography Sec. 13 and 24-149-73"
6. SWC #6062-671-10 "Outlet box plan and steel detail"
7. SWC #6068-671-11 "Cross-sections"
8. SWC #6069-671-12 "Gate details"
9. SWC #6554-671-13 "Recreation area and facilities"

D-660-3 AGREEMENTS:

A. Agreements included with this proposal include:

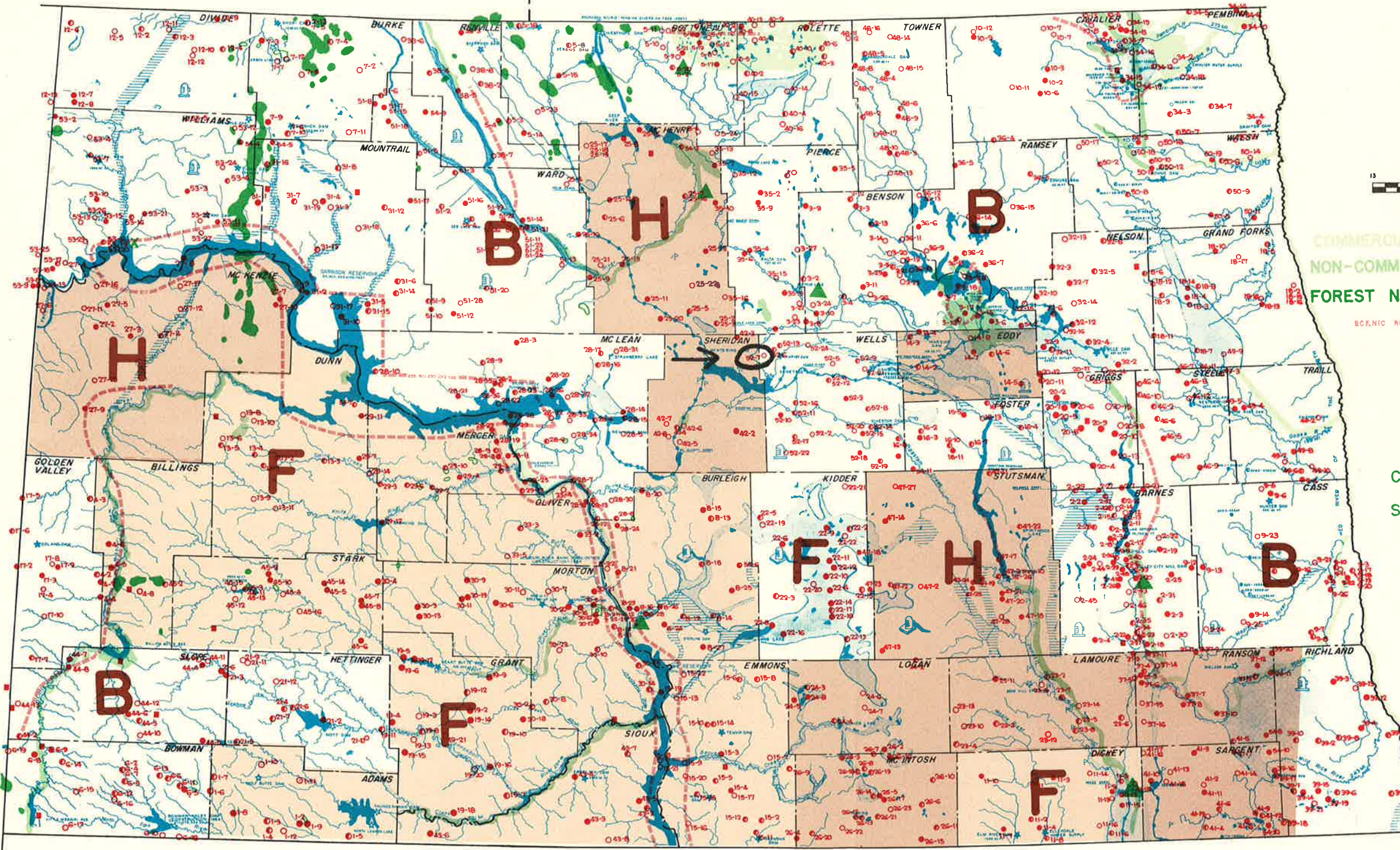
1. Project assurances by Wells County Water Management District provided to the State Outdoor Recreation Agency on January 14, 1966.
2. Agreement for construction of dam and appurtenant facilities and land acquisition as well as cost participation and operation and maintenance between North Dakota State Water Commission, North Dakota State Outdoor Recreation Agency, North Dakota State Game and Fish Department, and Wells County Water Management District dated April 1, 1966.
3. Agreement dated October 22, 1964 between North Dakota State Highway Department and State Water Commission providing for operation and maintenance of facilities installed by Highway Department at embankment utilized as a State Highway.
4. Permit to construct or enlarge dam or reservoir issued by State Engineer to Game and Fish Department.

Dist.

