

Considered: _____

Vested Right Claim
~~WATER PERMIT~~ NO. 1461-1

HAP No. same 965-3108

Name of Applicant Gerald and Donna Martian

Post Office Address HCR 77, Box 62, Trail City SD 57657

Amount of Water Claimed 123 ac-ft Total Acres NA

Source of Water Supply Little Oak Creek

Water to be used for FWP County Corson

About 13 miles SW of Little Eagle.

PROOF OF PUBLICATION: Received _____ Not Received _____

APPLICATION: Approved _____ Subject to _____

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

PRIORITY _____ Date Received June 20, 1989 Fee \$15.00 Remarks Fee is to be remitted by GFWP on behalf of Martian's

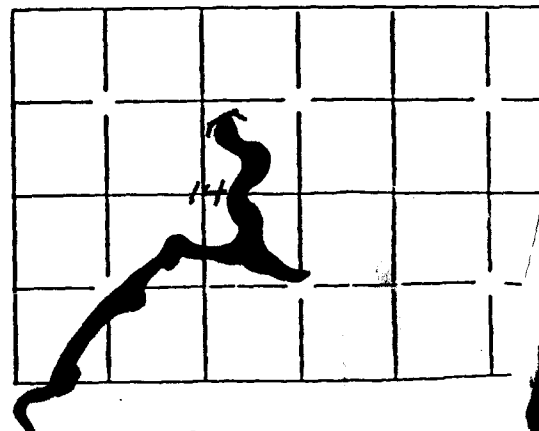
Corrected Application Received _____ Period of Annual Use Jan 1 - Dec 31

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

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

Diversion Point Martian Dam: W 1/2 NE 1/4
section 14-T18N-R26E

Land to be Irrigated NA



Well Log: Driller NA Licensed YES _____ NO _____

Depth of Well _____ REMARKS _____

Type of Map topo PREPARED BY Roger Smith Reviewed and the Number
assigned on _____ By Ron D. Small

STATE OF SOUTH DAKOTA

VESTED RIGHT WATER LICENSE NO. 1461-1

(1) Gerald and Donna Martian of HCR 77, Box 62, Trail City SD 57657 made Application No. 1461-1, June 20, 1989 for validation of a vested right claim to impound 123 acre-feet of water annually in Martian Dam located on Little Oak Creek, Corson County, South Dakota for fish & wildlife production and domestic purposes. Vested Water Right No. 1461-1 was validated September 28, 1989, with a priority date of January 1, 1934. Construction of the described water supply system and application to water to beneficial use has been completed and complies with applicable provisions of South Dakota State Law.

(2) The applicant is entitled to impound 123 acre feet of water annually for beneficial use. The location of the dam is on Little Oak Creek in the W 1/2 NE 1/4 Section 14, T18N, R26E. The water is to be stored annually to a spillway elevation of 2102.5 feet mean sea level.

(3) Pursuant to Section 46-5-30.1 Gerald & Donna Martian of HCR 77, Box 62, Trail City SD 57657 the holders and/or owners of Vested Water Right No. 1461-1 is issued a license to impound 123 acre feet of water annually in Martian Dam with a priority date of January 1, 1934 from the location specified in (2) of this license. The water is to be used for the purpose of fish and wildlife production and domestic use. This license is subject to any limitations or qualifications listed in Vested Water Right No. 1461-1 and subject to South Dakota State Law.



JOHN HATCH, Chief Engineer
Water Rights Division
Department of Water and Natural
Resources

NOV 20 1989

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

(See instructions)

No. 1461-1 Hydrologic Unit 10130303
Basin Grand River
Newspaper Corson Co. News (Wed) Box 788, McLaughlin
McLaughlin Messenger 57642
(Thurs)

Application For Soil/Water Compatibility Permit and Permit To Appropriate Water

- Type of Application: ☐ New ☒ Vested Right ☐ Amend Permit No. _____
- ☐ Change Acreage ☐ Change diversion point(s) ☐ Add diversion point(s)
- ☐ Add Acreage ☐ Increase diversion rate ☐ Other _____
- Name of Applicant Gerald & Donna Martian Phone No. 865-3108
- Address HCR 77 Box 62 TRail City State SD 57657
(Street, RR or Box) (City) Zip Code
2. Amount of water claimed (d.f.s.) 123 AF Total acres irrigated NA
3. Source of Water supply Little Oak Creek
4. Location of point of diversion W $\frac{1}{2}$ NE $\frac{1}{4}$ Sec. 14, T18N, R26E - Martian Dam
Full Service level reservoir capacity is 123 acre-feet at 2102.5 feet mean sea level
County Corson
5. Counties where water will be used Corson
6. Annual period during which water is to be used 1-1 through 12-31
7. List below each forty acre subdivision, or lot, or fraction thereof and show number of acres to be irrigated in each.

Land Description	No. Acres Irr.

Land Description	No. Acres Irr.

Attach sheet if more space is needed

8. Type of Irrigation: Gravity: _____ Towline: _____ Center Pivot: _____ Gun: _____ Other: _____ (Specify) _____
9. Crops to be Irrigated: _____
10. Give a description of proposed project. (Attach sheet if more space is needed)

Wildlife enhancement, waterfowl production via a dam repair. This is a cooperative Ducks Unlimited, SD GF&P project with the private landowner retaining all water rights for impoundment.

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach maps, soils information and any other technical information.

STATE OF SOUTH DAKOTA)
County of Corson)^{ss}

Gerald Martian
I, & Donna Martian, the applicant, certify that I have read this application and examined the attached maps, that the water sample, if needed, has been taken by the required procedures and has not been adulterated or tampered with and is truly representative of the water to be used, and that the matters stated in this application are true and correct.

Signed Gerald & Martian

Subscribed and sworn to before me this 14th day of June 19 89

Judith A. Redding
Notary Public (4-2291)

Affidavit of Water Use

No. _____

(Type or Print in Ink)

Note: This Form is supplemental to Form 2 and is to be used when an affidavit pertaining to construction and water use already constructed is needed, primarily with vested right claims.

Affidavit Of Construction Of Water Use System And Application Of Water To Beneficial Use

Name of Applicant (Same as Form 2) Gerald & Donna Martian

Post Office Address	HCR 77 Box 62	Trail City	SD	57657
	(Street, RR or Box)		(State)	(Zip Code)

A. Notice of Appropriation _____ Date of Posting _____

Date of recording _____ Recording date _____
Where Book Page

B. Date of start of construction of water supply system _____

C. Date that water was first applied to beneficial use 1935

D. Name of owner of original water supply system U.S. Gov't. - WPA dam

E. Amount of water originally applied to beneficial use 123 AF

F. Present Use of Water - Amount of water now being used None, dam breached in 1987

Date that this water was first used 1935

G. Chronological History of Water Use

WPA constructed dam in 1934 or 1935, water has been used continuously when available for wildlife and livestock until 1987 when dam breached during a severe thunderstorm.

Attach to this Form 2B any copies of notices, postings, filings, publications, affidavits, or other records that apply. You may also attach any written statement by you, or by others, that you deem pertinent.

State of South Dakota)

County of Corson

I, Gerald & Donna Martian the applicant, certify that I have read the foregoing
(print or type)
and that the matters therein stated are true.

Signed Donna Martine
Gerold A Martine

Subscribed and sworn to before me June 14, 1989

For me June 14, 1989
Paul H. A. Redding
 Notary Public or other qualified officer (4-22-91)

I, the undersigned do hereby certify that I know about the water use system described above, that I have read the foregoing, and that the matters therein stated are true.

19

19

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 Inc.

b) Freeboard 4'

c) Crest Width 0.75'

Crest Length 50'

d) Height 7'

e) Primary Outlet Capacity 1087 cfs
If Pipe, diameter _____

f) Secondary Spillway Capacity _____
Spillway width _____

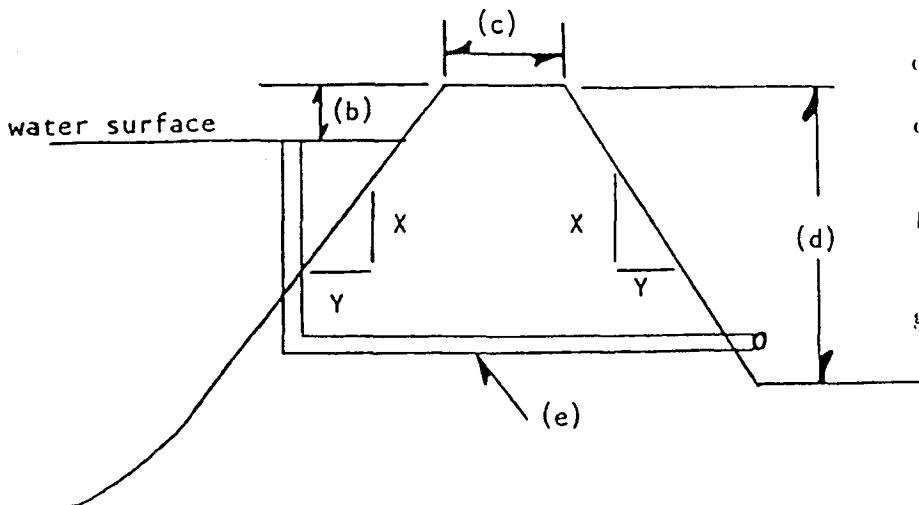
g) X & Y Slope
Upstream vertical

Downstream vertical

Surface Area of Impoundment 46.8 acres

Storage 123 acre feet

Drainage area above dam 21.27 sq. mi.



Donna Martin
David A. Martin
Signature of Applicant

SOUTH DAKOTA

VESTED WATER RIGHT NO. 1461-1

Date of Receipt of Claim June 20, 1989.

Date of Validation September 28, 1989.

The Water Management Board validated Vested Water Right Claim No. 1461-1 for Gerald & Donna Martian, HCR 77, Box 62, Trail City SD 57657 with the following limitations, conditions and qualifications:

1. Vested Water Right No. authorizes impoundment of 123 acre-feet of water by reconstructing Martian Dam located on Little Oak Creek in the W1/2 NE1/4 section 14-T18N-R26E. Water is to be stored annually to a spillway elevation of 2102.5 feet mean sea level.

2. The appropriated water is used for providing habitat for fish and wildlife and for stock water and may not exceed the amount of water needed for beneficial use for fish and wildlife production and domestic purposes.

The water is to be used during the following annual period:
January 1 - December 31.

3. The priority date of the Vested Water Right is: January 1, 1934.

4. The water use system has been constructed and water has been applied to beneficial use.

5. Water Rights obtained in compliance with the laws of the State of South Dakota must not be unlawfully impaired by this appropriation.

WATER MANAGEMENT BOARD

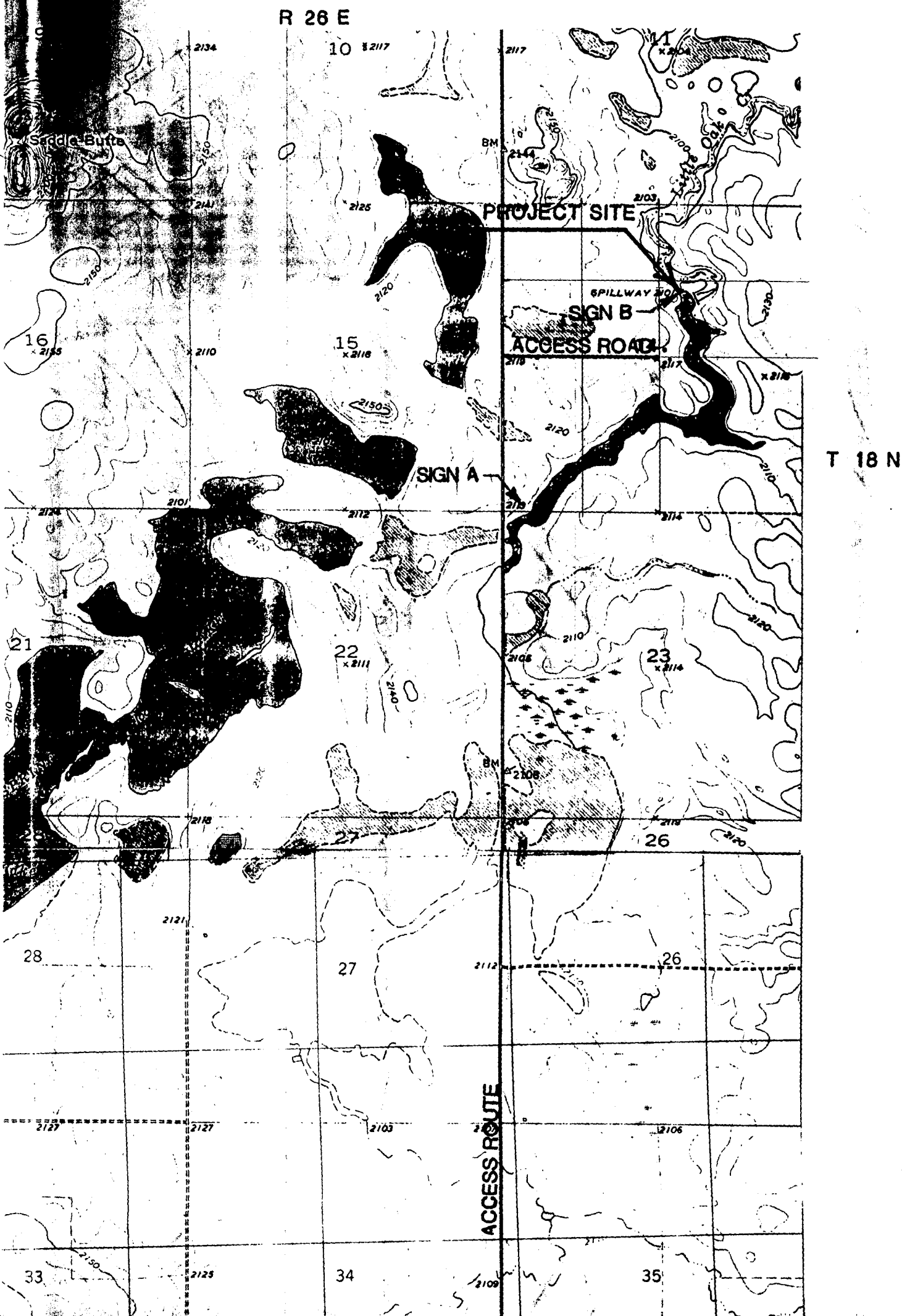
By: 
Chief Engineer
Division of Water Rights
Dept. of Water and Natural Resources

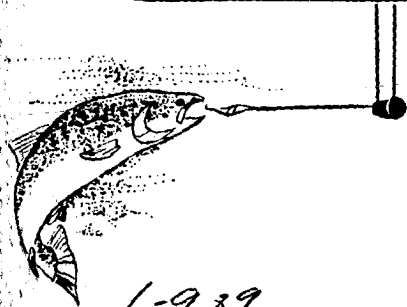
NOV 20 1989
date

ROCK COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

SOUTH DAKOTA DEPARTMENT OF GAME, FISH, & PARKS





Ron Koth

6-9-89

Ron:

Attached is the pertinent information
for a water right we would like
considered at the July BWM.

This project is a cooperative venture
with a private landowner - part
of which is that GFD will pay

the appropriate water right fee --
please bill us for that amount.

The notarized apps will be in
next week but I wanted you
to have the attached for review
as soon as possible.

Any? just call,
Ron



Department of Water & Natural Resources

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

June 15, 1989

Roger Smith, Regional Engineer
Ducks Unlimited, Inc.
6115 E Main
Bismarck ND 58501

Dear Mr. Smith:

This letter is in response to a vested right claim being made for Martian dam located in Corson County, South Dakota. The following information is needed concerning the dam to complete the vested right claim:

- 1) The enclosed plans and specifications need to be signed and stamped by a South Dakota registered professional engineer.
- 2) A written preliminary risk assessment of the downstream hazard potential needs to be provided to aid in determining the hazard classification for the dam (see enclosed Safety of Dams Rules Section 74:02:08:05). The hazard classification of the dam (Category 1, 2 or 3) is needed to determine what provisions of the Safety of Dams Rules will apply to your dam.

The downstream hazard potential is to consist of a list of downstream properties (homes, roads and other structures) with the potential affects of a dam failure to these properties. The legal description and elevation above the stream channel of these properties is to be included in the assessment pursuant to Section 74:02:08:05.01.

The vested right claim can not be considered by the Water Management Board until the claim is complete. Please return the signed and stamped plans and specifications as soon as possible and contact me if you have any questions.

Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

enc.



Conversation or File Documentation

NAME OF PERSON OR FILE: Gerald & Donna MartianADDRESS: HCR 77, Box 62, Trail City COUNTY ConsonDATE: June 20, 1989 TELEPHONE 865-3108RE: Preliminary Risk Assessment

COMMENTS:

Roger Smith, Ducks Unlimited, called regarding my
request for a preliminary risk assessment. Mr.
Smith stated he would complete an on-site inspection
this week of the downstream area. Mr. Smith also
indicated that the plans and specifications would be
signed and returned as soon as possible.

June 20, 1989

Contacted Donna Martian regarding proposed uses
for the dam. Ms Martian stated the dam would be
used for stock watering as well as fish and wildlife
production.

File in Permit or other file as necessary. Use to document conversations and what the other party was told; why action or decision was made.

NAME: Don Duvall

RECEIPT

411872

Division of Water Rights

South Dakota Department of Water and Natural Resources

Pierre, August 8, 19 89

RECEIVED OF SD Dept Game, Fish & Parks (Gerald & Donna Martian), Pierre, SD 57501-
the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct works and to put water to beneficial use _____	1500
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	15 00

By John Hatch (mra)
Chief Engineer
John Hatch/mra

4145955
Do not use this space.

STATE OF SOUTH DAKOTA VOUCHER

☒ Direct

(E) ☐ Expenditure Correction

(Z) ☐ Travel

(T) ☐ Cash Transfer

(R) ☐ Revenue Correction

(N) ☐ Non-Cash

(I) ☐ Investment

(P) ☐ Period Ending Adjustment

(C) ☐ Cash Receipt

(B) ☐ Appropriation-Budget Transfer

(A) ☐ Other Adjustment

AGENCY USE ONLY				APPROVAL OFFICE ONLY	
Application Area 34	Vendor Number 406000364	Invoice ID 6646	Voucher Number	Date	
Date	Purchase Order ID State 34	Document ID	Delivery Date	Payment Due Date	
(Payee, Billed Agency) TO: Department of Water & Natural Resources Water Rights Division Foss Bldg. Pierre, SD 57501			(Department, Billing Agency) FROM: Game, Fish and Parks		

FUNDING INFORMATION										Debit/Credit		Dr.	Cr.	U C O S E D R E
S E Q	Company	Account		Center		Project		Amount	Code	Invoice	1	6		
		Required	User	Required	User	Company	Number			Other	Dr.	Cr.		
1	3122	5204030		06105	03			15.00	1					
2														
3														
4														
5														
6														
7														
8														
9														
10														
								Total	15.00					

Description of Service, Product, or Transfer		
Application fee and publication expenses for Vested Water Right Claim No. 1461-1, Gerald & Donna Martian	15	00
Total	15	00

I declare and affirm under the penalties of perjury that this claim is in all things, true and correct. I further agree to comply with the provisions of the Civil Rights Act of 1964 and regulations issued thereunder relating to nondiscrimination in federally assisted programs.

 Claimant	6-27-89 Date	 Authorization
		6/27/89 Date



DUCKS UNLIMITED, INC.
GREAT PLAINS REGIONAL OFFICE

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



June 26, 1989

Ron Duvall
Natural Resources Engineer
S.D. Dept. W.N.R.
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181

Mr. Duvall:

In response to your letter dated June 15, 1989 I am submitting the following materials regarding Martian Dam in Corson County, South Dakota.

- 1) Construction plans and specifications signed by myself, a professional engineer registered in South Dakota.
- 2) A preliminary risk assessment.
- 3) A Design Report.

Hopefully this information will be sufficient to allow the vested water right claim to be considered favorably.

A handwritten signature in black ink, appearing to read "Roger C. Smith".

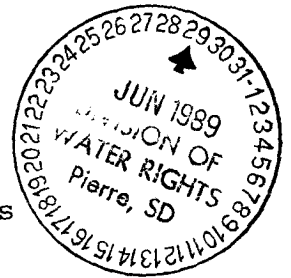
Roger C. Smith, P.E.
Regional Engineer

RCS:ckm

Enclosure

MARTIAN DAM - SECTION 14 TWP 18 N RGE 26 E

Preliminary Risk Assessment of Downstream Hazards



INVESTIGATION

An onsite inspection was conducted on June 23, 1989 by Roger C. Smith, P.E. Regional Engineer, Great Plains Regional Office, Ducks Unlimited, Inc.

FINDINGS

1. Approximately 25000 Linear Feet downstream from the proposed construction on Little Oak Creek is a township/county roadway crossing.
2. The crossings are located through an unpaved roadway between Section 1 Township 18 N Range 26 E and Section 36 Township 19N Range 26 E.
3. The crossing contains an 8 ft. diameter CMP. The vertical distance from the CMP invert to the top of the roadway is 18 ft.
4. An occupied farmstead is located in the NW $\frac{1}{4}$ Section 1 Township 18 N Range 26 E. The elevation of the buildings are a minimum of 10 higher than the roadway at the crossing location (USGS Topography Map and Visual Observation).
5. Approximately 12 creek miles downstream from the project site, directly above the confluence of the Little Oak Creek and the Grand River, exists a bridge on an unpaved county/township roadway east of the town of Little Eagle.
6. Little Oak Creek immediately downstream of the project area has a well defined channel and flood plain which serves no other land use purpose. The average channel gradient is 2%.
7. Lands adjoining the Little Oak Creek Flood Plain are used for agriculture, mainly pasture and rangeland and to a minor extent crop land.
8. As defined in Section 74:02:08:06 Classification of Dams the proposed dam would be classified as a small dam having a storage capacity between 50 and 1000 acre feet and a height less than 25 feet.

9. The spillway planned for the dam is designed to pass the runoff produced by a 100 year - 24 hour rainfall.

CONCLUSIONS

1. That the 8' culvert through the roadway between SEC 1-18 N-26 E and SEC 36-19 M-26 E has the capacity to pass most runoff events. Should flows exceed the culvert capacity the roadway could be over-topped and run the risk of damage. The potential for economic loss is minimal.
2. That the farmstead located in SEC 2-18 N-26 E is on high enough ground to be protected for flows on Little Oak Creek.
3. That the bridge located on the roadway east of Little Eagle has sufficient capacity to pass high runoff events as evidenced in the 1988 flood. (10"-12" of rain fell in a 24 hour period).
4. That in the event that flows exceed the capacity of Little Oak Creek Channel the potential for economic loss is minimal and will be confined to erosion, temporary loss of land use, or to a minor extent loss of crop.
5. That no loss of life is expected from a failure of the proposed dam or from a high runoff event.
6. That as described in Section 74:02:08:05 Classification of Dams the proposed dam would fit the definition of a Category 3 Dam.
7. That design standards for the proposed spillway exceed those set forth in Section 74:02:08:07 Minimum Spillway Design Flood Requirements.

RECOMMENDATION

1. It is recommended to the Chief Engineer that based on the findings and conclusions of the preliminary risk assessment the proposed dam be classified as a Small Category 3 Dam.

Submitted by:



Roger C. Smith, P.E.
Regional Engineer

RCS:ckm



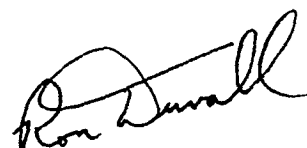
Department of Water & Natural Resources

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

June 21, 1989

MEMO

TO: Ron Koth, Department of Game, Fish & Parks

FROM: Ron Duvall, Division of Water Rights, DWNR 

SUBJECT: Application fee and publication expenses for Vested
Water Right Claim No. 1461-1, Gerald & Donna Martian

The Department of Game, Fish & Parks has indicated that payment of the application fee for Vested Right Claim No. 1461-1 will be the responsibility of Game, Fish & Parks. This memo is to be considered as a request for payment of the application fee for Claim No. 1461-1. The application fee for this vested right claim is \$15.00 pursuant to SDCL 46-2-13.11. Vested Right Claim No. 1461-1 is to impound 123 acre-feet in Martian Dam.

The Department of Game, Fish & Parks will also be billed for publication of the notice of hearing for Claim No. 1461-1. The notice of hearing is to be published in the McLaughlin Messenger and in the Corson Co. News. The papers will bill the Department for the publication costs.

Please contact me if you have any questions.



Hydraulic Calculations Check

6/30/89

1/2

Summary of Permit Application 1461-3 Gerald & Donasa Maritions

LLP

DU project

Rebuilding "washed out" Dam

A) Hydraulic Calculations Check

Given: $L = 50$ ft long sheet pile weir, crest of weir at elevation 2102.5 MSL, Top of Dam at elevation 2106.5, Hence: Head = $4.0' = H$

Sharp crested weir calculations

$$Q = 3.33 L H^{3/2}$$

Fluid Mechanics, Streeter, Wylie, 1979, P. 358 - 361.

$$Q = 3.33 (50) (4.0)^{3/2} = \underline{1332 \text{ cfs}}$$

Taking into account end contractions

$$\text{Length loss} = 2 \times (0.1) \times H = 2 (0.1) (4.0) = 0.8'$$

$$\text{Net weir length} = 50' - 0.8' = \underline{49.2'}$$

$$\text{Corrected } Q = 3.33 (49.2) (4.0)^{3/2} = \underline{1311 \text{ cfs}}$$

Broad crested weir calculations - well rounded edge

$$Q = 3.03 L H^{3/2}$$

Use corrected weir length of 49.2'

$$Q = 3.03 (49.2) (4.0)^{3/2} = \underline{1,193 \text{ cfs}}$$

B) Cross check of calculations

EIT Review Manual, Michael R. Lindberg, P.E. Sixth Edition, 1982, P. 5-5.

Sharp Crested weir calculations * Contracted weir

$$\text{EQ. 5.22 } Q = \frac{2}{3} C_1 b \sqrt{2g} (H)^{3/2}$$

$$\text{EQ. 5.23 } C_1 = \left[.6035 + .0813 \left(\frac{H}{Y} \right) + \frac{.000095}{Y} \right] \left[1 + \frac{.00361}{H} \right]^{3/2}$$

$$C_1 = \left[.6035 + .0813 \left(\frac{4.0}{1.0} \right) + \frac{.000095}{1.0} \right] \left[1 + \frac{.00361}{4.0} \right]^{3/2} = \underline{0.93}$$

$$\text{EQ. 5.24 } b_{\text{effective}} = b_{\text{actual}} - (.1)(N)(H) = (50.0) - (.1)(2)(4.0) = \underline{49.2'}$$

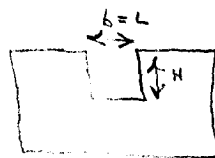
$$\text{EQ. 5.22 } Q = \frac{2}{3} (0.93) (49.2) \sqrt{2(32.2)} (4.0)^{3/2} = \underline{1,958 \text{ cfs}}$$

Broad Crested weir calculations ($Y=0$)

$$\text{EQ. 5.23 } C_1 = \left[.6035 + .0813 \left(\frac{H}{Y} \right)^{1/2} + \frac{.00015}{Y} \right] \left[1 + \frac{.00361}{H} \right]^{3/2} = \underline{0.60}$$

$$\text{EQ. 5.24 } b_{\text{effective}} = \text{same} = 49.2$$

$$\text{EQ. 5.22 } Q = \frac{2}{3} (0.60) (49.2) \sqrt{2(32.2)} (4.0)^{3/2} = \underline{1,263 \text{ cfs}}$$



assume $H=3.5'$, recalculate A)A.) Sharp crested weir

$$Q = 3.33 L H^{3/2}$$

$$Q = 3.33 (49.2) (3.5)^{3/2} = \underline{1073 \text{ cfs}}$$

where: $L = 49.2'$, $H = 3.5'$

Broad crested weir

$$Q = 3.03 L H^{3/2}$$

$$Q = 3.03 (49.2) (3.5)^{3/2} = \underline{976 \text{ cfs}}$$

where: $L = 49.2'$, $H = 3.5'$

Accept submitted discharge value of 1087.0 cfs at pool elevation
2106.0 MSL (Sharp crested weir) as weir capacity

RUN

THIS PROGRAM CALCULATES THE DISCHARGE FROM A TRAPAZODIAL
SPILLWAY WHEN THE SLOPE, FLOW DEPTH, SIDE SLOPES, AND
THE BOTTOM WIDTH ARE KNOWN.

WHAT IS THE DAM NAME?

? MARTIAN

WHAT IS THE SIDE SLOPE X:Y WITH Y=1?

? 3
WHAT IS THE BOTTOM WIDTH OF THE SPILLWAY?

? 50

WHAT IS THE SLOPE OF THE SPILLWAY CHANNEL?

? .0115

WHAT IS THE MANNINGS N?

? .035

WHAT IS THE DEPTH OF FLOW?

? 2

DO YOU WISH THIS ROUTED TO THE PRINTER?

? Y

manning's n= .035

velocity= 6.703992

flow= 750.8471 cfs

MARTIAN

FLOW DEPTH= 2 FT

AREA= 112 FT²

WETTED PERIMETER= 62.64911

HYDRAULIC RADIUS= 1.787735

MANNINGS N= .035

VELOCITY= 6.703992 FT/SEC

FLOW= 750.8471 CFS

DO YOU WISH ANOTHER CALCULATION VARYING ONLY FLOW DEPTH?

? Y

WHAT IS THE DEPTH OF FLOW?

? 2.5

DO YOU WISH THIS ROUTED TO THE PRINTER?

? Y

manning's n= .035

velocity= 7.660868

flow= 1101.25 cfs

MARTIAN

FLOW DEPTH= 2.5 FT

AREA= 143.75 FT²

WETTED PERIMETER= 65.81139

HYDRAULIC RADIUS= 2.184273

MANNINGS N= .035

VELOCITY= 7.660868 FT/SEC

FLOW= 1101.25 CFS

DO YOU WISH ANOTHER CALCULATION VARYING ONLY FLOW DEPTH?

? Y

WHAT IS THE DEPTH OF FLOW?

? 3.0

DO YOU WISH THIS ROUTED TO THE PRINTER?

? Y

manning's n= .035

velocity= 8.528776

flow= 1509.593 cfs

MARTIAN

FLOW DEPTH= 3 FT

AREA= 177 FT²

WETTED PERIMETER= 68.97366

HYDRAULIC RADIUS= 2.566197

MANNINGS N= .035

VELOCITY= 8.528776 FT/SEC

FLOW= 1509.593 CFS

DO YOU WISH ANOTHER CALCULATION VARYING ONLY FLOW DEPTH?

? N

OK

Hydrologic Check

Permit Application 1461-3 Gerald + Donna Martians

7/5/89
JDB

Determine Peak Discharge For 100 yr Flood

Given: Drainage Area = 21.27 mi².

SCS Curve Number = 72

Time of Concentration = 30 hr

} All Data

Method

SCS, Dave Konechwa 12-87, Federal Bldg, Pierre,

T.P. 40

1) 1 day Point rainfall, 100 yr frequency = 5.1 inches

T.P. 49

10 day Point rainfall, 100 yr frequency = 8.3 inches

Hydrology

Table 21.1

2) Areal Rainfall, DA = 21.27 mi²

Ratios for Areal adjustment of rainfall amount

Area/ Point ratio For

<u>1 day</u>	<u>10 days</u>
0.968	0.985

Corrected 1 day Point rainfall, 100 yr frequency = (5.1 inches) x (0.968) = 4.94 inches

Corrected 10 day Point rainfall, 100 yr frequency = (8.3 inches) x (0.985) = 8.18 inches

Table 21.2

3) CN For 10 day rains = 54

Fig 10-1

4) Direct runoff

CN=72 1 day rainfall (4.94 inches); $Q_1 = 2.1$ inches direct runoff

CN=54 10 day rainfall (8.18 inches); $Q_{10} = 2.8$ inches direct runoff

Hyg. P. 21.3

5) Climate index = C_i

$$C_i = \frac{100 P_a}{(T_a)^2}$$

where: P_a = average Annual Precip. in inches
 T_a = average Annual Temp. in °F

$$P_a = 16.8 \text{ in}$$

$$T_a = 44.3 \text{ °F}$$

$$C_i = \frac{100 (16.8 \text{ in})}{(44.3 \text{ °F})^2} = 0.86 = \underline{\underline{0.9}}$$

Table 21.3

6) Estimate net runoff (Channel Loss factors for Reduction of Direct Runoff)
reduction factor = 0.93

$$Q_1 = (2.1)(0.93) = 1.95 \text{ in}$$

$$Q_{10} = (2.8)(0.93) = 2.60 \text{ in}$$

7) Compute $\frac{Q_1}{Q_{10}} = \frac{1.95 \text{ in}}{2.60 \text{ in}} = \underline{\underline{0.75}}$

Table 21.9

8) Serial No. = 55

P 21.33

9) Peak occurs at 5.7 days, $CFS/AQ_{10} = 19.840$

$$10) Q_{100} = (2.60 \text{ in})(21.27 \text{ mi}^2)(19.840) = \underline{\underline{1,097 \text{ CFS}}}$$

DESIGN SUMMARY

April 13, 1989



PROJECT: MARTIAN DAM

PROJECT GOALS:

The project planned on the Martian Farm in Section 14, Township 18N - Range 26E will replace a masonry structure built by the W.P.A. in the 1930's and failed in the summer of 1987 after an intense thunderstorm. The structure will provide the same Full Service Level as the previous structure and will have equal or greater capacity. A separate earthen embankment is in satisfactory condition and will not be part of this project.

PROJECT DESCRIPTION:

The planned structure will be constructed of driven sheetpile in two separate curtains. The upstream curtain will be driven into natural ground after required excavation and supported on each end by compacted fill. The downstream curtain will be driven into natural ground after required excavation and will be braced to the upstream curtain in order to act as a footing. Rock riprap will be placed between the sheet pile curtains. An adequate upstream and downstream channel will be constructed. The existing masonry spillway will be removed and buried or used to supplement the rock riprap.

A sheet pile structure was chosen over a concrete structure due to the depth of cutoff wall required to reduce the development of excessive uplift pressures.

The F.S.L. (Full Service Level) will be 2102.5 M.S.L. or the same elevation as the masonry structure. The area of the reservoir at F.S.L. is 46.8 acres and the reservoir capacity is 123 AC-FT. This information was determined by a Ducks Unlimited field survey.

HYDROLOGIC SUMMARY

Watershed = 21.27 sq. mi.
SCS Curve Number = 72
Time of Concentration = 30 hr.

Runoff
 Q_{10} = 496 CFS
 Q_{100} = 1002 CFS

HYDROLOGIC SUMMARY

The failed masonry structure had a weir length of 60' and weir breadth of 4'. The structure was analyzed as a broad crested weir. The proposed sheet pile structure will have a 50' weir length and was analyzed as both a broad crested and sharp crested weir. The weir length is less than the masonry

structure however, due to the increased weir coefficient the sheet pile structure will offer an equal or greater capacity than the original structure.

Restrictions in the upstream channel which controlled the flow reaching the masonry weir will be removed. The downstream channel will be improved to better accomodate flows.

Stage-Discharge Relationship for Sheet Pile Structure

Elevation (M.S.L)	Q (C.F.S.)
2102.5	0
2103.0	48.3
2103.5	149.0
2104.0	297.6
2104.5	466.7
2105.0	654.2
2105.5	862.6
2106.0	1087.0

The apron length was designed by analyzing the flow trajectory and hydraulic jump. An H3 water surface profile will develop within the apron. A jump will last some distance downstream where an S2 water surface profile will allow the water surface to reach normal flow. The jump is classified as an oscillating jump with very little turbulence. The velocity at Q=1000 CFS is 4.1 F.P.S. through the jump.

SOIL ANALYSIS

The structure was analyzed for overturn with and without the downstream curtain being used as a footing. The analysis made use of soil parameters developed by laboratory tests from actual field samples; see Report of Soil Investigation by Midwest Testing Laboratory.

CONSTRUCTION

Construction is planned to begin upon notification that all permits have been obtained. The use of vibratory hammer will be required. Quality control will be ensured by the use of Ducks Unlimited Construction Specification.

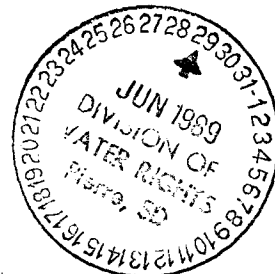
MANAGEMENT

Project Management after construction will be the responsibility of the South Dakota Game, Fish and Parks.

Submitted By:



Roger Smith, P.E.
Regional Engineer
Ducks Unlimited, Inc.



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, stockpiling and replacement. The work shall include:

- removal from site and disposal of all trees, roots, brush, stone, rubbish and all other surface litter in designated areas.

- coordination of necessary clearing and grubbing operations to allow timely completion of construction staking of a project prior to the start up of topsoil excavation.

- excavation, removal, stockpiling and placement of topsoil in designated areas of borrows, dikes and channels.

- final clean up of the site prior to demobilization will require the spreading and shaping of all materials stockpiled or moved to facilitate construction including but not limited to snow, ice or vegetative material other than topsoil.

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 paid for shall be the estimated topsoil quantities shown on the plans or described herein for areas under the proposed dikes only. Clearing and grubbing, coordination of clearing and grubbing operations for construction staking and topsoil removal and replacement of topsoil in 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.

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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 BASIS 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 which 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.

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 or 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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214 SPECIFICATION FOR SHEET PILING MATERIALS

214.1 DESCRIPTION

The work in this section shall consist of furnishing the specified or approved equal types of sheet piling shown on the plans. This shall include the furnishing of all labor, materials, tools, equipment, transportation, and any incidental items required to furnish the sheet piling. This shall also include delivery of the sheet piling to the project site and removal of excess sheet piling from the project site.

214.2 MATERIALS

Sheet piling shall be made of new standard ASTM A328 grade steel and be of the sections shown or specified on the plans. Alternate sheet piling may be used if approved by the Engineer and if it has a thickness and section modulus equal or greater than that 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. The interlock shall have an opening of sufficient width to allow free slippage of the adjoining sheet pile.

A sufficient amount of sheet piling shall be provided to construct a structure of the dimensions shown on the plans. If an alternate sheet pile section is approved for use by the Engineer then structure width dimensions may vary slightly. This variance (plus or minus) may not equal more than one section width of the original specified section. In addition, it is the Contractor's responsibility to ensure that the specified structural steel will fit the alternate sheet piling.

214.3 SHIPPING

Sheetpile material shall be obtained and supplied to the project site in a timely manner. Piling shall be handled in such a manner as to ensure no injury to the pile.

214.4 MEASUREMENT

Sheet piling shall be measured on a plan quantity basis. The number of square feet paid for shall include all sheet pile needed to construct a structure to the dimensions shown on the plans. All needed sheet pile will be payed for regardless if it is driven or not. Extra sheet pile material above and beyond plan quantity that is needed to construct the structure shall not be measured and shall be considered incidental to the bid unit price for "Sheet Piling Materials."

214.5 PAYMENT

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

2/89

215 SPECIFICATION FOR SHEET PILE INSTALLATION

215.1 DESCRIPTION

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

215.2 MATERIALS

Sheet pile material to be driven shall be provided in accordance with the "Specification for Sheet Pile Materials".

215.3 DRIVING

215.32 EQUIPMENT

The Contractor shall provide the necessary driving equipment that is capable of driving the specified sheet pile to the depth and alignment shown.

Driving hammers may be drop, single acting, double acting, diesel, vibratory, or as approved by the Engineer. Drop hammers shall weigh between 1000-3000 lbs. with drops of 12 to 48 inches. Single acting, double acting and diesel hammers shall develop at least 7000 ft.-lbs. with ram weights of at least 1400 lbs. Vibratory hammers shall be at least 40 hp. and capable of driving at a minimum of 1000 vpm. Regardless of what type of hammer is utilized the energy developed by the hammer shall be of sufficient energy to adequately drive the sheetpile without damaging it.

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.

Piles shall be protected at all times from damage during driving. This shall include but is not limited to the use of suitable caps, rings, heads, blocks, mandrels, and other devices. A driving

cap shall be used at all times and the heads of the steel piles shall be cut square to accept this cap. It will be the Contractors responsibility to provide those items (driving heads, mandrels, etc.) necessary to drive special types of piles per pile manufacturer's recommendations.

215.33 DRIVING

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.

All piles shall be driven to the depth shown or specified on the plans unless directed by the Engineer in the field. If a pile hits refusal prior to reaching the required depth and can no longer be driven without damage to the pile or driving it out of alignment then driving of the pile shall cease. Refusal shall be determined by inability of driving equipment to drive a pile more than one inch with four blows of the driving hammer operating at normal capacity. If a pile is starting to deform or move out of alignment prior to determining if it has hit refusal then driving shall also cease. If it appears that a pile has encountered a boulder or some other obstruction within the first five feet of driving then the pile shall be pulled and the area excavated. The obstruction shall be removed if possible with the excavation backfilled and compacted prior to re-driving of the pile. If the obstruction can not be removed then the excavation shall be backfilled and recompactd with the pile redriven to the obstruction unless the Engineer directs otherwise. In all cases of refusal the undriven portion of sheetpile shall be cut at shown or specified elevations and saved on site for inspection and measurement by the Engineer prior to removal of this material from the site by the Contractor.

Under no circumstances shall the top of the pile vary from the design centerline alignment by more than one inch (horizontal or vertical).

215.34 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.

215.35 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, which ever 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.

215.36 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.

215.4 MEASUREMENT

Driven sheetpile shall be measured by the square foot. Only that sheetpile that has been driven and accepted to design depth or refusal shall be measured for payment. The amount of piling driven shall not exceed the design quantity without approval of the Engineer.

215.5 METHOD OF PAYMENT

The cost of all labor, equipment and any incidental items required to install the sheet pile only as specified shall be paid for in the bid price per square foot for "SHEET PILE INSTALLATION". Cost of the sheetpile material shall be paid for under the "SPECIFICATION FOR SHEET PILE MATERIALS."

216 - STRUCTURAL STEEL

216.1 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.

216.2 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.

216.3 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.

216.4 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.

216.5 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."

Checklist, Safety of Dam Requirements

Water Permit # 1461-1 Gerald & Donna Martien

7/5/89
DSB

Structure Dimensions

Dam is: 7 Feet High, 0.75' wide (sheet piling mainly),

Normal pool = 123 acre Feet (Elev. = 2102.5 MSL)

Maximum pool = 200 acre Feet (Elev. = 2106.5 MSL)

← approximated by extending DA Capacity Curve

Review of Contents of Plans & Specifications

As specified under 74002:08:09 Safety of Dams

- 1) Topo map submitted? yes
- 2) Profile along dam axis & borehole locations? yes
- 3) Maximum cross section of dam? yes
- 4) Area - Capacity curves? yes but could be extended
- 5) Detailed drawings? yes
- 6) Q capacity of spillway? yes
- 7) Detailed plans of spillway? yes
- 8) Specifications? yes
- 9) EPP? not needed as determined from preliminary risk assessment

Spillway Capacity Requirements

Category 3 dam, 150 loss of life expected

Small - less than 1000 ac-ft of storage, less than 25' tall

* A 50 year Frequency required

- currently has 100 year Frequency design

All Safety of Dam requirements have been met

Report on Vested Right Claim No. 1461-1
Gerald and Donna Martian
July 13, 1989

Vested Right Claim No. 1461-1 is for 123 acre-feet (ac-ft) of water annually to be stored in a dam with a 1934 priority date. The dam is located in the W1/2 NE1/4 Section 14, T18N, R26E, Corson County. The dam was built by the Works Progress Administration in the 1930's and failed in the summer of 1987 after an intense thunderstorm generated runoff which caused the masonry spillway to fail. Plans and specifications to repair the dam are complete with construction to begin following Vested Right validation. The proposed spillway crest elevation (2102.5 feet above mean sea level) will be the same elevation as the pre-failure masonry spillway crest level.

Water Source

Surface water runoff was used continuously by the applicant from 1934 through the summer of 1987. Martian Dam is located on Little Oak Creek (ephemeral creek) with the following hydrologic and hydraulic characteristics (Water Permit Application No. 1461-1, 1989):

21.27 square mile drainage area
46.8 surface acres at normal operating level
1002 cfs 100 year frequency runoff event
1087 cfs proposed sheet piling spillway capacity, 0.5 feet of freeboard

It appears water was and is available for the applicants past and proposed use. Magnitude and frequency estimates of flood volumes for Martian Dam were derived using the method specified in the United States Geological Survey publication: Techniques for Estimating Flood Peaks, Volumes, and Hydrographs on Small Streams in South Dakota, September, 1980, Water Resources Investigations 80-80. The estimated runoff volumes for 2, 5, 10, 25, 50, and 100 year frequencies are as follows:

FREQUENCY	VOLUME
V2	213 ac-ft
V5	384 ac-ft
V10	549 ac-ft
V25	843 ac-ft
V50	1112 ac-ft
V100	1444 ac-ft

United States Geological Survey 7.5 Minute Topographic maps of the Martian Dam watershed indicate approximately eight small "dugout" structures contained within the watershed which are probably used for livestock watering purposes. The estimated flood volumes indicate that water is available to fill the 123 ac-ft dam on a yearly basis.

Review of Existing Water Permits

There are no Water Permits on file with the Division of Water Rights for the Little Oak Creek drainage above Martian Dam (Division Files).

There are no downstream Water Permits on file with the Division of Water Rights for Little Oak Creek between Martian Dam and the Grand River (Division Files).

Safety of Dams Rules, Chapter 74:02:08

Safety of Dams Rules, Chapter 74:02:08:01(6) requires barriers over 6 feet in height constructed across drainage ways be classified as a dam. Martian Dam is 7 feet in height with a normal pool storage of 123 ac-ft and a maximum storage capacity of approximately 700 ac-ft at the top of the dam.

A preliminary downstream hazard risk assessment conducted by Roger C. Smith, P.E., Regional Engineer, Ducks Unlimited, indicates that Martian Dam should be classified as a Small Category 3 Dam. Division review of the proposed dam also indicates that Martian Dam is a Small Category 3 Dam whose failure would cause limited damage to agricultural lands and county or township roads with minimum economic loss.

Safety of Dams Rules Chapter 74:02:08:07 requires Martian Dam to have a minimum spillway design capacity of a 50 year frequency, 24 hour duration flood. The proposed spillway design is capable of passing a 100 year frequency, 24 hour storm (1002 cfs). All Safety of Dams Rules requirements have been met for the proposed spillway renovation of Martian Dam.

Conclusions

1. Vested Right Claim No. 1461-1 claims 123 ac-ft annually to be stored in a dam with a 1934 priority date. Vested Right Claim No. 1461-1 is a valid claim.
2. All Safety of Dams Rules Chapter 74:02:08 have been met for the proposed spillway renovation of Martian Dam.

3. There are no water rights on file with the Division which would be adversely affected by validation of Vested Right Claim No. 1461-1.

David S. Brown /KS

David S. Brown
Natural Resources Engineer
DWNR, Water Rights Division

Approved by:

Gale N. Selken

Gale N. Selken, P.E.
Hydrologist

Bibliography

Division Files, Department of Water and Natural Resources,
Joe Foss Building, Pierre, South Dakota.

U.S. Geological Survey, Techniques for Estimating Flood Peaks, Volumes, and Hydrographs on Small Streams in South Dakota, Water-Resources Investigations 80-80, September, 1980.

Water Permit Application No. 1461-1, Division Files,
Department of Water and Natural Resources, Joe Foss
Building, Pierre, South Dakota, 1989.

REVISED RECOMMENDATION OF CHIEF ENGINEER FOR VALIDATION OF
VESTED WATER RIGHT APPLICATION NO. 1461-1,
Gerald and Donna Martian

Pursuant to SDCL 46-2A-2, the following is the Revised recommendation of the Chief Engineer, Water Rights Division, Department of Water and Natural Resources concerning Validation of Vested Water Right Application No. 1461-1, Gerald and Donna Martian, HCR 77, Box 62, Trail City SD.

The Chief Engineer is recommending VALIDATION of Application No. 1461-1 for storage of 123 acre feet in the reconstructed Martian Dam because 1) water has been appropriated as described for fish, wildlife and stockwatering use with a priority date of January 1, 1934, 2) the use has been developed without unlawful impairment of existing rights, 3) the use is a beneficial use and 4) it is in the public interest.

See the attached report for additional information.

A handwritten signature in dark ink, appearing to read "John Hatch", is written above the typed name.

JOHN HATCH, Chief Engineer
August 11, 1989

RECOMMENDATION OF CHIEF ENGINEER FOR VALIDATION OF VESTED WATER
RIGHT APPLICATION NO. 1461-1, Gerald & Donna Martian

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 Validation of Vested Water Right Application No. 1461-1, Gerald & Donna Martian, HCR 77, Box 62, Trail City SD.

The Chief Engineer is recommending Deferral of VALIDATION of Application No. 1461-1 until a written preliminary risk assessment of the area downstream of the dam is completed and the hazard potential of the dam is determined.

See the attached report for additional information.

A handwritten signature in dark ink, appearing to read "John Hatch", is written over the typed name.

JOHN HATCH, Chief Engineer
June 20, 1989

Instruction to Newspaper - Publish first Notice on or before June 29, 1989 with 2nd publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING To Validate
Vested Water Right Application No. 1461-1 to Appropriate Water

Notice is given that Gerald and Donna Martian, HCR 77, Box 62, Trail City SD 57657 has filed an application to validate a vested water right claim to impound 123 acre-feet of water by reconstructing Martian Dam located on Little Oak Creek in the W 1/2 NE 1/4 Section 14-T18N-R26E. Water is to be stored annually to a spillway elevation of 2102.5 feet mean sea level with a claimed priority date of 1934. The water is to be used to provide habitat for fish and wildlife production and for stock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer of the Water Rights Division recommends DEFERRAL of Vested Water Right Application No. 1461-1 until a written preliminary risk assessment of the area downstream of the dam is completed and the hazard potential of the dam is determined. This application will be considered by the Water Management Board at the Hilton Inn, Deerfield Room, 445 Mt. Rushmore Road, Rapid City SD on July 26, 1989 at 10:00 am. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve validation, 2) approve the validation with qualifications, 3) defer or 4) deny validation of the 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 July 14, 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 July 14, 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, 46-2A-18; 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, 46-5-49; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15 and 74:02:01:19 thru 74:02:01:22.



Department of Water & Natural Resources

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

June 22, 1989

Corson Co. News
Box 788
McLaughlin SD 57642

Dear Sir:

Enclosed is a Notice of Hearing to Validate Vested Right Application No. 1461-1 to be published twice. Please publish the notice on or before June 29, 1989 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 Department of Game, Fish and Parks, Attn: Ron Koth, Anderson Building, Pierre SD 57501 for the cost of publication.

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

cc: Ron Koth, Dept. Game, Fish & Parks

CUT HERE

FIRST TRANSMITTAL NOTICE

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

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to Validate A Vested Right Application 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

June 22, 1989

McLaughlin Messenger
Box 788
McLaughlin SD 57642

Dear Sir:

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Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

enclosures

cc: Ron Koth, Dept. of Game, Fish and Parks

CUT HERE

FIRST TRANSMITTAL NOTICE

TO:

ATTN: Ron Duvall
Water Rights Division
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to Validate A Vested Right Application 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

June 22, 1989

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

Gerald & Donna Martian
HCR 77, Box 62
Trail City SD 57657

Dear Mr. & Mrs. Martian:

Your Application No. 1461-1 for a vested water right claim has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of your claim has been sent to the Publisher of the Corson Co. News and the McLaughlin Messenger printed at McLaughlin SD. For your information, a copy of the notice and the recommendation of the Chief Engineer are enclosed. The report on the application will be sent later. Please review the notice and notify this office, if you have any corrections or questions.

Be sure to contact the above newspapers to authorize publication of your notice of hearing to validate a vested right. Early contact with the papers 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

cc: Ron Koth
Dept. of Game, Fish and Parks



AFFADAVIT OF PUBLICATION

McLaughlin Messenger

STATE OF SOUTH DAKOTA)

188

COUNTY OF CORSON)

Merle E. Lofgren of said county and state, being first duly sworn, on his oath says that the McLaughlin Messenger is a weekly newspaper of general circulation, printed and published in McLaughlin, in said county and within the County of Corson for more than fifty-two successive weeks prior after mentioned and that I, Merle E. Lofgren, the undersigned, am Editor of said newspaper, in charge of the advertising department thereof, and have personal knowledge of the facts stated in the affidavit and that the advertisement headed

Native & Hearing

a printed copy of which is hereunto attached, was printed and published in the regular and entire issue of said newspaper, and not in supplement, once each week for 2 weeks, the first publication being made on the 29 day of June, 1989 and the last publication being made on the 6 day of July, 1989

The 1st publication being on	<u>29</u> day of <u>June</u>	of 19 <u>89</u>
The 2nd publication on the	<u>6</u> day of <u>July</u>	19 <u>89</u>
The 3rd publication on the	_____ day of _____	19_____
The 4th publication on the	_____ day of _____	19_____
The 5th publication on the	_____ day of _____	19_____
The 6th publication on the	_____ day of _____	19_____
The 7th publication on the	_____ day of _____	19_____
The 8th publication on the	_____ day of _____	19_____
The 9th publication on the	_____ day of _____	19_____

That said newspaper is a legal newspaper and has a bonafide circulation of more than two hundred copies weekly, and has been published within the County of Corson for more than fifty-two successive weeks prior to the first publication of said notice and is printed in English in an office maintained at McLaughlin, S. D., the place of publication of said newspaper. That the full amount of the fee for the publication of the annexed notice is \$ 42.61 and incurs solely to the benefit of said publisher, that no agreement or understanding of a division thereof has been made with any other person whomsoever.

Merle E. Lofgren

Subscribed and sworn to before me this

July

[Signature]

Notary Public

My commission expires
March 16, 1992

My Commission Expires

PUBLIC NOTICES

Notice of Hearing
To Validate Vested Water Right
Application No. 1461-1 to
Appropriate Water
Notice is given that Gerald and

Dorina Martian, HCR 77, Box 62, Trail City, SD 57657 has filed an application to validate a vested water right claim to impound 123 acre-foot of water by reconstructing Martian Dam located on Little Oak Creek in the W 1/2 NE 1/4 Section 14-T18N-R26E. Water is to be stored annually to a spillway elevation of 2102.5 feet mean sea level with a claimed priority date of 1934. The water is to be used to provide habitat for fish and wildlife production and for stock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer of the Water Rights Division recommends DEFERRAL of Vested Water Right Application No. 1461-1 until a written preliminary risk assessment of the area downstream of the dam is completed and the hazard potential of the dam is determined. This application will be considered by the Water Management Board at the Hilton Inn, Deerfield Room, 445 Mt. Rushmore Road, Rapid City, SD on July 26, 1989 at 10:00 a.m. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve validation, 2) approve the validation with qualifications, 3) defer or 4) deny validation of the 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 July 14, 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 petitioner. The request for a delay must be received by July 14, 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, 46-2A-18; 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, 46-5-49; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15 and 74:02:01:19 thru 74:02:01:22. (BP June 29, July 6)



Department of Water & Natural Resources

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

August 17, 1989

McLaughlin Messenger
Box 788
McLaughlin SD 57642

Dear Sir:

Enclosed is a Notice of Hearing to Validate Vested Right Application No. 1461-1 to be published twice. Please publish the notice on or before August 24, 1989 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 Department of Game, Fish and Parks, Attn: Ron Koth, Anderson Building, Pierre SD 57501 for the cost of publication.

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

cc: Ron Koth, Dept. of Game, Fish and Parks

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

FIRST TRANSMITTAL NOTICE

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

Date _____

We are in receipt of your letter of _____ enclosing Notice of Hearing to Validate A Vested Right Application which was first published in our issue of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper



SOUTH Dakota Department of
Water & Natural Resources

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

August 17, 1989

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

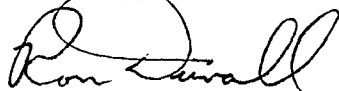
Gerald & Donna Martian
HCR 77, Box 62
Trail City SD 57657

Dear Mr. & Mrs. Martian:

Your Application No. 1461-1 for a vested water right claim needs to be readvertised due to an error in the publication date of the newspaper. A notice of your claim has been sent to the Publisher of the McLaughlin Messenger printed at McLaughlin SD. For your information, a copy of the notice is enclosed. Please review the notice 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 hearing to validate a vested right. 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

cc: Ron Koth
Dept. of Game, Fish and Parks



Instruction to Newspaper - Publish first Notice on or before August 24, 1989 with 2nd publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING To Validate
Vested Water Right Application No. 1461-1 to Appropriate Water

Notice is given that Gerald and Donna Martian, HCR 77, Box 62, Trail City SD 57657 has filed an application to validate a vested water right claim to impound 123 acre-feet of water by reconstructing Martian Dam located on Little Oak Creek in the W 1/2 NE 1/4 Section 14-T18N-R26E. Water is to be stored annually to a spillway elevation of 2102.5 feet mean sea level with a claimed priority date of 1934. The water is to be used to provide habitat for fish and wildlife production and for stock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer of the Water Rights Division recommends APPROVAL of Vested Water Right Application No. 1461-1 because 1) water has been appropriated as described for fish & wildlife production and stock watering with a priority date of January 1, 1934, 2) the use has been developed without unlawful impairment of existing rights, 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 216, Joe Foss Building, 523 E Capitol, Pierre SD on September 27, 1989 at 10:00 am. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve validation, 2) approve the validation with qualifications, 3) defer or 4) deny validation of the 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 September 15, 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 September 15, 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, 46-2A-18; 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, 46-5-49; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15 and 74:02:01:19 thru 74:02:01:22.

AFFADAVIT OF PUBLICATION

McLaughlin Messenger

STATE OF SOUTH DAKOTA)

)ss

COUNTY OF CORSON)

Merle E. Lofgren of said county and state, being first duly sworn, on his oath says that the McLaughlin Messenger is a weekly newspaper of general circulation, printed and published in McLaughlin, in said county and within the County of Corson for more than fifty-two successive weeks prior after mentioned and that I, Merle E. Lofgren, the undersigned, am Editor of said newspaper, in charge of the advertising department thereof, and have personal knowledge of the facts stated in the affidavit and that the advertisement headed

Notice of Hearing to Validate
Vested Water Right Application
No. 1461-1 to Appropriate Water

a printed copy of which is hereunto attached, was printed and published in the regular and entire issue of said newspaper, and not in supplement, once each week for 2 weeks, the first publication being made on the 24 day of August, 19 89 and the last publication being made on the 31 day of August, 19 89.

The 1st publication being on 24 day of August of 19 89

The 2nd publication on the 31 day of August 19 89

The 3rd publication on the _____ day of _____

The 4th publication on the _____ day of _____

The 5th publication on the _____ day of _____

The 6th publication on the _____ day of _____

The 7th publication on the _____ day of _____

The 8th publication on the _____ day of _____

The 9th publication on the _____ day of _____

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, 46-2A-18; 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, 46-5-49; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15 and 74:02:01:19 thru 74:02:01:22.

(Messenger August 24-31)

That said newspaper is a legal newspaper and has a circulation of more than two hundred copies weekly, and has been published within the County of Corson for more than fifty-two successive weeks prior to the first publication of said notice and is printed in English in an office maintained at McLaughlin, S. D., the place of publication of said newspaper. That the full amount of the fee for the publication of the annexed notice is \$ 43.51 and incurs solely to the benefit of said publisher, that no agreement or understanding of a division thereof has been made with any other person whomsoever.

Merle E. Lofgren

Subscribed and sworn to before me this 25 day of September, 19 89

[Signature]
Notary Public

My Commission Expires _____ My commission expires March 16, 1992, 19 _____

Notice of Hearing to Validate Vested Water Right Application No. 1461-1 to Appropriate Water

Notice is given that Gerald and Donna Martian, HCR 77, Box 62, Trail City, SD 57657 has filed an application to validate a vested water right claim to impound 123 acre-feet of water by reconstructing Martian Dam located on Little Oak Creek in the W 1/2 NE 1/4 Section 14-T18N-R26E. Water is to be stored annually to a spillway elevation of 2102.5 feet mean sea level with a claimed priority date of 1934. The water is to be used to provide habitat for fish and wildlife production and for stock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer of the Water Rights Division recommends APPROVAL of Vested Water Right Application No. 1461-1 because 1) water has been appropriated as described for fish and wildlife production and stock watering with a priority date of January 1, 1934, 2) the use has been developed without unlawful impairment of existing rights, 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 216, Joe Foss Building, 523 E. Capitol, Pierre, SD on September 27, 1989 at 10:00 a.m. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve validation, 2) approve the validation with qualifications, 3) defer or 4) deny validation of the 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 September 15, 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 of Engineer from the applicant or a petitioner. The request for a delay must be received by September 15,





Department of Water & Natural Resources

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

NOV 20 1989

Gerald & Donna Martian
HCR 77, Box 62
Trail City SD 57657

Dear Mr. & Mrs. Martian:

Enclosed are your Validated Vested Water Right and Water License No. 1461-1. As long as you use the water beneficially, as stated in the Water License, the State Water Laws provide that you have a continuing right to use the water.

Very truly yours,

A handwritten signature in black ink, appearing to read "John Hatch". The signature is written in a cursive, flowing style.

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

enclosures

Schaal, Tim

From: Schaal, Tim
Sent: Thursday, June 04, 2015 4:05 PM
To: 'rsmith@ducks.org'
Cc: Smith, Kim; Goodman, Jeanne; Duvall, Ron
Subject: RE: Atten: Tim Schaal
Attachments: 1461-1.pdf

OK thanks Roger—it looks like Vested Right Claim #1461-1 (copy attached) should still be good for 123 ac-ft. of storage. Could you send us a cover letter to go along with these plans and we will send you an approval letter and then have something to place in the file. Please let me know if you have any questions.

Tim Schaal
SD DENR

From: Duvall, Ron
Sent: Thursday, June 04, 2015 2:46 PM
To: Schaal, Tim
Cc: Smith, Kim; Goodman, Jeanne
Subject: FW: Atten: Tim Schaal

Tim, to your attention...

NOTE: When replying to this email do NOT click the person's [\[mailto:myname@email.com\]](mailto:myname@email.com) address since this may result in your reply being undeliverable. Either copy and paste just the email address (e.g. myname@email.com) or type just the address into your reply message.

From: Roger Smith [\[mailto:rsmith@ducks.org\]](mailto:rsmith@ducks.org)
Sent: Thursday, June 04, 2015 2:32 PM
To: DENR INTERNET INFORMATION; Schaal, Tim
Cc: Randy Meidinger
Subject: Atten: Tim Schaal

Hi Tim, It has been a little while since our paths have crossed, hope all is well.

We are going to repair a DU structure that was originally permitted and built in 1989. The dam was constructed on private land in 1989 and failed a little over a year ago. We are trying to secure funding to do the repair. We called the dam "Martian Dam". We worked with the landowner at the time to secure a water permit. The dam is located in Sec. 14 T18N R26E, in Corson County. (Lat/Long 45-31-35.4/100-53-00)

The spillway consisted of a sheet pile weir with a second sheet pile curtain driven downstream that acted like a footing to resist overturn. We were restricted to a shallow embedment depth due the presence of a dense layer sandstone. The downstream curtain also created a plunge pool, where we placed riprap. We were unaware that the original rock riprap had been displaced over the years. The loss of rock in the plunge pool allowed scour to develop to an elevation where there was no support to the toe of the upstream curtain. Piping below the upstream curtain

eventually removed enough material from upstream of the weir wall that the structure failed. The failure was a clear weather breach during January 2014.

We plan to repair the structure and restore its function. I am unsure as to what permits might be required from DENR. Attached is a set of plans that will more clearly show how we plan to repair the structure.

Please let me know if there is a form I would need to fill out of if the plans and specifications alone are sufficient for your review. I have them marked "Preliminary Not for Construction" only because we have not sent them out for bid. I did stamp them.

Thanks for the help,

Roger



Roger Smith. P.E.
Director of Conservation Services

Great Plains Region
2525 River Road
Bismarck ND 58503

701.355.3553 (o)
701.355.3557 (f)
rsmith@ducks.org



RECEIVED

JUN - 8 2015

WATER RIGHTS
PROGRAM

Great Plains Regional Office
2525 River Road
Bismarck, ND 58503-9011
(701) 355-3500 fax (701) 355-3575
www.ducks.org

June 5, 2015

Mr. Tim Schaal
Engineer
Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, SD 57501

Dear Mr. Schaal:

Please find the accompanying plans (5 sheets) to repair Martian Dam. The dam is located in Sec. 14 T18N R26E, in Corson County (Lat/Long 45-31-35.4/100-53-00). The original dam construction accompanied Vested Right Claim #1461-1.

Thank you.

Roger C. Smith, P.E.
Director of Engineering Services

Attachment

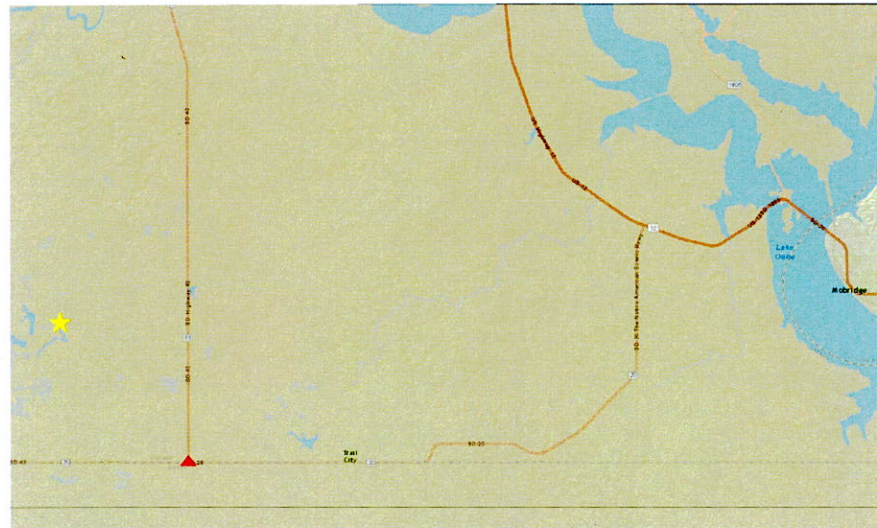
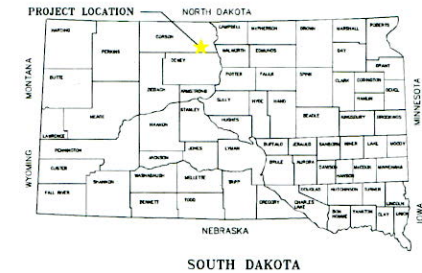


DUCKS UNLIMITED

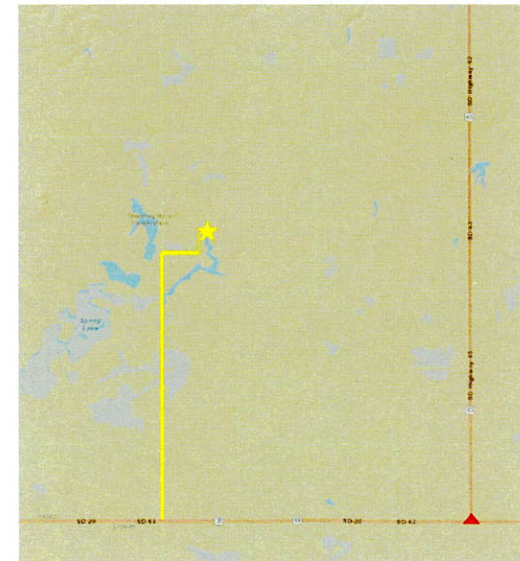
PROJECT

MARTIAN DAM

SECTION 14, TOWNSHIP 18 N, RANGE 26 E
CORSON COUNTY, SOUTH DAKOTA



VICINITY MAP
NOT TO SCALE



LOCATION MAP
NOT TO SCALE

MAP POINT "▲" IS LOCATED @ INTERSECTION OF SOUTH DAKOTA HIGHWAY 63 & SOUTH DAKOTA HIGHWAY 20. LOCATED IN CORSON COUNTY, SD. MAP POINT "▲" IS ± 24 MILES SOUTH OF WCLAUGHLIN, SD. SITE FROM MAP POINT: HEAD WEST ON SD-20 FOR FOUR MILES, THEN HEAD NORTH ON 261ST AVE / 9 COUNTY ROAD FOR THREE & A HALF MILES. TURN EAST ONTO PRIVATE DRIVE FOR .5 MILE. PROJECT IS LOCATED NORTH OF HOMESTEAD ACROSS PASTURE.

SPECIFICATIONS

- 201 MODIFICATION
- 202 SITE PREPARATION
- 203 EXCAVATION
- 204 FIRST IN PLACE REINFORCED CONCRETE
- 205 STRUCTURAL STEEL
- 101 SOIL EROSION AND POLLUTION CONTROL

PLAN INDEX

- SHEET 1 COVER
- SHEET 2 CONTROL STRUCTURE & SECTIONS
- SHEET 3 SITE PLAN
- SHEET 4 SECTIONS & DETAILS
- SHEET 5 SITE PHOTOS & CHANNEL PROFILE

ITEM	ESTIMATED QUANTITY	UNIT
1 MODIFICATION	1	S.N.
2 SITE PREPARATION - EXCAVATION REQUIRED FOR STRUCTURE MODIFICATION	1	S.N.
3 STRUCTURE MODIFICATION		
3A REMOVAL OF EXISTING TS DECKS AND REINSTALLING AT BASE OF 1/8 CURTAIN	1	S.N.
3B REMOVAL OF EXISTING WEIR WALL STRUCTURAL STEEL CAP (IF NEEDED)	1	S.N.
3C REPLACEMENT OF STRUCTURAL CAP (IF CAP IS REMOVED)	50	LF
3D NEW 5" x 5" x 5/8" ANGLE ON DOWNSTREAM SIDE OF UPSTREAM CURTAIN	50	LF
3E NEW TUBULAR STEEL 5" x 5" x 5/8" ANGLED BRACES (45° EA 7 TOTAL)	136	LF
3F NEW 6" x 4" x 5/8" ANGLE ON UPSTREAM SIDE OF DOWNSTREAM CURTAIN	50	LF
3G CORRECT LISTED (W) WEIR WALL	1	S.N.
4 FLOWABLE FILL (PAYMENT MADE ON ACTUAL QUANTITY USED)	105	CY-S

PRELIMINARY NOT FOR CONSTRUCTION

ROGER SMITH, P.E.
DU - BISMARCK, ND
701-355-3553



IF THESE PLANS ARE NOT PLOTTED AND/OR REPRODUCED AT THE ORIGINAL SIZE OF 24" x 36" ANY SCALE REFERENCED HEREIN SHOULD BE DISREGARDED AND THE PLANS SHOULD BE CONSIDERED "NOT TO SCALE."

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

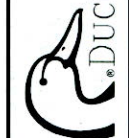
Roger C. Smith, P.E.
for Ducks Unlimited, Inc.
License No. 4325

06-04-2015
Date

Construction site safety is the sole responsibility of the contractor. Ducks Unlimited, Inc. shall not assume any responsibility for the safety of the work performed, persons engaged in the work, nearby structures or of other persons on-site.

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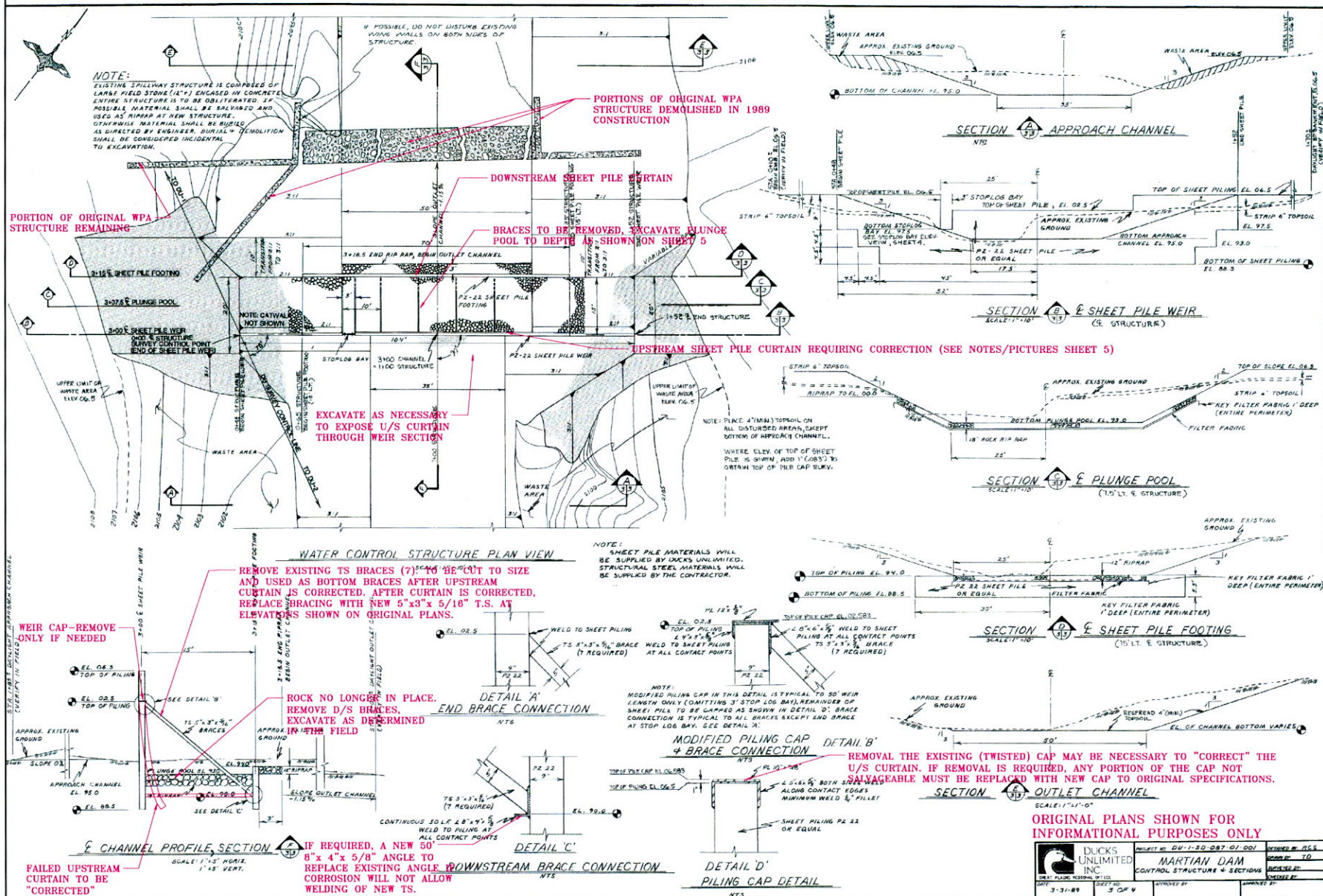
Global Leader in Wetlands & Wildlife Conservation
GREAT PLAINS REGIONAL OFFICE
BISMARCK, NORTH DAKOTA (701) 355-3500



MARTIAN DAM
CORSON COUNTY
SOUTH DAKOTA

Sheet No.	Date	Revised	By
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SHEET 1



USE OF FLOWABLE FILL CONCRETE TO REDUCING PIPING THREAT AND RESIST MOVEMENT IN "CORRECTED" WEIR WALL: THE ACTUAL ACTUAL LINES AND GRADES OF THE FLOWABLE FILL WILL BE DETERMINED IN THE FIELD AFTER CORRECTION IS APPLIED TO THE WEIR WALL.



ORIGINAL PLANS - NOT TO SCALE

PRELIMINARY NOT FOR CONSTRUCTION



TYPE 1 PORTLAND CEMENT	75-100 LBS/CY
FLY ASH	150-600 LBS/CY
AIR	5-20%
28 DAY COMPRESSIVE STR.	150 PSI
UNIT WEIGHT	100-125 LBS/CF

SELECT WATER CONTENT AS NECESSARY TO PRODUCE A CONSISTENCY THAT WILL RESULT IN A FLOWABLE, SELF-LEVELING PRODUCT AT THE TIME OF PLACEMENT.

 **DUCKS UNLIMITED**
Global Leader in Wetlands & Wildlife Conservation
GREAT PLAINS REGIONAL OFFICE
BISMARCK, NORTH DAKOTA (701) 355-3500

MARTIAN DAM
CORSON COUNTY
SOUTH DAKOTA

[illegible]



1461-1
DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

June 19, 2015

Roger Smith, P.E.
Ducks Unlimited
Great Plains Regional Office
2525 River Road
Bismarck, ND 58503-9011

Dear Mr. Smith:

Thank you for sending us the plan sheets for the repair of the Martian Dam, located in Section 14-T18N-R26E in Corson County. This dam is authorized under Vested Right Claim No. 1461-1, which was validated on September 28, 1989 for 123 ac-ft. of storage. After reviewing the plan sheets, I think we will classify the proposed repair work as "maintenance" and approval of the plans will not be required. However, I do agree with the proposed plan to correct the erosion and damaged sheet pile weir.

Thanks again and please let me know if you have and questions.

Sincerely,

Timothy G. Schaal, P.E.
Engineer IV
SD DENR, Water Rights Program
(605) 773-3352

1-1974



DUCKS UNLIMITED

PROJECT AT

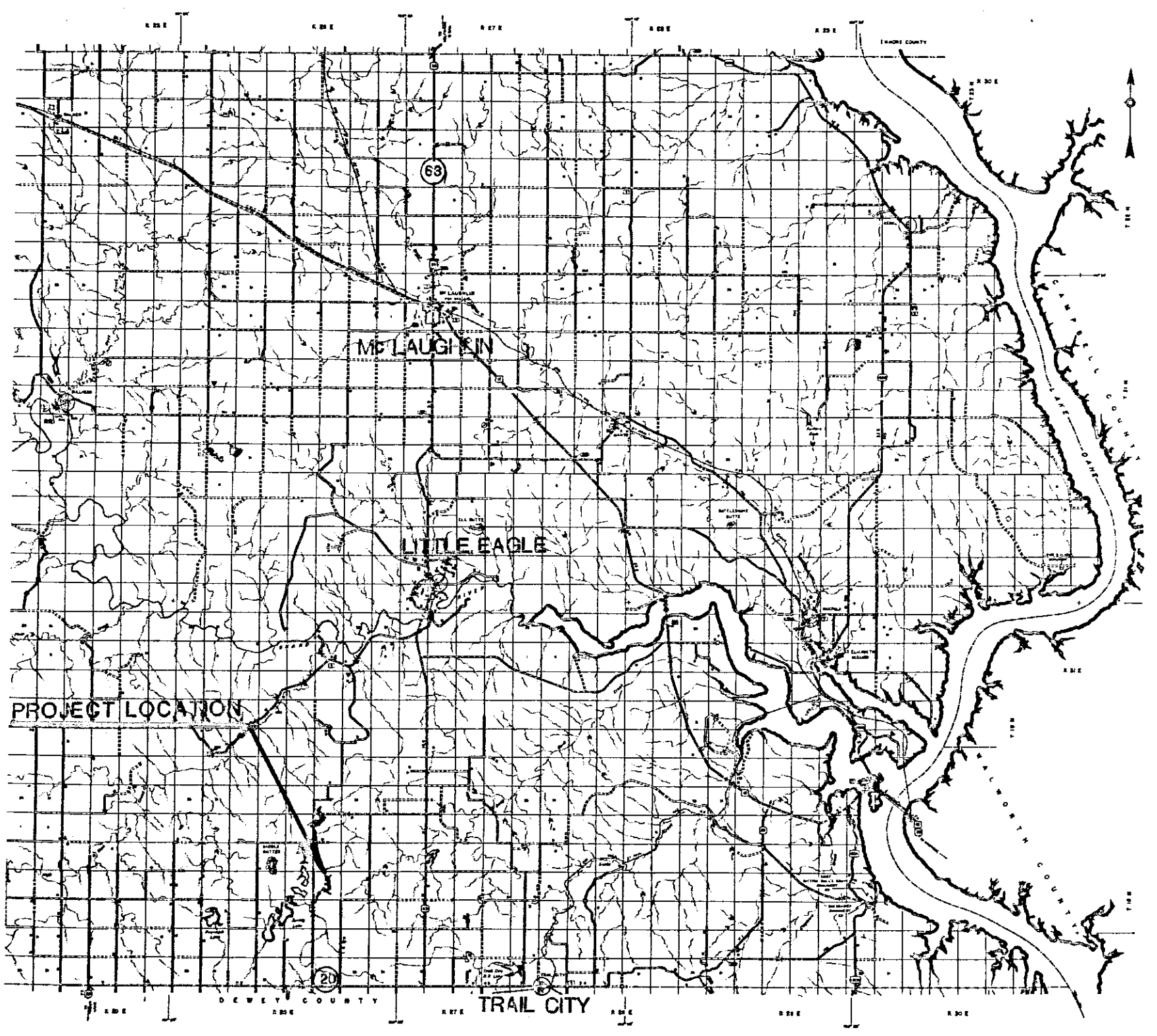
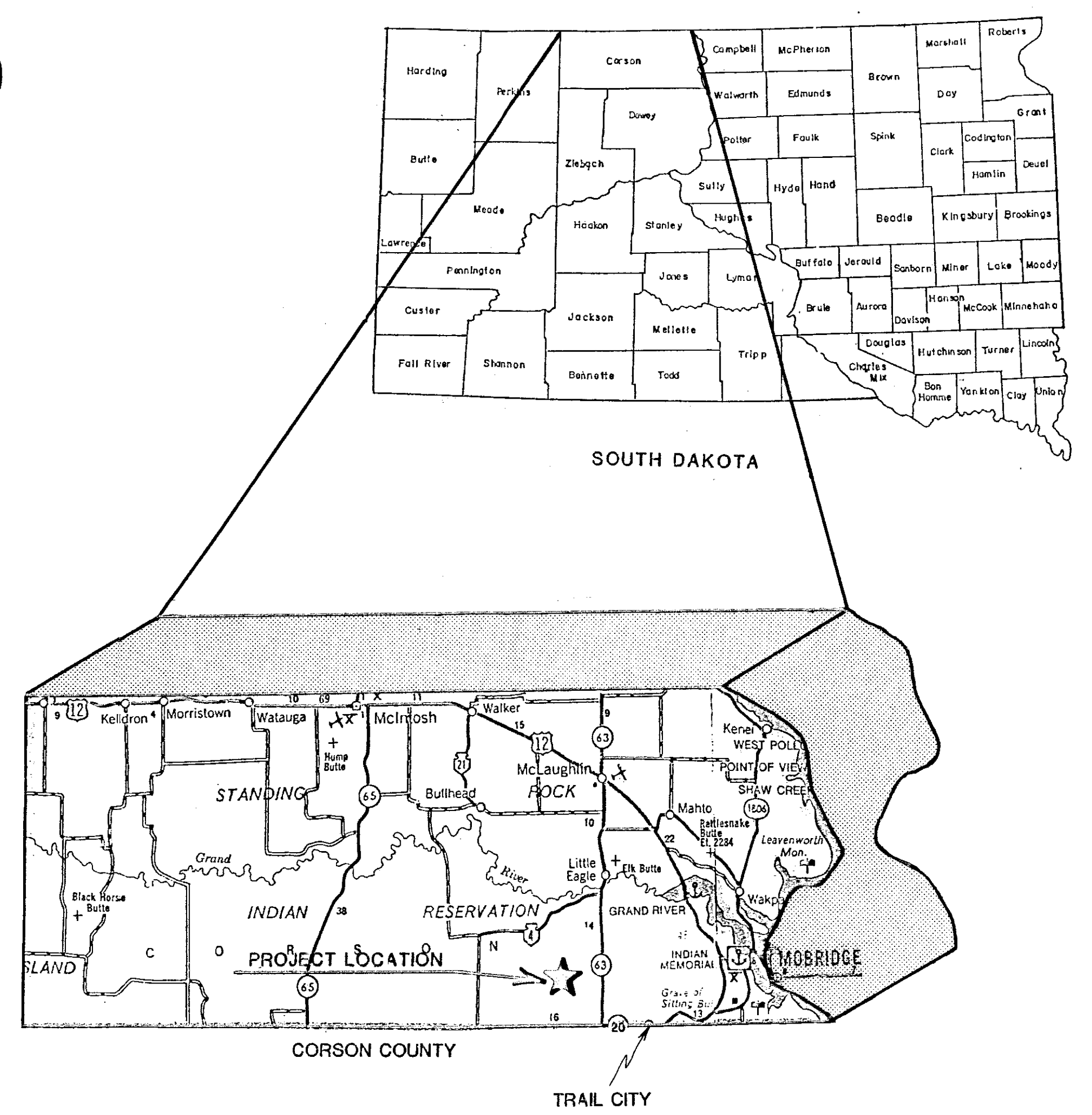
MARTIAN DAM

SEC. 14, TWP. 18 N., RGE. 26 E.

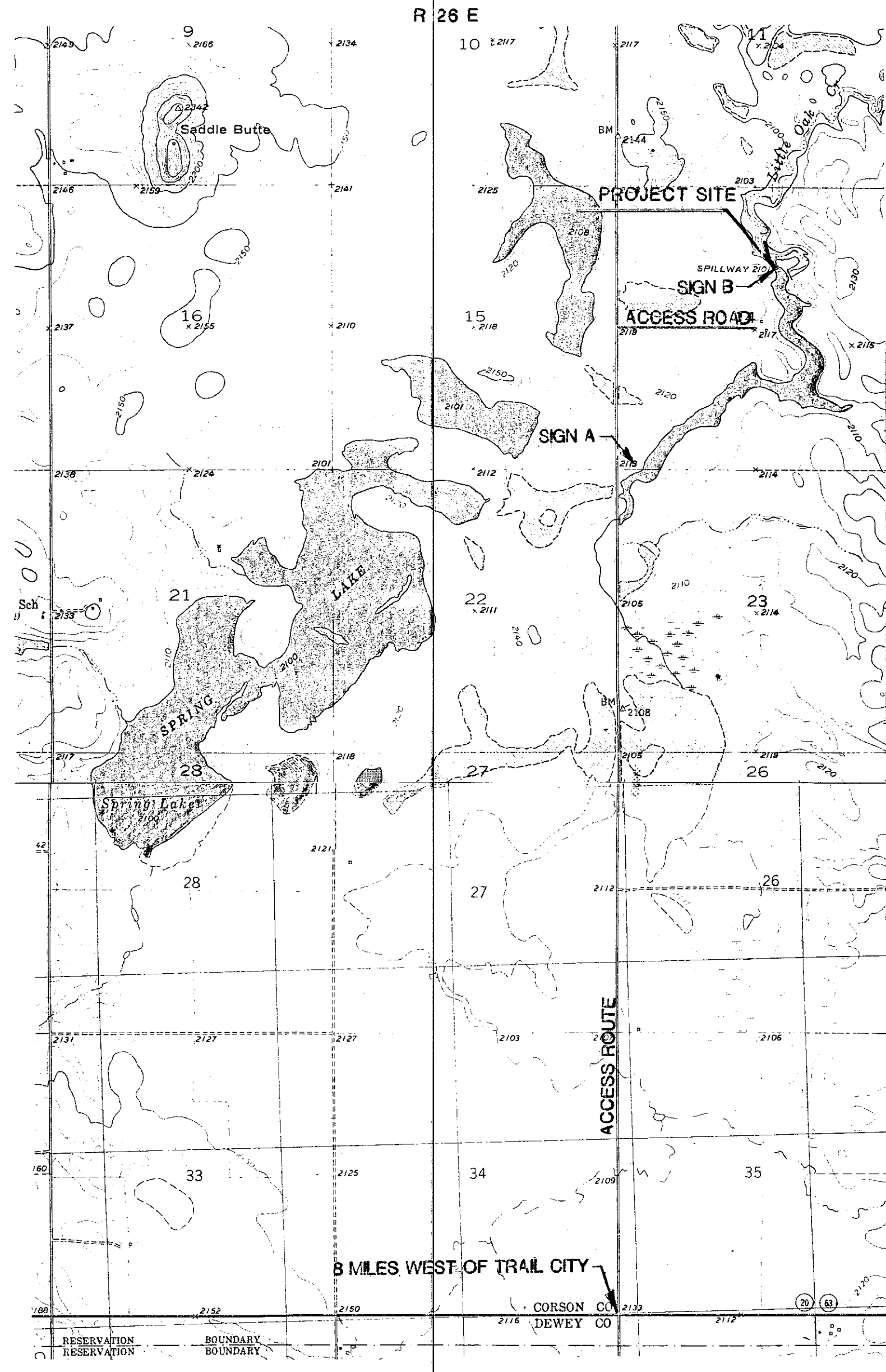
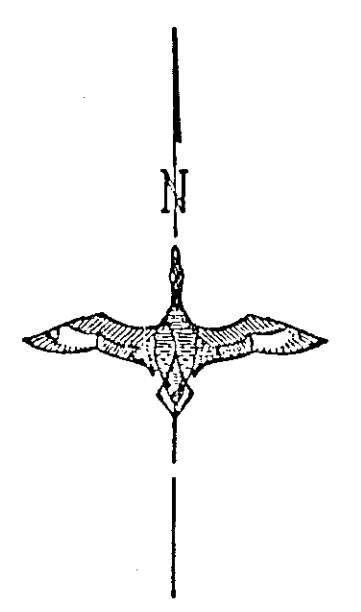
CORSON COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

SOUTH DAKOTA DEPARTMENT OF GAME, FISH, & PARKS



LOCATION MAP



VICINITY MAP

SCALE: 2,000' = 1 MILE

INDEX

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2. SITE PLAN
3. CONTROL STRUCTURE & SECTIONS
4. SOILS INFORMATION & DETAILS

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RIPRAP PLACEMENT	209
SHEET PILE MATERIAL	214
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STRUCTURAL STEEL	216

PROJECT SIGNING

SIGN 'A' 24"x36"

SIGN 'B' 11"x14"

1 SIGN 'A' AND 1 SIGN 'B' WILL BE PROVIDED BY DUCKS UNLIMITED AND DELIVERED TO THE CO-OPERATING AGENCY. THE AGENCY IS RESPONSIBLE FOR INSTALLING THE SIGNS AT LOCATIONS DESIGNATED ON THE PLANS.

John C. Smith P.E.

V.R. Appl. No. 17461-1

PROJECT NO. DU-1-SD-087-01-001	DESIGNED BY: RCS
DRAWN BY: TD	SURVEYED BY:
CHECKED BY:	APPROVED BY: <i>John C. Smith</i>
DATE: 3-23-89	SHEET NO: 1 OF 4

1461-1



DUCKS UNLIMITED

PROJECT AT

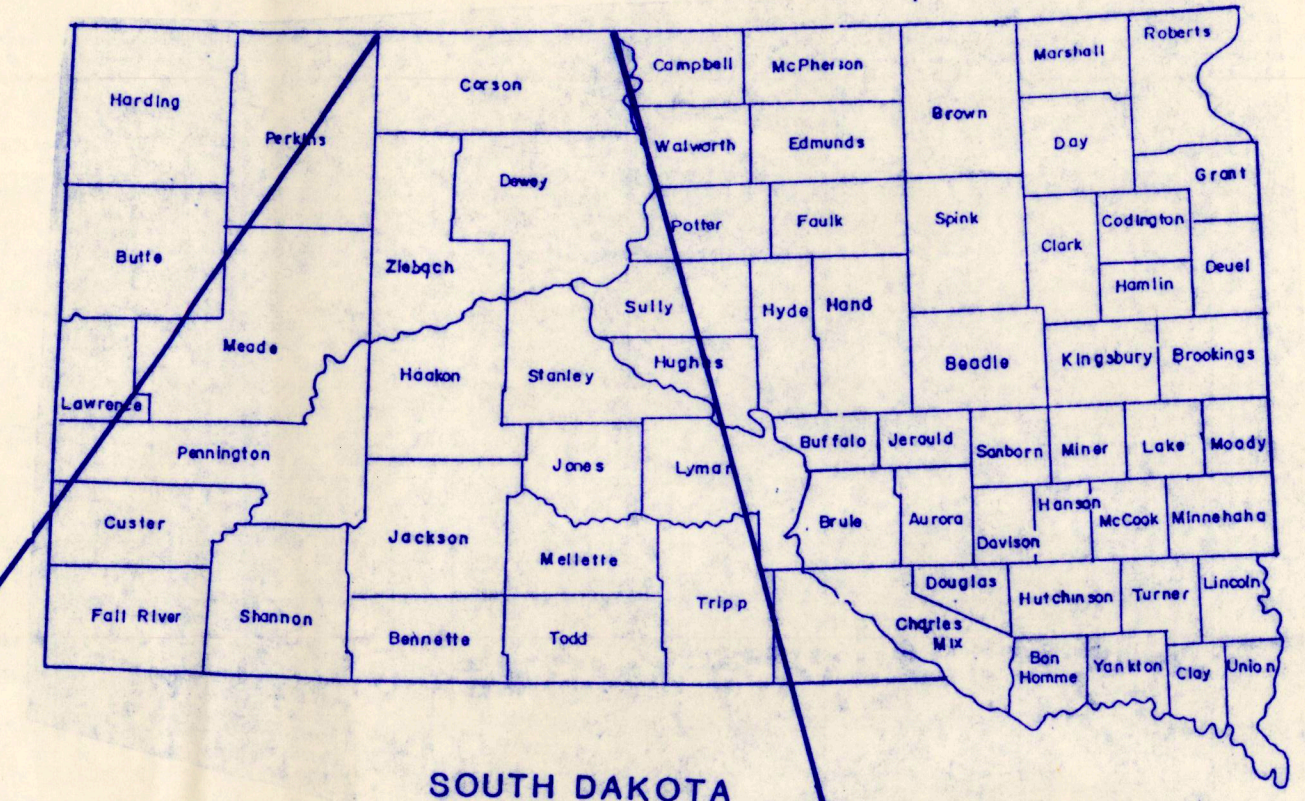
MARTIAN DAM

SEC. 14, TWP. 18 N., RGE. 26 E.

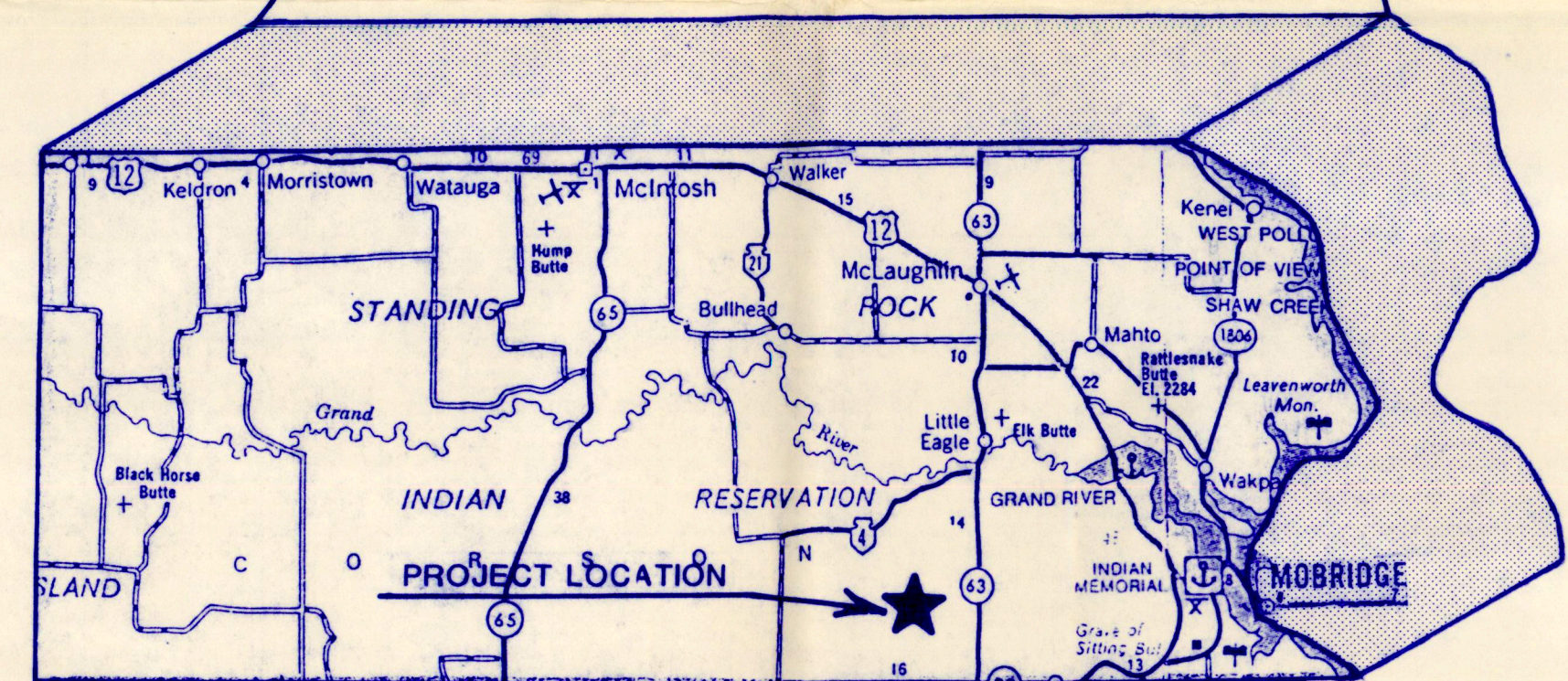
CORSON COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

SOUTH DAKOTA DEPARTMENT OF GAME, FISH, & PARKS



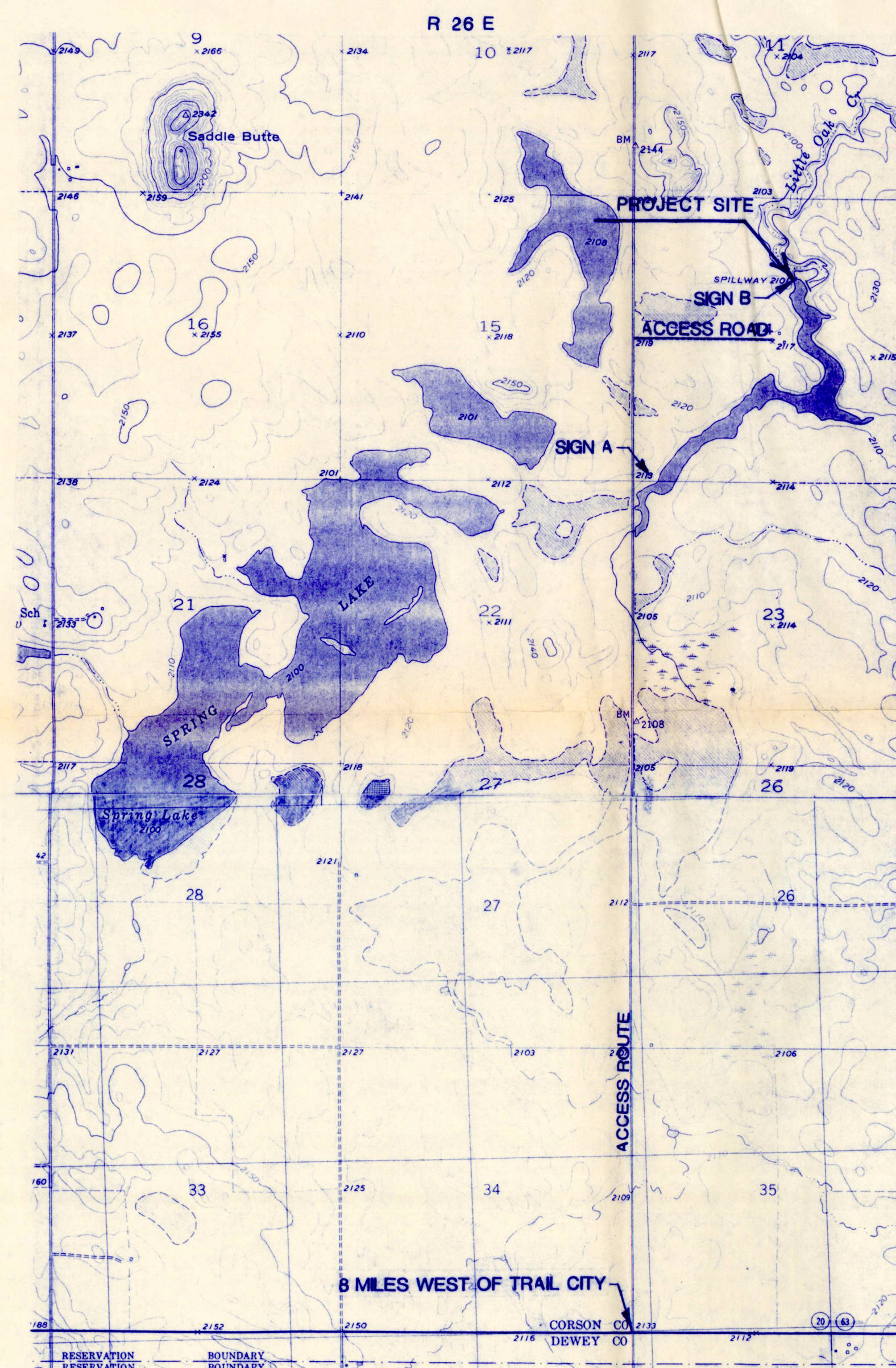
SOUTH DAKOTA



CORSON COUNTY

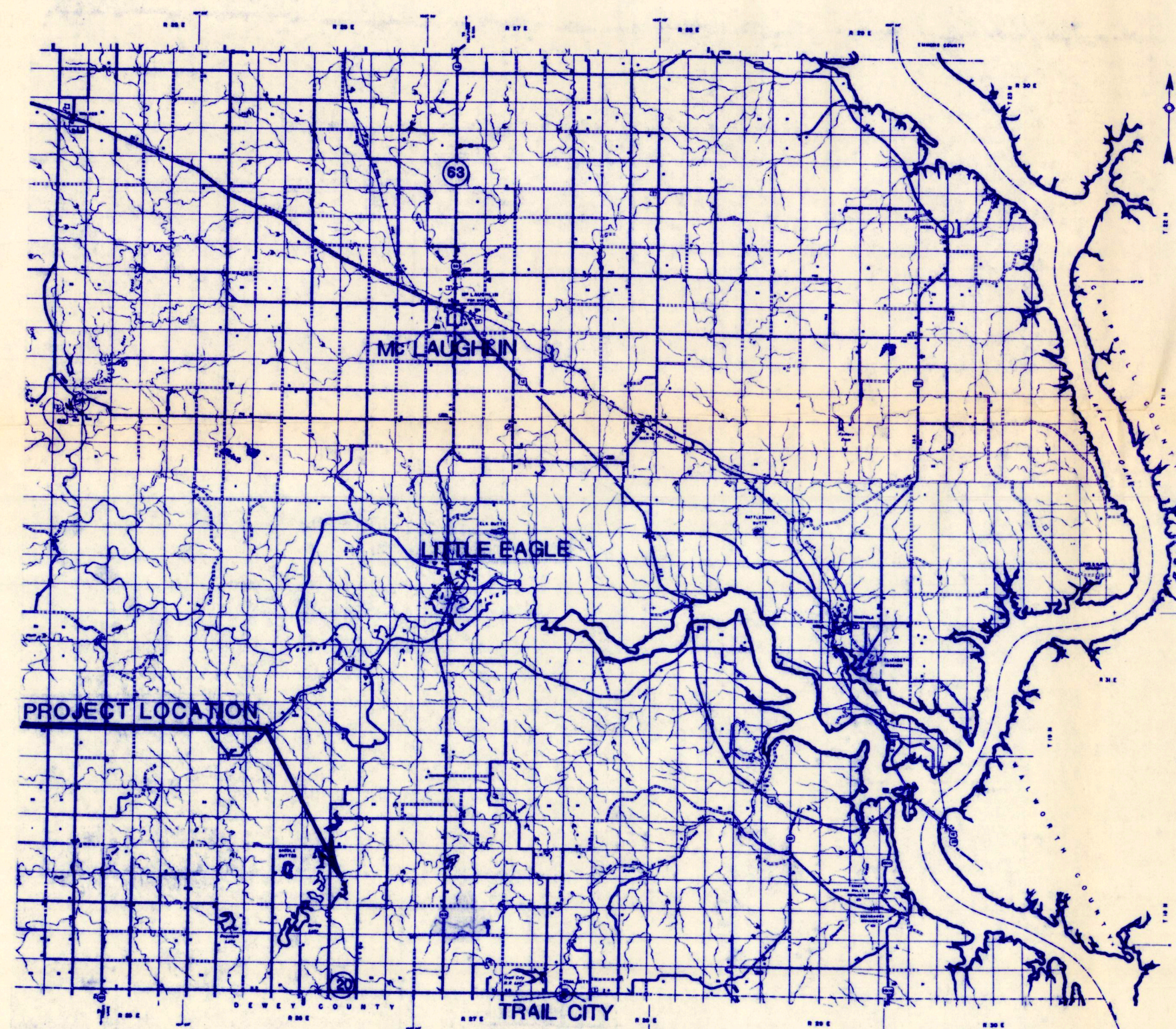
TRAIL CITY

T 18 N



VICINITY MAP

SCALE : 2,000' = 1 MILE



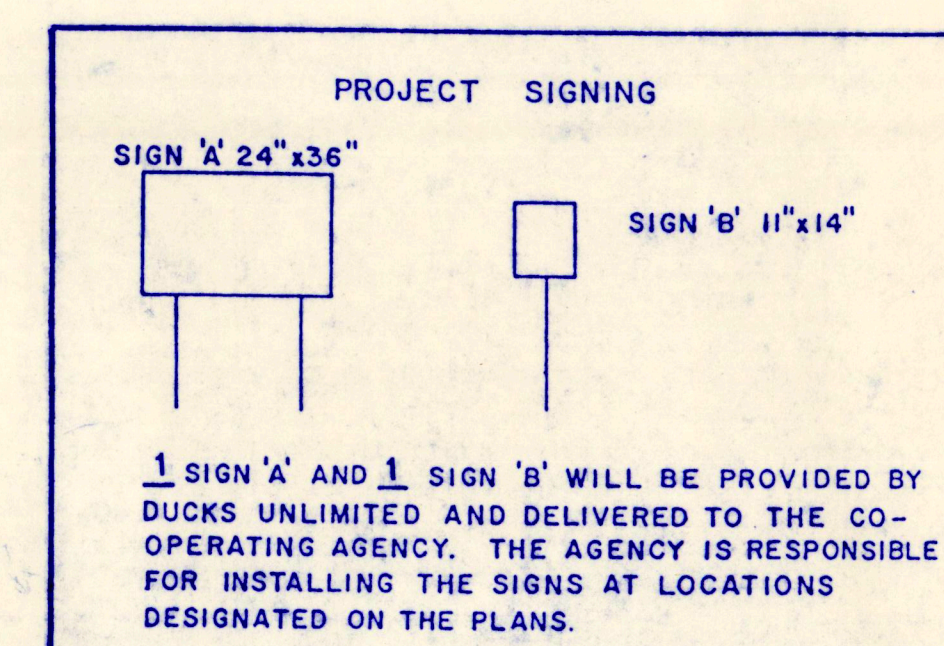
LOCATION MAP

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SPECIFICATIONS

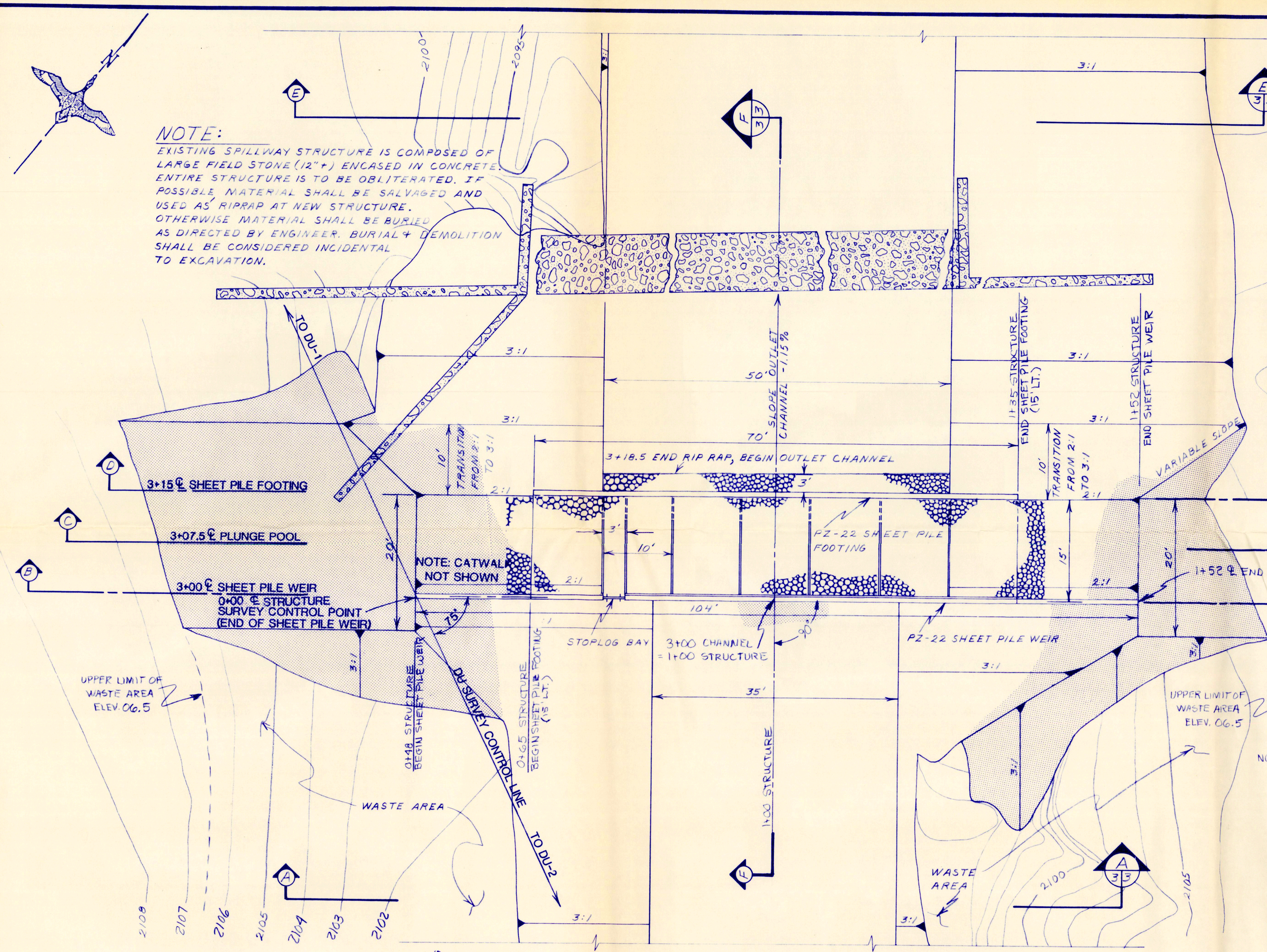
GENERAL CONDITIONS	101
MOBILIZATION	201
SITE PREPARATION	202
EXCAVATION	203
EMBANKMENT CONSTRUCTION	204
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RIPRAP PLACEMENT	209
SHEET PILE MATERIAL	214
SHEET PILE INSTALLATION	215
STRUCTURAL STEEL	216



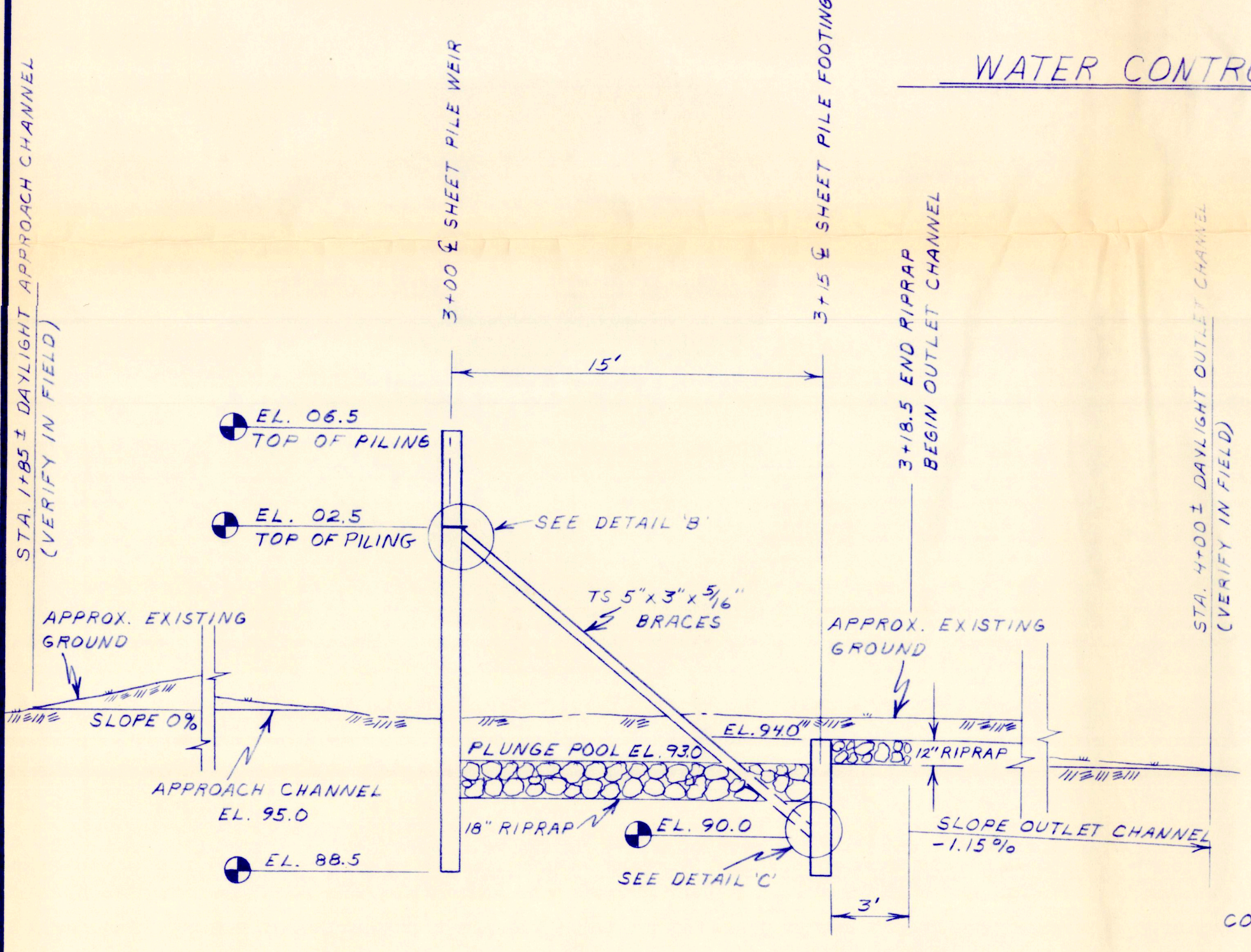
V.R. Appl No. 1461-1

	PROJECT NO: DU-1-SD-087-01-001	DESIGNED BY: RCS
	DRAWN BY: TD	
SHEET NO: 1 OF 4		CHECKED BY:
DATE: 3-23-89		APPROVED BY: Roger C. Smith

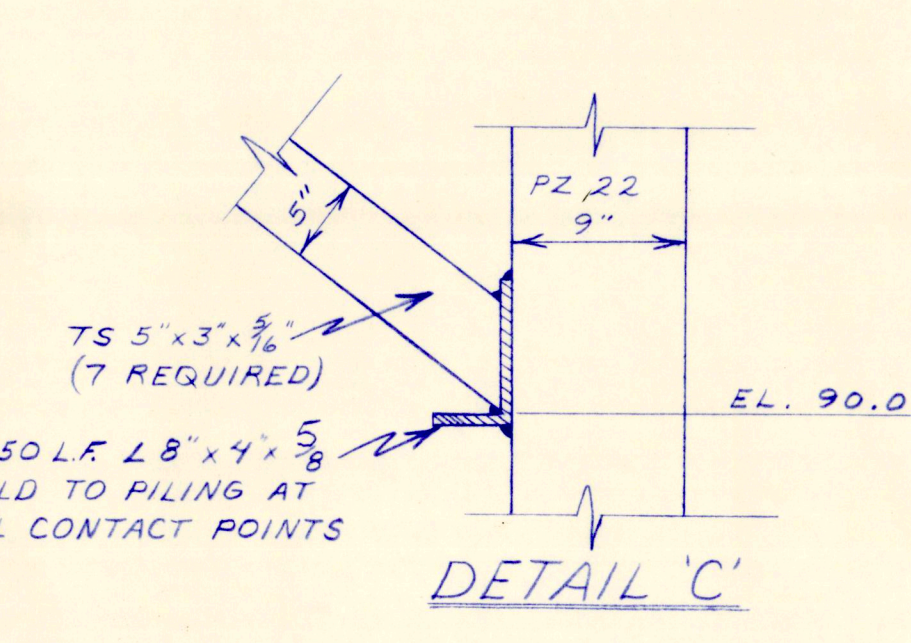
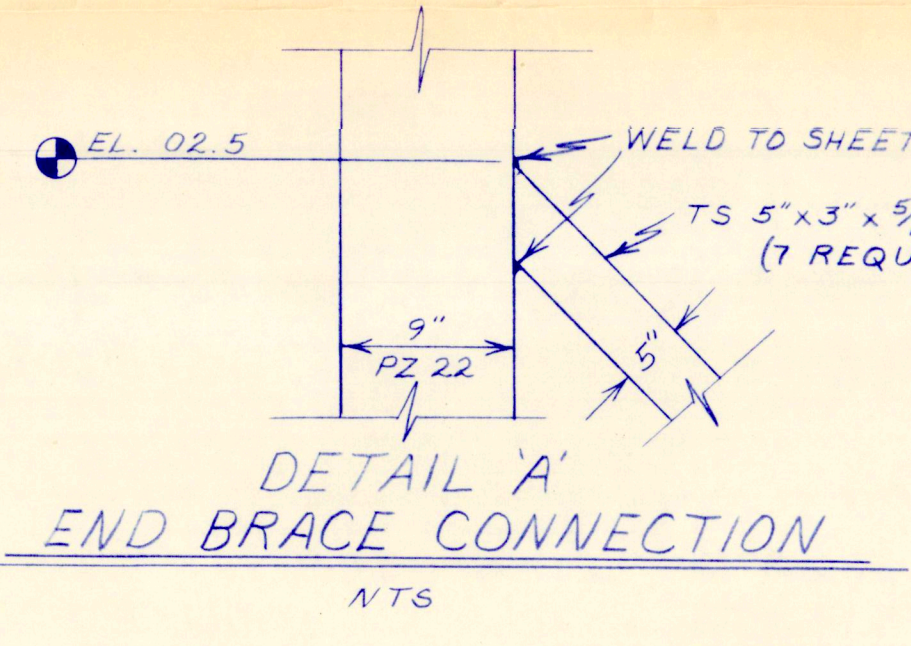
NOTE:
EXISTING SPILLWAY STRUCTURE IS COMPOSED OF LARGE FIELD STONE (12"+) ENCASED IN CONCRETE. ENTIRE STRUCTURE IS TO BE OBLITERATED. IF POSSIBLE, MATERIAL SHALL BE SALVAGED AND USED AS RIPRAP AT NEW STRUCTURE. OTHERWISE MATERIAL SHALL BE BURIED AS DIRECTED BY ENGINEER. BURIAL & DEMOLITION SHALL BE CONSIDERED INCIDENTAL TO EXCAVATION.



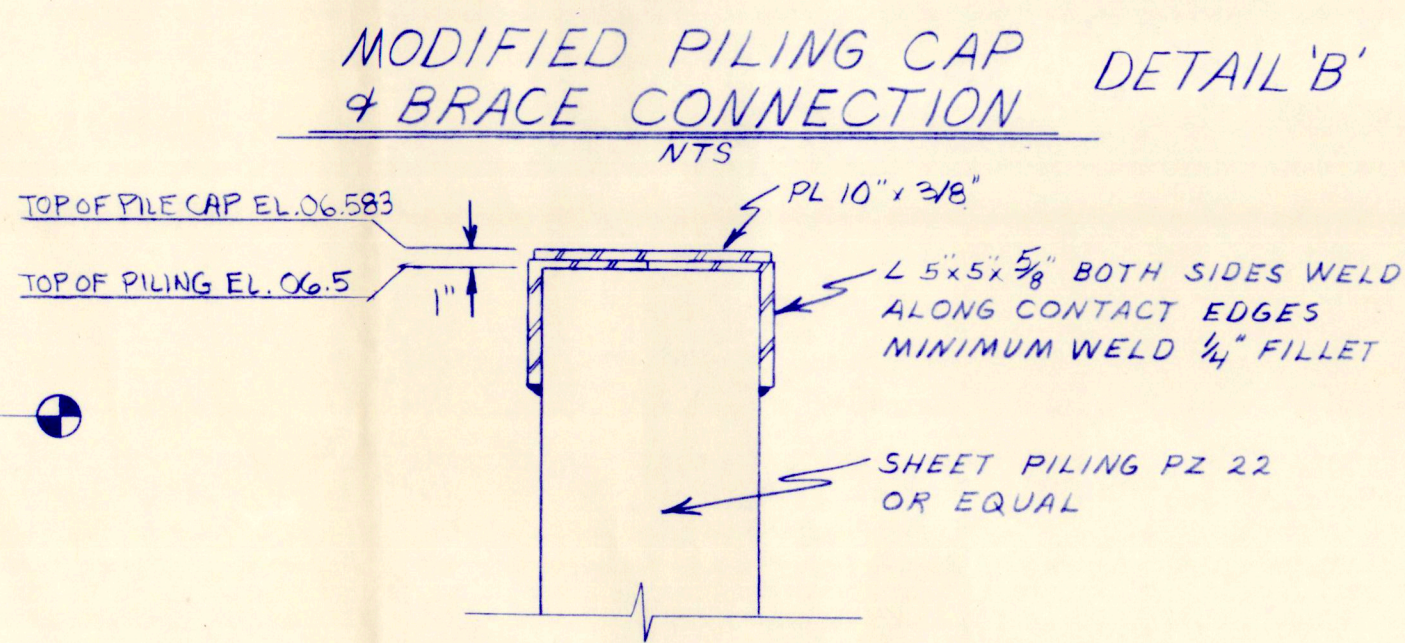
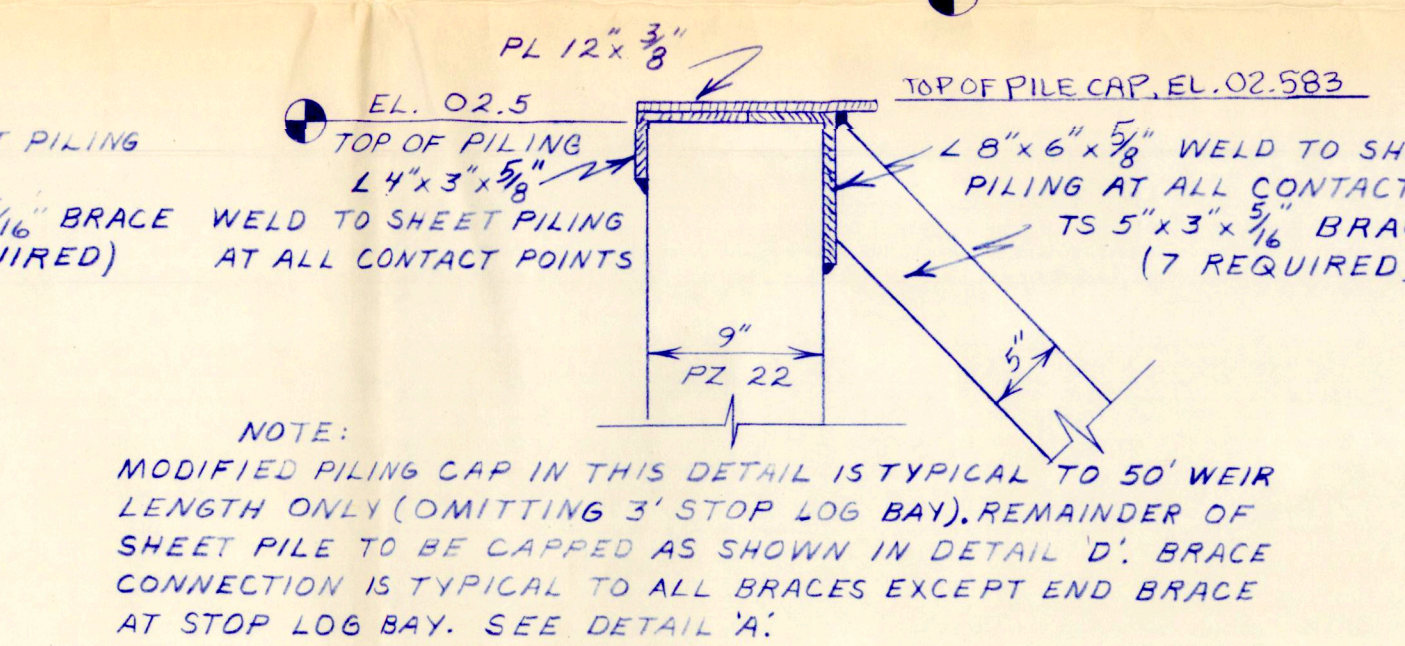
WATER CONTROL STRUCTURE PLAN VIEW
SCALE: 1" = 10'-0"



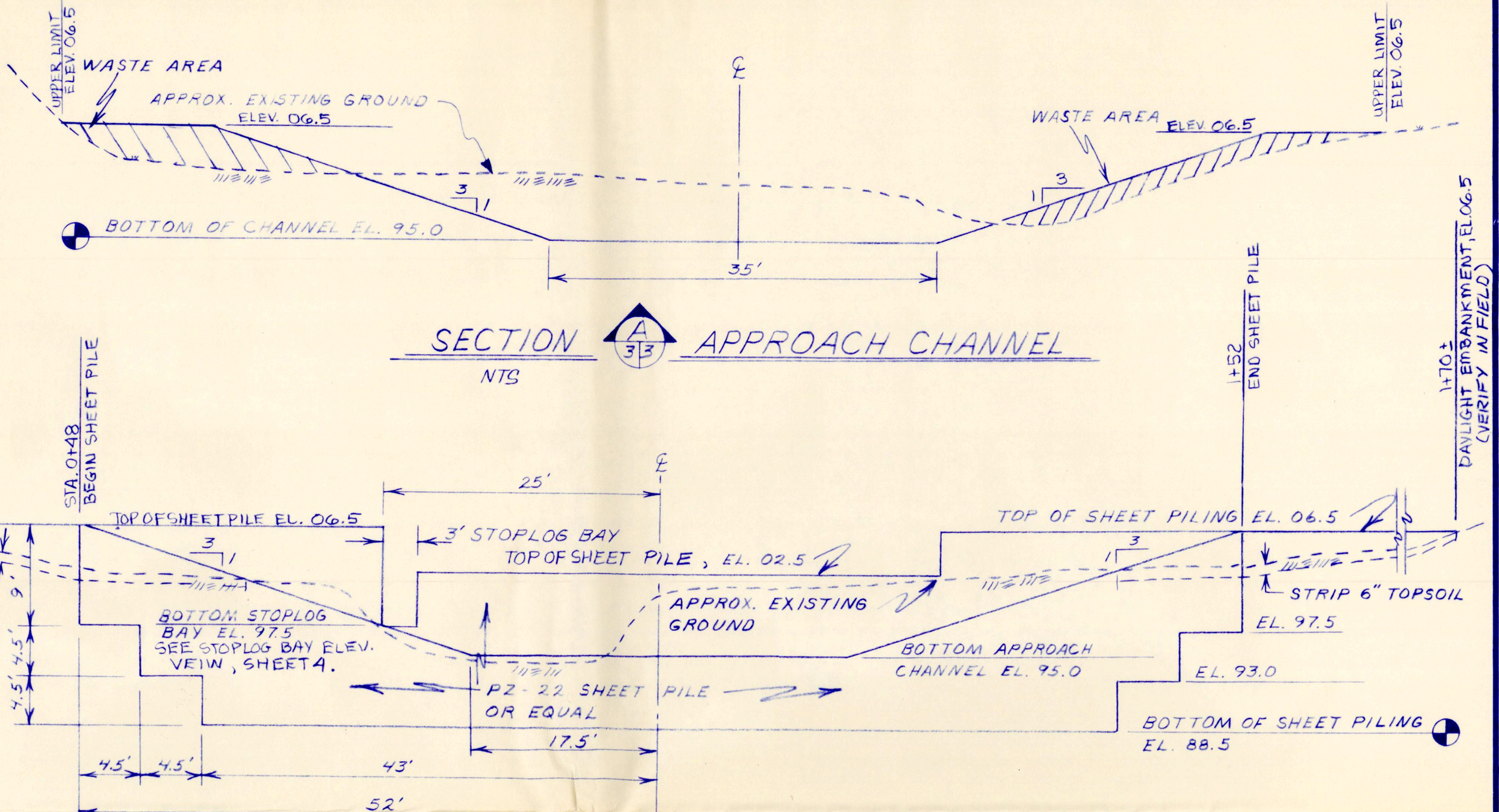
CHANNEL PROFILE, SECTION F
SCALE: 1" = 5' HORIZ., 1" = 5' VERT.



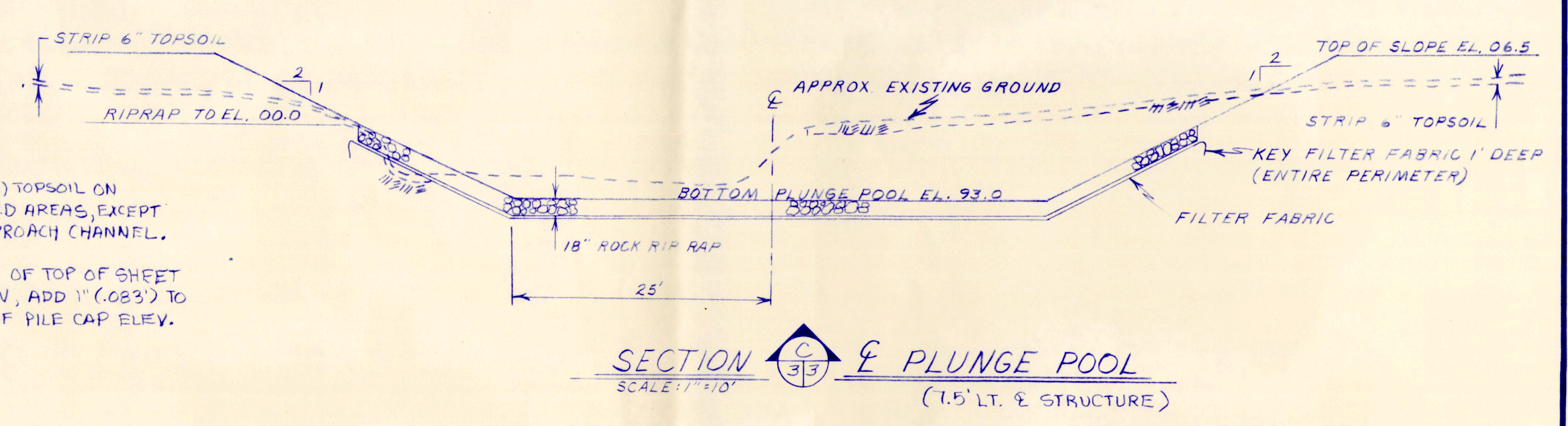
DOWNSTREAM BRACE CONNECTION
NTS



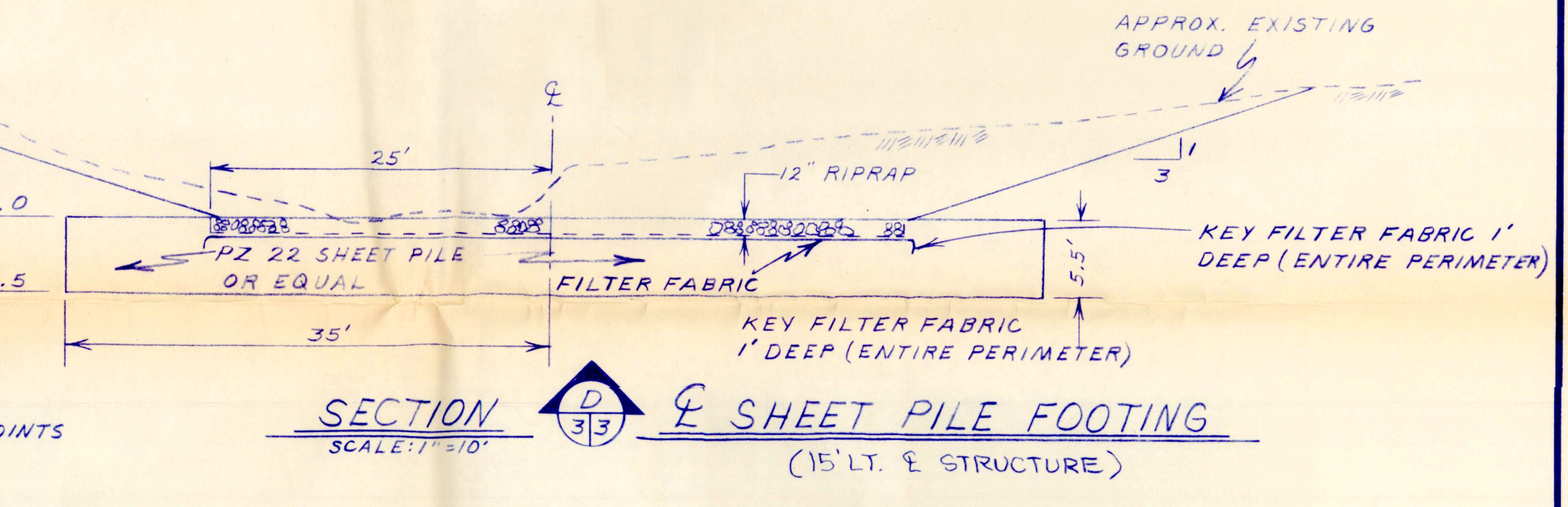
DETAIL D' PILING CAP DETAIL
NTS



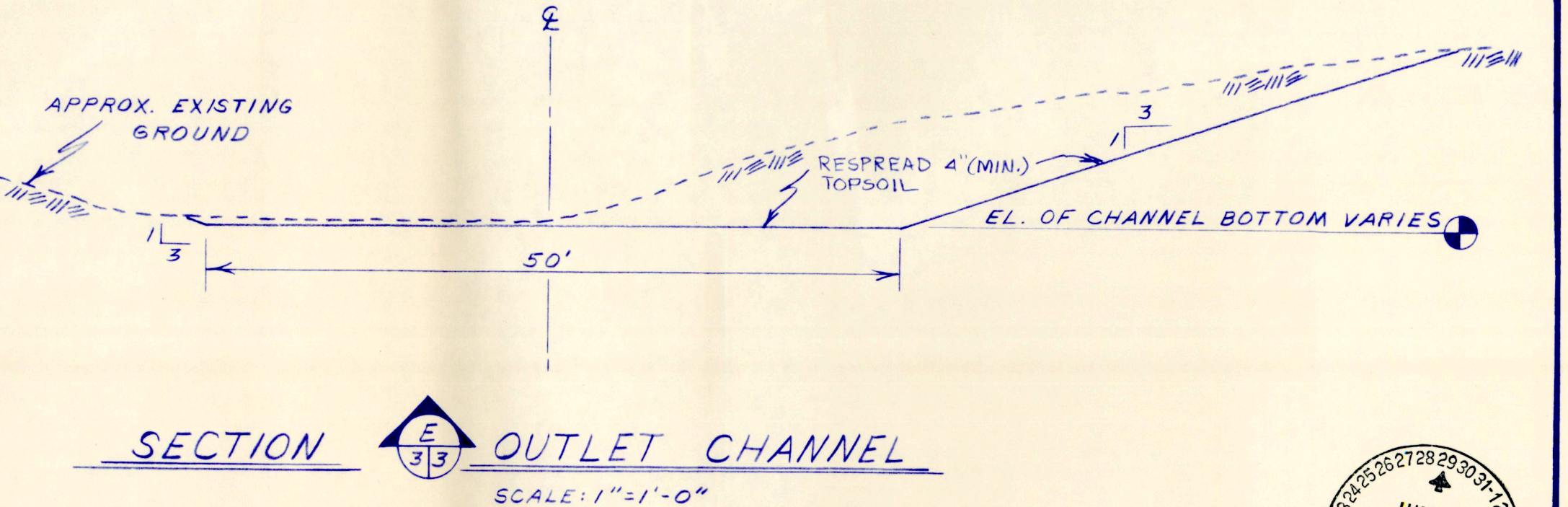
SECTION A' APPROACH CHANNEL
NTS



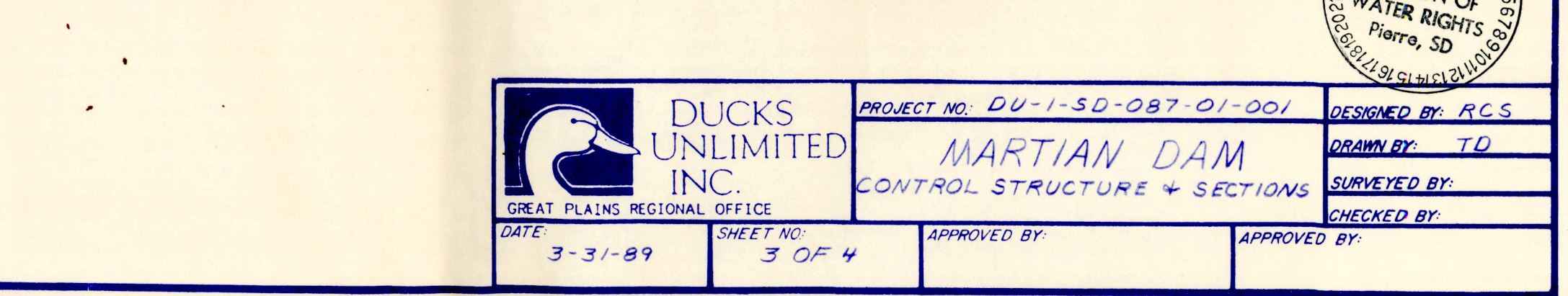
SECTION B' SHEET PILE WEIR (1.5' LT. & STRUCTURE)
SCALE: 1" = 10'-0"



SECTION C' PLUNGE POOL (1.5' LT. & STRUCTURE)
SCALE: 1" = 10'-0"



SECTION D' SHEET PILE FOOTING (15' LT. & STRUCTURE)
SCALE: 1" = 10'-0"



SECTION E' OUTLET CHANNEL
SCALE: 1" = 10'-0"

	PROJECT NO. DU-1-SD-087-01-001	DESIGNED BY: R.C.S.
	MARTIAN DAM	DRAWN BY: T.D.
GREAT PLAINS REGIONAL OFFICE	CONTROL STRUCTURE & SECTIONS	SURVEYED BY:
DATE: 3-31-89	SHEET NO. 3 OF 4	CHECKED BY:
	APPROVED BY:	APPROVED BY:

JUN 1989
DIVISION OF
WATER RIGHTS
POTTS, SD

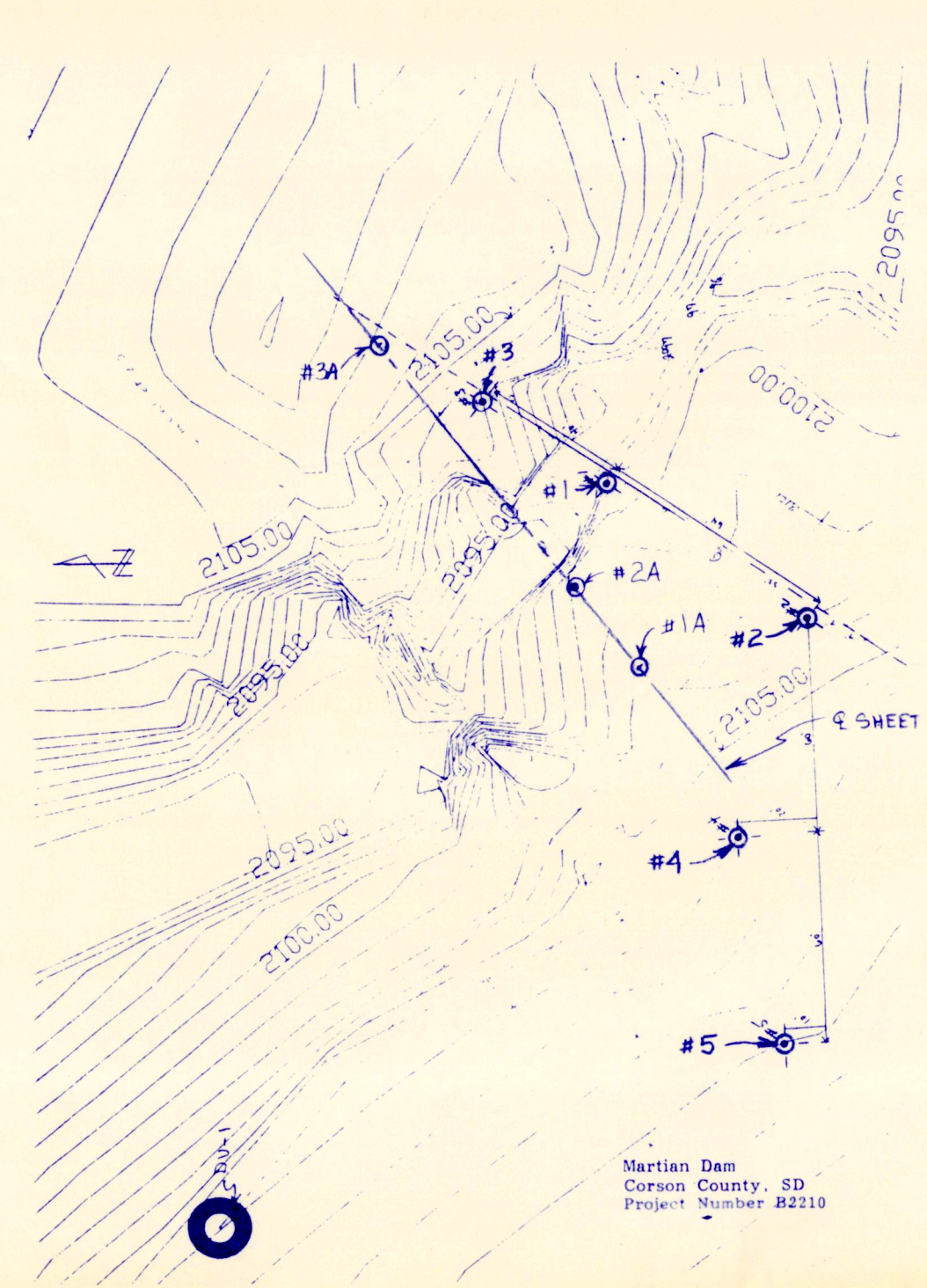
MIDWEST TESTING LABORATORY									
JOB NO. B2210 LOG OR TEST BORING NO. 1 VERTICAL SCALE 1"=3'									
PROJECT Martian Dam, Corson County, South Dakota									
DEPTH IN FEET	SOIL DESCRIPTION	SURFACE ELEV.	DEPTH IN FEET	NO.	TYPE	LABORATORY TESTS	MOISTURE	DENSITY	LL/PL
1	CLAYEY SAND-yellowish brown, fine, a few gravel inclusions (SC)	2108.1	1	SB	20				
2	CLAYEY SAND-olive yellow, fine, dense (SC)		2	SB	20				
3			3	SB	20				
4			4	SB	20				
5			5	SB	20				
6			6	SB	20				
7			7	SB	20				
8			8	SB	20				
9			9	SB	20				
10			10	SB	20				
11			11	SB	20				
12			12	SB	20				
13			13	SB	20				
14			14	SB	20				
15			15	SB	20				
16			16	SB	20				
17			17	SB	20				
18			18	SB	20				
19			19	SB	20				
20			20	SB	20				
21	END OF BORING								

MIDWEST TESTING LABORATORY									
JOB NO. B2210 LOG OR TEST BORING NO. 2 VERTICAL SCALE 1"=3'									
PROJECT Martian Dam, Corson County, South Dakota									
DEPTH IN FEET	SOIL DESCRIPTION	SURFACE ELEV.	DEPTH IN FEET	NO.	TYPE	LABORATORY TESTS	MOISTURE	DENSITY	LL/PL
1	SILTY SAND-brown, fine, dense, with sandy lean clay layers and seams (SM)	2102.0	1	SB	22				
2			2	SB	24				
3			3	SB	24				
4			4	SB	24				
5			5	SB	24				
6			6	SB	24				
7			7	SB	24				
8			8	SB	24				
9			9	SB	24				
10			10	SB	24				
11			11	SB	24				
12			12	SB	24				
13			13	SB	24				
14			14	SB	24				
15			15	SB	24				
16			16	SB	24				
17			17	SB	24				
18			18	SB	24				
19			19	SB	24				
20			20	SB	24				
21	END OF BORING								

MIDWEST TESTING LABORATORY									
JOB NO. B2210 LOG OR TEST BORING NO. 3 VERTICAL SCALE 1"=3'									
PROJECT Martian Dam, Corson County, South Dakota									
DEPTH IN FEET	SOIL DESCRIPTION	SURFACE ELEV.	DEPTH IN FEET	NO.	TYPE	LABORATORY TESTS	MOISTURE	DENSITY	LL/PL
1	SILTY SAND-brown, fine, dense, with sandy lean clay layers and seams (SM)	2102.0	1	SB	22				
2			2	SB	22				
3			3	SB	22				
4			4	SB	22				
5			5	SB	22				
6			6	SB	22				
7			7	SB	22				
8			8	SB	22				
9			9	SB	22				
10			10	SB	22				
11			11	SB	22				
12			12	SB	22				
13			13	SB	22				
14			14	SB	22				
15			15	SB	22				
16			16	SB	22				
17			17	SB	22				
18			18	SB	22				
19			19	SB	22				
20			20	SB	22				
21	END OF BORING								

MIDWEST TESTING LABORATORY									
JOB NO. B2210 LOG OR TEST BORING NO. 4 VERTICAL SCALE 1"=3'									
PROJECT Martian Dam, Corson County, South Dakota									
DEPTH IN FEET	SOIL DESCRIPTION	SURFACE ELEV.	DEPTH IN FEET	NO.	TYPE	LABORATORY TESTS	MOISTURE	DENSITY	LL/PL
1	SILTY SAND-brown, fine, medium dense (SM)	2108.1	1	SB	15				
2			2	SB	17				
3			3	SB	17				
4			4	SB	17				
5			5	SB	17				
6			6	SB	17				
7			7	SB	17				
8			8	SB	17				
9			9	SB	17				
10			10	SB	17				
11			11	SB	17				
12			12	SB	17				
13			13	SB	17				
14			14	SB	17				
15			15	SB	17				
16			16	SB	17				
17			17	SB	17				
18			18	SB	17				
19			19	SB	17				
20			20	SB	17				
21	END OF BORING								

MIDWEST TESTING LABORATORY									
JOB NO. B2210 LOG OR TEST BORING NO. 5 VERTICAL SCALE 1"=3'									
PROJECT Martian Dam, Corson County, South Dakota									
DEPTH IN FEET	SOIL DESCRIPTION	SURFACE ELEV.	DEPTH IN FEET	NO.	TYPE	LABORATORY TESTS	MOISTURE	DENSITY	LL/PL
1	SILTY SAND-brown, fine, dense (SM)	2102.0	1	SB	18				
2			2	SB	17				
3			3	SB	17				
4			4	SB	17				
5			5	SB	17				
6			6	SB	17				
7			7	SB	17				
8			8	SB	17				
9			9	SB	17				
10			10	SB	17				
11			11	SB	17				
12			12	SB	17				
13			13	SB	17				
14			14	SB	17				
15			15	SB	17				
16			16	SB	17				
17			17	SB	17				
18			18	SB	17				
19			19	SB	17				
20			20	SB	17				
21	END OF BORING								



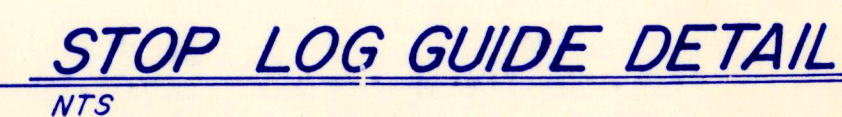
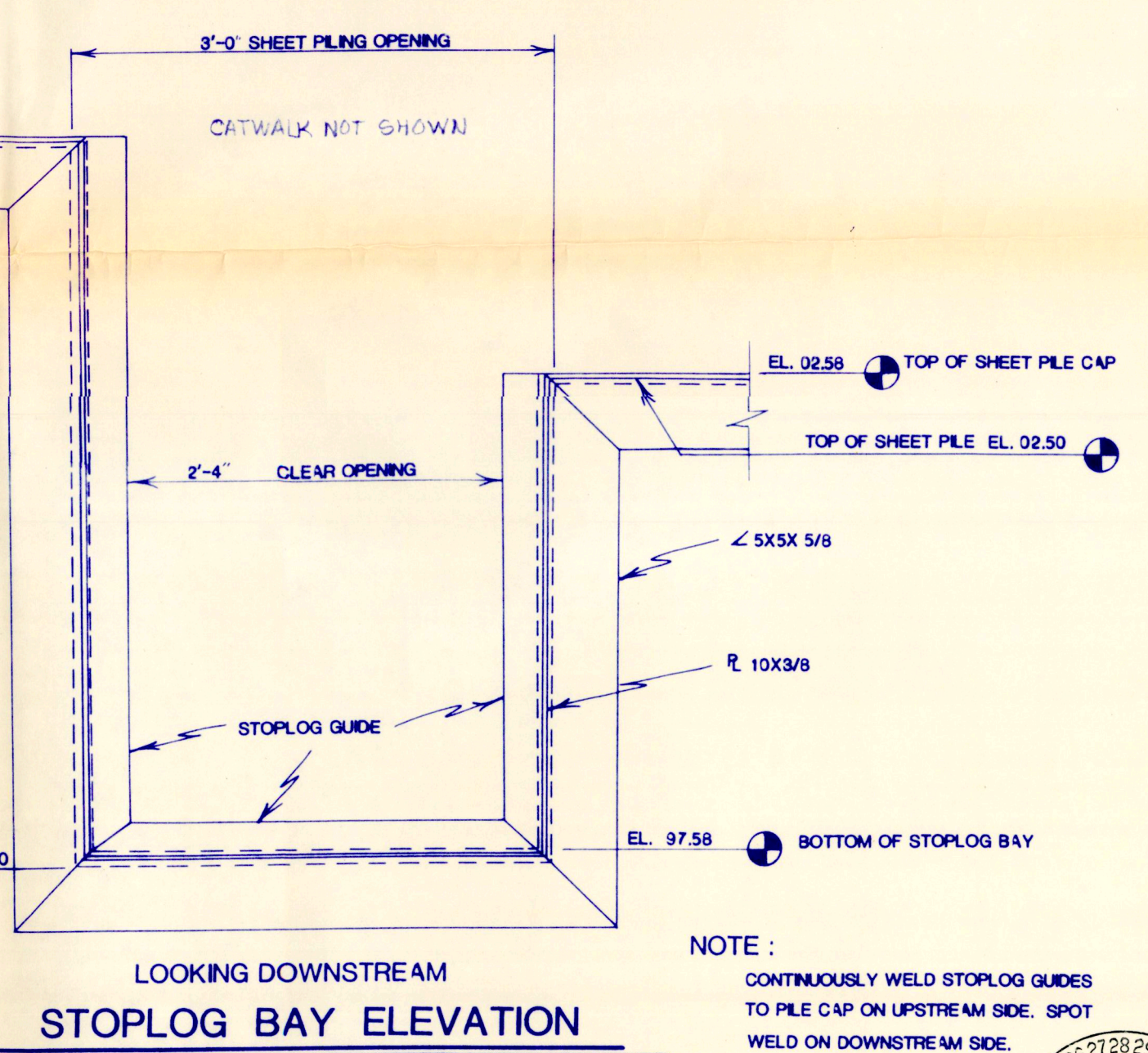
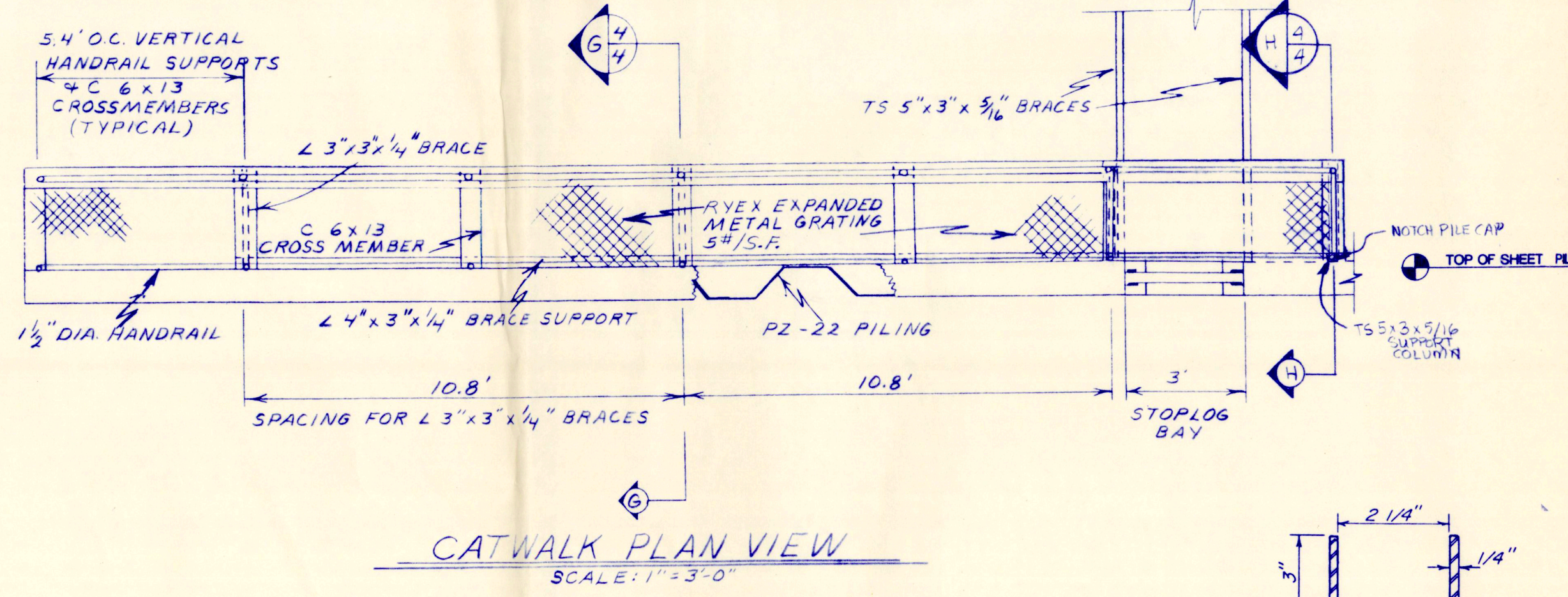
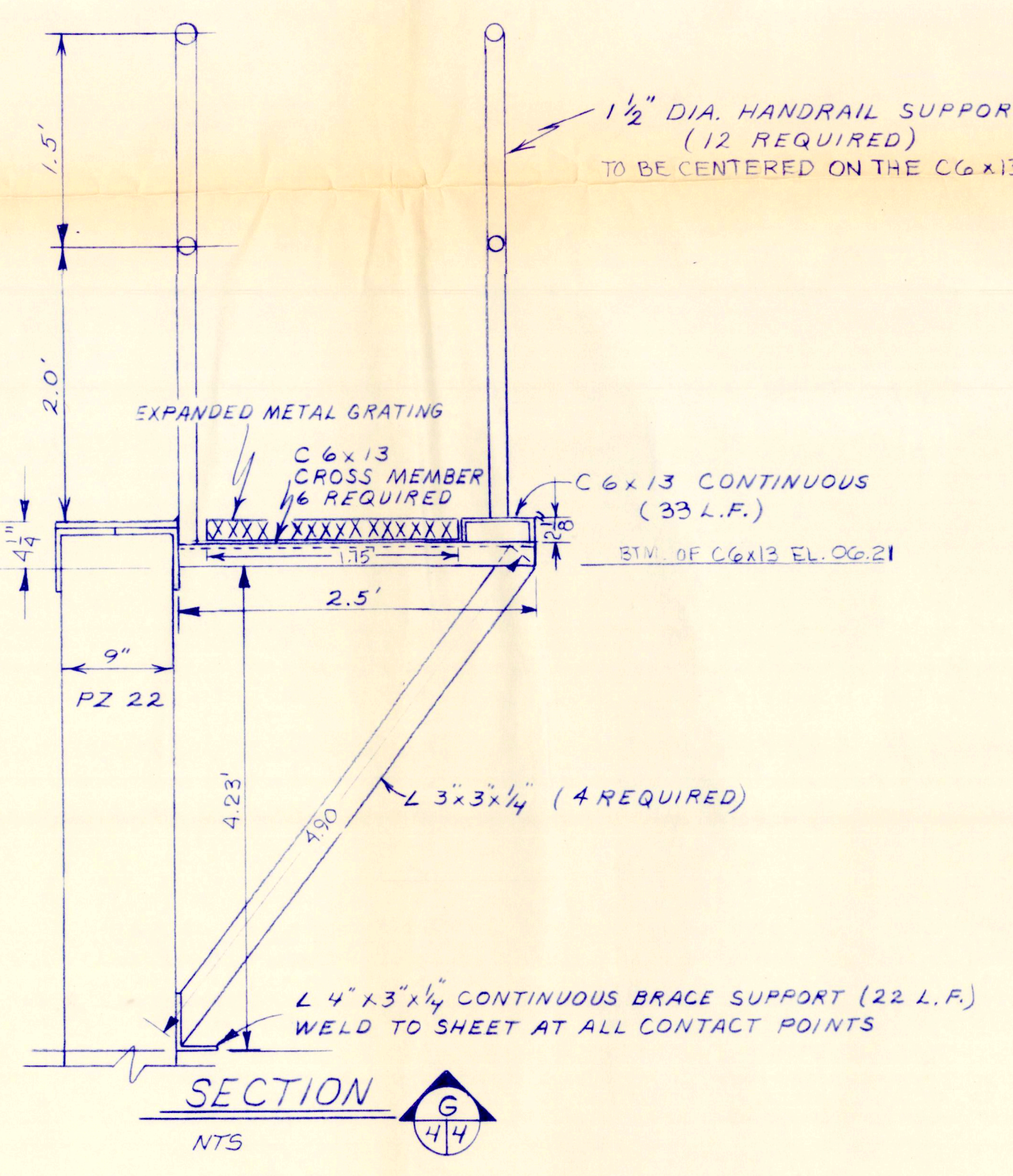
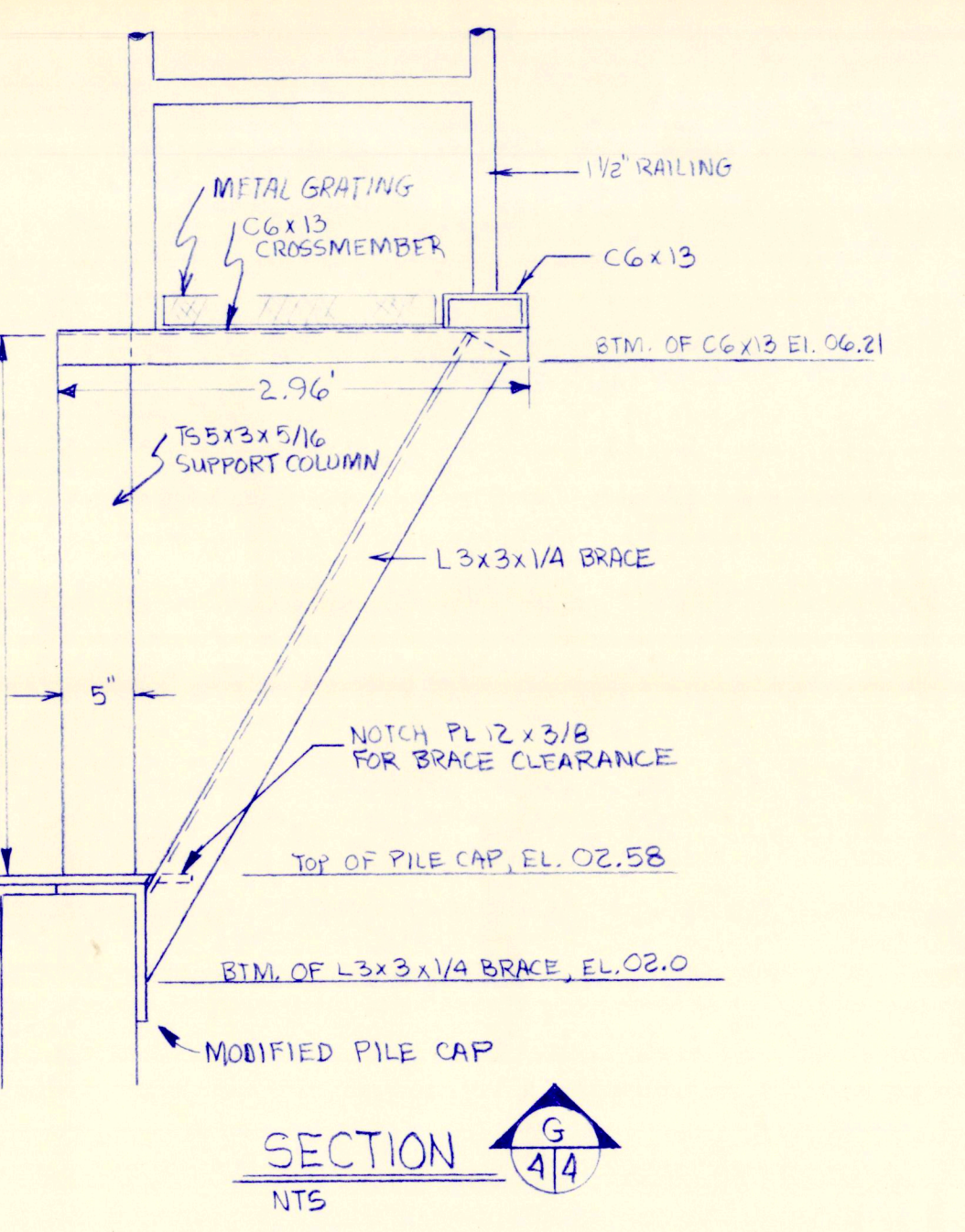
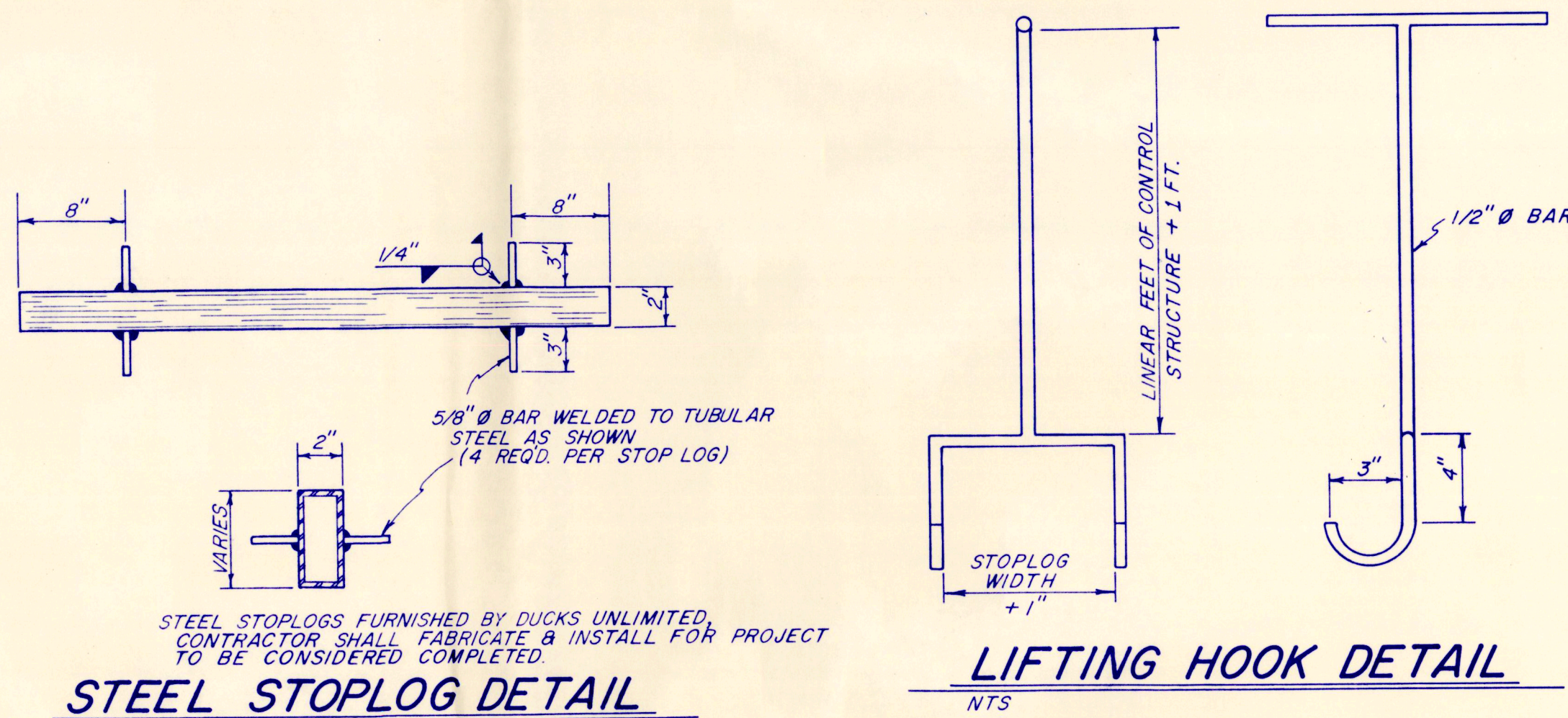
2 STA. 0+90.1, SHEET PILE WEIR LOCATION SURFACE ELEV. 2103.1 BORING NO. 1A JOB NO. B2210A CREW CHIEF: DAN									
DEPTH OF LAYER	SAMPLE NO./DEPTH	SET	1st 1/2 FT.	2nd 1/2 FT.	TOTAL	REC. IN INCH	SOIL CLASSIFICATION		
0-12'	1/0-1 1/2	AUGER					NO FROST CLAYEY SAND BROWN		
	2/2 1/2-3 1/2		10	12	18	30			
	3/5-6		13	16	24	40			
	4/7 1/2-8 1/2		9	16	21	37			
	5/10-11		10	17	19	36			
	6/12 1/2-13 1/2		14	22	23	45			
	7/15-16		12	19	24	43			

SOIL SAMPLING
The borings were advanced with three and one-quarter inch hollow stem auger, with split barrel samples obtained in accordance with ASTM D1586-67. Using this procedure, a two-inch O.D. split barrel sampler is driven by a 140 pound weight falling thirty inches. The number of blows required to drive the sampler twelve inches after a six-inch initial set is the standard penetration resistance and will be referred to as N value, an index related to the consistency of cohesive soils and the relative density of cohesionless soils.

Summary of Blow Count and Consistency	
Blow Count	Consistency
0 - 10	Loose
11 - 30	Medium
31 - 50	Dense
More than 50	Very Dense

2 STA. 0+90.1, SHEET PILE WEIR LOCATION SURFACE ELEV. 2102.1 BORING NO. 2A JOB NO. B2210A CREW CHIEF: DAN									
DEPTH OF LAYER	SAMPLE NO./DEPTH	SET	1st 1/2 FT.	2nd 1/2 FT.	TOTAL	REC. IN INCH	SOIL CLASSIFICATION		
0-2'	1/0-1 1/2		8	6	8	14	CLAYEY SAND		
2'-3'	2/2 1/2-3 1/2		NO BLOWS TAKEN				SANDSTONE		
3'-10'	3/5-6		12	7	12	19	CLAYEY SAND BROWN		
	4/7 1/2-8 1/2		14	20	26	46			
	5/10-11		12	20	22	42	" GREY		
	6/12 1/2-13 1/2		14	16	23	39			
	7/15-16		13	20	23	43			

2 STA. 1+50.1, SHEET PILE WEIR LOCATION SURFACE ELEV. 2107.1 BORING NO. 3A JOB NO. B2210A CREW CHIEF: DAN									
DEPTH OF LAYER	SAMPLE NO./DEPTH	SET	1st 1/2 FT.	2nd 1/2 FT.	TOTAL	REC. IN INCH	SOIL CLASSIFICATION		
0-9 1/2'	1/0-1 1/2		3	7	10	17	SILTY SAND		
	2/2 1/2-3 1/2		5	5	5	10	" SMALL ROCKS @ 4'		
	3/5-6		9	14	18	32	" THIN LAYER (2) SANDSTONE @ 8 1/2'		
	4/7 1/2-8 1/2		13	23	34	57	CLAYEY SAND BROWN		
	5/10-11		11	15	21	36			
	6/12 1/2-13 1/2		11	18	25	43			
	7/15-16		13	23	27	50	" GREY		
	8/17-18		13	23	27	50	SANDSTONE @ 17' - REFUSAL		



DUCKS UNLIMITED INC.		PROJECT NO. DU-1-50-087-01-001		DESIGNED BY: MCS	
GREAT PLAINS REGIONAL OFFICE		MARTIAN DAM		DRAWN BY: TD	
DIVISION OF					