

WATER PERMIT NO. 6014-3

Name of Applicant: **Loren Paulsen**

Address: **Rt 1 Box 50, Flandreau SD 57028**

Phone: **605 997-3379**

Amount of Water Claimed: **32 AF storage capacity**

Total Acres: **NA**

Source of Water Supply: **runoff**

Water to be used for: **fish & wildlife propagation and livestock watering** County: **Moody**

Type of Waste Disposal System: **NA**

Location: **5 miles northeast of Flandreau**

PRIORITY Date Received: **7-21-97**

Fee: **\$150.00**

Corrected Application Received: **7-29-97**

Period of Annual Use: **January 1 - December 31**

Remarks:

Diversion Point: **S 1/2 SE 1/4 Sec 31-T108N-R47W**

Water Impounded: **S 1/2 SE 1/4, NE 1/4 SE 1/4**
Sec 31-T108N-R47W

Depth of Well: **NA**

Well Driller: **NA**

Remarks:

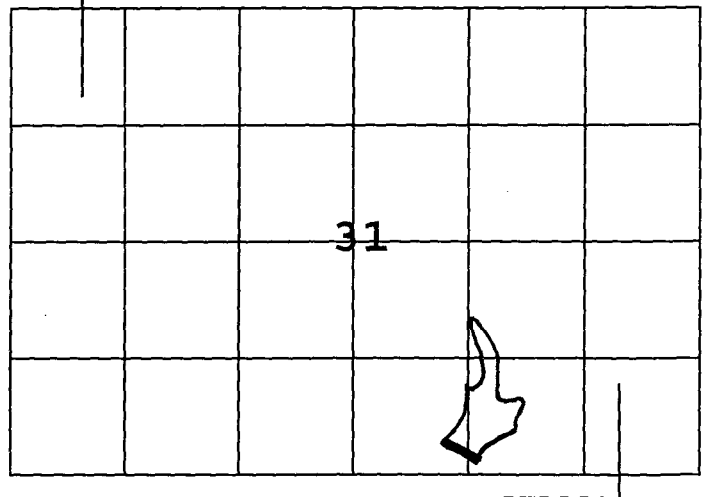
Type of Map: **topographic**

Prepared by: **Douglas Lipetzky**

Reviewed and the Number Assigned on: **7-30-97**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



**SOUTH DAKOTA
WATER PERMIT NO. 6014-3**

Date of first receipt of application July 21, 1997.

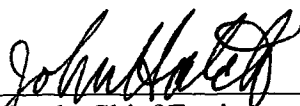
The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 6014-3 to Loren Paulsen, Rt 1, Box 50, Flandreau SD 57028 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 6014-3 authorizes impoundment of 32 acre-feet of water from runoff by constructing a dam located in the S 1/2 SE 1/4 Section 31 with water impounded in the S 1/2 SE 1/4, NE 1/4 SE 1/4 Section 31; all in T108N-R47W. This permit authorizes impoundment of water sufficient to maintain water at the outlet elevation of 1650.0 feet mean sea level.
2. The water appropriated shall be used for the purpose of supplying water for fish & wildlife propagation and livestock watering and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1- December 31.
4. The date of approval of Permit No. 6014-3 is September 19, 1997.
5. The date from which applicant may claim right is July 21, 1997.
6. One-fifth of the construction is to be completed on or before March 19, 2000.
7. All construction is to be completed on or before September 19, 2002.
8. Water is to be put to beneficial use on or before September 19, 2006.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. Water Permit No. 6014-3 authorizes a dam with a storage capacity of 32 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation of 1650.0 feet mean sea level.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

WATER MANAGEMENT BOARD

By: 
John Hatch, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

SEP 24 1997

date



523 E. Capitol
Pierre, SD 57501
(605) 773-3352No. 6014-3 Hydrologic Unit 10110203
Map No. _____ Basin Sioux River
Newspaper Moody Co. Enterprise, Flandreau, SD**Application For Permit To Appropriate Water Within The State Of South Dakota**

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

Type of Application: Check one or more of the following

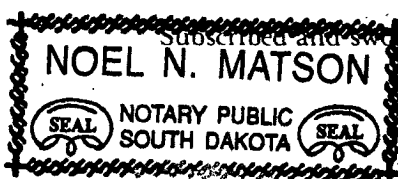
New ☒ Vested Right ☐ Future Use ☐ Change Use ☐
☐ Amend Permit No. _____ with old priority date retained
 Change diversion point(s) ☐ Add diversion point(s) ☐ Other ☐ _____
☐ Application to: Change diversion point(s) ☐ Add diversion point(s) ☐ on Permit No. _____
☐ Construction to use water reserved by Future Use Permit No. _____

1. Name of Applicant Loren Paulsen Phone No. (605) 997-3379Post Office Address Rt. 1 Box 50, Flandreau State South Dakota 57028
(Street, RR or Box) (City) Zip Code2. Amount of water claimed (c.f.s.) 32 acre-feet at primary spillway elevation 1650.03. Source of water supply 2,753 acres of watershed around the pond4. Location of point of diversion S1/2SE1/4 of Section 31, T. 108 N., R. 47 W., 5th P.M.Water Impounded: S1/2 SE 1/4, NE 1/4 SE 1/4 Sec. 31 - T108N - R47WCounty Moody5. Counties where water will be used Moody county6. Annual period during which water is to be used January 1 thru December 31

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

The U.S. Fish and Wildlife Service and Duck Unlimited Inc. have a 30 year agreement to inundate a natural drainage to be used by livestock and wildlife.

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

STATE OF SOUTH DAKOTA
County of Moody)^{ss}I, Loren Paulsen, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.Signed Loren PaulsenSubscribed and sworn to before me this 16th day of July 19 97Notary PublicMy commission expires 2-23-2001

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.
Great Plains Regional Office
3502 Franklin AVE
Bismark, ND 58501

b) Freeboard 5.0 feet

c) Crest Width 12 feet

Crest Length 563 feet

d) Height 13 feet

e) Primary Outlet Capacity 387 CFS
 If Pipe, diameter 2: 84" CMP risers

f) Secondary Spillway Capacity 732 CFS
 Spillway width 100 feet

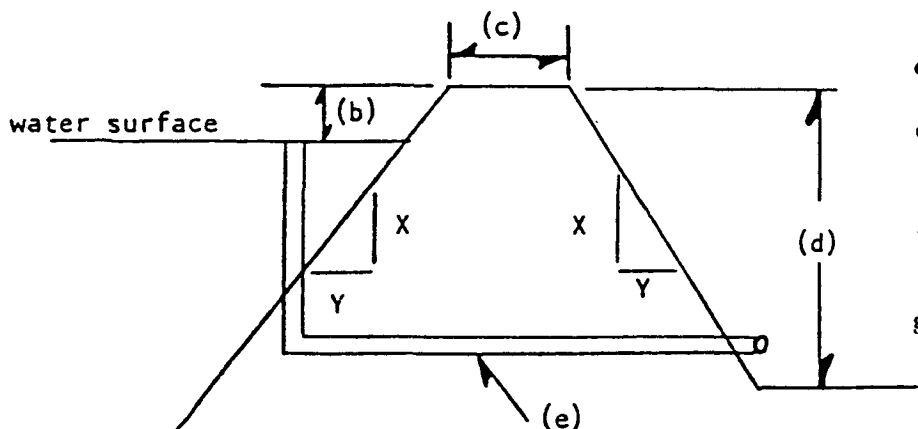
g) X & Y Slope
 Upstream 3:1

Downstream 3:1

Surface Area of Impoundment 13.0

Storage 32.0 acre feet

Drainage area above dam 2,753 acres



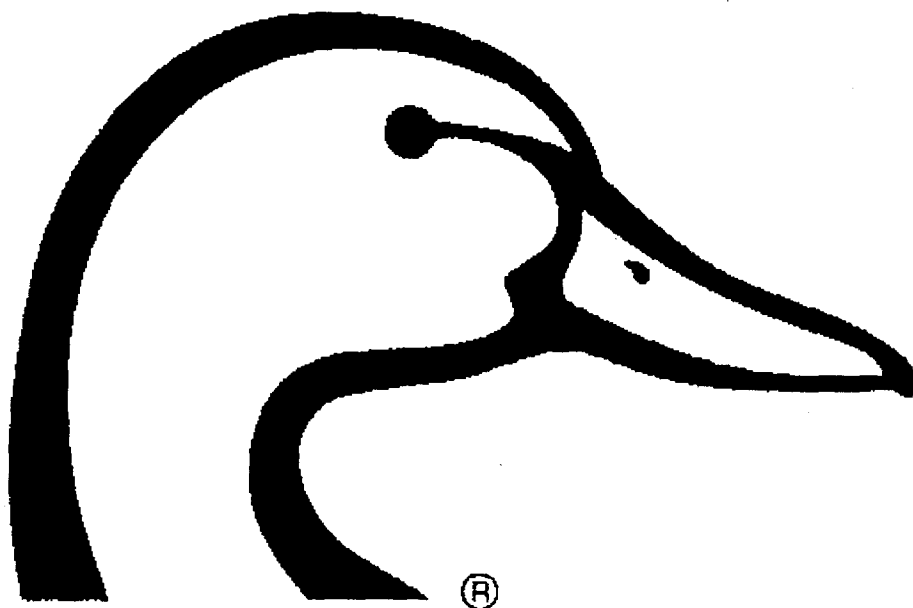
Signature of Applicant

DESIGN REPORT

for

LOREN PAULSON WETLAND PROJECT

SD-0206-001



November 12, 1996

Prepared by:
Ducks Unlimited, Inc.

PROJECT: LOREN PAULSON WETLAND
SD-0206-001

LOCATION: Section 31, T 108 N, R 47 W
4 miles east, 4 miles north of Flandreau
Moody County, South Dakota

MARSH DATA: Full Service Level (FSL) @ 1650.0
13.0 Surface Acres @ FSL
32.0' Acre-Feet Capacity @ FSL

Emergency Spillway Crest @ 1653.0
24.8 Surface Acres @ E.S. Crest
86.4 Acre-Feet Capacity @ E.S. Crest

Top of Compacted Embankment @ 1655.0
38.8 Surface Acres @ Top of Dam
150.9 Acre-Feet Capacity @ Top of Dam

PROJECT DESCRIPTION:

The project as proposed involves the construction of a small dam located on private land owned and managed by Mr. Loren Paulson. The dam will create a 13-acre wetland located entirely on Mr. Paulson's land. The proposed embankment is located near the headwaters of a drainage known as Mud Creek. Mud Creek discharges into the Big Sioux River approximately 4-5 miles downstream from the project site. The contributing watershed consists of approximately 2,753 acres or 4.30 square miles.

PRELIMINARY RISK ASSESSMENT:

The project site is located in a rural area of Moody County. No residences or other buildings are located in the way of danger immediately downstream adjacent to the outlet channel. Upon leaving the outlet structure, flows will follow the natural drainage channel which parallels a graveled-section line road for about 500 feet prior to passing through a 4' x 8' reinforced concrete box culvert in the road. Flows then continue in the creek channel through private land, intersecting three more section line roads before entering the Big Sioux River northeast of Flandreau.

Based on information obtained in the field, data present on the U.S.G.S. quadrangular maps, and the relative small size and capacity of the created marsh, the general public would be in no danger in the unlikely event of a dam failure. No loss of life and minimal or no economic loss would be expected. Therefore, per the classification criteria outlined in Chapter 74:02:08 "Safety of Dams," it is recommended that the proposed dam be classified as a low hazard, small, Category 3 dam.

The product of the intermediate storage capacity (86.4 acre-feet) times the effective height (10.5 feet) is 907 which is less than 3000. Therefore, the minimum spillway design flood is a 25-year frequency per 74:02:08:07.01 and must be passed through the spillway without overtopping the embankment.

DESIGN:

As designed, the primary spillway will pass flows in excess of those produced by a 25-year, 24-hour rainfall without using the emergency spillway. In addition, the primary and emergency spillways will pass flows in excess of those produced by a 100-year, 24-hour rainfall event without overtopping the embankment.

Dual 84" diameter CMP overflow risers connected in series with a 72" diameter CMP outlet barrel is proposed as the primary spillway. The structure will have removable stoplogs to provide variable control and drawdown capability to elevation 1645.0. The riser overflow crest elevation or full service level (FSL) is proposed at elevation 1650.0. As noted, a 100-foot wide emergency spillway with the level crest at elevation 1653.0 will assist in passing high flows.

Regression equations provided in *Techniques for Estimating Flood Peaks, Volumes, and Hydrographs on Small Streams in South Dakota*¹ were used to develop flood peaks for design purposes. The Natural Resource Conservation Service (NRCS, formerly SCS) TR-20 Hydrology program was then calibrated by adjusting the time of concentration to produce a peak inflow for the various design events similar to

¹Becker, Lawrence D., U.S. Geological Survey, Water Resources Investigations 80-80, September 1980.

those determined using the regression equations. The calibrated TR-20 model was then used to determine the discharge at various reservoir stages with respect to time. The program uses accepted procedures to develop inflow and outflow hydrographs. The primary spillway capacity was calculated by comparing discharges developed by the weir flow formula and formulas for calculating head loss through corrugated metal pipe. The emergency spillway capacity was calculated using Technical Release No. 39 *Hydraulics of Broad-Crested Spillways* developed by the NRCS. A total discharge curve for the proposed dam is attached.

The following is a relationship between peak inflows, corresponding outflows, and reservoir elevations using the previously-mentioned methods of analysis:

<u>EVENT</u>	<u>PEAK INFLOWS</u>	<u>MAXIMUM WATER SURFACE ELEVATION</u>	<u>FREEBOARD AVAILABLE</u>	<u>TOTAL DISCHARGE</u>
5 YR	138 CFS	1650.96	4.04 FT	137 CFS
10 YR	242 CFS	1651.45	3.55 FT	241 CFS
25 YR	415 CFS	1652.42	2.58 FT	387 CFS
50 YR	589 CFS	1653.97	1.03 FT	539 CFS
100 YR	795 CFS	1654.54	0.46 FT	732 CFS

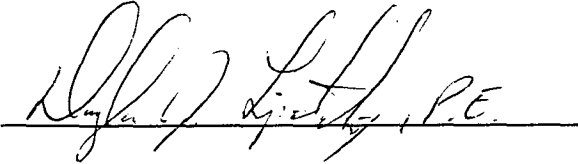
Primary Spillway (Riser) Crest Elevation . . @ 1650.0
 100' Wide Emergency Spillway Crest @ 1653.0
 Top of Compacted Embankment Elevation. . . . @ 1655.0

As indicated by the results in the previous table, the project will easily comply with State dam safety rules passing the 25-year, 24-hour rainfall event without overtopping the embankments. In addition to providing excellent waterfowl and other wildlife habitat, the basin will provide some water quality and flood storage benefits as well.

Construction plans have been drafted outlining project specifics. A set of standard construction specifications has previously been submitted to the Division of Water Rights.

Submitted By:

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

A handwritten signature in cursive script, reading "Douglas J. Lipetzky, P.E.", is written over a horizontal line.

Douglas J. Lipetzky, P.E.
PE-4499

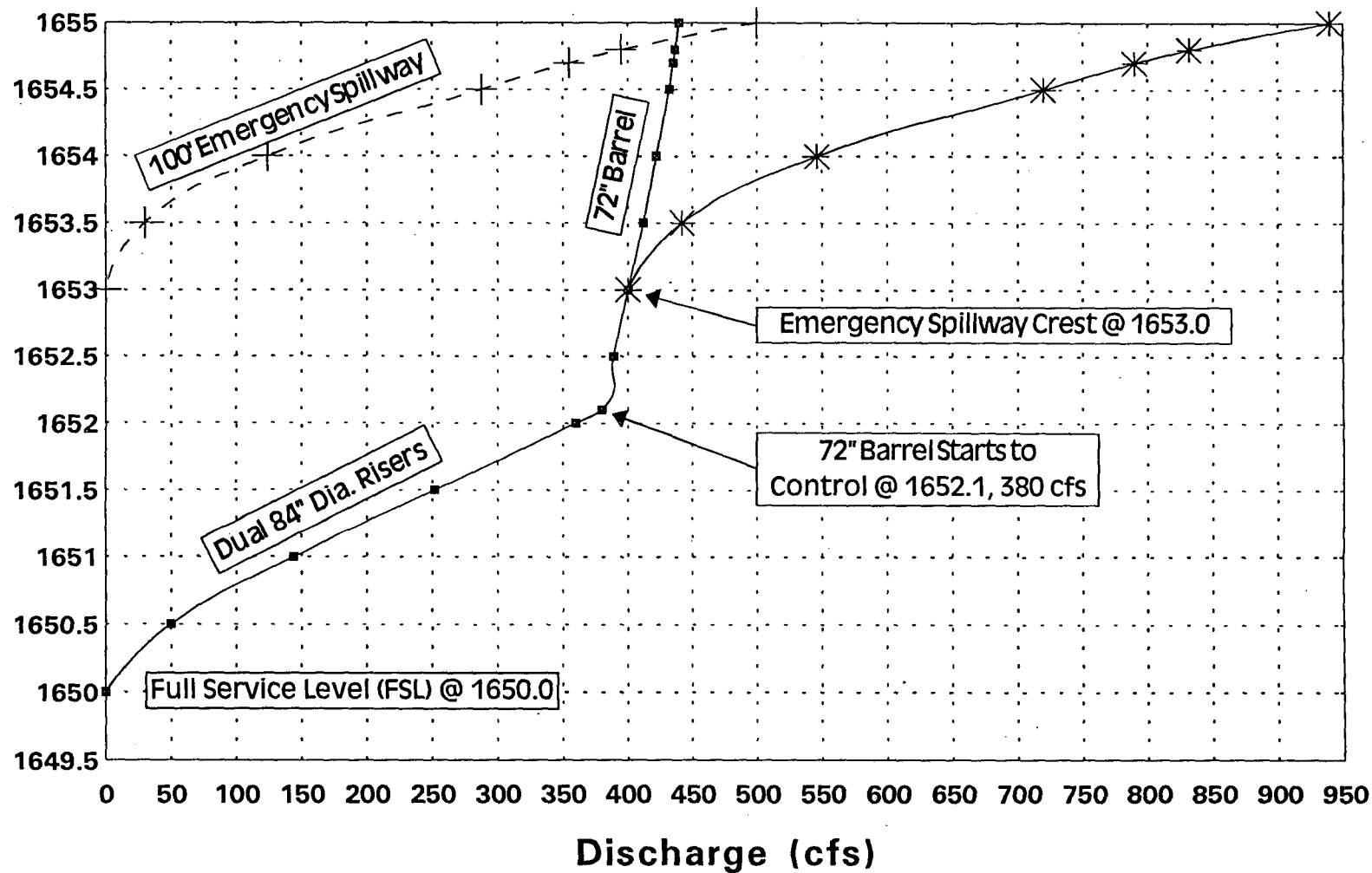
November 12, 1996

Date

LOREN PAULSON WETLAND

Discharge Curve

Elevation



■ 2-84\" Risers/72\" Bar. + 100' Emerg. Spillway * Primary & Emergency

Water Permit Application No. 6014-3
Loren Paulsen

Top of Dam Elev. - 1655
2nd Spillway Elev. - 1653
P. Spillway Elev. - 1650
Emb. Toe Elev. - 1642

Emb. Height 13 ft.

Cat. 3 - Low Hazard Dam

Normal Storage Capacity - 32 Ac.-Ft.
Int. Storage Capacity - 86.4
Max. Storage Capacity - 150.9

Int. Storage Capacity x Eff Ht. = $86.4 \times 10.5 = 907 < 3000 \therefore$ Minimum
Spillway Design = 25 year frequency Event

Drainage Area - 2753 Ac = 4.30 mi.²
Slope - 3.5 ft/mile
SI - 3.33

From USGS - WRI 80-80 "Tech. for Estimating Flood Peaks ... in SD"

$$Q_{25} = 83.4 A^{.6} S^{.46} S_i^{-.72}$$

$$= 83.4 (4.30)^{.6} (3.5)^{.46} (3.33)^{-.72}$$

$$= 83.4 (2.39) (4.78) (0.42)$$

$$= \underline{402 \text{ cfs}}$$

$$Q_{100} = 132 A^{.65} S^{.46} S_i^{-.67}$$

$$= 132 (4.30)^{.65} (3.5)^{.46} (3.33)^{-.67}$$

$$= 132 (2.58) (5.13) (0.45)$$

$$= \underline{786 \text{ cfs}}$$

Primary Spillway - 2-84" CMP Riser w/ 72" Barrel, Capacity = 387 cfs
2nd Spillway - 100' wide Earthen w/ 2' head, Capacity = 732 cfs

Ducks Unlimited uses the NRCS - TR20 model to route Q_{25} peak = 415 cfs thru the primary spillway with 2.58 ft of freeboard available and the Q_{100} peak = 795 cfs thru both spillways with 0.46 ft. of freeboard available.

Section 74:02:08

1. Topo Map - OK
2. Dam Axis Profile - OK
3. Dam X-sec. - OK
4. Area-Capacity - OK
5. Outlet Details - OK
6. Discharge Capacity - OK
7. Spillway Details - OK
8. Specs. - Std. - OK
9. EPP - Cat. 3 - N/A

NRCS Annual Yield

$$DA = 2753 \text{ Ac}$$

$$CN = 75$$

$$\text{Iso gram} = 2\frac{1}{2}$$

$$10\% \text{ chance} = \frac{2.2}{1.8} \times \frac{2753}{12}$$

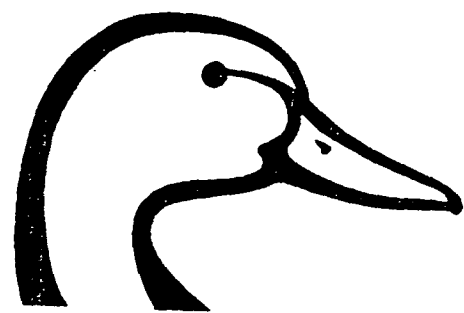
$$= \frac{505}{413} \text{ Ac.-Ft.}$$

$$50\% \text{ chance} = 0.46 \times \frac{2753}{12}$$

$$= 106 \text{ Ac.-Ft.}$$

$$80\% \text{ chance} = 0.17 \times \frac{2753}{12}$$

$$= 40 \text{ Ac.-Ft.}$$



DUCKS UNLIMITED

SPECIFICATIONS

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PLAN, PROFILE, & SECTIONS
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- 6 SOIL INFORMATION (WHEN AVAILABLE)

ESTIMATED QUANTITIES

MOBILIZATION	1 L.S.
SITE PREPARATION	742 CY-P
EMBANKMENT CONSTRUCTION	9065 C.Y.-S*
WATER	10 M-GAL.**
WATER CONTROL STRUCTURE INSTALLATION	1 EA.
WATER CONTROL STRUCTURE AND CULVERT APPURTENANCES	INC.
CULVERT INSTALLATION	
72"Ø CMP	71 L.F.
6"Ø PVC (SCHEDULE 40 PRESSURE PIPE)	18 L.F.
RIPRAP PLACEMENT (CLASS II)	86 C.Y.-P

* EMBANKMENT QUANTITY INCLUDES 15% FOR SHRINKAGE
** WATER QUANTITY IS BASED ON 1 GAL./CY; HOWEVER,
ONLY ACTUAL QUANTITY USED WILL BE PAID FOR.

DUCKS UNLIMITED

PROJECT

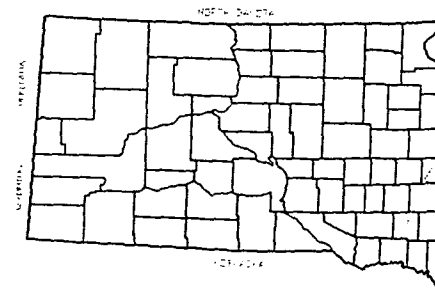
LOREN PAULSON WETLAND SECTION 31, TOWNSHIP 108 NORTH, RANGE 47 WEST MOODY COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

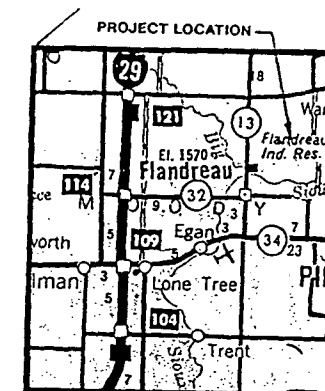
UNITED STATES FISH & WILDLIFE SERVICE

AND

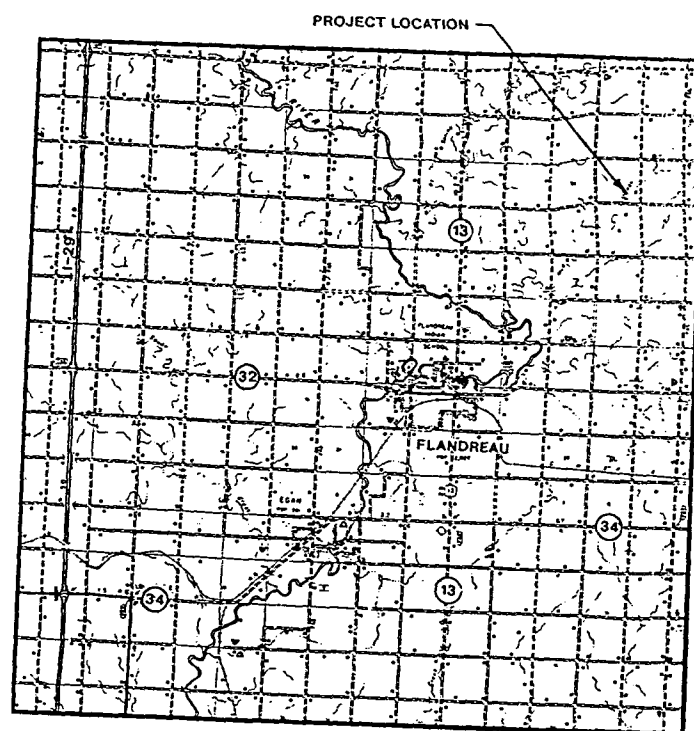
SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS



SOUTH DAKOTA



MOODY COUNTY



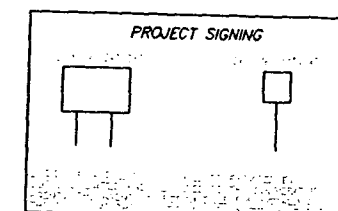
LOCATION MAP



VICINITY MAP

PROJECT SITE

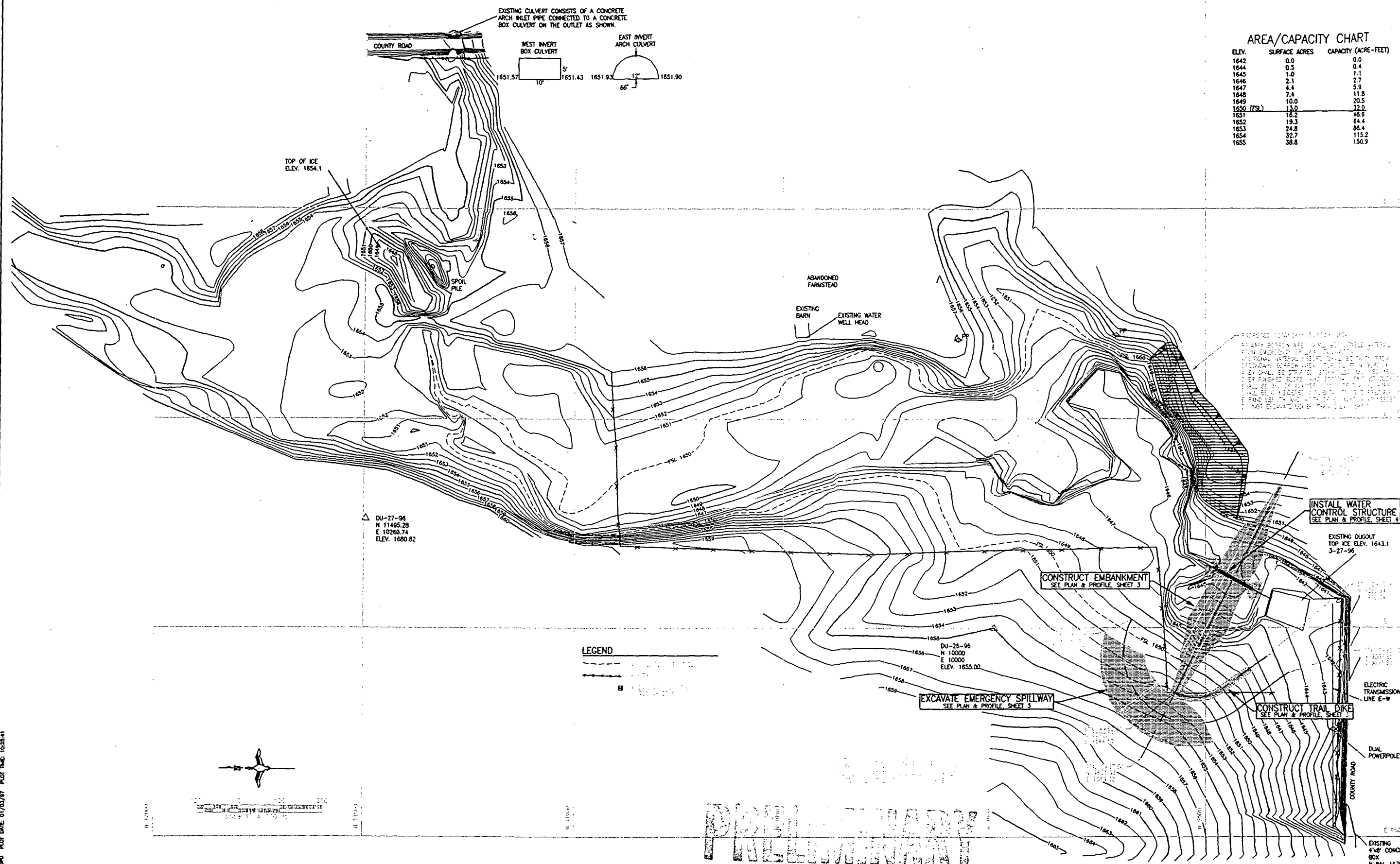
PRELIMINARY



PROJECT SIGNING

	LOREN PAULSON WETLAND	

ELEV.	SURFACE ACRES	CAPACITY (ACRE-Feet)
1642	0.0	0.0
1644	0.3	0.4
1645	1.0	1.1
1646	2.1	2.7
1647	4.4	5.9
1648	7.4	11.8
1649	10.0	20.5
1650 (FS)	13.0	32.0
1651	16.2	46.8
1652	19.3	64.4
1653	24.8	86.4
1654	32.7	115.2
1655	38.8	150.9



PROJECT TOPOGRAPHY
SCALE: 1"=100'

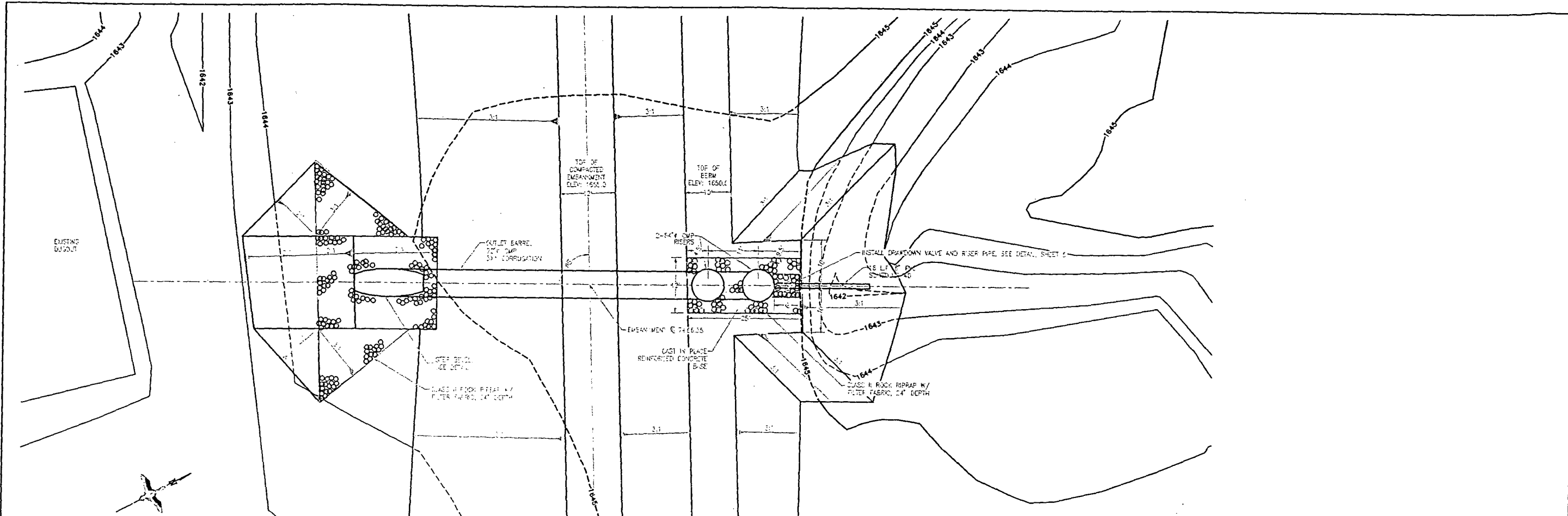
VERTICAL CONTROL:
ESTABLISHED WITH TRIGONOMETRIC LEVELS FROM THE 7 1/2 MINUTE
USGS TOPO MAP QUAD SPOT ELEVATION OF 1678 AT THE SE CORNER
OF SECTION 31.
HORIZONTAL CONTROL:
LOCAL DU COORDINATES WITH REFERENCE TO ASTRONOMICAL NORTH
THROUGH A SOLAR OBSERVATION ON MARCH 27, 1996.

TOMLIN ENGINEERING COMPANY
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
P.O. BOX 1000, WILSON, NORTH DAKOTA 58050

DUCKS
UNLIMITED
INC.

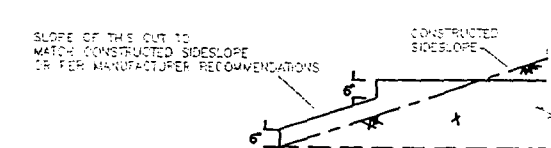
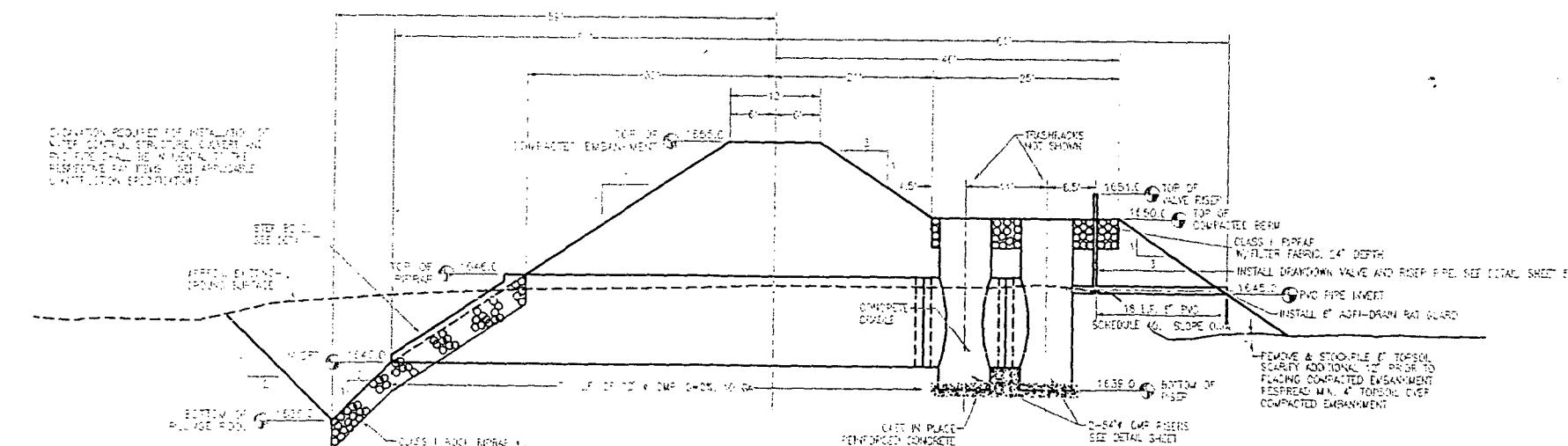
PROJECT NO. 30-0000-001
LOFEN PALUDOSITY WETLAND
PREFLIMINARY TOPOGRAPHY
SHEET NO. 2 OF 4
DATE: 10-23-96
APPROVED BY: [Signature]
DESIGNED BY: [Signature]

DRAWING: C:\7244\7244T000 PLOT DATE: 01/03/97 PLOT TIME: 10:25:41



1642.0	1643.0	1644.0	1645.0	1646.0	1647.0	1648.0	1649.0	1650.0	1651.0	1652.0	1653.0	1654.0	1655.0	1656.0	1657.0	1658.0	1659.0	1660.0	1661.0	1662.0	1663.0	1664.0	1665.0	1666.0	1667.0	1668.0	1669.0	1670.0	1671.0	1672.0	1673.0	1674.0	1675.0	1676.0	1677.0	1678.0	1679.0	1680.0	1681.0	1682.0	1683.0	1684.0	1685.0	1686.0	1687.0	1688.0	1689.0	1690.0	1691.0	1692.0	1693.0	1694.0	1695.0	1696.0	1697.0	1698.0	1699.0	1700.0
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NOTE TO SUBCUT:
CONFIRM ELEVATION OF 2:1 BACK SLOPE IN PLUNGE POOL
IS AT OR LESS THAN 1642.0
GRADE OUTLET CHANNEL @ 1642.0 OR SLOPE TO DRAINAGE
IF REQUIRED.



WATER CONTROL STRUCTURE
PLAN & PROFILE
SCALE: 1"=3' VERT
1"=10' HORIZ

PRELIMINARY

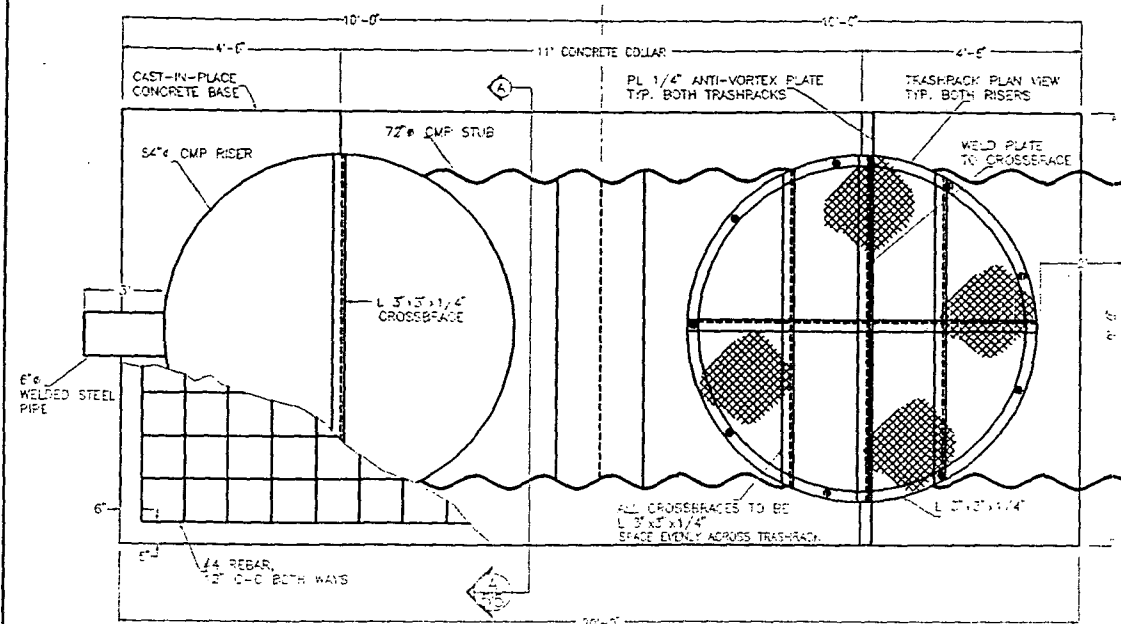
DUCKS UNLIMITED INC.
LOREN PAULSON METLAND
STRUCTURE PLAN & DETAILS

DATE: 12/23/96 SHEET NO: 4 OF 6

APPROVED BY: [Signature]

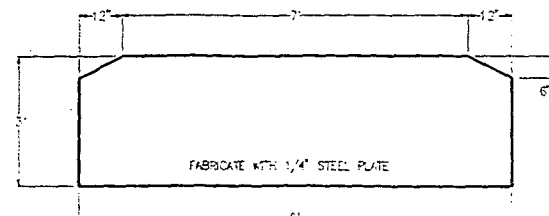
APPROVED BY: [Signature]

DRAWING 7244-CTR, PLOT DATE: 01/03/97 PLOT TIME: 10:45:40



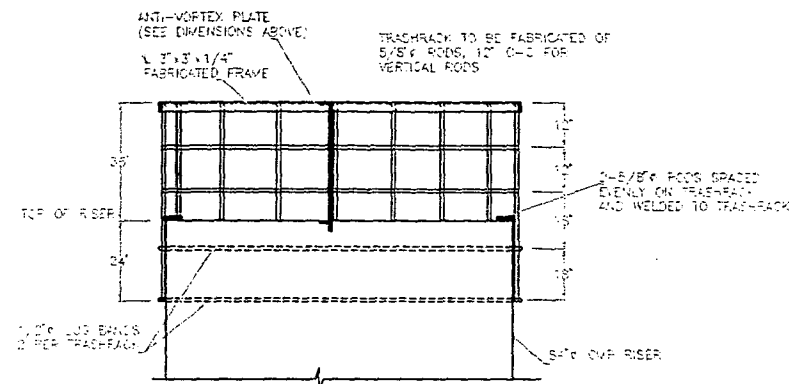
WATER CONTROL STRUCTURE PLAN

NOT TO SCALE



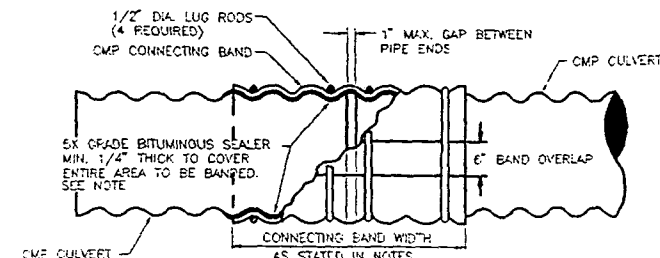
ANTI-VORTEX PLATE DETAIL

NOT TO SCALE



TRASHRACK DETAIL

NOT TO SCALE

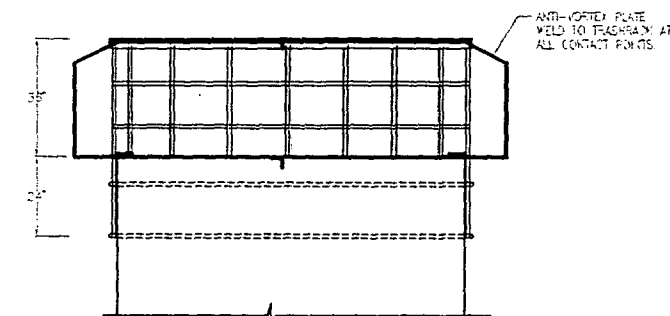


CONNECTING BAND DETAIL

NOT TO SCALE

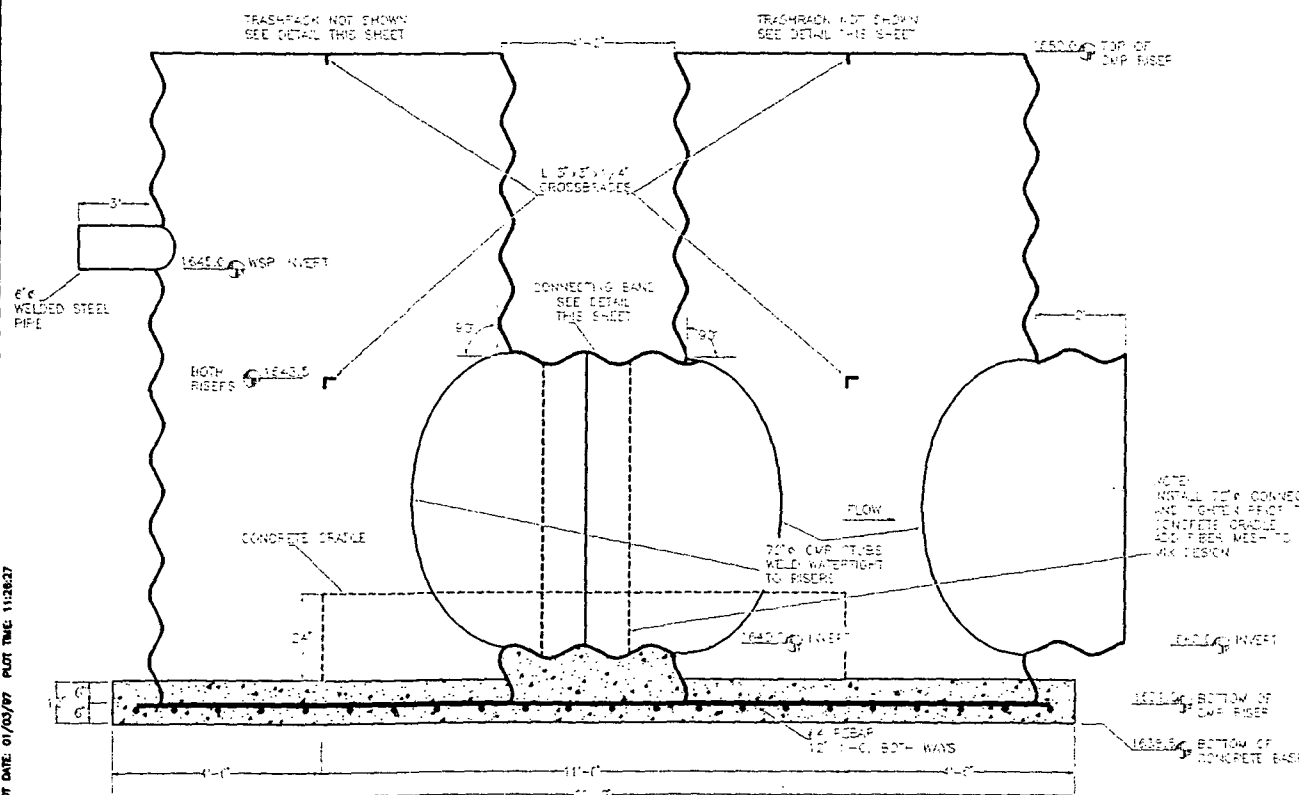
AFTER BANDS HAVE BEEN TIGHTENED, A COAT OF 5X SEALER SHALL BE APPLIED AROUND THE CULVERT AT THE ENDS OF THE CONNECTING BAND AND ALONG THE SEAM OF THE BAND OVERLAP.

NOTE TO SUPPLIERS: IF ANNULAR PIPE IS USED, USE A 2 FT. WIDE ANNULAR BAND. IF HELICAL PIPE WITH 4 CORRUGATIONS REROLLED TO ANNULAR IS USED, USE A 21 INCH WIDE ANNULAR BAND. SEE SPECIFICATION 207.2.



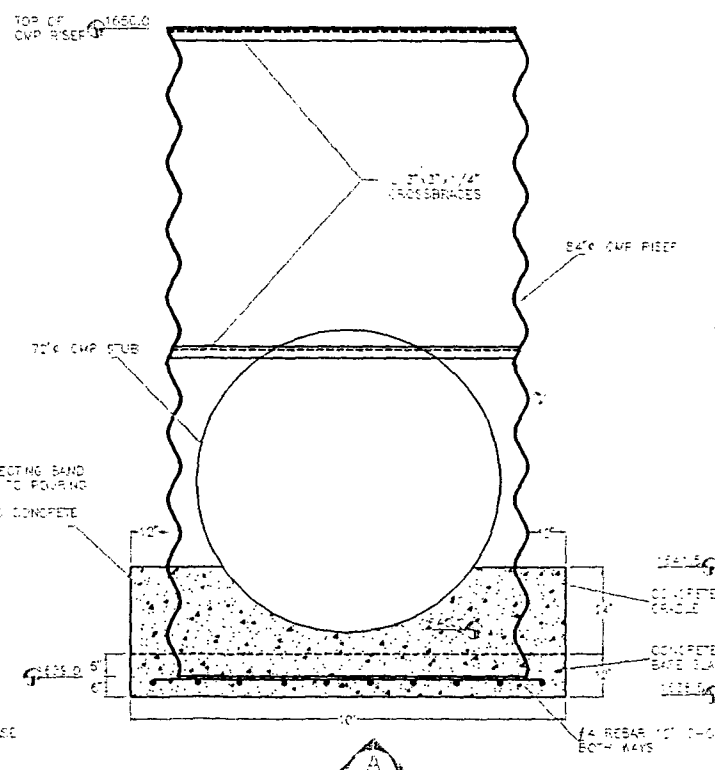
ANTI-VORTEX PLATE INSTALLATION DETAIL

NOT TO SCALE



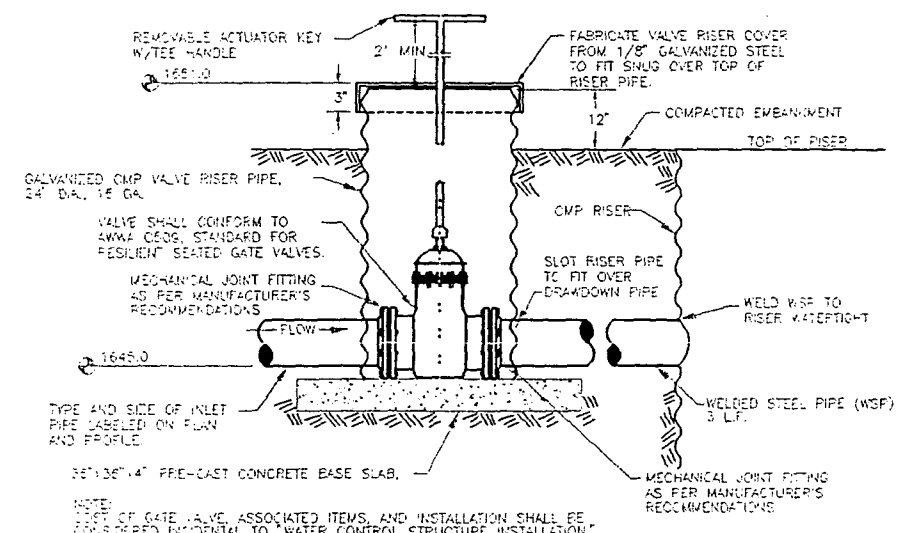
WATER CONTROL STRUCTURE
Q PROFILE

NOT TO SCALE



SECTION
CONCRETE CRADLE SECTION

NOT TO SCALE



DRAWDOWN VALVE DETAIL

NOT TO SCALE



TOYAN ENGINEERING COMPANY
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
101 W. 11th St., Suite 200, Des Moines, IA 50319



DUCKS UNLIMITED
INC.

PROJECT NO. SD-0205-001
LOPEN PAULSON WETLAND
RISER DETAILS

DATE: 12/23/96
SHEET NO. 5 OF 6
APPROVED BY: [Signature]

DESIGNED BY: J.L.L.
DRAWN BY: J.M.
CHECKED BY: J.M.
APPROVED BY: [Signature]

DRAWING: C:\7244\7244001.PLOT DATE: 01/03/97 PLOT TIME: 11:28:27

July 17, 1997

South Dakota Department of
Environmental and Natural Resources
Foss Building, 523 East Capitol
Pierre, South Dakota 57501-3181



Dear Sir or Madam:

I along with U.S. Fish and Wildlife Service and Ducks Unlimited Inc. propose to inundate a natural drainage way by constructing an embankment. The embankment is located in Moody County, South Dakota.

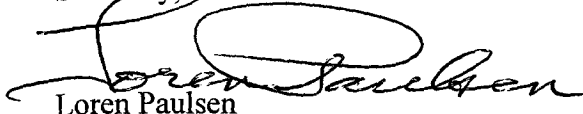
Enclosed are the following documents pertaining to the project:

1. Form 2, Application for Permit to Appropriate Water (in duplicate)
2. Form 2A, Supplemental Information (in duplicate)
3. Location Map and Vicinity Map (in duplicate)
4. Complete copies of the design blueprints (in duplicate)
5. Personal Check in the amount of \$150.00.

Please advise the U.S. Fish and Wildlife Service, % of Noel Matson P.O. Box 48 Madison, SD 57042, of the name and address of the newspaper selected to publish the Notice of Hearing so that they can forward the required Authorization of Advertisement prior to publication. I request that you allow at least 10 days for the Service to properly review and prepare the necessary documentation before notifying the newspaper of the need to publish.

If you have any other questions or require further information, please contact Noel Matson at the Madison WMD, at (605) 256-2974.

Sincerely,


Loren Paulsen

REPORT ON
WATER PERMIT APPLICATION No. 6014-3
Loren Paulsen
August 18, 1997

Water Permit Application No. 6014-3 has been filed by Loren Paulsen to appropriate 32 acre-feet of water annually from local runoff by constructing a dam located in the SE 1/4 of Section 31-T108N-R47W, in Moody County. This application requests impoundment of water sufficient to maintain water at the spillway elevation of 1650.0 feet mean sea level. The water will be used to provide habitat for fish and wildlife production and livestock watering.

Discussion:

The Loren Paulsen Wetland Project has been designed by Ducks Unlimited, Inc., and the plans and specifications have been reviewed and will be approved; however, construction of the project can not begin until Water Permit Application No. 6014-3 is approved. The dam will be classified as a small size Category 3, Low Hazard dam with an embankment height of 13 feet, a normal storage capacity of 32 acre-feet with a reservoir level at the spillway elevation, and a maximum storage capacity of 151 acre-feet with a reservoir level at the top of dam elevation. A dam of this size and hazard classification is required to have a minimum spillway design capable of passing a 25-year frequency event.

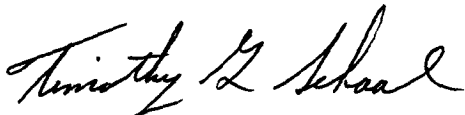
The dam is designed to have dual 84 inch diameter CMP overflow risers with a 72 inch diameter CMP outlet barrel as the primary spillway and a 100 foot wide earthcut channel as the secondary spillway. The dam will have a drainage area of 2753 acres (4.3 square miles). Ducks Unlimited uses the Natural Resources Conservation Service (NRCS) TR-20 model to route a 25-year frequency event peak of 415 cfs through the primary spillway with 2.58 feet of freeboard remaining and a 100-year frequency event peak of 795 cfs through both spillways with 0.46 feet of freeboard remaining.

The annual yield for the drainage area above the dam with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 106 acre-feet. The annual yield with a 80 percent chance of occurrence, or 8 out of 10 years, is expected to be 40 acre-feet and the annual yield with a 10 percent chance of occurrence, or 1 out of 10 years, is expected to be 505 acre-feet.

The Loren Paulsen Wetland project will be located in the SE 1/4 of Section 31-T108N-R47W near the headwaters of Mud Creek, about 5 miles upstream of the confluence of Mud Creek and the Big Sioux River. There are no existing Water Rights/Permits located on Mud Creek between the proposed dam and the Big Sioux River.

Conclusions:

1. Water Permit Application No. 6014-3 should be approved since unappropriated water is available and approval should not have any adverse effect on existing Water Permits/Rights.
2. If approved, the low flow bypass requirement for downstream domestic use should be a qualification on Water Permit Application No. 6014-3.



Timothy G. Schaal, P.E.
Natural Resources Engineer III

Approved by:



Gale N. Selken, P.E.
Natural Resources Engineer IV

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 6014-3, Loren Paulsen**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 6014-3, Loren Paulsen, Rt. 1 Box 50, Flandreau, SD 57028.

The Chief Engineer is recommending APPROVAL of Application No. 6014-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) in the public interest with the following qualification:

1. Water Permit No. 6014-3 authorizes a dam with a storage capacity of 32 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation of 1650.0 feet mean sea level.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

See report on application for additional information.


FOR **JOHN HATCH, Chief Engineer**
August 19, 1997



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

August 20, 1997

Doug Lipetzky, P.E.
Regional Engineer
Ducks Unlimited, Inc.
3502 Franklin Ave.
Bismarck, ND 58501-0761

Dear Mr. Lipetzky:

We have reviewed the plans and specifications for the Loren Paulsen Wetland Project located in Section 31-T108N-R47W, in Moody County. The plans and specifications as submitted are approved. Approval of the plans and specifications does not authorize construction of the project. Construction of the project may not begin until Water Permit Application No. 6014-3 is approved.

Our review was to determine compliance with the requirements of the Water Management Board Safety of Dams Rules, Chapter 74:02:08. Approval of these plans and specifications does not release Mr. Paulsen, as owner of the dam, from the responsibility for operating and maintaining the dam in good repair to ensure the safety of the dam.

The Loren Paulsen Dam will be classified as a small size Category 3 dam with an embankment height of 13 feet, a normal storage capacity of 32 acre-feet and a maximum storage capacity of 151 acre-feet.

If you have any questions, please feel free to contact us.

Sincerely,

Gale N. Selken, P.E.
Natural Resources Engineer IV
for John Hatch, Chief Engineer
Water Rights Program
(605) 773-3352

c: Loren Paulsen

RECEIPT

Division of Water Rights

415423

South Dakota Department of Environment and Natural Resources

Pierre, _____ July 21, 19 97

RECEIVED OF Loren P. Paulsen, RR 1, Box 50, Flandreau, SD 57028

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

Fee for Application for Permit No. <u>6014-3</u> to Appropriate Water, to construct and to put water to beneficial use _____	150	00
Fee for Application for Permit No. _____ to Appropriate Water, for Future Use _____		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____		
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for _____		

(Any Other Work Provided by Law)	Total	150 00

By John Hatch (Signature)
Chief Engineer



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

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

August 20, 1997

Loren Paulsen
Rt 1, Box 50
Flandreau, SD 57028

Dear Mr. Paulsen:

Water Permit Application No. 6014-3 for fish and wildlife propagation and livestock watering has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of hearing has been sent to the Publisher of the Moody Co. Enterprise printed at Flandreau, SD (Ph # (605) 997-3725). For your information, a copy of the notice, the recommendation of the Chief Engineer and a report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice of Hearing and to arrange for payment. Early contact with the paper can eliminate delays. The publisher has been instructed to publish your notice once each week for two consecutive weeks with the last publication to occur twenty days before the board meeting. The newspaper has been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

August 20, 1997

Moody Co. Enterprise
Box 71
Flandreau, SD 57028-0071

ATTENTION: Legal Department

Enclosed is a Notice of Hearing on Application No. 6014-3 to be published twice. Please publish the first notice on September 2, 1997, with the second publication 7 days later.

The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is Loren Paulsen, Rt 1, Box 50, Flandreau, SD 57028 (Ph # (605) 997-3379).

A copy of BOTH publications must be SENT to the WATER RIGHTS PROGRAM. 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. No action may be taken on the permit application until proof of publication has been received.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

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

FIRST TRANSMITTAL NOTICE

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

No. _____

Date _____

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

Name

Newspaper

Instruction to Newspaper - Publish first Notice on September 2, 1997, with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF APPLICATION NO. 6014-3 to Appropriate Water

Notice is given that Loren Paulsen, Rt 1, Box 50, Flandreau SD 57028 has filed an application for a water permit to impound 32 acre-feet of water from runoff by constructing a dam located in the S 1/2 SE 1/4 Section 31 with water impounded in the S 1/2 SE 1/4, NE 1/4 SE 1/4, Section 31; all in T108N-R47W. This application requests impoundment of water sufficient to maintain water at the outlet elevation of 1650.0 feet mean sea level and is to be used for fish & wildlife propagation and livestock watering.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 6014-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the chief engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the chief engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and chief engineer. The applicant must file a petition if contesting the chief engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 19, 1997.

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 the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Nettie H. Myers, Secretary, Department of Environment and Natural Resources.



PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)

County of Moody) SSI, Angela Nibbelink

certify that the attached printed Notice was taken

from the Moody County
Enterpriseprinted and published in FlandreauCounty of Moody and

state of South Dakota. The notice was published

in the newspaper on the following two dates:

Sept. 3, 1997Sept. 10, 1997Cost of Printing 37.57

Angela Nibbelink
(Signature)

Bookkeeper
(Title)

9-10-97
(Date Signed)

NOTICE OF APPLICATION

NO. 6014-3 to Appropriate Water

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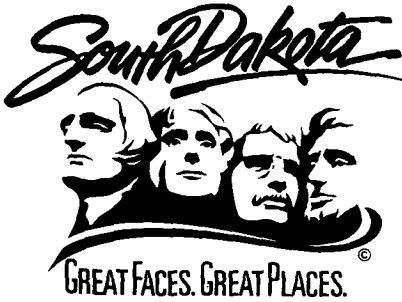
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Nettie H. Myers, Secretary
Department of Environment and Natural Resources

(Sept. 3 & 10, 1997)



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

SEP 24 1997

Loren Paulsen
Rt 1, Box 50
Flandreau, SD 57028

Dear Mr. Paulsen:

Enclosed is Water Permit No. 6014-3 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

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

Very truly yours,

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

enclosures

PLEASE NOTE: Certain changes may be made to your water permit usually without affecting the priority date. The location of a point of diversion may be changed or additional points of diversion may be approved if the water source remains unchanged; no additional water is appropriated; and, if irrigating, no additional land is irrigated. The change may be allowed without application or publication, if the Water Rights Program is contacted and the chief engineer makes a finding that the change does not increase the potential for interference with existing diversions.

A new water permit application is required to change water sources, increase the permitted diversion rate, or increase the irrigated acreage. If the application is approved, the water permit will receive a new priority date.

c: Noel Matson, US Fish & Wildlife Service, P.O. Box 48, Madison, SD 57042

REPORT ON INSPECTION OF PERMIT NO. 6014-3

Other permit(s) associated with the project: XXXX

DATE OF INSPECTION: May 28, 2002

NAME & ADDRESS OF INSPECTION CONTACT/ Loren Paulsen

RELATIONSHIP TO PERMIT HOLDER, IF APPLICABLE: owner

NAME & ADDRESS OF PERMIT HOLDER: Loren Paulsen, 48386 226th Street, Flandreau, SD
57028

DIVERSION POINT LEGAL LOCATION: 200 feet north & 1400 feet west of the SE corner of
Section 31-T108N-R47W (S 1/2 SE 1/4).

DAM INFORMATION:

- 1) Height to crest 13 feet
- 2) Height to primary spillway 8 feet
- 3) Height to secondary spillway 11 feet
- 4) Crest width 12 feet
- 5) Crest length 563 feet
- 6) Spillway length XXX feet
- 7) Spillway width 100 feet (secondary)
- 8) Approx. storage (Normal) 32 acre-feet
- 9) Approx. storage (Maximum) 151 acre-feet
- 10) Date constructed: 1997

PERMIT QUALIFICATIONS AND REGULATIONS:

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

Permit No. 6014-3
Sioux River - Water District

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

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

I have this day, May 28, 2002, made a thorough examination of the water use system constructed by Loren Paulsen of 48386 226th Street, Flandreau, SD 57028 holder of Permit No. 6014-3, bearing the priority of July 21, 1997 authorizing the storage of 32 acre-feet of the waters of runoff for fish & wildlife propagation and livestock use purposes, in Moody County.

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

A. Works used to divert the water:

13 foot high dam with a twin tube (84 inch risers & 72 inch barrel) primary spillway and a 100 foot wide secondary spillway that stores 32 acre-feet of water

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

N/A

C. Works used to apply water to beneficial use:

13 foot high dam with a twin tube (84 inch risers & 72 inch barrel) primary spillway and a 100 foot wide secondary spillway that stores 32 acre-feet of water

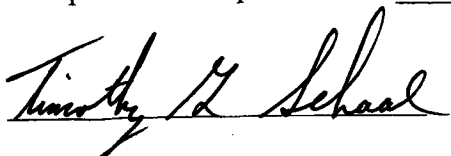
The system is in the following condition **good**. The point of diversion is located **200 feet north & 1400 feet west of the SE corner of Sec. 31-T108N-R47W (S 1/2 SE 1/4)**. The works are capable of storing 32 acre-feet of water which is to be used for fish & wildlife propagation and livestock use. Water has been put to beneficial use to the maximum extent as follows:

13 foot high dam with a twin tube (84 inch riser & 72 inch barrels) primary spillway and a 100 foot wide secondary spillway that stores 32 acre-feet of water

and the license should be issued for 32 acre-feet of storage.

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

Exceptions to compliance are: none Date Report Completed: June 18, 2002



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



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

June 28, 2002

6014-3

Loren Paulson
48386 226th Street
Flandreau SD 57028

Dear Mr. Paulson:

On May 28, 2002 the investigation of your water use system, including the extent of application of water to beneficial use, as developed under Water Permit No. 6014-3, was completed by Tim Schaal, a staff engineer with our program. Your final water right document, the water license, can now be issued.

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

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

If you have any questions regarding the water permit, investigation of your water use system or payment of the fee, please contact Genny McMath with our program at (605) 773-3352.

Sincerely,

Karen Schlaak
Water Rights Program
(605) 773-3352



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

September 17, 2002

REMINDER NOTICE

6014-3

Loren Paulson
48386 226th St
Flandreau SD 57028

Dear Mr. Paulson:

On June 28, 2002, we advised you that a \$50.00 fee was due for the completed investigation of your Water Permit No. 6014-3. The fee also covers issuance of your water license which is the final document in obtaining and perfecting a water permit.

To date, we have not received the fee and therefore can not issue the water license. Your licensed water right will be similar to a property right that can not be lost as long as the water use continues and you abide by any permit requirements.

Water Permit No. 6014-3 authorizes storage of 32 acre-feet of runoff water for fish & wildlife propagation and domestic livestock watering purposes. If you have any questions regarding the water permit, investigation of your water use system or payment of the fee, please contact Genny McMath with our program at (605) 773-3352. The check or money order for the fee should be made payable to the "Water Rights Program".

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program

Pd 9-20-02
CK # 2422

RECEIVED
SEP 23 2002
WATER RIGHTS
PROGRAM

6014-3

U.S. Postal Service
CERTIFIED MAIL RECEIPT
 (Domestic Mail Only; No Insurance Coverage Provided)

OFFICIAL USE

7556 503ET 0000 04TT 7002

Postage	\$	Postmark Here
Certified Fee		
Return Receipt Fee (Endorsement Required)		
Restricted Delivery Fee (Endorsement Required)		
Total Postage & Fees	\$	

Sent To Loren Paulson
 Street, Apt. No.,
 or PO Box No. 48386 226th St
 City, State, ZIP+4 Flandreau SD 57028
 PS Form 3800, January 2001 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: 6014-3

Loren Paulson
 48386 226th St
 Flandreau SD 57028

2. Article Number (Copy from service label)

7001 1140 0003 1305 8356

COMPLETE THIS SECTION ON DELIVERY

A. Received by (Please Print Clearly) B. Date of Delivery

LOREN PAULSON 9-18-08

C. Signature

☒ Agent
☒ Addressee
D. Is delivery address different from item 1? ☐ YesIf YES, enter delivery address below: ☐ No

3. Service Type

☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.
4. Restricted Delivery? (Extra Fee) ☐ Yes

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date September 23, 2001

RECEIVED OF Loren P Paulsen, 48386 226th St., Flandreau SD 57028

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

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	50	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>6014-3</u>		
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____	50.00	
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	

No.

000207

By

Darland Erlake
Chief Engineer
gm



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

OCT 25 2002

6014-3

Loren Paulson
48386 226th Street
Flandreau SD 57028

Dear Mr. Paulson:

Enclosed is Water License No. 6014-3. This is the final water right document completing your process of obtaining a Water Right. Enclosed is Receipt No. 000297 in the amount of \$50.00 which you paid for the investigation and issuance of the Water License.

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

Sincerely,

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

enclosures

STATE OF SOUTH DAKOTA

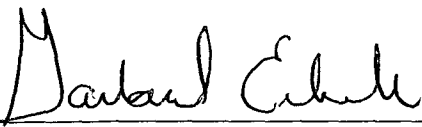
WATER LICENSE NO. 6014-3

(1) Loren Paulson, 48386 226th Street, Flandreau SD 57028 made Application No. 6014-3, July 21, 1997 for a water permit to impound 32 acre-feet of water from runoff, Moody County, South Dakota for fish & wildlife propagation and livestock watering purposes. Permit No. 6014-3, with a priority date of July 21, 1997 was approved September 19, 1997 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before September 19, 2002 and for the application to beneficial use of said water on or before September 19, 2006.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the construction of the storage dam and is entitled to impound 32 acre-feet of water for beneficial use with sufficient water annually to maintain the water level to the outlet elevation of 1650 feet mean sea level. The location of the storage dam (spillway) is 200 feet north and 1,400 feet west of the southeast corner of Section 31-T108N-R47W (S ½ SE ¼).

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Loren Paulson, 48386 226th Street, Flandreau SD 57028 the holder and/or owner of Water Right No. 6014-3 is issued a license to appropriate water, the right to impound 32 acre-feet of water from runoff with sufficient water annually to maintain the water level to the outlet elevation of 1650 feet mean sea level with a priority date of July 21, 1997 from the location specified in (2) of this license for fish & wildlife propagation and livestock watering purposes. This license is subject to any limitations or qualifications listed in Water Right No. 6014-3 and subject to South Dakota State Law.



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

OCT 25 2002

date



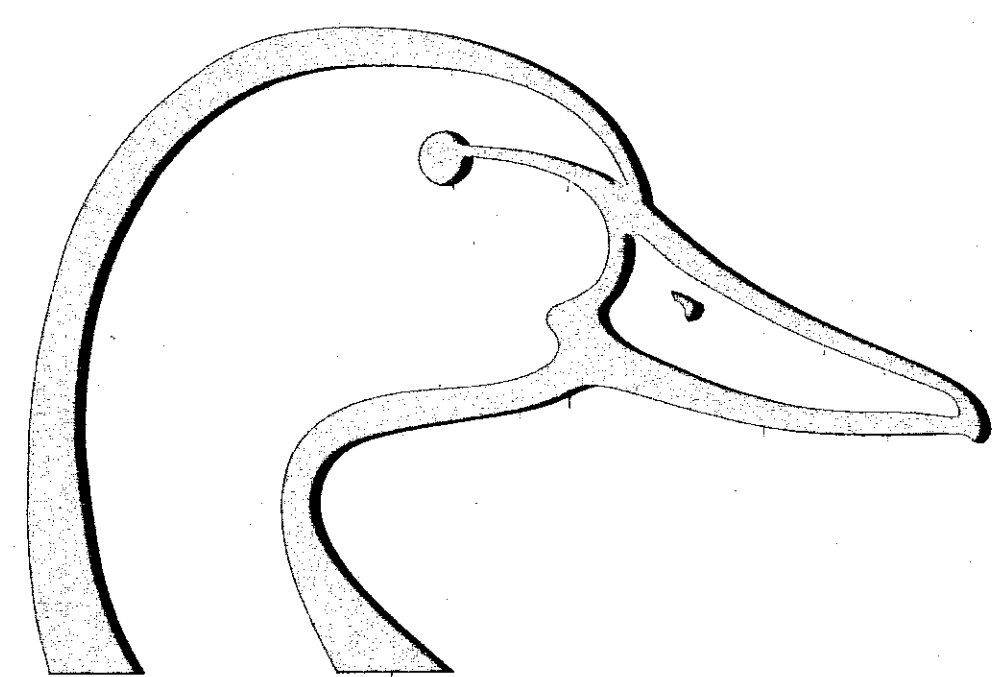
Water Permit Application No. 6014-3



Timothy G. Schaal
Timothy G. Schaal, P.E. 6/18/02
Natural Resources Engineer Specialist
Water Rights Program



Appl. 6014-3



DUCKS UNLIMITED

SPECIFICATIONS

GENERAL CONDITIONS	101
MOBILIZATION	201
SITE PREPARATION	202
EXCAVATION	203
EMBANKMENT CONSTRUCTION	204
WATER	205
WATER CONTROL	
STRUCTURE INSTALLATION	206
WATER CONTROL STRUCTURE	
& CULVERT APPURTENANCES	206A
CULVERT INSTALLATION	207
CAST-IN-PLACE	
REINFORCED CONCRETE	208
RIPRAP PLACEMENT	209

PLAN INDEX

- 1 LOCATION MAPS
- 2 MARSH TOPOGRAPHY
- 3 EMBANKMENT AND EMERGENCY SPILLWAY
PLAN, PROFILE, & SECTIONS
- 4 WATER CONTROL STRUCTURE
PLAN, PROFILE, & SECTIONS
- 5 WATER CONTROL STRUCTURE DETAILS
- 6 SOIL INFORMATION (WHEN AVAILABLE)

ESTIMATED QUANTITIES

MOBILIZATION	1 L.S.
SITE PREPARATION	742 CY-P
EMBANKMENT CONSTRUCTION	9065 C.Y.-S*
WATER	10 M-GAL.**
WATER CONTROL STRUCTURE INSTALLATION	1 EA.
WATER CONTROL STRUCTURE AND CULVERT APPURTENANCES	INC.
CULVERT INSTALLATION	
72"Ø CMP	71 L.F.
6"Ø PVC (SCHEDULE 40 PRESSURE PIPE)	18 L.F.
RIPRAP PLACEMENT (CLASS II)	86 C.Y.-P

* EMBANKMENT QUANTITY INCLUDES 15% FOR SHRINKAGE

** WATER QUANTITY IS BASED ON 1 GAL./CY; HOWEVER,
ONLY ACTUAL QUANTITY USED WILL BE PAID FOR.

DUCKS UNLIMITED

PROJECT

LOREN PAULSON WETLAND

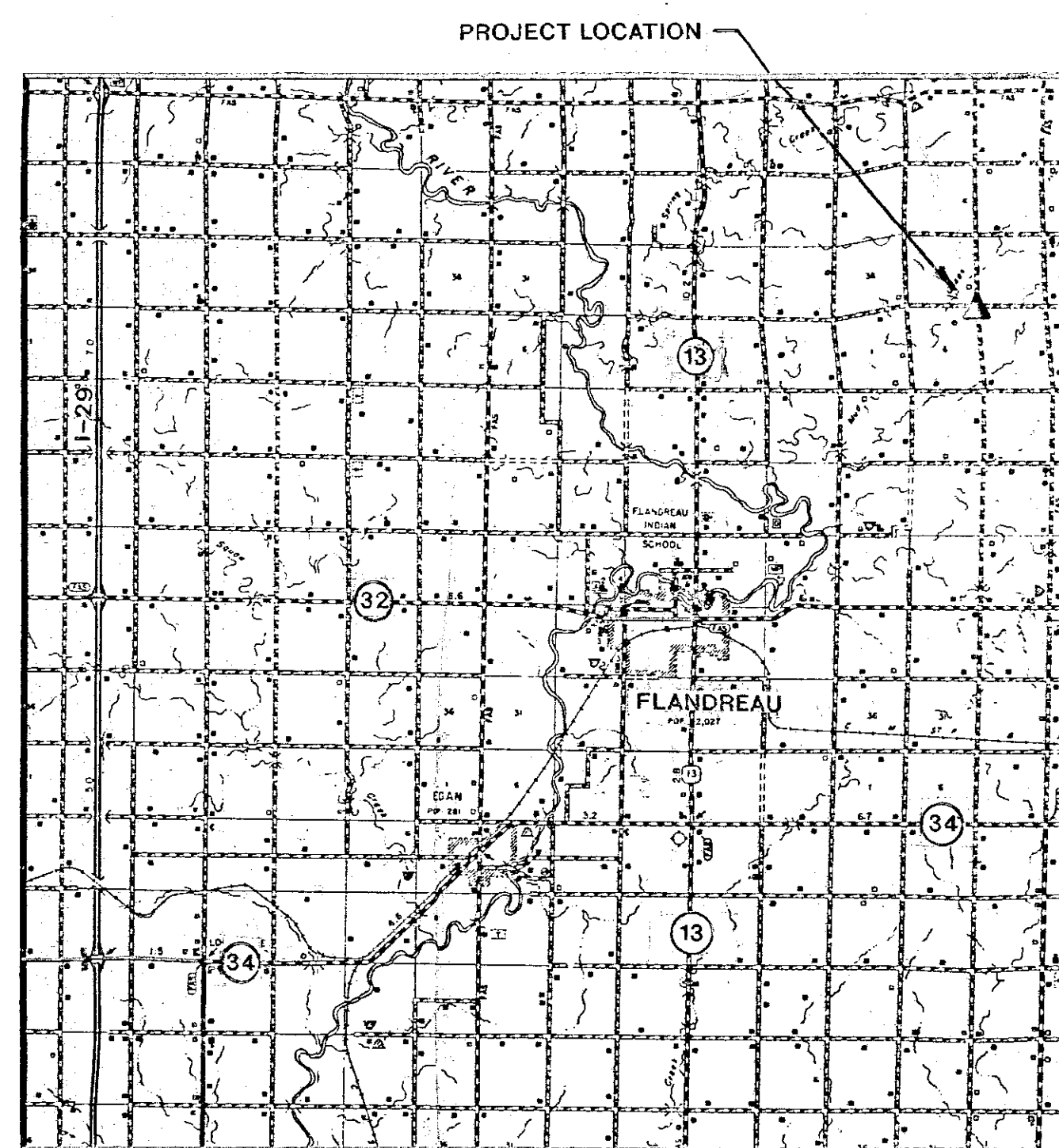
SECTION 31, TOWNSHIP 108 NORTH, RANGE 47 WEST
MOODY COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

UNITED STATES FISH & WILDLIFE SERVICE

AND

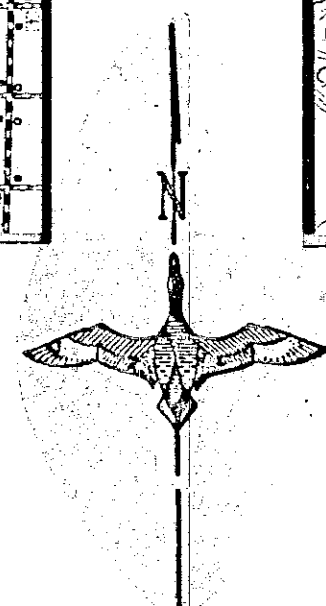
SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS



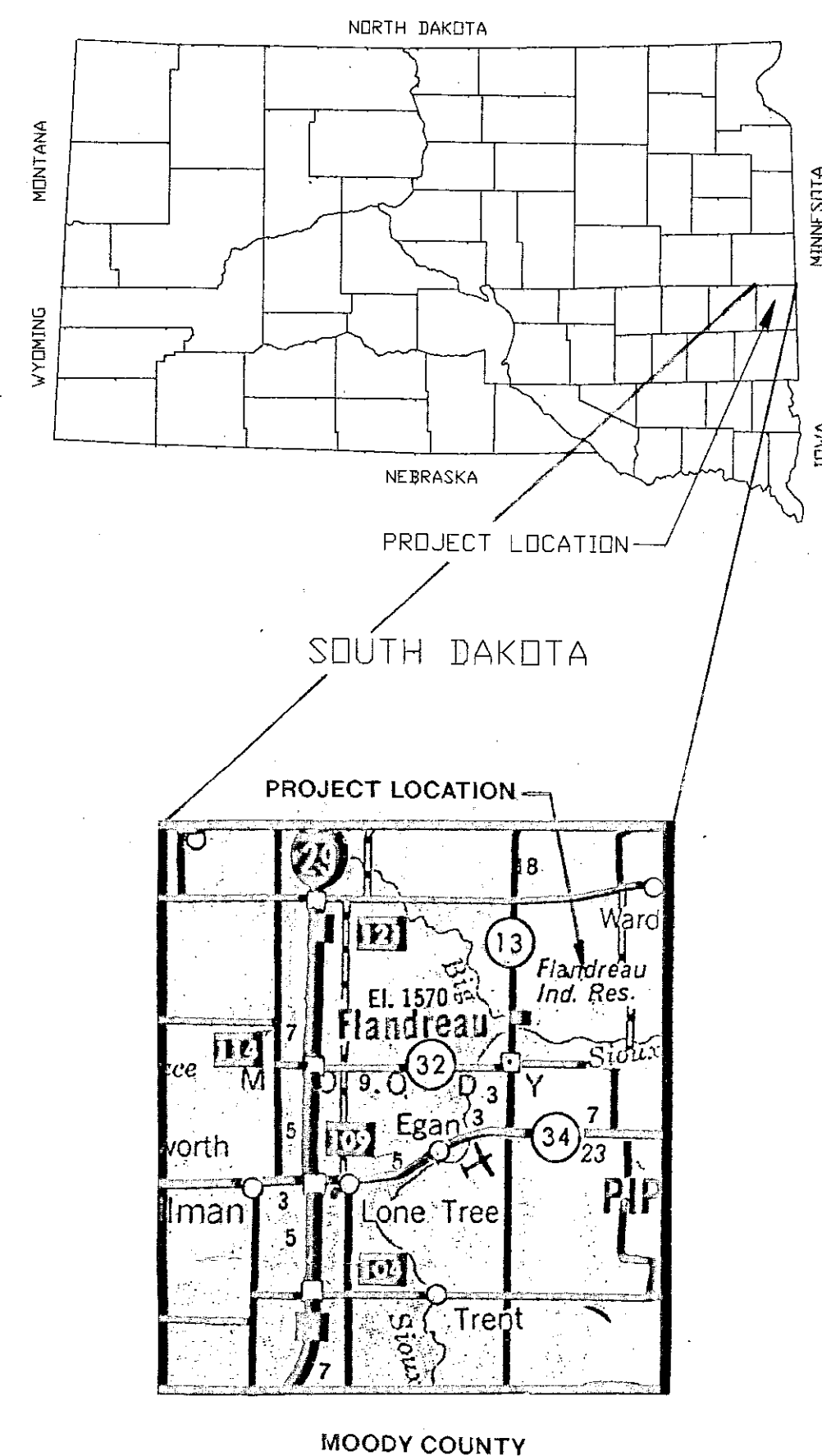
LOCATION MAP



VICINITY MAP



▲ IS 4 MI. EAS & 4 MI. NORTH OF
HWY. 13 & 30 CT. IN FLANDREAU



John A. L. [Signature]
P.E.

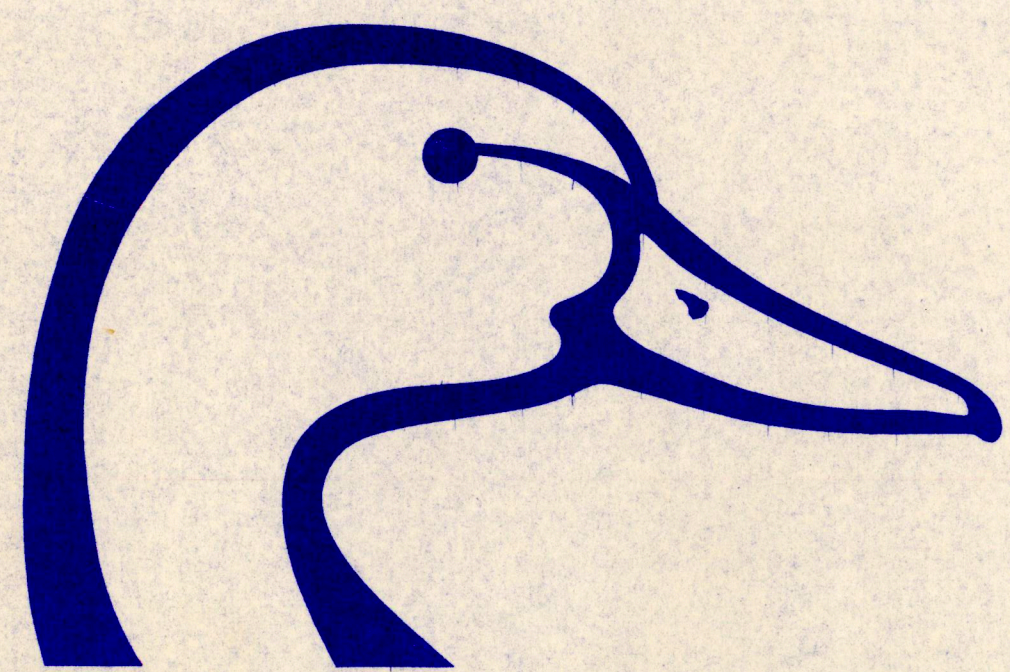
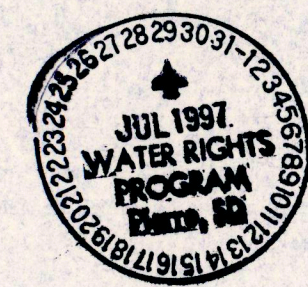
AGENCY CONTACT:
NOEL MATSON
USFWS, MADISON SD
605-256-2974

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 COOPERATING AGENCY. THE AGENCY IS RESPONSIBLE FOR INSTALLING THE SIGN(S) AT THE LOCATION(S) DESIGNATED ON THE PLANS.	

 DUCKS UNLIMITED INC. GREAT PLAINS REGIONAL OFFICE	PROJECT NO. SD-0206-001	DESIGNED BY: D.J.L.
	LOREN PAULSON WETLAND LOCATION MAPS	DRAWN BY: TSP
DATE: 1-14-1997	SHEET NO. 1 OF 6	SURVEYED BY: G.L.J.
	APPROVED BY:	CHECKED BY:

6014-3

Appl. 6014-3



DUCKS UNLIMITED

SPECIFICATIONS

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DUCKS UNLIMITED

PROJECT

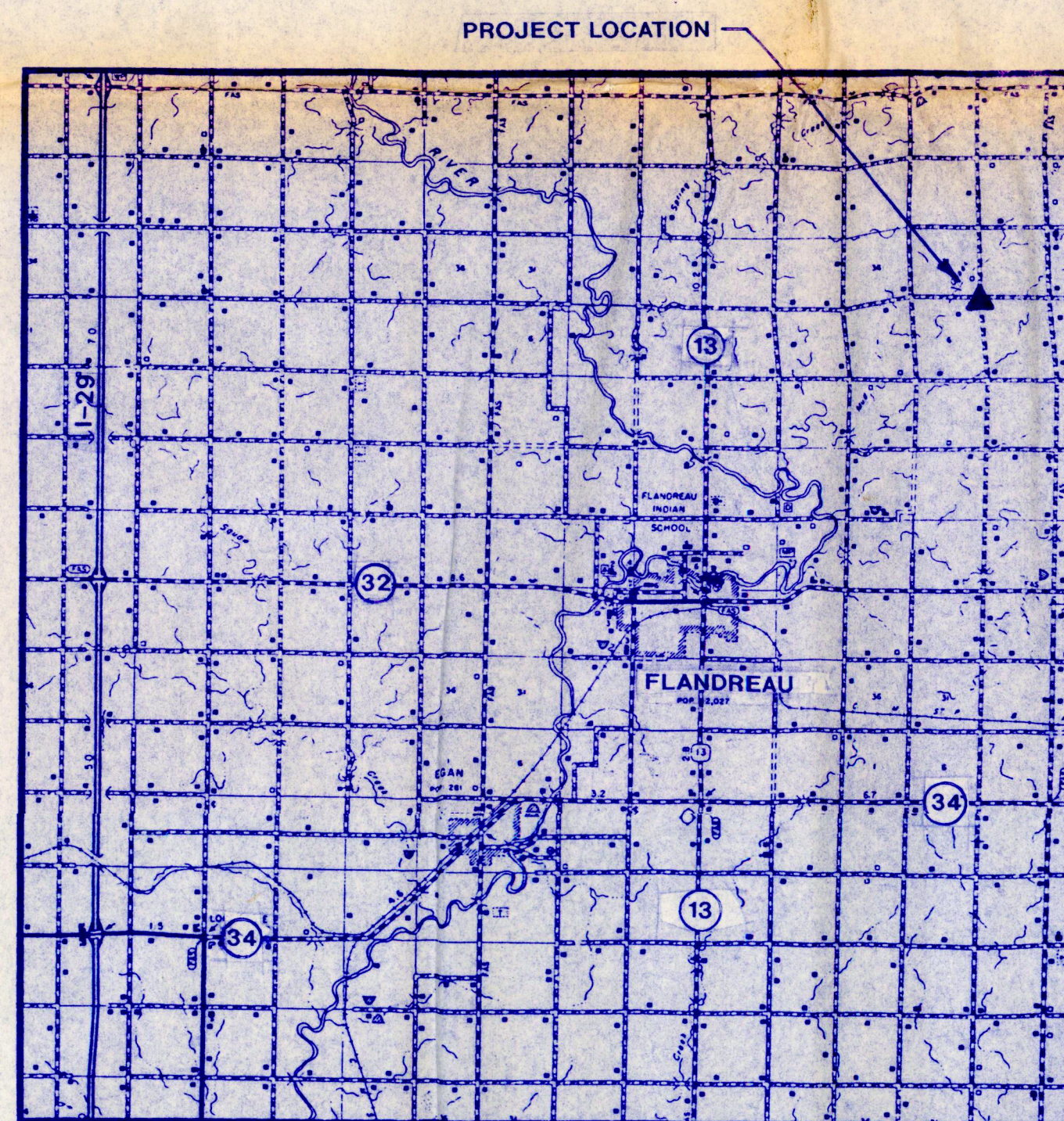
LOREN PAULSON WETLAND SECTION 31, TOWNSHIP 108 NORTH, RANGE 47 WEST MOODY COUNTY, SOUTH DAKOTA

IN COOPERATION WITH

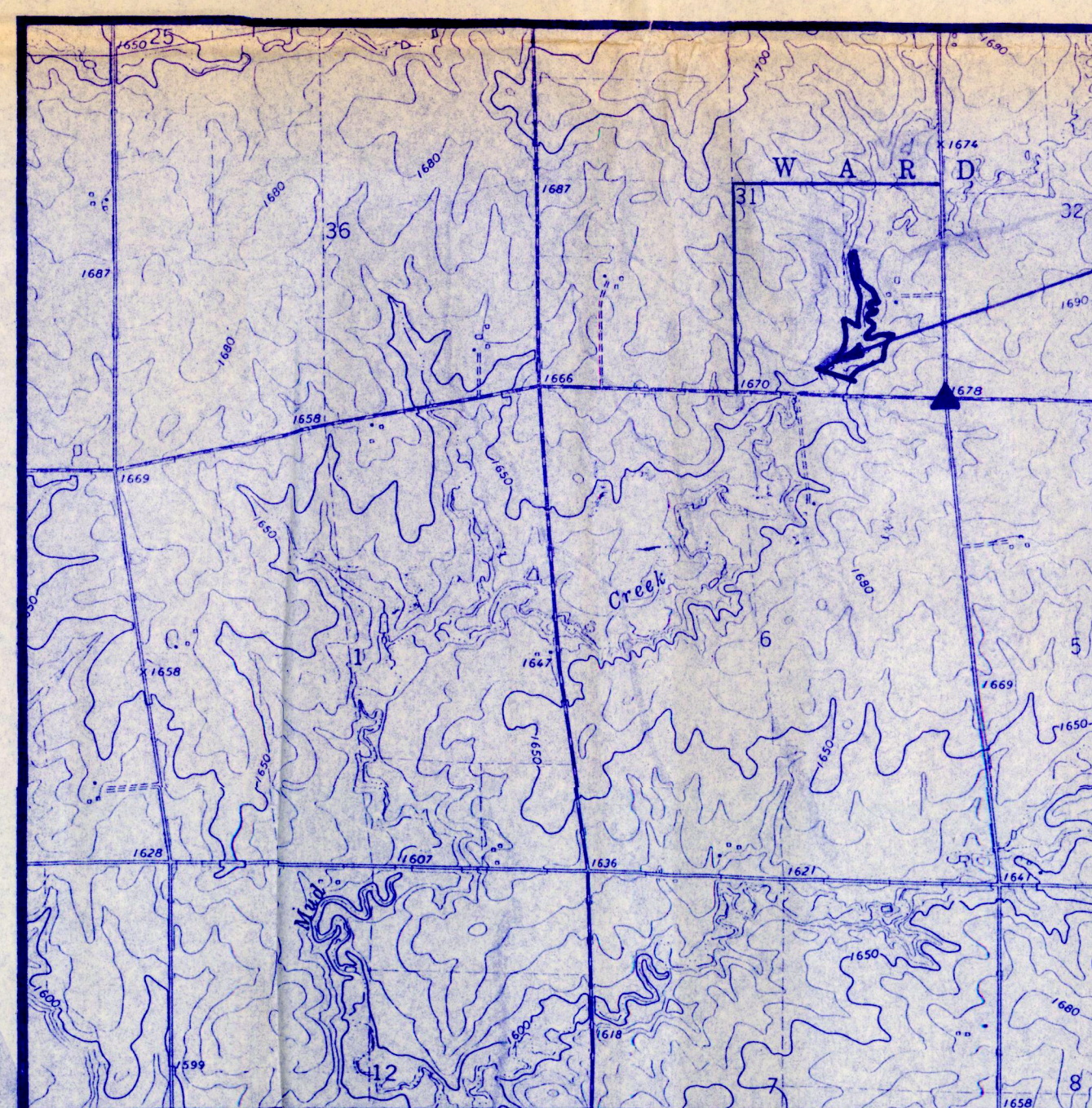
UNITED STATES FISH & WILDLIFE SERVICE

AND

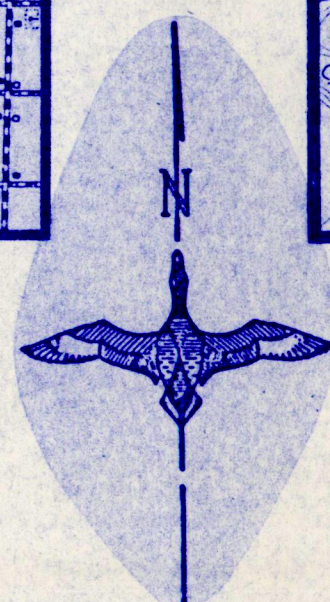
SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS



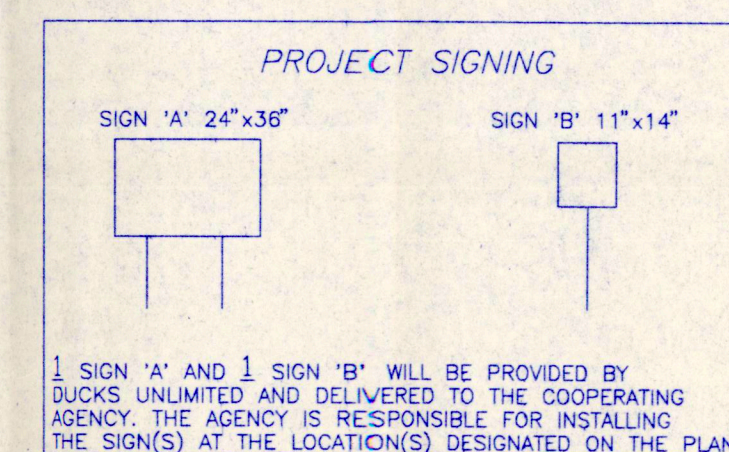
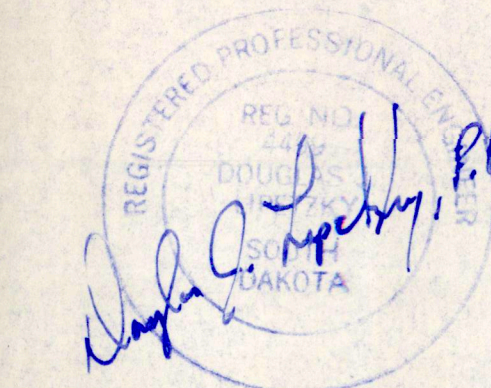
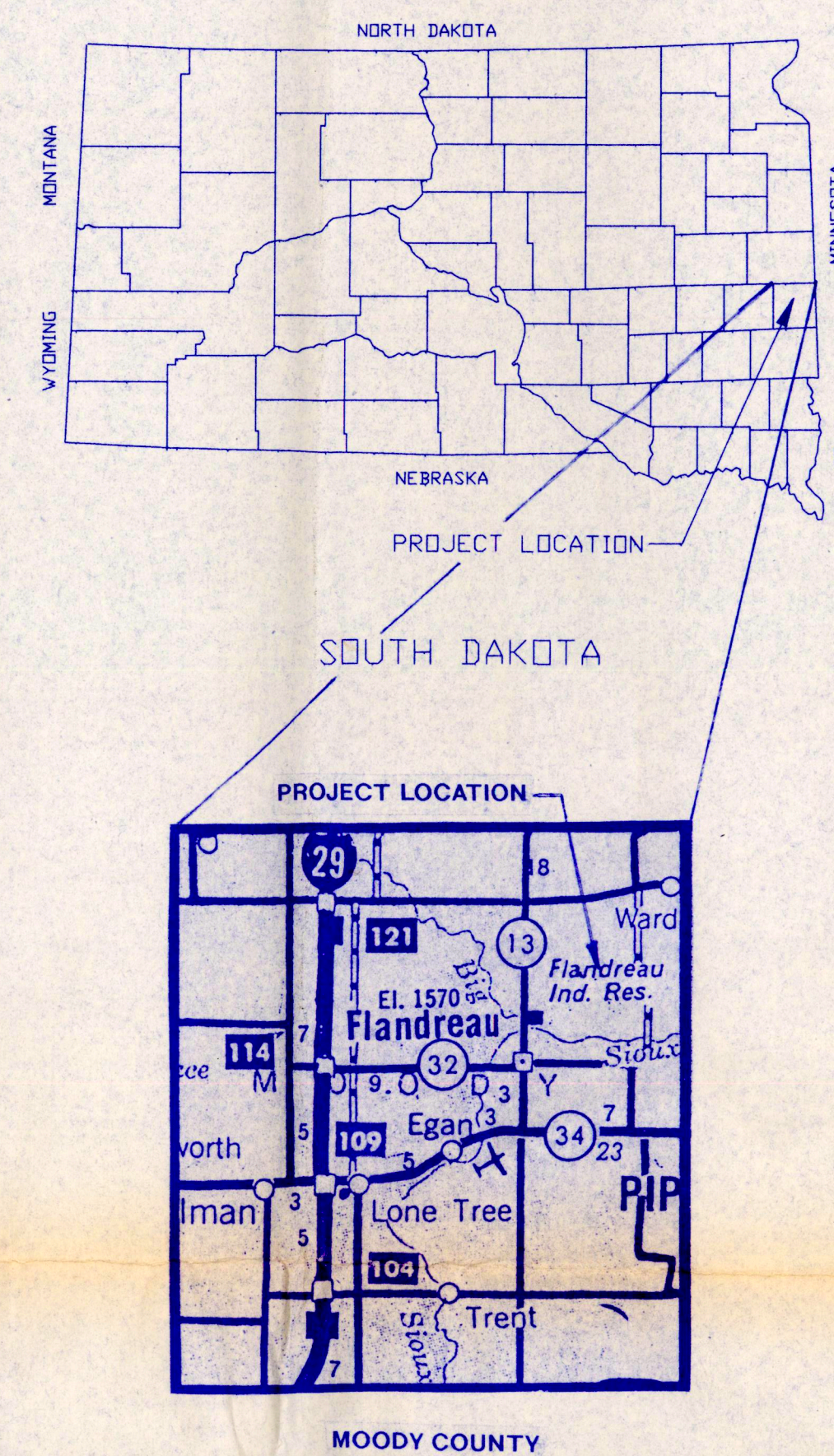
LOCATION MAP



VICINITY MAP



▲ IS 4 MI. EAS & 4 MI. NORTH OF
HWY. 13 & 34 CT. IN FLANDREAU

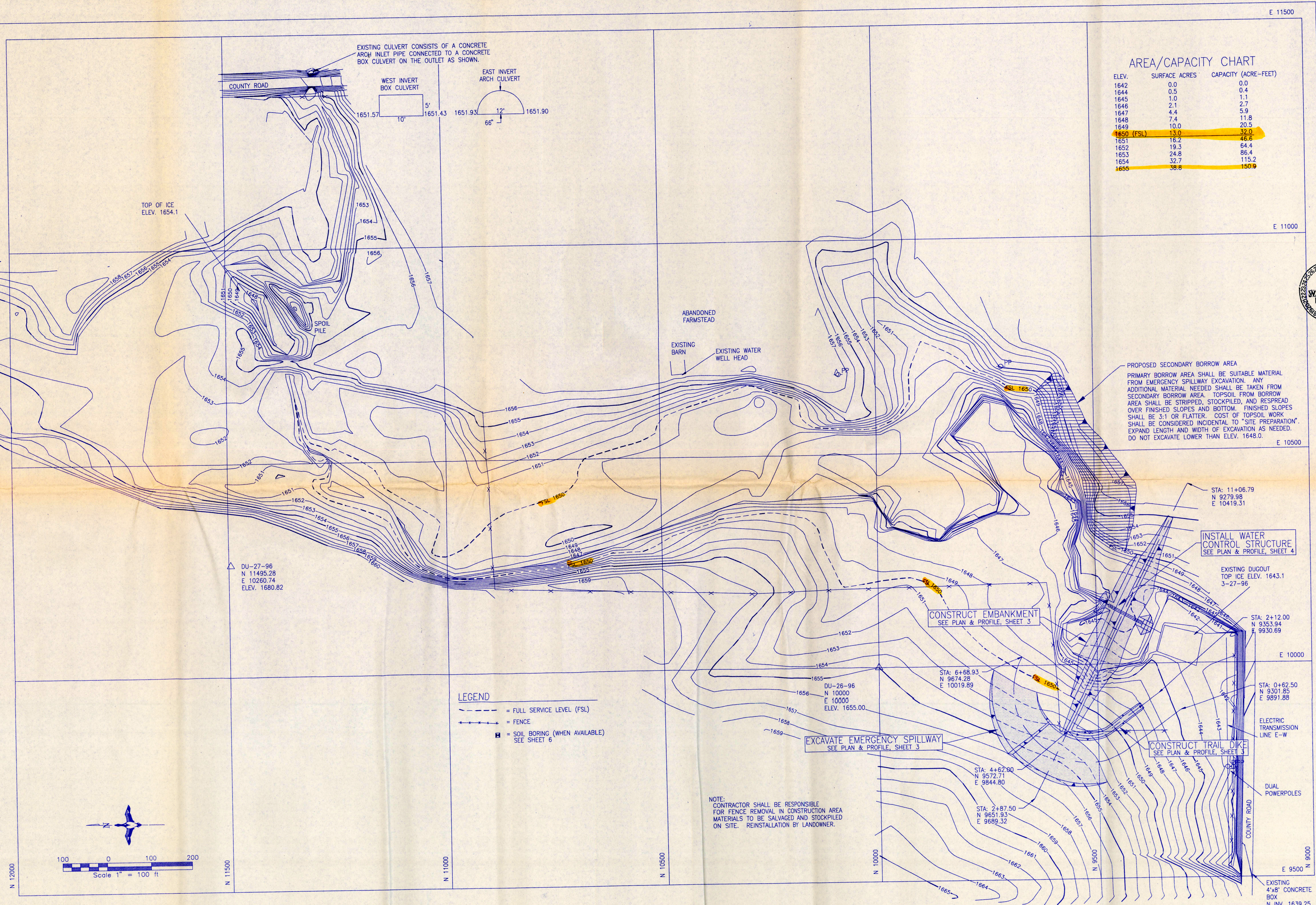


AGENCY CONTACT:
NOEL MATTSO
USFWS, MADISON SD
605-256-2974

	PROJECT NO.	SD-0206-001	DESIGNED BY: D.J.L.
	LOREN PAULSON WETLAND		DRAWN BY: TSP
	LOCATION MAPS		SURVEYED BY: GLJ
			CHECKED BY:
DATE:	SHEET NO.	APPROVED BY:	APPROVED BY:
1-14-1997	1 OF 6		

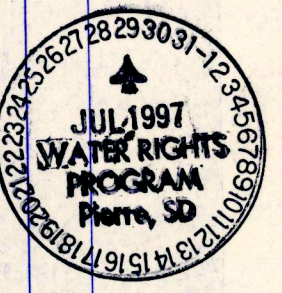
6014-3

6014-3



AREA/CAPACITY CHART

ELEV.	SURFACE ACRES	CAPACITY (ACRE-FEET)
1642	0.0	0.0
1644	0.5	0.4
1645	1.0	1.1
1646	2.1	2.7
1647	4.4	5.9
1648	7.4	11.8
1649	10.0	20.9
1650 (FSL)	13.0	32.0
1651	16.2	46.6
1652	19.3	64.4
1653	24.8	86.4
1654	32.7	115.2
1655	38.8	150.9



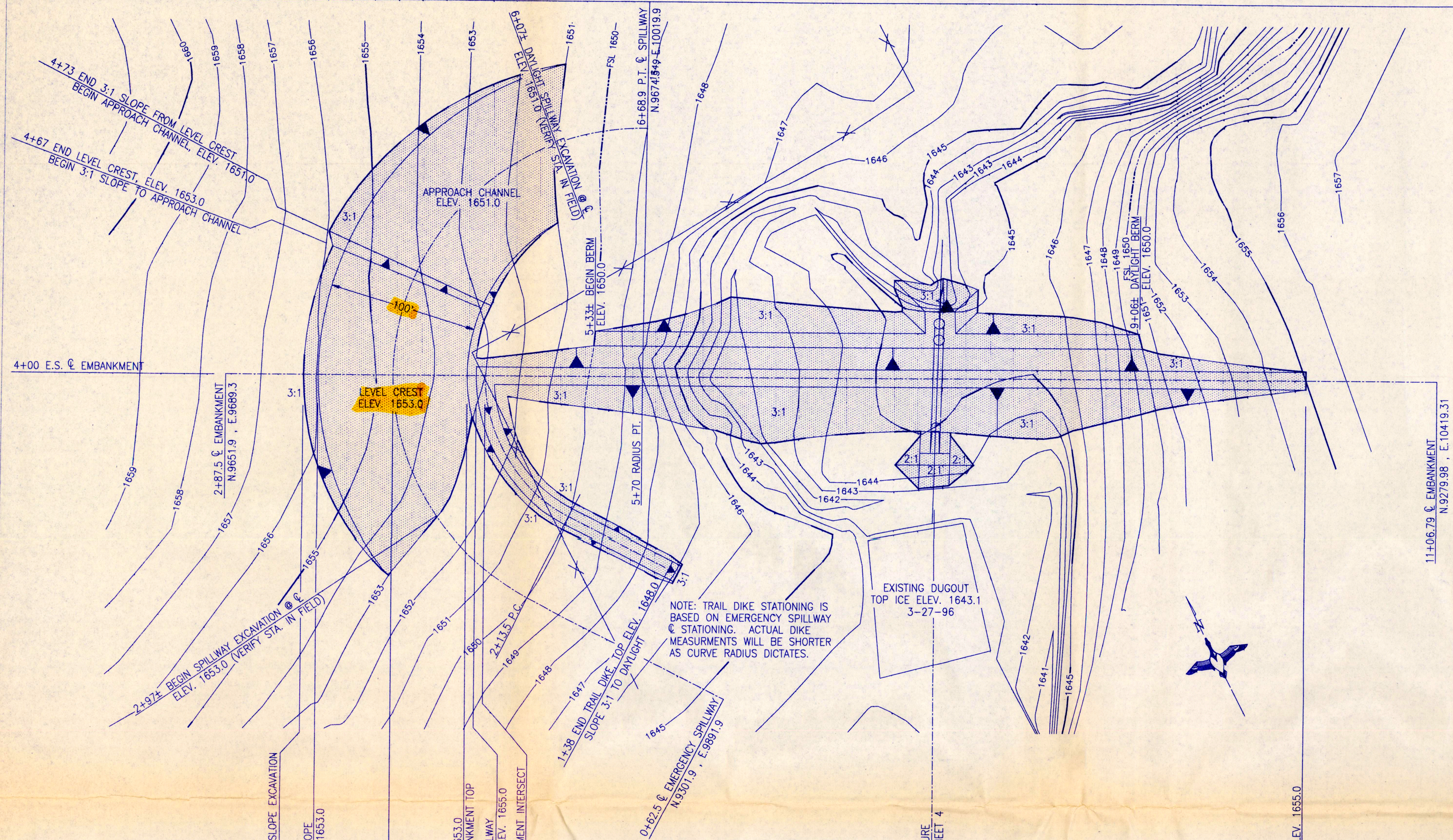
PROJECT TOPOGRAPHY
SCALE: 1"=100'

VERTICAL CONTROL:
ESTABLISHED WITH TRIGONOMETRIC LEVELS FROM THE 7 1/2 MINUTE
USGS TOPO MAP QUAD SPOT ELEVATION OF 1678 AT THE SE CORNER
OF SECTION 31.
HORIZONTAL CONTROL:
LOCAL DU COORDINATES WITH REFERENCE TO ASTRONOMICAL NORTH
THROUGH A SOLAR OBSERVATION ON MARCH 27, 1996.

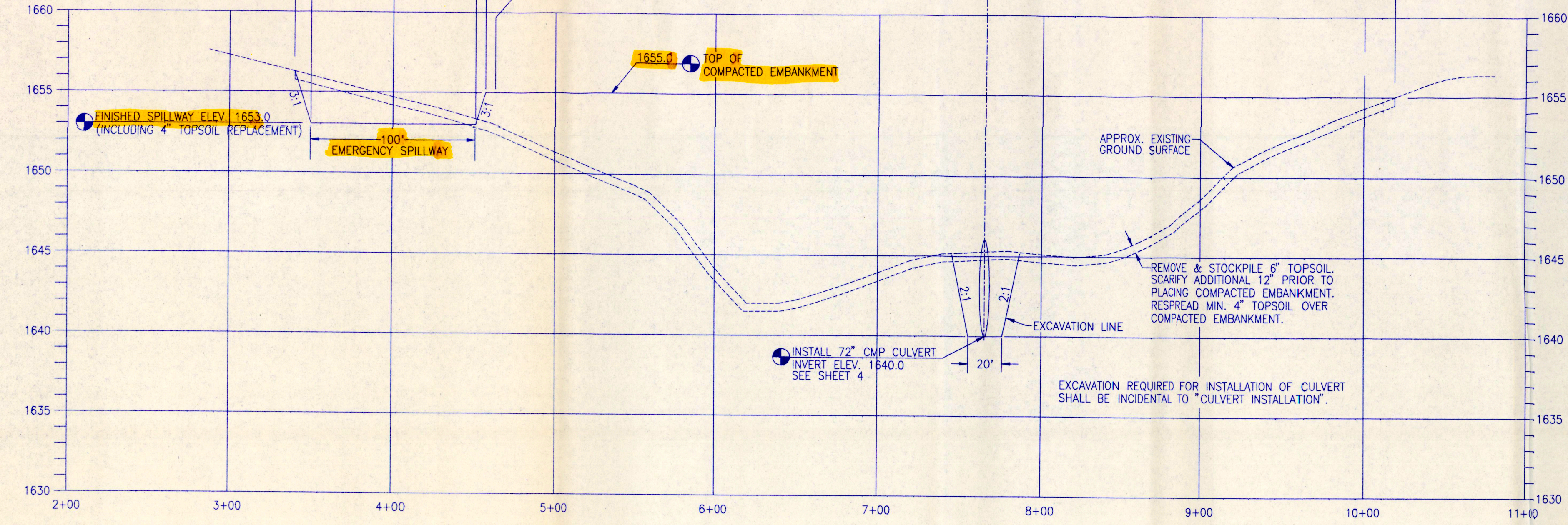
PREPARED BY: Toman Engineering Company CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS 906 2ND ST. N.W. • WANDAN, NORTH DAKOTA 58554 • 701-663-8483	DUCKS UNLIMITED INC. GREAT PLAINS REGIONAL OFFICE DATE: 12/23/96 SHEET NO. 2 OF 6	PROJECT NO. SD-0206-001 LOREN PAULSON WETLAND PRELIMINARY TOPOGRAPHY APPROVED BY:	DESIGNED BY: D.J.L. DRAWN BY: TECO TSP SURVEYED BY: CHECKED BY:
---	--	--	--

DWGNAME: C:\Z44\7441090.PLOT DATE: 01/03/97 PLOT TIME: 10:25:41

6014-3



SITE PLAN
SCALE: 1"=50'



EMBANKMENT C PROFILE
SCALE: 1"=50' HORIZ
1"=5' VERT.

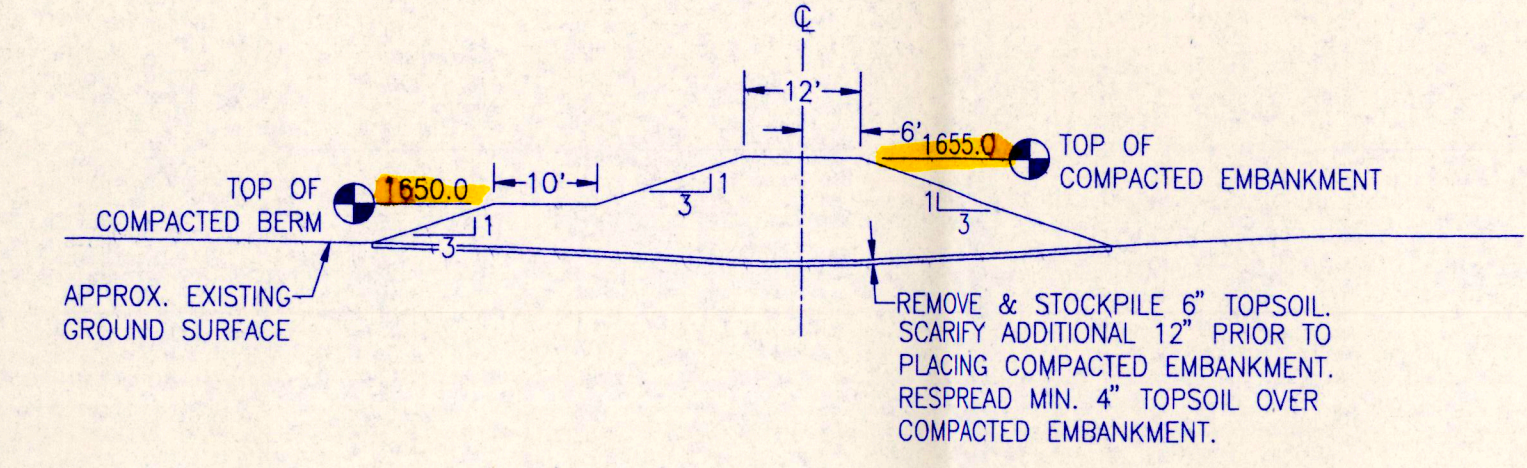
EMERGENCY SPILLWAY
CURVE DATA
Δ=153.29°26'
R=170.00'
T=721.70'
L=455.42'
PC STA=2+13.51
PT STA=6+68.93

TRAIL DIKE
CURVE DATA
Δ=62.49°45'
R=108.00'
T=65.96'
L=118.43'
PC STA=3+43.57
PT STA=4+62.003

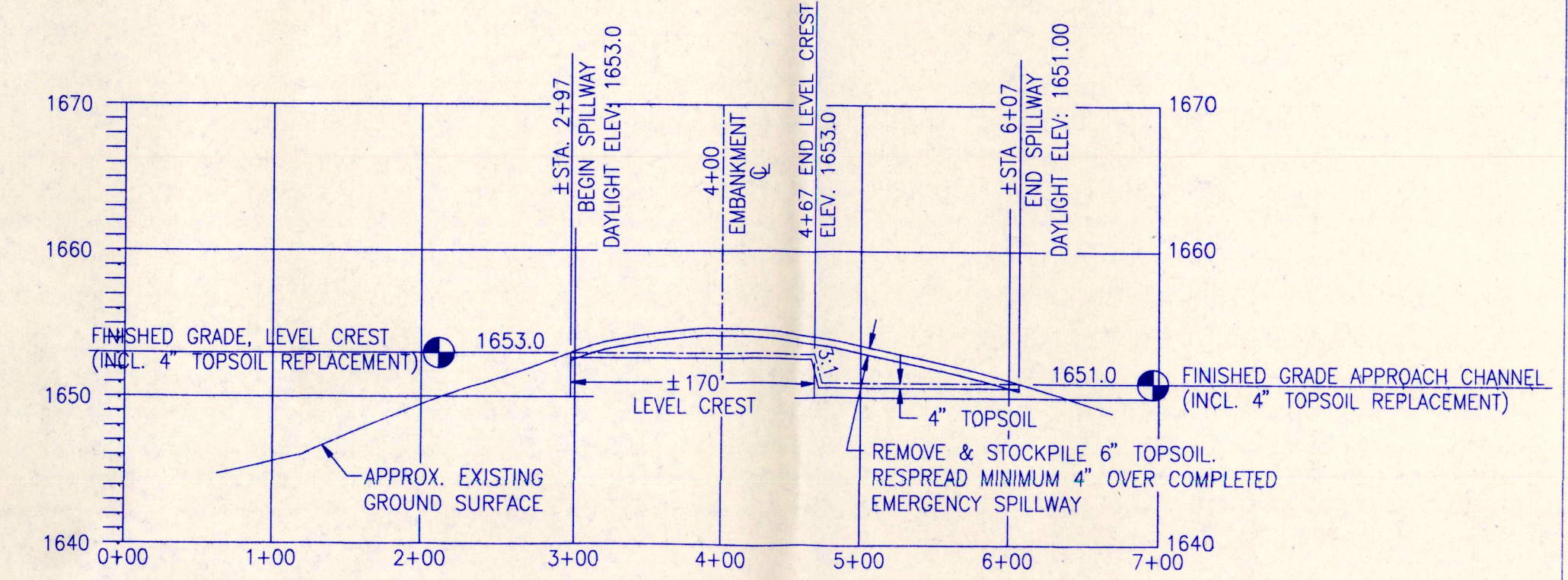
STATION COORDINATES
EMBANKMENT
STA. 2+87.50
N=9651.93
E=9689.32
STA. 4+00.00
N=9600.86
E=9789.55
STA. 11+06.79
N=9279.98
E=10419.31

EMERGENCY SPILLWAY
STA. 0+62.5
N=9301.85
E=9891.88
STA. 6+68.93
N=9674.28
E=10012.89

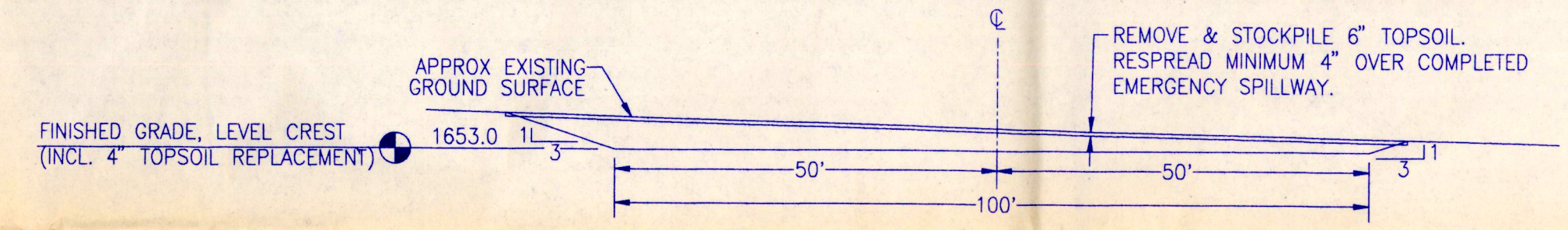
TRAIL DIKE
STA. 1+38
N=9353.94
E=9930.69
STA. 4+00
N=9572.71
E=9944.80



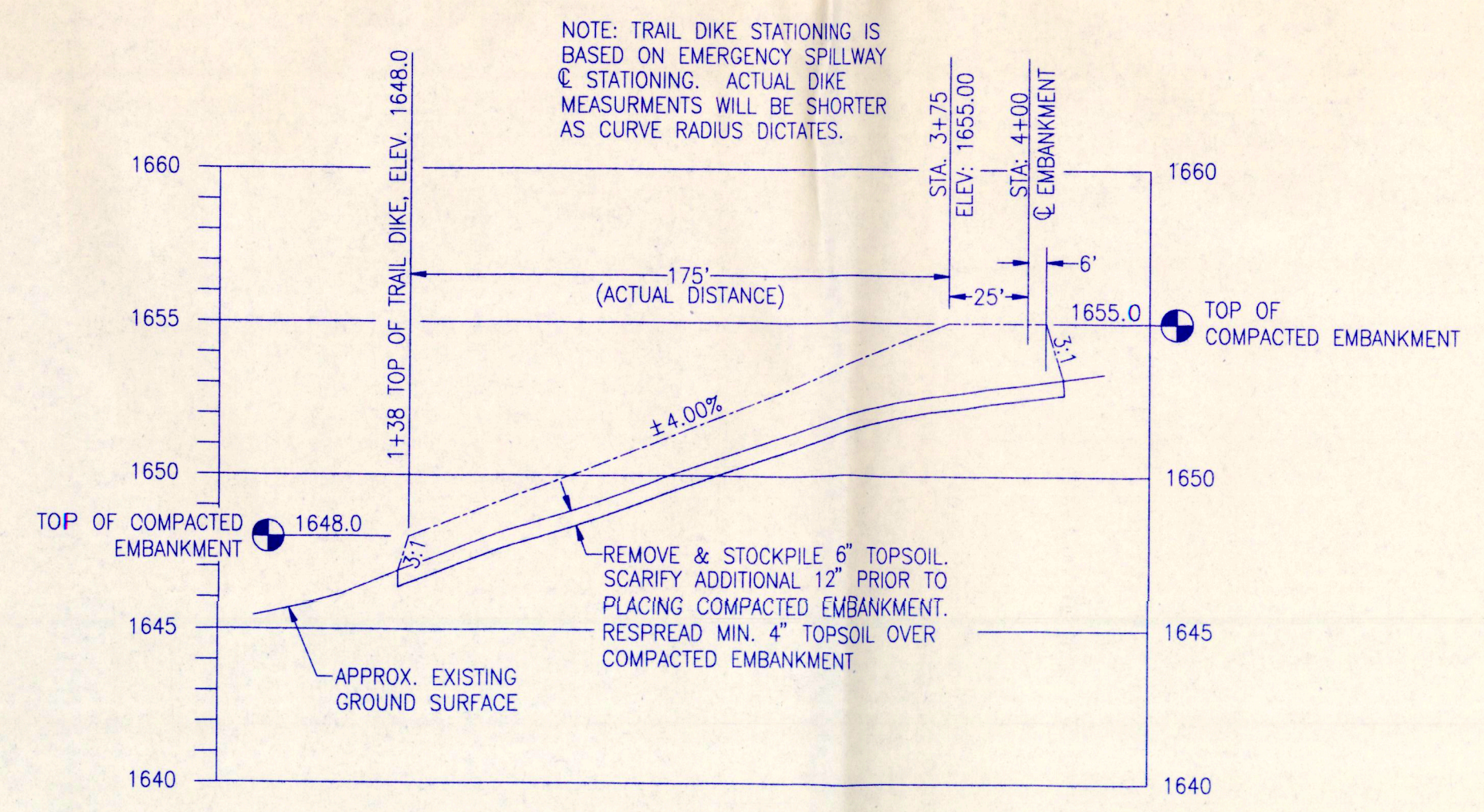
EMBANKMENT SECTION
SCALE: 1"=20'



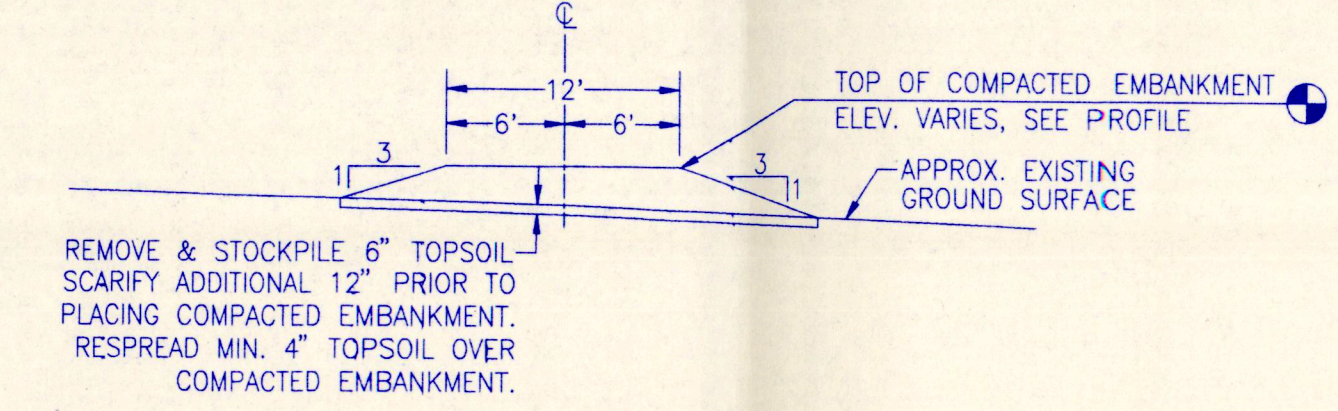
EMERGENCY SPILLWAY C PROFILE
SCALE: 1"=100'



EMERGENCY SPILLWAY-LEVEL CREST SECTION
SCALE: 1"=20'

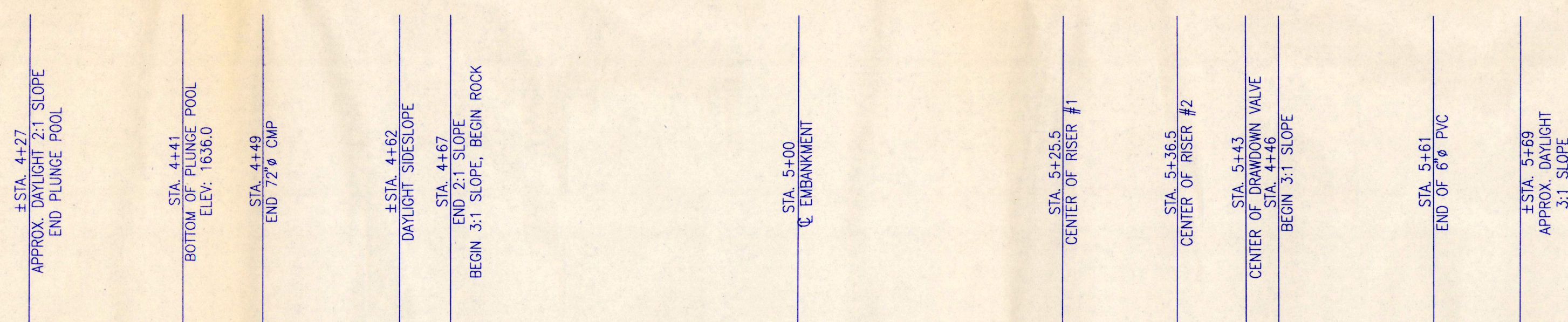


TRAIL DIKE C PROFILE
SCALE: 1"=50' HORIZ
1"=5' VERT

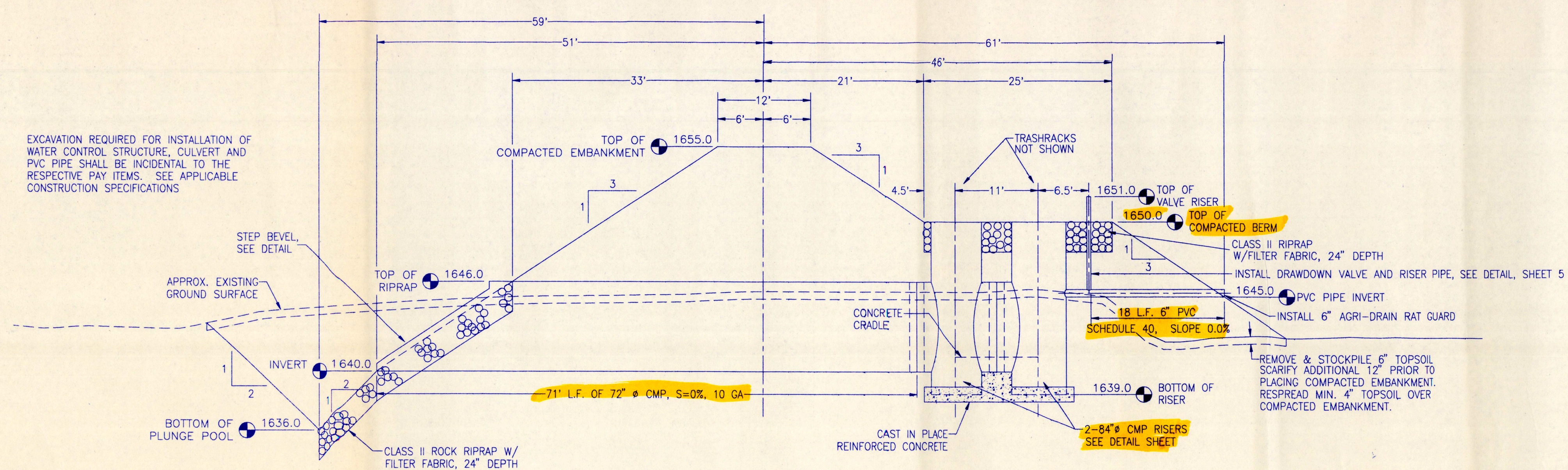


TRAIL DIKE SECTION
SCALE: 1"=10'

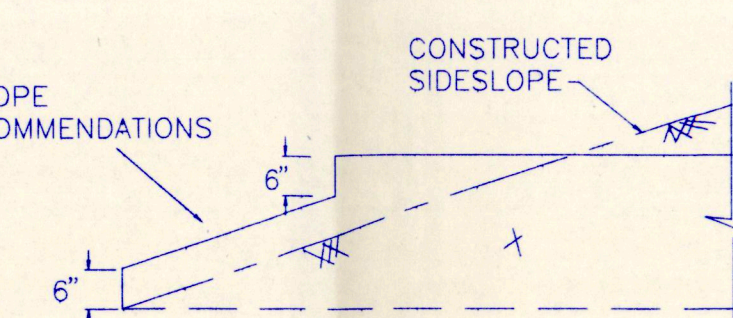
PREPARED BY:		PROJECT NO. SD-0206-001		DESIGNED BY: DJL	
TOMAN ENGINEERING COMPANY CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS 905 2ND ST. N.W. • WABASH, NORTH DAKOTA 58555 • 701-933-5453		DUCKS UNLIMITED INC. GREAT PLAINS REGIONAL OFFICE DATE: 1-21-1997		LOREN PAULSON WETLAND EMBANKMENT AND EMERGENCY SPILLWAY PLAN, PROFILE, AND SECTIONS APPROVED BY: [Signature]	
SHEET NO. 3 OF 6		DRAWN BY: TECO TSP		SURVEYED BY: [Signature]	
CHECKED BY: [Signature]		APPROVED BY: [Signature]		APPROVED BY: [Signature]	



EXCAVATION REQUIRED FOR INSTALLATION OF WATER CONTROL STRUCTURE, CULVERT AND PVC PIPE SHALL BE INCIDENTAL TO THE RESPECTIVE PAY ITEMS. SEE APPLICABLE CONSTRUCTION SPECIFICATIONS



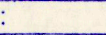
SLOPE OF THIS CUT TO
MATCH CONSTRUCTED SIDESLOPE
OR PER MANUFACTURER RECOMMENDATIONS



STEP BEVEL DETAIL
NOT TO SCALE

SCALE: 1"=5' VERT
1"=10' HORIZ

PREPARED BY:


7244

TOMAN ENGINEERING COMPANY
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
905, 2ND ST. N.W. • MANDAN, NORTH DAKOTA 58554 • 701-663-6448



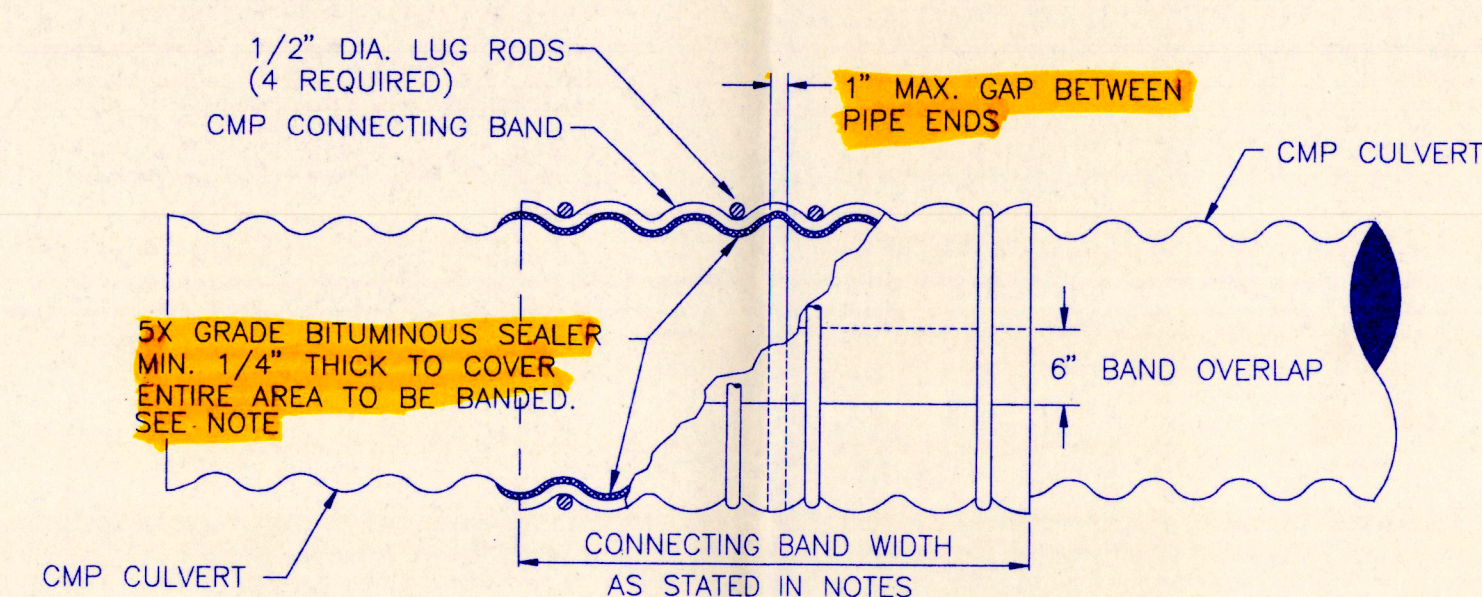
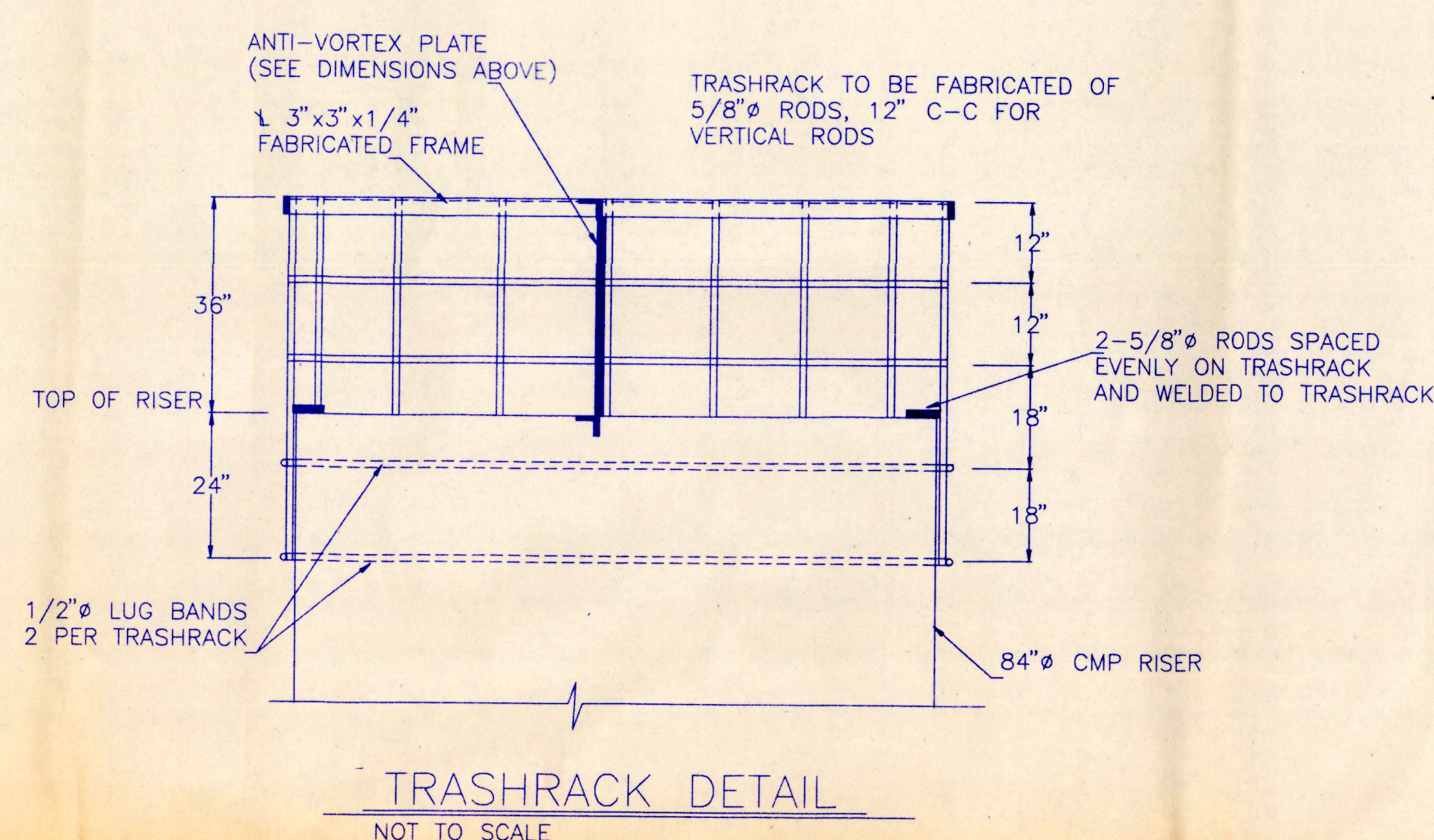
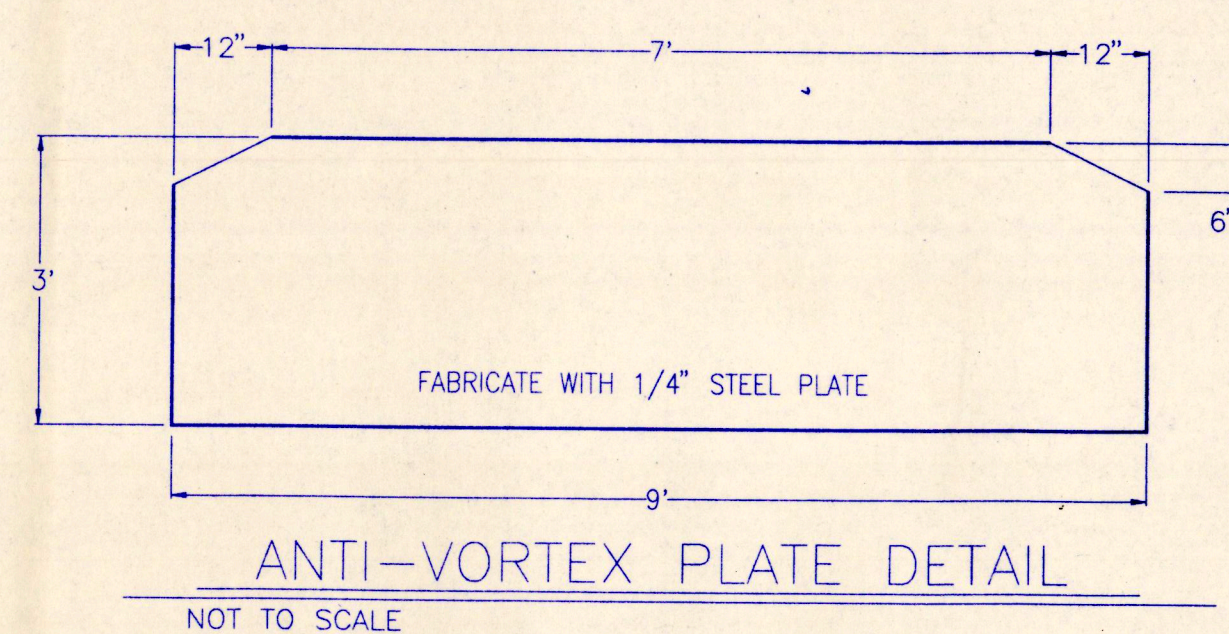
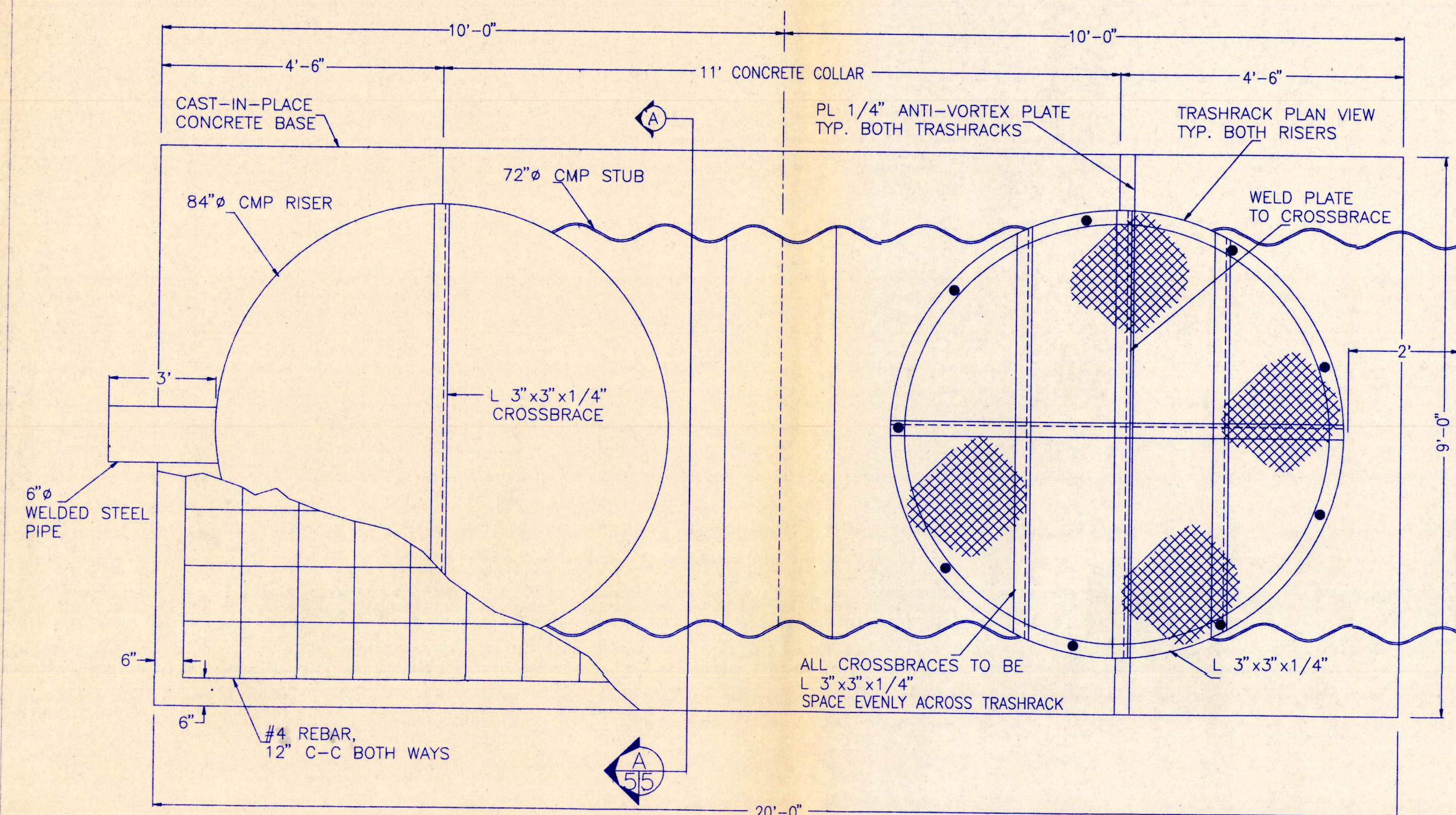
**DUCKS
UNLIMITED
INC.**
GREAT PLAINS REGIONAL OFFICE

PROJECT NO. SD-0206-001
LOREN PAULSON WETLAND
STRUCTURE PLAN & DETAILS

DESIGNED BY:	D.J.L
DRAWN BY:	AM
SURVEYED BY:	
CHECKED BY:	

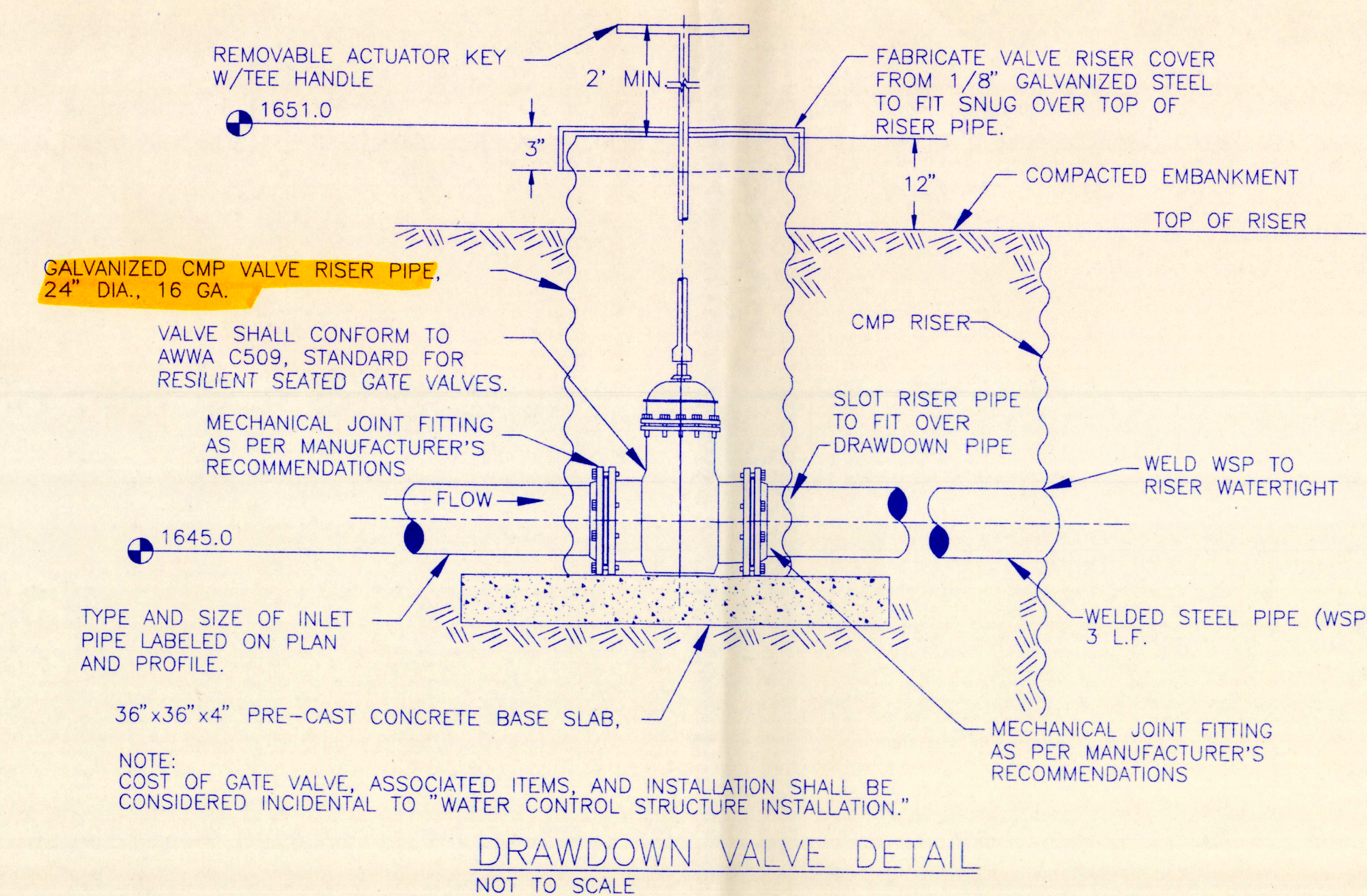
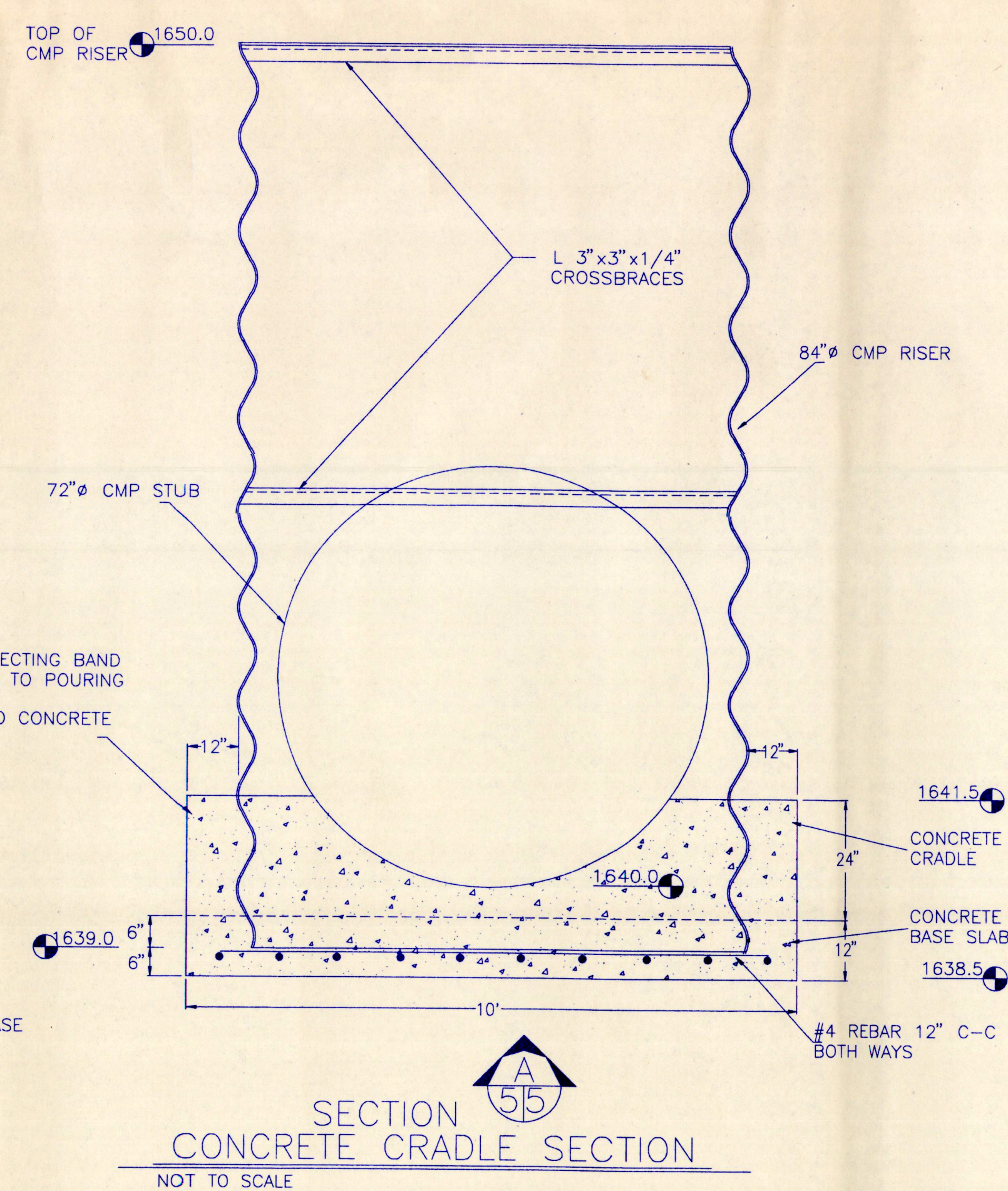
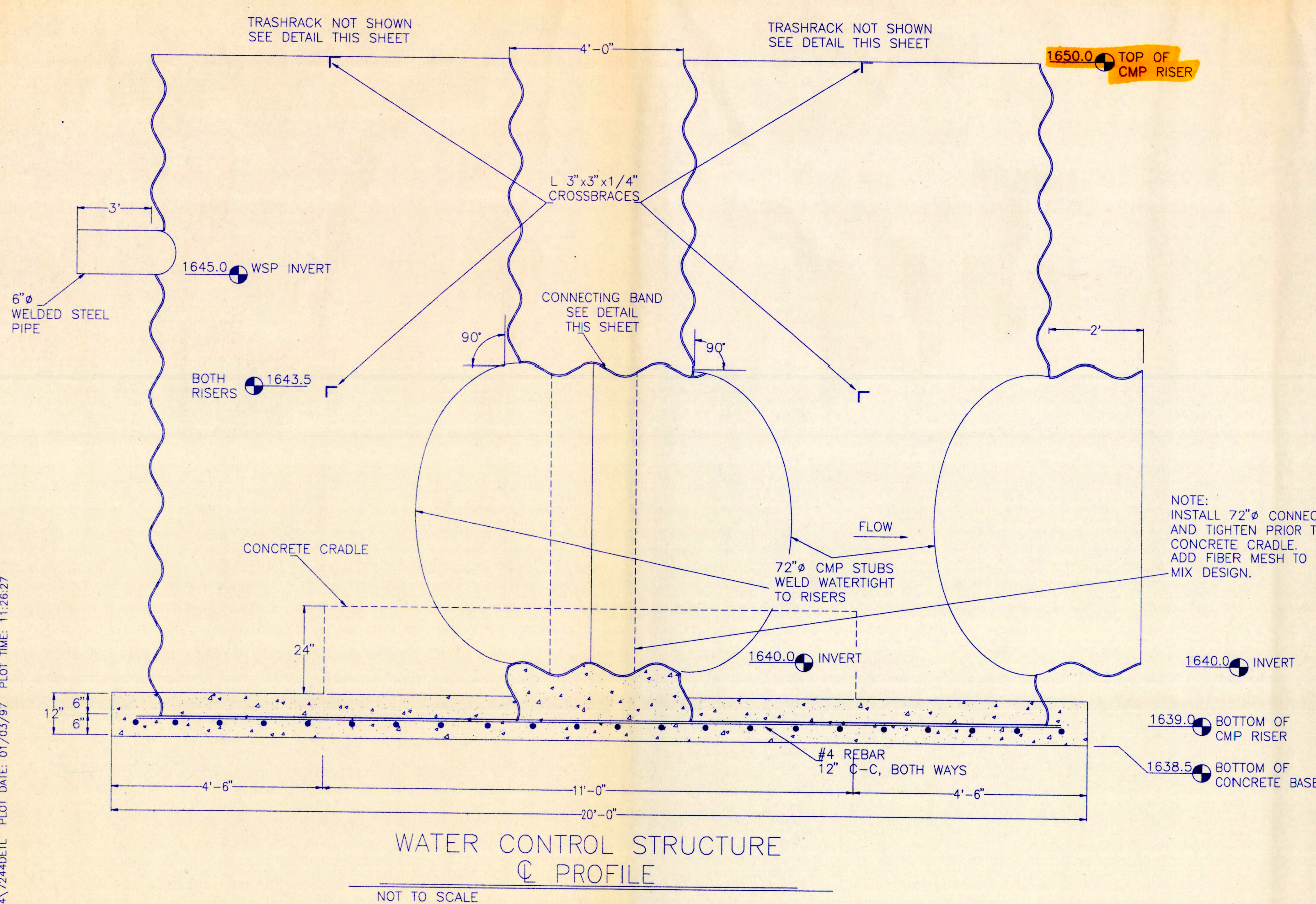
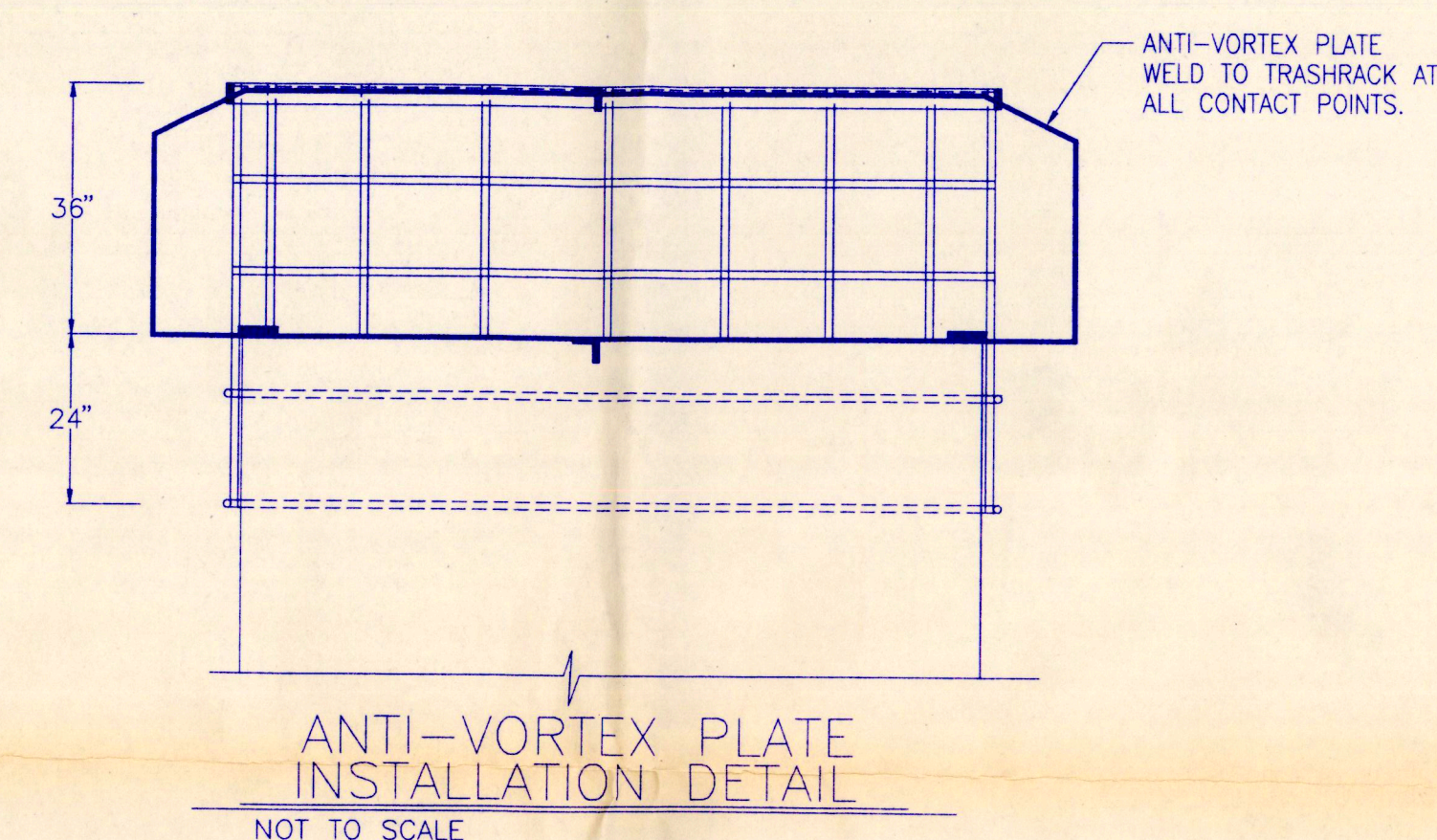
DWGNAME: 7244CTRL PLOT DATE: 01/03/97 PLOT TIME: 10:45:40

6014-3



AFTER BANDS HAVE BEEN TIGHTENED, A COAT OF 5X GRADE BITUMINOUS SEALER SHALL BE APPLIED AROUND THE CULVERT AT THE ENDS OF THE CONNECTING BAND AND ALONG THE SEAM OF THE BAND OVERLAP.

NOTE TO SUPPLIERS:
IF ANNULAR PIPE IS USED, USE A 2 FT. WIDE ANNULAR BAND. IF HELICAL PIPE WITH 4 CORRUGATIONS REROLLED TO ANNULAR IS USED, USE A 21 INCH WIDE ANNULAR BAND. SEE SPECIFICATION 207.2.



PREPARED BY: TECO	DATE: 12/23/96	DESIGNED BY: D.J.L.
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS 808 2ND ST. N.W. • WASHINGTON, NORTH CAROLINA 28584 • 707-663-6463	SHEET NO. 5 OF 6	DRAWN BY: AM
PROJECT NO. SD-0206-001 LOREN PAULSON WETLAND		CHECKED BY:
GREAT PLAINS REGIONAL OFFICE		APPROVED BY: