

Considered: _____

WATER PERMIT NO. 5224-3

HAP No. same

Name of Applicant US Fish and Wildlife Service

Post Office Address PO Box 25486, DFC, Denver CO 80225

Amount of Water Claimed 257 ac-ft Total Acres NA

Source of Water Supply Monighan Creek

Water to be used for FWP County Deuel

About 4 1/2 miles W of Gary

PROOF OF PUBLICATION: Received _____ Not Received _____

APPLICATION: Approved 1/25/89 Subject to _____

F.F. & C.L. Adopted _____ Not Approved _____ Deferred _____

PRIORITY _____ Date Received Aug 24, 1988 Fee \$250⁰⁰ Remarks _____

8/24/88

Corrected Application Received _____ Period of Annual Use Jan 1 - Dec 31

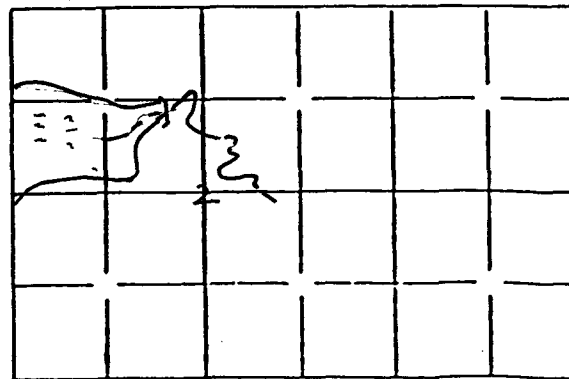
WATER QUALITY APPROVAL RECEIVED NA APPROVED/CONDITIONAL (Circle one)

WI-1 Description same as Application YES _____ NO _____ REMARKS _____

Diversion Point dam: SE 1/4 NW 1/4 section 2 -

T115N - R48W

Land to be Irrigated provide habitat for fish
& wildlife production



Well Log: Driller NA Licensed YES _____ NO _____

Depth of Well _____ REMARKS _____

Type of Map topo PREPARED BY William A Godby Reviewed and the Number

assigned on Sept. 21, 1988 By Ron D. Duvall

Mail to: Water Rights Div.
DWNR, Foss Bldg.
Pierre, SD 57501
(605) 773-3352

No. 5224-3 Hydrologic Unit 07020003
Map No. same Basin Minnesota-Whetstone
Newspaper Gary Interstate, Box 128 57237 (Thur)

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use of water: Industrial ☐ Commercial ☐ Municipal ☐ Other Common Distribution System ☐
Rural Water System ☐ Suburban Housing ☐ Geothermal Heat ☐ Institutional ☐ Recreational ☐
Domestic ☐ (above 18gpm) Other ☒ Fish and Wildlife

Type of Application: Check one or more of the following

New ☒ Vested Right ☐ Future Use ☐ Change Use ☐

☐ Amend Permit No. _____ with old priority date retained

Change diversion point(s) ☐ Add diversion point(s) ☐ Other ☐ _____

☐ Application to: Change diversion point(s) ☐ Add diversion point(s) ☐ on Permit No. _____

☐ Construction to use water reserved by Future Use Permit No. _____

UNITED STATES OF AMERICA, Department of the Interior

1. Name of Applicant Fish and Wildlife Service Phone No. 303/236-5321

Post Office Address P.O. Box 25486, Denver Federal Center, Denver State Colorado 80225
(Street, RR or Box) Zip Code

2. Amount of water claimed (c.f.s.) 257 acre-feet at elevation 1640.5

3. Source of water supply Monighan Creek dam

4. Location of point of diversion NW1/4 SE1/4 NW1/4 SECTION 2, T115N R48W

_____ County Deuel

5. Counties where water will be used Deuel

6. Annual period during which water is to be used January 1 through December 31

7. Give a brief description of proposed project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

Dam with steel sheet pile weir and stoplog structure to create semipermanent marsh for waterfowl production and migration.

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map (see instruction)

STATE OF COLORADO)
County of JEFFERSON)ss

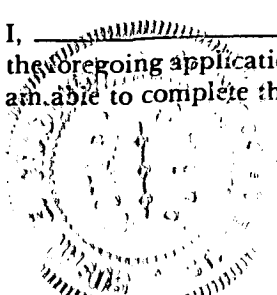
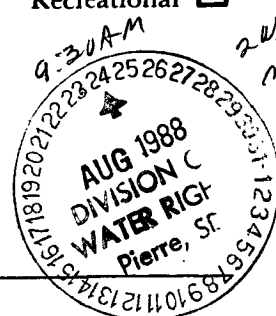
I, _____ the applicant, certify that I have read the foregoing application, have examined the attached map and that the matters therein stated are true and that I intend, and am able to complete the necessary construction.

Signed John A. Spinks, Jr.
Deputy REGIONAL DIRECTOR

Subscribed and sworn to before me this 22nd day of August 1988

Susan E. Craddock
Notary Public (or other qualified officer)

My Commission Expires August 5, 1989



**SOUTH DAKOTA
WATER PERMIT**

Date of first receipt of application August 24, 1988

Date of return to applicant for correction, amendments or changes required _____

Date of receipt of corrected application September 26, 1988

The Water Management Board approved Water Permit Application No. 5224-3

on January 25, 1989 for US Fish & Wildlife Service

<u>P.O. Box 25486, Denver Fed'l Ctr</u> (Street, RR or Box)	<u>Denver</u> (City)	<u>CO</u> (State)	<u>80225</u> (Zip Code)
---	--	-------------------------------------	---

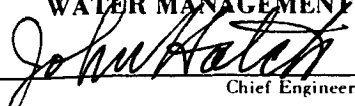
authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 5224-3 is to impound 257 acre-feet of water by constructing a dam on Monighan Creek in the Eilen Waterfowl Production Area. The dam site is to be located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 2 - T115N-R48W and water is to be stored annually to an approximate elevation of 1640.5 feet mean sea level.
2. The water appropriated shall be used for the purpose of providing habitat for fish & wildlife and may not exceed the amount of water needed for beneficial use for fish & wildlife production.
3. The water is to be used during the following described annual period: January 1 - December 31.
4. The date from which applicant may claim the right is August 24, 1988.
5. One-fifth of the construction is to be completed on or before July 25, 1991.
6. All construction is to be completed on or before January 25, 1994.
7. Water is to be put to beneficial use on or before January 25, 1998.
8. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. Low flows as needed for downstream domestic use, including livestock and prior water rights must be by-passed.
2. Approval of this Permit authorizes storage of up to 257 acre-feet water annually.

WATER MANAGEMENT BOARD

By: 

Chief Engineer

Division of Water Rights

Dept. of Water and Natural Resources

MAR 10 1989

Supplemental Information

(type or print in ink)

1. Well Information - Proposed construction

- a) Drill Hole Diameter _____ Depth _____
- b) Casing Type _____ Diameter _____ Thickness _____
- c) Screen Type _____ Diameter _____ Thickness _____
- d) Gravel Pack Thickness _____ Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material _____
- f) Depth to Water (ground surface to water level) _____
- g) Distance to nearest existing domestic well:
- On applicants property _____ On property owned by others _____

2. Dugout Information Estimates

- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

3. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below. The locations of each dam should be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam please give their name and address

Ducks Unlimited

6115 East Main

Bismarck, North Dakota 58501

701/258-5599

b) Freeboard 4.5 feet

c) Crest Width 10 feet

Crest Length 266 feet

d) Height 9 feet

e) Primary Outlet Capacity *
If Pipe, diameter 3' x 4.5' stoplog
structure

f) Secondary Spillway Capacity *
Spillway width 130 feet

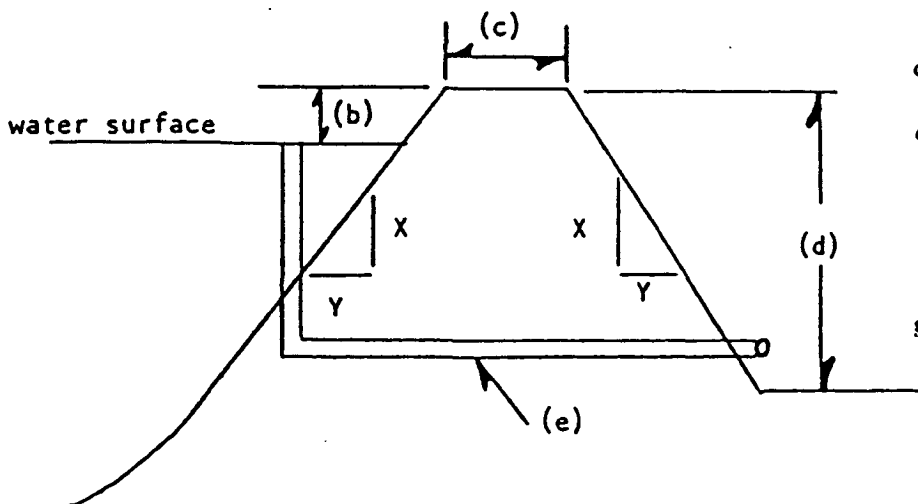
g) X & Y Slope
Upstream 10:1

Downstream 10:1

Surface Area of Impoundment 89 acres

Storage 257 acre feet

Drainage area above dam 22.5 sq. miles



Signature of Applicant

Deputy

REGIONAL DIRECTOR

John L. Spinks, Jr.

*Stoplog structure for drawdown purposes only - weir with stoplogs in place will pass 100-year peak discharge of 2052 cfs.

RECEIPT

Division of Water Rights

South Dakota Department of Water and Natural Resources

411431

Pierre, September 26, 1988, 19__

RECEIVED OF U.S. Fish & Wildlife, P.O. Box 25486, DFC, Denver CO 80225

the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>5224-3</u> to Appropriate Water, to construct works and to put water to beneficial use _____	250	00
Fee for Application for Permit No. _____ to Appropriate Water for Future Use _____		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____		
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for Certified Copy of _____		
Fee for Print Copy of Map _____		
Fee for Certifying _____		
Fee for _____		
(Any Other Work Provided by Law)	Total	250 00

By John Hatch
Chief Engineer

JOHN HATCH 

LAKE FRANCIS QUADRANGLE
SOUTH DAKOTA—DEUEL CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

R 48 W

T 116 N

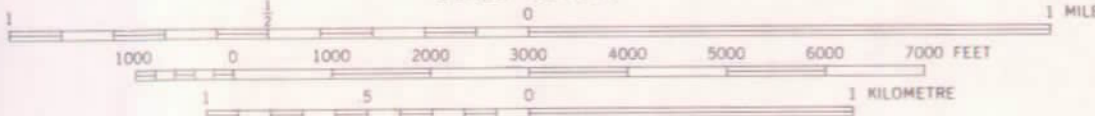
T 115 N

EILEN WPA
BOUNDARY

POINT OF
DIVERSION

THE NATURE
CONSERVANCY
BOUNDARY
(SECTIONS 3, 9, 10)

SCALE 1:24 000



I, William A. Godby, Regional
Engineer, do hereby certify that
this map was prepared under my
direction and correctly represents
the works for the accompanying
application.

William A. Godby
William A. Godby

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ENGINEERING

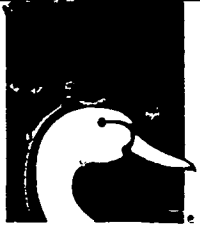
EILEN WPA

DEUEL COUNTY, SOUTH DAKOTA

WATER RIGHTS FILING MAP

DESIGNED DRAWN CHECKED DATE DENVER, COLO.
LC JFG CW 8-88
DRAWING NO. 6H-SD-609-WR-P-14.0 SHEET 1 OF 1

Appl No. 5224-3



DUCKS
UNLIMITED
INC.

DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE
6115 East Main Avenue
Bismarck, North Dakota, 58501
(701) 258-5599

DESIGN SUMMARY

August 11, 1988

PROJECT: Crystal Springs Prairie
Eilen WPA

LOCATION: Section 2, T115N, R48W
Deuel County, South Dakota



MARSH DATA:

Full Service Level (FSL) @ 1640.5 m.s.l.
69 Surface Acres @ FSL
215 AC-FT Capacity @ FSL

HAZARD CLASSIFICATION:

The proposed project is located on Eilen WPA. Monighan Creek flows into Eilen WPA, however, the creek appears to be an intermittent stream that flows only during periods of substantial rainfall. The channel downstream from the project is well defined. A farm is located downstream of the proposed site. The building nearest the site and at the lowest elevation is a hay barn at elevation 1647.56. The house is at elevation 1654.24. The project as designed will not impact or endanger the farm. A 10'x10' concrete box culvert is located approximately 1/2 to 3/4 mile downstream from the proposed project site with an invert elevation of 1617.59. The gravel roadway embankment is approximately 27' above the invert. Based on our field evaluation and design, we would classify the proposed dam as low hazard.

HYDROLOGY/HYDRAULICS:

The watershed consists of 22.5 square miles. A fair amount of ponding exists in the watershed as well as two large basins in addition to Eilen WPA. Rush Lake is a 130-150 acre lake and another basin known as Lake Camille is approximately 200-250 acres. The Lake Camille watershed is 6.42 square miles and all flow must pass through a roadway with a 30" CMP, 36" CMP, and 24" CMP located in it.

Flows were routed through Lake Camille and Eilen WPA. A reduction for ponding was incorporated into the analysis. Following is a summary of the data:

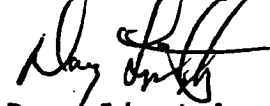
Inflows to Eilen WPA: Q_{10} = 1029 CFS
 Q_{50} = 1939 CFS
 Q_{100} = 2379 CFS

Proposed Structure: Steel Sheet Pile Weir w/130' Crest
 @ El. 1640.5

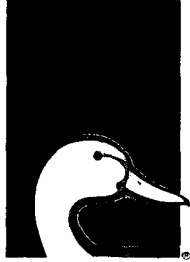
Peak Discharges:

<u>Event</u>	<u>Peak Discharge</u>	<u>Max. Water Surface Elevation in Marsh</u>
10 YR	890 CFS	1642.37
50 YR	1703 CFS	1643.39
100 YR	2147 CFS	1643.86

Submitted By:



Doug Lipetzky, P.E.
Regional Engineer



DUCKS
UNLIMITED
INC.

DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE

6115 East Main Avenue
Bismarck, North Dakota, 58501
(701) 258-5599



October 19, 1988

Ron Duvall
Water Rights Division
Dept. of Water & Natural Resources
523 East Capitol
Pierre, SD 57501-3185

Dear Mr. Duvall:

Enclosed is a set of revised and tentatively final plans for the Crystal Springs - Eilen WPA project near Clear Lake in Deuel County, South Dakota. We understand that the project is scheduled to be reviewed at the December 7-8 water rights hearing.

If you have any questions, please contact Rick Warhurst or me at (701) 258-5599. Thank you for your assistance.

Sincerely,

Doug Lipetzky, P.E.
Regional Engineer

DL/cm

Enclosure



DUCKS
UNLIMITED
INC.

DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE

6115 East Main Avenue
Bismarck, North Dakota, 58501
(701) 258-5599



October 21, 1988

David Brown
Water Rights Division
Dept. of Water & Natural Resources
523 E. Capitol
Pierre, SD 57501-3185

RE: Crystal Springs Prairie-Eilen WPA Project

Dear Mr. Brown:

Per your request, please find enclosed a Discharge Curve for the proposed structure installation at Eilen WPA.

If you have any questions, please contact me at (701) 258-5599.

Sincerely,

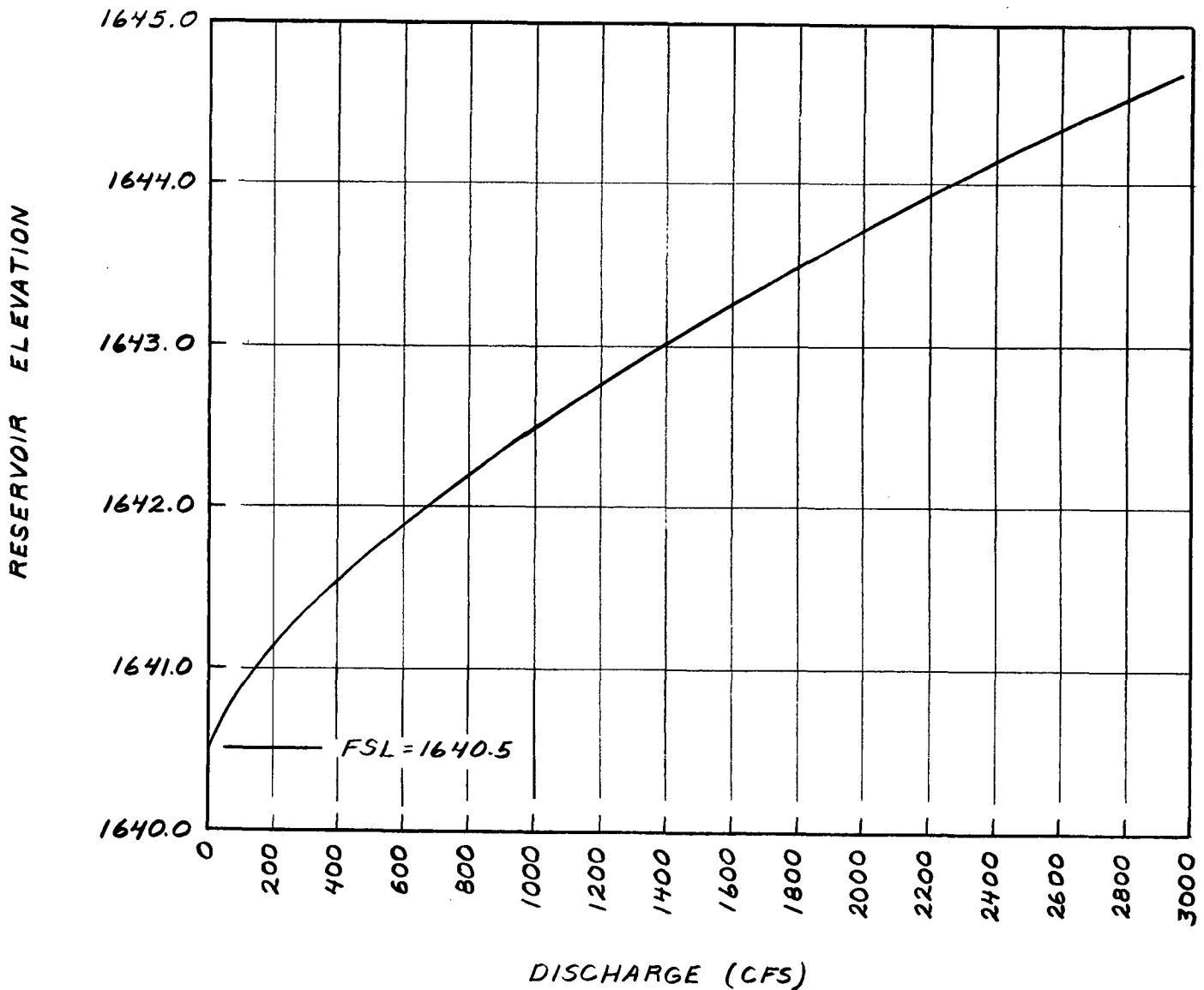
Doug J. Lipetzky, P.E.
Regional Engineer

DJL:ckm

Enclosure

CRYSTAL SPRINGS - EILEN WPA
DEUEL COUNTY, SOUTH DAKOTA
PROJECT NO. DU-1-SD-077-02

RESERVOIR ELEVATION
VS.
DISCHARGE



Instruction to Newspaper - Publish first Notice on or before November 3, 1988 with 2nd publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING on Application No. 5224-3 to Appropriate Water ~~and/or to Amend Water Permit or Water Right No. _____~~

Notice is given that U.S. Fish & Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver, CO 80225 has filed an application for a water permit

to impound 257 acre-feet of water by constructing a dam in the Eilen Waterfowl Production Area. The dam site is to be located in the SE¹/₄ NW¹/₄ Section 2-T115N-R48W. Water is to be stored annually to an approximate elevation of 1640.5 feet mean sea level and is to be used to provide habitat for fish and wildlife production.

Pursuant to SDCL 46-2A-2, the Chief Engineer of the Water Rights Division recommends APPROVAL of Application No. 5224-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water and 4) it is in the public interest. This application will be considered by the Water Management Board in Room Dakota A, Howard Johnson, 3300 W. Russell, Sioux Falls, SD on December 7 at 10:00 am. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer or 4) deny this application based on the facts presented at the public hearing.

Any interested person that intends to participate in the hearing before the Board by presenting evidence or cross-examining witnesses according to SDCL 1-26, must file a written petition with BOTH the applicant and Chief Engineer by November 25, 1988. The Chief Engineer's address is "Water Rights Division, Foss Building, 523 E Capitol, Pierre SD (605 773-3352)". The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application and the signature and mailing address of the petitioner or legal counsel if legal counsel is obtained. The applicant need not file a petition. Contact the Water Rights Division to request information on this application or to assure access to the hearing by the handicapped.

This hearing is an adversary proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. The time of the hearing will also be automatically delayed for at least twenty days upon written request to the Chief Engineer from the applicant or a petitioner. The request for a delay must be received by November 25, 1988.

This application is made pursuant to SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31; ~~(ground) 46-6-3, 46-6-3.1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14;~~ ~~(future use) 46-5-38 thru 46-5-40; (transfer lands) 46-5-33 thru 46-5-35; (10,000 AF) 46-5-20.1, 46-5-8.1;~~ and Board Rules ARSD 74:02:01:01 thru 74:02:01:15; ~~(future use) 74:02:01:24 thru 74:02:01:25; (10,000 AF) 74:02:01:15:02 thru 74:02:01:15:05.~~



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

November 7, 1988

John L. Spinks Jr.
Regional Director
US Fish and Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80225

Dear Mr. Spinks:

We have reviewed the plans and specifications for the Crystal Springs Prairie Eilen Waterfowl Production Area (WPA) Dam in Deuel County. The plans and specifications as submitted are approved.

Our review was to determine compliance with the minimum spillway design flood requirements as specified by Water Management Board Rules Chapter 74:02:08 Safety of Dams. Approval applies only to the portion of the plans and specifications that could result in uncontrolled release of water from the Eilen WPA Dam project. Approval of these plans and specifications does not release the US Fish and Wildlife Service as owner of Eilen WPA from the responsibility of operating and maintaining the dam in good repair to assure the safety of the dam.

If you have any questions, please contact us.

Very truly yours,

A handwritten signature in cursive script that reads "John Hatch".

John Hatch, Chief Engineer
Water Rights Division
605-773-3352

cc: Doug J. Lipetzky, P.E.
Regional Engineer
Ducks Unlimited Inc.



9/14/88
David
Brown

Du Proposed Dam, Duval County

Dam: Top of Dam = 1645.0
 Top of Silt Piling (Spillway crest) = 1640.5, length = 130'
 Top of Dam = 1636.0
 Height of Dam = 9 feet
 Storage Capacity = 257.2 Ac-ft (1640.5), 723 ac-ft (1645.0) ^{Maximum}
 Drainage Area = 22.5 mi²
 Downstream Buildings:
 Elevation = 1642.56, House at 1641.24

$$Q_{total} = 2.8 (130)^{1.5} (4.5)^{1.5} = 3,475 \text{ cfs}$$

$Q_{USFWS} = 2052 \text{ cfs}$: Find C: $C = Q / L H^{1.5} = 2052 \text{ cfs} / (130) (1643.76 - 1640.5)^{1.5}$
 $C = 2.68$

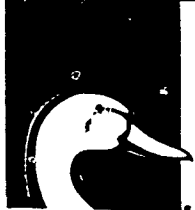
Dam is a Category 2 with a regulated spillway designed flood of a 50 year return period (1651 cfs). Maximum spillway discharge will pass at 3,475 cfs before overflowing dam.

* All Safety at Dams Rules have been met with the exception of a spillway rating curve which was not provided.

10/27/88

Brown received Spillway Rating Curve from DCL, as Safety at Dams Rules have been met

42 SHEETS 10 SQUARE
 42 SHEETS 10 SQUARE
 42 SHEETS 10 SQUARE
 42 SHEETS 10 SQUARE
 NATIONAL



DUCKS
UNLIMITED
INC.

DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE

6115 East Main Avenue
Bismarck, North Dakota, 58501
(701) 258-5599

August 15, 1988

William A. Godby, P.E.
U.S. Fish & Wildlife Service
PO Box 25486, DFC
Denver, CO 80225



Dear Bill:

You should have recently received three sets of preliminary plans for the Crystal Springs Prairie - Eilen WPA project near Clear Lake, South Dakota. Unfortunately, there was an error made on the stage/storage calculations and the information contained on Sheet 2 of the plans is wrong. A corrected stage/storage curve is enclosed. The surface acres at FSL elevation 1640.5 are 88.6 acres and the marsh capacity is 257.2 acre-feet.

The peak discharges and maximum water surface elevation in the marsh change as follows:

<u>Event</u>	<u>Peak Discharge</u>	<u>Maximum Water Surface Elevation in Marsh</u>
10 YR.	860 CFS	1642.30
50 YR.	1651 CFS	1643.33
100 YR.	2052 CFS	1643.76

I apologize for any inconvenience this may have caused. If you have any questions, please contact me at (701) 258-5599.

Sincerely,

Doug Lipetzky, P.E.
Regional Engineer

DL:cm

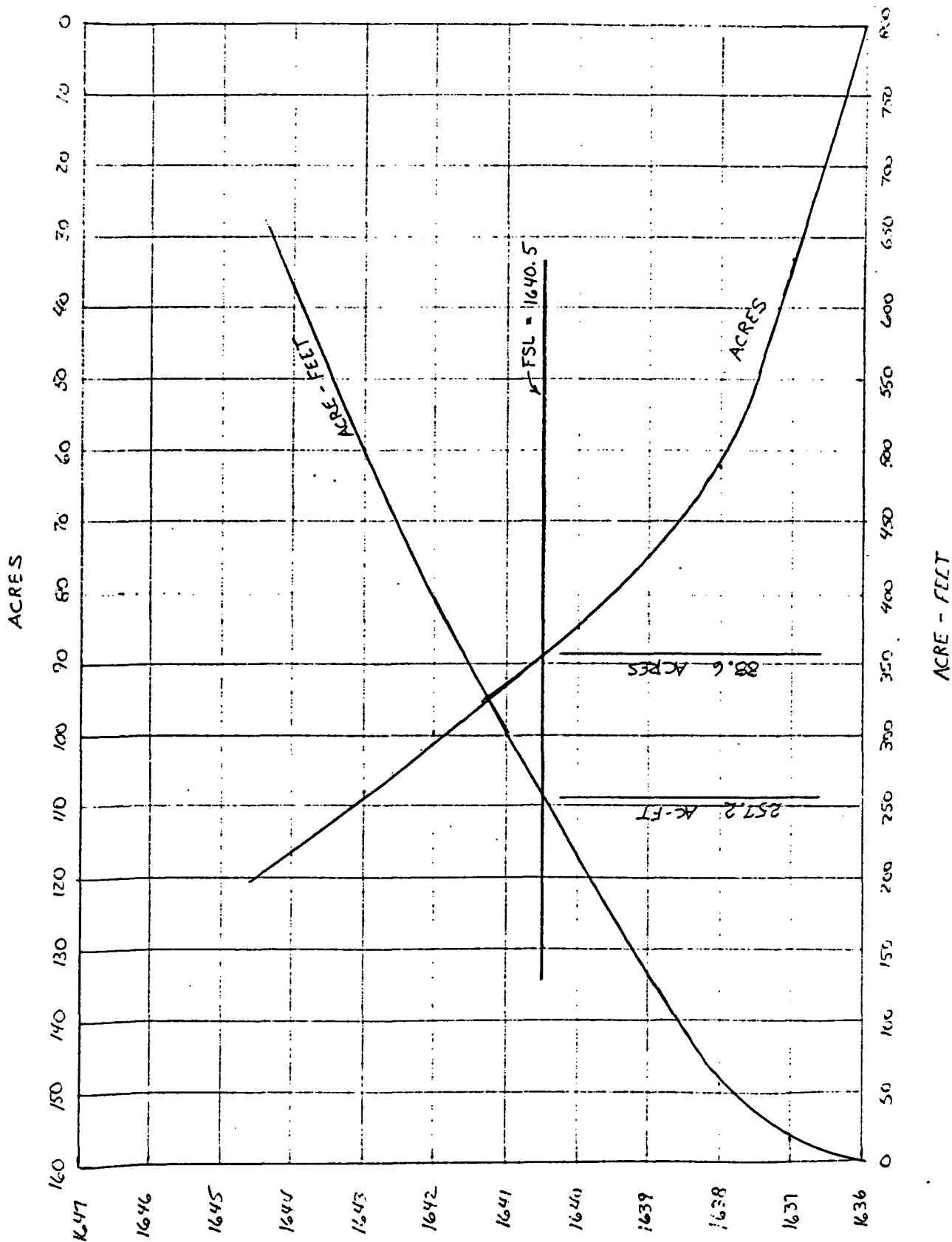
Enclosure

1 AUG 17 1988
U.S.F.W.S.



DESIGN NOTES

PROJECT: Crystal Spring Dam - 57.22 ACF
SUBJECT: Stage / Storage
FILE NO.: SD-077
DATE: 8-15-88
BY: DJL
CHECKED: _____
SHEET: _____
OF: _____





Ducks Unlimited, Inc.

DESIGN NOTES

BY: DLL

CHECKED: _____

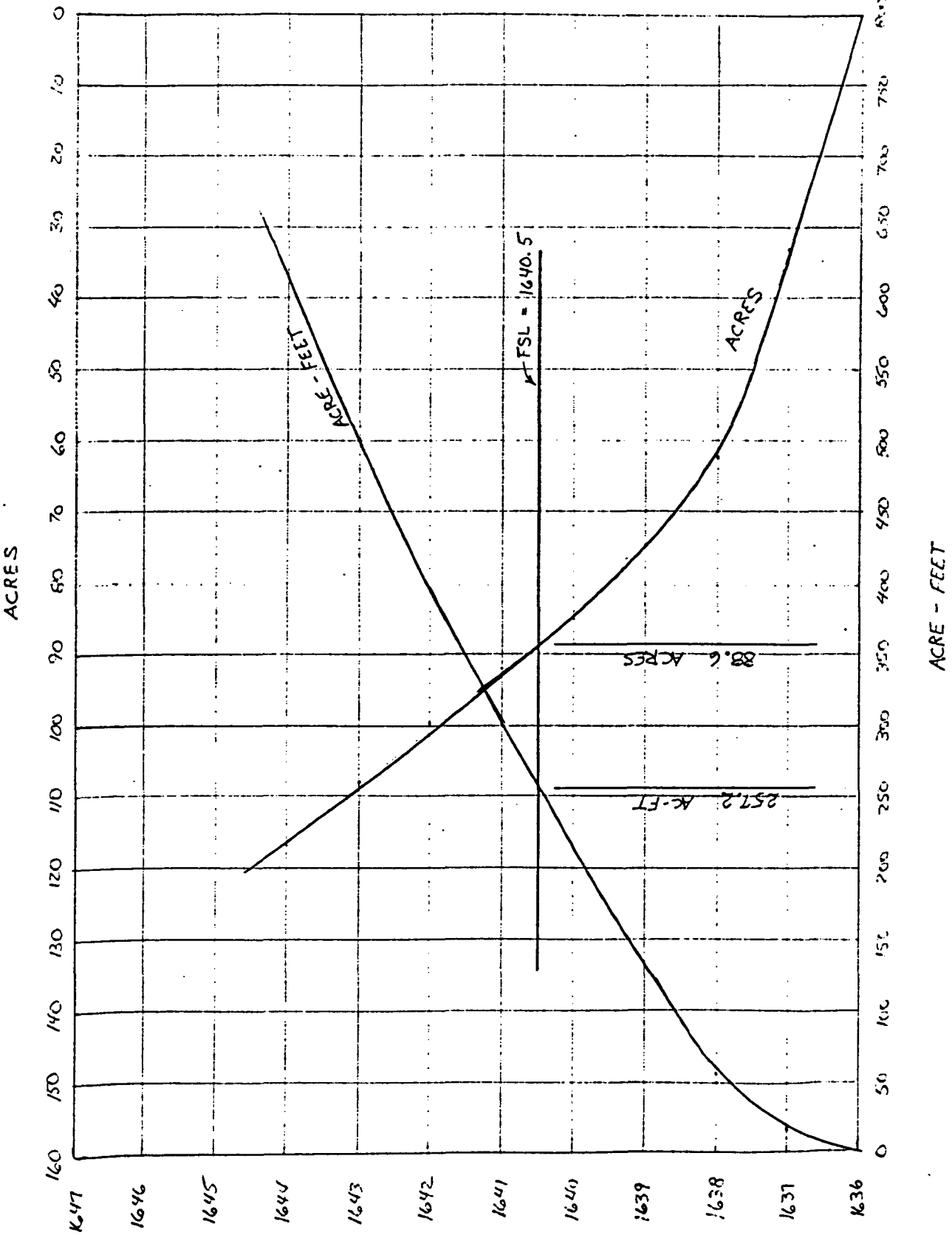
OF: _____

FILE NO.: SD-077

DATE: 8-15-88

SUBJECT: Stages / Storage

PROJECT: Central Swamp Drainage - 57.01 - 107.2





DESIGN NOTES

Ducks Unlimited, Inc.