6 BOR
1 SORA
8 WC
1 Game & Fish
1 Wells Co. WMD

Map No. 6 - Potential Recreation Resources in North Dakota

#52-7

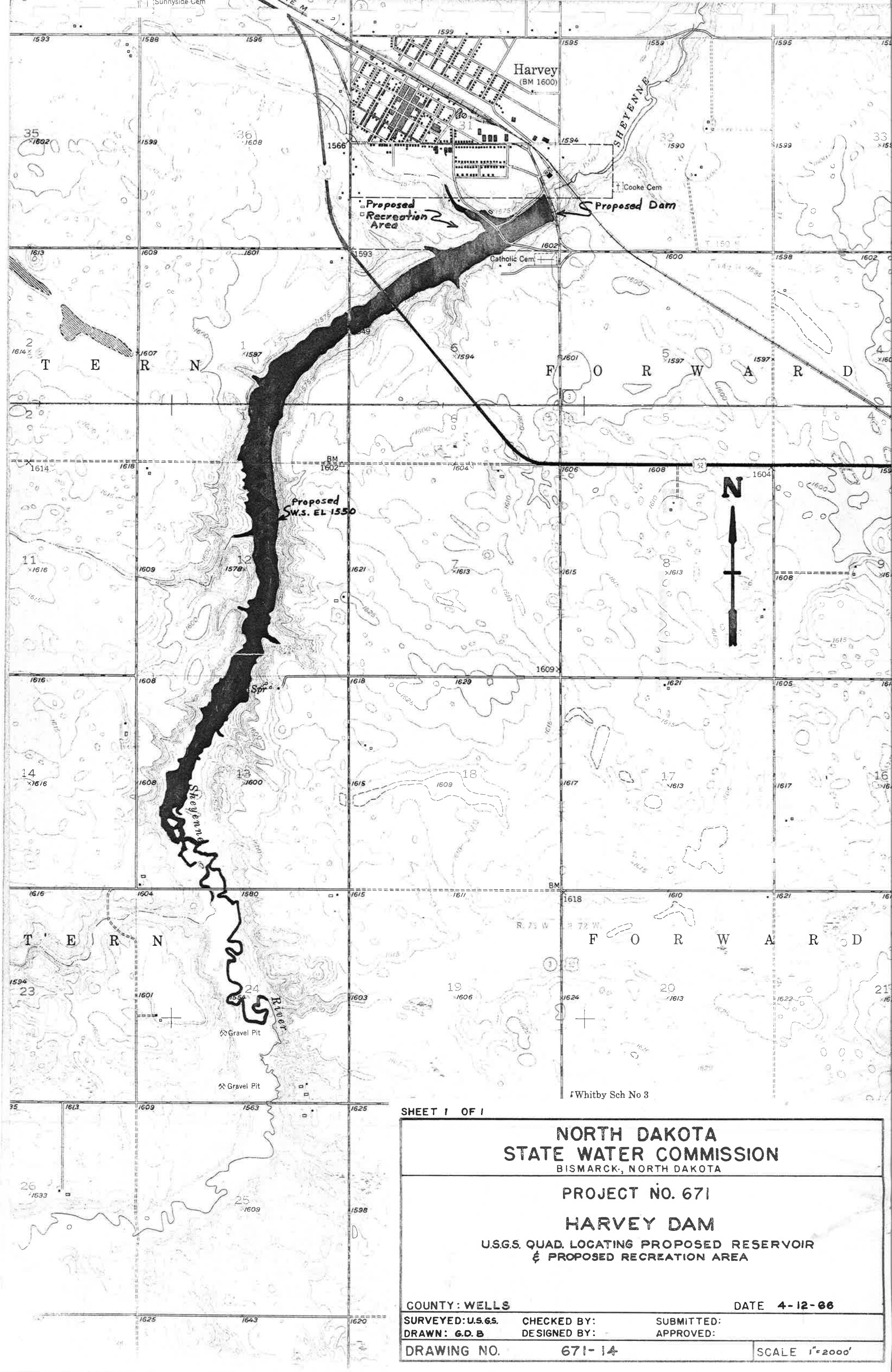


- GENERAL LEGEND**
- COMMERCIAL FOREST
 - NON-COMMERCIAL FOREST
 - FOREST NURSERIES
 - SCENIC ROADS
 - LIGHT WEIGHT AGGREGATE PIT (Mandan)
 - OIL FIELDS
 - LIGNITE MINES
 - CLAY PITS (Hebron)
 - SALT PLANT (Williston)
- LEGEND**
- EXISTING RECREATION AREAS
 - POTENTIAL RECREATION AREAS
 - EXISTING & POTENTIAL RECREATION AREAS
 - POINTS OF GEOLOGIC INTEREST
 - EXISTING DAM
 - PROPOSED DAM
 - DAM TO BE RECONSTRUCTED
 - CANALS - GARRISON DIVERSION
 - COUNTY GROUNDWATER STUDY
 - COUNTY GROUNDWATER STUDY COMPLETED

- B... PREDOMINANT CASH GRAIN FARMS
- F... PREDOMINANT LIVESTOCK FARMS & RANCHES
- H... GENERAL FARMS, NO PREDOMINANCE

Data Source: U.S. Census of Agriculture 1959, Vol. I, Part 18, North Dakota

SHADED AREAS (BLUE) GROUNDWATER AQUIFER
"BUY NORTH DAKOTA PRODUCTS"



SHEET 1 OF 1

**NORTH DAKOTA
STATE WATER COMMISSION**
BISMARCK, NORTH DAKOTA

**PROJECT NO. 671
HARVEY DAM**
U.S.G.S. QUAD. LOCATING PROPOSED RESERVOIR
& PROPOSED RECREATION AREA

COUNTY: WELLS		DATE 4-12-66	
SURVEYED: U.S.G.S.	CHECKED BY:	SUBMITTED:	
DRAWN: G.D.B	DESIGNED BY:	APPROVED:	
DRAWING NO. 671-14			SCALE 1"=2000'

NORTH DAKOTA STATE WATER COMMISSION

OFFICE MEMO

MEMO TO: Milo W. Hoisveen, Chief Engineer
FROM: Arland C. Grunseth, Investigation Engineer
SUBJECT: Soil Investigation, Harvey Dam
DATE: May 26, 1966

SOIL INVESTIGATION

Project No. 671

County: Wells

Project Name: Harvey Dam

INTRODUCTION:

A preliminary investigation was initiated by the Water Commission Engineers to determine the feasibility of the proposed reconstruction of Harvey Dam on the Sheyenne River south of Harvey, North Dakota. A total of eight test borings were drilled and tested by Twin City Testing and Engineering, Bismarck, North Dakota, during a period from June 4 to June 5 and July 29 and 30, 1963. The exact locations of the test borings are shown on Drawing No. 5945-671-7A.

Preliminary Field Boring Logs furnished to the State Water Commission by Twin City Testing and Engineering are not a part of this report. Information concerning textural classification, soil structure and description is attached to this report in the form of "Foundation Soil Test Boring". Laboratory test data and analysis was compiled on test Borings 3 and 4, while Test Borings 1 and 2 were only visually classified.

GEOLOGY AND PHYSIOGRAPHY:

The Harvey Dam Site, as described in this report, is located in Section 31, Township 150 North, Range 72 West, in central North Dakota. The surficial geology is primarily of glacial origin being situated in the Central Lowland Province and being composed for the most part of ground moraine deposits of low local relief.

The new proposed dam site on the Sheyenne River drains an approximate contributing area of 154 square miles. The present channel of the Sheyenne River near Harvey is of Late Pleistocene age. Deposits of sand and gravel with interlaminated silts and clays occupy the channel floor.

The dam site area is mantled by glacial drift and is made up of fine-grained compact aluminous clay, with silt particles and angular fragments of crystalline rocks, numerous cobbles and boulders three to four feet in diameter are exposed along the valley floor and sides.

As mentioned previously, the Sheyenne River valley near the dam site is floored with stream alluvium of undetermined thickness and extent. Therefore, the bedrock in the area was not penetrated during drilling operations and the writer believes that the bedrock is Pierre shale of Cretaceous age. However, the Fox Hills formation is shown on the geologic map of the State to underlie the drift in the extreme western part of Wells County and remnants of this formation may occur above the Pierre in parts of the Harvey area.

SOIL CONDITIONS:

As explained in the introductory section, eight test borings were drilled as a preliminary investigation of the soil conditions at the site. However, this foundation report included only four of the eight test borings, as the other four were considered nonessential to the design of the proposed reconstruction of the dam site.

The soil conditions indicated by the four test borings appear to be near uniform, except for test boring four. Boring four on the left bank consists primarily of lean clays and clay loams to an average depth of 20.0' [±]. The textural classification of the soils is predominantly clay and clay loam of moderately plastic to plastic and within the A-6 Soil Group. Except for a soft layer of topsoil and sod, the state of consistency of these soils range from stiff to hard.

Below the depth of 20' in Test Boring Four, the textural classification of the soils is predominantly silt loam and silty clay loam of nonplastic to moderately plastic and within the A-4 and A-6 Soil Group. The state of consistency of these soils is hard, and therefore, the average shear strength is approximately 4 tons per square foot or greater.

Soil conditions in Test Borings 1, 2 and 3 appear to be uniform and consist of stratified alluvium. The material consists essentially of permeable and water bearing sand and gravel deposits, with interbedded clay loams and silt loams.

The textural classification of the granular soils is predominantly sand and sandy loam within the A-4 and A-2-4 Soil Group. Due to their granular texture and very low plasticity, a relatively high permeability coefficient can be expected.

In summary, the following soil conditions are emphasized for the entire foundation:

1. That the soils encountered are inadequate for the proposed reconstruction of Harvey Dam, since they are primarily granular in texture and appear to have a relatively high permeability factor.
2. It is also undesirable to have soils of this type encountered beneath a dam in conjunction with a highway fill, unless this condition can be overcome by various methods of seepage and percolation control.


RECOMMENDATIONS:

In view of the soil conditions encountered as a part of this investigation, we recommend as follows:

1. That this site be utilized for the proposed reconstruction of the earth embankment as indicated on drawing No. 5945-671-7A.
2. That additional testing including investigation of borrow areas for moisture - density, determinations, compaction tests, and similar tests be made prior to final construction.
3. That construction be based on a controlled testing program insuring the placement of the fill and blanket material in accord with the design and within the capabilities of the

embankment material to adapt to a structure of this type.

4. That placement of the clay fill between the present dam embankment and the existing highway fill be carried up to elevation 1442.0 MSL or higher if required to allow a total thickness of ten (10) feet of clay over the underlying sand stratum.
5. That placement of the clay blanket be installed on the upstream face of the highway fill to the proposed control water surface elevation of 1555.0 MSL.
6. Riprap protection be installed on the clay blanket to elevation 1555.0 MSL.
7. A proper underground drainage system of weeps and toe drains be installed on the downstream side of the highway embankment.


Arland C. Grunseth
Arland C. Grunseth
Investigation Engineer

ACG:ka

Dist.
MWH
HAS

NORTH DAKOTA STATE WATER COMMISSION
FOUNDATION SOIL TEST BORING

Project No. 671

Boring No. 1

Project Name HARVEY DAM



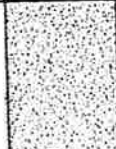
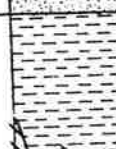


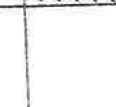



Date Drilling Started _____

County WELLS

Date Finished _____

Final Water Level 2.5

Average Seepage Rate (Ft.Rise/Min) _____

Depth	Elev.	Pro- file	Core No. or Sample No.	Textural Class	Color	Soil Group	Description
0.0	1540.0						
2.5	1537.5			CLAY LOAM	BROWN		FILL MEDIUM STIFF
5	1535.0			CLAY LOAM	BROWN- BLACK		SOFT
8.5	1531.5			CLAY	BROWN		MEDIUM STIFF
10				SANDY LOAM	BROWN		WATER BEARING GRAVELLY CLAY LENSES MEDIUM DENSE
13.5	1526.5						
15				SILT LOAM	GRAY		
20				SILTY CLAY LOAM			VERY STIFF MOIST LAMINATED
24.0	1516.0						
25				SILTY CLAY LOAM	GRAY		MOIST LAMINATED
26.5	1513.5						
30							
35							
40							

NORTH DAKOTA STATE WATER COMMISSION
FOUNDATION SOIL TEST BORING

Project No. 671

Boring No. 2

Project Name HARVEY DAM







Date Drilling Started _____

County WELLS

Date Finished _____

Final Water Level _____

Average Seepage Rate (Ft.Rise/Min) _____

Depth	Elev.	Pro- file	Core No. or Sample No.	Textural Class	Color	Soil Group	Description
0.0	1536.0						
2.5	1533.5			CLAY LOAM	GRAY		SOFT
6.0	1530.0			SILTY CLAY LOAM	GRAY		MEDIUM STIFF
9.5	1526.5			SANDY LOAM	GRAY		WATER BEARING MEDIUM DENSE
10							
13.5	1522.5			SANDY LOAM	GRAY		WATER BEARING GRAVELLY MEDIUM DENSE
15							
19.5	1516.5			SANDY LOAM	GRAY		WATER BEARING CLAY LENSES MEDIUM DENSE
20							
25							
26.5	1509.5			CLAY LOAM	GRAY		SILTY FINE SAND STIFF
30							
35							
40							

NORTH DAKOTA STATE WATER COMMISSION
FOUNDATION SOIL TEST BORING

Project No. 671

Boring No. 3

Project Name HARVEY DAM

Date Drilling Started _____

County WELLS

Date Finished _____

Final Water Level 21.0

Average Seepage Rate (Ft.Rise/Min) _____

Depth	Elev.	Pro- file	Core No. or Sample No.	Textural Class	Color	Soil Group	Description
0.0	1561.0		671-3-1	SAND	BROWN		FILL GRAVELLY
1.5	1559.5		671-3-2	SANDY LOAM	BROWN		FILL MOIST FINE SAND DENSE
4.5	1556.5		671-3-3	SANDY LOAM	BROWN		FILL SILTY MOIST MEDIUM DENSE
5							
10	1550.0		671-3-4	SANDY LOAM	BROWN		FILL FINE SAND DENSE
11.0							
15	1546.0		671-3-5			A-2-6	CLAY LENSES MEDIUM DENSE
20					SANDY LOAM	BROWN	
25			671-3-6			A-2-4	BOULDER AT 27.0 FEET
30	1531.0		671-3-7				FINE SAND AT TOP OF HORIZON AND GRAVELLY NEAR BOTTOM
35			671-3-8	SAND	GRAY		MEDIUM DENSE
36.5	1524.5						
40							

NORTH DAKOTA STATE WATER COMMISSION SOILS LABORATORY

REPORT OF TESTS ON SOIL SAMPLES
(AASHO T88)

Project No. 671

Boring No. 3

Project Name Harvey Dam

County Wells

Borrow Area & Location _____

Laboratory No.	671-3-1	671-3-2	671-3-3	671-3-4
Field Sample No.				
Depth, Ft.	0.5 - 1.5	2.5 - 3.5	7.5 - 8.5	11.0 - 13.0
% Pass. 3/8" Sieve	97	96	94	98
% Pass. No. 4 Sieve	89	94	92	98
% Pass. No. 10 Sieve	77	93	89	98
% Coarse Sand (-#10:#40)	26	6	7	3
% Fine Sand (-#40:#200)	31	47	36	71
% Silt (0.074-0.005 mm)	11	34	44	15
% Clay (minus 0.005 mm)	9	6	2	9
Lower Liquid Limit	18	18	25	
Plasticity Index				
Color	Brown	Brown	Brown	Brown
Textural Class	Sand	Sandy Loam	Sandy Loam	Sandy Loam
Soil Class (AASHO M-145)				
Optimum Moisture *				
Maximum Dry Density				

*By AASHO Test T-180 Modified

NORTH DAKOTA STATE WATER COMMISSION SOILS LABORATORY

REPORT OF TESTS ON SOIL SAMPLES
(AASHO T88)

Project No. 671

Boring No. 3

Project Name Harvey Dam

County Wells

Borrow Area & Location _____

Laboratory No.	671-3-5	671-3-6	671-3-7	671-3-8
Field Sample No.				
Depth, Ft.	16.0 - 18.0	21.0 - 23.0	30.0-31.0	35-0- 36.0
% Pass. 3/8" Sieve	96	99	100	100
% Pass. No. 4 Sieve	94	98	99	100
% Pass. No. 10 Sieve	92	96	98	96
% Coarse Sand (-#10+##40)	7	9	7	63
% Fine Sand (-#40+##200)	36	41	77	23
% Silt (0.074-0.005 mm)	47	44	9	5
% Clay (minus 0.005 mm)	2	2	5	5
Lower Liquid Limit	27	23		
Plasticity Index	12	5		
Color	Brown	Brown	Gray	Gray
Textural Class	Sandy Loam	Sandy Loam	Sand	Sand
Soil Class (AASHO M-145)	A-2-6	A-2-4		
Optimum Moisture *				
Maximum Dry Density				

*By AASHO Test T-180 Modified

NORTH DAKOTA STATE WATER COMMISSION
FOUNDATION SOIL TEST BORING

Project No. 671

Boring No. 4

Project Name HARVEY DAM







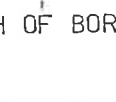
Date Drilling Started _____

County WELLS

Date Finished _____

Final Water Level _____

Average Seepage Rate (Ft.Rise/Min) _____

Depth 0.0	Elev. 1559.0	Pro- file	Core No. or Sample No.	Textural Class	Color	Soil Group	Description
5			671-4-1	CLAY LOAM	BROWN	A-6	SILTY MOIST MEDIUM STIFF TO HARD
10	1549.0		671-4-2				
15			671-4-3	CLAY	BROWN	A-6	SILTY TRACE OF GRAVEL VERY STIFF
19.0	1540.0		671-4-4	SILTY CLAY LOAM	GRAY		HARD
25	1534.0		671-4-5	SILT LOAM			
30			671-4-6		GRAY		
35			671-4-7	SILTY CLAY LOAM			HARD MOIST LAMINATED
40							

NOTE: FINAL DEPTH OF BORING = 51.0 FEET

NORTH DAKOTA STATE WATER COMMISSION SOILS LABORATORY

REPORT OF TESTS ON SOIL SAMPLES
(AASHO T88)

Project No. 671

Boring No. 4

Project Name Harvey Dam

County Wells

Borrow Area & Location _____

Laboratory No.	671-4-1	671-4-2	671-4-3	671-4-4
Field Sample No.				
Depth, Ft.	2.5 - 3.5	10.0 - 11.0	15.0 - 16.0	20.0 - 21.0
% Pass. 3/8" Sieve	98	97	100	100
% Pass. No. 4 Sieve	96	96	100	100
% Pass. No. 10 Sieve	94	94	98	100
% Coarse Sand (-#10+ #40)	8	7	5	0
% Fine Sand (-#40+ #200)	27	22	22	9
% Silt (0.075-0.005 mm)	30	31	34	67
% Clay (minus 0.005 mm)	29	34	37	24
				29
Lower Liquid Limit	33	37	37	
Plasticity Index	12	18	19	
Color	Brown	Brown	Brown	Gray
Textural Class	Clay Loam	Clay	Clay	Silty Cl. Lm.
Soil Class (AASHO M-145)	A-6	A-6	A-6	
Optimum Moisture *				
Maximum Dry Density				

*By AASHO Test T-180 Modified

(200-1/66)

NORTH DAKOTA STATE WATER COMMISSION SOILS LABORATORY

REPORT OF TESTS ON SOIL SAMPLES
(AASHO T88)

Project No. 671

Boring No. 4

Project Name Harvey Dam

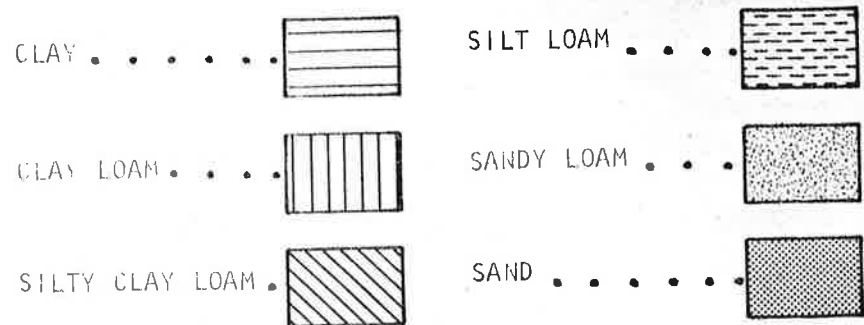
County Wells

Borrow Area & Location _____

Laboratory No.	671-4-5	671-4-6	671-4-7			
Field Sample No.						
Depth, Ft.	25.0 - 26.0	40.0-41.0	49.0-50.0			
% Pass. 3/8" Sieve	100	100	100			
% Pass. No. 4 Sieve	100	100	100			
% Pass. No. 10 Sieve	100	100	100			
% Coarse Sand (-#10+##40)	0	0	0			
% Fine Sand (-#40+##200)	18	26	12			
% Silt (0.074-0.005 mm)	64	50	68			
% Clay (minus 0.005 mm)	18	24	20			
	-----	-----	-----			
Lower Liquid Limit	24	26	27			
Plasticity Index						
Color	Gray	Gray	Gray			
Textural Class	Silt Loam	Silty Cl Lm	Silty Cl Lm			
Soil Class (AASHO M-145)						
Optimum Moisture *						
Maximum Dry Density						

*By AASHO Test T-180 Modified

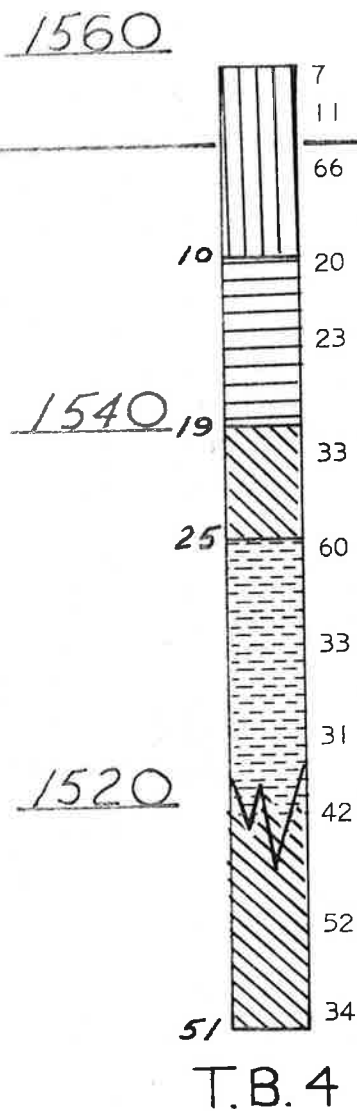
LEGEND



THE BORING LOG DATA SHOWN IS FOR DESIGN PURPOSES ONLY. THE STATE WATER COMMISSION ASSUMES NO RESPONSIBILITY IF SOIL CONDITIONS ENCOUNTERED DURING CONSTRUCTION DIFFER FROM THOSE SHOWN.

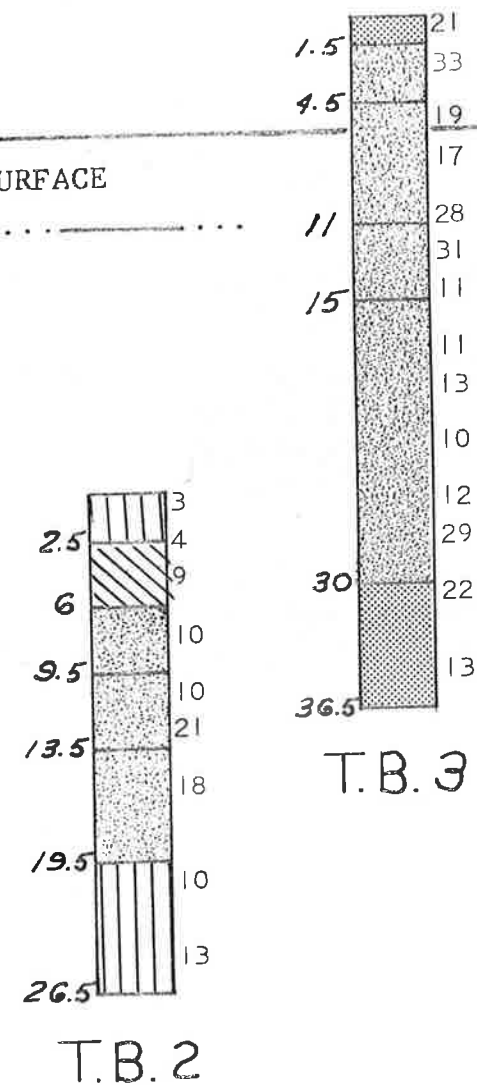
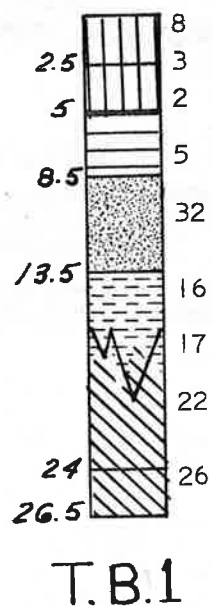
NUMBERS TO THE RIGHT OF THE BORING COLUMN INDICATE THE NUMBER OF BLOWS DELIVERED BY A 140 POUND HAMMER FROM A HEIGHT OF 30 INCHES TO DRIVE A 2 INCH O.D. CORE TUBE ONE FOOT.

NUMBERS TO THE LEFT OF THE BORING COLUMN INDICATE THE DEPTHS TO EACH SOIL HORIZON.



TOP OF EMBANKMENT

RESERVOIR WATER SURFACE



LOG OF TEST BORINGS

North Dakota State Water Commission
 Bismarck, North Dakota
 Project No. 671
 Harvey Dam
 County: Wells Date: May 1966
 Scale: Hor. 1"=40' Vert. 1"=10'
 Drawn: A. C. Grunseth

0

120

240

360

480

NORTH DAKOTA STATE WATER COMMISSION

OFFICE MEMO

MEMO TO: Milo W. Holsveen, State Engineer
 FROM: H. A. Sandwick, Office Engineer
 SUBJECT: Harvey Dam - Factors for Design, SWC Project #671
 DATE: May 20, 1966

The design of the proposed reconstruction of Harvey Dam is a little unique since structures which will control the capacity of the spillway are already in place. Therefore, a control structure which will hold the water surface at the desired elevation and still allow the passage of the maximum floods is required. To accomplish this a concrete drop inlet spillway with a radial gate has been designed for the upstream end of the 12½ foot culvert which is in the highway fill at Harvey. A clay blanket will be installed on the upstream face of the highway fill to elevation 1552 MSL or higher if required to allow a total thickness of 10 feet of clay over the underlying sand stratum. Weeps and toe drains will be installed on the downstream side of the fill. Riprap protection will be increased for the new route of Highway #52 upstream from the dam.

The following table gives some data on the probable floods and the approximate hydraulics of the outlet:

25 yr. flood (USGS)	1400 CFS
50 yr. flood (USGS)	2280 CFS
Max. flood of Record (1950)	1430 CFS
Capacity of Hwy. culvert (10 ft./sec. velocity)	1225 CFS
Capacity of RR culvert (10 ft./sec. max. velocity)	867 CFS
Velocity in RR culvert (1950 flood)	18.2 ft./sec.
Capacity of 8'x14' gate	
8' head	1050 CFS
9' head	1260 CFS
10' head	1470 CFS
Capacity of proposed drop inlet - gate closed	
WS @ Elev. 1551	226 CFS
WS @ Elev. 1552	640 CFS
WS @ Elev. 1553	1180 CFS
Capacity of outlet with gate open	
WS @ Elev. 1550	1050 CFS
WS @ Elev. 1551	1440 CFS
WS @ Elev. 1552	1978 CFS
WS @ Elev. 1553	2640 CFS

Hydrology

Computed Flows:

25-year frequency flood: 872 c.f.s., and 365 AF
50-year frequency flood: 980 c.f.s., and 410 AF
100-year frequency flood: 1085 c.f.s., and 455 AF

Observed Flow:

Maximum, 9 year record, 1955-64: 224 c.f.s.

Drainage Area

Contributing 154 sq. mi.
Non-contributing 270 sq. mi.
Total 424 sq. mi.

Volume for 1 inch runoff from contributing area: 8,200 AF
Volume for 100-year frequency flood: 455 AF
Average annual yield 2,420 AF
Average annual reservoir evap.: 36 inches 750 AF
Average annual precipitation: 16.25 inches
Average annual reservoir evap. less reservoir precipitation 410 AF

Reservoir

Elevation of design pool (controlled level) 1550.0 ft.
Area of water surface 250 ac.
Capacity 2200 ac.ft.
Maximum Depth 20 ft.
Average Depth 8.8 ft.
Average annual spill plus seepage 2010 ac. ft.

The above tabulation shows that a twenty five year flood, (also the 1950 flood) can be passed with the water surface raising to elevation 1551. A fifty year flood would raise the water slightly above elevation 1552. These peaks, of course, will be reduced when the flood storage capacity of the reservoir is considered.

The intake structure is being designed to accommodate all the water the highway culvert will handle rather than for a specific flood.

The size of the culvert through the railroad embankment will be the main limitation on the ability of the outlet complex to accommodate floods. A 25 year flood would reach a velocity of 16 ft./sec. through that culvert while it would reach a velocity of 11½ ft./sec. through the highway culvert.

These discharges probably will never be reached because of the ability of the reservoir to absorb peak flows. In addition, the Lone Tree Dam, a diversion structure which the Bureau of Reclamation plans to install ten miles upstream, will control the floods of 86% drainage area above this dam. It is expected that after construction of the Garrison Diversion project, the water entering the reservoir at Harvey will be runoff from 21 square miles and the controlled releases from Lone Tree Dam.

Redesign of the gates and structure will be made if the Garrison Diversion project is assured prior to construction.



H. A. Sandwick
Office Engineer

HAS:jd

Dist.

MWH (SWC Proj. #671)

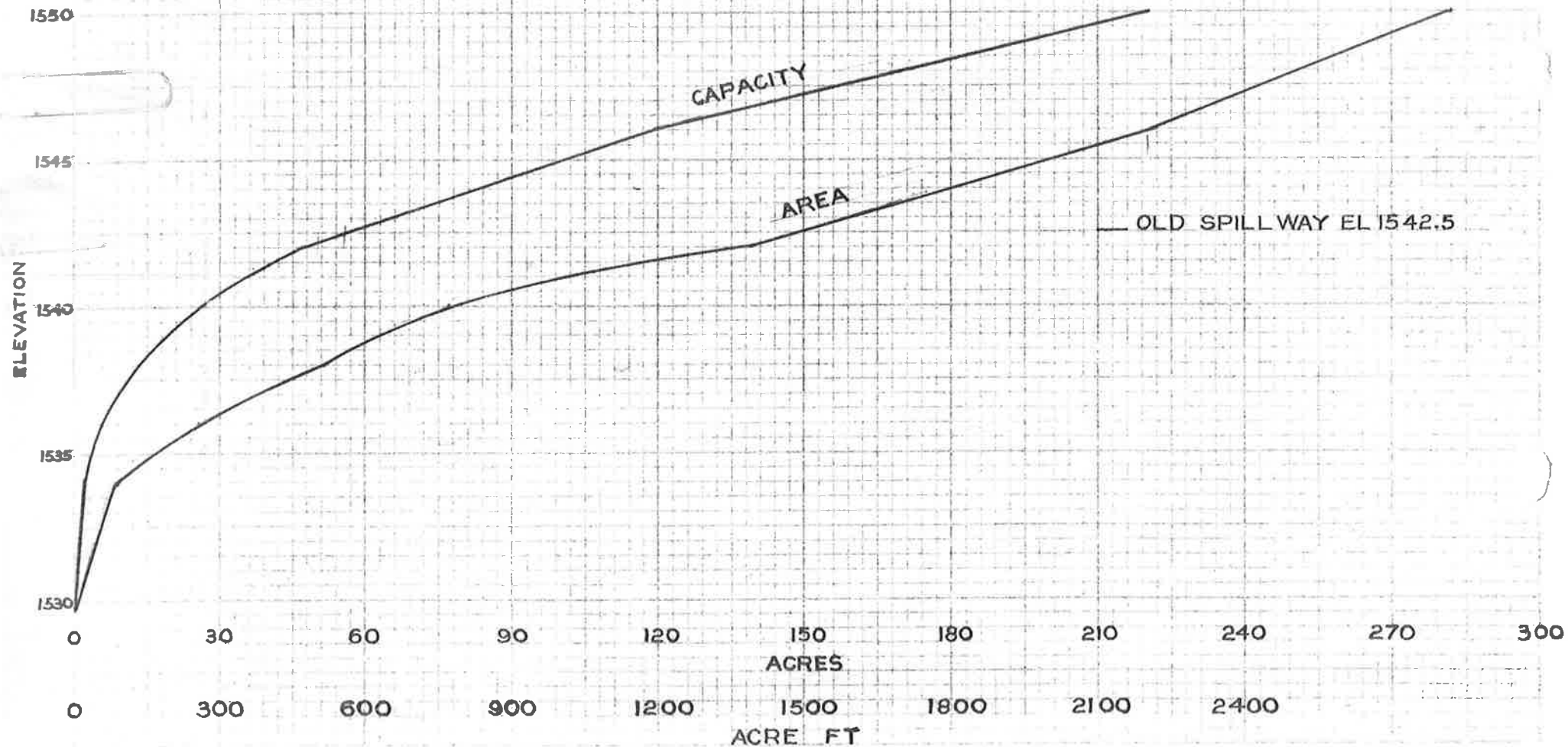
7 SORA

8 WC staff

1 G & F

1 Wells Co. WMD

HARVEY DAM PROJECT NO. 671 AREA CAPACITY CURVE



3/8/62

NORTH DAKOTA STATE WATER COMMISSION

Cost Estimate

Harvey Dam
Project #671

April 18, 1966

Water Control	\$1,000
Concrete (reinforced) 120 cu. yds. @ \$90.00	10,800
Traintor gate w/hoist	6,000
Installing gate	1,000
Fill to elevation 1540 - 6000 cu. yds. @ \$0.60	3,600
Fill on embankment - 4600 cu. yds. @ \$0.60	2,760
Riprap (old embankment) 1,200 cu. yds. @ \$4.50	5,400
Riprap (new Hwy. #52) 2,700 cu. yds. @ \$4.50	12,150
Structural excavation and backfill	2,000
Structural plate pipe remodeling	2,000
Toe drains, etc. - 600' @ \$1.40	840
2 Toe drain relief wells	<u>50</u>
	47,600
Engineering	4,460
Contingencies	5,040
Indirect Costs	<u>2,900</u>
	60,000

Prepared By:

H. A. Sandwick
H. A. Sandwick
Office Engineer

NORTH DAKOTA STATE WATER COMMISSION

RECREATION FACILITIES COST ESTIMATE

HARVEY DAM AND RECREATION AREA

WELLS COUNTY

SWC Proj. #671 (SORA Proj. #52-7)

May 19, 1966

<u>Item</u>	<u>Quantity</u>	<u>Estimated Unit Cost</u>	<u>Estimated Total Cost</u>
1. Picnic Area			
a. Table	20	\$ 40	\$ 800
b. Shelter	6	700	4,200
c. Fireplace	10	40	400
d. Trash receptacle	10	15	150
e. Extend city water (2 stop valves and yard hydrants)		Lump sum	1,800
f. Comfort station	2	1,200	2,400
2. Wading Area			
a. Sand blanket	1,000 tons	1.25	1,250
3. Boating area			
a. Dock (floating)	1	500	500
b. Loading ramp	1	1,000	1,000
4. Play Ground			
a. Swing (4 unit)	2	150	300
b. Slide	1	400	400
c. Seesaw	1	200	200
d. Merry-go-round	1	300	300
5. Access Road			
a. Excavation	5,000 C.Y.	30	1,500
b. Crushed gravel	900 tons	1.50	1,350
6. Parking Lot			
a. Excavation	1,000 C.Y.	.30	300
b. Crushed gravel	700 tons	1.50	1,050
c. Barriers	250	3.00	750
7. General Area Development			
a. Landscape	19,000	.30	5,700
b. Plant Trees		Lump sum	1,000
c. Plant grass	10 acres	25	250
d. Lights	6	40	240
			\$25,840
	Engineering		2,580
	Indirect Cost		1,580
	Total		\$30,000

Prepared by

Ken Simenson
Recreation Engineer

NORTH DAKOTA STATE OUTDOOR RECREATION AGENCY
 Project Economic Feasibility Report
 Benefit-Cost Ratio

Project Harvey Dam and Recreation Area
 Location (Co.) Wells SORA # 52-7

I. BASIC DATA

- A. Radius of anticipated use - 40 miles
- B. Population within use area - 13,860
- C. Anticipated annual visitation - 40,000
- D. Investment (include land) - \$ 120,000
- E. Estimated life of facilities - 30 years

II. ANNUAL COSTS

- A.. Operation and Maintenance - \$ 4,000
- B. Depreciation (I.D ÷ I.E) - \$ 4,000
- C. Total annual costs - \$ 8,000

III. ANNUAL BENEFITS

- A. Assumed value per visitation - \$ 1
- B. Est. Annual Benefits (III.A x I.C) - \$ 40,000
- C. Average Annual Net Benefits - \$ 32,000
 (III.B - II.C)

IV. BENEFIT-COST RATIO

- A. Factor for value of I. compounded
 $\frac{30 \text{ yrs. @ } 4\%}{\text{Standard - 30 yrs. @ 4\%}} = 3.24339751$
3.24339751
- B. Product of Investment (I.D) x factor (IV.A) - \$ 389,208
- C. Total benefits (III.C x I.E) - \$ 960,000
- D. Benefit-cost ratio (IV.C ÷ IV.B) - 2.47:1

Green Form - D-660-1.E

May 20, 1966

NORTH DAKOTA STATE OUTDOOR RECREATION AGENCY
1301 STATE CAPITOL
BISMARCK, NORTH DAKOTA

(
) SORA PROJECT NO. 52-7
(
) DATE RECEIVED _____
(
) PRIORITY _____

1. APPLICANT Wells County Water Management District AGENCY
c/o Arthur Gunderson, Secy-Treas., Fessenden, N. Dak. ADDRESS
PROJECT IS LOCATED IN Wells COUNTY

2. PROJECT IDENTIFICATION: TITLE Harvey Dam and Recreation Area SORA NO. 52-7
LEGAL DESCRIPTION: _____ SEC. 31 TWP 150 RGE 72
SCOPE OF PROJECT: Construction of dam to create reservoir in Harvey and installation
of public use facilities.

TO BE STARTED April 19 66 . TO BE COMPLETED September 19 66

IN SUBMITTING THIS PROJECT PROPOSAL Wells County Water Management District
(Name of Applying Agency)

HEREBY CERTIFIES THAT:

- A. No financial assistance has been given or promised under any other Federal program or activity with regard to this proposed project.
- B. The Applicant responsible for the proposed project has the ability and the intention to finance its share of the project.
- C. The Applicant accepts the obligation to comply with applicable laws, rules and regulations in effect at the time of the award and to the further terms and conditions of the Bureau of Outdoor Recreation Manual in effect at the time of the award.
- D. Property acquired under this program will be placed in use as an outdoor recreation facility and will be retained for such use in perpetuity or otherwise as provided and agreed to in the project agreement. Prior approval of the North Dakota State Outdoor Recreation Agency will be obtained before any other disposal is made of such property.
- E. The Applicant has the intent and ability to finance the operation and maintenance of the facility being developed for so long as is required.
- F. No foreign uses of such property, other than those described in the proposal will be permitted unless approved in advance by the North Dakota State Outdoor Recreation Agency. In the event foreign use is made of such project the Applicant shall, within one year of such foreign use, reimburse the North Dakota State Outdoor Recreation Agency the cost of the project, less the amount of such cost paid by the Applicant.
- G. If for any reason it shall become necessary for any department or agency of the State of North Dakota to expend State funds in order to fulfill any obligations which the Applicant has agreed to perform in the construction and maintenance of this project. the Applicant shall, within a one year period, reimburse the State department or agency the amount of funds expended for such maintenance or operation.
- H. The Applicant understands that qualification of this project proposal by the North Dakota State Outdoor Recreation Agency does not in itself constitute an obligation or award of requested funds and does not guarantee that funds will necessarily be made available for the project.
- I. The Applicant will supply development specifications and detailed plans to the North Dakota State Outdoor Recreation Agency as requested to do so by the Executive Officer of the Agency.
- J. The Applicant shall, within thirty days after completion of the project, submit to the North Dakota State Outdoor Recreation Agency a certified and itemized statement of its expenditures made in connection with the project. and shall, upon request. make all financial records available to the North Dakota State Outdoor Recreation Agency at any time.

SUBMITTED BY Wells County Water Management District APPLICANT
(Name of Applying Agency)

H. Schneider TITLE Chairman DATE January 14, 1966
(Authorized Representative)

_____ TITLE _____ DATE _____
(Authorized Representative)

_____ TITLE _____ DATE _____
(Authorized Representative)

Dist.
✓ SWC Proj. # 671
SWC Acct.
I ea. Proj. Participant

A G R E E M E N T
CONSTRUCTION OF WORKS

THIS AGREEMENT is entered into by and between:

(1) The North Dakota State Water Commission, hereinafter referred to as the Commission, acting by and through, Milo W. Hoisveen, Secretary and Chief Engineer;

(2) The State Outdoor Recreation Agency, hereinafter referred to as the Agency, acting by and through Milo W. Hoisveen,
(name)
Executive Officer ;
(title)

(3) The State Game and Fish Department, hereinafter referred to as the Department, acting by and through Russell W. Stuart,
(name)
Commissioner ;
(title)

(4) The Wells County Water Management Dist., hereinafter referred to as the District, acting by and through Jerry Schroeder,
(name)
Chairman .
(title)

I. Project, Location and Purpose

WHEREAS, the parties to this Agreement propose to construct the following:

Harvey Dam and recreation area

hereinafter referred to as the Project, located adjacent to the Harvey city limits, Wells County, North Dakota, the purpose of which is to provide water-based public outdoor recreation facilities.

It will also provide game production and public shooting.

NOW, THEREFORE, IT IS AGREED:

II. Drawings and Specifications

That the Project shall be constructed in accordance with drawings

Send out 3/30/66. Joe

4/1/66

and specifications of the Commission, approved by
the Agency , Department , and District ,

which drawings and specifications, SWC map #'s 5743-671-3 & 3A; 5735-671-4;
(describe)
5736-671-5; 5945-671-7; 6062-671-10; 6068-671-11; 6069-671-12; 6554-671-13

are by this reference made a part of this Agreement to the same force and effect as if they were incorporated into the body of this Agreement.

III. Costs and Allocations

That the estimated cost of the various Project elements and their allocation to the Project participants shall be as follows:

A. Preliminary Engineering and Investigations - Total Estimate \$

- 1. North Dakota State Water Commission - \$ or %
- 2. \$ or %
- 3. \$ or %
- 4. \$ or %
- 5. \$ or %

B. Land and/or Easement Acquisition - Total Estimate \$ 30,000

- 1. North Dakota State Water Commission - \$ ----- or -- %
- 2. Agency \$ 5,000 or 16.7 %
- 3. Department \$ 2,500 or 8.3 %
- 4. District \$ 7,500 or 25 %
- 5. Bureau of Outdoor Recreation \$ 15,000 or 50 %

C. Construction of Main Works - Total Estimate \$ 60,000

- 1. North Dakota State Water Commission - \$ 10,000 or 16.7 %
- 2. Department \$ 10,000 or 16.7 %
- 3. District \$ 10,000 or 16.7 %
- 4. - \$ - or - %
- 5. Bureau of Outdoor Recreation \$ 30,000 or 50 %

D. Construction of Appurtenant Works - Total Estimate \$ 30,000

- 1. North Dakota State Water Commission - \$ 5,000 or 16.7 %
- 2. Agency (WC allocation) \$ 2,500 or 8.3 %
- 3. District \$ 7,500 or 25 %
- 4. - \$ - or - %
- 5. Bureau of Outdoor Recreation \$ 15,000 or 50 %

E. Other Items - Total Estimate \$ _____

- 1. North Dakota State Water Commission - \$ _____ or _____ %
- 2. _____ \$ _____ or _____ %
- 3. _____ \$ _____ or _____ %
- 4. _____ \$ _____ or _____ %
- 5. _____ \$ _____ or _____ %

F. Total Project Costs and Allocations - \$ 120,000

- 1. North Dakota State Water Commission - \$ 15,000 or 12.5 %
- 2. Agency (WC allocation) \$ 7,500 or 6.3 %
- 3. Department \$ 12,500 or 10.4 %
- 4. District \$ 25,000 or 20.8 %
- 5. Bureau of Outdoor Recreation \$ 60,000 or 50 %

That all parties shall provide the others with cost statements within 30 days after the Project's completion and settlements shall be made within 30 days of receipt of said statements.

IV. Title to Lands and/or Easements

That title to all lands and/or easements for the Project shall be purchased in the name of North Dakota State Game & Fish Department by the Department and District and recorded in the County Register of Deeds office wherein the Project is situated.

-4-

V. Operation and Maintenance

That the _____ District _____ shall operate and maintain the Project in accordance with rules and regulations prescribed by the _____ Agency and Department _____.

VI. Indemnification

That the _____ District _____ does hereby accept responsibility for, and holds the Commission and the _____ Agency and Department _____ harmless from, all claims and damages to public or private properties, rights, or persons arising out of the construction, operation, and maintenance of the Project. In the event a suit is initiated or judgment entered against the Commission or _____ Agency and Department _____ the _____ District _____ shall indemnify them for any settlement arrived at or judgment satisfied.

VI. Changes in Responsibilities

That changes in any responsibilities of the parties hereto or conditions herein stated will not be effective or binding unless such changes or conditions are made in writing, signed by the parties concerned and attached hereto.

VIII. Other Stipulations

1. Bureau of Outdoor Recreation cost allocations assume qualification and funding of the project through the Land and Water Conservation Fund Act.
2. State Outdoor Recreation Agency commitments are subject to full Agency approval.
3. Total Game and Fish Dpt. participation in the Project is limited to \$12,500.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement the day and year indicated below.

WITNESS:	DATE:	NORTH DAKOTA STATE WATER COMMISSION By: <u>Milo W. Hovsveen</u> Secretary and Chief Engineer
<u>Jim Schulz</u>	<u>4-1-66</u>	NORTH DAKOTA STATE OUTDOOR RECREATION AGENCY By: <u>Milo W. Hovsveen</u> Executive Officer
<u>Jim Schulz</u>	<u>4-1-66</u>	NORTH DAKOTA STATE GAME & FISH DEPARTMENT By: <u>Bussell W. Stewart</u> Commissioner
<u>State Engineer</u>	<u>4-1-66</u>	WELLS COUNTY WATER MANAGEMENT DISTRICT By: <u>G.F. Schroeder</u> Chairman
<u>Jim Schulz</u>	<u>4-1-66</u>	

AGREEMENT FOR CONSTRUCTION AND MAINTENANCE, HARVEY DAM

WELLS COUNTY, NORTH DAKOTA

71

This Agreement entered on this 22nd day of October, 1964, by an
between:

(1) The North Dakota State Water Commission, acting by and through Milo W. Hoisveen, Chief Engineer and Secretary; and (2) The North Dakota State Highway Department, acting by and through Walter R. Hjelle, State Highway Commissioner.

WHEREAS, it is deemed to be in the public interest to utilize a portion of State Highway #3 near Harvey, North Dakota, as a dam to replace an existing dam and to raise the reservoir surface to provide for increased public use and recreation, and for flood control and other water conservation purposes;

NOW THEREFORE, it is agreed:

I

That the North Dakota State Water Commission shall plan, design and construct in a manner approved by the North Dakota State Highway Department, certain improvements to the existing highways across the Sheyenne River in Section 31, Township 150 North, Range 72 West and in Section 6, Township 149 North, Range 72 West, Wells County, North Dakota.

II

All costs for said planning, designing and construction shall be the sole responsibility of the North Dakota State Water Commission.

III

The responsibility for normal and routine highway maintenance shall be solely on the North Dakota State Highway Department and the maintenance responsibility otherwise, for the dam and related facilities shall be on the North Dakota State Water Commission.

IV

Full authority and responsibility for the operation of the impoundment, the management of the water level and the public use lands, shall be the responsibility of the North Dakota State Water Commission and other agencies which may co-operate with the North Dakota State Water Commission on this project.

V

The acquisition of all water rights shall be the responsibility of the North Dakota State Water Commission. The acquisition of all other rights and easements and lands shall also be the responsibility of the North Dakota State Water Commission.

VI

The North Dakota State Water Commission hereby accepts responsibility for, and will hold the North Dakota State Highway Department harmless from, any and all claims for damage to public or private properties, rights or persons arising out of the construction of this project.

VII

Nothing herein shall be construed as limiting or affecting in any way any power or authority of the North Dakota State Water Commission or the North Dakota State Highway Department.

Executed at Bismarck, North Dakota, on the day and year first above cited.

WITNESS

G. J. [Signature]

NORTH DAKOTA STATE WATER COMMISSION

By Mike W. Hansen
Chief Engineer and Secretary

APPROVED

[Signature]
Chief Engineer

NORTH DAKOTA STATE HIGHWAY DEPARTMENT

By Walter J. Hall
State Highway Commissioner

APPLICATION FOR PERMIT TO CONSTRUCT OR ENLARGE A DAM RESERVOIR

TO: Chief Engineer
North Dakota State Water Conservation Commission
Bismarck, North Dakota
Russel Stuart acting for North Dakota

I, **State Game and Fish Department**, the undersigned, do hereby apply for a permit to construct or enlarge a dam as indicated below and according to specifications shown on this and attached sheets:

1. Location: County Wells
Legal description to nearest forty acre tract: SE 1/4 Sec. 31 Twp. 150 N., Rge. 72 W.

2. Purpose: Recreation

3. Data
Drainage Area Above Dam 154 Square Miles
Type of Dam Earth Embankment
Type and Size of Spillway Drop inlet (gated) with pipe outlet
Type and Size of Emergency Spillway None
Type and Size of Gate Reservoir Control Structure 8' x 14' on drop inlet
Invert Height above Stream Bed of Control Structure 20 ft.
Height of Spillway above Stream Bed 20 ft. feet
Surface Area of Reservoir at Spillway Crest 282 acres
Computed Reservoir Capacity at Spillway Crest Elevation 2,200 acre feet

4. Water course on which dam is to be located is a tributary to: Red River

5. Will flows presently available to downstream riparian landowners be depleted? Yes If so, to what extent?
Small amount

6. Downstream landowners who might be deprived use of water by construction of the dam are _____

7. Is the dam and impounded water on the owners land? Will be prior to construction
(If the answer is no, proof of easement from other owner must be filed with application.)

8. For an enlargement of an existing dam, answer the following:
Why is enlargement necessary? To improve quality of water in reservoir and to provide game production and public hunting in upper reaches of reservoir.

Year dam was constructed _____ By what agency _____
Total yardage in existing dam _____

9. The dam will be built under the supervision of North Dakota State Water Commission and will conform to data and specifications given above and on the following attached sheets _____
(Name or Number of attached data sheet)

10. This dam will be operated in conformance to all state water laws and rules and regulations of the North Dakota State Water Conservation Commission.

11. Construction will begin on or before September 1, 1966
and will be completed on or before December 1, 1966

Date Submitted: May 24, 1966

Signed Russel W. Stuart
(Owner of land on which dam is located)
Address State Game and Fish Department
Bismarck, North Dakota

STATE OF NORTH DAKOTA }
COUNTY OF Burleigh } ss

On this 24th day of May, 1966, before me a Notary Public personally appeared

Russel Stuart, known to me to be the same person who executed the foregoing application for a water right permit and acknowledged to me that he executed the same.

Arnold J. [Signature]
Notary Public, Burleigh County, N. D.
My Commission Expires 8-29-66

It should be recognized that the filing of this application and its approval in no way relieves the landowner from any responsibility or liability for damages from the construction, operation or failure of this structure.

AFFIDAVIT OF DESIGNING AGENCY

The dam and reservoir described in this application and on attached sheets has been designed and approved by the North Dakota State Water Commission and, if the construction thereof is supervised by this agency, it will be built according to the specifications and data shown in this application and data sheets attached hereto.

Dated this 24th day of May, 19 66

North Dakota State Water Commission
(Name of Agency)

Milo W. Hoisveen
(Address of Agency)

Designing Agency North Dakota State Water Commission
Signed

By: Milo W. Hoisveen
Title Chief Engineer

For use of North Dakota State Water Conservation Commission
APPROVAL AND PERMIT

This is to certify that I have examined the foregoing application and hereby approve the same subject to the rules and regulations of the North Dakota State Water Conservation Commission and the laws of the State of North Dakota subject the following conditions:

WITNESS my hand and seal this 24th day of May, 19 66

Signed: Milo W. Hoisveen
Chief Engineer
North Dakota State Water Conservation Commission

DISAPPROVAL

This is to certify that I have examined the foregoing application and hereby reject and disapprove the same for the following reasons:

WITNESS my hand and seal this _____ day of _____, 19 _____

Signed: _____
Chief Engineer
North Dakota State Water Conservation Commission