

WATER PERMIT NO. 2535-2

Name of Applicant: Ray McQuiston

Address: 20489 Willow Creek Rd, Ft. Pierre SD ⁵⁷⁵³² 57501 Phone: 605 223-3197

Amount of Water Claimed: 52.30 AF Total Acres: NA

Source of Water Supply: runoff

Water to be used for: fish & wildlife propagation County: Stanley

Type of Waste Disposal System:

Location: 15 miles northwest of Ft. Pierre

PRIORITY Date Received: 8-25-04 Application/License Fee: \$200

Corrected Application Received: Period of Annual Use: January 1 – December 31

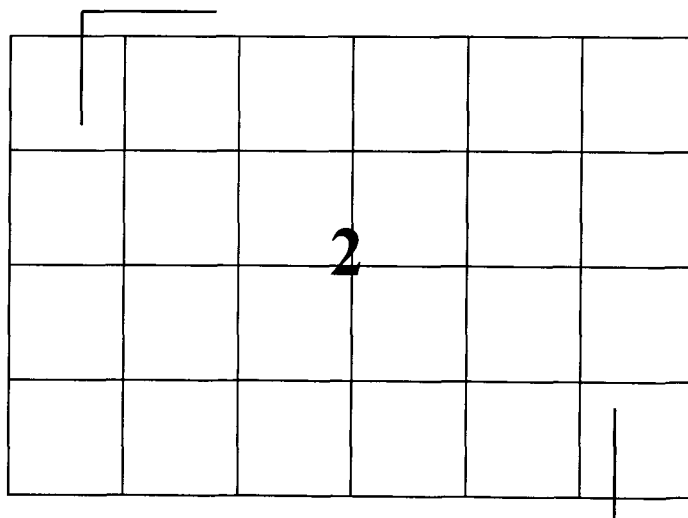
Remarks: West Dam

Diversion Point: N ½ SE ¼ Sec 2-T5N-R28E

Water Impounded:

~~Land to be Irrigated:~~ N ½ SE ¼, S ½ NE ¼ Sec 2-

T5N-R28E



Depth of Well: NA

Well Driller: : NA

Remarks:

Type of Map: topo

Prepared by: Angela Roman, NRCS

Reviewed and the Number Assigned on: 8-25-04

By: Karen Schlaak

Notice of Hearing - date to intervene: _____

RECEIVED

AUG 25 2004

AIR QUALITY
PROGRAM

Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	No. <u>2535-2</u> (office use only) Hydrologic Unit <u>10140102</u>
	Basin <u>Bad River</u>
	Newspaper <u>Capital Journal, Pierre</u>

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

Check use(s) of water:

- | | | | |
|---|---|--|--|
| ☐ Municipal | ☐ Suburban Housing | ☐ Recreational | ☐ Institutional |
| ☐ Rural Water System | ☐ Commercial | ☒ Fish & Wildlife | ☐ Geothermal Heat |
| ☐ Domestic (over 18 gpm) | ☐ Industrial | ☒ Other <u>Livestock</u> | |

Type of Application: (check one)

- ☒ New ☐ Vested Right (Use predates Mar 2, 1955) ☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____
☐ Amendment/Correction to Permit No. _____

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

- Name of Applicant Ray McQuiston (check one) ☒ Owner ☐ Tenant/lessee Phone (605) 223-3197
Mailing Address 20489 Willow Creek Road Fort Pierre State SD 57501
(Street, RR, or Box and City) (Zip Code)
- Amount of water claimed _____ *CFS or _____ **GPM 52.30 ***AF
(*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use if applicable)
- Source of water supply Runoff from Watershed
- Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) County Stanley
SE 1/4, SE 1/4, Section 2-T5N-R28E Water Impounded: N1/2 SE1/4, S1/2 NE1/4
N1/2 Sec 2 - T5N-R28E
- County or counties where water will be used Stanley
- Annual period during which water is to be used continuous Jan. 1 - Dec 31
- Give a description of the 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)

Attached Design Report, Plans and Specifications

West Dam

STATE OF SOUTH DAKOTA)
County of Stanley) SS

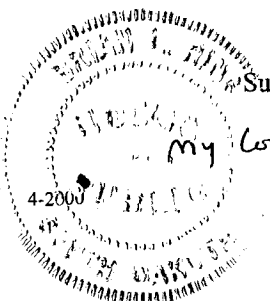
Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

I, Ray McQuiston, 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.

Applicant's signature Ray McQuiston

Subscribed and sworn to before me this 20th day of August 2004

Notary Public signature



**SOUTH DAKOTA
WATER PERMIT NO. 2535-2**

Date of first receipt of application August 25, 2004.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 2535-2 to Ray McQuiston, 20489 Willow Creek Road, Ft. Pierre SD 57532 authorizing the construction of the dam and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 2535-2 authorizes impoundment of 52.3 acre-feet of water from runoff by constructing a dam located in the N ½ SE ¼ Section 2 with water impounded in the N ½ SE ¼, S ½ NE ¼ Section 2; all in T5N-R28E.
2. The water appropriated shall be used for the purpose of fish & wildlife propagation and livestock water 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. 2535-2 is November 12, 2004.
5. The date from which applicant may claim right is August 25, 2004.
6. One-fifth of the construction is to be completed on or before March 12, 2007.
7. All construction is to be completed on or before November 12, 2009.
8. Water is to be put to beneficial use on or before November 12, 2013.
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. 2535-2 authorizes a dam with a storage capacity of 52.3 acre feet of water and sufficient water annually to maintain the water level to an outlet elevation.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

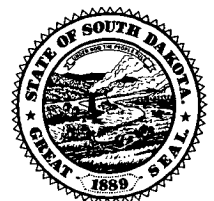
WATER MANAGEMENT BOARD

By: Garland Erbele

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

NOV 19 2004

date



(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 _____ 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. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) _____
- b) System Capacity (gallons) _____ Year Constructed _____
- c) Connected to the City of _____ Sanitary System

3. Dugout Information

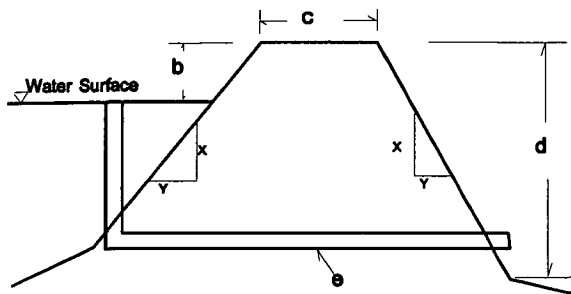
- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to 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:

USDA-NRCS
314 S. Henry Street, Suite #300
Pierre, SD 57501



- b) Freeboard _____ 6.5
- c) Crest Width _____ 14
Crest Length _____ 660
- d) Height _____ 28
- e) Primary Outlet Capacity _____ 79.3 cfs
If pipe, diameter _____ 24"
- f) Secondary Spillway Capacity _____ 645.9 cfs
Spillway Width _____ 100'
- g) X & Y Slope _____
Upstream _____ 3:1
Downstream _____ 3:1
- h) Surface Area of Impoundment _____ 9.19
- i) Storage _____ 52.3 _____ Acre Feet
- j) Drainage Area Above Dam _____ 913.0 _____ Acres

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date August 25, 20 04

RECEIVED OF Stanley County Conservation Dist., 316 S Coteau Suite 103, Pierre SD 57501

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

Fee for Application for Permit No. <u>2535-2</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. <u>2535-2</u>	50	00
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	<u>\$200.00</u>

No. 004102

By

Darland Culbreth
Chief Engineer

United States Department of Agriculture



Natural Resources Conservation Service
Field Support Office
314 S. Henry Street, Suite 300
P. O. Box 1258
Pierre, SD 57501-1258

Telephone: (605) 224-2476
Fax: (605) 224-6615

July 23, 2004

Water Rights Program
South Dakota Department of
Environment and Natural Resources
Foss Building
523 E. Capitol Avenue
Pierre, SD 57501

To Whom It May Concern:

Attached are plans, specifications, design data, and a water rights permit application for a dam for Ray McQuiston. This project is being constructed under the Bad River Water Quality Program which means the structure must be built and paid for by this fall, therefore time is of the essence. Your promptness is appreciated with this project.

Please don't hesitate to call me at the above number with any concerns or questions.

A handwritten signature in cursive script that reads "Angela Roman".

ANGELA D. ROMAN
Agricultural Engineer

RECEIVED

AUG 25 2004

AIR QUALITY
PROGRAM

Attachments

cc: Dana Edwards, Civil Engineer, NRCS, Pierre, SD



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

September 21, 2004

Ray McQuiston
20489 Willow Creek Rd.
Ft. Pierre, SD 57501

Dear Mr. McQuiston:

We have reviewed the plans and specifications for your dam projects located in the SE 1/4 of Section 2-T5N-R28E and the NE 1/4 Section 6-T5N-R29E, in Stanley County. The plans and specifications as submitted are approved. Approval of the plans and specifications does not authorize construction of the dams. The construction may not begin until Water Permit Application Nos. 2535-2 and 2536-2 are 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 you, as owner of the dams, from the responsibility for operating and maintaining the dams in good repair to ensure the safety of the dams.

Both dams will be classified as a small size Category 3, Low Hazard dam with the McQuiston West Dam having a dam height of 28 feet with a normal storage capacity of 52.3 acre-feet and a maximum storage capacity of 136 acre-feet; and the McQuiston East Dam having a dam height of 21 feet with a normal storage capacity of 45.4 acre-feet and a maximum storage capacity of 127 acre-feet.

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

Sincerely,

A handwritten signature in cursive script that reads "Gale N. Selken".

Gale N. Selken, P.E.
Natural Resources Engineer Director
for Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

c: Angela Roman, NRCS, Pierre

**Design Report
Ray McQuiston
West Dam**

Summary

This is a multi-purpose dam for sediment control, livestock water, and wildlife. This is a new construction of the dam. Funding for this project will be provided by the Bad River Water Quality Project and Ray McQuiston.

Job Description

This site is a Hazard "A" and Job Class IV structure with a drainage area of 913 acres. In the event of a breach, range and pastureland could be damaged. The principle spillway of this site is a 24" diameter corrugated smooth lined polyethlelyne pipe, with a concrete 60" diameter drop structure.

Basis for Design

Overall design of this structure was governed by the 378 Pond standard. The design is routing the 5yr- 24hr storm through the principle spillway with approval of Walter Delp, Assistant State Conservation Engineer.

General Basic Data

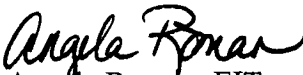
This pond will require a Water Rights Permit from South Dakota Department of Environment and Natural Resources. Refer to storage tables on sheet 1 of 8.

Hydrology

The principle spillway was routed using a 5 year frequency 24 hour duration storm of 2.9 inches. The emergency spillway was routed using a 50 year frequency 24 hour duration storm of 4.4 inches.

Soils

Roger Assmus and Kevin Paulsen conducted a soils investigation; the results are attached to this report.



Angela Roman, EIT
Agricultural Engineer

Date: *July 23, 2004*

Water Permit Application No. 2535-2
 Ray McQuiston
 (West Dam - Sec. 2-T5N-R78E)

Top of Dam Elev. - 100.5
 2nd Spillway Elev. - 98
 P. Spillway Elev. - 94
 Dis. Top Elev. - 72.5

Cont. 3 - Low Hazard Dam

Ht. = 28 ft

Normal Storage Capacity - 52.3 Ac-Ft
 Int. Storage Capacity - 98.7
 Max. Storage Capacity - 136.0

Int. Capacity x Eff. Ht. = $98.7 \times 20 = 1974 < 3000 \therefore 25 \text{ year}$
Minimum Spillway Design

From USGS WRI 80-80 "Tech. for Est. Flood Peaks ... in SO"

$$DA = 913 \text{ Ac} = 1.43 \text{ mi}^2$$

$$\text{Slope} = 80 \text{ ft/mi}$$

$$SI = 1.76$$

$$\begin{aligned} Q_{100} &= 83.4 A^{.60} S^{.44} S^{-.72} \\ &= 83.4 (1.43)^{.60} (80)^{.44} (1.76)^{-.72} \\ &= 83.4 (1.2344) (6.87) (0.6656) \\ &= \underline{475 \text{ cfs}} \end{aligned}$$

$$\begin{aligned} Q_{100} &= 132 A^{.65} S^{.46} S^{-.67} \\ &= 132 (1.43)^{.65} (80)^{.46} (1.76)^{-.67} \\ &= 132 (1.2617) (7.50) (.6847) \\ &= \underline{855 \text{ cfs}} \end{aligned}$$

Secondary Spillway Flow

$$\begin{aligned} Q &= CLH^{3/2} \quad C=2.6 \\ &= (2.6)(100)(2.5)^{1.5} \quad L=100 \\ &= \underline{1025 \text{ cfs}} \quad H=2.5 \end{aligned}$$

Section 74:02:08:09

1. Topo Map - OK
2. Dam Axis Profile - OK
3. Dam Max X-Sec. - OK
4. Area Capacity - OK
5. Outlet Details - OK
6. Spillway Rating - OK
7. Spillway Details - OK
8. Specs - Std NRCS - OK
9. EPP - N/A - Cats - OK

NRCS Annual Y=16

$$DA = 913 \quad ISO = 2 \quad CN = 80$$

$$80\% \text{ chance} = 0.26$$

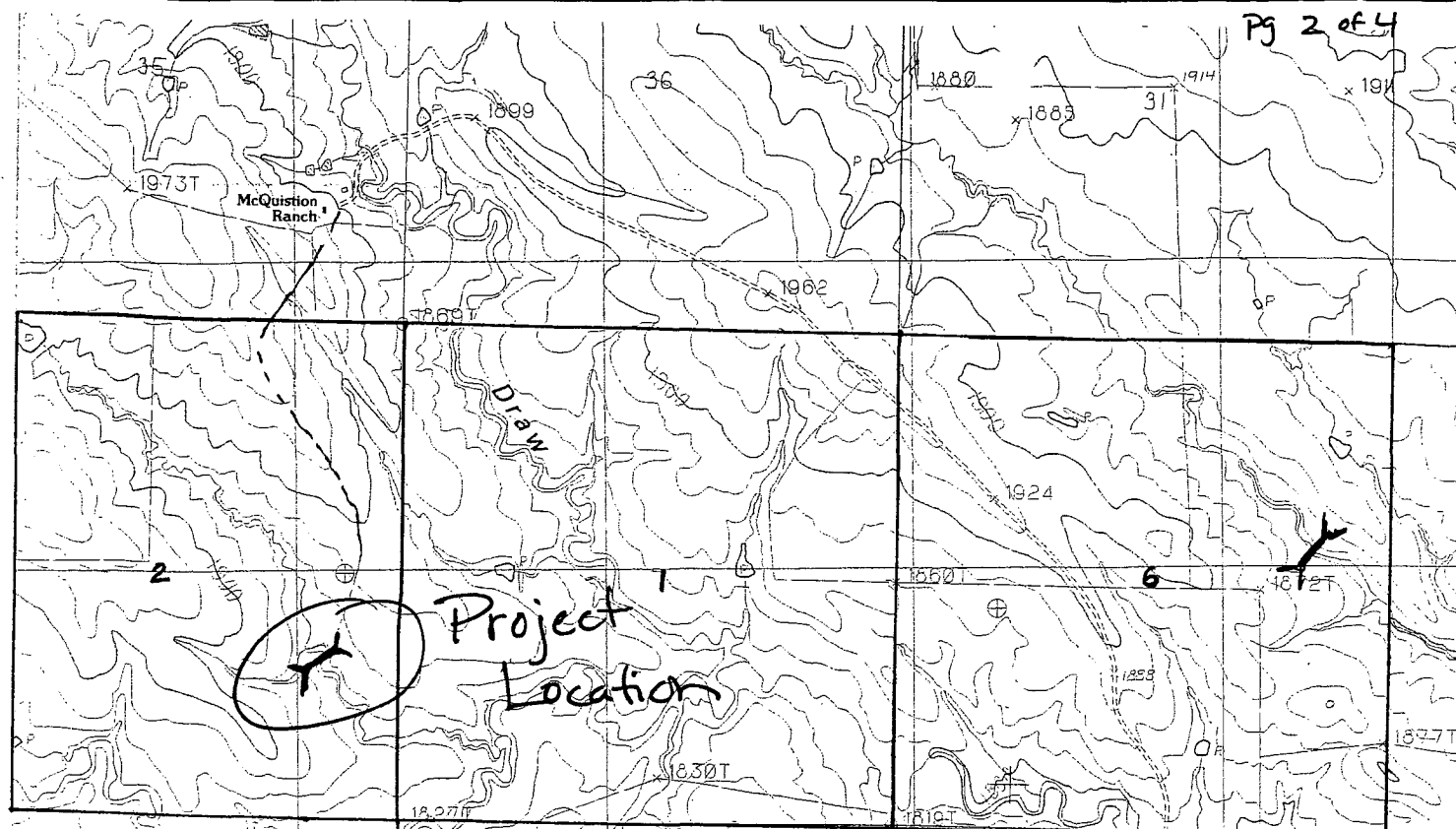
$$0.26 \times 9^{13/12} = \underline{20 \text{ Ac-Ft}}$$

$$50\% \text{ chance} = 0.66$$

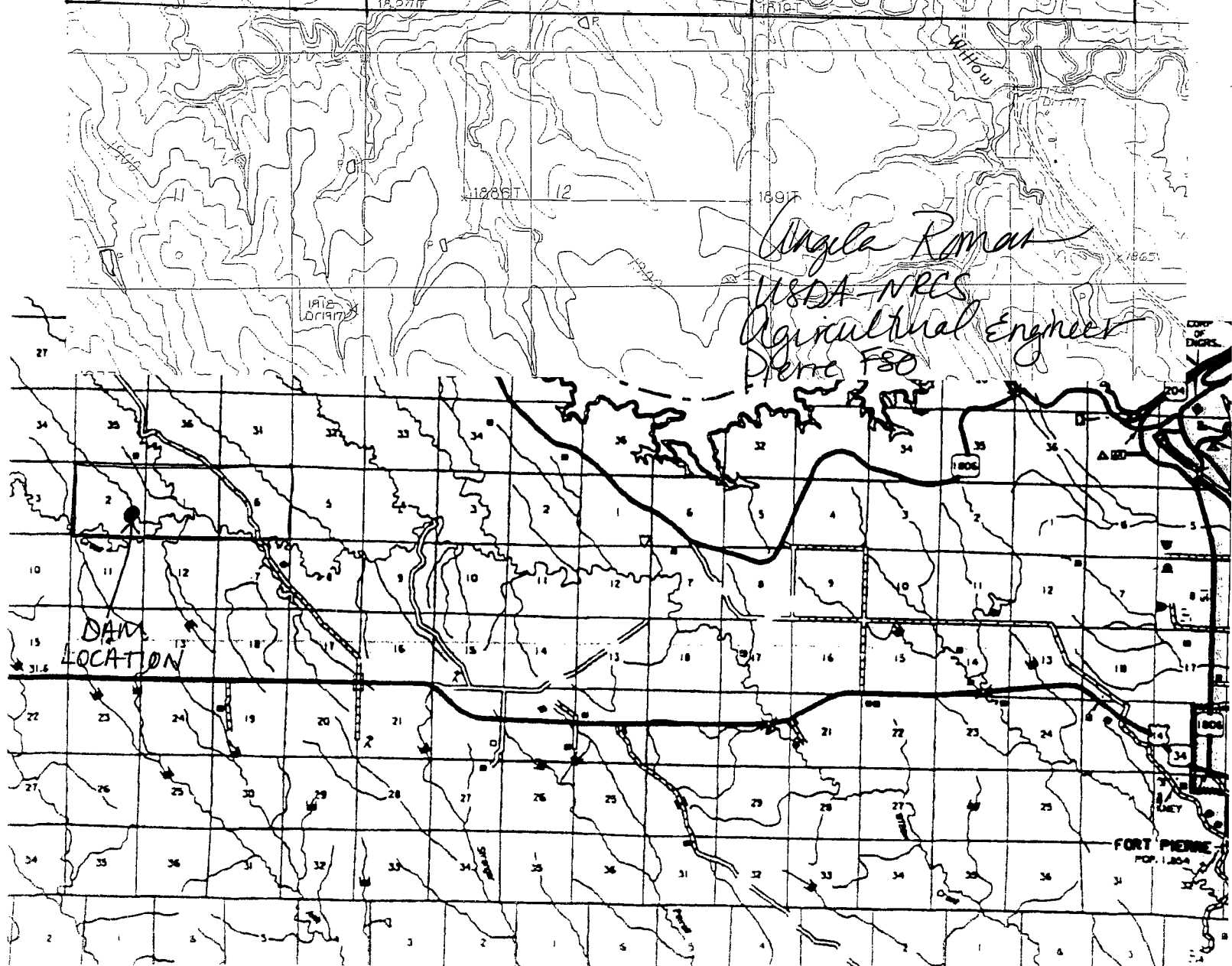
$$0.66 \times 9^{13/12} = \underline{50 \text{ Ac-Ft}}$$

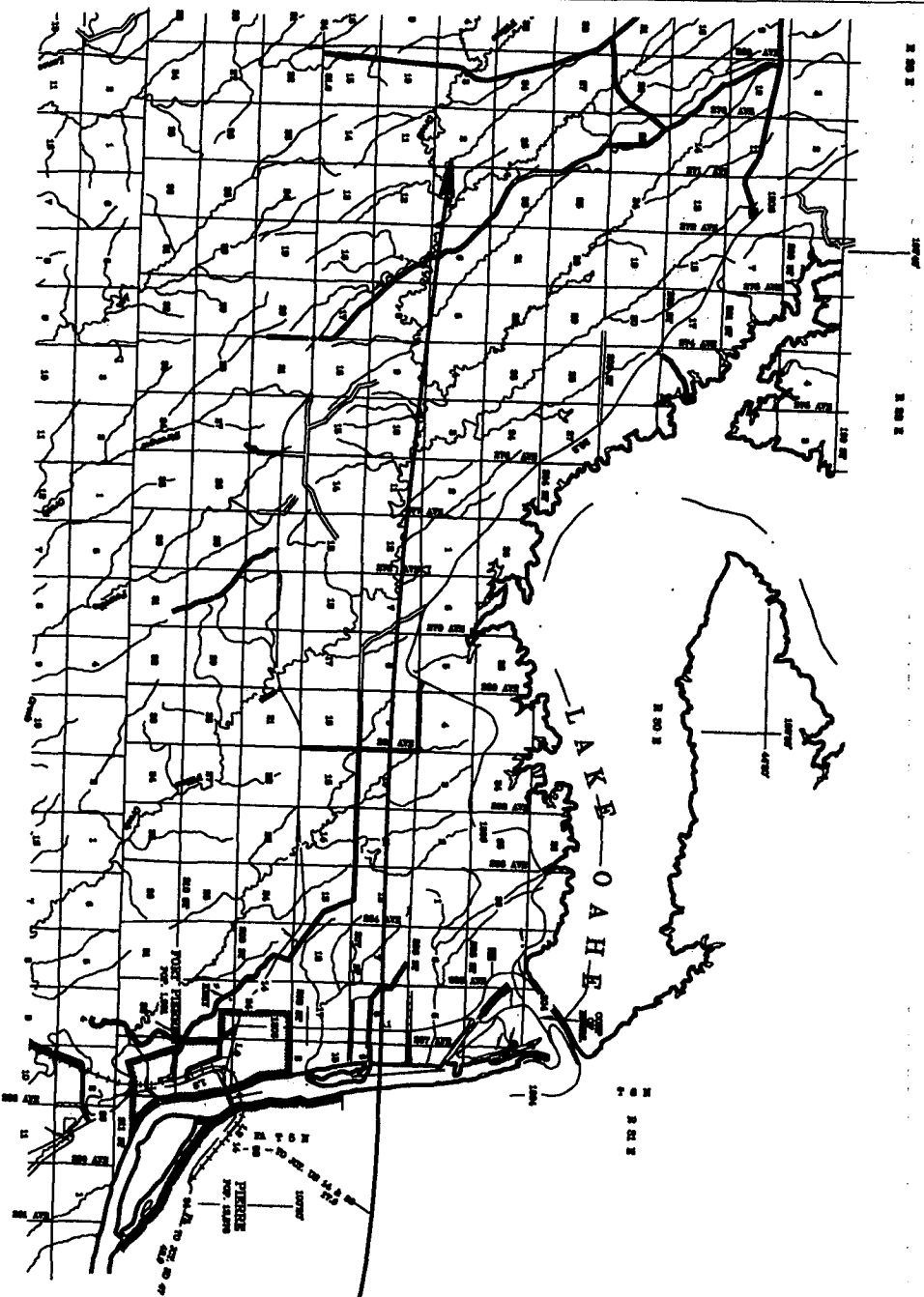
$$10\% \text{ chance} = 2.5$$

$$2.5 \times 9^{13/12} = \underline{190 \text{ Ac-Ft}}$$



Angela Roman
USDA-NRCS
Agricultural Engineer
Dennis, FSO





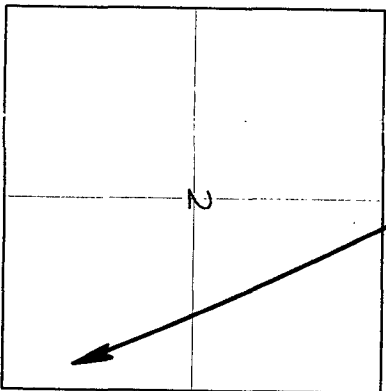
Notes

1. A preconstruction meeting is required before construction between NRCS, Ray McQuistion, and the contractor.
2. Water Rights Permit and Location Notice is required by South Dakota Department of Environment and Natural Resources. This is the responsibility of the landowner.
3. Extra permanent storage has been provided at the request of the landowner. Pond may not stay full and the pond level will vary.

Sheet Index

- 1 Cover
- 2 Plan
- 3 General Layout
- 4 Profile of Dam
- 5 Cross Section of Dam
- 6 Concrete Riser
- 7 Trash Rack and Baffle
- 8 Sand Anti-Seep Collar
- 9 Timber Pipe Support

**Hazard Class A
Job Class IV**



T5N R28E

Contact Information

Ray McQuistion
20489 Willow Creek Road
Ft. Pierre, SD 57532
605-223-3197

TABLE OF QUANTITIES

ITEM	UNIT	QUANTITY	'AS BUILT' QUANTITY
Excavation (core trench)	cu. yd.	953	
Earthfill Class A	cu. yd.	21,542	
Topsoil	sq. yd.	4,778	
Seeding	acre	2.3	
60" dia. x 4' deep concrete drop structures	each	1	
24" dia. dual wall smooth lined PE pipe	lin. ft.	129	
4" PVC Perforated Pipe (SCH 40 min)	lin. ft.	13	
4" PVC NON Perforated Pipe (SCH 40 min)	lin. ft.	62	
Fine Drainfill	cu.yd.	11	
Outlet Support	each	1	

Construction Specifications

Clearing and Grubbing
SD-2
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Excavation
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Earth Fill, Class S
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Drain Fill and Filter
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Salvaging and Spreading Topsoil
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Concrete for Minor Structures
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Steel Reinforcement
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Wood Fabrication and Installation
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Seeding
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Plastic Pipe
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD-28
SD-65

Hydraulic Data

Drainage Area
913 Acres

Time of Concentration
2.2 hours

Runoff Curve Number
80

Principal Spillway, 5 yr, 24-hr. Rainfall
2.9 inches

Emergency Spillway 50 yr, 24-hr. Rainfall
4.4 inches

Principal Spillway Discharge as ES
76.3 CFS.

Emergency Spillway Discharge
482.1 CFS

Required Sediment Storage (35 yrs)
37.6 AcFt

Sed. Storage Below Crest
52.3 AcFt

Sed. Storage Above Crest
1.0 AcFt

Crest of Normal Pool
9.19 Acres 52.3 AcFt

Crest of Emergency Spillway
14.06 Acres 98.7 AcFt

Top of Dam
16.97 Acres 136.0 AcFt

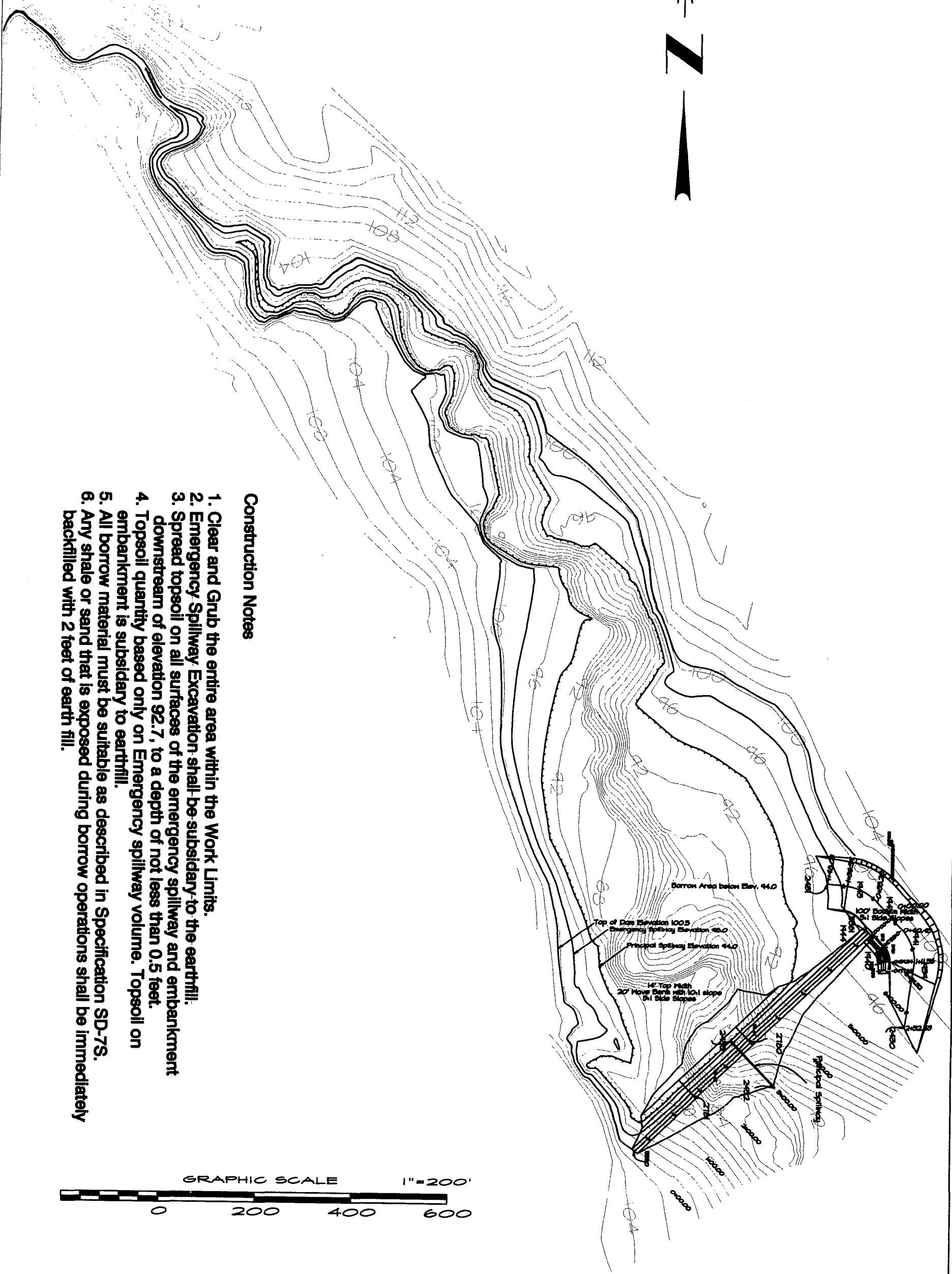
According to South Dakota State Law, "No excavator may begin any excavation without first notifying the One-Call Notification Center of the proposed excavation" at 1-800-781-7474

Ray McQuistion West Pond
SE1/4, Section 2, T5N, R28E
Stanley County, South Dakota

 **NATURAL RESOURCES CONSERVATION SERVICE**
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
314 South Henry Suite #300
PIERRE, SOUTH DAKOTA 57501-1258

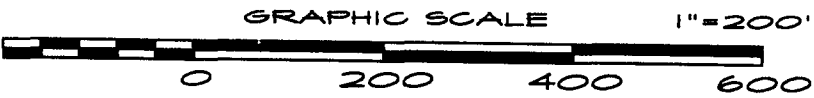
Designed by: A. Roman Date: 6/23/04
Drawn by: A. Roman Date: 6/24/04
Traced by: WMD
Checked by: WMD

Approved by: [Signature]
Title: ASSET F.C. Cont.
Title: CLASS IV



Construction Notes

1. Clear and Grub the entire area within the Work Limits.
2. Emergency Spillway Excavation shall be subsidiary to the earthfill.
3. Spread topsoil on all surfaces of the emergency spillway and embankment downstream of elevation 92.7, to a depth of not less than 0.5 feet.
4. Topsoil quantity based only on Emergency spillway volume. Topsoil on embankment is subsidiary to earthfill.
5. All borrow material must be suitable as described in Specification SD-7S.
6. Any shale or sand that is exposed during borrow operations shall be immediately backfilled with 2 feet of earth fill.



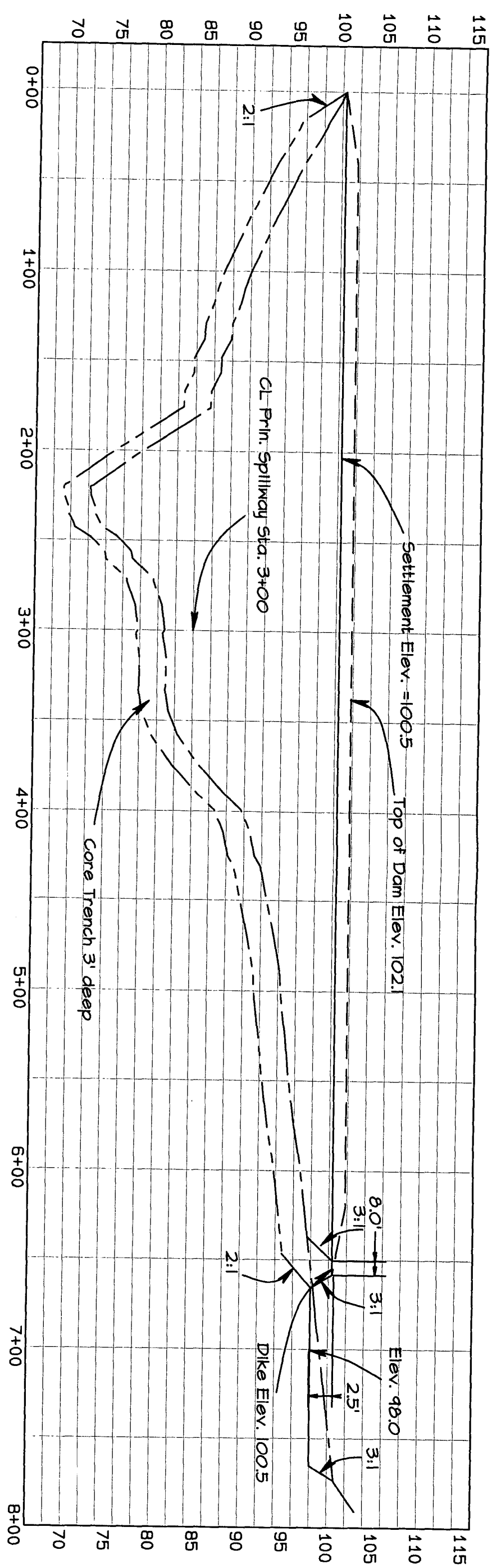
Ray McQuiston West Pond
SE1/4, Section 2, T5N, R28E
Stanley County, South Dakota

 **NATURAL RESOURCES
CONSERVATION SERVICE**
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
314 South Henry Suite #300
PIERRE, SOUTH DAKOTA 57501-1288

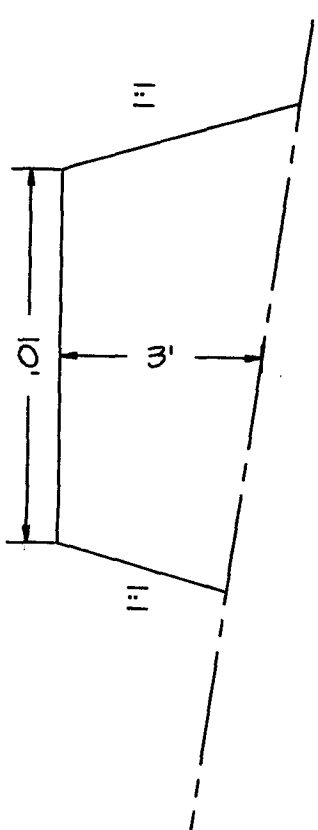
	Date:
Designed by: <u>A. Roman</u>	<u>6/23/04</u>
Drawn by: <u>A. Roman</u>	<u>6/24/04</u>
Traced by: _____	_____
Checked by: _____	_____

Approved by: _____
Title: _____
Title: _____

Cross Section on Centerline of Embankment



Typical Core Trench Cross Section

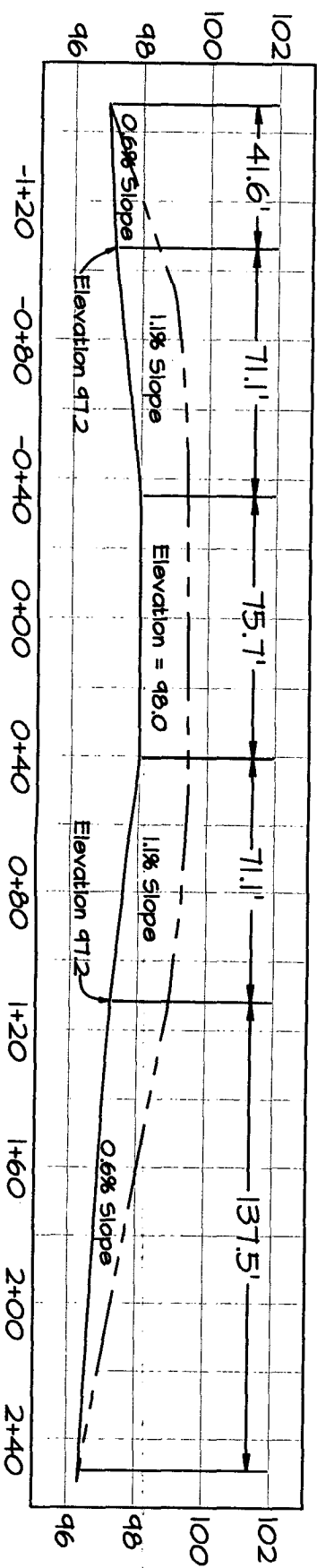
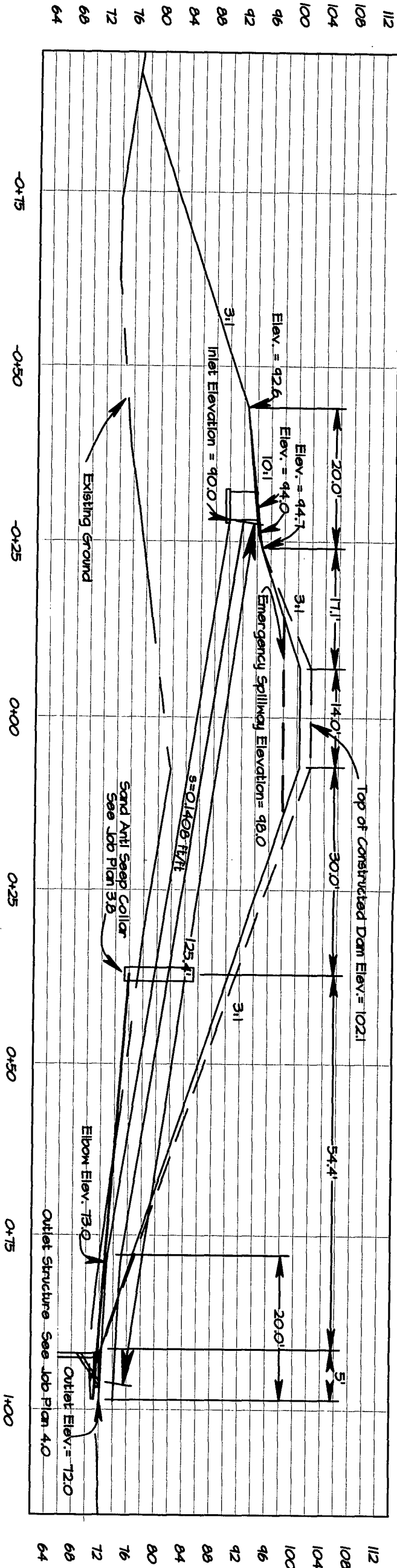


Ray McQuiston West Pond
SE1/4, Section 2, T5N, R28E
Stanley County, South Dakota

 **NRCS** NATURAL RESOURCES
CONSERVATION SERVICE
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
314 South Henry Suite #300
PIERRE, SOUTH DAKOTA 57501-1268

Designed by: A. Roman
Drawn by: A. Roman
Traced by:
Checked by:
Date: 6/23/04
6/24/04

Approved by:
Title:
Title:



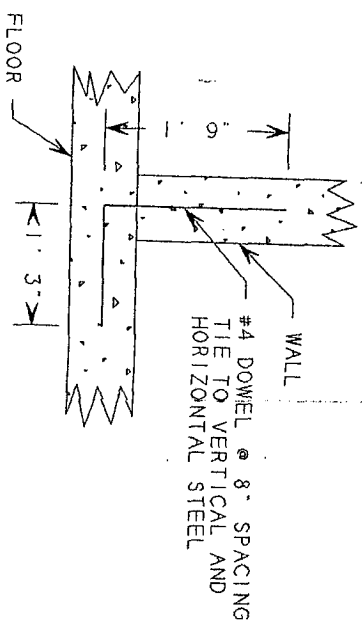
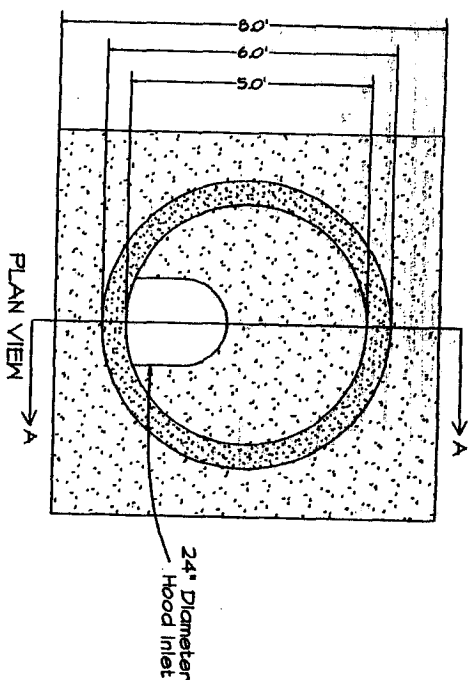
Note: Excavation of Emergency Spillway (2,107 CY) and Stripping (1,395 CY) is subsidiary to Earth Fill.

Ray McQuiston West Pond
 SE1/4, Section 2, T5N, R28E
 Stanley County, South Dakota

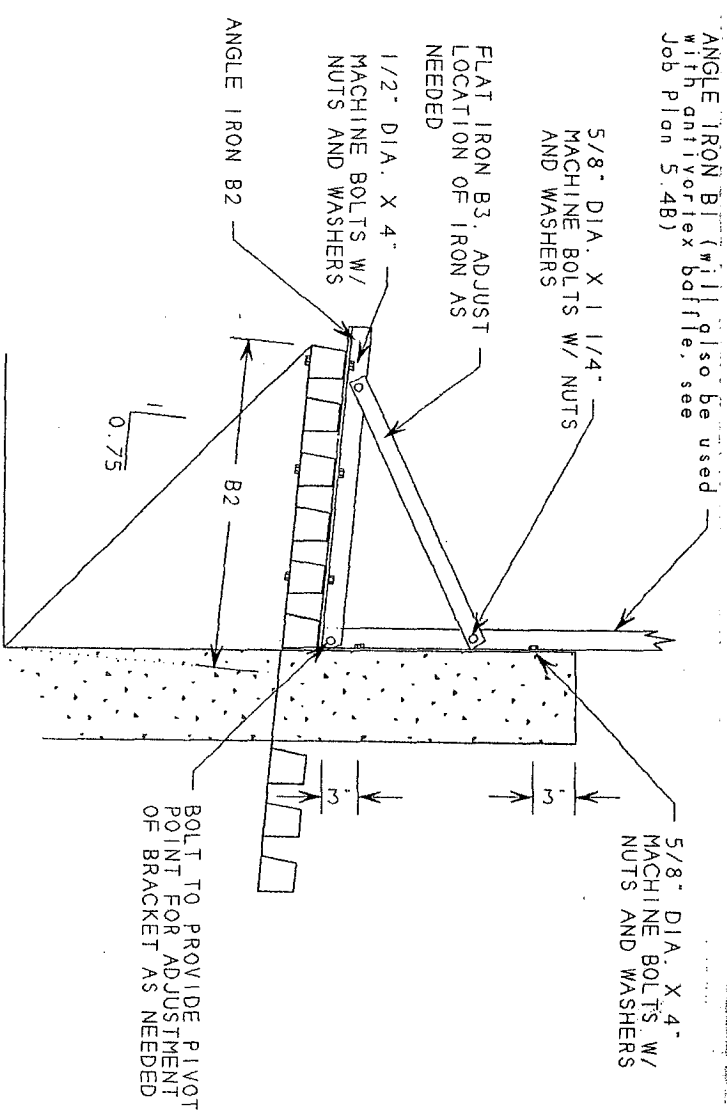
NRCS NATURAL RESOURCES CONSERVATION SERVICE
 USDA-NRCS PIERRE FIELD SUPPORT OFFICE
 314 South Henry Suite #300
 PIERRE, SOUTH DAKOTA 57501-1268

Designed by: A. Roman Date: 8/23/04
 Drawn by: A. Roman Date: 8/24/04
 Traced by: _____
 Checked by: _____

Approved by: _____
 Title: _____
 Title: _____



DOWEL DETAIL

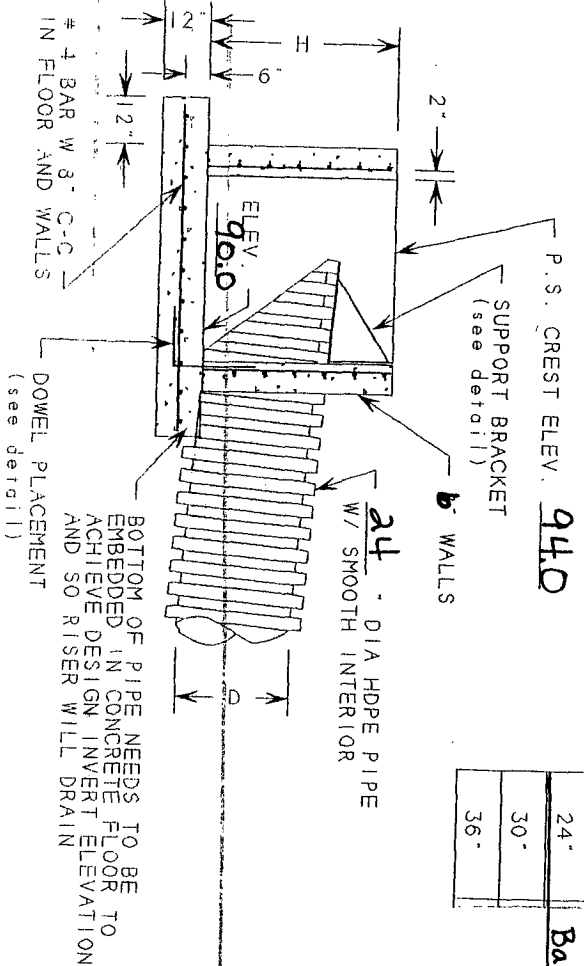


SUPPORT BRACKET DETAIL

BARREL DIA. D
10"
12"
15"
18"
24"
30"
36"

Base = 2.4 CY Drop Structure = 5.2 CY

SUPPORT BRACKET		BOLTS W/ WASHERS & NUTS	
2" X 2" 3/16" ANGLE IRON	3/16" X 2" FLAT IRON	1/2" DIA 5/8" DIA 5/8" DIA	X 4" X 1 1/4" X 4"
LENGTH FT. - IN. B1	LENGTH FT. - IN. B2	LENGTH FT. - IN. B3	
2'-10 1/4"	7 1/2"	1'-3"	2
2'-10 1/8"	9"	1'-4"	2
2'-10 3/8"	11 1/4"	1'-5"	2
2'-10 3/4"	1'-1 1/2"	1'-6"	2
3'-8 1/4"	1'-6"	1'-9"	3
3'-8"	1'-10 1/2"	2'-0"	3
4'-3 1/4"	2'-3"	2'-4"	3



SECTIONAL ELEV. A-A

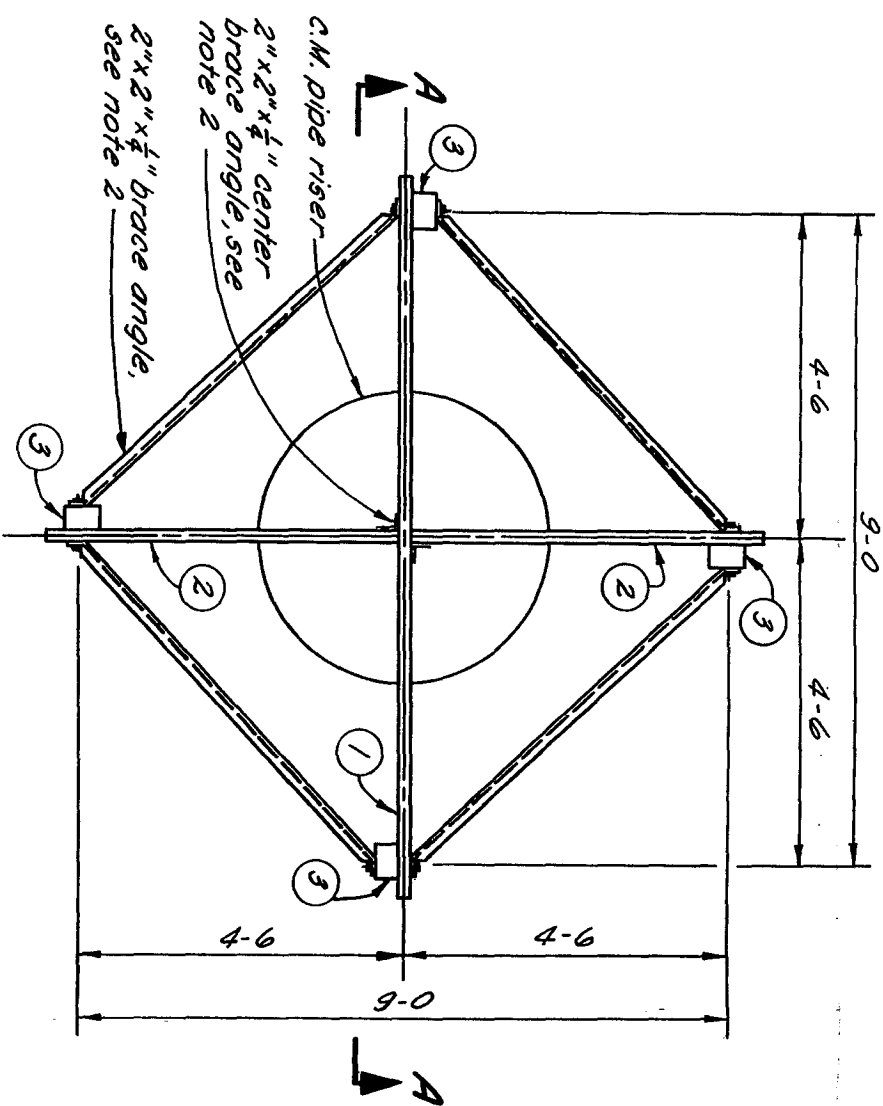
- NOTE: 1. CONCRETE AROUND PIPE NEEDS TO BE VIBRATED TO INSURE A GOOD SEAL AROUND PIPE.
2. CONSTRUCTION JOINT BETWEEN WALLS AND FLOOR OF CONCRETE RISER WILL HAVE #4 DOWELS @ MAX. 8" SPACING.
3. PE DOUBLE WALL CORRUGATED PIPE W/ SMOOTH INTERIOR (AASHTO M294 TYPE S) WITH BELL & SPIGOT JOINT AND WATER TIGHT GASKET.

CONCRETE RISER
AND POLYETHYLENE
HOOD INLET COMBINATION

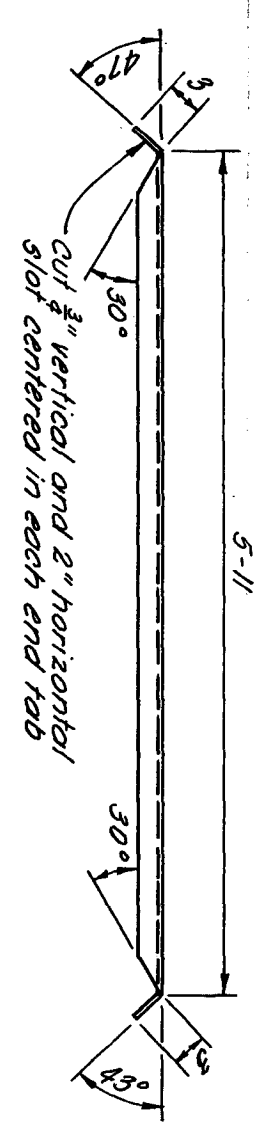
Roy McQuiston
Starkley County

USDA U.S. Department of Agriculture
Natural Resources Conservation Service

DESIGNED BY: O. Roman
DRAFTED BY: O. Roman
DATE: 7/9/04
APPROVED BY: [Signature]
TITLE: [Blank]
SHEET: 6 OF 8
FIG. NO.: [Blank]
REVISIONS: [Blank]



PLAN VIEW



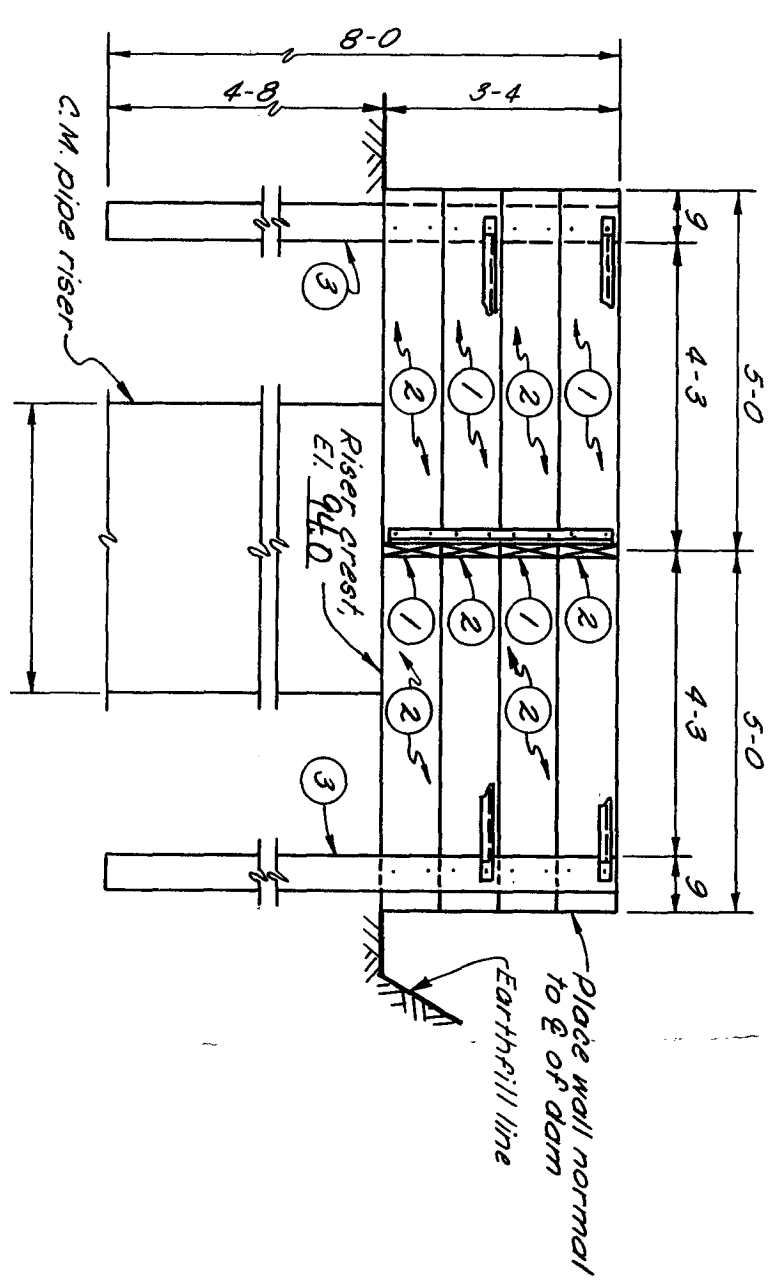
PLAN VIEW OF BRACE ANGLE

TABLE OF QUANTITIES

ITEM	MARK	NO. REQ'D.	QUANTITY
2" X 10" X 10' PRESSURE TREATED LUMBER	1	4	67 BD. FT.
2" X 10" X 4'-11" PRESSURE TREATED LUMBER	2	8	66 BD. FT.
4" X 6" X 8' PRESSURE TREATED POST	3	4	64 BD. FT.
2" X 2" X 1/4" X 6'-5" STEEL ANGLE		8	164 LB.
2" X 2" X 1/4" X 3'-2" STEEL ANGLE		2	20 LB.
5/8" X 8" STEEL BOLTS, NUTS, 2 WASHERS		32	32 SETS
1/2" X 3" STEEL BOLTS, NUTS, 2 WASHERS		32	32 SETS

NOTES:

1. TO 4" X 6" POSTS (4 REQUIRED) BOLT 2" X 10" BOARDS USING TWO 5/8" X 8" BOLTS PER 2" X 10" BOARD. DO NOT PLACE BOLTS CLOSER THAN 1 1/2" FROM EDGE OF BOARD.
2. FOR CENTER BRACE ANGLES DRILL 8 - 9/16" HOLES 5/8" FROM OUTER EDGE OF EACH LEG OF EACH ANGLE AND CENTERED 5 1/4" APART ALONG THE LEG.
3. ATTACH BRACE ANGLES TO TOP BOLT ON TOP 2" X 10" BOARD AND TO TOP BOLT ON NEXT TO BOTTOM BOARD.

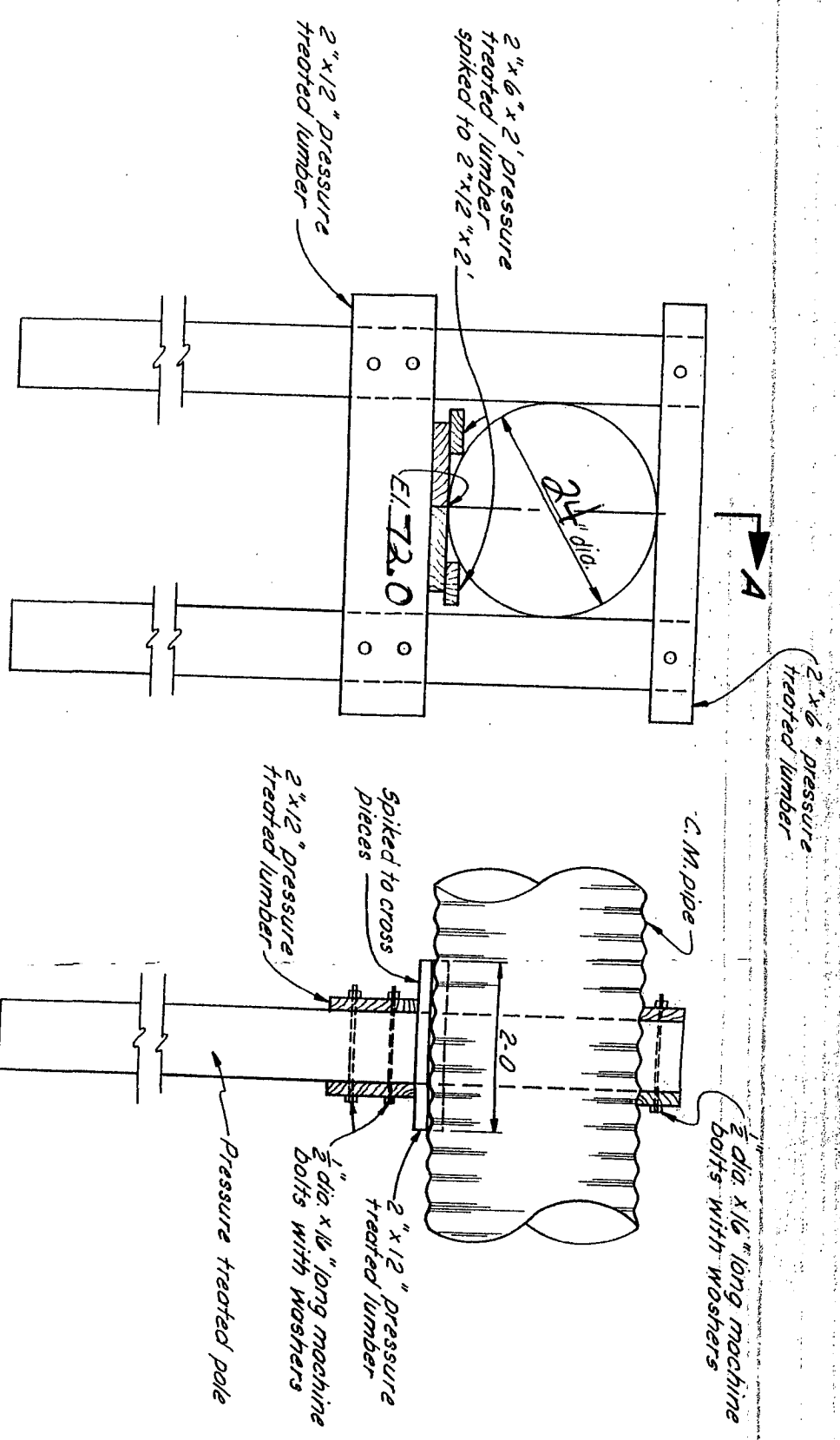


SECTIONAL ELEVATION A-A

TRASH RACK AND BAFFLE
FOR RISER DIA. 36" THRU 60"

OPERATOR: Ray McQuiston
 CONSERVATION DISTRICT: Stanley City
 U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

Designed by W. H. H. H.
 Drawn by W. H. H. H.
 Title Trash Rack and Baffle
 Traced W. H. H. H.
 Checked W. H. H. H.
 No. 1 of 1
 Drawing No. 5, N-29, 073.6-40



ELEVATION SECTIONAL ELEVATION A-A

TABLE OF QUANTITIES

ITEM	LENGTH FOR 24" DIA. C.M. PIPE	UNIT	QUANTITY
PRESSURE TREATED POLE 10" DIA.	10'	EACH	2
2" X 12" PRESSURE TREATED LUMBER	4'	EACH	6
2" X 6" PRESSURE TREATED LUMBER	4'	EACH	2
2" X 12" PRESSURE TREATED LUMBER	2'	EACH	3
2" X 6" PRESSURE TREATED LUMBER	2'	EACH	2
1/2" DIA. MACHINE BOLTS WITH NUTS	1-4	EACH	10
1/2" DIA. WASHERS		EACH	20

NOTES:
1. HAND OR MACHINE TAMP BACKFILL THOROUGHLY AROUND FOOTINGS AND COLUMNS.

TIMBER PIPE SUPPORT

OPERATOR: Ray McDushan
CONSERVATION DISTRICT: Stanley Cty.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed by	Approved by
Drawn	Title
Traced	Site
Checked	No
	at

REFERENCE: GUIDE PLAN NO. 4.0

JOB PLAN NO. 4.0

5, N-29, 073.49

CONSTRUCTION SPECIFICATIONS

For:

Ray McQuiston
West Pond
Section 2-T5N-R28W

Prepared by:

USDA-NATURAL RESOURCES CONSERVATION SERVICE
Pierre Field Support Office
605-224-2476

Assisting:

Stanley County Conservation District

According to South Dakota State Law no excavator may begin any excavation without first notifying the One-Call Notification Center of the proposed excavation.

1-800-781-7474

CHECKLIST
NRCS SOUTH DAKOTA CONSTRUCTION SPECIFICATIONS

Check Column	Spec. No.	Construction Specification Title
	SD-1	Clearing
X	SD-2	Clearing and Grubbing
	SD-3	Structure Removal
X	SD-4	Stripping
	SD-6	Excavated Pond (dugout)
X	SD-5	Excavation
	SD-7A	Earth Fill, Class A (controlled compaction)
	SD-7A(CNMS)	Earth Fill, Class A (Comprehensive Nutrient Mgt. System)
X	SD-7S	Earth Fill, Class S (method compaction)
	SD-7U	Earth Fill, Class 7U (uncompacted)
	8	Rock Riprap and Bedding
	SD-8A	Rock Riprap (SD Dept. of Transportation, Class A)
	SD-8B	Rock Riprap (SD Dept. of Transportation, Class B)
X	SD-9	Drain Fill and Filter
X	SD-10	Salvaging and Spreading Topsoil
	SD-12A	Concrete (Class 3500)
X	SD-12B	Concrete for Minor Structures (less than 10 cubic yards)
X	SD-13	Steel Reinforcement (for concrete)
	SD-15	Corrugated Metal Pipe
X	SD-16	Wood Fabrication and Installation
	SD-17	Metal Fabrication and Installation
	SD-18	Wire Mesh Gabion Baskets and Mattresses
	SD-19	PVC Drain for Sediment Basin (Comp. Nutrient Mgt. System)
	SD-20	Plastic Irrigation Pipeline
	SD-20A	Plastic Pipeline (Stockwater and/or Domestic)
	SD-20RC	Plastic Pipeline (Stockwater and/or Domestic)
	SD-21	Steel Pipeline
	SD-22	Concrete Pipeline
	SD-24	Land Leveling
	SD-25	Diversion
	SD-26	Terrace
	SD-27	Grassed Waterway
X	SD-28	Seeding (specific site recommendations required)
	SD-29	Sodding (specific site recommendations required)
	SD-30	Fence
	SD-31	Cathodic Protection
	SD-32	Well
	SD-33	Mulch Blankets and Nets
	SD-34	Clay Lining (Comprehensive Nutrient Management System)
	SD-95	Geotextile

CHECKLIST

NRCS SOUTH DAKOTA MATERIAL SPECIFICATIONS

[illegible]

Notes:

CLEARING AND GRUBBING (SD-2)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of clearing, grubbing and disposal of trees, snags, logs, brush, shrubs, stumps, and rubbish from the designated areas.

2. Protection of Existing Vegetation

Trees and other woody vegetation designated to remain undisturbed shall be protected from damage throughout the entire construction period. Vehicles, stockpiled materials, and/or ground disturbance shall not be allowed within the dripline of the vegetation designated to remain in place. The contractor shall repair any damage resulting from the contractor's operations or neglect.

3. Marking

Limits of the areas to be cleared and grubbed will be marked by stakes, flags, tree markings or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunks at a height of about six feet above the ground surface.

4. Clearing and Grubbing

Unless otherwise specified, all stumps, roots, and root clusters that have a diameter one inch or larger shall be grubbed out to a depth of at least two feet below subgrade for concrete structures and one foot below ground surface for embankment and other designated sites. All trees not marked for preservation, and all snags, logs, brush, shrubs, stumps, rubbish, and similar materials shall be cleared from within the limits of the marked areas.

5. Disposal

Where brush piles for wildlife are not specified on the drawings, cleared and grubbed materials shall be disposed of by burning and/or burying at locations shown on the drawings or shall be disposed of by methods and at sites selected by the contractor and approved by the NRCS Inspector. Materials to be buried shall be placed at least two feet below the surrounding ground line, and shall be covered by at least two feet of soil with the soil surface graded to drain.

The contractor is responsible for complying with all applicable laws and regulations and the payment of any and all fees that may result from disposal at locations away from the construction site.

STRIPPING (SD-4)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of removing topsoil and other undesirable materials from borrow areas and foundations of structures and earth fills.

2. General

Required stripping excavation depth will be the depth needed to expose subsoil reasonably free of roots and other perishable material. Excavated earth material suitable for fill shall be placed in earth fills as appropriate. Stripped material suitable for topsoil shall be stockpiled and placed over disturbed areas as shown on the drawings or as approved by the NRCS Inspector. All waste material shall be disposed of as shown on the drawings or as approved by the NRCS Inspector.

3. Foundation Stripping

Remove loose soil and extend stripping to a reasonably smooth surface in consolidated subsoil. Except as shown on the drawings, foundation slopes shall be excavated to one horizontal to one vertical, or flatter.

4. Borrow Area Stripping

Borrow areas shall be stripped to expose material suitable for earth fill.

EXCAVATION (SD-5)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of excavation required by the drawings and specifications and disposal of the excavated material.

2. Classification

Common Excavation is defined as the excavation of all materials that can be excavated, transported and unloaded using heavy ripping equipment, and heavy rubber tired loaders or scrapers with pusher tractors. This classification includes rocks smaller than one cubic yard.

Rock Excavation is defined as the excavation of all hard, compacted, or cemented materials that require blasting or the use of unusually large ripping and excavating equipment. This classification includes the removal of isolated rocks larger than one cubic yard.

Unclassified Excavation is defined as the excavation of all materials (including rock) encountered, regardless of the nature of the material or the excavation method needed.

3. Use of Excavated Materials

To the extent needed, all suitable materials from excavations shall be used in the construction of specified earth or rock fills. Suitability of materials for specific purposes will be determined by the NRCS Inspector. The contractor shall not waste or otherwise dispose of suitable excavated materials.

4. Disposal of Waste Materials

All surplus and unsuitable excavated materials will be disposed of at the locations shown on the drawings or designated by the landowner or NRCS Inspector. The disposal site shall be left in a neat condition and sloped to provide drainage.

5. Excavation Limits

Excavated surfaces too steep to be safe without support, shall be supported as necessary to safeguard the work and workers. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring and other supporting installations. The contractor shall furnish, place and subsequently remove such supporting installations. Excavation side slopes may be flattened for safety reasons where approved by the NRCS Inspector. Excavations shall be completed to specified lines and grades prior to placement of earth fill or construction of structures.

7. Borrow Excavation

When suitable materials from specified excavations are insufficient to construct specified fills, additional material shall be obtained from designated borrow areas. The extent and depth of borrow pits shall be as approved by the NRCS Inspector. Borrow pits must be shaped to eliminate unsightly conditions and steep or unstable slopes.

EARTH FILL-CLASS S (SD-7S)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of the construction of compacted earth fills where the amount of compaction is to be controlled by specifying a construction method.

2. Materials

All fill materials shall be obtained from required excavations and designated borrow areas. Selection, blending, placement and compaction of fill will be subject to approval of the NRCS Inspector.

Fill materials shall contain no frozen material, sod, roots or other perishable material, or rocks larger than eight inches in diameter. Fill shall not be placed on a frozen surface.

3. Foundation Preparation

All foundation (including abutment) surfaces shall be shaped one horizontal to one vertical or flatter except as otherwise specified.

After stripping (see stripping specification), the foundation shall be loosened thoroughly by scarifying or plowing to a minimum depth of four inches. The foundation shall then be compacted by the process specified for the fill.

4. Placement

All foundation excavation and preparation shall be completed before placing fill. Except as required by the drawings, fill material shall be mixed and uniformly placed throughout the entire fill without lenses, streaks, pockets, or layers of material that differ significantly from surrounding material.

Placement and compaction methods must prevent damage to structures and allow the structure to assume backfill loads gradually and uniformly. Within 2 feet of any structure, fill layer thickness must not exceed 4 inches and equipment loads must not exceed 400 pounds.

Fill shall be placed in approximately horizontal layers. Except as described above, fill layer thickness shall not exceed nine inches for compaction by large machines or four inches for small hand directed power tampers.

If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill, to a depth of not less than two inches, before the next layer is placed.

Except as otherwise specified, openings temporarily left in dam fills (for pipe installation, streamflow, etc.) shall have side slopes three horizontal to one vertical or flatter. When filling the opening, the bonding surface of the fill in place shall be stripped of all material not meeting the requirements of this specification and shall be scarified, moistened, and recompact as new earthfill is placed.

5. Control of Moisture Content

At the time of compaction, earth fill shall have a moisture content that when kneaded in the hand will form a ball that does not easily crumble when pressed between the hands. If the soil is too wet, it will yield free water when kneaded in the hand.

Fill materials must be wetted or dried as needed to achieve proper moisture prior to compaction.

6. Compaction (Class S)

Fill layers shall be compacted by one of the following methods.

- a. By routing the hauling and spreading equipment such that all points of the fill are traversed by at least one tread track of the loaded equipment traveling parallel to the centerline of the fill.
- b. By at least 2 passes of a tamping (sheepsfoot) roller weighing at least 100 pounds per square inch of bearing area.

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers or plate vibrators. Within 2 feet of any structure, equipment loads must not exceed 400 pounds.

Compaction of fill adjacent to concrete structures shall not be started for at least the following number of days after placement of the concrete.

Concrete Structure	Days After Concrete Placement
Vertical or near-vertical walls with earth load on one side only	14
Walls backfilled on both sides simultaneously	7
Conduits and spillway risers, cast-in-place (with inside forms in place)	7
Conduits and spillway risers, cast-in-place (forms removed)	14
Conduits, pre-cast, cradled	2
Conduits, pre-cast, bedded	1
Anti-seep Collars and Cantilever Pipe Supports (backfill both sides simultaneously)	3

DRAINFILL AND FILTER (SD-9)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of furnishing, placing and compacting drain fill and filter sands and/or gravels.

2. Materials

Aggregates shall be sand, gravel, crushed stone, or mixtures thereof, composed of clean, hard, durable mineral particles free of organic matter, clay balls, soft particles or other substances that would interfere with free draining properties of the aggregates.

Not more than five percent of the material may be limestone, and not more than 15 percent may be flat elongated particles.

The aggregates shall meet the following gradation requirements except as otherwise specified.

Filter Aggregate Size	percent Finer by Weight
3"	100
1"	90 to 100
#4	50 to 85
#50	10 to 40
#200	0 to 5

3. Subgrade Preparation

Surfaces on which drain fill will be placed shall be as undisturbed as possible (do not scarify), and must be free of standing water during placement of drain aggregates. Care shall be taken to prevent collapse of drain walls.

4. Placement

Drain fill shall not be placed until the subgrade has been made available for inspection by the NRCS Inspector. Drain fill shall not be placed around pipes until the pipe installation has been made available for inspection by the NRCS Inspector.

Material must be placed in uniform, approximately six-inch thick layers. Extreme care shall be taken to assure uniformity of the drain fill, and to prevent segregation or contamination of the drain fill with foreign mater. When collector pipes are included in drains, the fill materials shall be placed in a manner to avoid displacing the pipe.

SALVAGING AND SPREADING TOPSOIL (SD-10)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of salvaging topsoil from borrow pits or other excavations and spreading it in the designated areas to the specified depths.

2. Quality of Topsoil

Topsoil shall consist of friable soil reasonably free of grass, roots, weeds, sticks, stones or other foreign materials.

3. Excavation

Topsoil shall be removed after clearing, grubbing and removing vegetation and shall be stockpiled. Objectionable materials shall be removed and buried, or disposed of, at locations approved by the NRCS Inspector.

4. Spreading

Spreading shall not be done when the ground or topsoil is frozen, excessively wet or otherwise in a condition detrimental to the work. Surfaces to be covered shall be lightly scarified just prior to the spreading operation.

All earth fills not to be submerged shall be covered with topsoil to a depth of 6 to 18 inches measured perpendicular to the surface of the fill and placed to the neat lines shown on the drawings.

After placement is completed, the topsoil surface shall be left in a condition that will permit seeding equipment to be operated without excessive smoothing.

CONCRETE FOR MINOR STRUCTURES (generally for structures <10 cu. yd.) (SD-12B)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of proportioning, forming, placing, finishing, and curing portland cement concrete.

2. Materials

Portland Cement shall conform to ASTM C150, Type II or IIA and shall be low alkali. Partially hydrated or damaged cement shall not be used.

Aggregates shall conform to the requirements of ASTM C33. Coarse aggregates shall be size 467 (1/2 inch to #4 sieve) unless otherwise specified. Aggregates must be free of contamination and segregation.

Water shall be clean, free of harmful chemicals and suitable for drinking.

Air-entraining admixtures must follow the Manufacturer's recommendations.

3. Concrete Mix Design

The contractor or person in charge of construction shall be responsible for designing a concrete mix that will produce 3000 pounds per square inch compressive strength at 28 days and meet the following requirements:

The concrete mix must contain less than six gallons of water per bag of cement.

The mix must contain at least six bags of cement per cubic yard of concrete.

Air-entrainment shall be between four and seven percent by volume.

Concrete slump after mixing must be between two and five inches.

Use of Ready Mixed concrete meeting this specification is encouraged. Upon request, the vendor must provide the owner and NRCS Inspector a signed delivery ticket giving the quantities of concrete, cement, fine aggregate, coarse aggregate, and water contained in the batch.

Calcium chloride, Sodium chloride (salt) or other corrosive accelerators shall not be used.

4. Concrete Forms

Forms shall be wood, plywood, metal, fiberglass or other approved material. The forms and associated falsework shall be substantial and unyielding and shall be constructed so that the finished concrete will conform to the specified dimensions and contours. Form surfaces shall be smooth and free from holes, dents, sags, or other irregularities. Forms shall not be embedded in the concrete.

5. Placing Concrete

Concrete shall be placed in final position within 1.5 hours after adding cement (water if using sack-crete premix) to the mix.

Earth surfaces under concrete shall be compacted, and free of debris, frost, ice, or flowing water. Concrete shall not be dropped more than five feet vertically without use of equipment designed to prevent segregation.

Each layer of concrete must be completely consolidated by spading, hand tamping, and/or mechanical vibration. Vibration shall compact the concrete and bring it into intimate contact with the forms, reinforcing steel, and other embedded items while removing voids and pockets of trapped air.

Unformed concrete surfaces (excluding slip-formed surfaces) exposed in the completed work shall be accurately struck off to grade and then float finished. Concrete edges exposed in the final work shall be chamfered or finished with molding tools.

Concrete shall be placed at air temperatures between 40°F and 80°F unless special measures are taken to protect the concrete. Concrete must be protected from freezing for 24 hours after placement.

6. Curing

All concrete shall be cured by keeping all exposed surfaces wet for 7 days (counting only days above 50°F). Alternately, the wet cure process can be stopped when curing compound is applied as recommended by the manufacturer.

7. Defective Concrete

Honey combed areas and other voids in concrete must be promptly repaired with mortar patching immediately upon discovery.

Damaged concrete and concrete not meeting requirements of this specification will be rejected.

STEEL REINFORCEMENT (SD-13)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of furnishing and placing steel reinforcement for reinforced concrete or pneumatically applied mortar.

2. Materials

Steel reinforcement shall be free of flaky rust, oil, grease, paint, mill scale, or other deleterious matter.

Steel bar reinforcement (except as otherwise specified) shall be grade 40, 50, or 60 deformed bars conforming to one of the following specifications.

- a. Deformed and Plain Billet-steel Bars for Concrete Reinforcement ASTM A615
- b. Rail-steel Deformed and Plain Bars for Concrete Reinforcement ASTM A616 with S1 Supplement Requirements
- c. Axle-steel Deformed and Plain Bars for Concrete Reinforcement ASTM A617

Dowels shall be plain round bars conforming to the above specifications.

Fabricated deformed steel bar mats for concrete reinforcement shall meet ASTM A184.

Plain steel welded wire fabric for concrete reinforcement shall meet ASTM A185.

Deformed steel welded wire fabric for concrete reinforcement shall meet ASTM A497.

Epoxy-coated steel bars for concrete reinforcement shall meet ASTM A775.

3. Cutting and Bending

Reinforcing bars may be shop or field cut and/or bent. All bends must be made without heating or otherwise weakening the bar. Shop bends must meet American Concrete Institute Standard 315. Bars with kinks, cracks, or improper bends will be rejected.

4. Splicing Bar Reinforcement

Except as otherwise specified, splices of reinforcing bars shall provide an overlap of at least 30 times the smaller bar diameter, but not less than 12 inches.

5. Splicing Welded Wire Fabric

Welded wire fabric shall be overlapped one full mesh (rectangle) not counting cut portions.

6. Placing

Reinforcing shall be accurately placed and secured in position to prevent its displacement during concrete placement. Tack welding of bars is not permitted. Dimensions shown on the plans indicating concrete cover, are the clear distances from the concrete surface to the reinforcing steel.

Metal hangers, spacers, and ties shall be placed in a manner that they are not exposed in the finished concrete surface. The legs of metal chairs or side form spacers that may be exposed on any surface of slabs, walls, beams, or other concrete surfaces shall be a design that will not corrode at the concrete surface. Precast concrete chairs shall be clean and moist at the time of concrete placement.

On structures exceeding four cubic yard of concrete, concrete shall not be placed until the reinforcement has been inspected and approved by the NRCS Inspector. For any size pour, inspection of reinforcement embedded in concrete may be performed by the NRCS Inspector using radar, or other inspection instruments.

WOOD FABRICATION AND INSTALLATION (SD-16)

CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of furnishing and constructing wood structures and wood parts of composite structures.

2. Plywood Material

Plywood and Oriented Strand Board (OSB) for use in above ground sheltered construction (buildings etc.) shall meet Product Standard PS-1 and shall conform to the requirements shown on the drawings.

Plywood for use in exposed above ground construction shall be exterior grade, meet Product Standard PS-1 and shall conform to the requirements shown on the drawings.

Treated plywood for use above ground shall meet Product Standard PS-1 and be pressure treated with waterborne preservatives (Arsenicals) to a retention level of at least 0.4 pounds per cubic foot except as shown on the drawings.

Treated plywood that is to be in permanent contact with water or the earth must meet Product Standard PS-1 and be pressure treated with waterborne preservatives (Arsenicals) to a retention level of 0.6 pounds per cubic foot, except as shown on the drawings.

3. Structural Timber and Lumber Material

All wood material shall be sound wood free from decay and disease damage, shall be straight, not cracked, and shall meet the requirements shown on the drawings. Structural timber and lumber shall be structural grade or better.

Unless otherwise specified, all timber and all nominal lumber sizes 2X10 or larger shall be pressure treated by one of the following preservatives:

Cresote

Pentachlorophenol

Waterborne Preservatives (Arsenicals) treated to 0.4 pounds per cubic foot retention

Unless otherwise specified, all nominal lumber sizes 2X8 or smaller shall be pressure treated using waterborne preservatives (Arsenicals). Wood for use above ground shall be treated to a retention level of at least 0.4 pounds per cubic foot. Wood for use in permanent contact with water or earth shall be treated to a retention level of at least 0.6 pounds per cubic foot.

4. Metal Hardware

Bolts, nuts, washers, rods, angle iron, and other metal hardware shall be an appropriate grade of steel, and if installed underground, shall be galvanized, or have equal corrosion protection.

5. Installation

All framing shall be true and exact. Timber and lumber shall be accurately cut and assembled to close fit. Nails and spikes shall be driven with just sufficient force to set the heads flush with the surface of the wood.

Bolt holes shall be drilled for snug fit. Holes for lag screws shall be bored with a bit not larger than the body of the screw at the base of the thread.

Washers shall be used in contact with all bolt heads and nuts that would otherwise be in contact with wood.

SEEDING (SD-28)
CONSTRUCTION SPECIFICATION

1. Scope

The work shall consist of furnishing all labor, equipment, and materials needed for seeding the areas shown on the drawings.

2. General

Seeding and related operations shall be performed in the following time period.

Dates: _____

3. Fertilizer

Fertilizer shall be uniformly applied commercial liquid or dry fertilizer conforming to South Dakota laws and regulations. Fertilizer shall be supplied and applied as follows.

Types and rates: _____

4. Seed

Seed requirements and seeding rates are listed below. Documentation must be provided showing the seed meets current South Dakota laws and regulations. The seed must be planted within one year of its latest germination test.

5. Seedbed Preparation

The area to be seeded shall be made reasonably smooth and firm. Ditches shall be filled to conform to design lines and grades before seedbed preparation is begun. Prior to seeding, required fertilizer shall be applied and mixed with the soil surface to a depth of three inches. The contractor shall suspend operations when the soil is too wet.

6. Cover and/or Nurse Crops

When specified, cover and/or nurse crops shall be seeded as follows:

7. Sowing Seed

Except as otherwise specified, seeding shall be performed immediately after seedbed preparation. Seeding shall be drilled or broadcast and incorporated in a manner that will achieve uniform distribution of seed placed at appropriate soil depth.

When seeding waterways or similar water flow areas, machinery operations must be performed in a direction that is not parallel to water flow (use Figure 8, serpentine, etc.).

8. Mulching

Except as otherwise specified, required mulching must be performed as soon as possible after seeding. Mulch shall be applied uniformly as follows.

CORRUGATED POLYETHYLENE (PE) PIPE (SD-55A)
MATERIAL SPECIFICATION

1. Scope

This specification covers the quality of corrugated polyethylene (PE) tubing and fittings.

2. Pipe and Tubing

Corrugated polyethylene tubing shall conform to the following requirements for the specified tubing types, sizes, and fittings.

ASTM F667	Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings
ASTM F667	Standard Specification for Corrugated Polyethylene Pipe and Fittings
ASTM F894	Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
AASHTO M252	Standard Specification for Polyethylene Corrugated Drainage Pipe
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 12" to 36" diameter

PARTICIPANT RESPONSIBILITIES

PARTICIPANT		Ray McQuiston	County		Stanley				
PRACTICE							West Dam		
LEGAL DESCRIPTION					Sec.	T	R		
SE ¼, SE ¼ 2-T5N-R28E									
GPS									

GENERAL: Policies and regulations of USDA assistance programs place responsibility on the participant for obtaining adequate real property rights and interests, applicable water rights, and necessary approvals, easements, licenses and permits. The participant must also meet requirements for installation, inspection, and operation and maintenance.

For copies of South Dakota Laws, see Internet at: <http://www.state.sd.us/state/legis/lrc/statutes/lrcmenu.htm>.

1. CULTURAL/HISTORICAL RESOURCES

An NRCS approved cultural/historical evaluation **must** be made of the contracted and/or technically assisted (earth disturbing) practices **prior** to construction. If construction activities expose cultural/historical resources, human remains (bones), or similar objects, the participant and/or contractor **must** immediately stop construction and notify NRCS. Any further construction without clearance **could jeopardize assistance** (cost-share/technical) and may be a **violation of state or federal law**.

2. WATER RIGHTS, CONSTRUCTION PERMIT, AND LOCATION NOTICE

South Dakota Codified Law 46-5 requires securing a permit from the South Dakota Chief Engineer **before** construction work begins for any development involving storage or use of water. Small user exceptions are explained on the Internet. Forms and information is available on the Internet at: <http://www.state.sd.us/denr/DES/WaterRights/waterprg.htm>.

Compliance with all requirements of South Dakota water laws is necessary to avoid possible penalties and/or loss of your rights. Forms, signed map, fees and other pertinent information for filing a South Dakota Water Right application should be submitted to: DENR Water Rights Program, Joe Foss Building, 523 East Capitol, Pierre SD 57501-3181 (Phone 605 773 3352).

South Dakota Codified Law 46-4 requires the filing of a Location Notice for small nonnavigable stream and dry draw dams. South Dakota Codified Law 46A-10A regulates drainage, in South Dakota, generally through County Drainage Commissions.

Administrative Rules (Dam Safety, etc.,) - see Internet at:

http://www.state.sd.us/denr/DES/WaterRights/WR_laws.htm.

Other Laws may also apply. The participant is responsible for obtaining all necessary rights and permits, including but not limited to easements, rights-of-way, zoning approval, permits to construct, etc. required by any applicable level of government.

3. PROPERTY RIGHTS (INCLUDING WETLAND EASEMENTS)

The participant is responsible, financially and otherwise, for any costs incurred by the failure to obtain adequate and necessary real property rights and interests, easements, subordination agreements, permits, and/or licenses required for the installation. Participants are cautioned to be sure the area to be affected is either not covered by a wetland easement or a written agreement is reached with the easement owner. Property rights documents should be recorded for your future protection.

4. CLEAN WATER ACT

Clean Water Act Section 10 or 404 permits from the US Army Corps of Engineers are required where proposed construction will involve dredging or filling a wetland, or stream. Information may be obtained by contacting : US Army Corps of Engineers, South Dakota Regulatory Office, 28563 Powerhouse Road, Room 120, Pierre SD 57501, (Phone 605 224 8531). Forms are available on the internet at: <http://www.usace.army.mil/inet/usace-docs/forms/formlib-all/e4345.pdf>.

National Pollutant Discharge Elimination System (NPDES) permits or approval from the South Dakota Department of Environment and Natural Resources (DENR) may be needed where discharge of polluted water or wastewater (ag waste etc.) to waters of the state (including wetlands) may occur or have occurred. In addition, a Storm Water Permit is needed for any construction disturbance of over 5 acres. Information is available by telephone at 605 773 3351 or on the Internet at: <http://www.state.sd.us/denr/DES/Surfacewater/surface.htm>

5. PARTICIPANT RESPONSIBILITIES IN CONSTRUCTION SUPERVISION AND INSPECTION

(A) South Dakota Codified Law 49-7A, (also know as South Dakota One-Call) requires that no excavator may begin any excavation without first notifying the One-Call Notification Center of the proposed excavation (Phone 1 800 781 7474). NRCS makes no representation as to the existence or non-existence of any utility or buried object, and assumes no liability for damage to utilities or buried objects caused by construction of this or other conservation practices.

(B) All conservation practices require on-site supervision and inspection during construction. The NRCS cannot provide all of the assistance or inspection that may be needed to assure the practice is installed correctly. **Participants must actively lead construction supervision and inspection efforts.** Items requiring inspection by you are as follows:

Ensure materials meet specifications as noted in design and verify location of dam with contractor prior to construction.

NRCS must be notified and given the opportunity to inspect the following items **prior to installation:**

Placement of concrete

(C) If you employ a contractor to do your construction work, it is your responsibility to clearly inform the contractor, **prior** to start of construction, that materials and construction must be in accordance with the plans and specifications.

(D) If necessary, the plans can be modified during construction. However, changes to sizes, grades, elevations, etc., **must be approved by NRCS** for permits, certifications, and cost-share to be assured. **Get approvals before construction!**

(E) The completed practice must be checked by NRCS. NRCS will ask for written certification from you and/or the contractor for those items not inspected by NRCS and for those items you agreed to inspect. **Certification for cost-share** will be made by NRCS when it has been determined that the NRCS approved design has been completed. Otherwise, NRCS will either require construction changes before certification or the practice will not be certified.

(F) NRCS designed practices as well as cost-shared practices designed by contractors (or others) **must meet NRCS Practice Standards and must be approved by an NRCS employee with appropriate Job Approval Authority prior to construction.**

6. OPERATION AND MAINTENANCE (O&M)

The participant is responsible for the safe operation and maintenance of the improvements for the life of the practice. O&M requirements or special O&M plans are listed below and/or attached.

Attached.

7. PARTICIPANT RESPONSIBILITIES AND CERTIFICATION

I have reviewed the plans and specifications provided to me. I understand my responsibility to follow the plans and specifications for proper installation of the conservation practice. I understand the cultural/historical resources requirements and certify that I will obtain the necessary landrights, easements, water rights, permits, and other authorizations necessary to complete the planned conservation improvements.

Participant signature: Ray McQuiston Date: _____

I have reviewed the requirements as set forth in this document with the participant.

NRCS Employee: _____ Date: _____

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
SOUTH DAKOTA

OPERATION AND MAINTENANCE PLAN
POND
CODE 378

Landowner/Operator Ray McQuiston

Job Location SE ¼ Sec 2 Twn 5N, R28W

GPS _____

Prepared by Angela Roman

Date July 26, 2004

Operation and Maintenance Items

A properly operated and maintained Pond is an asset to your farm. This structure was designed and installed to provide storage to runoff water for beneficial use. The estimated life span of this installation is at least 20-35 years. The life of this installation can be assured and usually increased by developing and carrying out an effective operation and maintenance program. Here are some recommendations for effective operation and maintenance:

- ☐ Inspect the pond after the first significant rainfall and again after each rain until the pond is filled to the inlet elevation.
- ☐ Avoid using vegetated spillways as a travel lane for vehicles and/or farm machinery.
- ☐ Excessive erosion, settlement and/or cracks in earthen sections must be investigated (to determine the cause) and repaired.
- ☐ Periodically inspect spillways and control gates, valves and weirs for proper functioning and their ability to maintain the water level to design elevations. Remove debris or flow blockages.
- ☐ Inspect metal surfaces for rust and other damage. Especially inspect sections in contact with earthfill and/or other materials. Repair or replace damaged sections and apply a protective covering.
- ☐ Inspect concrete for accelerated weathering, spalling, settlement, misalignment or cracks. Repair defects.
- ☐ Inspect rock riprap for accelerated weathering and displacement. Repair to original grades if necessary.
- ☐ Check for unusual seepage on the backside of the dam. Check for water flowing underneath the pipe at the outlet, water flowing in the inlet but not out the outlet, and for water flowing out the outlet but not in the inlet. Make sure all structure drains are functional and soil is not being transported through the drainage system. Screens and/or rodent guards must be maintained and in place.
- ☐ Repair any rodent, burrowing animal, vandalism, vehicle, or livestock damage.
- ☐ Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization, and application of herbicides when necessary. Periodic mowing or short term grazing may also be needed.
- ☐ If fences are installed, they must be maintained to prevent unauthorized entry.

Other _____

STATE <u>SD</u>		PROJECT <u>McQuiston West</u>			
BY <u>ADR</u>	DATE <u>5/18/04</u>	CHECKED BY <u>WMT</u>	DATE	JOB NO.	
SUBJECT <u>Annual Surface Yield</u>				SHEET _____ OF _____	

Annual Surface Yield

REF: EFM 2-83 Method A

Data

Isogram # = 2
CN = 80
contr. acres = 913
percent of chance = 50%

.66 inches runoff

$$\frac{\text{Acres} \times \text{inches runoff}}{12} = \text{AcFt}$$

$$\frac{913 \times .66}{12} = 50.215 \text{ AcFt} = \underline{\underline{50.2 \text{ AcFt}}}$$

$$\text{Storage at PS} = 54.2 \text{ AcFt} > 50.2$$

This tells me that the pond is not going to stay full

STATE SD		PROJECT Ray McQuiston		
BY A. Roman	DATE 6-10-04	CHECKED BY	DATE	JOB NO.
SUBJECT West Dam Watershed Data				SHEET _____ OF _____

Watershed Slope
(Spot check method)

Length of Watershed = 17,100'
Drainage Area = 913

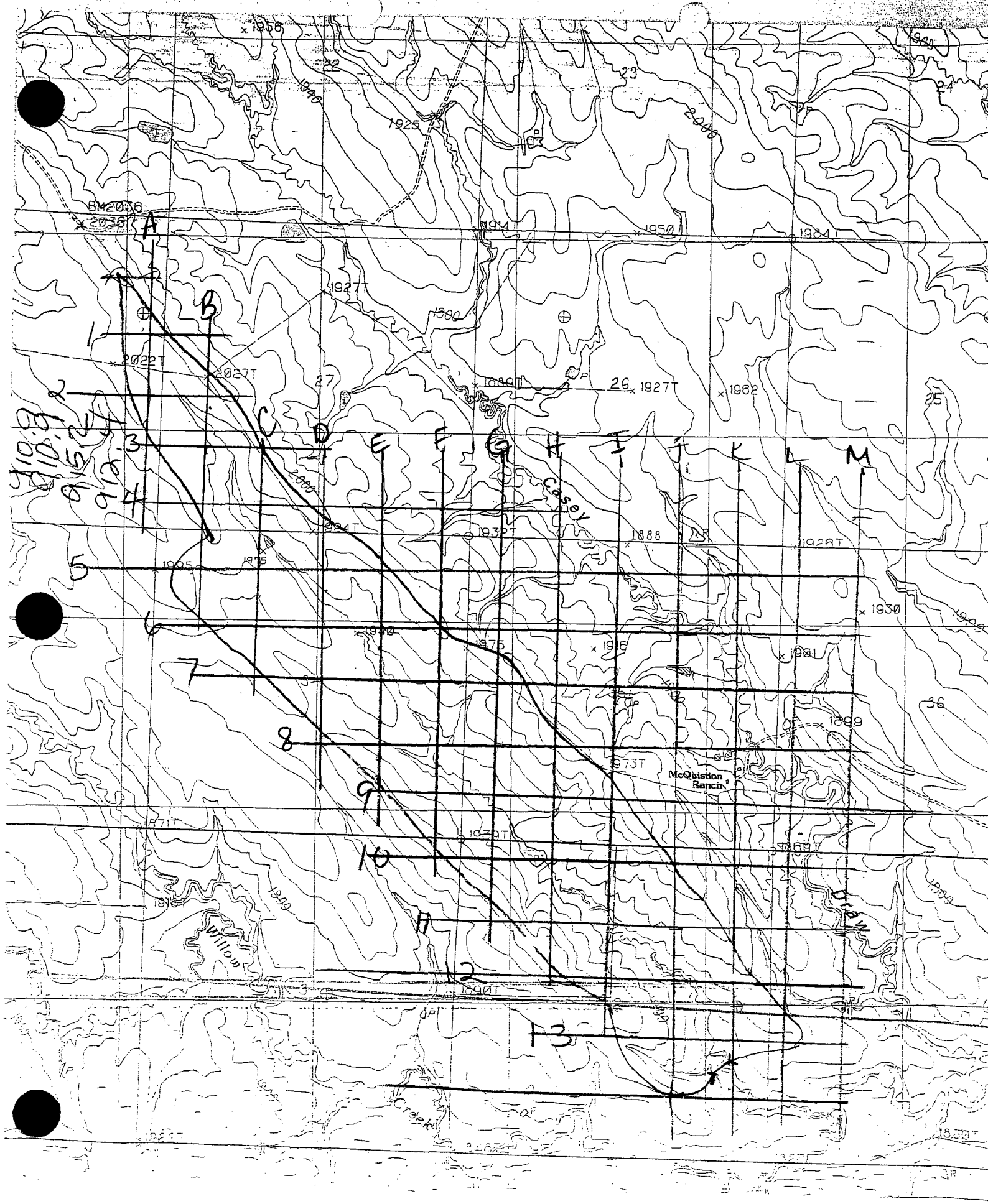
$$\frac{60'}{1200} = 5\%; \quad \frac{60'}{600} = 10\%; \quad \frac{60'}{4600} = 1.3\%; \quad \frac{40'}{1800} = 2.2\%; \quad \frac{40'}{800} = 5\%; \quad \frac{40'}{900} = 4.4\%; \quad \frac{60'}{6100} = .98\%$$

(Grid Method)

avg = 4.1%

A	2000	3
B	4200	3
C	3800	4
D	3750	6
E	3900	7
F	3800	7
G	4250	7
H	4000	9
I	3850	9
J	3850	10
K	2500	3
L	700	1
1	800	0
2	1750	3
3	1850	2
4	1900	4
5	3700	6
6	4000	5
7	4400	7
8	4100	6
9	4100	8
10	3950	7
11	3550	8
12	3300	8
13	3100	4
80,700		137

$$S = \frac{11571(20 \times 137)}{80,700} = .05334 \times 100 = \underline{\underline{5.334\%}}$$



DRILLING LOG DOCUMENTATION

Date 6-30-04Hole No. 2

Soil Name

Drilling Location

[illegible]

Notes: Located at bottom of drainage way. Clay texture down to 11 feet. Did not hit shale at this site. There appeared to be shale chips exposed at about 8 feet in the cut bank, but when the chips were wetted they were easily deformed into a mud ball. Soil moisture content was high throughout this hole.

[illegible]

Unified Symbols and Group Names		Agricultural Waste Management Field Handbook, Chapter 10			
GW = Well graded gravel, gravel-sand mix, few fines		Table 10D-3 (1161 test results)		Table 10D-2	
GP = Poorly graded gravel, gravel-sand mix, few fines	Soil	Median	Median	Unified	Perm Group
GC = Clayey gravel, gravel-sand-clay mix	Group	K, cms	K, fl/d	Class	I II III IV In Perm Group

Location In Section (X)

Z

West Dam

Date 6-30-04

Hole No. 1

Soil Name

Drilling Location

Hole El.

[illegible]

Notes: Located on the upper bank of drainage way. Clay texture down to 14 feet. Did not hit shale at this site

Unified Symbols and Group Names		Agricultural Waste Management Field Handbook, Chapter 10								
		Table 10D-3 (1161 test results)		Table 10D-2						
		Soil Group	Median K, cm/s	Median K, ft/d	Unified Class	Perm Group I II III IV	In Perm Group			
GW	= Well graded gravel, gravel-sand mix, few fines				CH	N	N	S	U	A=Always
GP	= Poorly graded gravel, gravel-sand mix, few fines				MH	N	S	U	S	
GC	= Clayey gravel, gravel-sand-clay mix				CL	N	S	U	S	N=Never
GM	= Silty gravel, gravel-sand-silt mix				ML	N	U	S	N	
SW	= Well graded sand, gravelly sand with few fines		7.2x10-4	2.0						S=Sometimes
SP	= Poorly graded sand, gravelly sand with few fines		3.5x10-4	1.0						
SC	= Clayey sand, sand-clay mix									U=Usually
SM	= Silty sand, sand-silt mix									
CL	= Lean inorganic clay, low to medium plastic LL < 50		4.8x10-6	0.014		CL-ML	N	A	N	
CH	= Fat inorganic clay, gravelly/sandy/silty clay LL > 50		1.5x10-6	0.004		GC	N	S	U	S
CL-ML	= Silty Clay					GM	S	U	S	
OL	= Organic silts and organic silty clays, low plasticity		8.8x10-7	0.0025		GW	A	N	S	
OH	= Organic silt/clay, medium to high plasticity		2.1x10-7	0.0006		SM	S	S	S	
ML	= Inorganic silt, very fine sand, low plastic LL < 50		4.9x10-7	0.0014		SW	N	N	U	S
MH	= Inorganic silt, fine sand or silty soils LL > 50		3.5x10-8	0.0001		SP	A	N	N	N
						GP	A	N	N	N

Location In Section (X)

Z

✱

REF: SDTG Section II Soils Legends

soils	name	K factor	Hydrologic Group
CsC	Chanter-Sansarc Clays	0.37	D
OpB	Opal Clay 3-6%	0.37	D
OpC	Opal Clay 6-9%	0.37	D
OtB	Opal Chantier Clays 2-6%	0.37	D
OtC	Opal Chantier Clays 6-9%	0.37	D
PrB	Promise Clay 3-6%	0.37	D
PrC	Promise Clay 6-9%	0.37	D
ScD	Sansarc-Opal Clays 6-15%	0.37	D
Sw	Bullcreek clay	0.37	D

100% D soils

ScD spillway

Trimble
 5475 Kellenburger Road
 Dayton, Ohio 45424-1099, USA
 1-937-233-8921
 Wednesday, June 30, 2004 2:25:05 PM

PROJECT: C:\home\angela.roman\Dams\McQuistion\McQuistionWest.pro

 DTM TO DTM VOLUME

Cut and Fill Volumes

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
POINTS	1,693	DAM	141
Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
0.0	0.0	21,430.2	21,430.2

Net Difference: 21430.2 Cu. Yd. BORROW

Trimble
 5475 Kellenburger Road
 Dayton, Ohio 45424-1099, USA
 1-937-233-8921
 Wednesday, June 30, 2004 2:25:23 PM

PROJECT: C:\home\angela.roman\Dams\McQuistion\McQuistionWest.pro

 DTM TO DTM VOLUME

Cut and Fill Volumes

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
POINTS	1,693	SPILLWAY	143
Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
2,106.3	2,106.3	0.0	0.0

Net Difference: 2106.3 Cu. Yd. WASTE

Trimble
 5475 Kellenburger Road
 Dayton, Ohio 45424-1099, USA
 1-937-233-8921
 Friday, July 09, 2004 1:50:35 PM

PROJECT: C:\home\angela.roman\Dams\McQuistion\McQuistionWest.pro

 DTM TO DTM VOLUME

Cut and Fill Volumes

Shrinkage/swell factors: Cut 1.0000 Fill 1.0000

Original DTM Layer Name	# of Points	Final DTM Layer Name	# of Points
POINTS	1,693	DIKE	56
Cut Volume (Cu. Yd.)	Cumulative Cut Volume	Fill Volume (Cu. Yd.)	Cumulative Fill Volume
0.0	0.0	110.4	110.4

Net Difference: 110.4 Cu. Yd. BORROW

STATE		PROJECT		
BY	DATE	CHECKED BY	DATE	JOB NO.
SUBJECT				SHEET OF

Core Trench

$$\frac{(6+16)}{2} = 13 \times 3' \text{ deep} \times 660 = 953 \text{ CY}$$

27

Stripping

$$\text{Area} = (62,769 \text{ ft}^2 \times .6' \text{ deep}) / 27 = 1,395 \text{ CY}$$

Client: Ray McQuiston
 County: STANLEY
 Practice: West Pond
 Calculated By: ADR
 Checked By: _____

State: SD

Date: 3/18/2004

Date: _____

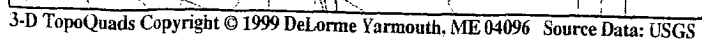
Drainage Area: 913 Acres (User entered value)
 Curve Number: 80 (Provided from CN Calculator)
 Watershed Length: 17100 Feet
 Watershed Slope: 5.68 Percent
 Time of Concentration: 2.154 Hours (Calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.10
Ia/P Ratio	0.28	0.24	0.17	0.15	0.13	0.11	0.10
Used	0.28	0.24	0.17	0.15	0.13	0.11	0.10
Runoff (in)	0.44	0.62	1.18	1.56	2.04	2.38	2.98
Unit Peak Discharge (cfs/acre/in)	0.281	0.293	0.313	0.320	0.327	0.330	0.334
Peak Discharge (cfs)	114	167	335	455	609	716	909

Client: Ray McQuiston
County: STANLEY State: SD
Practice: West Pond
Calculated By: ADR Date: 3/18/2004
Checked By: _____ Date: _____

COVER DESCRIPTION	Percent (CN)			
	Hydrologic Soil Group			
	A	B	C	D
OTHER AGRICULTURAL LANDS Pasture, grassland or range good	-	-	-	100(80)
Total Area (by Hydrologic soil Group)				100
TOTAL DRAINAGE AREA: 100 Percent		WEIGHTED CURVE NUMBER: 80		

890 Ac.



950 ft Scale: 1 : 24,000 Detail: 13-0 Datum: WGS84

DRAINAGE DIAPHRAGM LOCATOR

McQuiston West

Data Input	
Elev. Invert	89
Pipe slope (ft/ft)	0.1328
Top of Fill	102
SS ratio	3
Dist from invert to ds edge top dam	36.1
pipe diam (ft)	2
dist from pipe CL to top diaphragm	5
Diaphragm thickness (ft)	2

(This solver button doesn't work

X (max dist from invert to U/S diaph.) 57

(PLAY WITH THIS UNTIL b16 AND b17
ARE EQUAL)

theta 18.43495

1/2 of top of fill to top Diaphragm 7.3512

1.001695

perp dist from to diaph to backslope 7.338761 Adjust X so that these are equal

Elevation of top of Diaphragm 87.2976

A. Roman
7-8-04

Data Input	
Pipe Size (in)	24
Corrugation depth (in)	1
Outside Diameter	26
Req. Projection	4.333333
Total Width	10.83333
use	11
volume	363

13.44444 cu.yds

HYDROLOGIC DATA SHEET

Operator: Ray McQuiston Farm No.: _____

Structure/Practice: West Pond (378)

Location: 2-5N-28W County: _____

Comps. By: A. Roman Date: 3/18/04 Checker: WMD Date: _____

Note:

PEAK RATE OF RUNOFF (Chapter 2, Engineering Field Manual)

Soil Group	Land Use and Condition	Curve No. (CN)	Acres	(CN)(Acres)
Totals:				

Weighted CN = Total (CN)(Acres)/Total Acres = See EFH-2 printout

Average Watershed Slope: _____ Slope Factor: _____

Weighted CN	Design Storm (Years)	Inches Rain (P)	Inches Runoff (Q)	Feet ³ /S. Peak Flow (q _p)	Acre-Inches Storm Volume

ANNUAL YIELD

% Chance	Frequency	Isogram No.	Area Acres	Yield Inches	Acre-Inches	Acre-Feet

Note:

Ref: EFM 11-74 Ref: Cost List

between med & min ratio

SPILLWAYS - EARTH OR VEGETATED

CHANNELS (DITCHES, DIVERSIONS, WATERWAYS, ETC.)

PRINCIPAL SPILLWAYS

CULVERTS

WATERWAYS, DIVERSIONS (From Tables)

[illegible]

ATON
Anselg

mcquinton_fetch.txt

Effective fetch (TR-56) Version 2.0
CAD file name = C:\1_WALT\mcquinton.dwg
CAD layer name = 1.Dsgn.Tr56.RunA
Elevation of pool polyline = 0.00
Trial run name = RunA

ALPHA	COS(ALPHA)	XALPHA	XALPHA x COS(ALPHA)
-42	0.743	293.551	218.151
-36	0.809	387.684	313.643
-30	0.866	476.351	412.532
-24	0.914	561.607	513.053
-18	0.951	619.013	588.717
-12	0.978	668.055	653.457
-6	0.995	753.442	749.314
0	1.000	940.722	940.722
6	0.995	820.401	815.907
12	0.978	691.900	676.780
18	0.951	489.820	465.847
24	0.914	303.187	276.975
30	0.866	246.037	213.074
36	0.809	176.897	143.112
42	0.743	140.510	104.419

Effective Fetch (FT) = 524.443
Wave Height (FT) (50 MPH wind) = 0.744

Effective fetch (TR-56) Version 2.0
CAD file name = C:\1_WALT\mcquinton.dwg
CAD layer name = 1.Dsgn.Tr56.Runb
Elevation of pool polyline = 0.00
Trial run name = Runb

ALPHA	COS(ALPHA)	XALPHA	XALPHA x COS(ALPHA)
-42	0.743	340.678	253.173
-36	0.809	398.794	322.631
-30	0.866	502.835	435.468
-24	0.914	586.598	535.884
-18	0.951	657.687	625.498
-12	0.978	705.444	690.029
-6	0.995	756.257	752.114
0	1.000	1129.975	1129.975
6	0.995	905.628	900.667
12	0.978	762.811	746.141
18	0.951	318.392	302.809
24	0.914	146.610	133.935
30	0.866	99.750	86.386
36	0.809	84.698	68.522
42	0.743	83.133	61.780

Effective Fetch (FT) = 521.431
Wave Height (FT) (50 MPH Wind) = 0.742

Effective fetch (TR-56) Version 2.0
CAD file name = C:\1_WALT\mcquinton.dwg
CAD layer name = 1.Dsgn.Tr56.Runc
Elevation of pool polyline = 0.00
Trial run name = Runc

ALPHA	COS(ALPHA)	XALPHA	XALPHA x COS(ALPHA)
-42	0.743	166.435	123.685
-36	0.809	199.493	161.393
-30	0.866	308.982	267.587
-24	0.914	404.307	369.353

		mcquinton	fetch.txt
-18	0.951	490.597	466.585
-12	0.978	552.577	540.502
-6	0.995	613.911	610.548
0	1.000	897.830	897.830
6	0.995	819.593	815.103
12	0.978	736.790	720.689
18	0.951	647.984	616.269
24	0.914	544.416	497.348
30	0.866	426.712	369.543
36	0.809	342.885	277.400
42	0.743	274.728	204.162

Effective Fetch (FT) = 513.510
Wave Height (FT) (50 MPH Wind) = 0.737

USE Height of 0.70

EXAMPLE:

Pool@ 90 94

1.9

DS@ 90.7 94.7

DS 88.6 92.6

USE 20 ft

10:1

90.7 + 88.7

1*****

SITES XEQ 07/22/2004 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM
VER 2000 (USER MANUAL - DATED MAY 2001)
TIME 11:24:15

***** 80-80 LIST OF INPUT DATA *****

SITES 05/01/2000West McQuiston West 1.4265625 H5

SAVMOV 0 101

SAVMOV 101 1 1

* Principle Spillway = 5 year

* Emergency Spillway = 50 year

* Principle Spillway Elevation = 94

* AS Crest raised to 98

STRUCTURE West Stage Storage Table

74	0
76	.0541
78	.2631
80	.5952
82	1.0712
84	1.6347
86	2.4376
88	3.6911
90	4.9757
92	6.8127
94	9.1933
96	11.6074
98	14.0524
100.4	16.9701

ENDTABLE

WSDATA 5A1 AC 80 913 17100 5.334

PDIRECT 2.9 .00 4.40

POOLDATA ELEV 94 94 94 72 70.5 SC

PSINLET 1 15.71

PSDATA 1 130 24 .009 72.5

ASDATA 41 100 3 .011 2

ASINSURF 41 4.4 D 3

ASINLET 41 0.0 0.0 78.7 0.0 3
149.8 .8 191.4 1

ENDTABLE

ASEXSURF 41 4.4

.67 0

1

1 0

.0075

ENDTABLE

ASEXIT 41 N 100

BTMWIDTH FEET 100

GRAPHICS I

GO,DESIGN HL TYPE2 24 TYPE2378 24

SAVMOV 2 101 1 West

ENDJOB

1SITES XEQ 07/22/2004 ----- COMMENT PAGE -----

VER 2000

McQuiston West

WSID = West

Principle Spillway = 5 year

Emergency Spillway = 50 year

Principle Spillway Elevation = 94

AS Crest raised to 98

***** MESSAGE - ALTERNATE SUBWATERSHED ID (A) BEING USED SINCE
USER DID NOT INPUT AN ID.

***** MESSAGE - DRAINAGE AREA FROM WSDATA CONTROL BEING CONVERTED FROM
ACRES TO SQUARE MILES FOR COMPUTATION PURPOSES.

1SITES -----

XEQ 07/22/2004 McQuiston West WSID= West
VER 2000 Stage Storage Table SUBW= A
TIME 11:24:15 SITE = West PASS= 1 PART= 1

***** BASIC DATA *****

CLIMATE AREA - NOT DEFINED DESIGN CLASS A1 = LT 3000.

STORM DISTRIBUTION-PSH 24 HOUR TYPE II RAINFALL DISTRIBUTION

STORM DISTRIBUTION AUX. -24 HOUR TYPE II RAINFALL DISTRIBUTION

PRECIP. - P-PS,1-DAY P-PS,10-DAY P-SD P-FB
 2.90 0.00 0.00 4.40

WSDATA - CN DA-SM TC/L -/H QRF
 80.00 1.43 17100.00 5.33 0.00

SITEDATA- PERM POOL CREST PS FP SED VALLEY FL 378?
 94.00 94.00 94.00 70.50 YES

BASEFLOW INITIAL EL EXTRA VOL SITE TYPE
 0.00 0.00 0.00 DESIGN

PSDATA - NO. COND COND L DIA/W -/H
 1.00 130.00 24.00 0.00

PS N KE WEIR L TW EL
 0.009 1.00 15.71 72.50

2ND STG ORF H ORF L START AUX.
 0.00 0.00 0.00 0.00

ASCRESTS - AUX.1 AUX.2 AUX.3 AUX.4 AUX.5
 0.00 0.00 0.00 0.00 0.00

AUX.DATA - REF.NO. RETARD. Ci TIE STATION INLET LENGTH

41 0.00 0.00 100

AUX.DATA - INLET Ci SIDE SLOPE EXIT Ci EXIT SLOPE ACTUAL AUX?
4.400 3.00 4.400 0.011 NO

BTM WIDTH - BW1 BW2 BW3 BW4 BW5
ft 100.00 0.00 0.00 0.00 0.00

AUXILIARY SPILLWAY RATING DEVELOPED USING WSPVRT.

1SITES -----

XEQ 07/22/2004 McQuiston West WSID= West
VER 2000 Stage Storage Table SUBW= A
TIME 11:24:15 SITE = West PASS= 1 PART= 2

PERM POOL 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

CREST PS 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

SED ACCUM 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

START ELEV 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

NRCS-PSH D= 24.00 HR P= 2.90 IN Q= 1.18 IN DA= 1.43 SM
TC= 2.22 HR CN= 80.00 VOL= 89.5 ACFT

PEAK = 314.6 CFS, AT 13.2 HRS.

ROUTED RESULT - HYD TYPE EMAX VOL-MAX AMAX QMAX
NRCS-PSH 97.60 FT 93.2 ACFT 13.57 AC 75.8 CFS

PS STORAGE 41.0 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

DRAWDOWN (DDT) TEST 94.00 FT 52.3 ACFT 0.00 CFS
CONTROL IS 0.000 DETENTION STORAGE

TIME = 1.48 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

RATING TABLE DEVELOPED, SITE = West :
BY PROGRAM FOR PS AND AUX. SPILLWAYS
AUX. RATING USED WSPVRT METHOD.

RATING TABLE NUMBER 1

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	94.00	0.00	0.00	0.00	52.26	9.19
2	94.32	9.02	9.02	0.00	55.32	9.59
3	94.65	25.52	25.52	0.00	58.49	9.98
4	94.97	46.89	46.89	0.00	61.80	10.37

FULL CONDUIT FLOW, ELEV = 95.30 FT

5	95.30	72.18	72.18	0.00	65.24	10.76
6	95.94	73.25	73.25	0.00	72.34	11.53
7	96.57	74.24	74.24	0.00	79.94	12.31
8	97.21	75.22	75.22	0.00	88.04	13.09
9	97.85	76.18	76.18	0.00	96.63	13.87
10	98.49	77.13	77.13	0.00	105.72	14.65
11	99.13	78.07	78.07	0.00	115.30	15.42
12	99.76	79.00	79.00	0.00	125.38	16.20
13	100.40	79.92	79.92	0.00	135.95	16.97

1SITES -----

XEQ 07/22/2004 McQuiston West WSID= West
VER 2000 Stage Storage Table SUBW= A
TIME 11:24:15 SITE = West PASS= 1 PART= 3

AUX. CREST 97.60 FT 93.2 ACFT 13.57 AC 75.8 CFS

PS STORAGE 41.0 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

START ELEV 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

EFFECTIVE HEIGHT(H)= 25.6 FEET, PRODUCT= 2387. (H * STORAGE AT CREST AUX.).

INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT.

NRCS-FBH D= 24.00 HR P= 4.40 IN Q= 2.38 IN DA= 1.43 SM
TC= 2.22 HR CN= 80.00 VOL= 180.8 ACFT

PEAK = 663.7 CFS, AT 13.2 HRS.

RATING TABLE DEVELOPED, SITE = West :
BY PROGRAM FOR PS AND AUX. SPILLWAYS
AUX. RATING USED WSPVRT METHOD.

RATING TABLE NUMBER 2

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	94.00	0.00	0.00	0.00	52.26	9.19
2	94.32	9.02	9.02	0.00	55.32	9.59
3	94.65	25.52	25.52	0.00	58.49	9.98
4	94.97	46.89	46.89	0.00	61.80	10.37
FULL CONDUIT FLOW, ELEV = 95.30 FT						
5	95.30	72.18	72.18	0.00	65.24	10.76
6	95.59	72.70	72.70	0.00	68.38	11.11
7	95.88	73.15	73.15	0.00	71.63	11.46
8	96.16	73.60	73.60	0.00	74.97	11.81
9	96.45	74.05	74.05	0.00	78.42	12.16
10	96.74	74.49	74.49	0.00	81.97	12.51
11	97.03	74.93	74.93	0.00	85.62	12.86
12	97.31	75.37	75.37	0.00	89.37	13.21
13	97.60	75.81	75.81	0.00	93.22	13.57

14	97.74	80.54	76.02	4.53	95.13	13.74
15	97.88	85.28	76.23	9.05	97.07	13.91
16	98.13	93.85	76.60	17.25	100.61	14.21
17	98.44	143.88	77.06	66.81	105.04	14.59
18	99.00	380.56	77.89	302.67	113.40	15.27
19	99.70	784.62	78.91	705.71	124.38	16.12
20	100.40	1288.70	79.92	1208.78	135.95	16.97

SUMMARY OF AUXILIARY SPILLWAY SURFACE CONDITIONS USED IN COMPUTATIONS BY REACH

REACH	FROM STA (ft)	TO STA (ft)	SLOPE (%)	RETARDANCE INDEX	VEGETAL COVER FACTOR	MAINT. CODE	ROOTING DEPTH (ft)	REACH LOCATION
-------	---------------	-------------	-----------	------------------	----------------------	-------------	--------------------	----------------

1	-100.	-79.	-1.1	4.4	**	**	**	INLET
2	-79.	0.	0.0	4.4	**	**	**	CREST
3	0.	100.	1.1	4.4	0.67	1	1.0	EXIT !

* Upper case indicates a reach of constructed spillway channel.

** The program does not use vegetal cover factor, maintenance code, and rooting depth for inlet and crest reaches in computations.

! Reach 3 used in computing exit channel velocities.

DRAWDOWN USING FREEBOARD STORM FOLLOWS, STARTING AT ELEVATION 97.60 FT.

DRAWDOWN (DDT) TEST 94.00 FT 52.3 ACFT 0.00 CFS
CONTROL IS 0.000 DETENTION STORAGE

TIME = 1.42 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

ROUTED RESULTS	BTM FT	WIDTH FT	MAX ELEV ACFT	VOL-MAX AC	AREA-MAX FT	AUX.-HP ACFT	VOL-AUX.
NRCS-FBH	100.0	99.14	115.5	15.4	1.54		22.3

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGE = 78.1 380.0 458.1

	CRITICAL DEPTH FT	CRITICAL VELOCITY FT/SEC	CRITICAL SLOPE-Sc FT/FT	25% OF Q Sc FT/FT
AUXILIARY SPILLWAY	0.76	4.89	0.022	0.077

EFFECTIVE STRESS FOR STABILITY ANALYSIS OF AUX. EXIT CHANNEL
(Refer to Ag. Handbook 667, Chapt. 3, for allowable stresses.)

Aux. Discharge = 380. cfs; Bottom Width = 100. ft

REACH NO.	FROM STA	TO STA	SLOPE %	MANNING'S n	VELOCITY ft/s	STRESS lb/ft^2
3	0.	100.	1.10	0.037	3.94	0.038

AUXILIARY SPILLWAY DURATION FLOW = 8.6 HOURS
ATTACK, OE/B = 0.7 ACFT/FT

***** MESSAGE - NHCP378 CRITERIA USED BUT AUXILIARY SPILLWAY RATING NOT
BASED ON ASFILE RATINGS.

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 3.9 FT/SEC
EXIT SLOPE = 0.011 FT/FT
FLOW DEPTH = 0.9 FT

>>>> NHCP378 RUN - MINIMUM DEPTH, CREST AUX. TO TOP OF DAM IS 2.00 FT.
NEW TOP OF DAM ELEVATION = 99.60.

ROUTED	BTM	WIDTH	MAX	ELEV	VOL-MAX	AREA-MAX	AUX.HP	VOL-AUX.
RESULTS	FT	FT	ACFT	AC	FT	ACFT		
MINIMUM AUX.	100.0	99.60	122.8	16.0	2.00	29.6		

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGES = 78.8 648.8 727.6

	CRITICAL	CRITICAL	CRITICAL	25% OF Q
	DEPTH	VELOCITY	SLOPE-Sc	Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.08	5.81	0.015	0.045

>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED
FOR THIS PASS. NEW TOP OF DAM ELEVATION = 100.14.

ROUTED	BTM	WIDTH	MAX	ELEV	VOL-MAX	AREA-MAX	AUX.HP	VOL-AUX.
RESULTS	FT	FT	ACFT	AC	FT	ACFT		
MINIMUM AUX.	100.0	100.14	131.6	16.7	2.54	38.4		

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGES = 79.6 1020.4 1100.0

	CRITICAL	CRITICAL	CRITICAL	25% OF Q
	DEPTH	VELOCITY	SLOPE-Sc	Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.46	6.71	0.012	0.030

INFLOW HYD 1 PSH-PEAK = 75.80 CFS AT 16.33 HRS, LOCATION POINT

INFLOW HYD 1 FBH-PEAK = 458.12 CFS AT 14.17 HRS, LOCATION POINT
HYDOUT 1 West

1SITES.....JOB NO. 1 COMPLETE.

West McQuiston West

0 SUBWATERSHED(S) ANALYZED.

1 STRUCTURE(S) ANALYZED.

0 TRIALS TO OBTAIN BOTTOM WIDTH FOR SPECIFIED STRESS OR VELOCITY.

1 SUMMARY TABLE 1 SITES VERSION 2000
----- DATED 05/01/2000

PASS	DIA./	AUX.	CREST	BTM.	MAX.	MAX.	EMB.	INTEGR.*	EXIT*	TYPE
NO.	WIDTH	ELEV	WIDTH	HP	ELEV	VOL.	DIST.	VEL.	HYD	
	(IN/FT)	(FT)	(FT)	(FT)	(CY)	(FT)	(FT/SEC)			
1	24.0	97.6	100.0	2.5	100.1	0.	0.	3.9	MIN.	AUX.

Page 7

OPTION "P" DATED 07/22/2004 11:24:15
C:\home\angela.roman\SITES\McQuistonWest\WestFinalPrinciple.DHY

OPTION "E" DATED 07/22/2004 11:24:15
C:\home\angela.roman\SITES\McQuistonWest\WestFinalPrinciple.DEM

Emerg.

1*****

SITES XEQ 07/22/2004 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM
VER 2000 (USER MANUAL - DATED MAY 2001)
TIME 11:22:58

***** 80-80 LIST OF INPUT DATA *****

SITES 05/01/2000West McQuiston West 1.4265625 H4

SAVMOV 0 101

SAVMOV 101 1 1

* Principle Spillway = 5 year

* Emergency Spillway = 50 year

* Principle Spillway Elevation = 94

* AS Crest raised to 98

STRUCTURE West Stage Storage Table

74	0
76	.0541
78	.2631
80	.5952
82	1.0712
84	1.6347
86	2.4376
88	3.6911
90	4.9757
92	6.8127
94	9.1933
96	11.6074
98	14.0524
100.4	16.9701

ENDTABLE

WSDATA 5A1 AC 80 913 17100 5.334

PDIRECT .00 4.40

POOLDATA ELEV 94 94 94 72 70.5 SC

PSINLET 1 15.71

PSDATA 1 130 24 .009 72.5

ASDATA 41 100 3 .011 2

ASCREST ELEV 98

ASINSURF 41 4.4 D

ASINLET 41 0.0 0.0 78.7 0.0 3

149.8 .8 191.4 1

ENDTABLE

ASEXSURF 41 4.4

.67 0

1

1 0

.0075

ENDTABLE

ASEXIT 41 N 100

BTMWIDTH FEET 100

GRAPHICS 1

GO,DESIGN HL TYPE2 24 TYPE2378 24

SAVMOV 2 101 1 West

ENDJOB

1SITES XEQ 07/22/2004 ----- COMMENT PAGE -----
VER 2000 McQuiston West WSID = West

Principle Spillway = 5 year

Emergency Spillway = 50 year

Principle Spillway Elevation = 94

AS Crest raised to 98

***** MESSAGE - ALTERNATE SUBWATERSHED ID (A) BEING USED SINCE
USER DID NOT INPUT AN ID.

***** MESSAGE - DRAINAGE AREA FROM WSDATA CONTROL BEING CONVERTED FROM
ACRES TO SQUARE MILES FOR COMPUTATION PURPOSES.

1SITES -----
XEQ 07/22/2004 McQuiston West WSID= West
VER 2000 Stage Storage Table SUBW= A
TIME 11:22:58 SITE = West PASS= 1 PART= 1

***** BASIC DATA *****
CLIMATE AREA - NOT DEFINED DESIGN CLASS A1 = LT 3000.

STORM DISTRIBUTION-PSH 24 HOUR TYPE II RAINFALL DISTRIBUTION

STORM DISTRIBUTION AUX. -24 HOUR TYPE II RAINFALL DISTRIBUTION

PRECIP. - Q-PS,1-DAY	Q-PS,10-DAY	P-SD	P-FB
0.00	0.00	4.40	

WSDATA - CN	DA-SM	TC/L	-/H	QRF
80.00	1.43	17100.00	5.33	0.00

SITEDATA- PERM POOL	CREST PS	FP SED	VALLEY FL	378?
94.00	94.00	94.00	70.50	YES

BASEFLOW	INITIAL EL	EXTRA VOL	SITE TYPE
0.00	0.00	0.00	DESIGN

PSDATA - NO. COND	COND L	DIA/W	-/H
1.00	130.00	24.00	0.00

PS N	KE	WEIR L	TW EL
0.009	1.00	15.71	72.50

2ND STG	ORF H	ORF L	START AUX.
0.00	0.00	0.00	0.00

ASCRESTS - AUX.1	AUX.2	AUX.3	AUX.4	AUX.5
98.00	0.00	0.00	0.00	

AUX.DATA - REF.NO. RETARD. Ci TIE STATION INLET LENGTH
41 0.00 0.00 100

AUX.DATA - INLET Ci SIDE SLOPE EXIT Ci EXIT SLOPE ACTUAL AUX?
4.400 3.00 4.400 0.011 NO

BTM WIDTH - BW1 BW2 BW3 BW4 BW5
ft 100.00 0.00 0.00 0.00 0.00

AUXILIARY SPILLWAY RATING DEVELOPED USING WSPVRT.

1SITES -----
XEQ 07/22/2004 McQuiston West WSID= West
VER 2000 Stage Storage Table SUBW= A
TIME 11:22:58 SITE = West PASS= 1 PART= 2

PERM POOL 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS
CREST PS 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS
SED ACCUM 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS
START ELEV 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

1SITES -----
XEQ 07/22/2004 McQuiston West WSID= West
VER 2000 Stage Storage Table SUBW= A
TIME 11:22:58 SITE = West PASS= 1 PART= 3

AUX. CREST 98.00 FT 98.7 ACFT 14.05 AC 76.4 CFS

PS STORAGE 46.5 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

START ELEV 94.00 FT 52.3 ACFT 9.19 AC 0.0 CFS

EFFECTIVE HEIGHT(H)= 26.0 FEET, PRODUCT= 2567. (H * STORAGE AT CREST AUX.).

INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT.

NRCS-FBH D= 24.00 HR P= 4.40 IN Q= 2.38 IN DA= 1.43 SM
TC= 2.22 HR CN= 80.00 VOL= 180.8 ACFT

PEAK = 663.7 CFS, AT 13.2 HRS.

RATING TABLE DEVELOPED, SITE = West :
BY PROGRAM FOR PS AND AUX. SPILLWAYS
AUX. RATING USED WSPVRT METHOD.

RATING TABLE NUMBER 2

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	94.00	0.00	0.00	0.00	52.26	9.19
2	94.32	9.02	9.02	0.00	55.32	9.59
3	94.65	25.52	25.52	0.00	58.49	9.98
4	94.97	46.89	46.89	0.00	61.80	10.37
FULL CONDUIT FLOW, ELEV = 95.30 FT						
5	95.30	72.18	72.18	0.00	65.24	10.76
6	95.64	72.78	72.78	0.00	68.94	11.17
7	95.97	73.31	73.31	0.00	72.77	11.58
8	96.31	73.83	73.83	0.00	76.75	11.99
9	96.65	74.36	74.36	0.00	80.87	12.40
10	96.99	74.87	74.87	0.00	85.12	12.81
11	97.32	75.39	75.39	0.00	89.52	13.23
12	97.66	75.90	75.90	0.00	94.05	13.64
13	98.00	76.41	76.41	0.00	98.72	14.05
14	98.12	80.52	76.59	3.93	100.42	14.20
15	98.24	84.53	76.76	7.76	102.13	14.34
16	98.46	91.84	77.09	14.75	105.26	14.61
17	98.72	112.51	77.48	35.03	109.16	14.93
18	99.20	286.77	78.18	208.59	116.46	15.51
19	99.80	595.76	79.06	516.70	125.99	16.24
20	100.40	984.32	79.92	904.40	135.95	16.97

SUMMARY OF AUXILIARY SPILLWAY SURFACE CONDITIONS USED IN COMPUTATIONS BY REACH

REACH	FROM STA (ft)	TO STA (ft)	SLOPE (%)	RETARDANCE CURVE INDEX	VEGETAL COVER FACTOR	MAINT. CODE (ft)	ROOTING DEPTH *	REACH LOCATION
1	-100.	-79.	-1.1	4.4	**	**	**	INLET
2	-79.	0.	0.0	4.4	**	**	**	CREST
3	0.	100.	1.1	4.4	0.67	1	1.0	EXIT !

* Upper case indicates a reach of constructed spillway channel.

** The program does not use vegetal cover factor, maintenance code, and rooting depth for inlet and crest reaches in computations.

! Reach 3 used in computing exit channel velocities.

DRAWDOWN USING FREEBOARD STORM FOLLOWS, STARTING AT ELEVATION 98.00 FT.

DRAWDOWN (DDT) TEST 94.00 FT 52.3 ACFT 0.00 CFS
CONTROL IS 0.000 DETENTION STORAGE

TIME = 1.62 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.-HP FT	VOL-AUX. ACFT
NRCS-FBH	100.0	99.45	120.4	15.8	1.45	21.7

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGE = 78.5 335.3 413.9

CRITICAL CRITICAL CRITICAL 25% OF Q

	DEPTH	VELOCITY	SLOPE-Sc	Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	0.70	4.70	0.024	0.088

EFFECTIVE STRESS FOR STABILITY ANALYSIS OF AUX. EXIT CHANNEL
 (Refer to Ag. Handbook 667, Chapt. 3, for allowable stresses.)
 Aux. Discharge = 335. cfs; Bottom Width = 100. ft

REACH FROM TO SLOPE MANNING'S VELOCITY STRESS						
NO.	STA	STA	%	n	ft/s	lb/ft^2
3	0.	100.	1.10	0.038	3.68	0.033

AUXILIARY SPILLWAY DURATION FLOW = 8.9 HOURS
 ATTACK, OE/B = 0.6 ACFT/FT

***** MESSAGE - NHCP378 CRITERIA USED BUT AUXILIARY SPILLWAY RATING NOT
 BASED ON ASFILE RATINGS.

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 3.7 FT/SEC
 EXIT SLOPE = 0.011 FT/FT
 FLOW DEPTH = 0.9 FT

>>>> NHCP378 RUN - MINIMUM DEPTH, CREST AUX. TO TOP OF DAM IS 2.00 FT.
 NEW TOP OF DAM ELEVATION = 100.00.

ROUTED	BTM WIDTH	MAX ELEV	VOL-MAX	AREA-MAX	AUX.HP	VOL-AUX.
RESULTS	FT	FT	ACFT	AC	FT	ACFT
MINIMUM AUX.	100.0	100.00	129.3	16.5	2.00	30.6

PEAK - CFS Q-PS Q-AUX. Q-TOT.
 DISCHARGES = 79.3 645.9 725.3

CRITICAL CRITICAL CRITICAL 25% OF Q				
DEPTH	VELOCITY	SLOPE-Sc	Sc	
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.08	5.80	0.015	0.045

>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED
 FOR THIS PASS. NEW TOP OF DAM ELEVATION = 100.45.

ROUTED	BTM WIDTH	MAX ELEV	VOL-MAX	AREA-MAX	AUX.HP	VOL-AUX.
RESULTS	FT	FT	ACFT	AC	FT	ACFT
MINIMUM AUX.	100.0	100.45	136.8	17.0	2.45	38.1

PEAK - CFS Q-PS Q-AUX. Q-TOT.
 DISCHARGES = 80.0 936.8 1016.8

CRITICAL CRITICAL CRITICAL 25% OF Q				
DEPTH	VELOCITY	SLOPE-Sc	Sc	
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.38	6.53	0.013	0.032

***** WARNING - SOLUTION EXCEEDED MAX. INPUT ELEVATION (100.40) BY 0.05 FT.

INFLOW HYD 1 FBH-PEAK = 413.85 CFS AT 14.17 HRS, LOCATION POINT
HYDOUT 1 West

1SITES.....JOB NO. 1 COMPLETE.

West McQuiston West

0 SUBWATERSHED(S) ANALYZED.

1 STRUCTURE(S) ANALYZED.

1 HYDROGRAPHS ROUTED AT LOWEST SITE.

0 TRIALS TO OBTAIN BOTTOM WIDTH FOR SPECIFIED STRESS OR VELOCITY.

SITES.....COMPUTATIONS COMPLETE

1 SUMMARY TABLE 1 SITES VERSION 2000
DATED 05/01/2000

WATERSHED ID	RUN DATE	RUN TIME
West	07/22/2004	11:22:58

>>>	SITE ID	SUBWS ID	SUBWS (SQ MI)	DA NO.	DA (HRS)	CURVE (SQ MI)	TC DESIGN	TOTAL DA	DA TYPE	STRUC	<<<
	West	A	1.43	80.	2.22	1.43	378NR	A1			

PASS	DIA./	AUX.	CREST	BTM.	MAX.	MAX.	EMB.	INTEGR.*	EXIT*	TYPE
NO.	WIDTH	ELEV	WIDTH	HP	ELEV	VOL.	DIST.	VEL.	HYD	
(IN/FT)	(FT)	(FT)	(FT)	(FT)	(CY)	(FT)	(FT/SEC)			
1	24.0	98.0	100.0	2.5	100.4	0.	0.	3.7	MIN.	AUX.

* INTEGRITY DIST. AND EXIT VEL. ARE BASED ON THE ROUTED HYDROGRAPH
AND WILL NOT RELATE TO THE MAX. ELEV. (TOP OF DAM),
WHICH IS SET BY MINIMUM DESIGN CRITERIA.

SITES.....SUMMARY TABLE 1 COMPLETED.

NRCS SITES VERSION 2000 ,05/01/2000
West FILES

INPUT

C:\home\angela.roman\SITES\McQuistonWest\WestFinalEmergency.D2C

OUTPUT - DATED 07/22/2004 11:22:58

C:\home\angela.roman\SITES\McQuistonWest\WestFinalEmergency.OUT

GRAPHICS FILES GENERATED

OPTION "L" DATED 07/22/2004 11:22:58

C:\home\angela.roman\SITES\McQuistonWest\WestFinalEmergency.DRG

OPTION "P" DATED 07/22/2004 11:22:58

C:\home\angela.roman\SITES\McQuistonWest\WestFinalEmergency.DHY

OPTION "E" DATED 07/22/2004 11:22:58

C:\home\angela.roman\SITES\McQuistonWest\WestFinalEmergency.DEM

REPORT ON
WATER PERMIT APPLICATION No. 2535-2
Ray McQuiston
August 31, 2004

Water Permit Application No. 2535-2 has been filed by Ray McQuiston to impound 52.3 acre-feet of water from runoff by constructing a dam located in the N ½ SE ¼ of Section 2-T5N-R28E, in Stanley County. The application also requests impoundment of sufficient water to maintain water at the outlet elevation. The water will be used for fish and wildlife production and livestock water purposes.

Discussion:

The dam will be classified as a small size, Category 3, Low Hazard dam. The Natural Resources Conservation Service (NRCS) has designed the dam. The plans and specifications have been reviewed and will be approved; however, reconstruction of the dam can not begin until Water Permit Application No. 2535-2 is approved.

The McQuiston West Dam will be 28 feet high with a normal storage capacity of 52.3 acre-feet with a reservoir level at the primary spillway elevation, and a maximum storage capacity of 136 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.

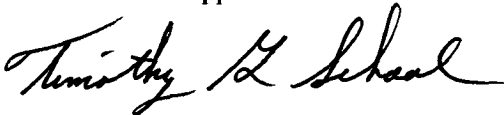
The dam has a drainage area of 913 acres or 1.43 square miles. The dam is designed to have a 5 foot diameter concrete riser and a 24 inch diameter HDPE barrel with 6.5 feet of available freeboard as the primary spillway, and a 100 foot wide earthcut secondary spillway with 2.5 feet of available freeboard. A 25-year frequency event for this drainage produces a peak runoff of approximately 475 cfs and a 100-year frequency event produces a peak runoff of approximately 855 cfs. The 100 foot wide secondary spillway has a capacity of approximately 1025 cfs.

The annual yield for this drainage area with an 80 percent chance of occurrence, or 8 out of 10 years, is expected to be 20 acre-feet. The annual yield with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 50 acre-feet and the annual yield with a 10 percent chance, or 1 out of 10 years, is expected to be 190 acre-feet.

The McQuiston West Dam will be located in the N ½ SE ¼ of Section 2-T5N-R28E on an unnamed tributary to Willow Creek about one-half mile upstream of the confluence of the unnamed tributary and Willow Creek and about 15 miles upstream of the confluence of Willow Creek and the Bad River. There are no existing Water Permits/Rights located on the unnamed tributary or Willow Creek between the proposed dam and the Bad River.

Conclusions:

1. Water Permit Application No. 2535-2 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. 2535-2.



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

Approved by:



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



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2535-2, Ray McQuiston**

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. 2535-2, Ray McQuiston, 20489 Willow Creek Road, Fort Pierre SD 57501.

The Chief Engineer is recommending APPROVAL of Application No. 2535-2 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) it is in the public interest with the following qualifications:

1. Water Permit No. 2535-2 authorizes a dam with a storage capacity of 52.3 acre feet of water and sufficient water annually to maintain the water level to an outlet elevation.
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.

Garland Erbele, Chief Engineer
September 21, 2004

PROOF OF PUBLICATIONSTATE OF SOUTH DAKOTA)
) SSCounty of Hughes)I, Marilyn Bakercertify that the attached printed Notice was
takenfrom the Capitol Journalprinted and published in PierreCounty of Hughes and

state of South Dakota. The notice was published

in the newspaper on the following two dates:

October 25, 2004November 2, 2004Cost of Printing no charge
(correction)Marilyn Baker
(Signature)Bookkeeper - Accts. Receivable
(Title)11-10-04
(Date Signed)

No. 6467

2tdly 10/25, 11/2

**NOTICE OF APPLICATION
NOS. 2535-2 and 2536-2
to Appropriate Water**

Notice is given that Ray McQuiston, 20489 Willow Creek Rd, Ft. Pierre SD 57532 has filed the following water permit applications. Application No. 2535-2 proposes to impound 52.30 acre-feet of water from runoff by constructing a dam located in the N 1/2 SE 1/4 Section 2 with water impounded in the N 1/2 SE 1/4, S 1/2 NE 1/4 Section 2; all in T5N-R28E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Application No. 2536-2 proposes to impound 45.40 acre-feet of water from runoff by constructing a dam located in the S 1/2 NE 1/4 Section 6 with water impounded in the S 1/2 NE 1/4, NW 1/4 NE 1/4 Section 6; all in T5N-R29E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 2535-2 and 2536-2 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 applica-

tions, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the Chief Engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting these applications or recommendations must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendations. 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 November 12, 2004.

The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, 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 these applications. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.

RECEIVED

NOV 12 2004

WATER RIGHTS
PROGRAM

NOTICE OF APPLICATION NOS. 2535-2 and 2536-2 to Appropriate Water

Notice is given that Ray McQuiston, 20489 Willow Creek Rd, Ft. Pierre SD 57532 has filed the following water permit applications. Application No. 2535-2 proposes to impound 52.30 acre-feet of water from runoff by constructing a dam located in the N $\frac{1}{2}$ SE $\frac{1}{4}$ Section 2 with water impounded in the N $\frac{1}{2}$ SE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$ Section 2; all in T5N-R28E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Application No. 2536-2 proposes to impound 45.40 acre-feet of water from runoff by constructing a dam located in the S $\frac{1}{2}$ NE $\frac{1}{4}$ Section 6 with water impounded in the S $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 6; all in T5N-R29E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 2535-2 and 2536-2 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 applications, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the Chief Engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting these applications or recommendations must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendations. 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 November 12, 2004.

The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, 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 these applications. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

October 19, 2004

Ray McQuiston
20489 Willow Creek Rd
Fort Pierre SD 57532

Dear Mr. McQuiston:

I am writing to advise you that the Notice on Water Permit Application Nos. 2535-2 & 2536-2 published in the Capital Journal was not correct. A comma was missing in each of the legal descriptions where water was to be impounded. The newspaper was called so the corrections could be made in the second publication on October 5th. However, the correction was not made on the second publication.

As a result of the error, the legal notice will need to be readvertised. The readvertisement is needed to ensure the permit is free from legal problems due to inaccurate and incomplete public notice. The information need to readvertise the notice is enclosed.

If you have any questions, please contact me.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosure

cc: Capital Journal



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

October 19, 2004

Capital Journal
PO Box 878
Pierre SD 57501-0878

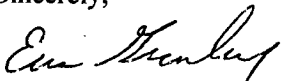
ATTENTION: Legal Public Notice

Enclosed is a Notice on Application Nos. 2535-2 & 2536-2 to Appropriate Water to be published twice. Please publish the first notice on October 25, 2004 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,


Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

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

Nos. 2535-2 & 2536-2

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

Date _____

We are in receipt of your letter of October 19, 2004 enclosing Notice to Appropriate Water by Application Nos. 2535-2 & 2536-2 which was first published in our issue of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper

PROOF OF PUBLICATIONSTATE OF SOUTH DAKOTA)
) SSCounty of Hughes)I, Marylin Bakercertify that the attached printed Notice was
takenfrom the Capital Journalprinted and published in PierreCounty of Hughes and

state of South Dakota. The notice was published

in the newspaper on the following two dates:

September 28, 2004October 5, 2004Cost of Printing \$52.08Marylin Baker
(Signature)Bookkeeping
(Title)10-15-04
(Date Signed)

No. 6410 2tdly 9/28, 10/5

**NOTICE OF APPLICATION
NOS. 2535-2 and 2536-2
to Appropriate Water**

Notice is given that Ray McQuiston, 20489 Willow Creek Rd., Ft. Pierre, SD 57532 has filed the following water permit applications. Application No. 2535-2 proposes to impound 52.30 acre-feet of water from runoff by constructing a dam located in the N 1/2 SE 1/4 Section 2 with water impounded in the N 1/2 SE 1/4 S 1/2 NE 1/4 Section 2; all in T5N-R28E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Application No. 2536-2 proposes to impound 45.40 acre-feet of water from runoff by constructing a dam located in the S 1/2 NE 1/4 Section 6 with water impounded in the S 1/2 NE 1/4 NW 1/4 NE 1/4 Section 6; all in T5N-R29E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 2535-2 and 2536-2 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 applications, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the Chief Engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting these applications or recommendations must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendations. 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 October 15, 2004.

The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, 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 these applications.

Steven M. Pirner
Secretary
Department of Environment
and Natural Resources

RECEIVED

OCT 18 2004

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

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

September 21, 2004

Ray McQuiston
20489 Willow Creek Rd
Fort Pierre SD 57532

Dear Mr. McQuiston:

Water Permit Application Nos. 2535-2 & 2536-2 for fish & wildlife propagation use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Publisher of the Capital Journal printed at Pierre, SD (Ph # 605-224-7301). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendations of the Chief Engineer and reports on the applications 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 and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization, the publisher has been instructed to publish your notice once each week for two consecutive weeks. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the applications.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

cc: Angela Roman, NRCS

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendations, 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 applications.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

September 21, 2004

Capital Journal
PO Box 878
Pierre SD 57501-0878

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application Nos. 2535-2 & 2536-2 to Appropriate Water to be published twice. Please publish the first notice on September 28, 2004 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

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 Ray McQuiston, 20489 Willow Creek Rd, Ft. Pierre SD (Ph # 605-223-3197).

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,


Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

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

Nos. 2535-2 & 2536-2

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

Date _____

We are in receipt of your letter of September 21, 2004 enclosing Notice to Appropriate Water by Application Nos. 2535-2 & 2536-2 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 28, 2004 with the second publication 7 days later.
The applicant is responsible for payment.

NOTICE OF APPLICATION NOS. 2535-2 and 2536-2 to Appropriate Water

Notice is given that Ray McQuiston, 20489 Willow Creek Rd, Ft. Pierre SD 57532 has filed the following water permit applications. Application No. 2535-2 proposes to impound 52.30 acre-feet of water from runoff by constructing a dam located in the N $\frac{1}{2}$ SE $\frac{1}{4}$ Section 2 with water impounded in the N $\frac{1}{2}$ SE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$ Section 2; all in T5N-R28E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Application No. 2536-2 proposes to impound 45.40 acre-feet of water from runoff by constructing a dam located in the S $\frac{1}{2}$ NE $\frac{1}{4}$ Section 6 with water impounded in the S $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 6; all in T5N-R29E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 2535-2 and 2536-2 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 applications, as recommended, unless a petition is filed opposing the applications or the applicant files a petition contesting the Chief Engineer's recommendations. If a petition opposing the applications or contesting the recommendations is filed, then a hearing will be scheduled and the Water Management Board will consider the applications. Notice of the hearing will be given to the applicant and any person filing a petition.

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The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, 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 these applications. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.



NOV 19 2004

**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

Ray McQuiston
20489 Willow Creek Road
Ft Pierre SD 57532

Dear Mr. McQuiston:

Enclosed are Water Permit Nos. 2536-2 and 2535-2 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An informational sheet *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

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

enclosures

Permit No. 2535-2
Bad 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, November 9, 2005, made a thorough examination of the water use system constructed by Ray McQuiston of 20489 Willow Creek Rd, Ft. Pierre, SD 57532 holder of Permit No. 2535-2, bearing the priority of August 25, 2004 authorizing the storage of 52.3 acre-feet of the waters of runoff for fish & wildlife propagation purposes, in Stanley County.

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

A. Works used to divert the water:

A 28 foot high earth dam with a normal storage capacity of 52.3 acre-feet

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

N/A

C. Works used to apply water to beneficial use:

A 28 foot high earth dam with a normal storage capacity of 52.3 acre-feet

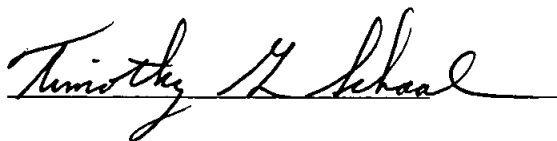
The system is in the following condition good. The point of diversion is located 1600 ft. north & 700 ft. west of the SE corner of Sec. 2-T5N-R28E (NE ¼ SE ¼) (Lat. 44.419883, Long. -100.69503). The works are capable of storing 52.3 acre-feet of water which is to be used for fish & wildlife propagation use. Water has been put to beneficial use to the maximum extent as follows:

A 28 foot high earth dam with a normal storage capacity of 52.3 acre-feet

and the license should be issued for 52.3 acre-feet of storage.

Applicable permit qualifications have been complied with: Yes X

Exceptions to compliance are: none Date Report Completed: January 27, 2006



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

REPORT ON INSPECTION OF PERMIT NO. 2535-2

DATE OF INSPECTION: November 9, 2005

NAME & ADDRESS OF INSPECTION CONTACT/ Ron McQuiston

RELATIONSHIP TO PERMIT HOLDER, IF APPLICABLE: son

NAME & ADDRESS OF PERMIT HOLDER: Ray McQuiston, 20489 Willow Creek Road, Ft. Pierre, SD 57532

DIVERSION POINT LEGAL LOCATION: 1600 ft. north & 700 ft. west of the SE corner of Sec. 2-T5N-R28E (NE ¼ SE ¼) (Lat. 44.419883, Long. -100.69503).

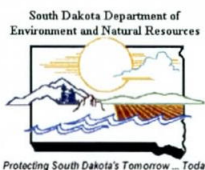
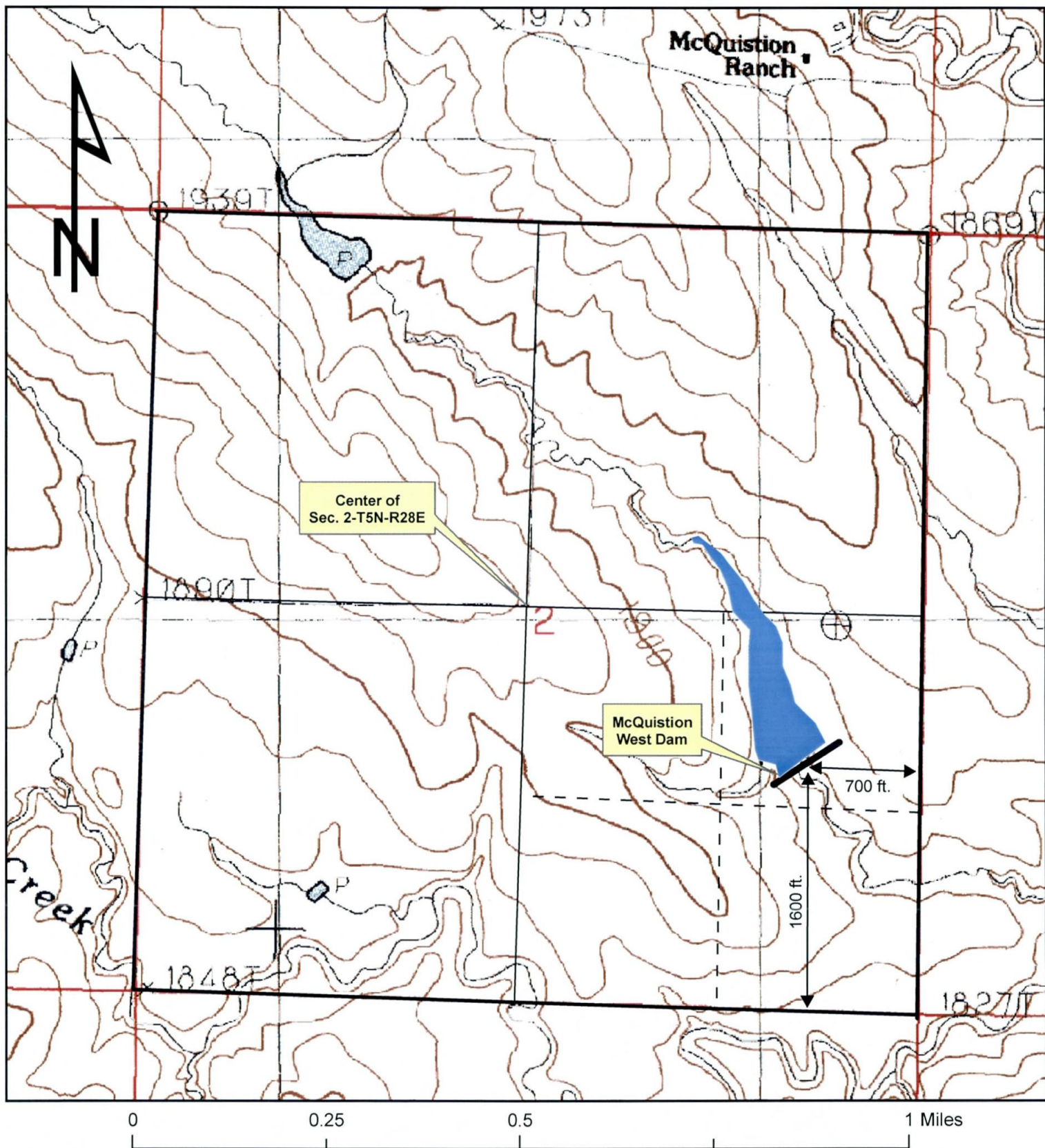
DAM INFORMATION:

- 1) Height to crest 28 feet
- 2) Height to primary spillway 21.5 feet
- 3) Height to secondary spillway 25.5 feet
- 4) Crest width 14 feet
- 5) Crest length 660 feet
- 6) Spillway length XXX feet
- 7) Spillway width 100 feet
- 8) Approx. storage (Normal) 52.3 acre-feet
- 9) Approx. storage (Maximum) 136 acre-feet
- 10) Date constructed: 2004

PERMIT QUALIFICATIONS AND REGULATIONS:

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

Water Permit Application No. 2535-2



Timothy G. Schaal

1/27/06

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

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 2535-2

(1) Ray McQuiston, 20489 Willow Creek Rd, Ft Pierre SD 57532 made Application No. 2535-2, August 25, 2004 for a water permit to impound 52.3 acre feet of water from runoff in Stanley County, South Dakota for fish and wildlife propagation and domestic purposes. Permit No. 2535-2, with a priority date of August 25, 2004 was approved November 12, 2004 and issued to the applicant for construction of the described water supply system to be completed on or before November 12, 2009 and for the application to beneficial use of water on or before November 12, 2013.

(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 water supply system and is entitled to impound 52.3 acre feet of water for beneficial use with sufficient water annually to maintain the water level to the outlet elevation.

The location of the storage dam (spillway) is 1,600 feet north and 700 feet west of the SE corner of Section 2, T5N, R28E (NE ¼ 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 for fish and wildlife propagation and domestic use.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Ray McQuiston, 20489 Willow Creek Rd, Ft Pierre SD 57532 the holder and/or owner of Water Right No. 2535-2 is issued a license to appropriate water, the right to impound 52.3 acre feet of water from runoff with sufficient water annually to maintain the water level to the outlet elevation from the location specified in (2) of this license. Water Right No. 2535-2 carries a priority date of August 25, 2004.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 2535-2 and subject to the following qualifications:

- Water Right No. 2535-2 authorizes a dam with a storage capacity of 52.3 acre feet of water and sufficient water annually to maintain the water level to an outlet elevation.
- Low flows as needed for downstream domestic use, including livestock water and prior water rights must be bypassed.



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

APR 07 2006

date





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

APR 07 2006

2535-2
2536-2

Ray McQuiston
20489 Willow Creek Rd
Ft Pierre SD 5732

Dear Mr. McQuiston:

Enclosed are Water License Nos. 2535-2 and 2536-2. The maps prepared by the staff engineer who conducted the field investigation are also included. Water License Nos. 2535-2 and 2536-2 are the final documents which complete the process of obtaining a water right.

As long as you use the water beneficially, as stated in the Water Licenses, 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