BY: DLL

CHECKED:

SHEET:

OF:

PROJECT:

Central Swamp Project - 1971-1972

SUBJECT:

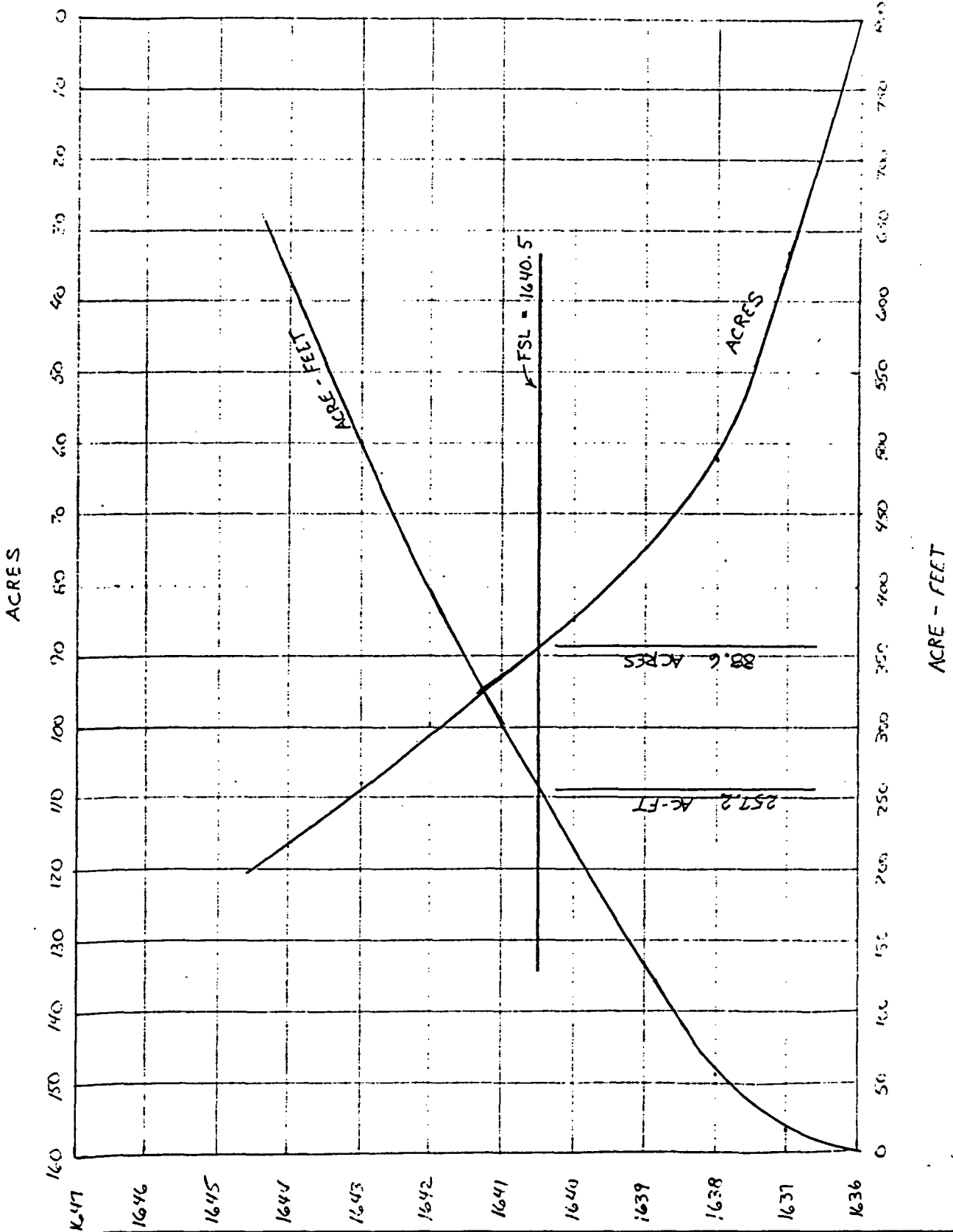
Stage / Storage

FILE NO.:

SD-017

DATE:

5-15-88





United States Department of the Interior
FISH AND WILDLIFE SERVICE



IN REPLY REFER TO:

BA EN
WR SD
Mail Stop 60190

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

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228

AUG 22 1988

Mr. Ron Duvall
South Dakota Department of
Water and Natural Resources
Foss Building, 523 East Capitol
Pierre, South Dakota 57501-3181



Dear Mr. Duvall:

The U.S. Fish and Wildlife Service and Ducks Unlimited, Inc. (DU), propose construction of a dam to create a semipermanent marsh for waterfowl production and migration on the Eilen Waterfowl Production Area (WPA) in Deuel County. We are negotiating a flowage easement with The Nature Conservancy for impoundment of water on their lands adjoining the WPA.

Enclosed are the following materials pertaining to the project:

1. Form 2, Application for Permit to Appropriate Water (in duplicate).
2. Form 2A, Supplemental Information (in duplicate).
3. Engineering drawings, five sheets.
4. Filing Map No. 6R-SD-609-WR-P-14.0.
5. Government Purchase Order in the amount of \$250.

Please sign the purchase order where indicated and return to this office, or send an invoice so that payment can be issued.

Also enclosed are letters from Ducks Unlimited to William A. Godby dated August 11 and August 15, 1988, which contain design information.

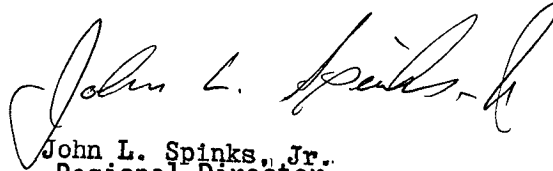
We would appreciate your advising us of the name and address of the newspaper selected to publish the Notice of Application, so that we can forward the required Authorization of Advertisement prior to publication.

Mr. Ron Duvall

Page 2

For technical information, please contact Doug Lipetzky of DU, at 701/258-5599. If you have any other questions, please contact Cheryl Williss, of this office, at 303/236-5321.

Sincerely,



Deputy
John L. Spinks, Jr.
Regional Director

Enclosures

cc: Ducks Unlimited, Inc.
6115 East Main Avenue
Bismarck, North Dakota 58501
w/o enclosures

Ross Sublett
The Nature Conservancy
1313 5th Street, SE
Minneapolis, MN 55414-1524
w/o enclosures

RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 5224-3, US Fish & Wildlife Service

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Division, Department of Water and Natural Resources concerning Water Permit Application No. 5224-3, US Fish & Wildlife Service, PO Box 25486, DFC, Denver CO.

The Chief Engineer is recommending APPROVAL of Application No. 5224-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) in the public interest with the following qualifications:

1. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.
2. Approval of this Permit authorizes storage of up to 257 acre feet of water annually.

See the attached report for additional information.



JOHN HATCH, Chief Engineer
October 20, 1988

Report on Application No. 5224-3
US Fish and Wildlife Service
October 14, 1988

Application No. 5224-3 for the US Fish and Wildlife Service requests the appropriation of 257 acre feet of water to be stored in a dam proposed to be constructed in the Eileen Waterfowl Production Area. The dam site is to be located in the SE1/4NW1/4 of section 2, T115N, R48W. The conservation storage of the dam would be at an elevation of 1640.5 feet mean sea level. The project is a Ducks Unlimited Project and will be used to provide habitat for fish and wildlife.

Discussion

The point of diversion is on Monighan Creek in Deuel County. The dam will create a semipermanent marsh for waterfowl production and migration. The drainage area above the dam is 22.5 square miles. The height of the structure is 9 feet. The structure will contain a low level outlet consisting of a 3 ft. by 4.5 ft. stoplog structure and a 130 feet wide spillway.

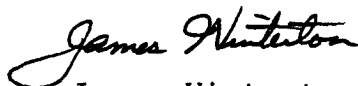
The dam is classified as a Category 3 for Safety of Dams purposes. In accordance with Safety of Dams Rules the required flood bypass requirement would be a 25 year frequency flood. According to Doug Lipetzky, P.E., Regional Engineer for Ducks Unlimited, the 50 year event would produce a peak discharge of 1651 cfs, the 100 year event would produce a peak discharge of 2052 cfs. Our review of the design determined that the spillway will pass approximately 3,475 cfs. All Safety of Dams requirements have been met.

A review of the Water Rights Division files showed no existing water rights below the proposed point of diversion in South Dakota. Monighan Creek flows east into Minnesota.

Conclusions and Recommendation

Water is available from Monighan Creek to meet the needs of this application. There are no existing water rights which would be adversely affected. The proposal for the dam meets the requirements of the Safety of Dams Rules for a Category 3 Dam.

It is recommended that Application No. 5224-3 be approved with the low flow qualification for the protection of domestic use downstream on Monighan Creek.



James Winterton
Natural Resources Engineer



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol

Pierre, South Dakota 57501-3181

Water Rights Division
(605) 773-3352

October 26, 1988

NOTE:

TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT THE
NEWSPAPER RIGHT AWAY.

U.S. Fish & Wildlife Service
PO Box 25486 DFC
Denver, Colorado 80225

ATT: Cheryl Willis

Dear Sir:

Your Application No. 5224-3 for a permit to appropriate water for

fish & wildlife propagation use, has been examined and found to
comply with the South Dakota Water Laws and applicable rules. A notice of
your intent to appropriate water has been sent to the Publisher of the

Gary Interstate, Box 128, printed at Gary

South Dakota. For your information, a copy of this notice, the recommendation
of the Chief Engineer and a report on the application are enclosed. Please
review this notice prior to publication and notify this office, if you have
any corrections or questions.

BE SURE TO CONTACT THE ABOVE NEWSPAPER IMMEDIATELY TO AUTHORIZE PUBLICATION
OF YOUR NOTICE OF INTENT TO APPROPRIATE WATER AND TO ARRANGE FOR PAYMENT.
Early contact with the paper can eliminate delays. The publisher has been
instructed to publish your notice once each week for two consecutive weeks
with the last publication to occur at least twenty days before the board
meeting. We must receive Proof of Publication before the application can be
considered by the Water Management Board.

Sincerely,

RON DUVALL
Natural Resources Engineer

enclosures

cc: Doug Lipetzky-Ducks Unlimited



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

October 26, 1988

Gary Interstate
Box 128
Gary, South Dakota 57237

Dear Sir:

Enclosed is a Notice of Hearing on Application No. 5224-3 to be published twice. Please publish the first notice on or before November 3, 1988 with the second publication 7 days later.

The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is U.S. Fish & Wildlife Service, PO Box 25486, DFC, Denver, CO 80225.

A copy of BOTH publications must be SENT to the WATER RIGHTS DIVISION. IMMEDIATELY return the FIRST publication with the FIRST Transmittal form on the bottom of this page. The first copy is needed to check the publication for errors so any corrections can be made in the second publication. Publication errors can invalidate the public notice and cause the applicant costly delays.

Please be sure the SECOND publication is returned IMMEDIATELY with the enclosed Proof of Publication form. DO NOT WAIT until the end of the month or the billing cycle. The permit application cannot be considered by the Water Management Board until proof of publication has been received.

Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

FIRST TRANSMITTAL NOTICE
No. _____

TO: Water Rights Division
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to
Appropriate Water by Application No. _____ which was first published in our issue
of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

November 16, 1988

Cheryl Willis
US Fish and Wildlife Service
PO Box 25486, DFC
Denver CO 80225

Dear Ms. Willis:

I am writing to advise you that the legal notice of hearing for Application No. 5224-3 (Eilen WPA project) published in the Gary Interstate, Gary SD is incomplete. The second publication of the legal notice was to be printed on November 10, 1988. Due to an oversight the notice was not published the second time. Application No. 5224-3 can not be considered at the December Board meeting because of improper public notice of hearing.

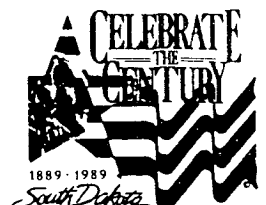
As a result of the publication error, the legal notice will need to be readvertised for the March 1 & 2, 1989 Water Management Board meeting. The readvertisement is needed to meet the statutory requirement to publish for 2 successive weeks with the second publication at least 20 days before the scheduled hearing. The information needed to readvertise the notice will be sent to you and the newspaper under separate cover.

Please contact me if you have any questions.

Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

cc: Gary Interstate





Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

December 13, 1988

NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

US Fish and Wildlife Service
ATTN: Cheryl Willis
PO Box 25486
DFC
Denver CO 80225

Dear Ms. Willis:

Your Application No. 5224-3 for a permit to appropriate water for fish and wildlife propagation use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of your intent to appropriate water has been sent to the Publisher of the Gary Interstate printed at Gary SD. For your information, a copy of the notice is enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice of Intent to Appropriate Water and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting. We must receive Proof of Publication before the application can be considered by the Water Management Board.

Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

enclosures





Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

December 14, 1988

Gary Interstate
Box 128
Gary SD 57237

Dear Sir:

Enclosed is a Notice of Hearing on Application No. 5224-3 to be published twice. Please publish the first notice on or before December 22, 1988 with the second publication 7 days later.

This notice is a readvertisement of the notice published in your paper on November 3, 1988. Due to a publishing error, the notice did not get published on November 10, 1988. The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is US Fish & Wildlife Service, PO Box 25486, DFC, Denver CO 80225.

A copy of BOTH publications must be SENT to the WATER RIGHTS DIVISION. IMMEDIATELY return the FIRST publication with the FIRST Transmittal form on the bottom of this page. The first copy is needed to check the publication for errors so any corrections can be made in the second publication. Publication errors can invalidate the public notice and cause the applicant costly delays.

Please be sure the SECOND publication is returned IMMEDIATELY with the enclosed Proof of Publication form. DO NOT WAIT until the end of the month or the billing cycle. The permit application cannot be considered by the Water Management Board until proof of publication has been received.

Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

FIRST TRANSMITTAL NOTICE
No. _____

TO: Water Rights Division
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to
Appropriate Water by Application No. _____ which was first published in our issue
of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper



Instruction to Newspaper - Publish first Notice on or before December 22, 1988 with 2nd publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING on Application No. 5224-3 to Appropriate Water

Notice is given that the US Fish and Wildlife Service, PO Box 25486, Denver Federal Center, Denver CO 80225 has filed an application for a water permit to impound 257 acre-feet of water by constructing a dam in the Eilen Waterfowl Production Area. The dam site is to be located in the SE 1/4 NW 1/4 Section 2, T115N, R48W. Water is to be stored annually to an approximate elevation of 1640.5 feet mean sea level and is to be used to provide habitat for fish and wildlife.

Pursuant to SDCL 46-2A-2, the Chief Engineer of the Water Rights Division recommends Approval of Application No. 5224-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water and 4) it is in the public interest. This application will be considered by the Water Management Board at the Crossroads Hotel, Salon 1, 100 4th St SW, Huron SD on January 25, 1989 at 10:30 am. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer or 4) deny this application based on the facts presented at the public hearing.

Any interested person that intends to participate in the hearing before the Board by presenting evidence or cross-examining witnesses according to SDCL 1-26, must file a written petition with BOTH the applicant and Chief Engineer by January 13, 1989. The Chief Engineer's address is "Water Rights Division, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)". The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application and the signature and mailing address of the petitioner or legal counsel if legal counsel is obtained. The applicant need not file a petition. Contact the Water Rights Division to request information on this application or to assure access to the hearing by the handicapped.

This hearing is an adversary proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. The time of the hearing will also be automatically delayed for at least twenty days upon written request to the Chief Engineer from the applicant or a petitioner. The request for a delay must be received by January 13, 1989.

This application is made pursuant to SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15.

No. 5224-3

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
County of Deuel) ss.

I, Mary E. Burkman hereb

certify that the annexed printed copy of Notice of Intent to Appropria

Water was taken from the Gary Interstate,

A newspaper which during the whole time of publication of said notice
herein after stated, has been and is printed and published in the _____

City _____ of Gary

County of Deuel and State of South Dakota;
that the said notice was published in said newspaper on the following
two dates:

December 22, 1988

December 29, 1988

Mary E. Burkman
(Signature)

Publisher

(Title)

12-19-1988

(Date Signed)

Cost of Printing:

1st - 100 lines x \$.201 = 20.10

2nd - 80% = 16.08

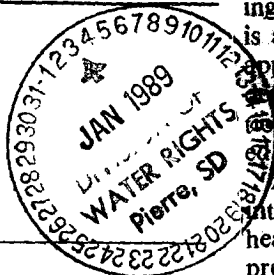
Total = 36.18

**Notice of Hearing on Applica-
tion No. 5224-3 to Appropriate
Water**

Notice is given that the U.S.
Fish and Wildlife Service, P.O.
Box 25486, Denver Federal
Center, Denver, Colo. 80225,
has filed an application for a
water permit to impound 257
acre-feet of water by construct-
ing a dam in the Eilen Water-
fowl Production Area. The
dam site is to be located in the
SE 1/4 NW 1/4 Section 2, T115N,
R48W. Water is to be stored
annually to an approximate
elevation of 1,640.5 feet mean
sea level and is to be used to
provide habitat for fish and
wildlife.

Pursuant to SDCL 46-2A-2,
the Chief Engineer of the Wat-
ers Rights Division recommends
Approval of Application No.
5224-3 because 1) unappropri-
ated water is available, 2) exist-
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impaired, 3) it is a beneficial
use of water and 4) it is in the
public interest. This application
will be considered by the Water
Management Board at the
Crossroads Hotel, Salon 1, 100
4th St. SW, Huron, SD, on
January 25, 1989 at 10:30 a.m.
The Chief Engineer's recom-
mendation is not final or bind-
ing upon the Board. The Board
is authorized to 1) approve, 2)
approve with qualifications, 3)
defer or 4) deny this applica-
tion based on the facts present-
ed at the public hearing.

Any interested person that
intends to participate in the
hearing before the Board by
presenting evidence or cross-
examining witnesses according
to SDCL 1-26, must file a writ-
ten petition with BOTH the



applicant and Chief Engineer by January 13, 1989. The Chief Engineer's address is Water Rights Division, Foss Building, 523 E. Capitol, Pierre, S.D. 57501 (605-773-3352). The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application and the signature and mailing address of the petitioner or legal counsel if legal counsel is obtained. The applicant need not file a petition. Contact the Water Rights Division to request information on this application or to assure access to the hearing by the handicapped.

This hearing is an adversarial proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. The time of the hearing will also be automatically delayed for at least twenty days upon written request to the Chief Engineer from the applicant or a petitioner. The request for a delay must be received by January 13, 1989.

This application is made pursuant to SDCL 46-1 thru 46-1-9, 46-1-12 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-13, 46-2A-15; 46-5-1 thru 46-5-13, 46-5-15, 46-5-17, 46-5-21, 46-5-30.2, 46-5-31, 46-5-33; and Board Rules A and D 74:02:01 thru 74:02:01.
(Publish Dec. 22, 1988)



DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE

6115 East Main Avenue
Bismarck, North Dakota, 58101
(701) 258-5599



January 18, 1989

John Hatch, Chief Engineer
Water Rights Division
SD Dept. of Water & Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181

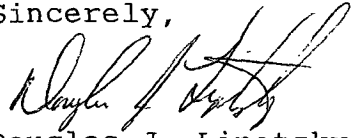
RE: Crystal Springs Prairie - Eilen WPA Project
Deuel County, South Dakota

Dear Mr. Hatch:

Per your January 10, 1989 letter to Mr. John Spinks of the U.S. Fish & Wildlife Service in Denver, please find enclosed a final and signed set of plans and specifications for the above-referenced project. Upon completion of your review, please retain the specifications package for future reference on Ducks Unlimited projects.

If you have any questions or need any additional information, please feel free to contact me at (701) 258-5599. Thank you.

Sincerely,


Douglas J. Lipetzky, P.E.
Regional Engineer

DJL:ckm

Enclosures

cc: William Godby

DUCKS UNLIMITED, INC.
FORM 101 - GENERAL CONDITIONS



101.100 DEFINITIONS:

101.101 Corporation

Shall mean Ducks Unlimited, Inc.

101.102 Engineer

Shall mean the Chief Engineer designated by the Corporation acting directly or through a duly authorized representative.

101.103 Contractor

The individual, partnership or corporation undertaking the execution of the work under the terms of the Contract and acting directly or through a duly authorized representative.

101.104 Subcontractor

Any person or entity who has a direct contract with the Contractor to perform any part of work, and who is approved in writing by the Corporation.

101.105 Contract

The Contract consists of the Unit Price Agreement (including all Addenda and attachments thereto), between the Corporation and the successful Bidder by which such Bidder, as the Contractor, is obligated to perform the proposed work, together with the Bid, Specifications, Plans, General Conditions, Special Provisions, supplemental agreements and securities, and any written change orders thereto signed by both the Corporation and the Contractor. The Contract represents the entire and integrated agreement between the parties thereto and supercedes all prior negotiations, representations or agreements, either written or oral.

101.106 Bid

The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the work to be performed.

101.107 Bidder

Any person or entity submitting a Bid for the proposed work.

101.108 Plans

The Plans which show the character and scope of the work to be performed and which have been prepared or approved by the Engineer and are referred to in the Contract documents.

101.109 Addenda

Written or graphic attachments to the Bid and the Contract which modify or interpret the Bidding documents (including Plans and Specifications) by addition, deletion, clarification or corrections, and which have been mutually approved by the Contractor and the Corporation. Addenda will become part of the Contract documents when the agreement is executed.

101.110 Specifications

A general term applied to all directions and requirements pertaining to the performance of the work.

101.111 Special Provisions

Special directions, provisions or requirements peculiar to the work under consideration and not otherwise thoroughly or satisfactorily detailed or set forth.

101.112 Specification Package

A collection of specifications and special provisions attached to a contract for the direction and performance of that contract. Each specification and special provision included in the package applies to and is considered a part of all the other specifications and special provisions within the package.

101.113 Extra Work

An item of work not provided for in the Contract as awarded but found essential, by the Engineer, to complete the work within its intended scope. Contractor is not authorized to commence any Extra Work without the prior written consent of the Corporation.

101.114 Substantial Performance

A Contract or Subcontract shall be conclusively deemed to be substantially performed when the works to be constructed under the Contract or Subcontract are ready for use and the Contractor or Subcontractor has met all statutory requirements.

or decrease in actual quantity of any particular item of work, the Bidder shall promptly notify the Corporation of the change in writing. No change in quantities shall be permitted until the Corporation approves the change in writing. In the event the Corporation approves such a change, the actual quantity delivered or installed shall be paid for at the bid unit price for that particular item of work.

101.205 Preparation of Bid

Each bidder shall submit bids on the Standard Bid Form supplied by the Corporation. All bids shall be completed and signed including all statements and securities as required. Only the completed Standard Bid Form needs to be submitted. The Plans, General Conditions, Specifications, and Special Provisions will be considered a part of the bid and shall be retained by the Contractor for the firms records. The authorized representative(s) of the bidder shall sign in the space provided.

101.206 Mathematical Errors in the Bid

No mathematical errors or omissions in the Bid form shall be corrected by the Corporation except that should a mathematical error occur in the extensions of unit prices and additions of amounts, the unit price shall govern. In such event, the amount and total price shall be corrected accordingly. In the event any other material error or omission should occur, the Engineer, in his sole discretion, shall have the option to terminate the Contract.

101.207 Inconsistency

In the event there is an inconsistency or conflict in the Contract documents, Special Provisions shall prevail over Plans, Specifications and General Conditions.

In the event of discrepancies or conflicts within the Plans, the drawings drawn to the largest scale shall govern.

In the event of discrepancies or conflicts between figures, dimensions and scaled dimensions, the figured dimensions shall govern.

Except as otherwise provided for herein, any inconsistencies between the General Conditions, Specifications and Plans shall be resolved by the Engineer.

101.208 Withdrawal of Qualifying Bids

A Bidder may, without prejudice, withdraw a Bid after it has been deposited with the Corporation provided the request for such withdrawal is received by the Corporation, in writing or by

101-115 Performance and Payment Bonds

Without restricting or limiting any other format and acceptable definition of Performance and Payment Bonds, for the purposes of this agreement the Performance and Payment Bonds shall also include any form of security acceptable to the Corporation and obtained or provided by the Contractor for the benefit of the Corporation, under the terms of which the Corporation is to be indemnified by the Contractor for any loss or damage howsoever arising, as a result of any failure, neglect, delay or for default under the terms of the Contract, including breach of the Contract.

101.200 BID REQUIREMENTS AND CONDITIONS:

101.201 Bid

The accepted Bid shall apply to and be part of the Contract.

101.202 Delivery of the Bid

All Bids must be submitted on the form supplied by the Corporation. Each Bid must be submitted in a sealed envelope addressed to the Corporation, at the address listed on the cover page of the Bid documents. Each envelope must be clearly marked "BID", and shall identify the project name, Contract number and return address of the Bidder. The Corporation reserves the right to open the Bids in private. The Bid will be reviewed by the Engineer after which a Contract may or may not be awarded. Any Bid received after the closing time will not be accepted.

101.203 Examination of the Site

The Bidder warrants that he has visited and examined the site of the project and is familiar with the location, means of access, physical conditions including surface and subsurface conditions, nature and position of any existing structures, obstructions and any other factors which may affect the Bid or the execution of the work. The Bidder shall not claim, after submission of this Bid, that there was any misunderstanding of the terms and conditions of the Contract relating to the site conditions. Examination of existing soil information can be arranged by notifying the Engineer at his office. Should the Bidder wish to conduct any subsurface exploration or soil testing, he shall contact the Engineer prior to such exploration.

101.204 Bid Quantities

The quantities set forth in the Bid Form are approximate only. The portion of the work for which the bidders are to submit prices have been divided into items, in order for the bidders to bid for the different portions of the work in accordance with their estimate of cost. If there is an increase

telegram, before the time set for opening Bids. The Bidder may then submit a revised Bid provided it is received prior to the Bid closing time.

101.209 Discrepancies

Should a Bidder find omissions from or discrepancies in any of the Bid documents or should a Bidder be in doubt as to the meaning of any part of such documents, he should notify the Engineer for clarification before the closing date of Bids. If the Engineer considers a correction or interpretation necessary or desirable, he will issue a written Addendum to all Bidders notifying them of the omissions or discrepancy and setting out the correction or interpretation.

101.210 Acceptability of Bids

Bids which are incomplete, conditional, illegible or obscure or that contain additional matters not requested by the Corporation, reservations, erasures, alterations (unless properly and clearly made and initialed by the Bid signing officer), or irregularities of any kind, may be rejected. All entries in the Bid shall be made in ink or by typewriter. The Corporation reserves the right to waive formalities at its discretion. The Corporation reserves the right to reject any or all Bids. The lowest Bid may not necessarily be accepted. Any obviously unbalanced Bid may be rejected.

101.211 Validity of the Bid

The Bidder agrees that the Bid and the prices quoted therein constitutes an offer to the Corporation which is open for acceptance of the Corporation for a period of thirty calendar days from the Bid closing time.

101.300 AWARD AND EXECUTION OF CONTRACT:

101.301 Qualification of Bidder

Before awarding the Contract, the Corporation may require any Bidder to submit proof that he has successfully carried out work of a similar nature, is financially capable of carrying out the terms of the Contract; has sufficient quantity and type of equipment to perform the work; and such other related information as the Corporation shall reasonably require.

101.302 Acceptance of Bid and Award of Contract

Within thirty days of the Bid closing time, the successful Bidder will be notified. The successful Bidder shall execute a Unit Price Agreement on the Corporation's standard form, and furnish any required information within fifteen days thereafter.

After the Unit Price Agreement is signed, any security held by the Corporation shall be returned to the successful Bidder. If the Contractor fails to execute the Unit Price Agreement, the security will be forfeited to the Corporation, which forfeiture shall not impair any other remedies which the Corporation may have either at law or in equity. All unsuccessful Bidders will be relieved of any obligation to enter into a contract and any security held by the Corporation will be returned.

101.303 Execution of Contract

Upon acceptance of the Bid from the Contractor, an agreement shall be executed on the Corporation's standard form Unit Price Agreement, at which time the Contractor shall deliver to the Corporation Performance and Payment Bonds, supplied by a surety company acceptable to the Corporation. The Contractor shall also include delivery of a certificate of the specified comprehensive general liability insurance to the Corporation.

101.304 Performance and Payment Bonds

Performance and Payment Bonds shall be provided on forms acceptable to the Corporation. The Performance Bond is the Contractor's guarantee for all workmanship and materials used to construct the project. The Payment Bond is the security required to guarantee that the contractor made all payments for sub contracts, labor and materials for the project. The Performance Bond and Payment Bond are each for the amount shown on the original Bid Form and must remain in full effect for one year after the projects final acceptance. Projects involving construction of islands or level ditching the Engineer may reduce the one year time requirement. The reduction in time shall be shown on the Bid Form.

101.305 Notice to Proceed

No work or ordering of materials shall be done on a project until the Engineer has issued a Notice to Proceed. The Notice will be written and will be issued only when a signed Unit Price Agreement and a Certificate of Insurance have been received by the Corporation. If a Notice to Proceed has not been issued within thirty days of the bid closing date then the contract is considered void unless both parties mutually agree in writing to extend it. If a contract is extended in such a manner, the contractor understands that a Notice to Proceed is still needed prior to the start of a project.

Once a Notice to Proceed has been issued the Contractor shall initiate work in sufficient time to complete the works by the completion date indicated on the Unit Price Agreement. If the Contractor has, in the opinion of the Engineer, delayed the commencement of work to the extent that the Date of Completion cannot be met, then the Contractor may be subject to the penalties of default or delay as described herein.

101.400 SCOPE OF WORK:

101.401 Increased or Decreased Quantities

The quantity of any contract item may increase or decrease naturally during the completion of a project or may be ordered changed by the Engineer without nullifying the contract. If the quantity of any contract item required to complete the project varies from the original estimate by 25 percent or less, payment for that quantity shall be made at the contract unit price. Unless otherwise noted, adjustment to the contract item unit price shall be made if quantities differ from the original estimate by more than 25%. The contract unit price shall be adjusted for the entire bid item quantity. This adjustment shall be made by the mutual consent of the Contractor and Corporation.

If payment for increased or decreased quantities can not be agreed upon between parties, then payment shall be made as outlined in 101.402 Extra Work. The contractor shall be responsible for all of the recordkeeping requirements described in this section.

101.402 Extra Work

The Corporation may, without invalidating the Contract, order the Contractor to perform Extra Work. The Contractor shall not commence any Extra Work unless the work has been ordered in writing by the Engineer. Extra Work shall be paid for in accordance with the rate or rates as set out in the Extra Work order.

If a method of payment for the Extra Work cannot be agreed to between the parties, then it shall be paid for on the basis of actual cost plus fifteen percent. The Contractor shall keep a daily record of each piece of work covered by the Extra Work order, showing the names of each workman engaged on the Extra Work, the number of hours each workman was employed, and the number of hours equipment was employed on the Extra Work. These daily records shall be made in duplicate each day of which Extra Work is done, and shall be signed by the Contractor in charge of the work and submitted to the Engineer for approval.

All invoices in connection with the Extra Work shall be submitted by the Contractor to the Engineer, on certified duplicate statements, not later than the tenth day of the month following that in which the Extra Work was performed.

101.403 Clean Premises

The Contractor shall keep the work site in a neat and orderly condition at all times. Care shall be taken to prevent excessive soil erosion by either wind or water. Waste materials, rubbish and debris shall be promptly and regularly removed from the site by the Contractor.

Upon completion of the work, the Contractor shall promptly remove all remaining materials, rubbish, litter, debris, temporary structures, excess materials and plants, and shall clean up the site and works to the satisfaction of the Engineer.

101.404 Stop Work Order

The Engineer may stop work at any time by giving written notice to that effect to the Contractor. Under no circumstances shall the Contractor recommence construction until he has obtained written permission of the Engineer.

101.405 STANDBY TIME

The Engineer may require a Contractor to stop work on a project and "standby" for a period of time before resuming work. When a Contractor is required to "standby" by order of the Engineer then payment for idle equipment shall be made at an hourly fixed cost rate for each piece of equipment plus fifteen percent as agreed upon between the Contractor and Engineer. If an hourly fixed cost rate for equipment cannot be agreed upon between both parties then a rate determined using one half the Rental Rate Blue Book hourly rate plus fifteen percent shall be used. In both cases the fixed cost rate shall only include the equipment rental rate plus labor and will not include any operating costs. If the Rental Rate Blue Book is used to determine an hourly rental rate for a piece of equipment the monthly rate divided by 176 hours shall be used. Payment for standby equipment shall not exceed eight (8) hours per day nor 40 hours per week.

101.500 CONTROL OF WORKS:

101.501 Engineer's Rights and Obligations

The Engineer shall:

- (a) decide whether all work has been completed as required by the Contract and decide what the Contractor is required by the Contract to do, including the acceptability of: the quality of quantity of any labor plant or material used in the execution of the work; the quality and quantity of work, and the timing and scheduling of the various phases of the work.

- (b) be authorized to order work insufficiently or improperly performed or defective materials supplied to be re-executed or removed and replaced by the Contractor to his satisfaction.
- (c) have the right to order Extra Work, dispense with or change the whole or any part of the work provided for in the unit price table or in the Plans and Specifications.

101.502 Supervision of Construction and Workers

The Contractor shall supervise and direct the work using his best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the work under the Contract. The Contractor shall also designate a person(s) to be the Contractor's representative on site. This person will serve as the project contact person and will represent not only the Contractor but also any subcontractors used on the project.

Any person employed by the Contractor who, in the opinion of the Engineer, does not perform his work in a proper skillful manner, or is disrespectful, intemperate, disorderly, or otherwise objectionable, shall by written request (detailing reasons) of the Engineer to the Contractor be removed from the work site by the Contractor employing the person, and that person shall not be employed again on any portion of the said work.

101.503 Inspection

The following construction operations shall not be in progress when the Engineer is not on site unless otherwise authorized by the Engineer:

- (a) Pipelaying.
- (b) Backfilling.
- (c) Placing control structures or water control devices.
- (d) Construction involving existing works or utilities.
- (e) Pouring concrete.
- (f) Blasting.

The Contractor shall give the Engineer no less than two days written or verbal notice of Contractor's intention to commence construction on any of these operations. It shall be the Engineer's responsibility to ensure that he is available to inspect the work provided he has been given the appropriate notice.

This inspection shall not relieve the Contractor of his responsibility to perform the work in a proper and workmanlike manner.

101.504 Survey Stakes and Plans

The Engineer will provide the Contractor with lines and grades. In general, construction stakes will be set to mark the location, alignment, elevation and grade of the work. The Contractor shall assume full responsibility for dimensions and elevations measured from such stakes and for checking the location and elevation of the individual units.

If necessary, the Contractor shall provide adequate and suitable employees to assist the Engineer with minor construction staking.

The Contractor shall be responsible for the preservation of construction stakes and identified survey pins, and the cost of replacing pins.

101.505 Accommodation of Traffic

The Contractor shall make proper provisions for maintaining traffic on roads and railways. Vehicular and pedestrian traffic shall not be stopped, restricted or diverted except when specified in the construction specification.

101.506 Specifications or Access to Work

When crossing private property, the Contractor shall confine his activity to only access roads indicated on the Plans, unless otherwise specified by the Engineer.

101.507 Subcontracts

The Contractor shall not, without the written permission of the Corporation, assign this Contract, or make any Subcontract with any person to perform any portion of the work except as approved in the Bid.

In the event the Corporation consents to a subcontract or assignment, the Contractor shall not be relieved of any liabilities or obligations under the Contract. The Contractor shall be responsible for the prompt payment of all just debts incurred by the assignee or Subcontractor on work done under the Contract.

The Contractor shall supervise all work performed by a Subcontractor and shall terminate a Subcontractor if the Subcontractor's performance is not of good quality or in accordance with the Contract requirements.

101.600 CONTROL OF MATERIALS:

101.601 Materials Supplied by the Corporation

(a) Acceptance of Materials

The Contractor shall, upon delivery to the site or to his possession, check carefully the number and quality of such materials. In the event that there are shortages, discrepancies or materials in poor condition, the Contractor shall immediately report in writing such shortage, discrepancy or poor condition to the Engineer responsible for the work.

(b) Shortage and Care of Materials

(i) The Contractor shall be solely responsible for the full amount of material in each shipment and any theft of, loss of, or damage to material after delivery to the Contractor, will be charged to the Contractor.

(ii) If any questions should arise as to the suitability of any material supplied by the Corporation for use on the work, such material shall remain in the care of and at the risk of the Contractor until it can be examined and tested by the Engineer to determine its fitness for the purpose for which it was supplied.

(iii) Materials supplied by the Corporation to the Contractor shall not be used by him for any purpose other than that for which they were supplied.

101.602 Warranty

The Contractor warrants to the Corporation that all materials and equipment furnished by the Contractor under the Contract will be new and in accordance with the specifications unless otherwise specified, and that all work will be of good quality, free from faults and defects and in conformance with the Contract. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Corporation, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. In the event the Engineer discovers that unacceptable materials are being used, whether incorporated in the work or not, such materials shall be promptly removed from the site at the Contractor's expense.

101.700 LEGAL RELATIONS AND RESPONSIBILITIES:

101.701 Insurance

Notwithstanding any other insurance coverages carried, or required by law to be carried, by the Contractor, the Contractor shall provide, maintain and pay for comprehensive General Liability Insurance which shall be in the joint names of the Contractor and the Corporation with limits not less than one million dollars inclusive per occurrence for bodily injury, death and for damage to property including loss of use. Proof of such coverage must be provided to the Corporation at the time of execution of the Contract by the Contractor. Insurance shall be maintained throughout the entire construction period of the project. The Contractor can request release of the insurance coverage either verbally or in writing to the Engineer only if the project is completed, all equipment and associated items have been removed from the project site, and the Contractor has received a written notice of Final Acceptance.

101.702 Indemnity

The Contractor shall indemnify and save harmless the Corporation and its agents and employees from and against all claims, costs, damages and actions arising out of any work done or activities of the Contractor, his Subcontractors, employees, agents, servants or assigns.

101.703 Regulations, Acts and By-Laws

The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority that apply to the work carried out under this Contract. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations and without such notice to the Engineer, he shall assume full responsibility therefore and shall bear all costs attributable thereto.

101.704 Licenses and Permits

The Contractor shall obtain and pay for all necessary permits and licenses required by statute or by any by-law, order or regulation having the force of law.

101.705 Taxes

The Contractor shall pay all sales taxes, excise taxes and duties on materials supplied by the Contractor for the Contract.

101.706 Existing Utilities

It shall be the Contractor's responsibility to determine and verify the location of existing utilities before commencing any work in the vicinity. The Contractor shall indemnify and save harmless the Corporation from and against any and all claims, actions, suits, demands, damage or costs howsoever arising because of any damage to existing utilities.

101.707 Existing Fencing

Any existing fencing dismantled or removed by the Contractor so as to accomodate the construction or access to site shall be replaced or rebuilt to its original condition prior to the Contractor leaving the site. Before any dismantling or removing of fence on private property, the Contractor shall get written permission from the local landowner of that property. All costs incurred for this dismantling or removing shall be borne entirely by the Contractor.

101.708 Roads

The Contractor shall be responsible for all damage and/or restoration of roads whether existing or created, public or private, used in conjunction with the construction of a project. All roads shall be returned to a condition similar or equal to that existing prior to their use in construction of the project. Repair and or restoration work of roads shall be at the expense of the Contractor.

101.709 Cultural or Historic Resources

Federal law protects any cultural or historic resources found on the project land. If any cultural or historic resources (artifacts) are found during construction, all work shall immediately cease and Contractor shall notify the Engineer. Pending a cultural examination, a determination will be made to continue or cease all construction activities in that area.

Contractor will be compensated for work completed to the point of ceasation of activities. Any additional claims will be reviewed by the Engineer.

101.710 Safety

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, safety in accordance with all the applicable laws, regulations and generally accepted practices. The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

- (a) all employees on the work and all other persons who may be affected thereby;
- (b) all the work and materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his subcontractors or sub-subcontractors; and
- (c) other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

101.800 PROGRESS OF WORK:

101.801 Neglect or Delay by the Corporation

No extra payment, in addition to the Contract price, will be made to the Contractor for an extra expense, loss or damage due to neglect or delay, unless the Engineer has first certified in writing that such extra expense, loss or damage is directly attributable to any neglect or delay on the part of the Corporation in providing any information or doing any act which is expressly required to do by the Contract, or by the usage of the trade. The Contractor shall, within thirty days from commencement of such neglect or delay, give written notice to the Engineer of a claim for such extra expense, loss or damage. If such notice is not given within the thirty day period, any claim the Contractor may have for extra payment shall be waived.

101.802 Default by the Contractor

If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a material violation of any provision of the Contract, then the Corporation may, without prejudice to any right or remedy and after giving the Contractor and his surety, if any, four days' written notice, terminate the employment of the Contractor and take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished.

Where the Contractor is so relieved of the work the Contractor will reimburse the Corporation for all costs and damages incurred or sustained by the Corporation by reason of the Contractor's non-completion of the work. The Contractor will continue to be liable for any legal or contractual obligations other than the physical completion of the work of which he was relieved.

Where the work is subsequently completed by the Corporation, the Engineer will determine the amount, if any owing to the Contractor that is not required, by the Corporation, for the purpose of completing the Contract and will authorize payment of that amount to the Contractor.

101.803 Extension of Time

The Engineer may, in writing, extend the time for completion of the work or any part of the work.

101.804 Suspension of the Contract

The Engineer may suspend the Contract at any time by giving notice to that effect to the Contractor. If the period of suspension is thirty days or less, the Corporation shall reimburse the Contractor for the Contractor's out-of-pocket expenses involved in complying with the suspension. These costs shall be as mutually agreed upon between the Engineer and the Contractor. If the period of suspension is more than thirty days, the Contractor shall resume operations at such time in accordance with any terms and conditions agreed upon by the Engineer and the Contractor, or failing such agreement, the Contract shall be terminated. In the event of such termination, work done prior to the date of suspension will be paid for at the Contract Unit Prices.

101.805 Termination of the Contract

The Engineer may terminate the Contract at any time for cause or due to a supervening possibility by giving written notice to that effect to the Contractor. Any compensation due to the Contractor will be in accordance with sub-section 101.900.

101.806 Final Acceptance

When the Contractor believes the work set forth in this Contract has been completed and is ready for operation, he shall notify the Corporation and a joint inspection shall be undertaken at which time any deficiencies will be identified.

Thereafter, the Engineer will issue a written notice of Substantial Performance or Final Acceptance of the work done if, in his opinion, all requirements of the Contract have been fulfilled. Nothing, other than this acceptance shall imply completion of any part of the works, or the fulfillment of the Contract requirements. Until a letter of Substantial Performance or Final Acceptance is issued the Contractor shall be responsible for injury or damage to any part of the project resulting from the action of the elements or from any other cause. The Contractor shall rebuild, repair, restore, or make good all injuries or damages to any portion of the work prior to the final inspection.

When conditions dictate that a small amount of work must be postponed until a later date, then only a letter of Substantial Performance may be issued on that work which has been completed with a letter of Final Acceptance to follow when all the work has been completed.

101.900 PAYMENTS:

101.901 General

All payments to the Contractor will be for materials actually furnished and work actually performed by the Contractor. Quantities will be measured and verified by the Engineer. The extension amounts shown in the Bid are for comparative purposes only and in no way constitute an actual amount for which the Corporation will be liable.

101.902 Partial Payments

Payments to the Contractor will be made at a frequency of not more than every two weeks or less than once a month. The Engineer can waive the frequency of payment requirement if no significant work has been accomplished on a project.

101.903 Final Payment

Final payment will be made at the earliest practical date following final inspection and the Corporation's written acceptance. The Contractor shall be paid based on final, verified quantities, after deducting all previous partial payments and all amounts to be retained or deducted under provisions of the Contract. By acceptance of the final payment, the Contractor shall waive any and all claims it may have against the Corporation in any way arising from or related to the Contract.

Final payment shall not be made until the Contractor submits to the Engineer (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the Corporation or his property might in any way be responsible, have been paid or otherwise satisfied,

(2) consent of surety, if any, to final payment, and (3) if required by the Corporation, other date establishing payment or satisfaction of all such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as may be designated by the Corporation. If any Subcontractor refuses to furnish a release or waiver required by the Corporation, the Contractor may furnish a bond satisfactory to the Corporation to indemnify him against any such lien. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Corporation all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

101.904 Claims

Any claims which the Contractor may have arising out of or related to the Contract must be presented in writing to the Engineer within thirty days after the particular work on which the claim is based has been completed, otherwise such claims shall be waived.

101.905 Statutory Holdbacks

The Corporation shall be entitled to deduct and withhold payment of any and all amounts required by law to be so withheld, for whatever period of time and in whatever amounts prescribed; and whether in regards to progress payments or for final payment for services rendered, materials supplied for work done. Such withholding shall not constitute a breach of the Corporation's obligations hereunder and the corporation shall not be liable to the Contractor for any amounts so withheld, except to the extent and in the manner provided for in the applicable Municipal, State or Federal legislation.

Unless otherwise noted, holdbacks on projects involving embankments, structures, etc. shall be 10% of the invoice amount while projects involving islands, level ditching, non embankment/structure work, etc. shall be 5% of the invoice amount. Unless the Engineer determines otherwise retentions will be held for one pay period and released on the next (retentions from the first invoice will be released on the third invoice) depending upon the length of the contract. All retentions yet to be paid shall be released on the final invoice once the project has been accepted.

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201 - SPECIFICATION FOR MOBILIZATION

201.1 DESCRIPTION

The work shall include the supply of all labor, material and equipment to transport all needed labor, material and equipment to and from a project site to successfully complete that project as shown on the plans or described by the Engineer.

201.2 METHOD

The Contractor shall conduct all mobilization operations in a timely orderly manner. Unless otherwise approved by the Engineer, mobilization operations shall commence no later than one week after the pre-construction meeting. Mobilization shall commence no later than one week after project completion and be finished within two weeks of project completion.

During all operations, the Contractor is responsible for maintaining public and private property in original condition.

201.3 METHOD OF MEASURE AND BASIS OF PAYMENT

Mobilization shall be measured on a unit basis. Payment shall be made at the contract unit price for "Mobilization" according to the following schedule:

25% of contract unit price at project start up.
50% of contract unit price at half project completion. 100% of contract unit price at project completion.

A Contractor is eligible for a separate mobilization payment when the Contractor is required to discontinue work by the Corporation for reasons other than seasonal termination of work. The payment shall be payment in full for supply of all necessary labor, equipment, and materials to perform mobilization operations herein described and all work in this specification. The payment shall be commensurate to the amount of equipment and materials that are required to be removed from the project site and that payment shall not exceed the original unit price specified for mobilization.

202 - SPECIFICATION FOR SITE PREPARATION

202.1 DESCRIPTION

This specification shall cover the supply of all labor, materials, and equipment required for clearing and grubbing a site as well as topsoil excavation and placement. Clearing and grubbing shall include removal from site and disposal of all trees, roots, brush, stone, rubbish and all other surface litter in designated areas. Topsoil excavation shall include the excavation, removal, stockpiling and placement of topsoil in designated areas of borrows, dikes, and channels.

202.2 MATERIAL

Clearing and grubbing material shall include all trees, tree roots, large stones and boulders, and unsuitable material. Topsoil shall consist of organic surface soils, peats, and black mineral soils free of clearing and grubbing material.

202.3 CONSTRUCTION METHODS

202.31 CLEARING & GRUBBING

Clearing shall consist of the cutting, removing, disposal and cleaning up all timber, brush and fallen timber, stumps, shrubs, and rubbish. Trees and shrubs designated for preservation shall be marked and protected from scoring, barking or other injury during construction operations. Where grubbing is not to be done, trees, roots and stumps shall be cut off level to the original ground surface and all depressions filled with insitu-material.

Grubbing shall consist of the removal and disposal of all roots, stumps, imbedded logs or objectionable debris to a depth of not less than 12" below the original ground surface. The resulting excavation must be rough filled with clean earth.

Trees, logs, stumps, brush and other debris shall be buried or disposed of in areas designated by the Engineer. Areas such as borrows, pits, excavations so designated shall be left in a neat and finished appearance free from debris. All materials disposed of shall be covered with clean fill, levelled in such a way as to promote drainage.

202.32 TOPSOIL HANDLING

No topsoil excavation shall commence until necessary clearing and grubbing methods are completed. Topsoil (organic surface soils, peat or black mineral soils) shall be excavated in the area of dikes, channels or borrows as staked or in accordance with plans and specifications to depths designated and approved by the Engineer. The work shall include the excavation, stockpiling as necessary and the placement of the topsoil over the surface of constructed embankment, berms, borrows or in those areas designated by the Engineer. Topsoil materials shall be removed to the lateral limits of the dikes, borrows, or berms specified and shall be placed in windrows outside the indicated toe of the embankment or borrow. Upon completion of embankment construction the topsoil shall be blended against the embankment, berm or borrow and trimmed to blend with the area or slopes. The topsoil shall be placed over designated areas evenly in a layer four to six inches in thickness over the entire crest, side slopes, berms of an embankment and/or the surface of borrows. The placed material shall be trimmed to specified tolerances above the lines and grades shown on the plans and as staked in the field.

202.4 METHOD OF MEASUREMENT AND PAYMENT

Site Preparation shall be measured on a plan quantity basis. The quantity to be payed for shall be the estimated topsoil quantities shown on the plans or described herein for areas under the proposed dikes only. Clearing and grubbing and topsoil removal and replacement of other areas of the project site are not included in the plan quantity and shall be considered incidental to Site Preparation. The plan quantity listed shall be the final quantity for Site Preparation.

203 - SPECIFICATION FOR EXCAVATION

203.1 DESCRIPTION

This specification shall cover the supply of all labor, materials, and equipment required for the excavation, hauling and spreading of materials from within the limits of the cut area as shown on the plans including a) excavation of designated areas; b) peninsula cutoffs; c) dugout construction; d) key trench. The work shall include control of water during excavation, the shaping of slopes to the lines and grades shown on the drawings and the disposal of materials within designated areas. Unless otherwise specified all material to be excavated shall be considered unclassified regardless of their nature or the manner in which they are removed.

203.2 CONSTRUCTION METHODS

203.21 SITE PREPARATION

Prior to any excavation, sites shall be cleared and grubbed with topsoil removed as specified in the "SPECIFICATION FOR SITE PREPARATION". Material cleared and grubbed shall be disposed of per the Engineer's directions. Topsoil removed shall be stockpiled and later respread on those areas and at thicknesses shown on the plans.

203.22 EXCAVATION

Excavation shall mean the removal of all materials encountered within the limits of excavation as shown on the drawings or as staked by the Engineer. Excavation shall be performed in as nearly a continuous operation as possible, trimmed and levelled to conform to the required lines, grades and tolerances. Areas overexcavated shall be replaced with suitable materials compacted to a density at least equal to that of the insitu material or to the satisfaction of the Engineer.

Suitable material excavated from the excavation areas shown on the plans shall be used in any embankments called for on the plans. This shall include areas stripped of topsoil or unsuitable material that need to be backfilled with suitable material or key trenches. Placement of these

embankments or backfills shall be done in accordance with the SPECIFICATION FOR EMBANKMENT CONSTRUCTION.

Excavated material unsuitable for embankments shall be deposited in locations shown on the plans or as directed by the Engineer. Unsuitable excavated materials shall be deposited as uniformly and continuously as possible in successive layers. No specific compaction will be required but where the material is placed with equipment other than tractor scrapers, blading and levelling is required to minimize voids. The fill shall be leveled upon completion to conform to lines and grades and enable the area to be seeded.

Rock excavation operations shall be controlled by the Contractor to produce the size gradations specified for other parts of the work, if the rock is designated by the Engineer as suitable for use. The Contractor will dispose as directed by the Engineer.

203.23 DISPOSAL OF WASTE MATERIALS

All surplus or unsuitable excavated materials designated as waste by the Engineer shall be disposed of at the locations shown on the plans or as directed by the Engineer.

203.24 CONTROL OF SURFACE AND SUBSURFACE WATER

The Contractor is responsible for control of surface/subsurface water and drainage during the construction period. All temporary fills and/or crossings necessary to promote construction will be installed and removed at the Contractor's expense prior to acceptance of the work.

203.3 METHOD OF MEASURE

All excavation except Key Trench Excavation shall be measured on a volume basis. The number of cubic yards of excavation paid for shall be made by superimposing the final cross-section on the applicable stripped or original ground profile and using average end area methods of volume calculation. No measurement for payment will be made for over-excavated materials.

Any Key Trench Excavation called for in the plans shall be measured as a neat line quantity

calculated from the construction plans. The quantity shown on the plans represents the quantity to be paid.

203.4 METHOD OF PAYMENT

Excavation shall be paid for at the unit price per cubic yard bid for "EXCAVATION". The unit price bid for excavation shall be payment in full for supplying all materials, equipment, labor and any incidental items necessary for performing all excavation operations described in the SPECIFICATION FOR EXCAVATION. No payment for excavation of suitable material will be made when excavating in a designated borrow area to obtain material that is to be placed, measured and paid in accordance with the "EMBANKMENT CONSTRUCTION" specification.

204 - SPECIFICATIONS FOR EMBANKMENT CONSTRUCTION

204.1 DESCRIPTION

The work shall include the supply of all labor, material and equipment required to complete the construction of key trenches and dams/dikes or roadway embankments as shown on the plans and as staked in the field. The work shall include:

- excavation of suitable materials from borrows or excavations.

- placement of materials from designated borrow areas or excavation into embankments such as dams, dikes, or roadway.

- levelling and trimming of embankments and borrow areas.

204.2 CONSTRUCTION METHODS

204.21 FILL MATERIAL

Unless otherwise specified, all material shall be placed in loose lifts of not more than 8" thickness and shall be compacted by suitable compaction equipment to a minimum of 95% of maximum density as determined by the Standard Proctor Method ASTM D698. Moisture content shall be in the range of -1% to +3% of optimum moisture content.

204.22 KEY TRENCH CONSTRUCTION

The Contractor shall not commence key trench construction until such work specified under "SITE PREPARATION" has been completed to the satisfaction of the Engineer.

The key trench excavation shall be made to the lines and grades shown on the drawings but may be altered during construction upon the direction of the Engineer to adjust for variation in soil conditions. Excavated material if acceptable in quality to the Engineer may be stockpiled for use in "SITE PREPARATION" or "EMBANKMENT CONSTRUCTION" in accordance with those specifications and the items included herein. Unacceptable materials shall be disposed of by placing into designated areas.

During construction, the control of drainage in the key trench excavation, dewatering placement area and borrows must be maintained and is the responsibility of the Contractor. Should material quality lessen through inadequate drainage the Contractor may be directed by the Engineer to construct drainage facilities.

The key trench completed to the original ground surface elevation shall be rough levelled prior to commencing embankment construction.

204.23 EMBANKMENT CONSTRUCTION

The Contractor shall not commence embankment construction until such work specified under "SITE PREPARATION" and the key trench has been completed to the satisfaction of the Engineer.

Embankment material excavated from ditches/borrows with tractor-scraper units shall be placed in successive layers across the entire width of the embankment. Each layer must be spread as deposited longitudinally along the embankment with each layer not exceeding 8" in thickness. The initial layer may be increased in thickness in wet areas to provide a working pad capable of supporting the hauling equipment. The embankment at all times must be maintained in a reasonably level condition and hauling equipment shall be directed over the full width of each layer to facilitate uniform compaction.

Where embankment material is excavated with bucket equipment from ditches or borrow, it shall be deposited into the embankment within reach of the equipment. To prevent berm failure, stock piling on berms will not be permitted. Materials shall be placed and spread in layers with each layer after spreading not to exceed eight inches in thickness.

All embankments will be construction staked to final grade elevations shown on the drawings. Embankments shall be brought to these elevations using embankment material graded to a tolerance of ± 0.1 ft. Topsoil or riprap materials are to be placed on top of embankment construction. Topsoil depths shall be four to six inches while riprap depths shall be as specified on the drawings.

All embankment construction must be as continuous as possible and the fill maintained such that drainage is assured at all time.

Should fill settlement occur during the construction of the embankment and within seven days of substantial completion, and prior to acceptance of the work, additional material shall be placed and trimmed to achieve final grade by the Contractor at his own expense. After embankments have been constructed to grade, they shall be levelled and trimmed to conform with the lines, grades and cross-sections shown on the plans and/or as staked. Acceptance of finished embankment may be made progressively during the course of construction upon the request of the Contractor. A completed embankment once accepted by the Engineer shall not be used by the Contractor for haulage, access or other purposes without the consent of the Engineer.

204.24 WATERING

Additional costs incurred for the supply and application of water will be at a unit price agreed to by the field engineer and Contractor prior to application and is not to be included as part of the unit price for "EMBANKMENT CONSTRUCTION." This cost shall be for the supply and application of water only. Additional working of fill material by equipment to mix water with material shall be considered part of embankment construction and incidental to these costs.

204.25 HAUL ROADS AND BORROWS

The construction, maintenance and removal of all haul roads from the borrow areas shall be the responsibility of the Contractor and be considered incidental to the work. Borrow areas shall be maintained during construction in a graded condition such that drainage is assured and that operations can resume quickly after precipitation periods. Following completion of the work, borrows are to be left in a graded condition acceptable to the Engineer and all haul roads, access roads and temporary crossings are to be removed.

204.26 TRIMMING

The crest, side slopes and berms of the embankment shall be levelled and trimmed to conform to the lines and grades shown on the drawings. The crest shall be constructed to the elevation shown on the plans prior to acceptance of the work. Acceptance of the finished embankment may be made progressively during the course of construction upon the request of the Contractor. A completed embankment once accepted by the Engineer shall not be used by the Contractor for haulage, access or other purposes.

204.3 METHODS OF MEASURE

Embankment construction shall be measured on a volume basis. The volume to be paid for shall be the total number of cubic yards of key trench, embankment, berms or incidental embankments acceptably installed as measured by the Engineer. Measurements shall be made by cross-sectioning the borrow area minus topsoil quantities and using the average end area method of volume calculation. Material used from the key trench as fill will be measured using neat lines found in the plans minus topsoil quantities.

204.4 METHOD OF PAYMENT

Embankment construction shall be paid at the contract unit price per cubic yard for "EMBANKMENT CONSTRUCTION". Each cubic yard to be measured as specified herein shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this specification.

204 - SPECIAL PROVISION FOR EMBANKMENT CONSTRUCTION

204.1 DESCRIPTION

The purpose of this special provision is to change the methods of measurement for work done under the specification for embankment construction.

204.3 METHODS OF MEASURE

Embankment construction shall be measured on a volume basis. The volume to be paid for shall be the total number of cubic yards of key trench, embankment, berms or incidental embankments acceptably installed as measured by the Engineer. Measurements shall be made on the "in place" volume of the constructed embankments.

Measurements shall be done by cross-sectioning the embankments and using the average end area method of volume calculation. The volume of embankment placed directly below the design embankment to replace stripped materials shall be added to the cross sectioned measurement. The limits of embankment to replace stripped materials shall start from the staked embankment toes at the original ground surface and extend vertically for the specified stripping depth to a horizontal plane.

An alternate method of measure shall be to measure the height of fill, above original ground, placed at each cross section and the depth of stripping below original ground. The cross-sectional area of the embankment limits shall be calculated using the dimensions shown on the typical embankment sections. Stripped areas below the design embankment shall be considered as extending vertically from the staked embankment toes at original ground to a horizontal plane at the specified stripping depth. The total cross sectional area shall be the sum of the embankment limits above original ground and the stripped area below original ground as described. Volumes will then be calculated using the average end area method.

204.4 METHOD OF PAYMENT

Embankment construction shall be paid at the contract unit price per cubic yard for "EMBANKMENT CONSTRUCTION". Each cubic yard to be measured as specified herein shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this specification.

205 - SPECIFICATION FOR WATER

205.1 DESCRIPTION

The work shall include the supply of all labor, material, and equipment required to add water to embankments as directed by the Engineer. The work shall include:

- Mobilization to and from the project site of all labor, material, and equipment required to do needed work.
- Locating and procuring a suitable water source.
- Delivery of water to the site, applying and mixing water with embankment material.

205.2 MATERIALS

Water used for construction shall be reasonably clean and shall not effect normal soil characteristics.

205.3 CONSTRUCTION METHODS

Water shall be applied to the embankment areas in a way that maintains the specified moisture content. Sufficient equipment shall be on the project to secure and maintain the specified moisture content until the required density is secured. Water shall be applied uniformly over the working area.

205.4 METHOD OF MEASUREMENT AND PAYMENT

The addition of "water" shall be on a 1000 gal -M) basis. An estimate of the quantity of water quired for proper compaction will not be shown on the Bid Form. Only actual quantities of water used will be paid for. Payment shall be made at the contract unit price for water.

206 - SPECIFICATION FOR WATER CONTROL STRUCTURE INSTALLATION

206.1 DESCRIPTION

The work of this section shall include the supply of all labor, materials, and equipment required to complete the installation of the water control structures as called for on the drawings and/or specified herein. These water control structures include:

- a. Corrugated metal pipe riser with stoplog control.
- b. Corrugated metal pipe riser with slide gate control.
- c. Cast-in-place concrete structure with stoplog control.
- d. Cast-in-place concrete structure with slide gate control.
- e. Corrugated metal pipe riser fixed level control.
- f. Slide gate control.

This work shall consist of coupling the structure or gate to the pipe; excavation; bed preparation; installation of structure and associated hardware with the use of a concrete base pad or form, reinforcement, and concrete placement, or framing and supports as shown on the plans. Work shall also include the supply, placing and compaction of backfill to the lines and grades shown on the drawings or as specified.

206.2 MATERIALS

206.21 SUPPLY OF MATERIALS

The Contractor shall supply all couplers, nuts, bolts, corrugated metal riser controls, slide gates, stoplogs, stoplog channels, sealants, and all accessories recommended by the material manufacturer or necessary for a complete installation. Also, any anti-seep diaphragms, fish screens and associated fittings shown on the plans.

Corrugated metal pipe risers and associated anti-seep diaphragms shall meet the composition requirements of AASHTO M218-86 and shall be of the length and gauge as shown on the plans. All risers and diaphragms shall be made of galvanized

or aluminized Type II steel or aluminum. The aluminized Type II steel shall conform to the requirements of AASHTO M274-84. Risers and diaphragms made of galvanized or aluminized Type II steel shall be coated. This coating shall be a double bituminous coating (dipped or sprayed), or a 10 mill polymeric film laminate. The coatings shall be applied to both the inside and outside of the riser and both sides of the diaphragms. The bituminous coating shall be of double thickness measuring no less than 0.10 inches or 2.6 millimeters and be in accordance with AASHTO M190-80 Type "A" Standard Specification.

Pipe shall be close riveted or of a "lock seam" construction.

The pipe used for the control structure must have the same color and be fabricated of the same metal as any culvert that may be attached to the water control structure

When called for on the plans, the Contractor shall supply to the site ready mix concrete, or site mix concrete in accordance with the "SPECIFICATION FOR CAST-IN-PLACE REINFORCED CONCRETE". Forms, reinforcing steel or wire mesh, for the concrete pad for the control structure will be the responsibility of the Contractor.

All materials supplied by the Contractor shall be subject to inspection by the Engineer.

206.22 HANDLING AND STORAGE OF MATERIALS

All materials shall be handled and stored in careful and workmanlike manner to the satisfaction of the Engineer.

206.3 CONSTRUCTION METHODS

Site preparation shall be carried out in accordance with the "SPECIFICATION FOR SITE PREPARATION".

Excavation shall be carried out in accordance with the "SPECIFICATION FOR EXCAVATION", culvert assembly and installation shall be carried out in accordance with the "SPECIFICATION FOR CULVERT INTALLATION".

Riprap shall be carried out in accordance with the "SPECIFICATION FOR RIPRAP PLACEMENT".

Cast-in-place concrete, reinforcing, mixing, delivery and placement shall be carried out in accordance with the "SPECIFICATION FOR CAST-IN-PLACE REINFORCED CONCRETE".

206.31 BACKFILL

If, in the opinion of the Engineer, the site excavated material is unsuitable for backfill, the Contractor shall supply, from an assigned borrow area, suitable impervious backfill material. No granular backfill will be allowed unless approved by the Engineer. The payment for supplying this impervious fill will be classified as extra work and will be paid for as such.

If no compaction is specified on the plans or in the specifications the Contractor shall compact the backfill to insitu-conditions or embankment compaction requirements whichever is greater.

206.32 CONTROL OF SURFACE/SUBSURFACE WATER

The Contractor is responsible for control of surface water, subsurface water and drainage during the construction period. All temporary fills, crossing, culverts necessary to promote drainage will be installed and removed at the Contractor's expense prior to acceptance of the work. Any flooding caused or claims arising due to the flooding of adjacent lands as a result of the construction of these temporary works will be the Contractor's responsibility.

206.33 CORRUGATED METAL PIPE CONTROL STRUCTURE INSTALLATION

Prior to installation of the control structure, any protective coating which has been removed from the structure exposing the pipe shall be recoated. Welding, drilling, bolting or otherwise attaching devices (temporary or permanent) to the structure to assist in structure installation is prohibited.

Control structure, as delivered to the site, shall be cast-in-place into the concrete foundation. The structure shall be supported with adequate falsework so as to maintain the lines and grades shown on the plans, and to maintain those lines

and grades without movement, until the concrete has reached a strength as specified herein.

Care shall be taken in the placement of the concrete so as not to splash concrete on the control structure. All concrete splashed on the structure shall be cleaned off immediately, to the satisfaction of the Engineer.

All stoplogs, slide gates, tiedown lock, grating, railing, and assembly tools shall be removed from the control structure prior to installation of the control structure in the concrete base. All of these items shall be re-installed after completion of structure installation.

Falsework, chairs, or supportive devices used in supporting the control structure in the formwork, and to be permanently incorporated in the concrete shall be of the same material as and shall be considered as reinforcing. All such falsework, chairs, and supportive devices shall be approved by the Engineer prior to installation. No supportive devices shall protrude from the finished surface of the concrete, unless approved by the Engineer.

206.34 CAST-IN-PLACE CONCRETE CONTROL STRUCTURE INSTALLATION

The control structure shall be cast-in-place to the lines and grades shown on the plans. Reinforcement, stoplog channels, gate bolts and other items to be cast-in-place shall be installed as called for on the plans. Falsework, chairs, or supportives devices to be permanently incorporated in the concrete shall be of the same material as and shall be considered as reinforcing. All such falsework chairs and supportive devices shall be approved by the Engineer prior to installation. No supportive devices shall protrude from the finished surface of the concrete unless approved by the Engineer.

The structure shall be finished in accordance with the "SPECIFICATION FOR CAST-IN-PLACE REINFORCED CONCRETE" and once completed, slide gates, stoplogs, grating or railing as specified in the plans shall be installed.

206.35 SLIDE GATE CONTROL STRUCTURE INSTALLATION

The slide gate shall be installed according to manufacturer's instructions to provide a water tight seal with the culvert. The Contractor shall install the gate with all necessary framework and hardware to allow efficient operation of the gate. Planking/grating, railing, and bracing shall be provided as shown on the plans or specified herein.

206.36 ANTI-SEEP DIAPHRAGM INSTALLATION

Anti-seep diaphragms and associated fittings shall be constructed and attached to the culvert at the stations shown on the plans. Diaphragms should be located midway between two adjacent seams or at least 4' from a field joint. Backfill operations shall be carried out as not to damage diaphragms.

206.37 FISH SCREEN INSTALLATION

Fish screens and associated hardware shall be supplied and attached to the structures as shown on the plans.

206.4 QUALITY CONTROL

206.41 WORKMANSHIP AND MATERIALS

All workmanship and materials furnished and supplied under this specification are subject to close and systematic inspection and testing by the Engineer including all operations from the selection and production of materials through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Engineer reserves the right to reject any materials or works which are not in accordance with the requirements of this specification.

206.42 ACCESS

The Engineer shall be afforded full access for the inspection and control testing of materials, both at the site of work and at any plant or borrow pit used for the supply of the materials, to determine whether the materials are being supplied in accordance with this specification.

206.5 METHODS OF MEASURE

The installation of water control structures will be measured on a per unit basis. The quantity to be paid for shall be the actual number of control structures installed, measured by the Engineer in the field.

All excavation, dewatering, backfill, compaction, installation of control structure and associated hardware as shown on the plans, anti-seep diaphragms and trashracks shall be considered as incidental to construction for the control structure and no separate payment will be made for this work unless otherwise specified.

206.6 METHOD OF PAYMENT

The construction of the water control structures will be paid for at the contract price per unit for "CONTROL STRUCTURE" to be measured as specified herein, which price shall be payment in full for supplying all material and for performing all operations herein described and all other work incidental to the work included in this specification.

207 - SPECIFICATIONS FOR CULVERT INSTALLATION

207.1 DESCRIPTION

The work of this section shall include the supply of all labor, materials and equipment required to complete the installation of all culverts with associated earthwork called for on the drawings and/or specified herein.

This work shall consist of excavation; cofferdams and dewatering; preparing the bed for the pipe; assembly of pipe sections with materials supplied; supply, placement, and compacting backfill material to the lines and grades shown on the drawings, as specified.

207.2 MATERIALS

All materials will be supplied by the Contractor. All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Engineer. Contractor shall be responsible for handling material from point of stockpile to construction area.

The pipe shall meet the composition requirements of AASHTO M218-86 and shall be of the length and gauge as shown on the plans. All pipe shall be made of concrete, steel (galvanized or aluminized Type II), or aluminum. The aluminized Type II steel shall conform to the requirements of AASHTO M274-84. Pipe made of galvanized or aluminized Type II steel shall be coated. This coating shall be a double bituminous coating (dipped or sprayed) or a 10 mill polymeric film laminate. The coatings shall be applied to both the inside and the outside of the pipe. The bituminous coating shall be of double thickness measuring no less than 0.10 inches or 2.6 millimeters and be in accordance with AASHTO M190-80 Type "A" Standard Specification.

Pipe shall be close riveted cold rivets (annular) or of a "lock seam" (helical) construction. If annular pipe is used then connections shall be made using two foot wide annular watertight connecting bands. If helical pipe is used then a minimum of 4 corrugations shall be reformed into annular corrugations to allow the use of 18 inch wide watertight annular connecting bands. All bands shall have the same coating as the pipe and shall be installed using a band type gasket of expanded rubber of at least 12" in width, meeting requirements of ASTM D1056 for the "RE" closed cell grades. One ring of mastic such as Remnick will be used on each side of the gasket.

An acceptable alternative to the gasket will be the use of a mastic sealant equivalent to Remnick with a diameter of 3/4" or larger. This type of sealant shall be wrapped around the pipe twice on each end, once at the end of each pipe and again at the ends of the connecting band. A piece of sealant shall also be placed in the area where the bands overlap each other.

After bands have been tightened a coat of tar shall be placed around the pipe at the ends of the connecting band.

Where the coating is damaged due to handling or fabrication, damaged areas shall be coated with a bituminous or polymeric patching material.

Concrete pipe shall be of the shape and type specified on the plans. Contractor shall obtain sealant to provide a waterproof seal at all joints.

207.3 CONSTRUCTION METHODS

207.31 EXCAVATION

The Contractor will be required to excavate the base to the lines of excavation and to a depth of the invert elevations as shown on the plans. Base excavation shall extend three feet beyond the ends and sides of the pipe, or pipes, and the excavation shall be transitioned to meet the existing channel slopes. If necessary, the excavation shall be dewatered in order to prevent disturbing the natural soil conditions at the base of the excavation and to allow the placing and compacting of the backfill material in the dry.

Cofferdams will be required for all excavations in active water course channels and in areas of ground water seepage. Cofferdams must be built to withstand all the forces to which they may be subjected and shall be located such as to give sufficient clearance for the construction of cutoff trenches and/or sump pits for dewatering unless otherwise provided. Cofferdam placement, maintenance and removal shall be the responsibility of the Contractor and shall be considered as incidental to the placement of the culvert.

Dewatering shall be accomplished by constructing cut-off trenches and sump pits around the outside perimeter of the pipe beds. These shall be excavated to a depth of no less than 2 feet below

the elevation of the base of the excavation. Trenches and sump pits shall be shored and braced with cribs as necessary. The Contractor will be required to provide sufficient pumping capacity to lower and maintain the ground water approximately 1 foot below the base of excavation.

The excavated base shall be inspected by the Engineer prior to commencement of backfilling. If the Engineer deems further excavation to be required below the bottom of the excavation line shown on the plans and specified herein, the Contractor shall excavate such additional materials as directed by the Engineer. The work involved in doing this additional excavation will be classified as extra work and will be paid for as such.

The Contractor shall not overexcavate by digging below specified lines and grades. If, in the opinion of the Engineer, the Contractor overexcavates material in an area, he shall replace at his expense the overexcavated material with suitable site material and compact that material to a density equal to the surrounding insitu-material, or to the satisfaction of the Engineer.

Excavated material not required as backfill shall be classified as "surplus material" and will be dealt with as outlined in the Special Provisions.

207.32 INSTALLATION AND ASSEMBLY OF PIPE

The Contractor, after preparation of the bed, shall assemble the pipe sections, progressively in accordance with the manufacturer's instructions.

All pipe supplied to site shall be inspected prior to assembly, for chipping or damage in handling and shall be repaired as directed by the Engineer. Welding, drilling, bolting or otherwise attaching devices (temporary or permanent) to the structure to assist in structure installation is prohibited.

All materials damaged, lost, broken or deemed unsuitable due to the Contractor's method of installation, handling or from neglect shall be replaced by the Contractor at his expense.

207.33 BACKFILL

All materials to be used for bed preparation and backfill will be suitable site material as approved by the Engineer. In the event that no

suitable site material is available for the pipe installation, the Contractor shall supply suitable material from an approved borrow area the payment for placing this fill will be classified as extra work and will be paid for as such.

The Contractor shall compact the insitu-material below the invert elevations prior to assembly and erection of the pipe. This bed shall be fully levelled and compacted throughout the full width and length of the trench and to the exact grade as specified, so that the barrel of the pipe shall be uniformly and evenly supported throughout its entire length.

Initial backfill shall be deposited in horizontal, uniform layers not exceeding 6 inches in thickness before compaction, and each layer shall be thoroughly compacted throughout to ensure thorough tamping of backfill under the haunches and around the pipe. This is to be achieved by hand and mechanical compaction. Compacted backfill shall be placed in this manner and shall extend to a depth of 1 foot above the top of the pipe for the entire width of the trench. Each layer will be inspected and approved by the Engineer prior to proceeding with the next layer of fill.

After the above initial backfilling has been completed and approved, the remaining backfill, consisting of suitable site material, shall be placed in layers not exceeding 10 inches before compaction. Each layer shall be compacted by mechanical means to a density equivalent to that of the surrounding unexcavated material. Each layer will be inspected and approved by the Engineer prior to proceeding with the next layer of backfill.

No boulders, rock, ice, snow, organic material or debris shall be permitted in the trench. This material will be classified as unsuitable material and treated as such.

Compaction equipment or methods that produce horizontal or vertical earth pressures which may cause excessive displacements or which may damage the installation, shall not be used.

Backfill shall be executed to the lines and grades shown on the plans and as specified herein.

207.34 PLACE RIPRAP

Placement of riprap shall be in accordance with "SPECIFICATION FOR RIPRAP PLACEMENT".

207.35 WATER CONTROL INSTALLATION

The water control structures shall be attached to the pipe in same manner as described in "SPECIFICATION FOR WATER CONTROL STRUCTURE INSTALLATION".

207.36 ROAD SURFACE OF CULVERT CROSSING

Any road material removed as necessary for the installation of the culvert shall be replaced to the width, depth, consistency and compaction of existing road on each side.

207.4 QUALITY CONTROL

207.41 WORKMANSHIP AND MATERIALS

All workmanship and materials furnished and supplied under this specification are subject to close and systematic inspection and testing by the Engineer including all operations, from the selection and production of materials, to final acceptance of the specified work.

The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Engineer reserves the right to reject any materials or works which are not in accordance with the requirements of this specification.

207.42 ACCESS

The Engineer shall be afforded full access for the inspection and control testing of materials, both at the site of work and at any plant or borrow pit used for the supply of the materials, to determine whether the materials are being supplied in accordance with this specification.

207.5 METHOD OF MEASURE

The Engineer shall determine by field measurement the actual number of lineal feet of each culvert size-group placed. The length of couplers shall not be included in the measurement of the linear feet of culvert. Where sloped ends are used, the length measured shall be the bottom length of the pipe.

207.51 EXCAVATION AND REPLACEMENT

Excavation and replacement of unsuitable material required to be removed below the established grade of the culvert invert shall be measured in cubic yards by the Engineer.

207.52 GENERAL REQUIREMENTS

All excavation, cofferdams (installation and removal), dewatering, backfill, compaction, assembly and installation of pipe shall be considered as incidental to culvert installation construction of the culvert crossing and no separate payment will be made for this work unless otherwise specified herein.

207.6 METHOD OF PAYMENT

This work will be paid for at the contract unit price for culvert installation.

All items to be measured as specified herein, which price shall be payment in full for supplying all material and performing all operations herein described and all other work incidental to the work included in this specification.

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208 - SPECIFICATION FOR CAST-IN-PLACE REINFORCED CONCRETE

208.1 DESCRIPTION

The work to be performed under this specification shall include the furnishing of all superintendence, overhead, labor, materials, equipment tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

The work includes, but is not necessarily limited to, the following:

- Supply, erection and removal of all formwork.
- Supply and placement of reinforcement.
- Supply, placing and curing of concrete.
- Finishing of all concrete surfaces as specified.
- All excavation and backfill associated with concrete structures shall be executed as designated by the "SPECIFICATION FOR EXCAVATION AND BACKFILL OF CONCRETE STRUCTURES."

208.2 MATERIALS

208.21 CEMENT

The cement shall be:

- Portland Cement ANSI/ASTM CI50, Type II A unless otherwise specified by or acceptable to the Engineer.

208.22 ADMIXTURES

All air entraining agents shall conform to specifications in ASTM C260. Use of calcium chloride shall not be allowed.

208.23 WATER

Mixing water for concrete shall be fresh, clean and potable.

208.24 AGGREGATES

Aggregates shall be free from dirt and organic material and contain no more than 2 percent by weight of silt and clay particles.

All aggregates shall be uniformly graded with a maximum size of 3/4 inch with a fine sand content of between 35-42 percent. Aggregate will be inspected and approved by the Engineer prior to use.

208.25 REINFORCING STEEL

All reinforcing steel shall be free of all dirt, scale, oil, grease, and other coating that may reduce bonding to concrete. The required reinforcing shall be of the size and grade specified on the plans.

208.26 STORAGE AND HANDLING OF MATERIALS

Cement shall be stored off the ground in a dry location at all times.

Aggregates shall be stored separately in a manner that will prevent segregating, mixing, and intrusions of foreign materials.

Reinforcement shall be stored on skids or racks off the ground.

208.3 CONSTRUCTION METHODS

208.31 WORKMANSHIP

Work shall be supervised by a competent foreman at all times and shall be performed by skilled and experienced workmen.

208.32 MIX REQUIREMENTS

All concrete shall be either site mix or ready-mix to achieve a 4,000 psi 28 day compressive strength, a 1 to 4 inch slump, and 4 to 6 percent air entrainment.

For the installation of corrugated metal pipe risers as described in the "Specification for Water Control Structure Installation", the concrete used to pour the base shall have the following design mix:

PER CUBIC YARD DESIGN MIX

6 bags cement (Portland Cement ANSI/ASTM 150, Type IIA)

36 gallons water (adjust for moisture in aggregate)

2873 pounds of aggregates (38% fine sand)

Unless otherwise noted the Contractor shall submit a concrete mix design to the Engineer for all other concrete used in construction. Acceptance of this design by the Engineer does not relieve the Contractor's responsibility to meet above strength, slump or air requirements.

208.33 MIXING AND PLACING

The Contractor shall notify the Engineer 48 hours in advance of any concrete pour. This advance notice will allow the Engineer to schedule the concrete testing and inspection services. No concrete shall be poured without notification or approval of the Engineer.

Concrete shall be mixed only in quantities required for immediate use. Mixing procedures shall be approved by the Engineer prior to commencement. Water may be added on site by the Contractor as needed as long as slump and air requirements are met. Failure to adhere to these requirements may result in rejection of that batch. The minimum mixing time for all site batch mixes shall be 1½ minutes and 75 revolutions for all mixes delivered by transit mixers. No concrete shall be placed in forms after mixing longer than 1½ hours.

Mixing and placement of concrete shall occur at temperatures between 50°F to 90°F whenever possible. When conditions require mixing and placement of concrete outside of these ranges, concrete temperatures shall be kept within these ranges by methods approved by the Engineer.

Cold weather concreting procedures shall include but will not necessarily be limited to; preheating of forms and subgrade prior to pouring, heating of poured concrete for a minimum of 3 days and adequate covering of poured concrete during curing. All procedures shall be outlined to the Engineer for approval prior to any concrete pour.

Formwork, falsework, and reinforcing shall be inspected and approved by the Engineer prior to concrete placement. Earth surfaces shall be firm, moist, contain no frost or ice, and be free of debris. All formwork shall be oiled or moistened prior to concrete placement. Reinforcement shall

be placed in such a manner to provide the specified cover requirements and shall have minimum splice overlap of 30 bar diameters.

Concrete shall be placed by hand, buggy, trough or suitable placement method. Concrete shall not be allowed to freefall more than five feet. Concrete shall be handworked or mechanically vibrated to achieve a dense, homogenous, structure free of cold joints and honeycombing. If cold joints are necessary in pouring a structure the Contractor shall install waterstops at all such joints. All exposed edges shall be chamfered as shown on the plans. Finishing of concrete shall be a wood float finish.

Formwork shall not be removed until the concrete has hardened adequately to prevent surface damage and support applied loads. Forms shall remain on poured structures a minimum of 3 days unless otherwise directed by the Engineer. For cold weather concrete pours, forms shall remain on poured structures for a minimum of 5 days.

All minor surface defects, small honeycomb areas, or broken edges shall be repaired using a drypack mortar consisting of 1 part cement and 2½ parts of fine sand. Exposed steel forming ties shall be removed to a depth of 1 inch below the planned concrete surface and the surface defect repaired with a dry pack mortar. Exposed surfaces shall then have a finish coat of mortar applied once surface defects, honeycomb areas, and broken edges have been repaired. All repair shall be done in an efficient and timely manner after formwork is removed.

Concrete shall be cured by means of waterproof paper, polyethylene or placement compound. Curing treatment shall be applied after concrete surfaces are finished.

208.34 TESTING

Unless otherwise specified, the Engineer will perform concrete testing during the course of the work to determine if specifications have been met. Testing shall include slump and air measurements and cylinders shall be made for strength tests. Failure to meet specified requirements will mean rejection of that batch. Cylinders shall be taken

randomly during a pour and broken at 7 and 28 day strengths. Failure of a cylinder to achieve the specified strength for any pour shall require removal of the concrete unless the Contractor can show (at his/her own expense) that the poured concrete meets specifications.

208.4 METHOD OF MEASUREMENT AND PAYMENT

Unless otherwise noted, batches poured for the installation of corrugated metal pipe risers shall be considered incidental to the "Specification for Water Control Structure Installation."

For all other batches all work shall be paid on a lump sum basis or a per cubic yard basis as specified on the Bid Form.

209 - SPECIFICATION FOR RIPRAP PLACEMENT

209.1 DESCRIPTION

This work shall consist of supply and placement of filter materials and rock riprap as protective covering along side slopes and bases of channels, slopes around culvert inlets and outlets and on embankments or such other places as may be indicated on the plans, as specified herein, or as directed by the Engineer.

209.2 SUPPLY OF MATERIALS

209.21 BEDDING MATERIAL

Material used for bedding shall be a well graded sand and gravel with the following gradation:

<u>Grain Size</u>	<u>% Passing By Weight</u>
3"	100%
1"	75-85
3/8	45-65
#4 sieve	15-35
#200	Less than 15%

The bedding material shall be from a source approved by the field engineer.

209.22 FILTER FABRIC

The filter fabric shall be a nonwoven polyester or polypropylene geotextile. This geotextile shall have a minimum grab tensile strength of 150 pounds as determined by ASTM D-1682. The geotextile shall have a maximum equivalent opening size (E.O.S.) of a number 70 U.S. standard sieve.

The Contractor shall supply all pins and other items necessary to fasten the filter fabric to the ground so it will not slide or form gaps when placing rock riprap.

All materials shall be handled and stored in a careful and workmanlike manner to the satisfaction of the Engineer.

209.23 RIPRAP

The Contractor shall supply rock which will consist of field stone or rough, unhewn quarry rock. No sandstone, shale or limestone shall be used as riprap. Unless otherwise specified, riprap shall have the following gradation:

<u>Size (Inch Diameter)</u>	<u>Approx. % of Total Weight Smaller than Given Size</u>
18"	100
12"	75
9"	50
3"	10

Rock shall be approved by the Engineer prior to installation.

209.3 CONSTRUCTION METHODS

209.31 SUBGRADE PREPARATION

The areas on which the bedding material or fabric is to be placed shall be graded to the lines shown on the plans. The soil surface shall be smooth and free from any obstructions to provide adequate contact area between the soil and the bedding material or filter fabric.

209.32 BEDDING MATERIAL

A 6" layer of bedding material shall be placed as shown on the plans prior to the placing of any rock riprap.

209.33 FILTER FABRIC

The filter fabric shall be placed as shown on the plans in such a way that there is adequate contact area between the soil and the fabric. Installation shall start on the downstream end of the slope. Pins shall be installed to prevent the filter fabric from sliding or forming gaps during installation of the filter material and placing of the rock riprap.

When filter fabric is required on a slope, an anchor trench shall be constructed on the upstream end of the filter fabric and a toe trench shall be constructed on the downstream end of the installation. The trenches shall be perpendicular to the slope and must be at least one foot wide and one foot deep. The filter fabric shall be placed in the anchor trench and the toe trench. The trenches shall be backfilled and compacted to adequately anchor the filter fabric.

Where a seam is needed to provide a continuous coverage of the filter fabric, the two pieces of filter material shall be overlapped a minimum of two feet. Pins shall be placed in the overlap area to prevent slipping during placement of the filter material and rock riprap.

Great care shall be taken to protect the filter fabric from damage either from the wheels or tracks or any sliding that may be caused by the equipment.

209.34 RIPRAP

A. Placing of Riprap

Riprap shall be dumped, rolled or placed in such a manner that the smaller stones will be uniformly distributed throughout the mass. Sufficient hand work shall be done to provide a neat and uniform surface, with the depth being specified herein and as shown on the plans.

B. Thickness of Riprap

The surface may not vary from the theoretical surface by more than 4" at any point, unless otherwise specified.

209.4 METHOD OF MEASURE

Bedding material and riprap shall be measured in cubic yards of acceptably placed rock only. The volume of riprap to be paid shall be the volume of rock placed to the depth shown on the plans and the area on which acceptable placement has been made. The total quantity will be computed to the nearest cubic yard. No separate measurement will be made for the bedding material of filter fabric.

209.5 METHOD OF PAYMENT

Bedding material or filter fabric and rock riprap placement shall be paid for at the contract unit price per cubic yard for "RIPRAP PLACEMENT". Each cubic yard to be measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items including supplying and placing bedding material and filter fabric which are incidental to the work included in these specifications.

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210 - SPECIFICATION FOR SEEDING AND MULCHING

210.1 DESCRIPTION

This specification shall cover the preparation of areas to be seeded, furnishing and placing required seed, fertilizer, and other materials necessary for the complete seeding of the areas of this project requiring the establishment of turf.

210.2 MATERIALS

210.21 SEED MIXTURE

Seed mixture shall be a seed mixture shown on the plans. Seed shall be furnished separately or in mixture in standard, sealed containers with (1) seed name; (2) lot number; (3) net weight; (4) percentages of purity and of germination and (5) percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the Owner duplicate signed copies of a statement by the vendor, certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six months of date of delivery.

210.3 SEEDING SEASON

The Contractor shall obtain the permission of the Owner to proceed with a dormant seeding during the late fall. If fall dormant seeding is not approved, the Contractor shall complete all seeding in the spring prior to June 15.

210.4 SOIL PREPARATION

Areas to be seeded that have been damaged by erosion shall be restored prior to seeding. All areas to be seeded shall be finished to the grades shown on the plans, plus 4" for topsoil thickness, and then cultivated to provide a reasonably firm, but friable seedbed. A minimum of $\frac{1}{2}$ inch of surface soil shall be in a loose condition.

210.5 APPLICATION

210.51 DRY METHOD

Mechanical seeders, seed drills, landscape seeders, cultipacker seeders, fertilizer spreaders, or other approved mechanical seeding equipment shall be used to apply the seed and fertilizer in the amounts and mixtures shown on the plans. Hand-operated seeding devices may be used when seed and fertilizer are applied in dry form. Application shall start at the top of the slope and work downward. All application rates shall be approved by the Engineer prior to application.

210.6 QUALITY CONTROL

210.61 WORKMANSHIP AND MATERIALS

All workmanship and materials furnished and supplied under this specification are subject to close and systematic inspection and testing by the Engineer including all operations, from the selection and production of materials, to final acceptance of the specified work.

The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Engineer reserves the right to reject any materials or works which are not in accordance with the requirements of this specification.

210.7 CARE DURING CONSTRUCTION

The Contractor shall be responsible for protecting and caring for seeded areas until acceptance of the work. The Contractor shall repair any damage to seeded areas caused by construction operations without additional compensation.

210.8 MEASUREMENT AND PAYMENT

Seeding shall be measured by the acre of seeding actually accomplished within the construction limits of the project. Payment for seeding shall be in accordance with the unit price bid and shall include all labor, material and equipment required for the proper preparation of the seed areas, seed mixture, fertilizer and the complete application of the materials and the care of the areas until project acceptance.

302 - SPECIFICATION FOR SHEET PILING

302.1 DESCRIPTION

The work in this section shall consist of furnishing and driving the specified kinds and types of piles at the location shown on the plans. This shall include the furnishing of all labor, materials, tools, equipment, transportation, and any incidental items required to furnish and drive the sheet piling.

302.2 MATERIALS

The sheet piling shall be made of steel and be of sections shown or specified on the plans. The sides of each piling shall be furnished with an interlock that is continuous for the full length of the pile. Interlock shall have an opening of sufficient width to allow free slippage of the adjoining sheet pile.

302.3 CONSTRUCTION

The Contractor shall provide a sufficient amount of steel sheet piles to construct a structure of the dimensions shown on the plans. The pile driving equipment shall be capable of providing the depth shown on the plans. Piles shall be handled in such a manner as to ensure no injury to the pile.

302.31 PROTECTION OF PILE HEADS

The heads of all piles shall be protected during driving by suitable caps, rings, heads, blocks, mandrels, and other devices. The heads of steel piles shall be cut square and fitted with a steel driving cap. Driving head, mandrels, and other devices shall be provided by the Contractor as needed for special types of piles and shall conform to the recommendation of the pile manufacturer.

302.32 DRIVING

Pile driver leads shall be of a type that will hold the pile and pile hammer in proper alignment during the driving operations, and shall be long enough to preclude the necessity for the use of punches or chasers. Leads for drop hammers shall be steel or steel shod. Generally, the recommendations of the pile hammer manufacturer shall be followed with respect to pile leads.

The Contractor shall notify the Engineer at least 24 hours before beginning any pile driving operations.

The piling shall be driven in such a manner as to insure perfect interlocking throughout the entire length of each pile. The piles shall be held in proper alignment during driving by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose.

At any time that the forward edge of the sheet pile wall is found to be out of correct alignment, the piling already assembled and partly driven shall be driven to the required depth and taper piles shall then be driven to bring the forward edge into correct alignment before additional regular piling is assembled and driven. The maximum permissible taper in a single pile shall be one-fourth inch per foot of length.

All piles shall be driven to the full length shown or specified on the plans unless otherwise directed by the Engineer in the field.

302.33 PILE CUTOFF

The Contractor shall cut the piles off at the elevations shown or specified on the plans. The head of each pile, after cutoff, shall be sound, undamaged material. The length of cutoff shall be sufficient to permit the removal of all damaged material.

302.34 DEFECTIVE PILES

Any pile damaged, driven out of its proper location, driven below the specified cutoff elevation or inaccurately cut off shall be corrected by one of the following methods, whichever is approved by the Engineer in the field.

- A. The defective pile shall be pulled and replaced or redriven.
- B. A new pile shall be driven adjacent to the defective pile.
- C. The defective pile shall be spliced or built up or a sufficient portion of the footing shall be extended to properly embed the pile.

All piles pushed up due to the driving of adjacent piles or by any other cause, shall be driven down again to their specified elevation. Any sheet pile ruptured in the interlock, or otherwise damaged during driving, shall be pulled and replaced.

302.35 CORRECTIVE SURFACE HEAVE

Any excess material resulting from displacement of earth by pile driving shall be removed. Materials disturbed by pile driving shall be reconditioned and compacted to a density equal to that of the adjacent undisturbed material.

302.4 MEASUREMENT

Sheet piling shall be measured by the horizontal projection of the driven pile onto a vertical plane. The area of this projection shall be measured to the nearest square foot of piling in place as accepted by the Engineer.

302.5 METHOD OF PAYMENT

The cost of all labor, materials, equipment, and any incidental items required to furnish and drive the sheet pile as specified shall be paid for in the price bid per square foot for "SHEET PILE".

303 - STRUCTURAL STEEL

303.1 DESCRIPTION

The work of this section will cover the fabrications, supply and placement of the structural steel portions of the project.

The work shall consist of supplying all labor, materials and equipment required to furnish and install catwalk, catwalk frame, stoplog channels, bracing, grating and sheet piling cap, all non driven H-pile, and all other structural steel frames shown on the plans.

303.2 MATERIALS

Catwalk metal grating shall be grip strut planking or equal. The grating shall be painted and attached to the structural steel frame as per the manufacturers recommendations.

All structural channels, angles, and plates specified shall be AISC A36 steel.

Hand rail shall be 2" x 2" x 3/16" structural tubing or 1½" schedule 80 steel pipe welded and painted.

Fasteners, bolts and anchors shall be AISC A36 steel.

Arc-welding electrodes shall conform to the requirements of the American Welding Society Specifications for Iron and Steel Arc Welding Electrodes, latest edition.

303.3 FABRICATION

Fabrication shall be shown on the drawings. Weld all contact edges with a continuous ¼" fillet weld. The technique, appearance and quality of all welds made shall conform to the American Welding Society code for Arc-Welding in Building Construction.

Shop drawings and materials list shall be submitted for approval by the Engineer.

303.4 PAINTING

The catwalk, handrails, bracing, grating and miscellaneous iron shall be given one shop coat of zinc base primer and one coat of zinc base primer after erection is completed. Apply two coats of an alkyd enamel flat black paint to all exposed structural steel surfaces. The non driven H-piles, sheet piling cap, and stoplog channels need not be painted.

303.5 MEASUREMENT AND PAYMENT

The structural steel work described shall be paid on a unit basis for each type of structure installed. The cost of all labor, materials, equipment and incidental items required to furnish all structural steel as specified shall be paid for in the unit price bid for "Structural Steel."

306 - SPECIFICATION FOR MAINTENANCE AND PROTECTION OF TRAFFIC

306.1 DESCRIPTION

This work shall consist of furnishing, erecting, and maintaining signs, barricades, warning lights and other traffic control devices in accordance with these specifications while the contract is in force.

306.2 MATERIALS

All materials shall conform to those found in the "MANUAL ON UNIFORM TRAFFIC CONTROL SERVICES FOR STREETS AND HIGHWAYS."

SIGN BACKING MATERIALS: The sign backing material shall be aluminum, steel, or exterior grade plywood.

REFLECTIVE SHEETING: The reflective sheeting shall consist of spherical lens elements embedded within a transparent plastic having a smooth, flat outer surface. The sheeting shall be weather resistant and have a protected pre-coated adhesive backing.

SIGN FACES: All sign faces and alphabets shall be made in accordance with the detailed drawings shown in the "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" published by the U.S. Government Printing Office, and the plans and these specifications.

BARRICADE BARS: The barricade bars shall be fabricated from 2 x 8 to 2 x 12 surfaced on four sides complying with American Lumber Standards or Aluminum Extrusion conforming to ASTM designation B-221 Alloy 6063-T6 of the size and shape shown on the plans.

Application of reflective sheeting on wood barricade bars shall be made only after all surfaces have been properly sanded, cleaned, sealed, resanded, and painted with a prime coat. The entire barricade bar that will face traffic shall have reflective sheeting applied in the colors and width shown on the plans. Application of reflective sheeting on aluminum barricade bars shall be in accordance with the requirements of the sheeting manufacture.

CONES: The cones shall be a minimum of 18" in height with a broadened base and may be of various materials to withstand impact without damage. The cones shall be orange and reflectorized or equipped with lighting devices. The cones shall be weighted at the base.

WARNING LIGHTS: Various warning lights may be used but shall conform to the requirements of the Institute of Traffic Engineers Standard for "FLASHING AND STEADY BURN BARRICADE WARNING LIGHTS" (1971). The color of light emitted shall be yellow.

306.3 CONSTRUCTION REQUIREMENTS

All signs, cones, warning lights, and barricades shall be erected as shown on the plans and in accordance with the Manual on Uniform Traffic Control.

No construction work shall be started until the proper signs and traffic control devices are installed.

Application of barrels, cones, signs, lights, barricades and warning lights shall be followed as shown on the plans. All applications done on the initiative of the Contractor shall follow the requirements of the "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."

The Contractor shall provide a watch person who shall patrol the entire job and detour route if any at least once before 8 a.m. each day and once again before dark each day, including days the Contractor is not working until or otherwise directed by the Engineer.

The watch person under the Contractor's supervision will be responsible for making sure all signs, barricades, cones, warning lights and markers are in good condition and working order and that the travel way is in good condition.

Additional signs and barricades may be required as directed by the Engineer.

315 - SPECIFICATION FOR STEEL H-PILES

315.1 DESCRIPTION

The work under this specification shall consist of furnishing all labor, materials, tools, equipment and any incidental items necessary to furnish and drive the steel H-pile called for in the plans. Any non-driven H-pile shall be structural steel and paid for as such.

315.2 MATERIALS

All steel H-piles shall be made of ASTM A-36 structural steel.

315.3 PILE DRIVE

315.31 HANDLING

Piling shall be handled in such a manner as to ensure no injury to the pile.

315.32 EQUIPMENT FOR DRIVING

A. Pile Hammers

The pile hammer selected for a particular job shall be one which will yield a computer bearing as defined in Section 4. In addition, the pile hammer selected shall conform with the minimum ram weight and energy requirements as follows:

<u>Pile Length</u>	<u>Gravity</u>	<u>Power</u>	
	<u>Hammers</u>	<u>Driven Hammers</u>	
	<u>Min. Wt.</u>	<u>Min. ram wt.</u>	<u>Energy</u>
	<u>(lbs.)</u>	<u>(lbs.)</u>	<u>(ft.-lbs.)</u>
Less than 50 ft.	2400	1500	7,000

If a gravity hammer is used for driving, it is preferable to use a heavy hammer and operate with a short drop. The maximum height of a drop shall be ten feet.

The Contractor shall furnish the Engineer with the manufacturer's specifications and catalog for all steam or air hammers used, showing all data necessary for computing the

bearing valve of piles driven. Gravity of drop hammers shall be weighed in the presence of the Engineer, or a certificate of weight shall be furnished to the Engineer. Hammers so weighed shall have the exact weight stamped on them.

B. Pile Driving Caps

When necessary to protect the pile against damage during the driving, the top of the pile shall be equipped with a driving cap of a size and type that will serve the purpose. A shock block of approved type and size shall also be used on the upper side of the driving cap, when necessary. Generally, the recommendations of the pile hammer manufacturer shall be followed with respect to driving caps and shock blocks.

C. Pile Driver Leads

Pile driver leads shall be of a type that will hold the pile and pile hammer in proper alignment during the driving operations, and shall be long enough to preclude the necessity for the use of punches or chasers. Leads for drop hammers shall be steel or steel shod. Generally, the recommendations of the pile hammer manufacturer shall be followed with respect to pile driver leads.

315.33 DRIVING

The Contractor shall notify the Engineer at least 24 hours before beginning any pile driving operations and shall provide the necessary cooperation for determining the bearing capacity.

In order to reach minimum depth, and if approved by the Engineer, water jetting and/or preboring shall be done. Preboring may be done with a power auger and/or steel mandrel (spud).

All piles shall be installed full length to plan alignments and grades.

315.34 PILE CUTOFF

After being driven the piles shall be cut off at the elevations shown on the plans. The head of each pile, after cutoff has been made, shall be sound, undamaged material. When a cap is used, the top of each pile shall be cut off so as to provide uniform bearing for the cap without the use of shims or fills.

315.35 DEFECTIVE PILES

Any pile damaged, driven out of its proper location, driven below the specified cutoff elevation or inaccurately cut off shall be corrected by one of the following methods, whichever is approved by the Engineer in the field.

- A. The defective pile shall be pulled and replaced or redriven.
- B. A new pile shall be driven adjacent to the defective pile.
- C. The defective pile shall be spliced or built up or a sufficient portion of the footing extended to properly embed the pile.

All piles pushed up by the driving of adjacent piles or by any other cause, shall be driven down again to their specified elevation.

315.4 PILE PERFORMANCE

315.41 PENETRATION AND BEARING

The piles shall be driven to either substantial refusal (1/8" penetration per blow) or to the bottom tip elevation shown on the plans, whichever comes first. Where a bearing is specified on the plans, the pile shall be driven to that bearing or substantial refusal, whichever comes first.

FORMULAS FOR DETERMINING APPROXIMATE BEARING CAPACITIES

1) Gravity hammers

$$P = \frac{3WH}{S=0.5} \times \frac{W=0.1M}{W+M}$$

2) Power-driven hammers (Timber piles)

$$P = \frac{3.5E}{S=0.2} \times \frac{W=0.1M}{W=M}$$

3) Power-driven hammers (Steel H-Piles)

$$P = \frac{3.5E}{S=0.2} \times \frac{W=0.2M}{W+M}$$

Where:

- P= Safe bearing capacity in pounds.
W= Weight of the striking part of hammer in pounds.
H= Height of fall in feet.
E= W x H for single acting steam hammers; it also equals the foot-pounds of energy per blow for each full stroke of either single acting or double acting hammers as given by the manufacturer's rating for the speed at which the hammer operates.
S= Average penetration in inches per blow for for the last five blows for the gravity hammers and for the last ten blows for the power driven hammers.
M= Total weight of pile plus weight of the driving cap.

These formulas will apply when:

- The gravity hammer has free fall.
- The height of the fall of gravity hammer will produce an energy per blow of between 28,000 and 36,000 foot-pounds.
- The head of the pile is free from broomed or crushed fiber.
- The penetration of the pile is at a reasonably uniform rate.
- There is not noticeable bounce after the blow. When there is noticeable bounce, twice its height shall be deducted from H to determine the value of H in the formula.

315.5 METHOD OF MEASUREMENT

H-piling shall be measured by the lineal feet actually driven. This length shall be measured from the cutoff elevation to the bottom of the driven H-pile. Measurement shall be to the nearest foot of piling in place as accepted by the Engineer.

315.6 BASIS OF PAYMENT

The cost of all labor, materials, tools, equipment and any incidental items necessary to furnish and install the steel H-piling as specified herein shall be paid for in the unit price per lineal foot bid for "H-PILE".

203.A SPECIAL PROVISION TO THE SPECIFICATION FOR
EXCAVATION



PURPOSE

The purpose of this Special Provision is to alter the "Method of Measure" and "Method of Payment" as found in the specification for Excavation.

203.3 METHOD OF MEASURE

All excavation shall be measured on a plan quantity basis. The number of cubic yards paid for shall be the estimated quantity for "Excavation" as shown on the plans.

203.4 METHOD OF PAYMENT

Excavation shall be paid for at the unit price per cubic yard bid for "Excavation". The unit price bid for excavation shall be payment in full for supplying all materials, equipment, labor and any incidental items necessary for performing all excavation operations described in the SPECIFICATION FOR EXCAVATION.

204.A SPECIAL PROVISION TO THE SPECIFICATION FOR
EMBANKMENT CONSTRUCTION

PURPOSE

The purpose of this Special Provision is to alter the "Method of Measure" and "Method of Payment" as found in the SPECIFICATION FOR EMBANKMENT CONSTRUCTION.

204.3 METHOD OF MEASURE

No separate measurement shall be made for embankment construction.

204.4 METHOD OF PAYMENT

No separate payment shall be made for embankment construction. Material used in the embankment shall come from excavation areas in the channel as designated on the plans and shall be paid for as excavation through the unit price per bid for "Excavation." Payment shall be in full for supplying all materials and performing all operations described in the SPECIFICATION FOR EMBANKMENT CONSTRUCTION.

209.A SPECIAL PROVISION TO THE SPECIFICATION FOR RIPRAP PLACEMENT

PURPOSE

The purpose of this Special Provision is to modify the "Description" as found in the .Specification for Riprap Placement.

209.1 DESCRIPTION

This work shall consist of supply and placement of filter materials and rock riprap as protective covering along side slopes and bases of channels, slopes around culvert inlets and outlets and on embankments or such other places as may be indicated on the plans, as specified herein, or as directed by the Engineer. This specification does not apply to the supply and placement of filter materials and rock riprap in the gabions or fish ladder, i.e. that area between sheet pile 'A' and sheet pile 'B'. Specification 400 applies to the gabions and fish ladder riprap.

210.A SPECIAL PROVISION TO THE SPECIFICATION FOR
SEEDING AND MULCHING

PURPOSE

The purpose of this Special Provison is to modify or add sections 210.22 MULCH, 210.3 SEEDING SEASON, 210.5 APPLICATION, and 210.8 MEASUREMENT AND PAYMENT in the Specification for Seeding and Mulching.

210.22 MULCH

Mulch shall consist of natural wood cellulose fiber having the property of dispersing readily in water and shall have no toxic effect when combined with seed or other materials. The homogeneous slurry or mixture shall be capable of application with power spray equipment. A colored dye that is non-injurious to plant growth may be used. Wood cellulose fiber shall be packaged in new, labeled containers in an air-dry condition.

210.3 SEEDING SEASON

The Contractor shall complete all seeding in the spring prior to May 1, 1989.

210.5 APPLICATION

Where possible, a seed drill shall be used to apply the seed and fertilizer to the exposed areas in the amounts and mixtures shown on the plans. In areas where a seed drill cannot be used, other seeding equipment may be used if approved by the Engineer. After seeding is complete, a mulch shall be uniformly applied to all seeded areas. Application rates shall be approved by the Engineer prior to application.

210.8 MEASUREMENT AND PAYMENT

Seeding shall be measured by the acre of seeding actually accomplished with the construction limits of the project. Payment for seeding shall be in accordance with the unit price bid and shall include all labor, material and equipment required for the proper preparation of the seed areas, seed mixture, fertilizer, mulch and the complete application of the materials and the care of the areas until project acceptance.

400 - SPECIAL SPECIFICATION FOR GABION/FISH LADDER
RIPRAP PLACEMENT

400.1 DESCRIPTION

The work shall include the supply of all labor, material and equipment required to install the gabion wall. This work shall also consist of supply and placement of filter materials and rock riprap in the fish ladder, i.e. that area between sheet pile 'A' and sheet pile 'B'.

400.2 SUPPLY OF MATERIALS

400.21 GABION BASKET MATERIAL

Gabions shall be a rectangular basket manufactured from zinc coated steel wire mesh of double twist hexagonal weave in accordance with ASTM A641 A-71A.

Mesh wire shall have a nominal diameter of steel wire mesh of .1181 inches (11 gauge) after galvanized.

Selvedge wire (perimeter wire, wire running through all edges) shall have a nominal diameter of .1535 inches (9 gauge) after galvanization.

Lacing wire (necessary wire for assembling and lacing gabion unit) shall have a nominal diameter of .0866 inches (13) gauge) after galvanization.

400.22 BEDDING MATERIAL

Bedding material shall be a well graded sand and gravel with the following gradation:

<u>Grain Size</u>	<u>% Passing By Weight</u>
3"	100%
1"	75-85
3/8	45-65
#4 sieve	15-35
#200	Less than 15%

The bedding material shall be from a source approved by the field engineer.

400.23 FILTER FABRIC

The filter fabric shall be a nonwoven polyester or polypropylene geotextile. This geotextile shall have a minimum grab tensile strength of 150 pounds as determined by ASTM D-1682. The geotextile shall have a minimum equivalent opening size (E.O.S.) of a number 70 U.S. standard sieve.

The Contractor shall supply all pins and other items necessary to fasten the filter fabric to the ground so it will not slide or form gaps when placing rock riprap.

All materials shall be handled and stored in a careful and workmanlike manner to the satisfaction of the Engineer.

400.24 RIPRAP

For the top 12" of riprap in the gabions/fish ladder, the Contractor shall supply well graded 3/4" to 3" diameter washed rock.

For the bottom 24" of riprap in the gabions/fish ladder, the Contractor shall supply rock which will consist of field stone or rough, unhewn quarry rock. The stone shall be well graded and range in size from 6" to 18" in diameter with not more than 10% greater than 12". The bottom 24" of riprap shall be intermixed with bedding material described in 400.22 Bedding Material, of this specification.

All rock shall be approved by the Engineer prior to installation.

400.3 CONSTRUCTION METHODS

400.31 SUBGRADE PREPARATION

The areas on which the filter fabric is to be placed shall be graded to the lines shown on the plans. The soil surface shall be smooth and free from any obstructions to provide adequate contact area between the soil and the filter fabric.

400.32 GABIONS

Gabions shall be placed to the lines and grades as shown on the plans. They shall be wired together every 12" and on all corners. Riprap shall be placed into the gabions in a workmanlike manner so as not to damage the wire baskets in any way.

400.33 FILTER FABRIC

The filter fabric shall be placed as shown on the plans in such a way that there is adequate contact area between the soil and the fabric. Installation shall start on the downstream end of the slope. Pins shall be installed to prevent the filter fabric from sliding or forming gaps during installation of the filter material and placing of the rock riprap.

When filter fabric is required on a slope, an anchor trench shall be constructed on the upstream end of the filter fabric and a toe trench shall be constructed on the downstream end of the installation. The trenches shall be perpendicular to the slope and must be at least one foot wide and one foot deep. The filter fabric shall be placed in the anchor trench and the toe trench. The trenches shall be backfilled and compacted to adequately anchor the filter fabric.

Where a seam is needed to provide a continuous coverage of the filter fabric, the two pieces of filter material shall be overlapped a minimum of two feet. Pins shall be placed in the overlap area to prevent slipping during placement of the filter material and rock riprap.

Great care shall be taken to protect the filter fabric from damage either from the wheels or tracks or any sliding that may be caused by the equipment.

400.34 RIPRAP

A. Placing of Riprap

In the bottom 24", riprap shall be dumped, rolled or placed in such a manner that the smaller stones will be uniformly distributed throughout the mass. Bedding material shall be intermixed with the riprap to fill all voids and provide a dense base for the washed rock. Where depressions are made between baffles, this riprap zone will be 16"-18" high.

The top 12" of riprap shall consist of 3/4" to 3" diameter washed rock as shown on the plans. Sufficient hand work shall be done to provide a neat and uniform surface. 6'-8" depressions shall be constructed between the baffles as shown on the plans.

B. Thickness of Riprap

The surface may not vary from the theoretical surface by more than 2" at any point, unless otherwise specified.

400.4 METHOD OF MEASURE

Gabions, bedding material, and riprap shall be measured in cubic yards of acceptably placed rock only. The volume of riprap to be paid shall be the volume of rock placed to the depth shown on the plans and the area on which acceptable placement has been made. The total quantity will include both zones of rock (lower 24" and top 12") and will be computed to the nearest cubic yard. No separate measurement will be made for the bedding material or filter fabric.

400.5 METHOD OF PAYMENT

Bedding material, filter fabric, gabions, and rock riprap (which includes the washed rock) shall be paid for at the contract unit price per cubic yard for "GABION/LADDER RIPRAP PLACEMENT". Each cubic yard shall be measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items including supplying and placing gabion baskets, bedding material and filter fabric which are incidental to the work included in these specifications.

500 SPECIAL PROVISION FOR DRIVING SHEET PILE

500.1 DESCRIPTION

The work in this section shall consist of driving the sheet piles at the location shown on the plans. This shall include the furnishing of all labor, tools, equipment, transportation, and any incidental items required to drive the sheet piling.

The sheet piling shall be furnished and delivered to the project site by Ducks Unlimited, Inc. The Contractor shall assist the supplier in unloading the sheet pile at the project site.

500.2 MATERIALS

The sheet piling shall be made of steel and be of sections shown or specified on the plans. The sides of each piling shall be furnished with an interlock that is continuous for the full length of the pile. Interlock shall have an opening of sufficient width to allow free slippage of the adjoining sheet pile.

500.3 CONSTRUCTION

The Corporation shall provide a sufficient amount of steel sheet piles to construct a structure of the dimensions shown on the plans. The pile driving equipment shall be capable of providing the depth shown on the plans. Piles shall be handled in such a manner as to ensure no injury to the pile.

500.31 PROTECTION OF PILE HEADS

The heads of all piles shall be protected during driving by suitable caps, rings, heads, blocks, mandrels, and other devices. The heads of steel piles shall be cut square and fitted with a steel driving cap. Driving head, mandrels, and other devices shall be provided by the Contractor as needed for special types of piles and shall conform to the recommendation of the pile manufacturer.

500.32 DRIVING

Pile driver leads shall be of a type that will hold the pile and pile hammer in proper alignment during the driving operations, and shall be long enough to preclude the necessity for the use of punches or chasers. Leads for drop hammers shall be steel or steel shod. Generally, the recommendations of the pile hammer manufacturer shall be followed with respect to pile leads.

The Contractor shall notify the Engineer at least 24 hours before beginning any pile driving operations.

The piling shall be driven in such a manner as to insure perfect interlocking throughout the entire length of each pile. The piles shall be held in proper alignment during driving by means of assembling frames or other suitable temporary guide structures. Temporary guide structures shall be removed when they have served their purpose.

At any time that the forward edge of the sheet pile wall is found to be out of correct alignment, the piling already assembled and partly driven shall be driven to the required depth and taper piles shall then be driven to bring the forward edge into correct alignment before additional regular piling is assembled and driven. The maximum permissible taper in a single pile shall be one-fourth inch per foot of length.

All piles shall be driven to the full length shown or specified on the plans unless otherwise directed by the Engineer in the field.

503.33 PILE CUTOFF

The Contractor shall cut the piles off at the elevations shown or specified on the plans. The head of each pile, after cutoff, shall be sound, undamaged material. The length of cutoff shall be sufficient to permit the removal of all damaged material.

500.34 DEFECTIVE PILES

Any pile damaged, driven out of its proper location, driven below the specified cutoff elevation or inaccurately cut off shall be corrected by one of the following methods, whichever is approved by the Engineer in the field.

- A. The defective pile shall be pulled and replaced or redriven.
- B. A new pile shall be driven adjacent to the defective pile.
- C. The defective pile shall be spliced or built up or a sufficient portion of the footing shall be extended to properly embed the pile.

All piles pushed up due to the driving of adjacent piles or by any other cause, shall be driven down again to their specified elevation. Any sheet pile ruptured in the interlock, or otherwise damaged during driving, shall be pulled and replaced.

500.35 CORRECTIVE SURFACE HEAVE

Any excess material resulting from displacement of earth by pile driving shall be removed. Materials disturbed by pile driving shall be reconditioned and compacted to a density equal to that of the adjacent undisturbed material.

500.4 MEASUREMENT

Sheet piling shall be measured by the horizontal projection of the driven pile onto a vertical plane. The area of this projection shall be measured to the nearest square foot of piling in place as accepted by the Engineer.

500.5 METHOD OF PAYMENT

The cost of all labor, materials, equipment, and any incidental items required to drive the sheet pile as specified shall be paid for in the price bid per square foot for "SHEET PILE DRIVEN."



DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE

6115 East Main Avenue
Bismarck, North Dakota, 58501
(701) 258-5599



January 31, 1989

John Hatch, Chief Engineer
Water Rights Division
SD Dept. of Water & Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181

RE: Crystal Springs Prairie - Eilen WPA Project
Deuel County, South Dakota

Dear Mr. Hatch:

On January 18, 1989, I sent you a signed and final set of plans and specifications for the above referenced project. On January 26, a meeting was held with Bob Hanten, fisheries biologist and several other members of the Division of Wildlife in Pierre to discuss operation of the fish ladder associated with this project. Per their suggestions, the baffle system on the fish ladder itself has been modified slightly to increase pooling. Specifically, the primary change involves using 6" x 3/8" notched plates rather than 3" x 3" x 3/8" angles for the baffles, thus, creating deeper pools on the ladder. As you can see, the modification does not affect the hydraulics of the primary structure (130' weir) however, I do want to ensure that you have a correct final copy of the plans. Please discard the copy sent to you under cover letter dated January 18, 1989, and replace it with the enclosed copy.

If you have any questions, please contact me at (701) 258-5599.
Thank you.

Sincerely,

Douglas J. Lipetzky, P.E.
Regional Engineer

Enclosure

cc: Emmett Keyser



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

MAR 10 1989

US Fish & Wildlife Service
ATTN: JOHN L. SPINKS, JR.
PO Box 25486, Denver Fed'l Ctr
Denver, CO 80225

Dear Mr. Spinks:

Enclosed is Water Permit No. 5224-3 as approved by the Water Management Board authorizing you to construct your water diversion system and put the water to beneficial use, not exceeding the limits as specified in Water Permit No. 5224-3.

Also enclosed is Form 10, Notice of Completion of Works and Application of Water to Beneficial Use, which you are to complete and submit to the Chief Engineer when you have completed the system and/or have put the water to beneficial use. An inspection can then be scheduled so that the Water License may be issued, thus completing your acquisition of a Water Right.

Very truly yours,

A handwritten signature in dark ink, appearing to read "John Hatch".

JOHN HATCH, Chief Engineer
Water Rights Division
605 773-3352

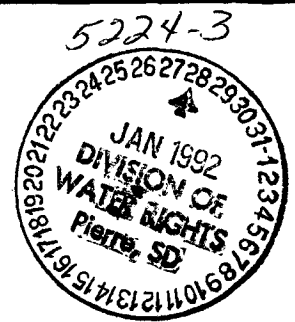
JH: mra

enclosure

PLEASE NOTE: Certain changes can be made in your permit within the five year construction period, usually without affecting the priority date provided an application to amend your permit is made within the five year period - i.e. changes in location or number of diversion points (wells) or location of land to be irrigated. Well locations for wells into the same aquifer can be moved up to 660 feet without application.

Applications to amend a permit after the five year construction period will be assigned a new priority date. Applications to change water sources, to add lands or increase original diversion rates, if approved will usually receive the date of the new application as a priority date regardless of the five year construction period.

Enclosures



NOTICE OF COMPLETION OF WORKS AND
APPLICATION OF WATER TO BENEFICIAL USE

Date JAN 22 1992

TO: Water Rights Division, DWNR
Joe Foss Building
Pierre SD 57501-3181

FROM: United States of America, Fish and Wildlife Service
P.O. Box 25486, Denver Federal Center Denver, CO 80225
name address city

I have completed the construction of the water diversion system and I have put the water to beneficial use to the maximum extent it is going to be used. I have not exceeded the amounts specified in Water Permit No. 5224-3.

Water Permit No. 5224-3 states that the diversion system is to be constructed by January 25, 1994, and that the water it put to beneficial use by January 25, 1998.

The diversion system was completed on April 1989.
Applying the water to beneficial use was completed on April 1989.

You may schedule an inspection so that the Water License may be issued.

ACTING Willard Ladd
signature Regional Director

Permit No. 5224-3
Minnesota-Whetstone River - Water District

Report Of Examination Of Works And/Or Application of Water To Beneficial Use

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre, SD 57501

I have this day, **August 26, 2004**, made a thorough examination of the water use system constructed by **US Fish and Wildlife Service** of **P.O. Box 25486, Denver Federal Center, Denver CO 80225** holder of Permit No. **5223-3**, bearing the priority of **August 24, 1998** authorizing the storage of **257** acre-feet of the waters of **Monighan Creek** for **fish & wildlife production** purposes, in **Deuel** County.

I have to report on the conditions of the same as follows:

A. Works used to divert the water:

A 9 ft. high embankment and a 130 ft wide steel sheet pile weir with a normal storage capacity of 257 acre-feet.

B. Works used to transport water to place of use:

N/A

C. Works used to apply water to beneficial use:

A 9 ft. high embankment and a 130 ft wide steel sheet pile weir with a normal storage capacity of 257 acre-feet.

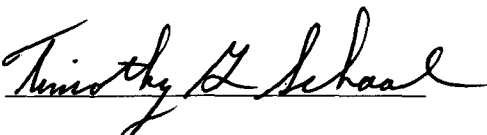
The system is in the following condition **good**. The point of diversion is located **1400 ft. south & 1800 ft. east of the NW corner of Sec. 2-T115N-R48W (SE ¼ NW ¼) (Lat. 44.80075, Long. -96.55457)**. The works are capable of storing **257** acre-feet of water which is to be used for **fish & wildlife production**. Water has been put to beneficial use to the maximum extent as follows:

A 9 ft. high embankment and a 130 ft wide steel sheet pile weir with a normal storage capacity of 257 acre-feet.

and the license should be issued for **257** acre-feet of storage.

Applicable permit qualifications have been complied with: Yes **X**

Exceptions to compliance are: **none** Date Report Completed: **January 14, 2005**



Timothy G. Schaal, P.E.
Natural Resources Engineer Specialist
DENR, Water Rights Program

REPORT ON INSPECTION OF PERMIT NO. 5224-3

DATE OF INSPECTION: August 26, 2004

NAME & ADDRESS OF PERMIT HOLDER: US Fish & Wildlife Service P.O. Box 25486
Denver Federal Center, Denver, CO 80225

DIVERSION POINT LEGAL LOCATION: 1400 ft. south & 1800 ft. east of the NW corner of
Sec. 2-T115N-R48W (SE ¼ NW ¼) (Lat. 44.80075, Long. -96.55457).

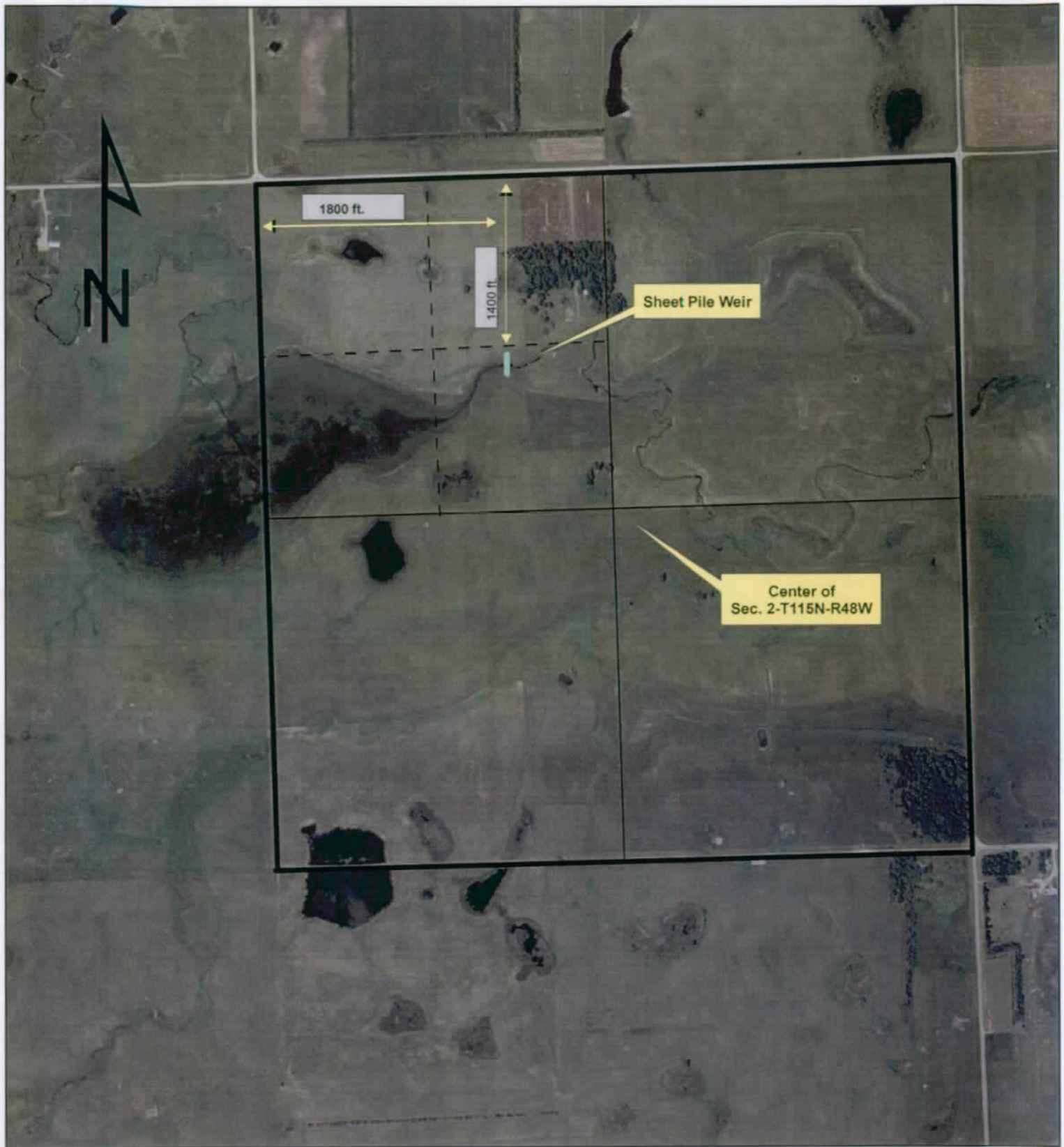
DAM INFORMATION:

- 1) Height to crest 9 feet
- 2) Height to primary spillway 0 to 4.5 ft. (w/ stoplogs)
- 3) Height to secondary spillway 4.5 feet
- 4) Crest width 10 feet
- 5) Crest length 266 feet
- 6) Spillway length XXX feet
- 7) Spillway width 130 ft. wide sheet pile weir
- 8) Approx. storage (Normal) 257 acre-feet
- 9) Approx. storage (Maximum) 725 acre-feet
- 10) Date constructed: 1989

PERMIT QUALIFICATIONS AND REGULATIONS:

- 1) Soil and water permit lands agree with lands being irrigated and lands listed on permit N/A
- 2) Special qualifications to permit being abided by yes
- 3) All structures, wells and lands on map yes
- 4) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period N/A

Water Permit Application No. 5224-3



0 0.25 0.5 1 Miles



Timothy G. Schaal
Timothy G. Schaal, P.E.
Natural Resources Engineer Specialist
DENR, Water Rights Program

1/14/05



January 20, 2005

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

5224-3

US Fish and Wildlife Service
Cheryl Willis
PO Box 25486
Denver Federal Center
Denver CO 80225

Dear Ms. Willis:

On August 26, 2004 the investigation of the dam, including the extent of application of water to beneficial use, as developed under Water Permit No. 5224-3, was completed by Tim Schaal, a staff engineer with our program. Water Permit No. 5224-3 authorizes the dam located in the Eilen Waterfowl Production Area, Deuel County. The water right document, the water license, can now be issued.

State law requires that we charge a \$50.00 fee for the investigation and issuance of the water license. Upon receipt of the \$50.00 fee from you, we will complete processing your water license. The check or money order for the fee should be made payable to the "Water Rights Program".

A licensed water right will be similar to a property right that can not be lost as long as the water use continues and you abide by the permit requirements.

If you have any questions regarding the water permit, investigation of the water use system or payment of the fee, please contact me.

Sincerely,

Karen Schlaak
Water Rights Program
(605) 773-3352
karen.schlaak@state.sd.us



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:

BA WTR
WR SD
Mail Stop 60189

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228-1807

RECEIVED

JAN 20 2005

WATER RIGHTS
PROGRAM

Ms. Karen Schlaak
South Dakota Department of Environment and
Natural Resources
Water Rights Program
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3182

RE: Water Permit No. 5224-3

Dear Ms. Schlaak:

In response to your letter dated January 20, 2005, the \$50 water license inspection fee under Water Permit 5224-3, Eilen Waterfowl Production Area, Deuel County, has been forwarded via electronic fund transfer. Upon receipt of payment, please complete processing of the water license.

If you have any questions or require further information, please contact me at (303) 236-5399.

Sincerely,

Carrie Cordova
Water Rights Specialist

BA0146R2 02/12/2005

PAGE: 1

STATE OF SOUTH DAKOTA
DAILY REVENUE & JOURNAL VOUCHER REPORT BY DOCUMENT
BUSINESS DATE: 02/11/2005

AGENCY 20 ENVIRONMENT & NATURAL RESOURCES
BUD UNIT 2010 FINANCIAL AND TECHNICAL ASSISTANCE

DOCUMENT	COMP	CENTER	ACCOUNT	AMOUNT	DC	EFFECT DATE	POST DATE	APPROVAL OR WRNT #	DESCRIPTION
CGEX050124	1000	2010101	51010100	255.00	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010101	51020100	19.51	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010101	51020200	15.30	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010101	51020800	.46	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010301	51010100	440.00	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010301	51020100	33.66	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010301	51020200	26.40	DR	02/09/2005	02/11/2005		
CGEX050124	1000	2010301	51020800	.79	DR	02/09/2005	02/11/2005		
* DOCUMENT TOTALS: DEBITS				791.12			NET CHANGE		791.12
C20G0131	3072	201050079901	42990000	280.93	DR	02/09/2005	02/11/2005	513648	CC DEPOSIT VISA/MC/AM EX JAN
C20G0131	3072	201050079901	42990000	280.93	CR	02/09/2005	02/11/2005	513648	CC DEPOSIT VISA/MC/AM EX JAN
* DOCUMENT TOTALS: DEBITS				280.93			NET CHANGE		280.93-
C205099	3072	2020000800	4299802	50.00	DR	02/11/2005	02/11/2005	513590	
C205099	3072	2020000800	4299802	50.00	DR	02/11/2005	02/11/2005	513590	
C205099	3072	2020000800	4299802	50.00	CR	02/11/2005	02/11/2005	513590	
C205099	3072	2020000800	4299802	50.00	CR	02/11/2005	02/11/2005	513590	
* DOCUMENT TOTALS: DEBITS				561.86			NET CHANGE		280.93-
C205110	3072	2020000797	428990006	3,950.00	DR	02/09/2005	02/11/2005	513537	
C205110	3072	2020000797	428990006	3,950.00	CR	02/09/2005	02/11/2005	513537	
C205110	3072	2020000797	428990006	3,950.00	CR	02/09/2005	02/11/2005	513537	
C205110	3072	2020000845	428990005	1,050.00	CR	02/09/2005	02/11/2005	513537	
C205110	3073	203000078791	428990000	932.40	CR	02/09/2005	02/11/2005	513537	
* DOCUMENT TOTALS: DEBITS				100.00			NET CHANGE		50.00-
E20G088	3072	201050079901	52049600	13.99	DR	02/09/2005	02/11/2005	MC868	CC SETTLEMENT V/MC JAN05
E20G088	3072	201050079901	52049600	13.99	DR	02/09/2005	02/11/2005	MC868	CC SETTLEMENT V/MC JAN05
E20G088	3072	201050079901	52049600	13.99	CR	02/09/2005	02/11/2005	MC868	CC SETTLEMENT V/MC JAN05
* DOCUMENT TOTALS: DEBITS				3,950.00			NET CHANGE		5,932.40-
E20G089	3072	201050079901	52079600	.69	DR	02/09/2005	02/11/2005	MC869	CC SETTLEMENT AM EX JAN05
E20G089	3072	201050079901	52079600	.69	DR	02/09/2005	02/11/2005	MC869	CC SETTLEMENT AM EX JAN05
E20G089	3072	201050079901	52079600	.69	CR	02/09/2005	02/11/2005	MC869	CC SETTLEMENT AM EX JAN05
* DOCUMENT TOTALS: DEBITS				27.98			NET CHANGE		13.99
E205027	2002	2010300267	520436003	21.34	CR	02/09/2005	02/11/2005		GY 3 DONE S/B GY 5
E205027	2002	2010300267	520436005	21.34	DR	02/09/2005	02/11/2005		GY 3 DONE S/B GY 5
E205027	2002	201040026601	525605054	14,013.00	DR	02/09/2005	02/11/2005		BELLEFORCHE WRONG PROJECT
E205027	2002	201040026603	525605031	9,580.81	CR	02/09/2005	02/11/2005		BELLEFORCHE WRONG PROJECT
E205027	2002	201040026603	525605051	4,432.19	CR	02/09/2005	02/11/2005		BELLEFORCHE WRONG PROJECT
* DOCUMENT TOTALS: DEBITS				1.38			NET CHANGE		.69

State of South Dakota
VOUCHER

- ☐ Direct
(Z) ☐ Travel
(N) ☐ Non-Cash
(C) ☐ Cash Receipt

- (T) ☐ Cash Transfer
(I) ☐ Investment
(B) ☐ Appropriation Budget Transfer

- (E) ☐ Expenditure Correction
(R) ☐ Revenue Correction
(P) ☐ Period Ending Adjustment
(A) ☐ Other Adjustment

2/11/05 *[Signature]*

AGENCY USE ONLY			APPROVAL OFFICE ONLY	
Application Area	Vendor Number	Invoice ID	Voucher Number	Date
Date	Purchase Order ID	Document ID <i>C205089</i>	Delivery Date	Payment Due Date
S T A P L E	TO: (Payee, Billed Agency)		FROM: (Department, Billing Agency)	

FUNDING INFORMATION											
S E Q	Company	Account		Center		Project		Debit/Credit	Dr.		U C S O D E D R E
		Required	User	Required	User	Company	Number		Invoices	Cr.	
									Other	Cr.	
1	3072	4299500		2020	000800						
2								Amount		Code	
3								5000		CR	
4											
5											
6											
7											
8											
9											
10											
Total											

Description of Service, Product, or Transfer	
<i>Wire</i> <i>US Fish + Wildlife -</i> <i>Water Permit 5224-3.</i>	5000
Total	

I declare and affirm under the penalties of perjury that this claim has been examined by me, and to the best of my knowledge and belief, is in all things true and correct.

Claimant: *[Signature]* Date: *1-20-05*

Authorization _____ Date _____

Authorization _____ Date _____

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date February 14, 2005

RECEIVED OF US Fish & Wildlife Service, PO Box 25486, Denver Fed. Center, Denver CO 80225

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	50	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>5224-3</u>		
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
ELECTRONIC TRANSFER		
(Any Other Work Provided by Law)	TOTAL	50.00

No.

001.02

By

Darland Eide
Chief Engineer
gm



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

APR 19 2005

5224-3

US Fish & Wildlife Service
% Carrie Cordova
PO Box 25486
Denver Federal Center
Denver CO 80225

Dear Ms. Cordova:

Enclosed is Water License No. 5224-3. This is the final water right document completing your process of obtaining a Water Right. Enclosed is Receipt No. 001762 in the amount of \$50.00 which you paid for the investigation and issuance of the Water License.

As long as you use the water beneficially, as stated in the Water License, State Water Laws provide that you have a continuing right to use the water.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 5224-3

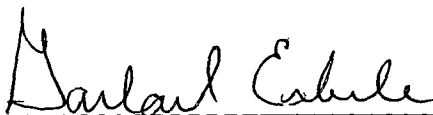
(1) US Fish & Wildlife Service, PO Box 25486, Denver Federal Center, Denver CO 80225 made Application No. 5224-3, August 24, 1988 for a water permit to impound 257 acre feet of water from Monighan Creek, Deuel County, South Dakota for fish and wildlife propagation purposes. Permit No. 5224-3, with a priority date of August 24, 1988 was approved January 25, 1989 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before January 25, 1994 and for the application to beneficial use of water on or before January 25, 1998.

(2) The water supply system has been completed and water applied to beneficial use in accordance with South Dakota State Law. Pursuant to South Dakota Codified Law 46-5-30.1, the holder and/or owner of Water Right No. 5224-3 is issued a license, bearing a priority date of August 24, 1988, to impound 257 acre feet of water for fish and wildlife propagation purposes.

The location of the storage dam (spillway) is 1,400 feet south and 1,800 feet east of the northwest corner of Section 2-T115N-R48W (SE ¼ NW ¼) (Eilen Waterfowl Production Area).

(3) This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Permit No. 5224-3, including the following now applicable qualifications:

- Low flows as needed for downstream domestic use, including livestock and prior water rights must be by-passed.
- Approval of this Permit authorizes storage of up to 257 acre-feet of water annually.

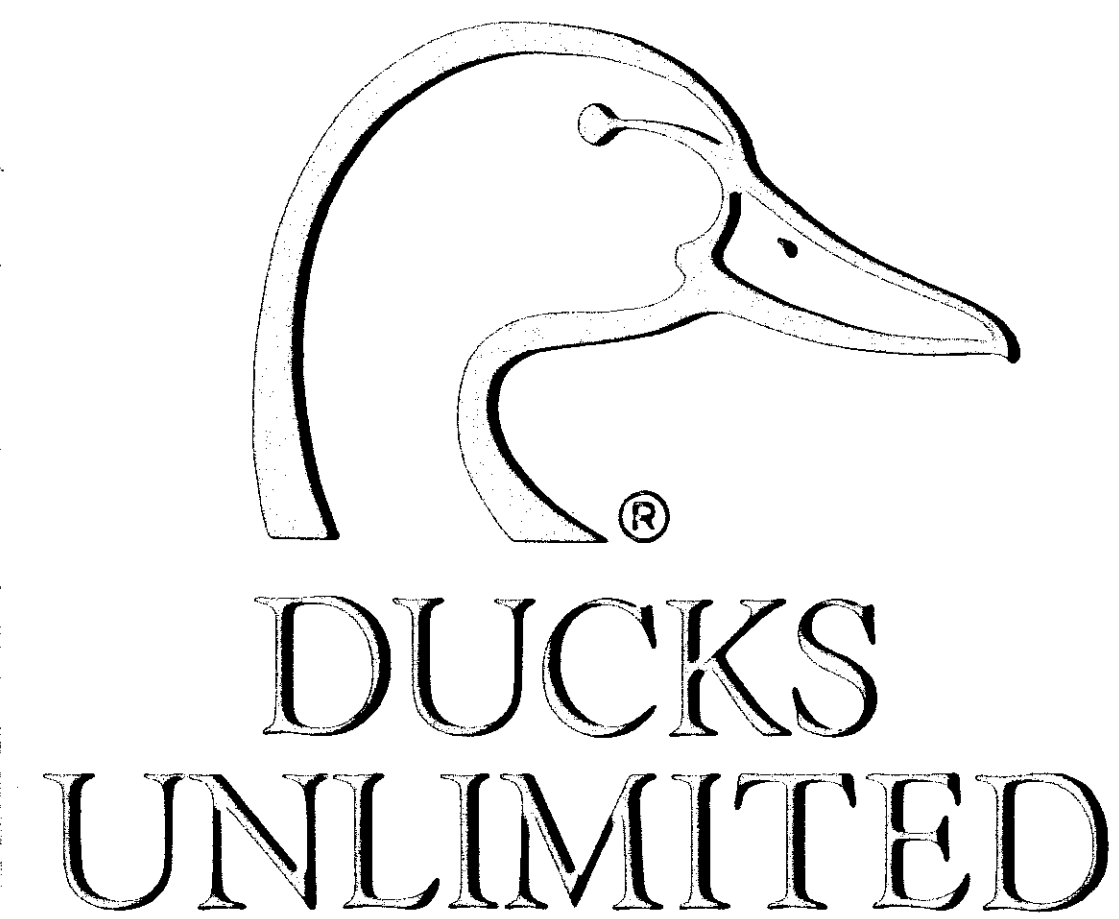


Garland Erbele, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

APR 19 2005

date





DUCKS UNLIMITED

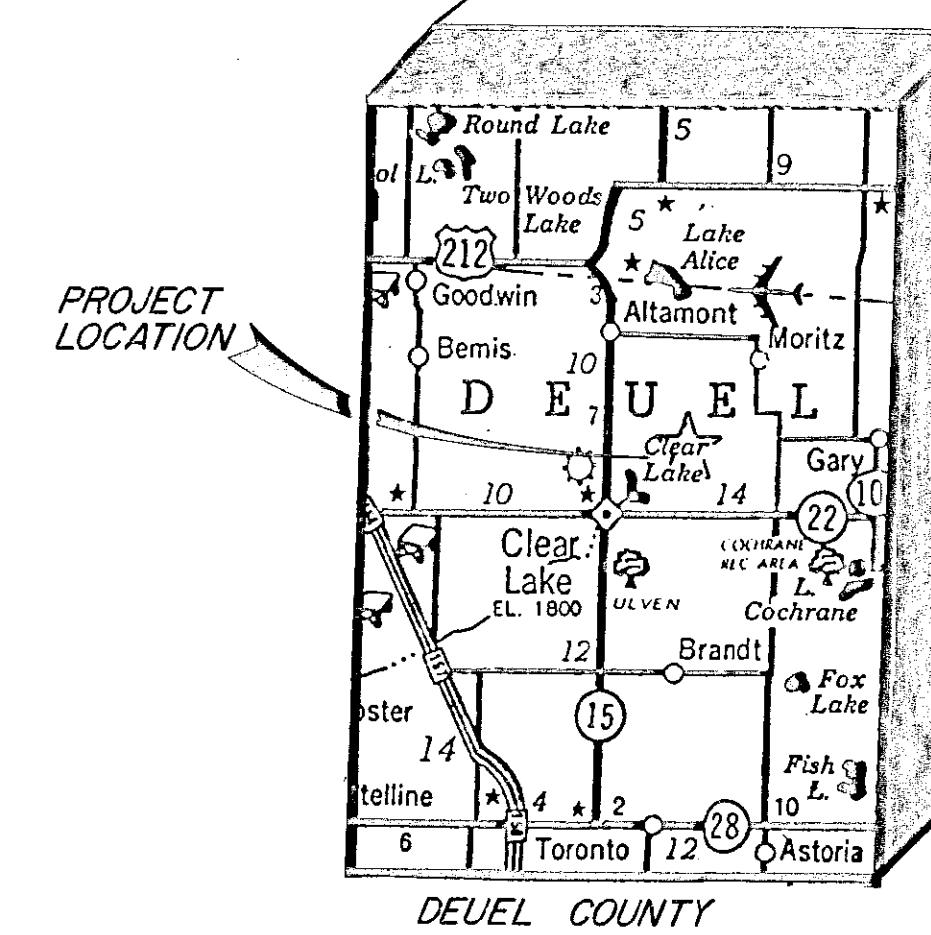
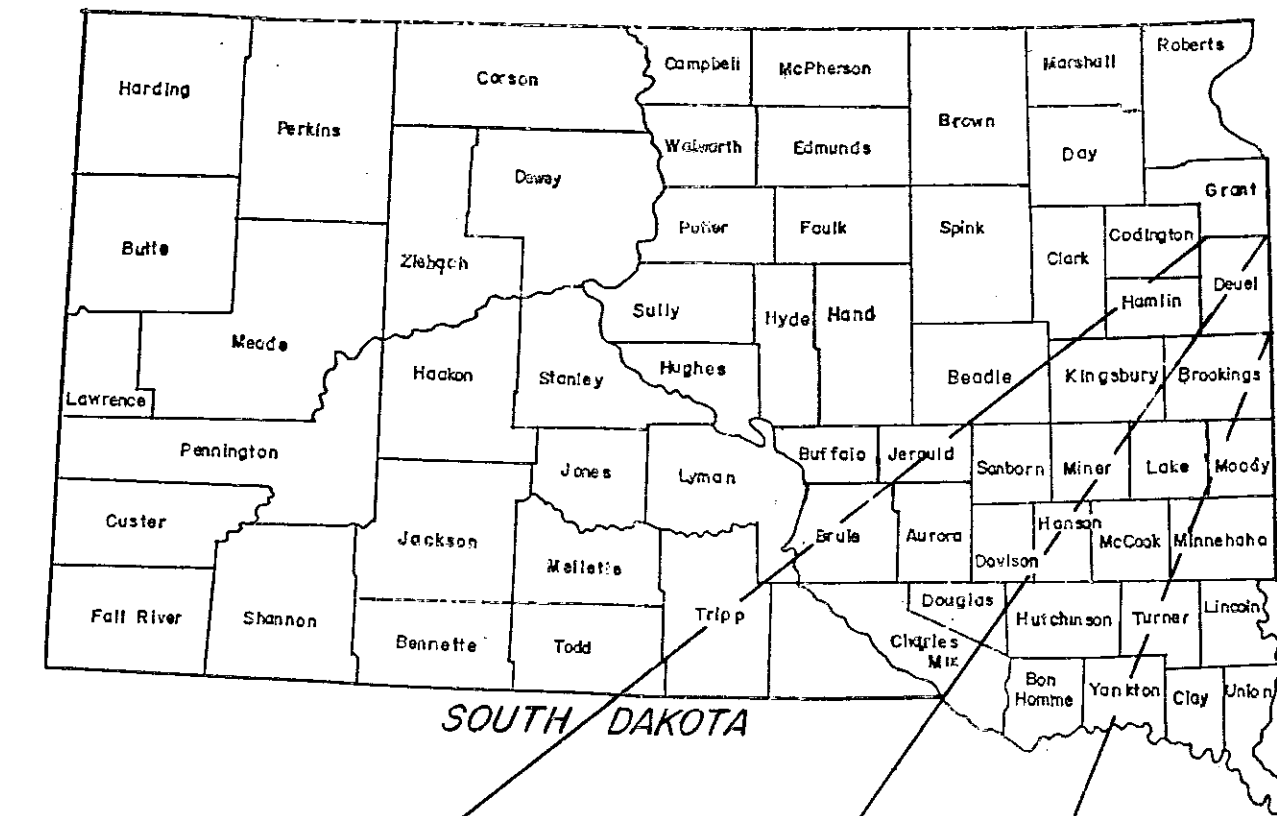
PROJECT

CRYSTAL SPRINGS PRAIRIE EILEN WATERFOWL PRODUCTION AREA

SECTION 2, TOWNSHIP 115 NORTH, RANGE 48 WEST, DEUEL COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

U.S. FISH & WILDLIFE SERVICE
&
THE NATURE CONSERVANCY



CONTRACTOR SHALL BURY GARBAGE PILE LOCATED ALONG ACCESS ROAD INTO WPA. TOPSOIL SHALL BE STRIPPED & RESPREAD ON BURIAL AREA. ALL COSTS ASSOCIATED WITH TOPSOIL STRIPPING & RESPREADING ON THE BURIAL AREA SHALL BE INCLUDED IN THE BID ITEM FOR "GARBAGE PILE BURIAL."

R 48 W

SPECIFICATIONS

GENERAL CONDITIONS	101
MOBILIZATION	201
SITE PREPARATION	202
EXCAVATION	203, 203A
EMBANKMENT CONSTRUCTION	204, 204A
WATER	205
RIPRAP PLACEMENT	209, 209A
SEEDING & MULCHING	210, 210A
STRUCTURAL STEEL	303
SPECIAL SPECIFICATION FOR GABION/FISH LADDER RIPRAP PLACEMENT	400
SPECIAL SPECIFICATION FOR SHEET PILE DRIVING	500

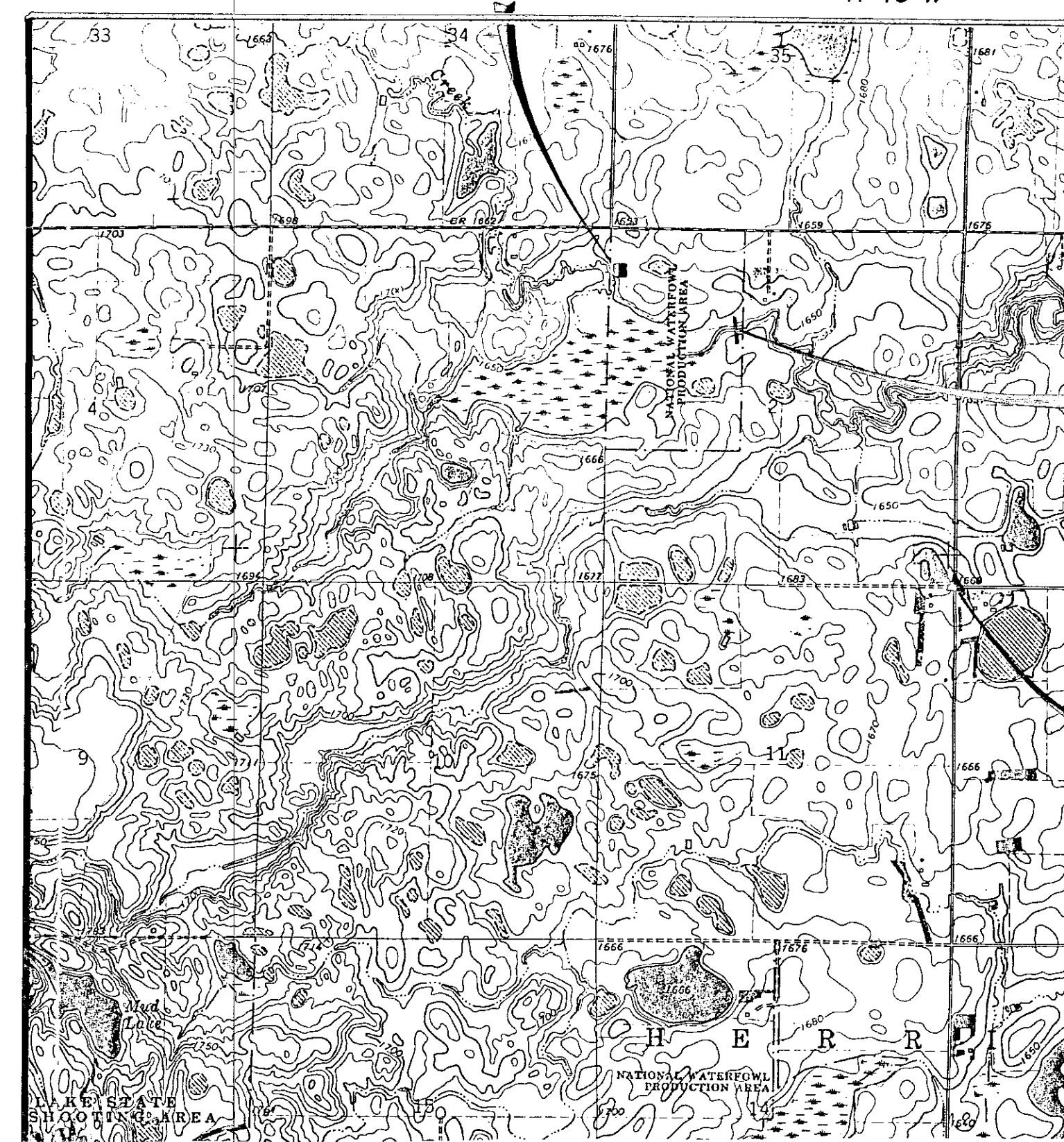
PLAN INDEX

VICINITY MAP	1
SITE PLAN	2
SITE TOPOGRAPHY	3
CONTROL STRUCTURE	
PLAN & PROFILE	4
CONTROL STRUCTURE DETAILS	5
MISCELLANEOUS DETAILS	6

ESTIMATED QUANTITIES

SITE PREPARATION	164 C.Y.
EMBANKMENT	450 C.Y. (NON-BID ITEM)
RIPRAP	292 C.Y.
SEEDING & MULCHING	0.2 AC.
SHEET PILING	3,386.0 S.F. (NON-BID ITEM)
GABION/LADDER RIPRAP	12 C.Y.
EXCAVATION	640 C.Y.
SHEET PILE DRIVEN	3,386.0 S.F.

NOTE TO CONTRACTOR:
DUCKS UNLIMITED, INC. SHALL FURNISH THE SHEET PILING & HAVE IT DELIVERED TO THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DRIVING THE SHEET PILING TO CONSTRUCT A STRUCTURE OF THE DIMENSIONS SHOWN ON THE PLANS. THE COST OF DRIVING THE SHEET PILING SHALL BE INCLUDED IN THE BID ITEM FOR "SHEET PILE DRIVEN".

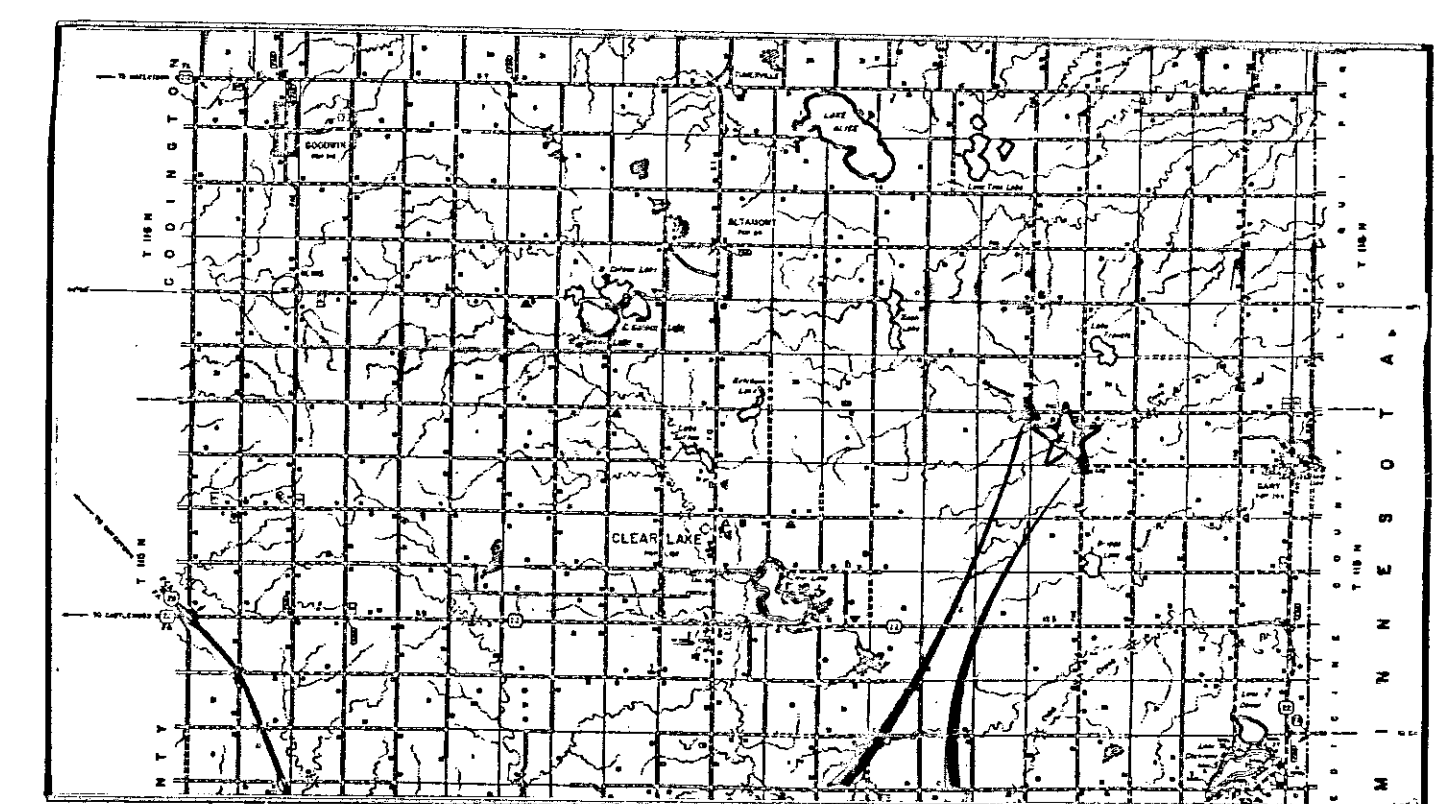
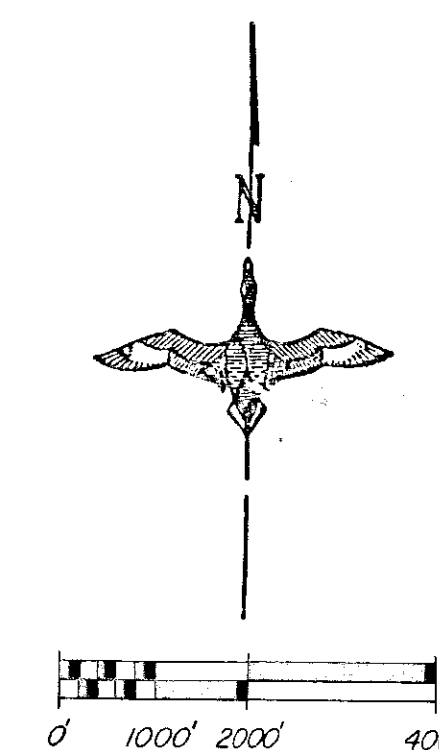


VICINITY MAP
SCALE: 1" = 2000'

T 116 N
T 115 N

PROJECT SITE

4 MILES WEST OF
GARY, SD



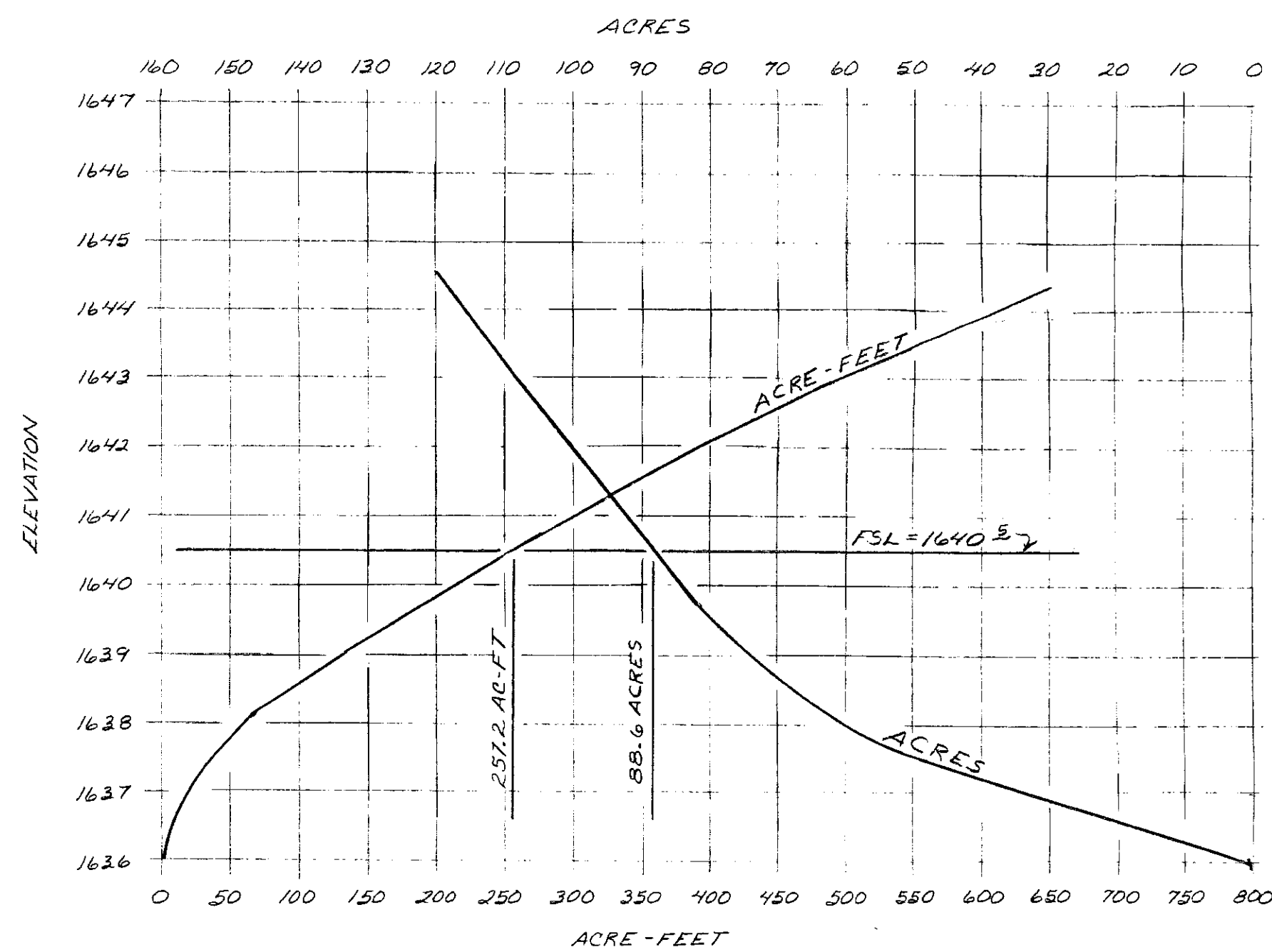
6 MILES EAST 3 MILES SOUTH
OF ALTAMONT, SD

4 MILES WEST OF
GARY, SD

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

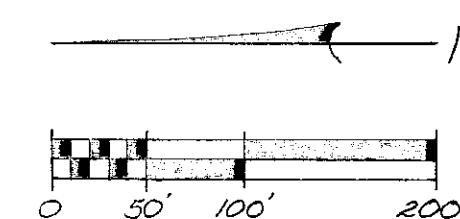
Wayne J. Lath
Date 1-4-89 Registration No. 4499

	DUCKS UNLIMITED INC.	PROJECT NO. DU-2-SD-077-02	DESIGNED BY: D.J.L.
	GREAT PLAINS REGIONAL OFFICE	CRYSTAL SPRINGS PRAIRIE EILEN WPA VICINITY MAP	DRAWN BY: K.D.B.
DATE: 8/4/88	SHEET NO: 1 of 6	APPROVED BY: <i>Wayne J. Lath</i>	CHECKED BY: 5224-3



MARSH DATA

FULL SERVICE LEVEL (FSL) 1640.57 (M.S.L.)
 WETLAND ACRES @ FSL 88.6 ACRES
 MARSH CAPACITY @ FSL 257.2 AC-FT
 SHORELINE MILES @ FSL 1.91 MILES



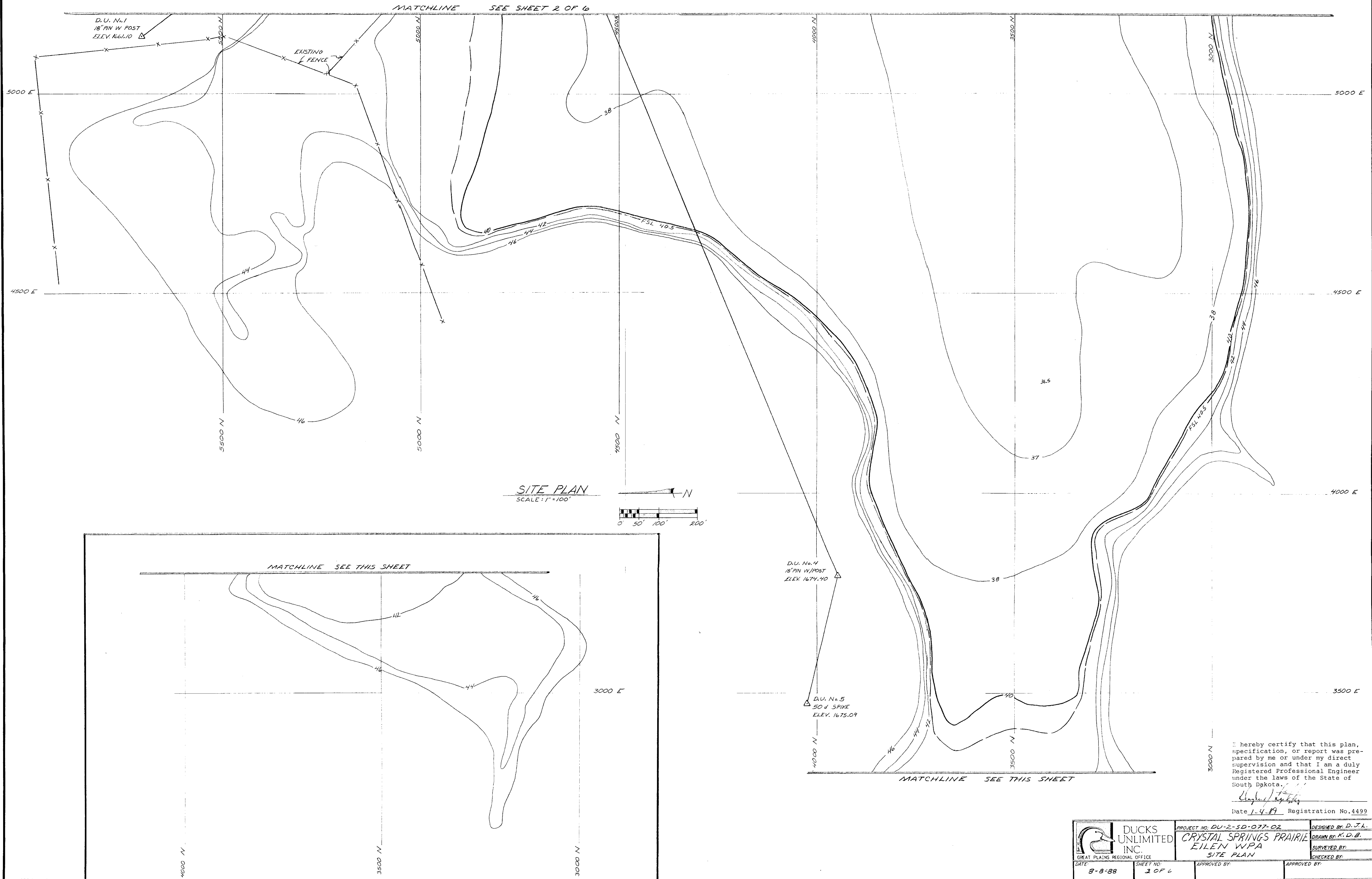
MATCHLINE SEE SHEET 3 OF 6

SITE PLAN
 SCALE: 1" = 100'

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

DATE 1-4-88 Registration No. 4499

DUCKS UNLIMITED INC. GREAT PLAINS REGIONAL OFFICE	PROJECT NO. DU-2-SD-077-02	DESIGNED BY: D.J.L.
	CRYSTAL SPRINGS PRAIRIE EILEEN WPA SITE PLAN	DRAWN BY: K.D.B.
DATE 8-8-88	SHEET NO. 2 OF 6	CHECKED BY:
APPROVED BY:	APPROVED BY:	APPROVED BY:





DUCKS UNLIMITED

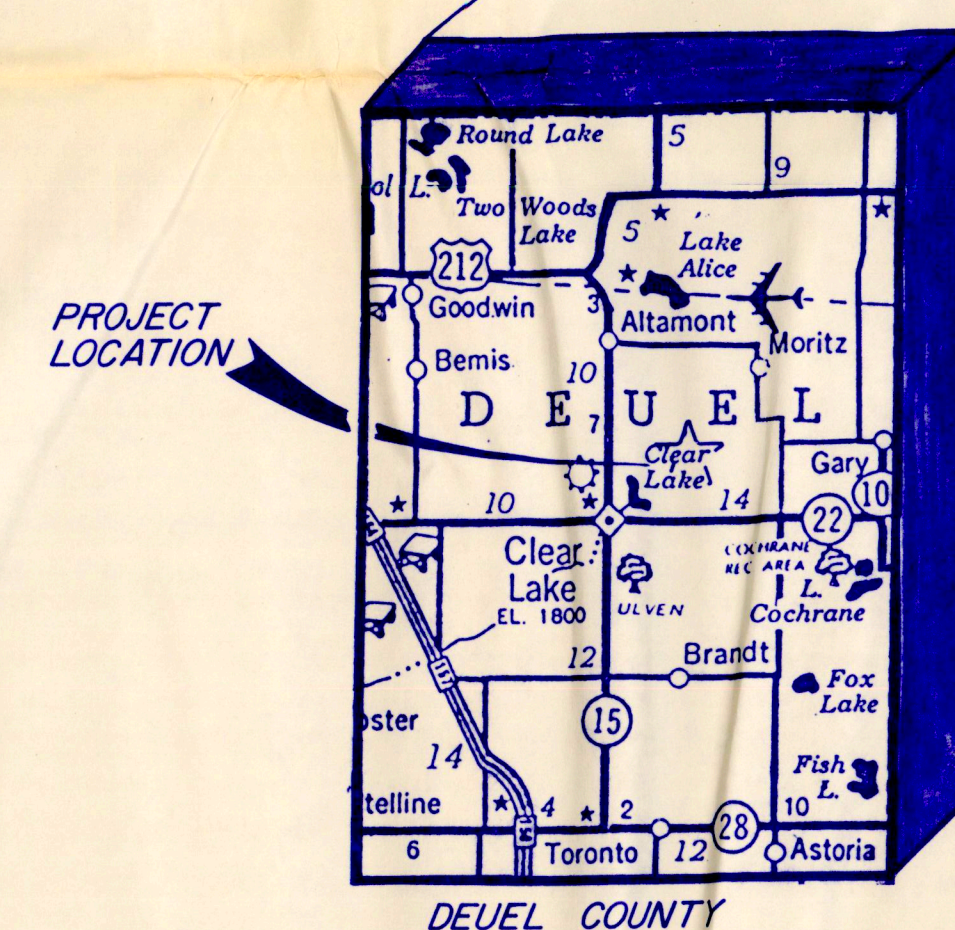
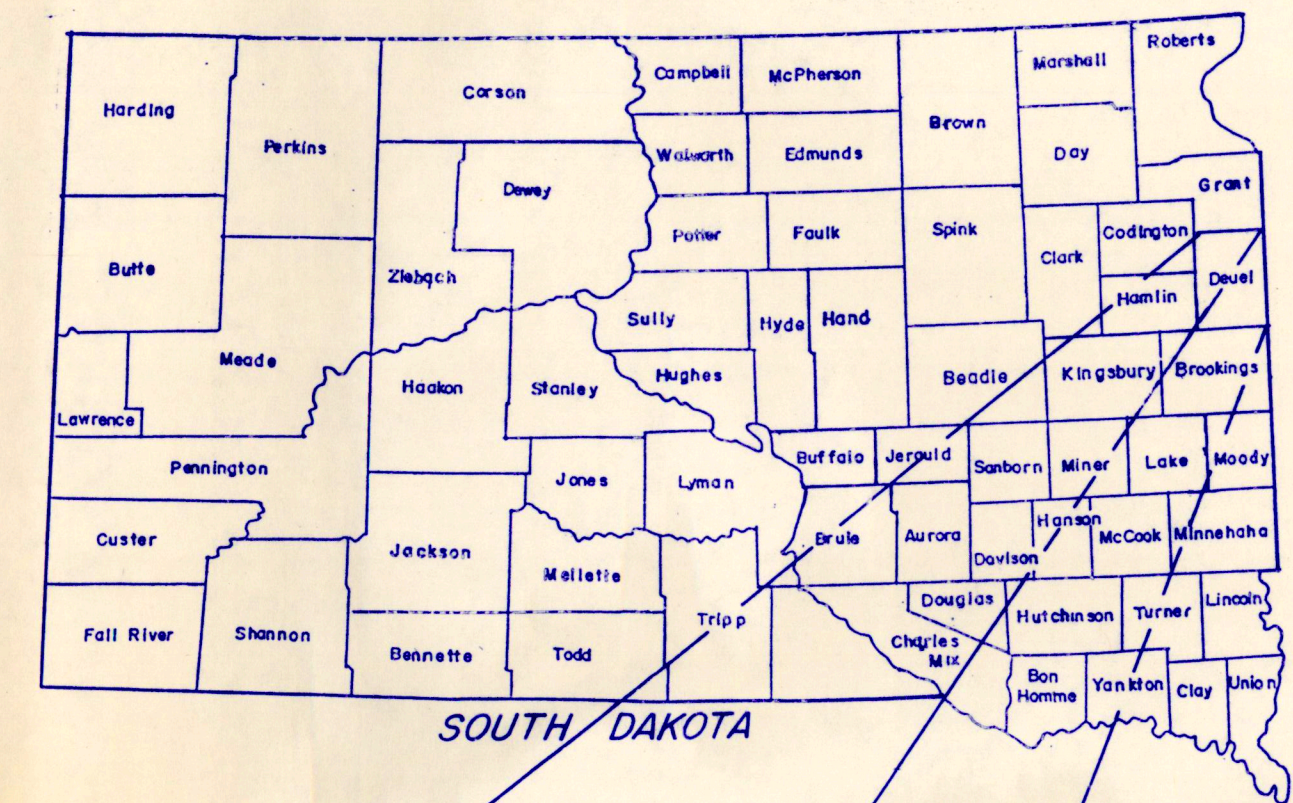
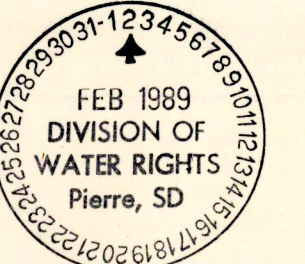
PROJECT

CRYSTAL SPRINGS PRAIRIE EILEN WATERFOWL PRODUCTION AREA

SECTION 2, TOWNSHIP 115 NORTH, RANGE 48 WEST, DEUEL COUNTY, SOUTH DAKOTA

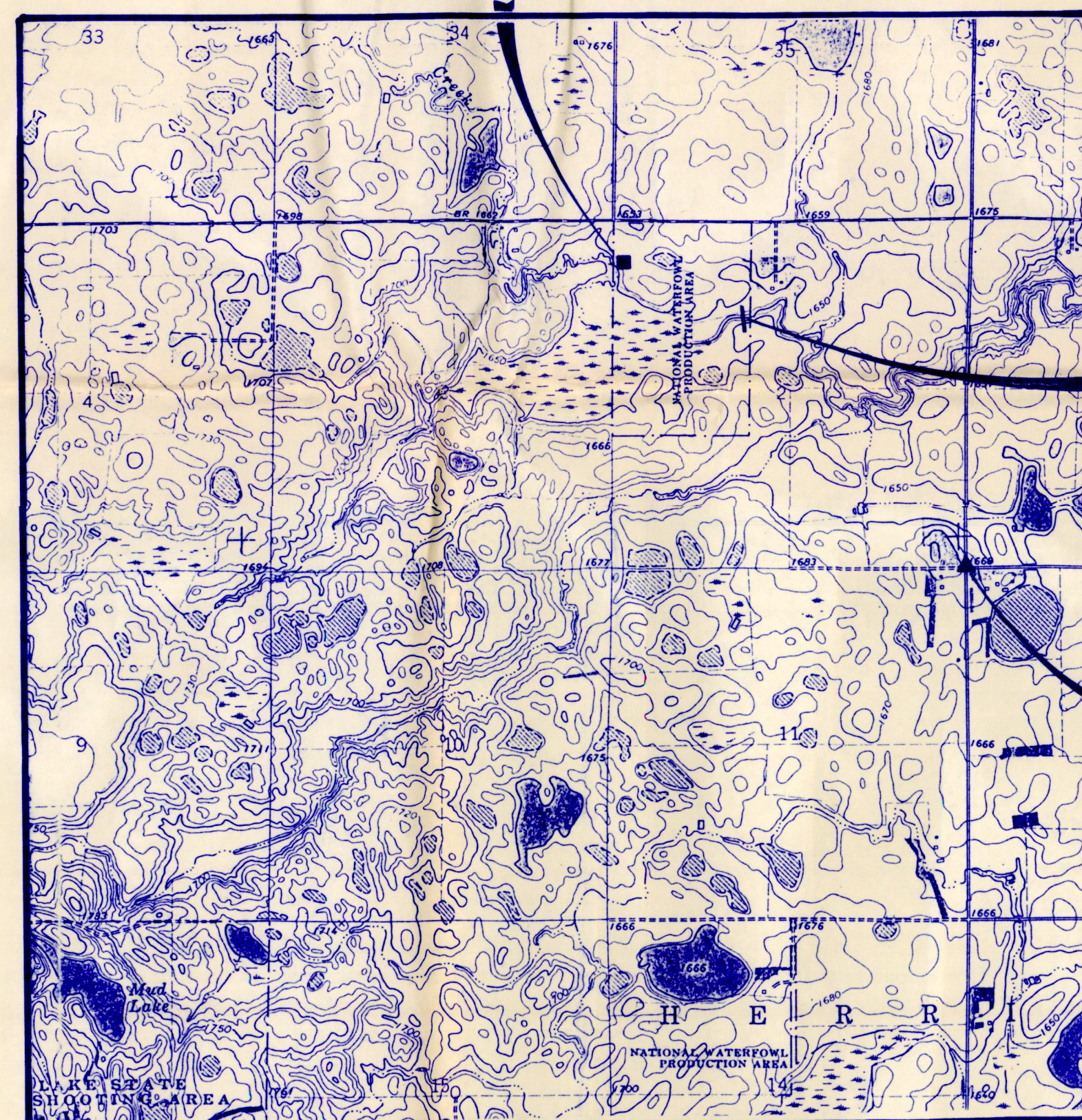
IN COOPERATION WITH

U.S. FISH & WILDLIFE SERVICE
&
THE NATURE CONSERVANCY



CONTRACTOR SHALL BURY GARBAGE PILE LOCATED ALONG ACCESS ROAD INTO WPA. TOPSOIL SHALL BE STRIPPED & RESPREAD ON BURIAL AREA. ALL COSTS ASSOCIATED WITH TOPSOIL STRIPPING & RESPREADING ON THE BURIAL AREA SHALL BE INCLUDED IN THE BID ITEM FOR "GARBAGE PILE BURIAL."

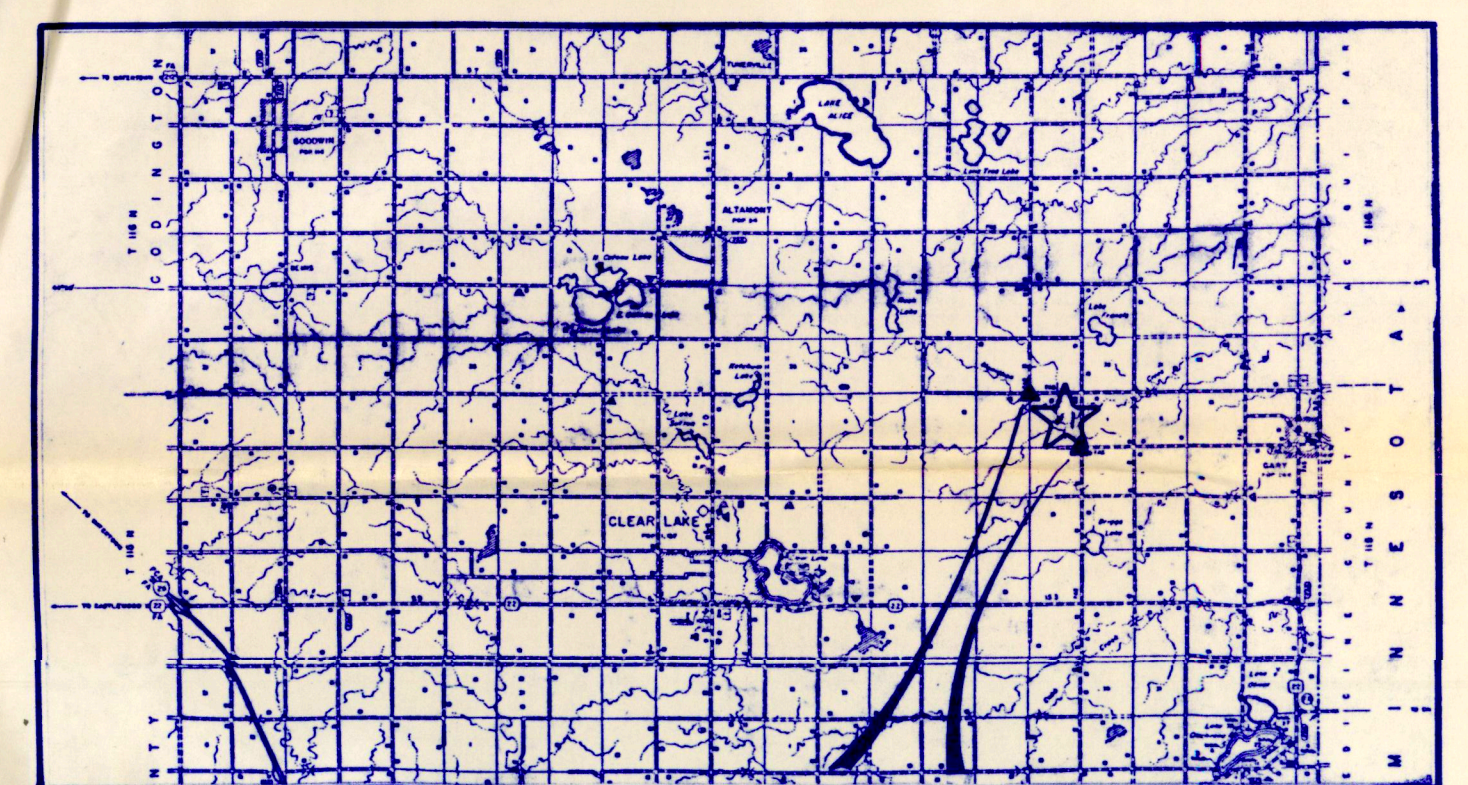
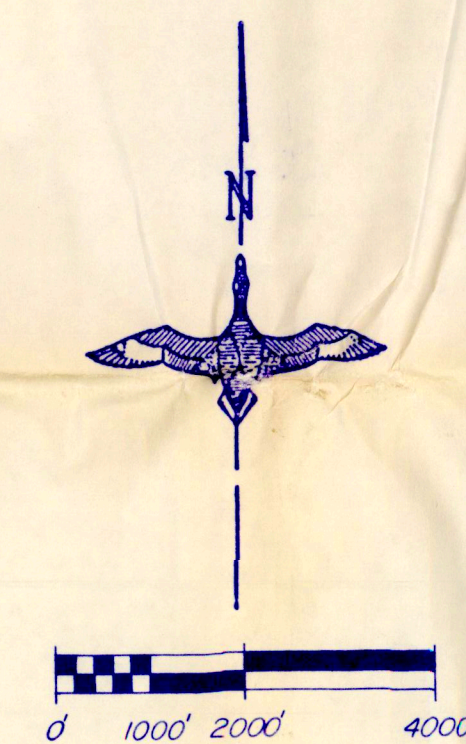
R 48 W



T 116 N
T 115 N

PROJECT SITE

4 MILES WEST OF
GARY, SD



6 MILES EAST, 3 MILES SOUTH
OF ALTAMONT, SD

4 MILES WEST OF
GARY, SD

SPECIFICATIONS

GENERAL CONDITIONS	101
MOBILIZATION	201
SITE PREPARATION	202
EXCAVATION	203, 203A
EMBANKMENT CONSTRUCTION	204, 204A
WATER	205
RIPRAP PLACEMENT	209, 209A
SEEDING & MULCHING	210, 210A
STRUCTURAL STEEL	303
SPECIAL SPECIFICATION FOR GABION/FISH LADDER RIPRAP PLACEMENT	400
SPECIAL SPECIFICATION FOR SHEET PILE DRIVING	500

PLAN INDEX

VICINITY MAP	1
SITE PLAN	2
SITE TOPOGRAPHY	3
CONTROL STRUCTURE	4
PLAN & PROFILE	4
CONTROL STRUCTURE DETAILS	5
MISCELLANEOUS DETAILS	6

ESTIMATED QUANTITIES

SITE PREPARATION	164 C.Y.
EMBANKMENT	450 C.Y. (NON-BID ITEM)
RIPRAP	292 C.Y.
SEEDING & MULCHING	0.2 AC.
SHEET PILING	3,386.0 S.F. (NON-BID ITEM)
GABION/LADDER RIPRAP	12 C.Y.
EXCAVATION	640 C.Y.
SHEET PILE DRIVEN	3,386.0 S.F.

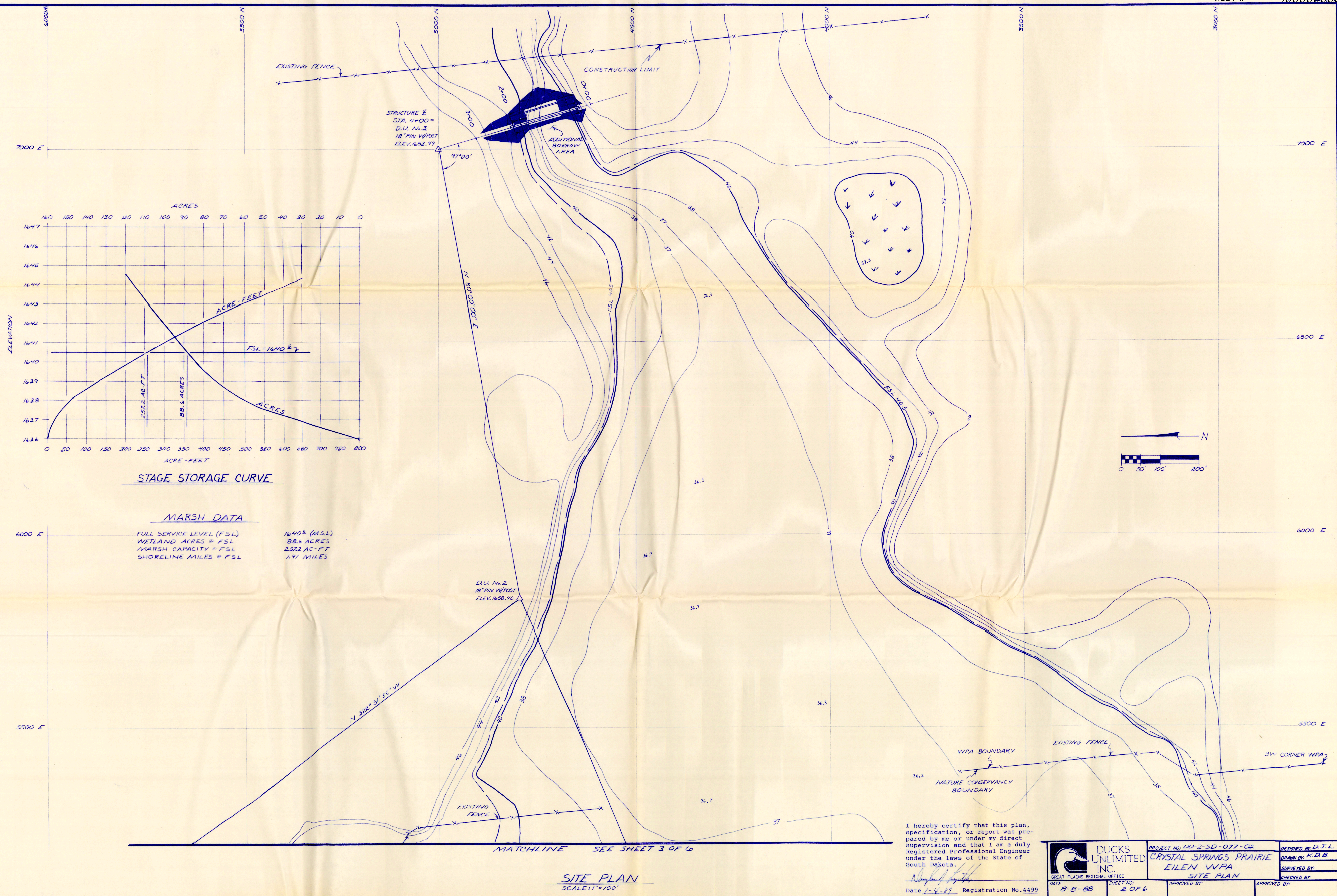
NOTE TO CONTRACTOR:
DUCKS UNLIMITED, INC. SHALL FURNISH THE SHEET PILING & HAVE IT DELIVERED TO THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DRIVING THE SHEET PILING TO CONSTRUCT A STRUCTURE OF THE DIMENSIONS SHOWN ON THE PLANS. THE COST OF DRIVING THE SHEET PILING SHALL BE INCLUDED IN THE BID ITEM FOR "SHEET PILE DRIVEN".

VICINITY MAP
SCALE: 1" = 2000'

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

Angela J. Little
Date 1-4-89 Registration No. 4499

	DUCKS UNLIMITED INC.	PROJECT NO. DU-2-SD-077-02	DESIGNED BY: D.U.L.
	GREAT PLAINS REGIONAL OFFICE	CRYSTAL SPRINGS PRAIRIE EILEN WPA VICINITY MAP	DRAWN BY: K.D.B.
DATE: 8/4/88	SHEET NO: 1 of 6	APPROVED BY: <i>Angela J. Little</i>	CHECKED BY: <i>Angela J. Little</i>
			5224-3



I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota. / / /

Date 1-4-88 Registration No. 4499



DUCKS
UNLIMITED
INC.
REGIONAL OFFICE

PROJECT NO: DU-2-SD-077-C2
CRYSTAL SPRINGS PRAIRIE
EILEEN WPA
SITE PLAN

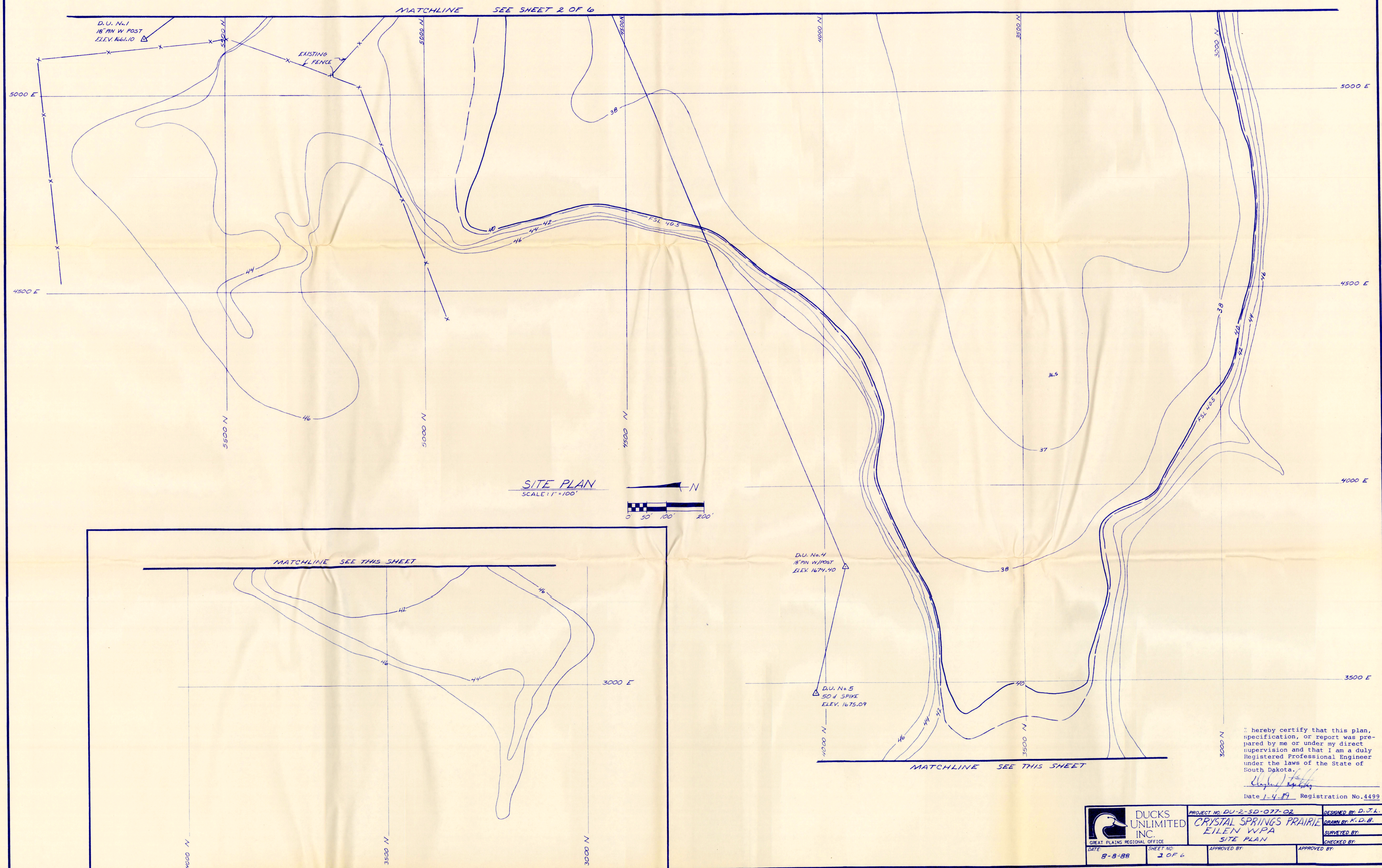
DESIGNED BY:	D.J.L.
DRAWN BY:	K.D.B.
SURVEYED BY:	
CHECKED BY:	

DATE: 8-8-

SHEET NO:
2 OF

APPROVED

APPROVED



PLAN	DATE	BY
SURVEYED		
DESIGNED		
CHECKED		
NOTED		
DATE		
NO.		

PROFILE	DATE	BY
SURVEYED		
DESIGNED		
CHECKED		
NOTED		
DATE		
NO.		

NOTE: SPECIAL PRECAUTIONS SHALL BE TAKEN TO MINIMIZE DISTURBANCE ON THE SURROUNDING LANDSCAPE.

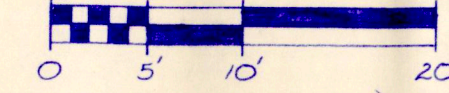
1. CONTRACTOR SHALL BE RESPONSIBLE FOR SEEDING + SPRAYING A MULCH COVER ON ALL EXPOSED AREAS IN ACCORDANCE WITH SPECIFICATIONS 210 + 210 A. THE SEED MIXTURE SHALL BE AS FOLLOWS:

11 pils 165/AC TALL WHEAT GRASS
10 pils 165/AC INTERMEDIATE WHEAT GRASS
4 pils 165/AC ALFALFA
12 pils 165/AC SWEET CLOVER
40 165/AC OATS

2. TOPSOIL SHALL BE STRIPPED ON ALL EXCAVATED AREAS, BORROW AREAS, + UNDER EMBANKMENTS. A MINIMUM OF 4" TOPSOIL SHALL BE RESPAID ON EMBANKMENTS + EXCAVATED AREAS.

3. BORROW FOR THE EMBANKMENTS SHALL COME FROM EXCAVATED AREAS IN THE CHANNEL. ANY ADDITIONAL MATERIAL NEEDED SHALL COME FROM THE ADDITIONAL BORROW AREA NOTED. ANY EXCESS MATERIAL SHALL BE BLENDED INTO THE EMBANKMENT.

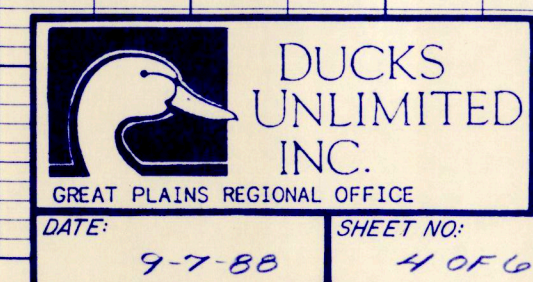
STRUCTURE PLAN VIEW
SCALE: 1"=10'-0"



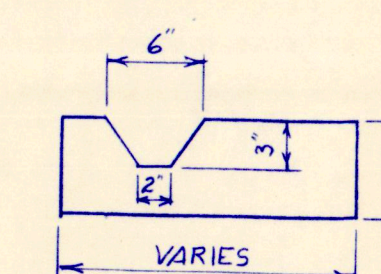
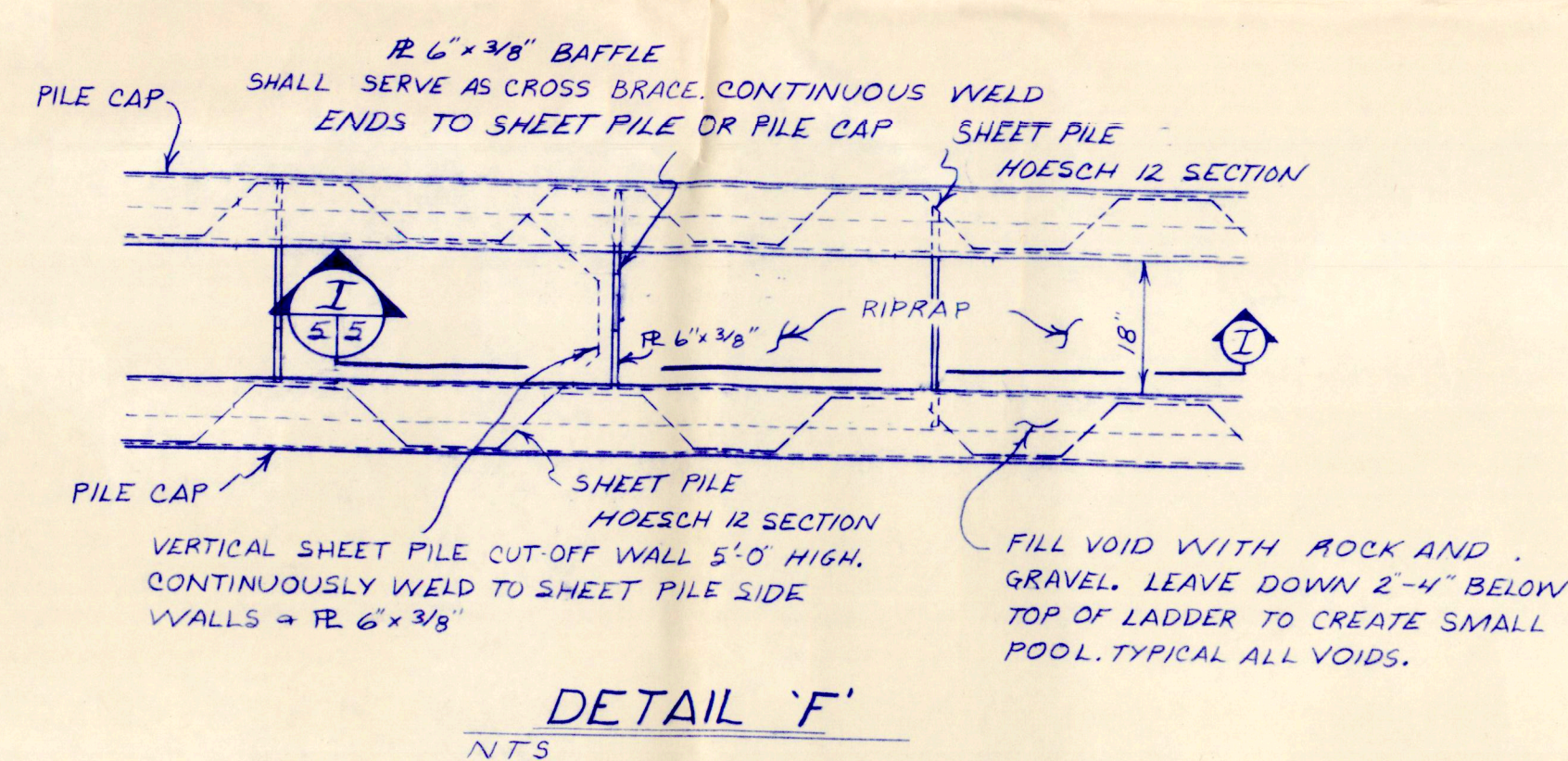
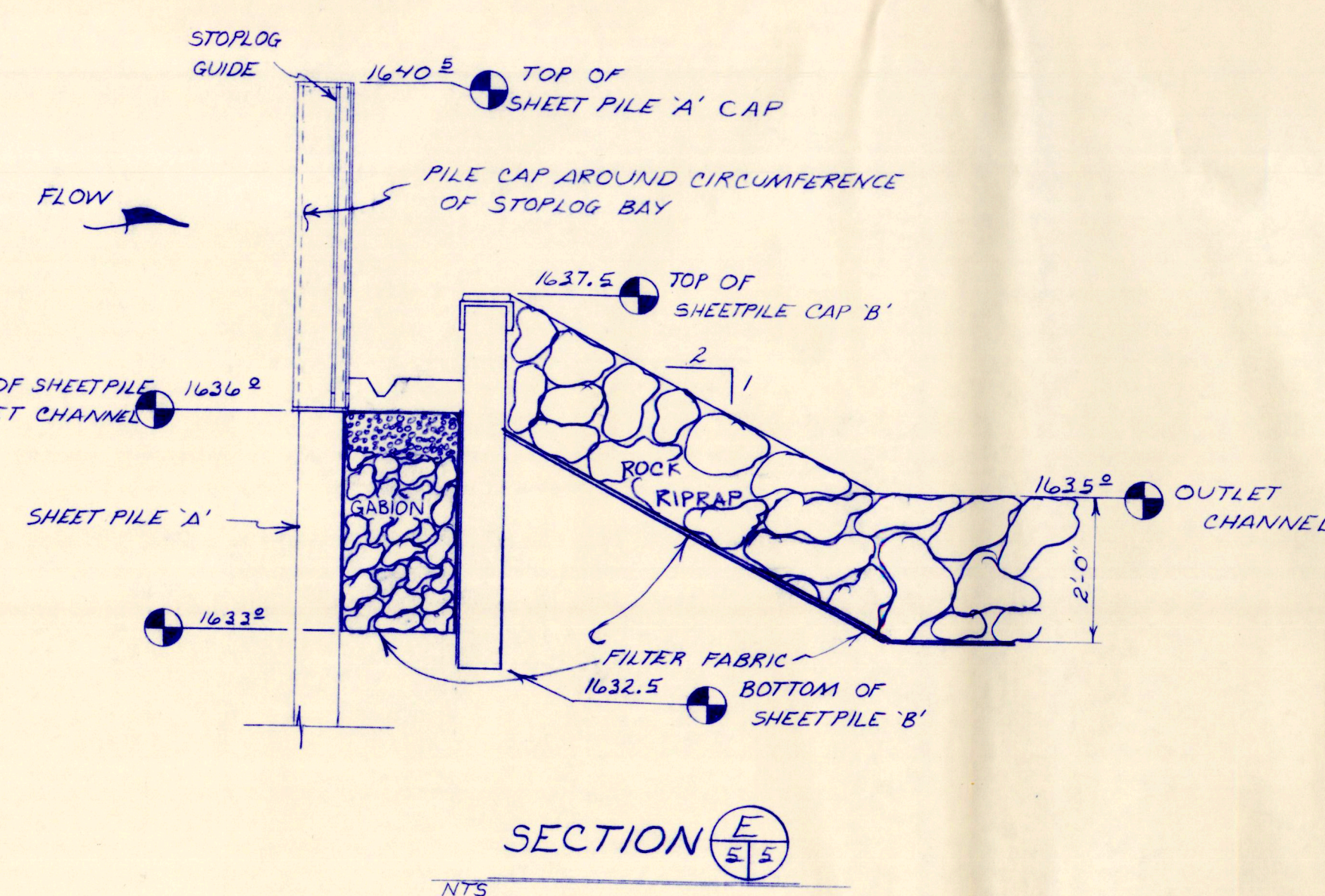
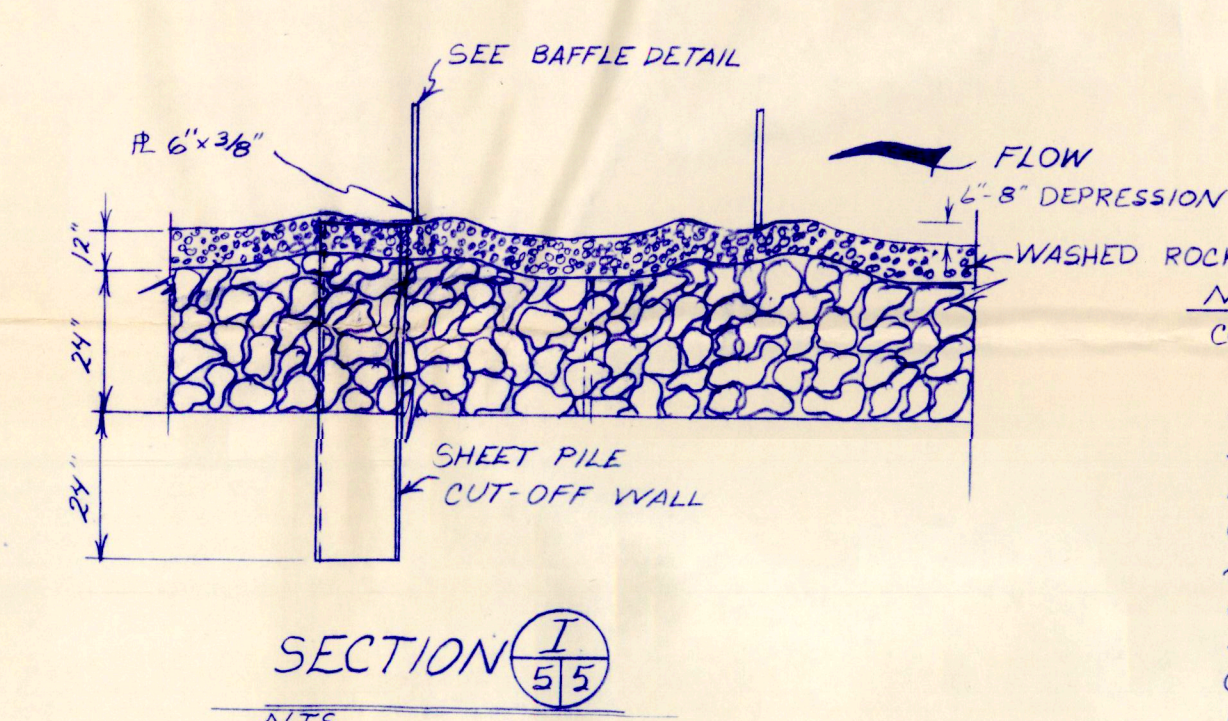
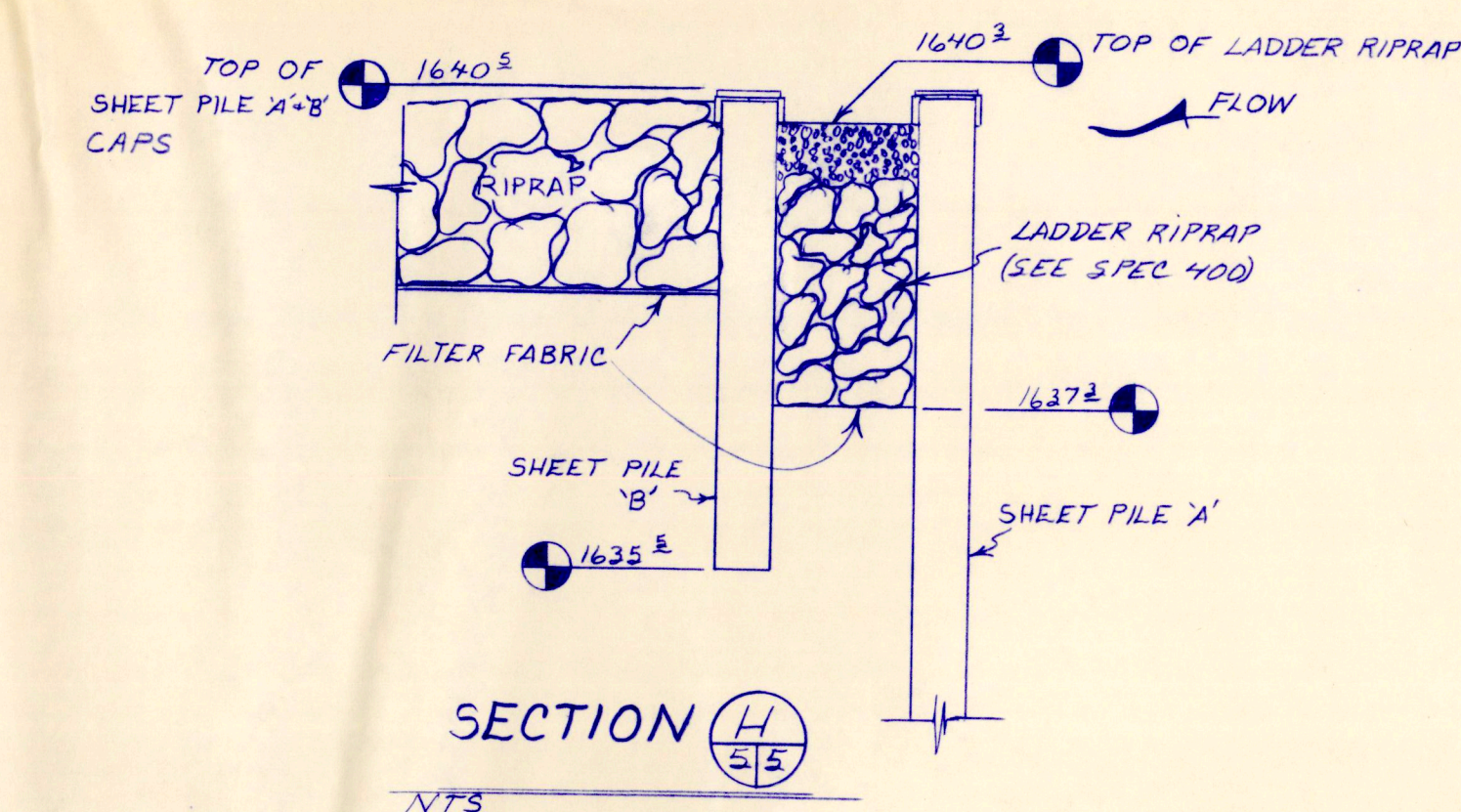
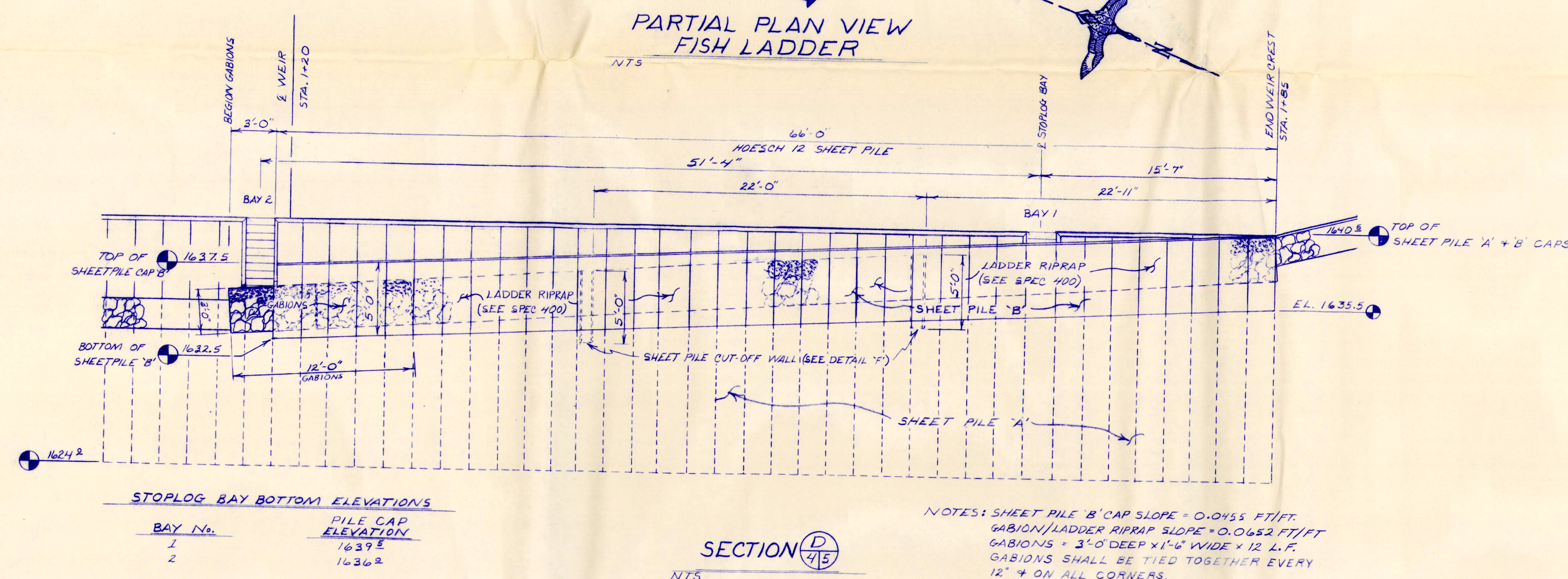
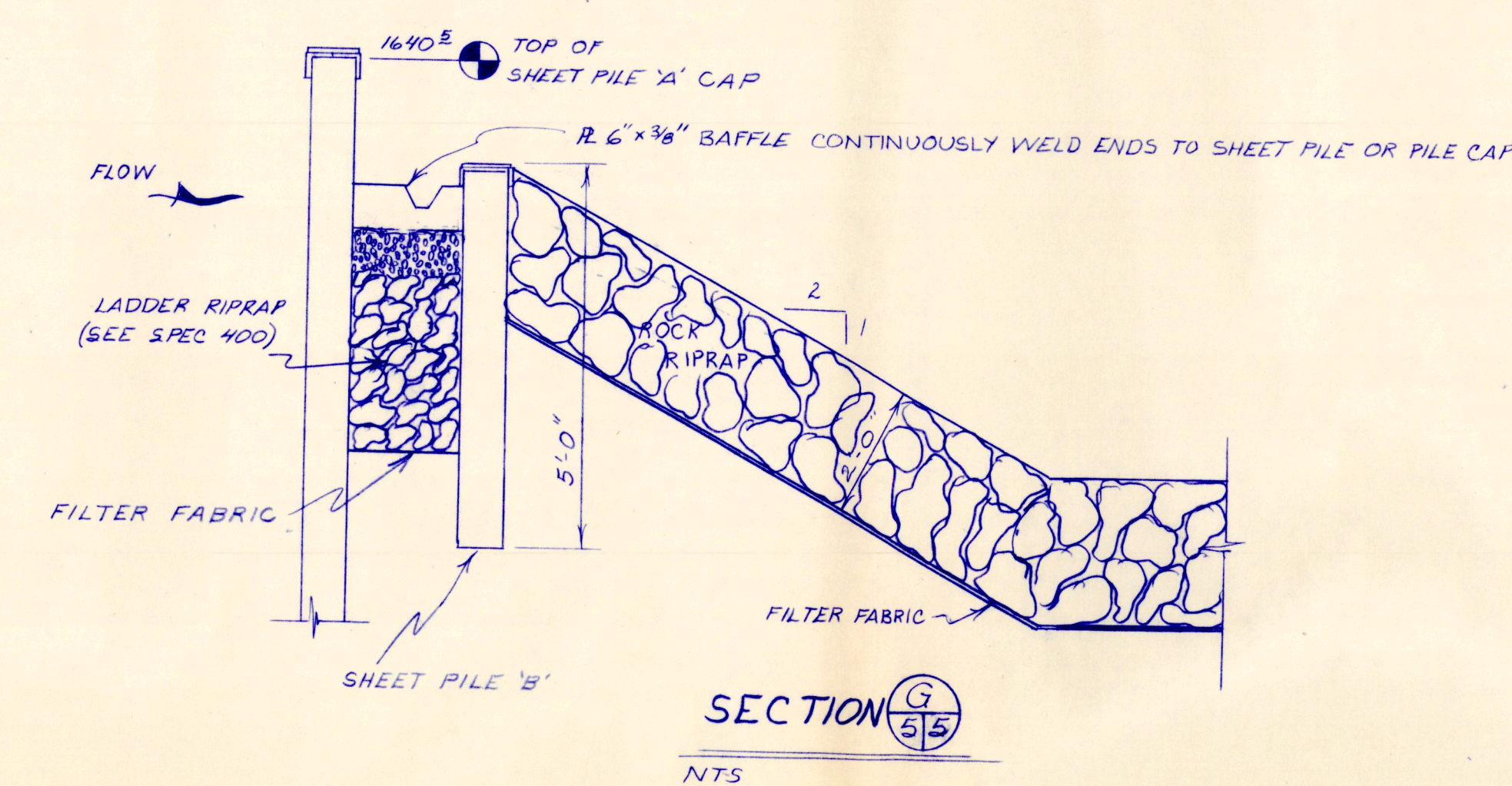
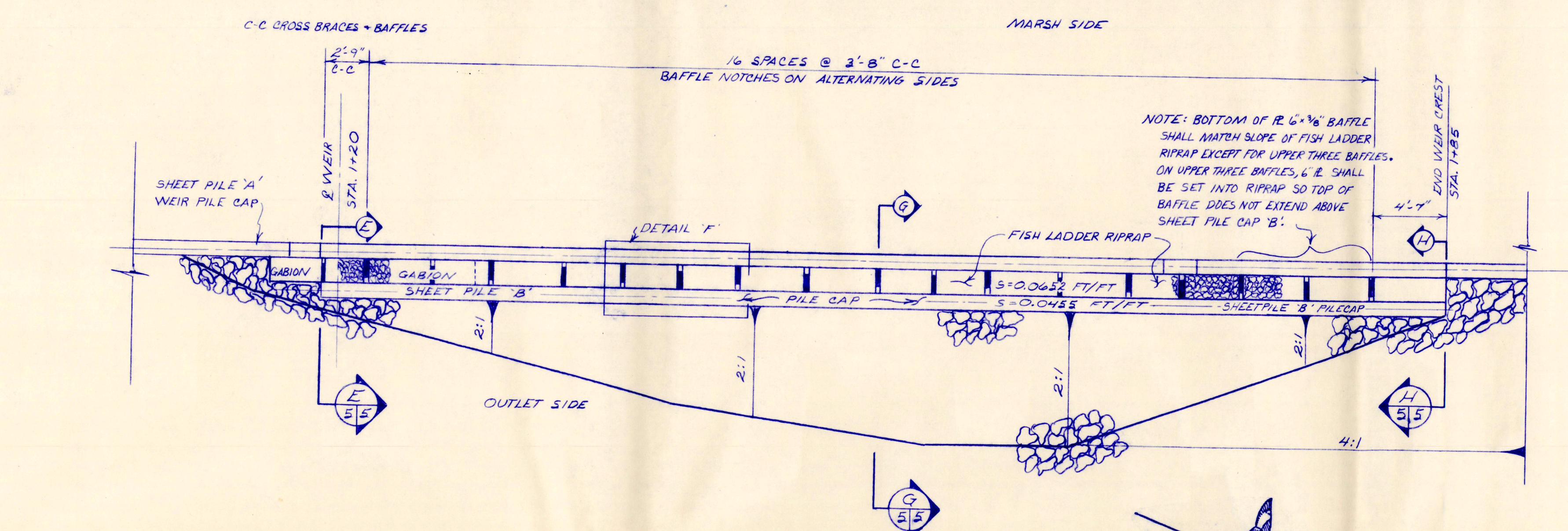
SECTION A-A
NTS

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

Date: 4-11-99 Registration No. 4499



PROJECT NO: DU-2-SD-077-02
DESIGNED BY: D.J.L.
DRAWN BY: K.D.B.
SURVEYED BY:
CONTROL STRUCTURE PLAN + PROFILE
APPROVED BY:
DATE: 4-7-99 SHEET NO: 4 OF 6

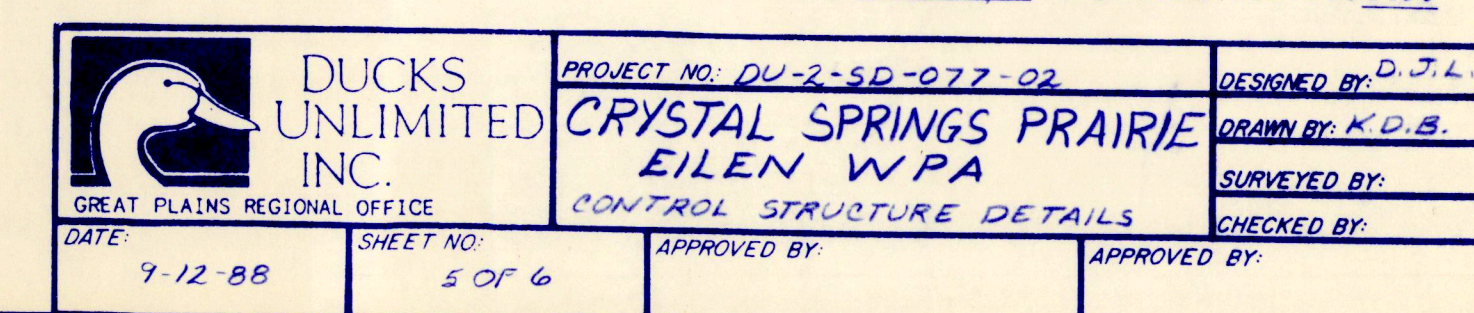


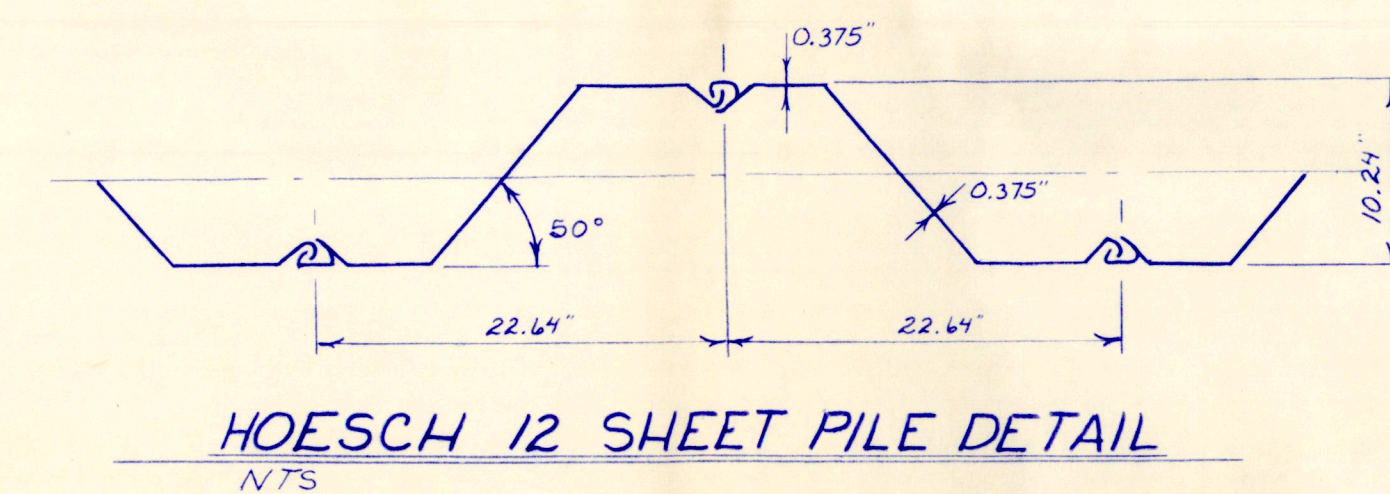
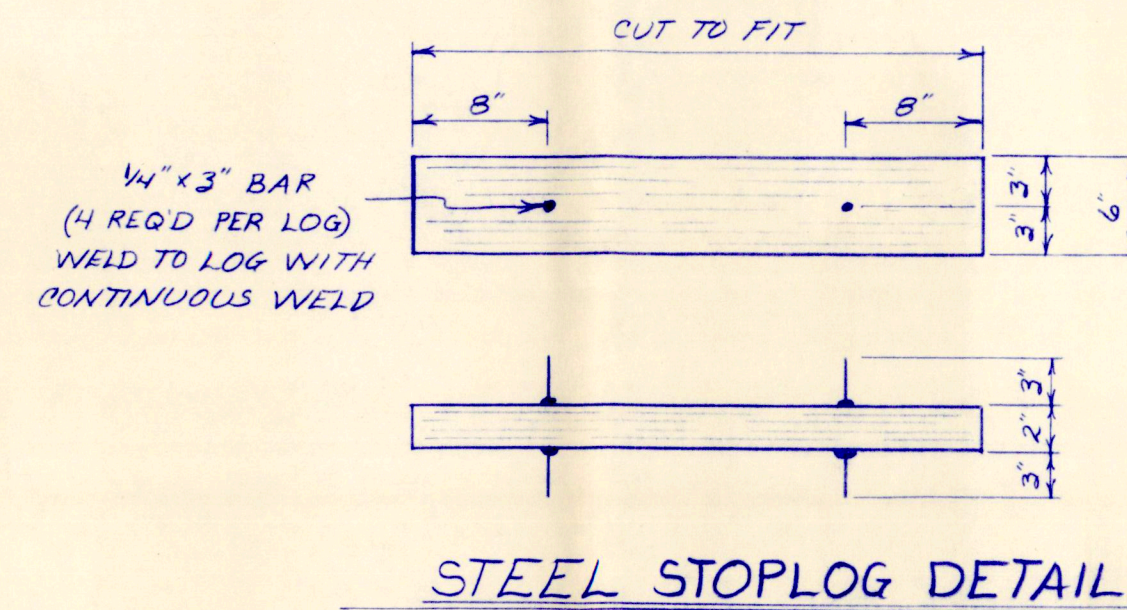
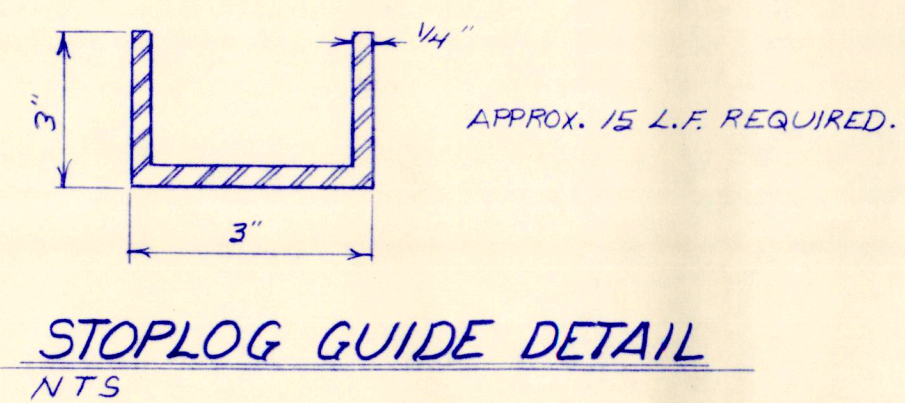
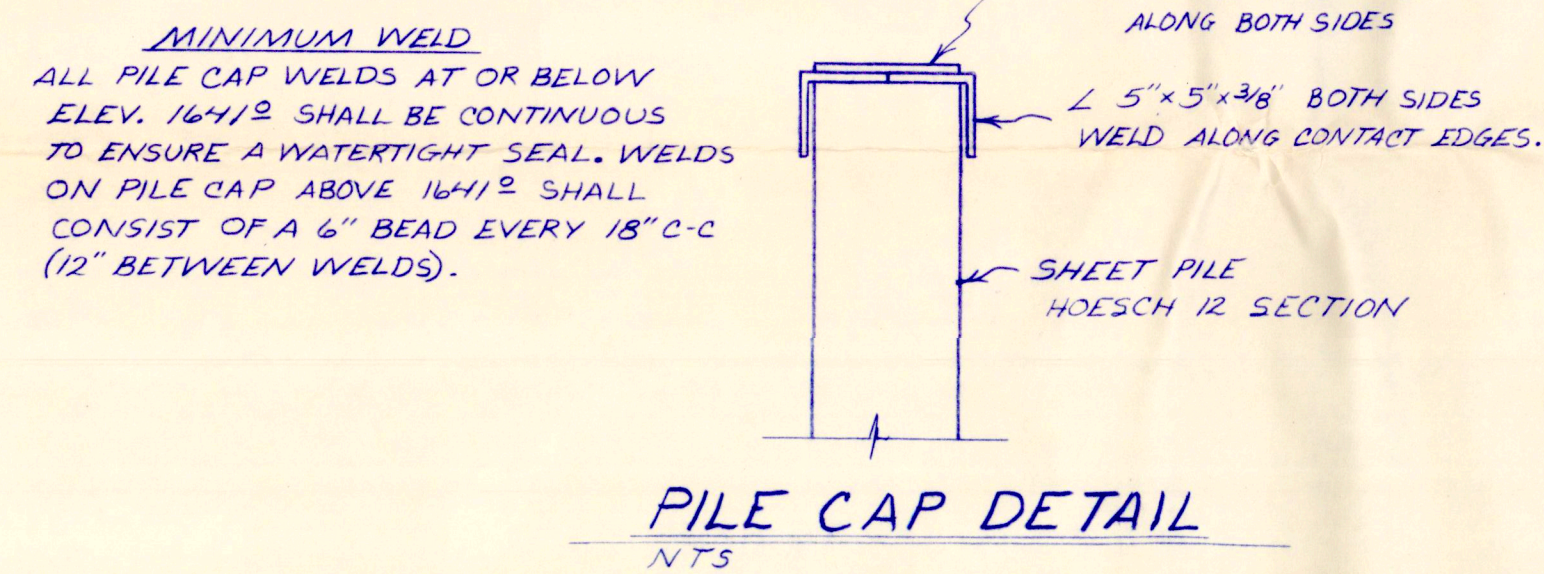
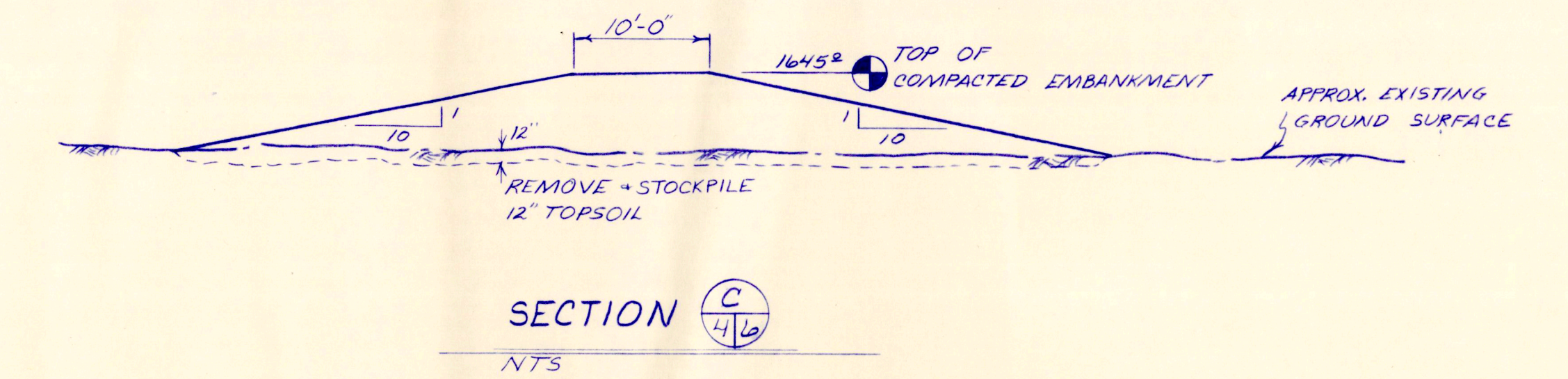
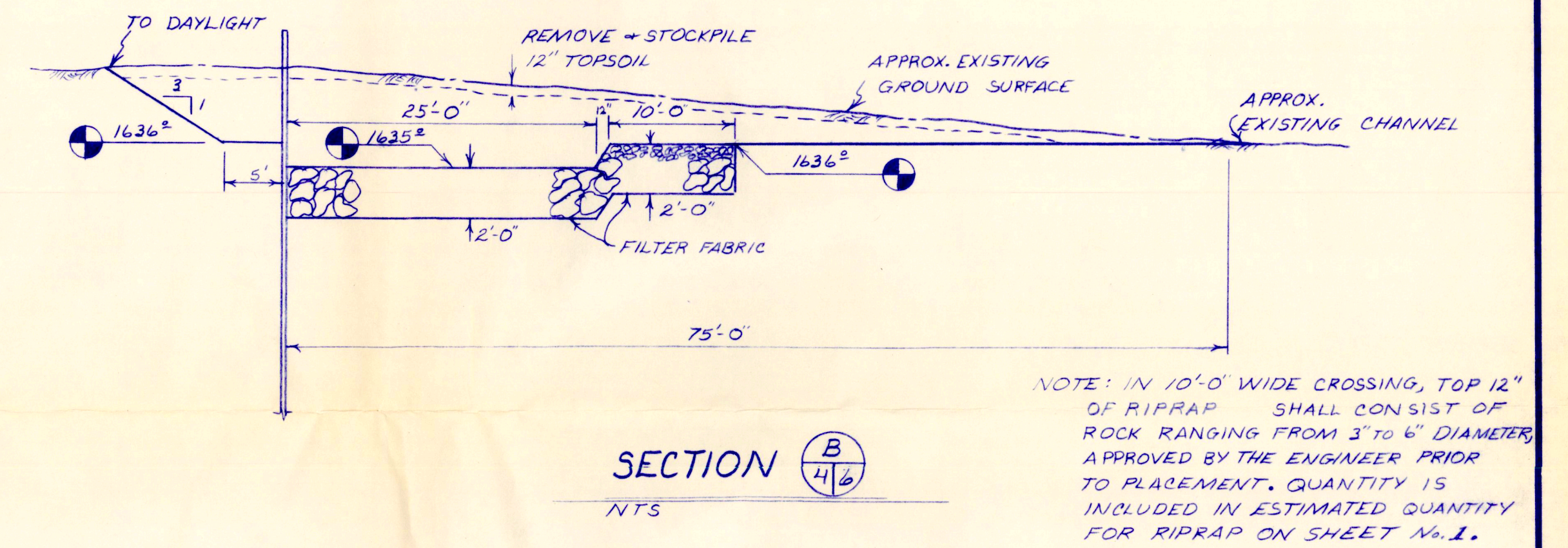
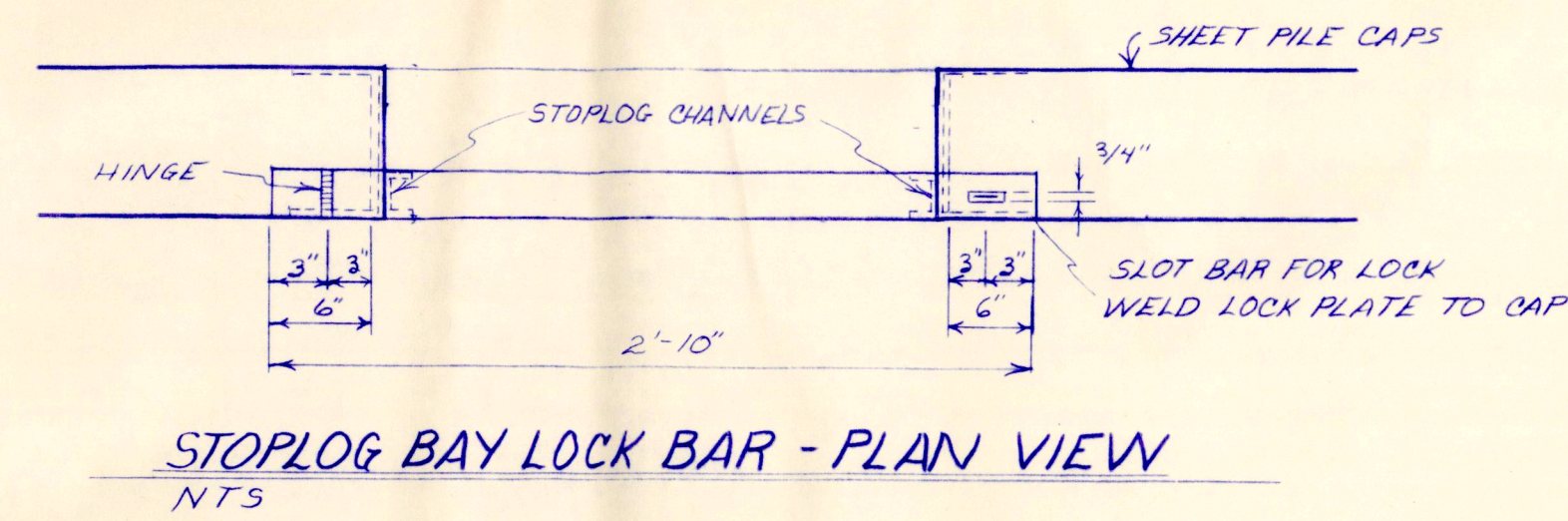
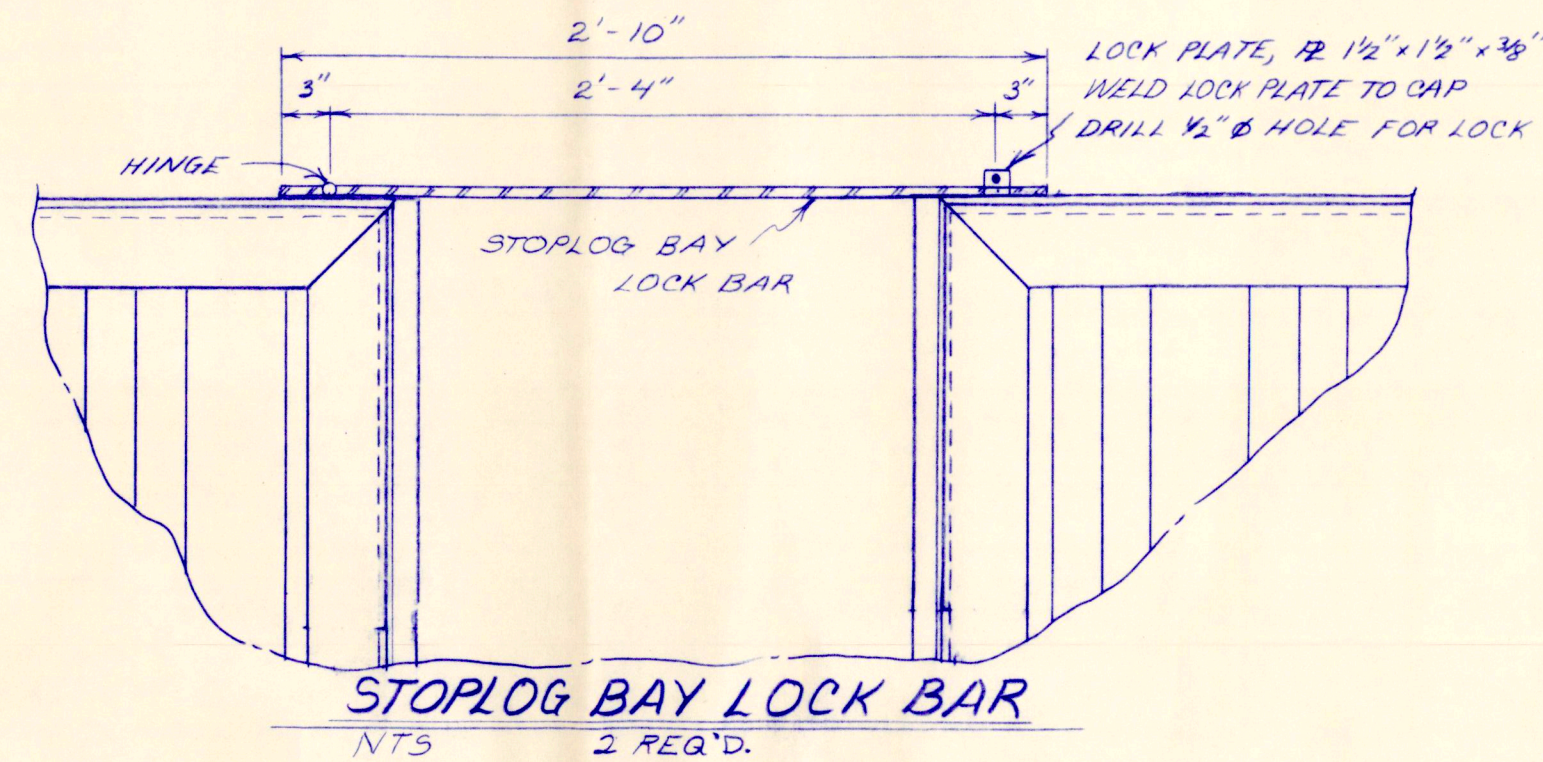
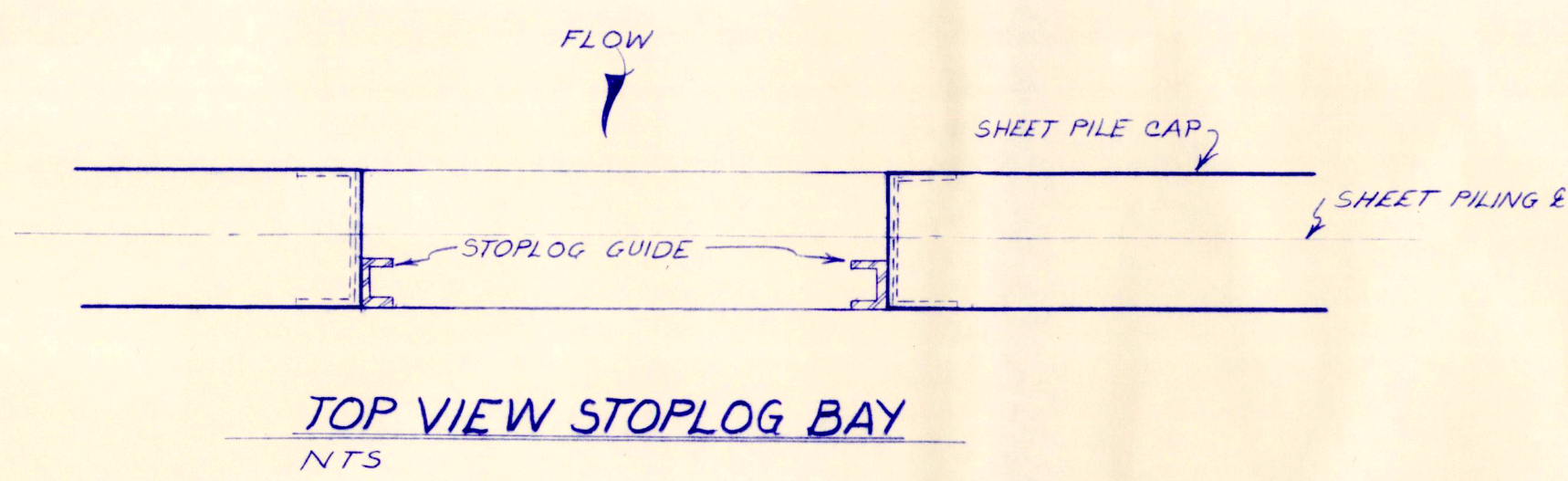
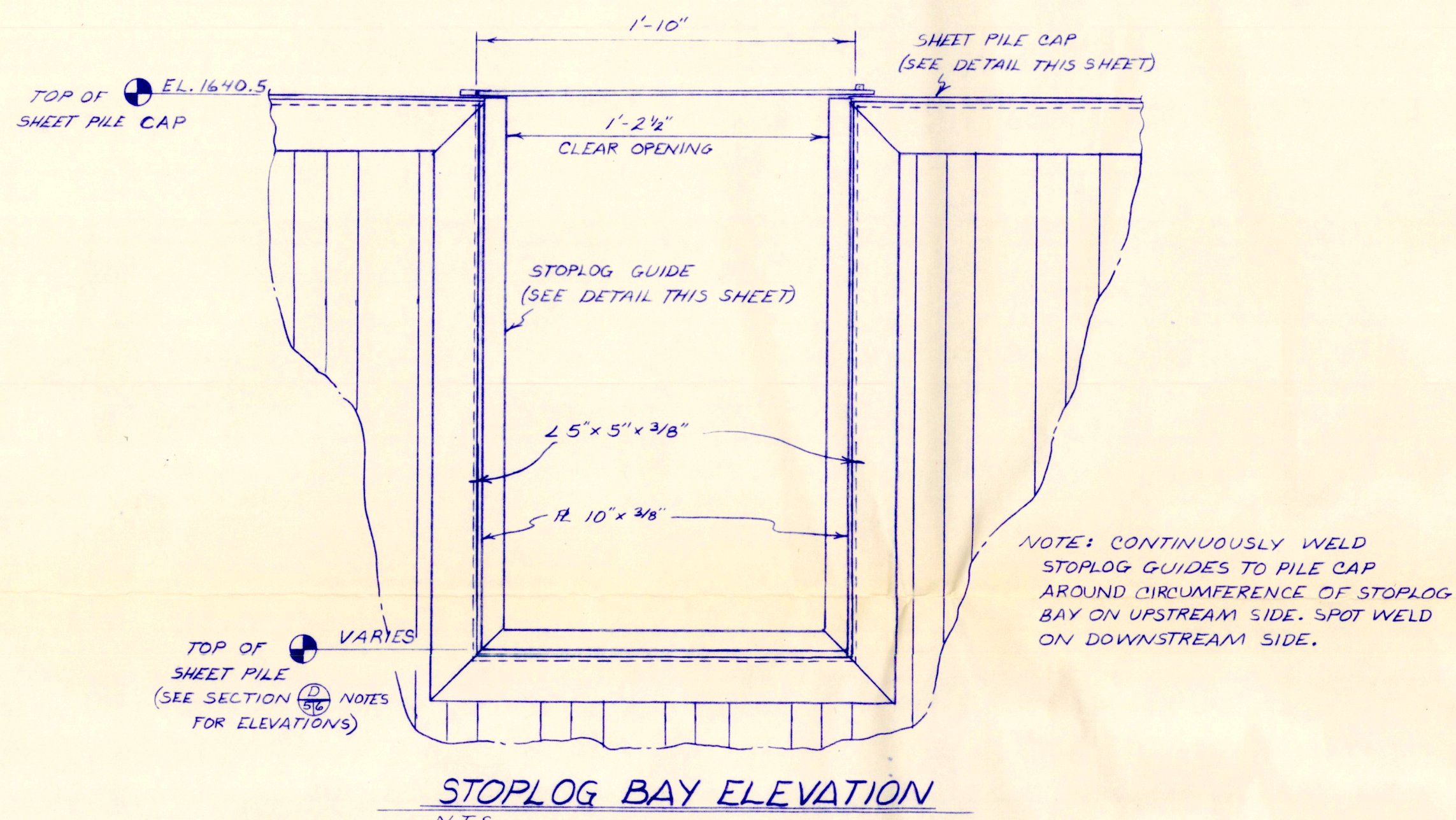
NOTE: BAFFLE NOTCHES SHALL BE
PLACED ON ALTERNATING SIDES.
ENDS OF BAFFLE SHALL BE CONTINUOUSLY
WELDED TO SHEET PILE OR PILE CAP.

NOTE ON GABIONS - FISH LADDER RIPRAP:
CONTRACTOR SHALL LEAVE A 6"-8" DEPRESSION
4" TOP OF GABIONS - LADDER RIPRAP BETWEEN
BAFFLES TO ALLOW FLEETER POOLS. SEE
SPECIFICATION 400 FOR GRADATION OF RIPRAP
IN GABIONS - LADDER TOP. 4" OF RIPRAP SHALL
CONSIST OF 1/4" TO 3" WASHED ROCK TO PROVIDE
A CHANNEL BED - REDUCE PERCOLATION
DOWN THROUGH THE GABIONS. BOTTOM 2"
SHALL CONSIST OF WELL GRADED FINE STONE
OR ROUGH, UNHEWN QUARRY ROCK INTERMIXED
WITH BEDDING MATERIAL. SEE SPECIFICATION 400.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

Date 1-4-89 Registration No. 4499





I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

Date 5-9-88 Registration No. 4499

DUCKS UNLIMITED INC. GREAT PLAINS REGIONAL OFFICE DATE: 5-9-88	PROJECT NO. DU-2-SD-077-02 CRYSTAL SPRINGS PRAIRIE EILEEN WPA MISCELLANEOUS DETAILS	DESIGNED BY: D.J.L. DRAWN BY: K.D.B. SURVEYED BY: CHECKED BY:
	SHEET NO. 6 OF 6 APPROVED BY:	APPROVED BY: