

**WATER PERMIT NO. 7127-3**

Name of Applicant: **Jon Williams**

Address: **40451 S Some House Rd, Avon SD**

Phone: **605 286-3734**

Amount of Water Claimed: **27 AF**

Total Acres: **NA**

Source of Water Supply: **runoff**

Water to be used for: **fish & wildlife propagatino**

County: **Bon Homme**

Type of Waste Disposal System: **NA**

Location: **4 miles south of Aveon**

**PRIORITY** Date Received: **4-9-09**

Application/License Fee: **\$200**

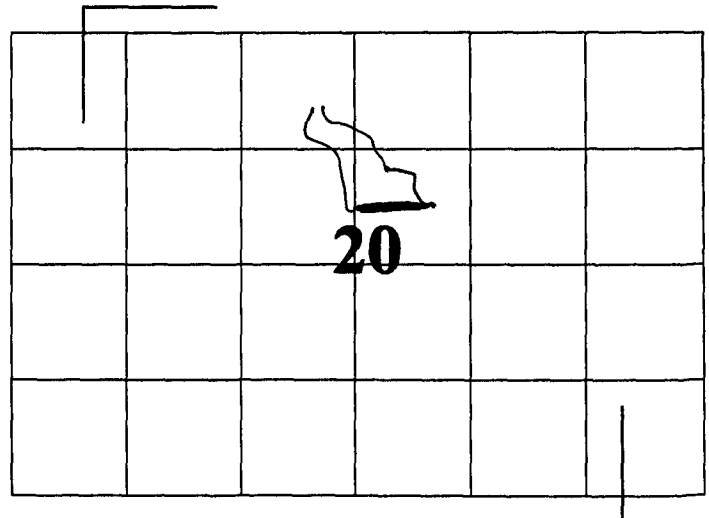
Corrected Application Received: **4-20-09**

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

Remarks:

Diversion Point: **SE ¼ NE ¼ Sec 20-T94N-R61W**

Water Impounded: **NE ¼ Sec 20-T94N-R61W**



Depth of Well: **NA**

Well Driller:

Remarks:

Type of Map: **aerial**

Prepared by: **D Edwards, NRCS**

Reviewed and the Number Assigned on: **4-20-09**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: \_\_\_\_\_

SD EForm - 1585 V2  
FORM 2: Application for uses other than irrigation  
(type or print)

|                                                                                                                    |                                                                                      |
|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Mail to:<br>Water Rights Program<br>Joe Foss Building<br>523 E. Capitol<br>Pierre, SD 57501-3181<br>(605) 773-3352 | No. <u>7127-3</u> (office use only)                                                  |
|                                                                                                                    | Hydrologic Unit <u>10170101</u>                                                      |
|                                                                                                                    | Basin <u>Missouri River</u>                                                          |
|                                                                                                                    | Newspaper <u>Avon Clarion P.O. Box 395</u><br><u>605-286-3919 (Wed)</u> <u>57315</u> |

RECEIVED  
APR - 9 2009  
WATER RIGHTS  
PROGRAM

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

Check use(s) of water:

- |                                                 |                                           |                                                                                 |                                          |
|-------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Municipal              | <input type="checkbox"/> Suburban Housing | <input type="checkbox"/> Recreational                                           | <input type="checkbox"/> Institutional   |
| <input type="checkbox"/> Rural Water System     | <input type="checkbox"/> Commercial       | <input type="checkbox"/> Fish & Wildlife                                        | <input type="checkbox"/> Geothermal Heat |
| <input type="checkbox"/> Domestic (over 18 gpm) | <input type="checkbox"/> Industrial       | <input checked="" type="checkbox"/> Other <u>Agricultural and Wildlife uses</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.)

1. Name of Applicant Jon Williams Phone (605) 286-3734  
(check one) ☐ Owner ☐ Tenant/lessee  
Mailing Address 40451 S. Stone House Road Avon State SD 57315  
(Street, RR, or Box and City) (Zip Code)
2. Amount of water claimed \_\_\_\_\_ \*CFS or \_\_\_\_\_ \*\*GPM 27.0 \*\*\*AF  
(\*Cubic Feet per Second) (\*\*Gallons per Minute) (\*\*\*)Acre Feet - storage capacity of dam/dugout or annual use if applicable)
3. Source of water supply Surface runoff
4. Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) County Bon Homme  
SE1/4, NE 1/4, Section 20, T94N, R61W  
Water impounded: NE1/4 Sec 20 T94N R 61W
5. County or counties where water will be used Bon Homme
6. Annual period during which water is to be used Jan 1 - Dec 31
7. 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)

The project consists of a 22.5' high, and 380' wide earthen dam which will on average pond approximately 27.0 acre feet of water per year.

STATE OF SOUTH DAKOTA)

County of Bon Homme

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, Jon Williams, 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 Jon Williams

Subscribed and sworn to before me this 2nd day of April 20 09

E R Bunn

Notary Public signature

My Commission Expires 10-15-2020

**SOUTH DAKOTA  
WATER PERMIT NO. 7127-3**

---

Date of first receipt of application April 9, 2009.

Date of return to applicant for corrections, amendments or changes April 16, 2009.

Date of receipt of corrected application April 20, 2009.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 7127-3 to Jon Williams, 40451 S Stone House Road, Avon SD 57315 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. 7127-3 authorizes impoundment 27 acre-feet of water from runoff by constructing a dam located in the SE 1/4 NE 1/4 Section 20 with water impounded in the NE 1/4 Section 20; all in T94N-R61W.
2. The water appropriated shall be used for fish and wildlife propagation and livestock water purposes 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. 7127-3 is June 22, 2009.
5. The date from which applicant may claim right is April 9, 2009.
6. One-fifth of the construction is to be completed on or before December 22, 2011.
7. All construction is to be completed on or before June 22, 2014.
8. Water is to be put to beneficial use on or before June 22, 2018.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

**QUALIFICATIONS**

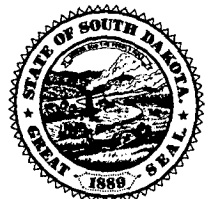
1. Water Permit No. 7127-3 authorizes a dam with a storage capacity of 27.0 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

**WATER MANAGEMENT BOARD**

By: Garland Erbele

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

JUN 24 2009  
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**

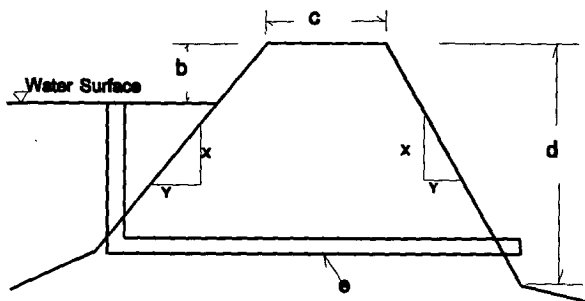
- a) Surface Dimensions \_\_\_\_\_ Depth \_\_\_\_\_
- b) Depth to water (ground surface to water level) \_\_\_\_\_

**4. Water Storage Dams**

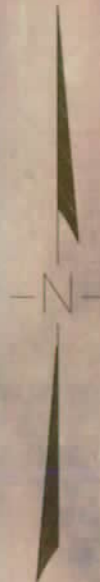
If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

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

Natural Resources Conservation Service  
Pierre Field Support Office  
1717 N. Lincoln Ave, Suite #104  
Pierre, SD 57501



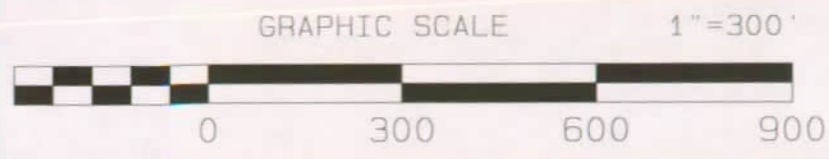
- b) Freeboard \_\_\_\_\_ 6.5'
- c) Crest Width \_\_\_\_\_ 12'
- Crest Length \_\_\_\_\_ 380'
- d) Height \_\_\_\_\_ 22.5'
- e) Primary Outlet Capacity \_\_\_\_\_ 13.0 CFS  
If pipe, diameter \_\_\_\_\_ 12"
- f) Secondary Spillway Capacity \_\_\_\_\_ 308 CFS  
Spillway Width \_\_\_\_\_ 60'
- g) X & Y Slope \_\_\_\_\_  
Upstream \_\_\_\_\_ 3:1  
Downstream \_\_\_\_\_ 3:1
- h) Surface Area of Impoundment \_\_\_\_\_ 4.29 Ac.
- i) Storage \_\_\_\_\_ 27.0 Acre Feet
- j) Drainage Area Above Dam \_\_\_\_\_ 655.0 Acres



Principal Spillway Crest= 983.0  
Emergency Spillway Crest= 986.4  
Top of Dam= 989.5

Excavate to Depth of 968.0  
(NRCS will stake required borrow area)

20  
center



RECEIVED  
APR 16 2009  
WATER RIGHTS  
PROGRAM

| REVISIONS |          |       |
|-----------|----------|-------|
| DATE      | APPROVED | TITLE |
|           |          |       |
|           |          |       |

|                                                                                                                                                                            |                                   |                                                                                                           |                          |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------|-------------------|
| <br>Natural Resources Conservation Service<br>United States Department of Agriculture | File Name:<br>Jon_Williams_PondFL | PRODUCER<br>NE 1/4 SECT. 20 T. 94 North R. 61 West<br>Bon Homme COUNTY<br>Bon Homme CONSERVATION DISTRICT | Designed<br>J. Weidemann | Date<br>4/16/2009 |
|                                                                                                                                                                            | Drawing No.                       |                                                                                                           | Drawn<br>J. Weidemann    | 4/16/2009         |
|                                                                                                                                                                            |                                   |                                                                                                           | Checked<br>DSE           | 4/16/09           |
|                                                                                                                                                                            |                                   |                                                                                                           | Approved<br>D. Edwards   | 4/16/09           |

USDA - NRCS  
FIELD SUPPORT OFFICE  
1717 N. LINCOLN AVE. SUITE 104  
PIERRE, SOUTH DAKOTA 57501

# RECEIPT

## WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 4/20, 20 09

RECEIVED OF Jon Williams 40451 Stone House Rd Avon SD 57315

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

|                                                                                                                        |        |
|------------------------------------------------------------------------------------------------------------------------|--------|
| Fee for Application for Permit No. <u>7127-3</u> to Appropriate Water, to construct and to put water to beneficial use | 150 00 |
| Fee for Application for Permit No. _____ to Appropriate Water for Future use                                           |        |
| Fee to retain Future Use Permit No. _____ after period of seven years.                                                 |        |
| Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>7127-3</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                                                                                                                  | 200 00 |

No.

04119

By

Michael Erbe

Chief Engineer



Natural Resources Conservation Service  
Field Support Office  
1717 North Lincoln Avenue Suite# 104  
Pierre, SD 57501

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

April 9, 2009

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

**RECEIVED**

**APR - 9 2009**

**WATER RIGHTS  
PROGRAM**

Mr. Tim Schaal,

Attached are plans, specifications, design data and a completed water rights permit for a dam in Bon Homme County for Jon Williams. Due to the size, a safety of dams review is required.

The landowner would like to construct this pond this spring/summer. Please call our office if you have any questions.

Thank You,

A handwritten signature in cursive script, appearing to read "Jon Weidemann".

JON WEIDEMANN  
Agricultural Engineer

Attachments

CC: Dana Edwards, CE, Pierre NRCS

Prepared By:

Thomas E. Alberts  
Attorney At Law  
P.O. Box 347  
Avon, SD 57315  
Telephone (605) 286-3218

### EASEMENT MEMORANDUM

For and in consideration of the mutual benefits to be obtained from the improvements to be constructed, the undersigned ARC Farms, Inc., a South Dakota Corporation, 40596 307<sup>th</sup> St., Avon, South Dakota 57315, does hereby grant unto Jon Williams and Faye Williams, husband and wife, 40451 S Stone House Rd., Avon, South Dakota 57315, their heirs, successors and assigns, a perpetual easement to overflow water onto, over, upon and across the Southeast Quarter (SE $\frac{1}{4}$ ) and the South Half of the Southeast Quarter of the Northeast Quarter (S $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ ), all of said property being located in Section Twenty (20), Township Ninety-four (94) North, Range Sixty-one (61), West of the 5<sup>th</sup> P.M., Bon Homme County, South Dakota. Jon Williams and Faye Williams will construct a pond embankment on the north property line of the South Half of the Southeast Quarter of the Northeast Quarter (S $\frac{1}{2}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ ) of Section Twenty (20), Township Ninety-four (94) North, Range Sixty-one (61), West of the 5<sup>th</sup> P.M., Bon Homme County, South Dakota, where the current fence line exists and the purpose of this easement is to provide an outlet for overflow water that may occur at the planned high-water level where the existing fence line exists.

Dated this 9<sup>th</sup> day of March, 2009.

ARC FARMS, INC.

By: Ron Ratzliff

Its President

State of South Dakota )

ss

County of Bon Homme )

On this the 9<sup>th</sup> day of March, 2009, before me, Thomas E. Alberts, the undersigned officer, personally appeared Ron Ratzliff, known to me to be the President of ARC Farms, Inc., the corporation that is described in and that executed the within instrument and acknowledged to me that such corporation executed the same.

In witness whereof I hereunto set my hand and official seal.

(SEAL)

My Commission Expires: 5/21/2010

Thomas E. Alberts  
Notary Public, State of South Dakota



## DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

## NOTICE OF INTENT (NOI)

to Obtain Coverage Under the SWD General Permit for  
Storm Water Discharges Associated with Industrial or Construction Activities

APR - 9 2009 Return to:

WATER RIGHTS  
PROGRAM

SD Department of Environment and Natural Resources  
Surface Water Quality Program  
523 East Capitol Avenue  
Pierre, South Dakota 57501-3181  
Telephone: (605) 773-3351 or 1-800-SDSTORM

## PLEASE PRINT OR TYPE

## I. Applicant/Owner Information:

Name Jon Williams Phone (605) 286-3734  
Responsible Contact Person Jon Williams  
Street 40451 S. Stone House Road  
City Avon State SD Zip Code 57315

## II. Facility/Site Information:

Name \_\_\_\_\_ Phone \_\_\_\_\_  
Responsible Contact Person \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_  
Type of Ownership: ☒ Private ☐ Federal  
☐ State ☐ Public (Other than Federal or State)

## III. Type of Permit Requested: Check (X) the appropriate response:

☐ Industrial Activity ☐ Sand/Gravel Mining Activity ☒ Construction Activity

## IV. Pollution Prevention Plan

A. Has the Pollution Prevention Plan been developed as Required? Yes ☒ No ☐

If No, when will it be developed? \_\_\_\_\_

*Please note: The plan must be developed before any industrial or construction activity begins*

B. Please include a brief description of best management practices (pollution control measures) being used at the facility/site:

If areas exist during construction with signs of visible soil erosion, temporary seeding, mulching, and silt fences will be utilized for erosion reduction.

## V. Facility/Site Location:

A. Quarter NE Section 20 Township 94N Range 61W  
County Bon Homme [If available: Latitude \_\_\_\_\_ Longitude \_\_\_\_\_]  
B. Site/Project Name: Jon Williams Pond  
C. What is the total area covered by the site (in acres) 1.44

## FOR DENR USE ONLY

Postmark Date:

Permit Number:

Date Permitted:

**VI. Receiving Waters:**

Please list all possible receiving waters of the storm water discharge (if discharging to a Municipal Storm Sewer, indicate which municipality and the ultimate receiving water):

Receiving waters will be an unnamed tributary to Choteau Creek on the Bon Homme and Charles Mix county line, which flows into the Missouri River.

**VII. Nature of Discharge**

- A. **Standard Industrial Classification (SIC) codes of this facility** (Include at least one, and up to four, SIC or 6-digit North American Industry Classification (NAIC) codes which best describe the facility. For example, the SIC Code for a sand/gravel pit is **1442**. For construction activities, no codes are assigned; therefore, indicate **CO**):

CO

- B. Please include a brief description of the activities conducted at this facility or construction site:

Project activities include constructing an earthen embankment and an auxiliary earthen spillway. A core trench will be excavated along the centerline of the dam and will be filled shortly after excavation. The disturbed area will be seeded immediately following construction.

**VIII. Operational History (Industrial Only)**

Date Constructed: \_\_\_\_\_

Operational Start-up: \_\_\_\_\_

**Construction Project History (Construction or sand/gravel mining)**

Project Start Date (MM/DD/YY): 4/15/2009

Estimated Area of Total Disturbance (in acres): 1.44

Estimated Completion Date (MM/DD/YY): 5/15/2009

**IX. Existing Environmental Permits**

Please check (X) all other Environmental Permits which are held by this facility/activity. Include permit numbers in the space provided:

☐ SWD or NPDES (Discharges to Surface Water) \_\_\_\_\_

☐ UIC (Underground Injection of Fluids) \_\_\_\_\_

☐ RCRA (Hazardous Wastes) \_\_\_\_\_

☐ PSD (Air Emissions from Proposed Sources) \_\_\_\_\_

☐ Other (please specify) \_\_\_\_\_

**X. Certification** (Authorized representative should *initial* the box)



I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including revocation of the permit and the possibility of fine and imprisonment for knowing violations. In addition, I certify that I am aware of the terms and conditions of the General Storm Water permit and I agree to comply with those requirements.

**CERTIFICATION OF APPLICANT (COA)**

I, Jon Williams, the applicant in the above matter after being duly sworn upon oath hereby certify the following information in regard to this application:

South Dakota Codified Laws Section 1-40-27 provides:

*"The secretary may reject an application for any permit filed pursuant to Titles 34A or 45, including any application by any concentrated swine feeding operation for authorization to operate under a general permit, upon making a specific finding that:*

*(1) The applicant is unsuited or unqualified to perform the obligations of a permit holder based upon a finding that the applicant, any officer, director, partner or resident general manager of the facility for which application has been made:*

- (a) Has intentionally misrepresented a material fact in applying for a permit;*
- (b) Has been convicted of a felony or other crime involving moral turpitude;*
- (c) Has habitually and intentionally violated environmental laws of any state or the United States which have caused significant and material environmental damage;*
- (d) Has had any permit revoked under the environmental laws of any state or the United States; or*
- (e) Has otherwise demonstrated through clear and convincing evidence of previous actions that the applicant lacks the necessary good character and competency to reliably carry out the obligations imposed by law upon the permit holder; or*

*(2) The application substantially duplicates an application by the same applicant denied within the past five years which denial has not been reversed by a court of competent jurisdiction. Nothing in this subdivision may be construed to prohibit an applicant from submitting a new application for a permit previously denied, if the new application represents a good faith attempt by the applicant to correct the deficiencies that served as the basis for the denial in the original application.*

*All applications filed pursuant to Titles 34A and 45 shall include a certification, sworn to under oath and signed by the applicant, that he is not disqualified by reason of this section from obtaining a permit. In the absence of evidence to the contrary, that certification shall constitute a prima facie showing of the suitability and qualification of the applicant. If at any point in the application review, recommendation or hearing process, the secretary finds the applicant has intentionally made any material misrepresentation of fact in regard to this certification, consideration of the application may be suspended and the application may be rejected as provided for under this section.*

*Applications rejected pursuant to this section constitute final agency action upon that application and may be appealed to circuit court as provided for under chapter 1-26."*

Pursuant to SDCL 1-40-27, I certify that I have read the forgoing provision of state law, and that I am not disqualified by reason of that provision from obtaining the permit for which application has been made.

**NOTE:** The Notice of Intent must be signed by the authorized chief elective, an executive officer or a corporate responsible official of the applicant, or by the applicant, if an individual.

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

Name (print) Jon Williams  
Title Landowner  
Signature Jon Williams  
Date 4-2-09

**PLEASE ATTACH SHEET DISCLOSING ALL FACTS PERTAINING TO SDCL 1-40-27 (1) (a) THROUGH (e).  
ALL VIOLATIONS MUST BE DISCLOSED, BUT WILL NOT  
AUTOMATICALLY RESULT IN THE REJECTION OF AN APPLICATION.**

Client: JON WILLIAMS  
 County: BON HOMME  
 Practice: POND  
 Calculated By: ROLSTON  
 Checked By: A. Roman

State: SD

Date: 10/4/2007

Date: 9/17/2008

RECEIVED

APR - 9 2009

WATER RIGHTS  
PROGRAM

Drainage Area: 655 Acres (user entered value)  
 Curve Number: 72 (provided from RCN Calculator)  
 Watershed Length: 12000 Feet  
 Watershed Slope: 7.37 Percent  
 Time of Concentration: 1.80 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)                  | 2.10  | 2.60  | 3.40  | 3.90  | 4.60   | 5.20   | 5.80   |
| Ia/P Ratio                           | 0.37  | 0.30  | 0.23  | 0.20  | 0.17   | 0.15   | 0.13   |
| Used                                 | 0.37  | 0.30  | 0.23  | 0.20  | 0.17   | 0.15   | 0.13   |
| Runoff (in)                          | 0.34  | 0.58  | 1.06  | 1.39  | 1.89   | 2.35   | 2.83   |
| (ac-ft)                              | 18.56 | 31.66 | 57.86 | 75.87 | 103.16 | 128.27 | 154.47 |
| Unit Peak Discharge<br>(cfs/acre/in) | 0.270 | 0.311 | 0.335 | 0.346 | 0.356  | 0.363  | 0.368  |
| Peak Discharge (cfs)                 | 59    | 119   | 232   | 315   | 442    | 559    | 682    |

## Curve number Computation

Client: JON WILLIAMS  
 County: BON HOMME  
 Practice: POND  
 Calculated By: ROLSTON  
 Checked By: \_\_\_\_\_

State: SD  
 Date: 10/4/2007  
 Date: \_\_\_\_\_

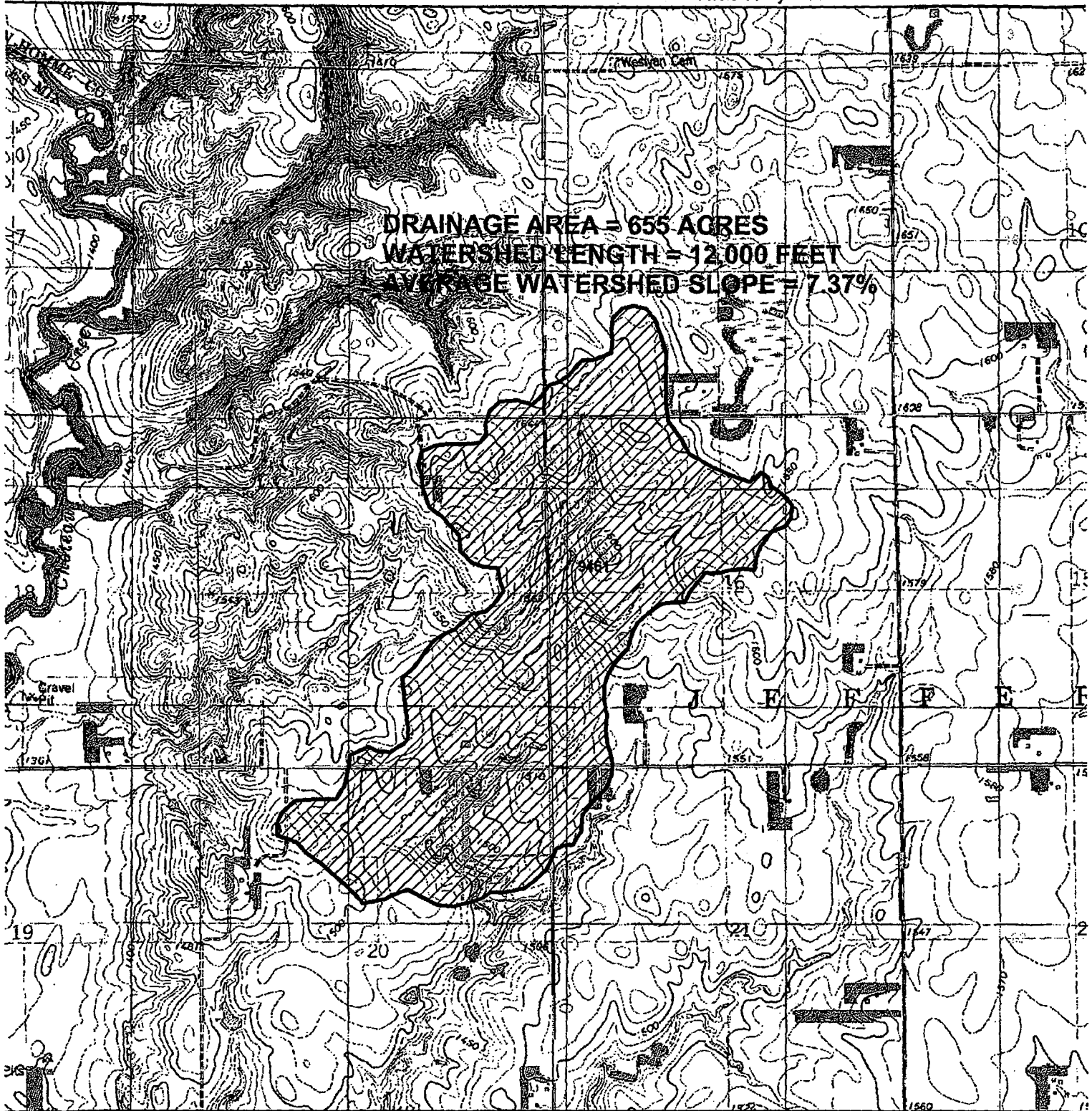
| COVER DESCRIPTION                                                        | Percent (CN)          |                           |       |   |
|--------------------------------------------------------------------------|-----------------------|---------------------------|-------|---|
|                                                                          | Hydrologic Soil Group |                           |       |   |
|                                                                          | A                     | B                         | C     | D |
| <b>CULTIVATED AGRICULTURAL LANDS</b><br>Row crops SR + Crop residue good | -                     | 41(75)                    | 8(82) | - |
| <b>OTHER AGRICULTURAL LANDS</b><br>Pasture, grassland or range fair      | 6(49)                 | 38(69)                    | 7(79) | - |
| Total Area (by Hydrologic Soil Group)                                    | 6                     | 79                        | 15    |   |
| TOTAL DRAINAGE AREA: 100 Percent                                         |                       | WEIGHTED CURVE NUMBER: 72 |       |   |

# TOPOGRAPHIC MAP

Date: 10/4/2007

Customer(s): JON WILLIAMS  
District: BON HOMME COUNTY CONSERVATION DISTRICT

Field Office: TYNDALL SERVICE CENTER  
Agency: USDA-NRCS  
Assisted By: Paul F Rolston



## Legend

-  DRAINAGE AREA
-  DG07\_T1322\_20-94-61
-  Township
- Sections



1,200 0 1,200 2,400 3,600 4,800 Feet



Reviewed EFH2 8/14/08 - All OK *DW*

Slope

Length of Gridlines

Contour lines crossed

|   |              |   |            |
|---|--------------|---|------------|
| A | 1100         | A | 2          |
| B | 5900         | B | 26         |
| C | 6500         | C | 24         |
| D | 900          | D | 3          |
| 1 | 2700         | 1 | 8          |
| 2 | 4200         | 2 | 18         |
| 3 | 2800         | 3 | 9          |
| 4 | 3000         | 4 | 18         |
|   | <u>27100</u> |   | <u>108</u> |

$$S = \frac{1.571 \times 10 \times 108}{27100} = 6.37\%$$

170 crop

60 crop

230 Ac crop

35% crop

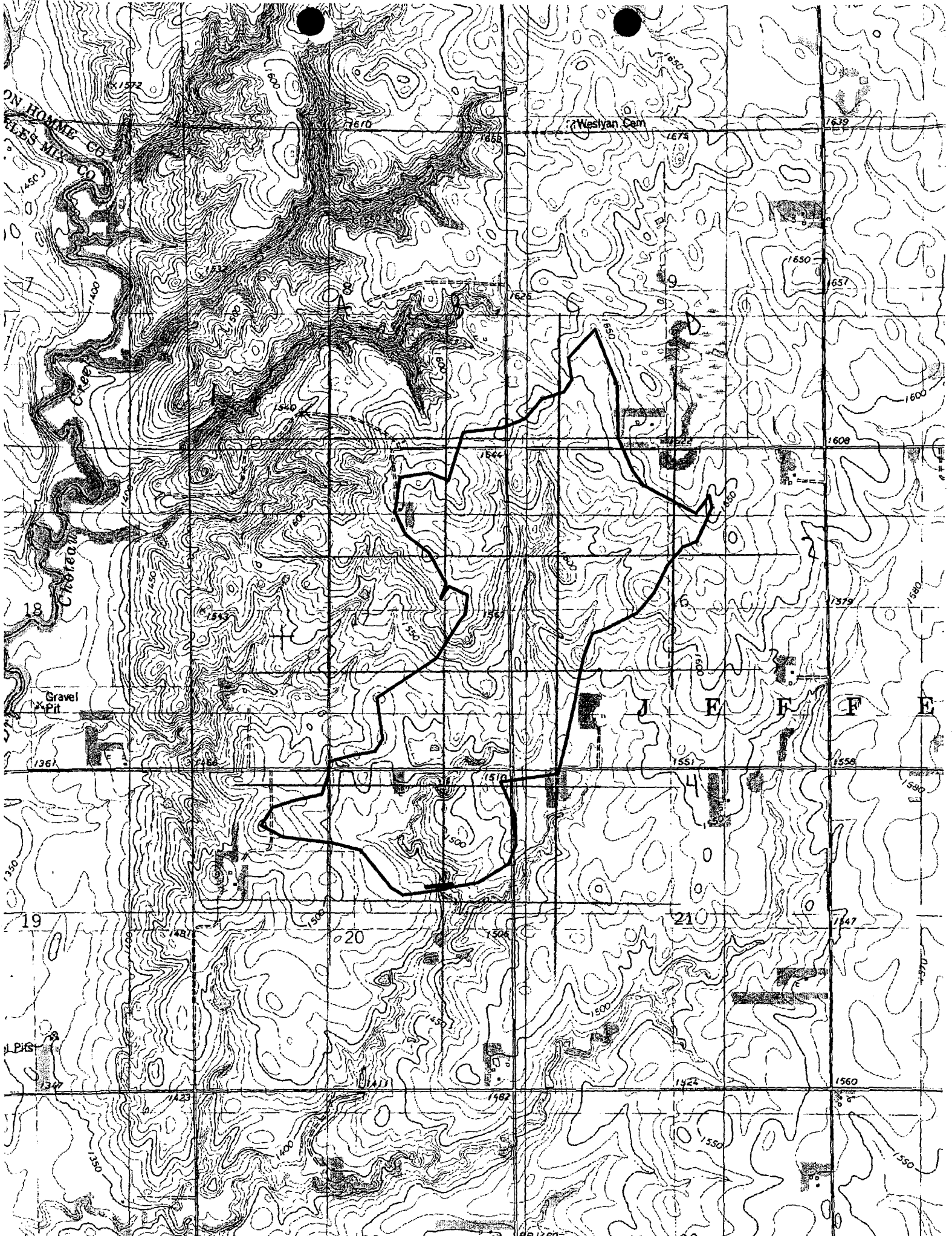
65% grass.

272 Ac grass  
30  
302

302 Ac grass  
353 Ac crop

36 Ac A, 93 Ac C, 173 B  
10 Ac C, 343 B

66% row crop 7 Ac C 226 Ac B  
33% small grain 3 Ac C 117 Ac B





## Hydrologic Soil Group

| Hydrologic Soil Group— Summary by Map Unit — Bon Homme County, South Dakota |                                                        |        |              |                |
|-----------------------------------------------------------------------------|--------------------------------------------------------|--------|--------------|----------------|
| Map unit symbol                                                             | Map unit name                                          | Rating | Acres in AOI | Percent of AOI |
| Bo                                                                          | Bon loam, channeled                                    | B      | 14.1         | 2.1%           |
| EmE                                                                         | Ethan-Betts loams, 15 to 40 percent slopes             | B      | 29.7         | 4.5%           |
| EoD                                                                         | Ethan-Davis loams, 9 to 15 percent slopes              | B      | 139.1        | 20.9%          |
| EpC                                                                         | Ethan-Homme complex, 6 to 9 percent slopes             | B      | 342.1        | 51.3%          |
| HnB                                                                         | Homme-Ethan-Onita complex, 1 to 6 percent slopes       | C      | 63.6         | 9.5%           |
| HpC                                                                         | Homme-Ethan-Tetonka complex, 0 to 9 percent slopes     | C      | 25.4         | 3.8%           |
| TbE                                                                         | Talmo-Ethan very stony complex, 6 to 40 percent slopes | A      | 36.4         | 5.5%           |
| Te                                                                          | Tetonka silt loam                                      | C/D    | 15.9         | 2.4%           |
| <b>Totals for Area of Interest</b>                                          |                                                        |        | <b>666.3</b> | <b>100.0%</b>  |

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol  | Depth     | USDA texture                                 | Classification             |                    | Frag-ments > 3 inches | Percentage passing sieve number-- |        |        |        | Liquid limit | Plas-ticity index |
|---------------------------|-----------|----------------------------------------------|----------------------------|--------------------|-----------------------|-----------------------------------|--------|--------|--------|--------------|-------------------|
|                           |           |                                              | Unified                    | AASHTO             |                       | 4                                 | 10     | 40     | 200    |              |                   |
|                           | <u>In</u> |                                              |                            |                    | <u>Pct</u>            |                                   |        |        |        | <u>Pct</u>   |                   |
| bC*, EbE*:<br>Eltree----- | 0-12      | Silt loam-----                               | CL, ML,<br>CL-ML           | A-4, A-6           | 0                     | 100                               | 100    | 85-100 | 65-100 | 20-40        | 3-15              |
|                           | 12-28     | Silt loam, very<br>fine sandy loam,<br>loam. | CL, CL-ML                  | A-4, A-6           | 0                     | 100                               | 95-100 | 85-100 | 85-100 | 25-40        | 5-20              |
|                           | 28-60     | Silt loam, loam,<br>silty clay loam.         | CL                         | A-4, A-6,<br>A-7-6 | 0                     | 100                               | 95-100 | 90-100 | 65-100 | 25-45        | 7-22              |
| Ethan-----                | 0-7       | Loam-----                                    | CL                         | A-4, A-6           | 0                     | 95-100                            | 90-100 | 80-95  | 55-80  | 30-40        | 8-15              |
|                           | 7-17      | Loam, clay loam                              | CL                         | A-6, A-7           | 0-5                   | 95-100                            | 90-100 | 80-100 | 55-80  | 30-50        | 10-25             |
|                           | 17-60     | Loam, clay loam                              | CL                         | A-4, A-6,<br>A-7   | 0-5                   | 90-100                            | 85-100 | 75-100 | 50-95  | 28-45        | 8-20              |
| cdD*:<br>Eltree-----      | 0-12      | Silt loam-----                               | CL, ML,<br>CL-ML           | A-4, A-6           | 0                     | 100                               | 100    | 85-100 | 65-100 | 20-40        | 3-15              |
|                           | 12-28     | Silt loam, very<br>fine sandy loam,<br>loam. | CL, CL-ML                  | A-4, A-6           | 0                     | 100                               | 95-100 | 85-100 | 85-100 | 25-40        | 5-20              |
|                           | 28-60     | Silt loam, loam,<br>silty clay loam.         | CL                         | A-4, A-6,<br>A-7-6 | 0                     | 100                               | 95-100 | 90-100 | 65-100 | 25-45        | 7-22              |
| Crofton-----              | 0-4       | Silt loam-----                               | ML, CL                     | A-6, A-7           | 0                     | 100                               | 100    | 95-100 | 95-100 | 35-50        | 10-25             |
|                           | 4-60      | Silt loam-----                               | CL                         | A-6, A-7           | 0                     | 100                               | 95-100 | 95-100 | 95-100 | 32-50        | 10-25             |
| EdA*, EdB*:<br>Enet-----  | 0-10      | Loam-----                                    | ML, CL                     | A-4, A-6           | 0                     | 90-100                            | 85-100 | 70-95  | 55-80  | 30-40        | 5-15              |
|                           | 10-25     | Loam, clay loam,<br>sandy clay loam.         | CL, ML,<br>SC, SM          | A-4, A-6           | 0                     | 90-100                            | 85-100 | 70-95  | 45-75  | 30-40        | 5-15              |
|                           | 25-60     | Gravelly loamy<br>sand, gravelly<br>sand.    | SW, SW-SM,<br>SM, SM-SC    | A-1, A-2,<br>A-3   | 0                     | 60-95                             | 45-90  | 10-60  | 0-15   | <25          | NP-5              |
| Delmont-----              | 0-8       | Loam-----                                    | CL                         | A-6, A-4           | 0                     | 90-100                            | 90-100 | 80-95  | 60-75  | 28-40        | 8-20              |
|                           | 8-15      | Loam, fine sandy<br>loam, sandy<br>loam.     | SC, CL,<br>CL-ML,<br>SM-SC | A-4, A-6           | 0                     | 80-100                            | 70-100 | 50-100 | 35-70  | 20-40        | 5-18              |
|                           | 15-60     | Gravelly sand,<br>gravelly loamy<br>sand.    | SM, SW-SM,<br>SM-SC, SW    | A-1, A-2           | 0-5                   | 60-100                            | 40-80  | 15-50  | 3-30   | <25          | NP-5              |
| EhB*, EhC*:<br>Ethan----- | 0-7       | Loam-----                                    | CL                         | A-4, A-6           | 0                     | 95-100                            | 90-100 | 80-95  | 55-80  | 30-40        | 8-15              |
|                           | 7-17      | Loam, clay loam                              | CL                         | A-6, A-7           | 0-5                   | 95-100                            | 90-100 | 80-100 | 55-80  | 30-50        | 10-25             |
|                           | 17-60     | Loam, clay loam                              | CL                         | A-4, A-6,<br>A-7   | 0-5                   | 90-100                            | 85-100 | 75-100 | 50-95  | 28-45        | 8-20              |
| Alcester-----             | 0-13      | Silt loam-----                               | CL, CL-ML,<br>ML           | A-4, A-6           | 0                     | 100                               | 100    | 95-100 | 85-100 | 25-40        | 6-20              |
|                           | 13-36     | Silty clay loam,<br>silt loam.               | CL, ML                     | A-6, A-7           | 0                     | 100                               | 100    | 95-100 | 90-100 | 35-50        | 10-25             |
|                           | 36-60     | Silty clay loam,<br>silt loam.               | ML, CL                     | A-6, A-7           | 0                     | 95-100                            | 95-100 | 95-100 | 85-100 | 30-50        | 10-20             |
| EmE*:<br>Ethan-----       | 0-7       | Loam-----                                    | CL                         | A-4, A-6           | 0                     | 95-100                            | 90-100 | 80-95  | 55-80  | 30-40        | 8-15              |
|                           | 7-17      | Loam, clay loam                              | CL                         | A-6, A-7           | 0-5                   | 95-100                            | 90-100 | 80-100 | 55-80  | 30-50        | 10-25             |
|                           | 17-60     | Loam, clay loam                              | CL                         | A-4, A-6,<br>A-7   | 0-5                   | 90-100                            | 85-100 | 75-100 | 50-95  | 28-45        | 8-20              |
| Betts-----                | 0-4       | Loam-----                                    | CL, CL-ML                  | A-4, A-6           | 0-5                   | 90-100                            | 80-100 | 75-100 | 60-75  | 20-38        | 5-15              |
|                           | 4-28      | Loam, clay loam                              | CL                         | A-6, A-7           | 0-5                   | 90-100                            | 85-100 | 75-100 | 50-85  | 30-45        | 10-25             |
|                           | 28-60     | Clay loam, loam                              | CL                         | A-6, A-7           | 0-5                   | 90-100                            | 85-100 | 75-100 | 50-85  | 30-45        | 10-25             |
| EnC*:<br>Ethan-----       | 0-7       | Loam-----                                    | CL                         | A-4, A-6           | 0                     | 95-100                            | 90-100 | 80-95  | 55-80  | 30-40        | 8-15              |
|                           | 7-17      | Loam, clay loam                              | CL                         | A-6, A-7           | 0-5                   | 95-100                            | 90-100 | 80-100 | 55-80  | 30-50        | 10-25             |
|                           | 17-60     | Loam, clay loam                              | CL                         | A-4, A-6,<br>A-7   | 0-5                   | 90-100                            | 85-100 | 75-100 | 50-95  | 28-45        | 8-20              |

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol  | Depth     | USDA texture                                  | Classification    |                  | Frag-ments<br>> 3<br>inches | Percentage passing<br>sieve number-- |        |        |        | Liquid<br>limit<br>Pct | Plas-<br>ticity<br>index |
|---------------------------|-----------|-----------------------------------------------|-------------------|------------------|-----------------------------|--------------------------------------|--------|--------|--------|------------------------|--------------------------|
|                           |           |                                               | Unified           | AASHTO           |                             | 4                                    | 10     | 40     | 200    |                        |                          |
|                           | <u>In</u> |                                               |                   |                  | <u>Pct</u>                  |                                      |        |        |        |                        |                          |
| HmA*:<br>Tetonka-----     | 0-11      | Silt loam-----                                | ML, CL            | A-4, A-6         | 0                           | 100                                  | 100    | 90-100 | 80-100 | 27-40                  | 5-15                     |
|                           | 11-31     | Clay, silty clay,<br>silty clay loam.         | CH, MH,<br>CL, ML | A-7              | 0                           | 100                                  | 95-100 | 90-100 | 70-100 | 40-70                  | 15-35                    |
|                           | 31-60     | Clay, silty clay,<br>silty clay loam.         | CH, CL            | A-6, A-7         | 0                           | 95-100                               | 90-100 | 85-100 | 65-100 | 30-60                  | 15-30                    |
| HnB*:<br>Homme-----       | 0-8       | Silty clay loam                               | CL                | A-6, A-7         | 0                           | 100                                  | 95-100 | 95-100 | 85-100 | 35-45                  | 15-25                    |
|                           | 8-24      | Silty clay loam                               | CL, CH            | A-7              | 0                           | 100                                  | 95-100 | 95-100 | 80-100 | 40-55                  | 15-30                    |
|                           | 24-36     | Silty clay loam,<br>silt loam.                | CL, CH            | A-6, A-7         | 0-5                         | 95-100                               | 95-100 | 90-100 | 80-100 | 30-50                  | 10-25                    |
|                           | 36-60     | Clay loam, loam                               | CL                | A-6, A-7         | 0-5                         | 95-100                               | 90-100 | 85-100 | 60-85  | 30-50                  | 10-25                    |
| Ethan-----                | 0-7       | Loam-----                                     | CL                | A-4, A-6         | 0                           | 95-100                               | 90-100 | 80-95  | 55-80  | 30-40                  | 8-15                     |
|                           | 7-17      | Loam, clay loam                               | CL                | A-6, A-7         | 0-5                         | 95-100                               | 90-100 | 80-100 | 55-80  | 30-50                  | 10-25                    |
|                           | 17-60     | Loam, clay loam                               | CL                | A-4, A-6,<br>A-7 | 0-5                         | 90-100                               | 85-100 | 75-100 | 50-95  | 28-45                  | 8-20                     |
| Onita-----                | 0-15      | Silty clay loam                               | CL                | A-6, A-7         | 0                           | 100                                  | 95-100 | 90-100 | 65-95  | 30-45                  | 12-20                    |
|                           | 15-36     | Silty clay loam,<br>clay loam, silty<br>clay. | CL, CH,<br>ML, MH | A-6, A-7         | 0                           | 100                                  | 95-100 | 90-100 | 75-100 | 35-60                  | 10-35                    |
|                           | 36-60     | Silty clay loam,<br>clay loam, silt<br>loam.  | CL, CH            | A-6, A-7         | 0-5                         | 95-100                               | 95-100 | 85-100 | 65-100 | 30-55                  | 10-30                    |
| HpB*, HpC*:<br>Homme----- | 0-8       | Silty clay loam                               | CL                | A-6, A-7         | 0                           | 100                                  | 95-100 | 95-100 | 85-100 | 35-45                  | 15-25                    |
|                           | 8-24      | Silty clay loam                               | CL, CH            | A-7              | 0                           | 100                                  | 95-100 | 95-100 | 80-100 | 40-55                  | 15-30                    |
|                           | 24-36     | Silty clay loam,<br>silt loam.                | CL, CH            | A-6, A-7         | 0-5                         | 95-100                               | 95-100 | 90-100 | 80-100 | 30-50                  | 10-25                    |
|                           | 36-60     | Clay loam, loam                               | CL                | A-6, A-7         | 0-5                         | 95-100                               | 90-100 | 85-100 | 60-85  | 30-50                  | 10-25                    |
| Ethan-----                | 0-7       | Loam-----                                     | CL                | A-4, A-6         | 0                           | 95-100                               | 90-100 | 80-95  | 55-80  | 30-40                  | 8-15                     |
|                           | 7-17      | Loam, clay loam                               | CL                | A-6, A-7         | 0-5                         | 95-100                               | 90-100 | 80-100 | 55-80  | 30-50                  | 10-25                    |
|                           | 17-60     | Loam, clay loam                               | CL                | A-4, A-6,<br>A-7 | 0-5                         | 90-100                               | 85-100 | 75-100 | 50-95  | 28-45                  | 8-20                     |
| Tetonka-----              | 0-16      | Silt loam-----                                | ML, CL            | A-4, A-6,<br>A-7 | 0                           | 100                                  | 100    | 95-100 | 80-100 | 27-50                  | 5-20                     |
|                           | 16-42     | Clay, silty clay,<br>silty clay loam.         | CL, CH,<br>MH, ML | A-7              | 0                           | 95-100                               | 95-100 | 85-100 | 65-100 | 40-70                  | 15-35                    |
|                           | 42-60     | Silty clay, clay,<br>silty clay loam.         | CL, CH            | A-6, A-7         | 0                           | 95-100                               | 95-100 | 80-100 | 55-95  | 30-60                  | 11-30                    |
| HrA*, HrB*:<br>Homme----- | 0-8       | Silty clay loam                               | CL                | A-6, A-7         | 0                           | 100                                  | 95-100 | 95-100 | 85-100 | 35-45                  | 15-25                    |
|                           | 8-24      | Silty clay loam                               | CL, CH            | A-7              | 0                           | 100                                  | 95-100 | 95-100 | 80-100 | 40-55                  | 15-30                    |
|                           | 24-36     | Silty clay loam,<br>silt loam.                | CL, CH            | A-6, A-7         | 0-5                         | 95-100                               | 95-100 | 90-100 | 80-100 | 30-50                  | 10-25                    |
|                           | 36-60     | Clay loam, loam                               | CL                | A-6, A-7         | 0-5                         | 95-100                               | 90-100 | 85-100 | 60-85  | 30-50                  | 10-25                    |
| Onita-----                | 0-15      | Silty clay loam                               | CL                | A-6, A-7         | 0                           | 100                                  | 95-100 | 90-100 | 65-95  | 30-45                  | 12-20                    |
|                           | 15-36     | Silty clay loam,<br>clay loam, silty<br>clay. | CL, CH,<br>ML, MH | A-6, A-7         | 0                           | 100                                  | 95-100 | 90-100 | 75-100 | 35-60                  | 10-35                    |
|                           | 36-60     | Silty clay loam,<br>clay loam, silt<br>loam.  | CL, CH            | A-6, A-7         | 0-5                         | 95-100                               | 95-100 | 85-100 | 65-100 | 30-55                  | 10-30                    |
| HtA*:<br>Homme-----       | 0-8       | Silty clay loam                               | CL                | A-6, A-7         | 0                           | 100                                  | 95-100 | 95-100 | 85-100 | 35-45                  | 15-25                    |
|                           | 8-24      | Silty clay loam                               | CL, CH            | A-7              | 0                           | 100                                  | 95-100 | 95-100 | 80-100 | 40-55                  | 15-30                    |
|                           | 24-36     | Silty clay loam,<br>silt loam.                | CL, CH            | A-6, A-7         | 0-5                         | 95-100                               | 95-100 | 90-100 | 80-100 | 30-50                  | 10-25                    |
|                           | 36-60     | Clay loam, loam                               | CL                | A-6, A-7         | 0-5                         | 95-100                               | 90-100 | 85-100 | 60-85  | 30-50                  | 10-25                    |

See footnote at end of table.

BEAN HOMME COUNTY, SOUTH DAKOTA



EARTH BORING DOCUMENTATION

|                      |                                                              |                        |           |               |               |
|----------------------|--------------------------------------------------------------|------------------------|-----------|---------------|---------------|
| Cooperator:          | Jon Williams                                                 | County:                | Bon Homme | Date:         | 9/24/08       |
| Practice:            | fish pond                                                    | Conservation District: |           | Hole No:      | 1 & 2         |
| Farm:                |                                                              | Sec:                   |           | Soil Name:    | 1=Bon 2=Ethan |
| Site Investigator/s: | Paul Roiston, Tom Schumacher                                 | Hole Elevation:        |           | Sample Taken: | tray          |
| Drilling Location:   | Site 1 - core trench area; Site 2 - Emergency spillway area. |                        |           |               |               |

| Description of Material |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|-------------------------|-------------------------------|--------------|---------------|-------------------------|-----------------|---------------------------|---------------------------------------------------|---------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------|--|--|--|
| Depth                   | Group Name<br>& Site Location | Unified Sym. | Depth<br>(ft) | Munsell<br>Color        | USDA<br>Texture | Unified<br>Classification | Geological<br>Material<br>Oxidized/<br>Unoxidized | Water Table<br>& or<br>Field Moisture | Permeability<br>Group * | Optional:<br>(Concretions, Stratification, Site observations, etc.)<br>(Site #, Location, Soil Name) |  |  |  |
| 0                       | Core trench area              | CL-ML        | 0-2           | very dark grayish brown | loam            | CL-ML                     | oxidized alluvium                                 | none                                  | II                      | Core area: dry-friable-strong effervescence                                                          |  |  |  |
| 2                       | silty clay                    | CL           | 2-5           | black                   | silty clay loam | CL                        | oxidized alluvium                                 | none                                  | III                     | Bon soil: moist-friable-slight effervescence                                                         |  |  |  |
| 5                       | lean clay                     | CL           | 5-8           | black                   | silty clay loam | CL                        | sl unoxidized all.                                | perched-8'5"                          | III                     | moist-saturated >6.5"-slight effervescence                                                           |  |  |  |
| 8                       | lean clay                     | CL           | 8-10+         | dark grayish brown      | clay loam       | CL+                       | unoxidized glacial till                           | none                                  | III+                    | moist-friable-violent effervescence                                                                  |  |  |  |
| 10                      | lean clay+                    | CL+          |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|                         |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|                         |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|                         |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|                         |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|                         |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
|                         | Emergency spillway            |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |
| 0                       | silty clay                    | CL-ML        | 0-0.5         | very dark grayish brown | loam            | CL-ML                     | sl unoxidized gl till                             | none                                  | II                      | Emergency spillway area-Site #2                                                                      |  |  |  |
| 0.5                     | lean clay                     | CL           | 0.5-3+        | light gray              | light clay loam | CL                        | sl unoxidized gl till                             | none                                  | III                     | dry-friable-strong effervescence                                                                     |  |  |  |
| 3                       |                               |              |               |                         |                 |                           |                                                   |                                       |                         | dry-friable-violent effervescence                                                                    |  |  |  |
| 5                       |                               |              |               |                         |                 |                           |                                                   |                                       |                         |                                                                                                      |  |  |  |

Comments: 1. Site #1= stratification of sand & gravel at 5 & 8 foot levels.  
2. Site #2=hit a stone at 3 feet. Glacial till continue below the 3 foot level.

Agricultural Waste Management Field Handbook

| Table 10D-2                                          |                    | Chapter 10                                 |           |
|------------------------------------------------------|--------------------|--------------------------------------------|-----------|
| Unified Classification vs. Soil Permeability Groups* |                    | Permeability Group: In Permeability Group: |           |
| Unified Class                                        | Permeability Group | I                                          | II III IV |
| CH                                                   | N                  | N                                          | S U       |
| MH                                                   | N                  | S U                                        | S         |
| CI                                                   | N                  | S U                                        | S         |
| ML                                                   | N                  | S U                                        | S         |
| CL-ML                                                | N                  | A                                          | N N       |
| GC                                                   | N                  | S U                                        | S         |
| GM                                                   | S                  | S U                                        | S         |
| GW                                                   | A                  | N N                                        | N         |
| SM                                                   | S                  | S S                                        | S         |
| SC                                                   | N                  | N U                                        | S         |
| SW                                                   | A                  | N N                                        | N         |
| SP                                                   | A                  | N N                                        | N         |
| GP                                                   | A                  | N N                                        | N         |

| Table 10D-3** |                      |                 |
|---------------|----------------------|-----------------|
| Soil Group    | Median K cm/s        | Median K ft/d * |
| I             | 7.2x10 <sup>-4</sup> | 2.0             |
| I             | 3.5x10 <sup>-4</sup> | 1.0             |
| II            | 4.8x10 <sup>-6</sup> | 0.014           |
| II            | 1.5x10 <sup>-6</sup> | 0.004           |
| III           | 8.8x10 <sup>-7</sup> | 0.0025          |
| III           | 2.1x10 <sup>-7</sup> | 0.0006          |
| IV            | 4.9x10 <sup>-7</sup> | 0.0014          |
| IV            | 3.5x10 <sup>-8</sup> | 0.0001          |

Unified Symbols & Group Names

GW: well graded gravel  
GP: poorly graded gravel  
GC: clayey gravel  
GM: silty gravel

SW: well graded sand  
SP: poorly graded sand  
SC: clayey sand  
SM: silty sand

CL: lean clay  
CL-ML: silty clay  
ML: silt  
CH: fat clay  
MH: elastic silt

\*\*Table 10D-3 summarizes a total of 1,161 tests.

12" PVC w/30" conc. riser - Pond located along fenceline  
 1\*\*\*\*\*  
 SITES XEQ 03/12/2009 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM  
 VER 2005.1.3 (USER MANUAL - DATED OCTOBER 2007)  
 TIME 16:10:38

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

SITES 01/01/2005 Jon\_Williams 1.0234375 H5  
 SAVMOV 0 101  
 SAVMOV 101 1 1  
 STRUCTURE Jon\_Williams

968 .87  
 970 .95  
 973 1.06  
 974 1.10  
 975 1.25  
 976 1.37  
 977 1.50  
 978 1.81  
 979 2.27  
 980 2.79  
 981 3.45  
 982 3.93  
 983 4.29 0  
 984 5.06 12.04  
 985 5.66 12.45  
 986 6.26 12.85  
 987 6.93 13.24  
 988 7.61 13.61  
 989 8.49 13.98  
 990 9.29 14.33

RECEIVED  
 APR - 9 2009  
 WATER RIGHTS  
 PROGRAM

ENDTABLE  
 WSDATA 5A1 AC 72 655 12000 7.37  
 PDIRECT 2.6 4.60  
 POOLDATA ELEV 983.0 968 983.0 969 969  
 ASDATA 41 360 160 3 .01 2  
 ASINSURF 41 .03  
 ASINLET 41 0.0 0.0 60 0.0 3  
 160 10

ENDTABLE  
 ASEXSURF 41 .035  
 .65 0  
 3  
 2 0  
 .02

ENDTABLE  
 ASEXIT 41 N 100  
 BTMWIDTH FEET 60  
 GRAPHICS I  
 GO,DESIGN HL TYPE2 24 TYPE2378 24  
 SAVMOV 2 101 1  
 ENDJOB

\*\*\*\*\*

\*\*\*\*\* MESSAGE - ALTERNATE STRUCTURE ID (S 1) BEING USED  
 SINCE USER DID NOT INPUT AN ID.

\*\*\*\*\* 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 03/12/2009 Jon\_Williams WSID=  
VER 2005.1.3 Jon\_Williams SUBW= A  
TIME 16:10:38 SITE = S 1 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         |             |
| 2.60                 | 0.00        | 0.00        | 4.60         |             |
| WSDATA - CN          | DA-SM       | TC/L        | -/H          | QRF         |
| 72.00                | 1.02        | 12000.00    | 7.37         | 0.00        |
| SITEDATA- PERM POOL  | CREST PS    | FP SED      | VALLEY FL    | 378?        |
| 983.00               | 968.00      | 983.00      | 969.00       | YES         |
| BASEFLOW             | INITIAL EL  | EXTRA VOL   | SITE TYPE    |             |
| 0.00                 | 0.00        | 0.00        | DESIGN       |             |
| PSDATA - NO. COND    | COND L      | DIA/W       | -/H          |             |
| 0.00                 | 0.00        | 0.00        | 0.00         |             |
| PS N                 | KE          | WEIR L      | TW EL        |             |
| 0.000                | 0.00        | 0.00        | 0.00         |             |
| 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        | 360.00      | 160          |             |
| AUX.DATA - INLET N   | SIDE SLOPE  | EXIT N      | EXIT SLOPE   | ACTUAL AUX? |
| 0.030                | 3.00        | 0.035       | 0.010        | NO          |
| BTM WIDTH - BW1      | BW2         | BW3         | BW4          | BW5         |
| ft 60.00             | 0.00        | 0.00        | 0.00         | 0.00        |

AUXILIARY SPILLWAY RATING DEVELOPED USING WSPVRT.

## 1SITES

XEQ 03/12/2009

VER 2005.1.3

TIME 16:10:38

Jon\_Williams

Jon\_Williams

WSID=

SUBW= A

SITE = S 1

PASS= 1

PART= 2

|            |             |            |                |             |
|------------|-------------|------------|----------------|-------------|
| PERM POOL  | 983.00 FT   | 27.0 ACFT  | 4.29 AC        | 0.0 CFS     |
| CREST PS   | 968.00 FT   | 0.0 ACFT   | 0.87 AC        | 0.0 CFS     |
| SED ACCUM  | 983.00 FT   | 27.0 ACFT  | 4.29 AC        | 0.0 CFS     |
| START ELEV | 983.00 FT   | 27.0 ACFT  | 4.29 AC        | 0.0 CFS     |
| NRCS-PSH   | D= 24.00 HR | P= 2.60 IN | Q= 0.58 IN     | DA= 1.02 SM |
|            | TC= 1.80 HR | CN= 72.00  | VOL= 31.7 ACFT |             |

PEAK = 111.1 CFS, AT 13.3 HRS.

|                          |           |           |         |          |
|--------------------------|-----------|-----------|---------|----------|
| ROUTED RESULT - HYD TYPE | EMAX      | VOL-MAX   | AMAX    | QMAX     |
| NRCS-PSH                 | 986.45 FT | 45.9 ACFT | 6.56 AC | 13.0 CFS |

PS STORAGE 18.9 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

|                                    |           |          |          |
|------------------------------------|-----------|----------|----------|
| DRAWDOWN (DDT) TEST                | 968.00 FT | 0.0 ACFT | 0.00 CFS |
| CONTROL IS 0.000 DETENTION STORAGE |           |          |          |

\*\*\*\*\* MESSAGE - DRAWDOWN TEST ELEVATION CANNOT BE LESS THAN SEDIMENT,  
 BASEFLOW ELEVATION, OR INPUT DRAWDOWN ELEVATION;  
 DDT TEST USED 983.00 FT, 27.0 ACFT, 0.0 CFS.

DRAWDOWN TIME = 1.83 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

\*\*\*\*\*

RATING TABLE DEVELOPED, SITE = S 1:  
 WITH PS GIVEN AND AUX. COMPUTED BY PROGRAM  
 AUX. RATING USED WSPVRT METHOD.

## RATING TABLE NUMBER 1

|    | ELEV.<br>FEET | Q-TOTAL<br>CFS | Q-PS<br>CFS | Q-AUX.<br>CFS | VOLUME<br>AC-FT | AREA<br>ACRE |
|----|---------------|----------------|-------------|---------------|-----------------|--------------|
| 1  | 968.00        | 0.00           | 0.00        | 0.00          | 0.00            | 0.87         |
| 2  | 970.00        | 0.00           | 0.00        | 0.00          | 1.82            | 0.95         |
| 3  | 973.00        | 0.00           | 0.00        | 0.00          | 4.84            | 1.06         |
| 4  | 974.00        | 0.00           | 0.00        | 0.00          | 5.91            | 1.10         |
| 5  | 975.00        | 0.00           | 0.00        | 0.00          | 7.09            | 1.25         |
| 6  | 976.00        | 0.00           | 0.00        | 0.00          | 8.40            | 1.37         |
| 7  | 977.00        | 0.00           | 0.00        | 0.00          | 9.84            | 1.50         |
| 8  | 978.00        | 0.00           | 0.00        | 0.00          | 11.49           | 1.81         |
| 9  | 979.00        | 0.00           | 0.00        | 0.00          | 13.53           | 2.27         |
| 10 | 980.00        | 0.00           | 0.00        | 0.00          | 16.06           | 2.79         |
| 11 | 981.00        | 0.00           | 0.00        | 0.00          | 19.18           | 3.45         |
| 12 | 982.00        | 0.00           | 0.00        | 0.00          | 22.87           | 3.93         |
| 13 | 983.00        | 0.00           | 0.00        | 0.00          | 26.98           | 4.29         |

Principal  
 Spillway  
 Discharge

|    |        |       |       |      |       |      |
|----|--------|-------|-------|------|-------|------|
| 14 | 984.00 | 12.04 | 12.04 | 0.00 | 31.66 | 5.06 |
| 15 | 985.00 | 12.45 | 12.45 | 0.00 | 37.02 | 5.66 |
| 16 | 986.00 | 12.85 | 12.85 | 0.00 | 42.98 | 6.26 |
| 17 | 987.00 | 13.24 | 13.24 | 0.00 | 49.57 | 6.93 |
| 18 | 988.00 | 13.61 | 13.61 | 0.00 | 56.84 | 7.61 |
| 19 | 989.00 | 13.98 | 13.98 | 0.00 | 64.89 | 8.49 |
| 20 | 990.00 | 14.33 | 14.33 | 0.00 | 73.78 | 9.29 |

# 1SITES

XEQ 03/12/2009

Jon\_Williams

WSID=

VER 2005.1.3

Jon\_Williams

SUBW= A

TIME 16:10:38

SITE = S 1

PASS= 1

PART= 3

AUX. CREST 986.45 FT 45.9 ACFT 6.56 AC 13.0 CFS

PS STORAGE 18.9 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

START ELEV 983.00 FT 27.0 ACFT 4.29 AC 0.0 CFS

EFFECTIVE HEIGHT(H)= 17.5 FEET, PRODUCT= 800. (H \* STORAGE AT CREST AUX.).

INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT.

NRCS-FBH D= 24.00 HR P= 4.60 IN Q= 1.89 IN DA= 1.02 SM  
TC= 1.80 HR CN= 72.00 VOL= 103.4 ACFT

PEAK = 426.2 CFS, AT 13.2 HRS.

\*\*\*\*\*

RATING TABLE DEVELOPED, SITE = S 1:  
WITH PS GIVEN AND AUX. COMPUTED BY PROGRAM  
AUX. RATING USED WSPVRT METHOD.

## RATING TABLE NUMBER 2

|    | ELEV.<br>FEET | Q-TOTAL<br>CFS | Q-PS<br>CFS | Q-AUX.<br>CFS | VOLUME<br>AC-FT | AREA<br>ACRE |
|----|---------------|----------------|-------------|---------------|-----------------|--------------|
| 1  | 968.00        | 0.00           | 0.00        | 0.00          | 0.00            | 0.87         |
| 2  | 969.54        | 0.00           | 0.00        | 0.00          | 1.38            | 0.93         |
| 3  | 971.08        | 0.00           | 0.00        | 0.00          | 2.86            | 0.99         |
| 4  | 972.61        | 0.00           | 0.00        | 0.00          | 4.43            | 1.05         |
| 5  | 974.15        | 0.00           | 0.00        | 0.00          | 6.08            | 1.12         |
| 6  | 975.69        | 0.00           | 0.00        | 0.00          | 7.98            | 1.33         |
| 7  | 977.23        | 0.00           | 0.00        | 0.00          | 10.18           | 1.57         |
| 8  | 978.76        | 0.00           | 0.00        | 0.00          | 13.00           | 2.16         |
| 9  | 980.30        | 0.00           | 0.00        | 0.00          | 16.93           | 2.99         |
| 10 | 981.84        | 0.00           | 0.00        | 0.00          | 22.24           | 3.85         |
| 11 | 983.38        | 4.52           | 4.52        | 0.00          | 28.64           | 4.58         |
| 12 | 984.91        | 12.41          | 12.41       | 0.00          | 36.52           | 5.61         |
| 13 | 986.45        | 13.03          | 13.03       | 0.00          | 45.86           | 6.56         |
| 14 | 986.63        | 20.12          | 13.09       | 7.03          | 47.04           | 6.68         |
| 15 | 986.81        | 29.24          | 13.16       | 16.07         | 48.23           | 6.80         |
| 16 | 987.12        | 72.14          | 13.29       | 58.86         | 50.44           | 7.01         |
| 17 | 987.52        | 148.50         | 13.43       | 135.07        | 53.23           | 7.28         |

|    |        |         |       |         |       |      |
|----|--------|---------|-------|---------|-------|------|
| 18 | 988.23 | 369.27  | 13.69 | 355.57  | 58.58 | 7.81 |
| 19 | 989.11 | 729.74  | 14.02 | 715.72  | 65.85 | 8.58 |
| 20 | 990.00 | 1189.32 | 14.33 | 1174.99 | 73.78 | 9.29 |

\*\*\*\*\*

# SUMMARY OF AUXILIARY SPILLWAY SURFACE CONDITIONS USED IN COMPUTATIONS BY REACH

| REACH | FROM<br>STA<br>(ft) | TO<br>STA<br>(ft) | SLOPE<br>(%) | RETARDANCE<br>CURVE<br>INDEX@ | VEGETAL<br>COVER<br>FACTOR | MAINT.<br>CODE | ROOTING<br>DEPTH<br>(ft) | REACH<br>LOCATION<br>* |
|-------|---------------------|-------------------|--------------|-------------------------------|----------------------------|----------------|--------------------------|------------------------|
| 1     | 200.                | 300.              | -10.0        | 0.030                         | **                         | **             | **                       | INLET                  |
| 2     | 300.                | 360.              | 0.0          | 0.030                         | **                         | **             | **                       | CREST                  |
| 3     | 360.                | 460.              | 1.0          | 0.035                         | 0.65                       | 3              | 2.0                      | EXIT !                 |

@ The program interprets retardance curve index entries of less than 1 as Manning's n values.

\* 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 986.45 FT.

DRAWDOWN (DDT) TEST 983.00 FT 27.0 ACFT 3.34 CFS *↳ Em. Spillway Elev.*  
CONTROL IS 0.000 DETENTION STORAGE

TIME TO DDT TEST DISCHARGE IS 1.09 DAYS - DRAWDOWN CONTINUING.

DRAWDOWN TIME = 1.10 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

| ROUTED<br>RESULTS | BTM WIDTH<br>FT | MAX ELEV<br>FT | VOL-MAX<br>ACFT | AREA-MAX<br>AC | AUX.-HP<br>FT | VOL-AUX.<br>ACFT |
|-------------------|-----------------|----------------|-----------------|----------------|---------------|------------------|
| NRCS-FBH          | 60.0            | 988.08         | 57.4            | 7.7            | 1.63          | 11.6             |

Top of Flow Elev. *↳* NOTE -- ACTUAL Hp OF 1.63 RAISED TO MEET MIN. 378 CRITERIA. *↳* Depth of Flow

|             |      |        |        |
|-------------|------|--------|--------|
| PEAK - CFS  | Q-PS | Q-AUX. | Q-TOT. |
| DISCHARGE = | 13.6 | 308.9  | 322.5  |

|              | CRITICAL<br>DEPTH | CRITICAL<br>VELOCITY | CRITICAL<br>SLOPE-Sc | 25% OF Q<br>Sc |
|--------------|-------------------|----------------------|----------------------|----------------|
| AUXILIARY    | FT                | FT/SEC               | FT/FT                | FT/FT          |
| SPILLWAY --- | 0.92              | 5.33                 | 0.019                | 0.025          |

\*\*\*\*\*

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

Aux. Spillway Discharge = 309. cfs; Bottom Width = 60. ft

| REACH<br>NO. | FROM<br>STA | TO<br>STA | SLOPE<br>% | MANNING'S<br>n | VELOCITY<br>ft/s | TOTAL<br>STRESS<br>lb/ft^2 | EFFECTIVE<br>STRESS<br>lb/ft^2 |
|--------------|-------------|-----------|------------|----------------|------------------|----------------------------|--------------------------------|
| 3            | 360.        | 460.      | 1.00       | 0.035          | 4.39             | 0.69                       | 0.422                          |

\*\*\*\*\*

AUXILIARY SPILLWAY DURATION FLOW = 14.0 HOURS  
ATTACK, OE/B = 1.1 ACFT/FT

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

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 4.4 FT/SEC  
EXIT SLOPE = 0.010 FT/FT  
FLOW DEPTH = 1.1 FT

>>>> NHCP378 RUN - MINIMUM DEPTH, CREST AUX. TO TOP OF DAM IS 2.00 FT.  
NEW TOP OF DAM ELEVATION = 988.45.

| ROUTED<br>RESULTS | BTM WIDTH<br>FT | MAX ELEV<br>FT | VOL-MAX<br>ACFT | AREA-MAX<br>AC | AUX.HP<br>FT | VOL-AUX.<br>ACFT |
|-------------------|-----------------|----------------|-----------------|----------------|--------------|------------------|
| MINIMUM AUX.      | 60.0            | 988.45         | 60.4            | 8.0            | 2.01         | 14.6             |

|              |      |        |        |
|--------------|------|--------|--------|
| PEAK - CFS   | Q-PS | Q-AUX. | Q-TOT. |
| DISCHARGES = | 13.8 | 447.0  | 460.8  |

|                           | CRITICAL<br>DEPTH<br>FT | CRITICAL<br>VELOCITY<br>FT/SEC | CRITICAL<br>SLOPE-Sc<br>FT/FT | 25% OF Q<br>Sc<br>FT/FT |
|---------------------------|-------------------------|--------------------------------|-------------------------------|-------------------------|
| AUXILIARY<br>SPILLWAY --- | 1.18                    | 5.99                           | 0.017                         | 0.023                   |

>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED  
FOR THIS PASS. NEW TOP OF DAM ELEVATION = 989.08.

| ROUTED<br>RESULTS | BTM WIDTH<br>FT | MAX ELEV<br>FT    | VOL-MAX<br>ACFT | AREA-MAX<br>AC | AUX.HP<br>FT | VOL-AUX.<br>ACFT |
|-------------------|-----------------|-------------------|-----------------|----------------|--------------|------------------|
| MINIMUM AUX.      | 60.0            | <del>988.45</del> | 65.6            | 8.6            | 2.63         | 19.7             |

PEAK - CFS Q-PS Q-AUX. Q-TOT.  
DISCHARGES = 14.0 702.1 716.1

|                           | CRITICAL<br>DEPTH<br>FT | CRITICAL<br>VELOCITY<br>FT/SEC | CRITICAL<br>SLOPE-Sc<br>FT/FT | 25% OF Q<br>Sc<br>FT/FT |
|---------------------------|-------------------------|--------------------------------|-------------------------------|-------------------------|
| AUXILIARY<br>SPILLWAY --- | 1.58                    | 6.88                           | 0.016                         | 0.021                   |

Inflow Hyd 1 PSH-Peak = 13.02 CFS at 20.92 hrs., Location Point  
Inflow Hyd 1 FBH-Peak = 322.53 CFS at 13.78 hrs., Location Point  
HYDOUT 1

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

Jon\_Williams

0 SUBWATERSHED(S) ANALYZED.

1 STRUCTURE(S) ANALYZED.

2 HYDROGRAPHS ROUTED AT LOWEST SITE.

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

\*\*\*\*\*

SITES.....COMPUTATIONS COMPLETE

| >>>         | SITE<br>ID                | SUBWS<br>ID               | SUBWS DA<br>(SQ MI)   | CURVE<br>NO.       | TC<br>(HRS)          | TOTAL DA<br>(SQ MI)  | TYPE<br>DESIGN            | STRUC<br>CLASS            | <<<         |
|-------------|---------------------------|---------------------------|-----------------------|--------------------|----------------------|----------------------|---------------------------|---------------------------|-------------|
| PASS<br>NO. | DIA./<br>WIDTH<br>(IN/FT) | AUX.CREST<br>ELEV<br>(FT) | BTM.<br>WIDTH<br>(FT) | MAX.<br>HP<br>(FT) | MAX.<br>ELEV<br>(FT) | EMB.<br>VOL.<br>(CY) | INTEGR.*<br>DIST.<br>(FT) | EXIT*<br>VEL.<br>(FT/SEC) | TYPE<br>HYD |
|             | S 1                       | A                         | 1.02                  | 72.                | 1.80                 | 1.02                 | 378NR                     | A1                        |             |
| 1           | 0.0                       | 986.5                     | 60.0                  | 2.6                | 989.1                | 0.                   | 0.                        | 4.4                       | 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 2005.1.3 ,01/01/2005  
FILES

INPUT = C:\home\Jon\_Williams\_BonHomme\_Pond\Sites\60ftSW\_12inPVCpnd\_FenL\Redo\12PVC\_FL\_  
OUTPUT = C:\home\Jon\_Williams\_BonHomme\_Pond\Sites\60ftSW\_12inPVCpnd\_FenL\Redo\12PVC\_FL\_  
DATED 03/12/2009 16:10:38

GRAPHICS FILES GENERATED

OPTION "L" = C:\home\Jon\_Williams\_BonHomme\_Pond\Sites\60ftSW\_12inPVCpnd\_FenL\Redo\12PV  
OPTION "P" = C:\home\Jon\_Williams\_BonHomme\_Pond\Sites\60ftSW\_12inPVCpnd\_FenL\Redo\12PV  
OPTION "E" = C:\home\Jon\_Williams\_BonHomme\_Pond\Sites\60ftSW\_12inPVCpnd\_FenL\Redo\12PV

## Instructions for South Dakota Job Plan 3.8

### Drainage Diaphragms

Fill in the blue shaded data fields on this page to automatically populate the title block areas on the drawings. Left click the blue shaded data fields to enter the required information.

#### Title Block

|              |              |
|--------------|--------------|
| Producer     | Jon Williams |
| 1/4 Section  | NE           |
| Section      | 20           |
| Township     | 94N          |
| Range        | 61W          |
| County       | Bon Homme    |
| Conservation | Bon Homme    |

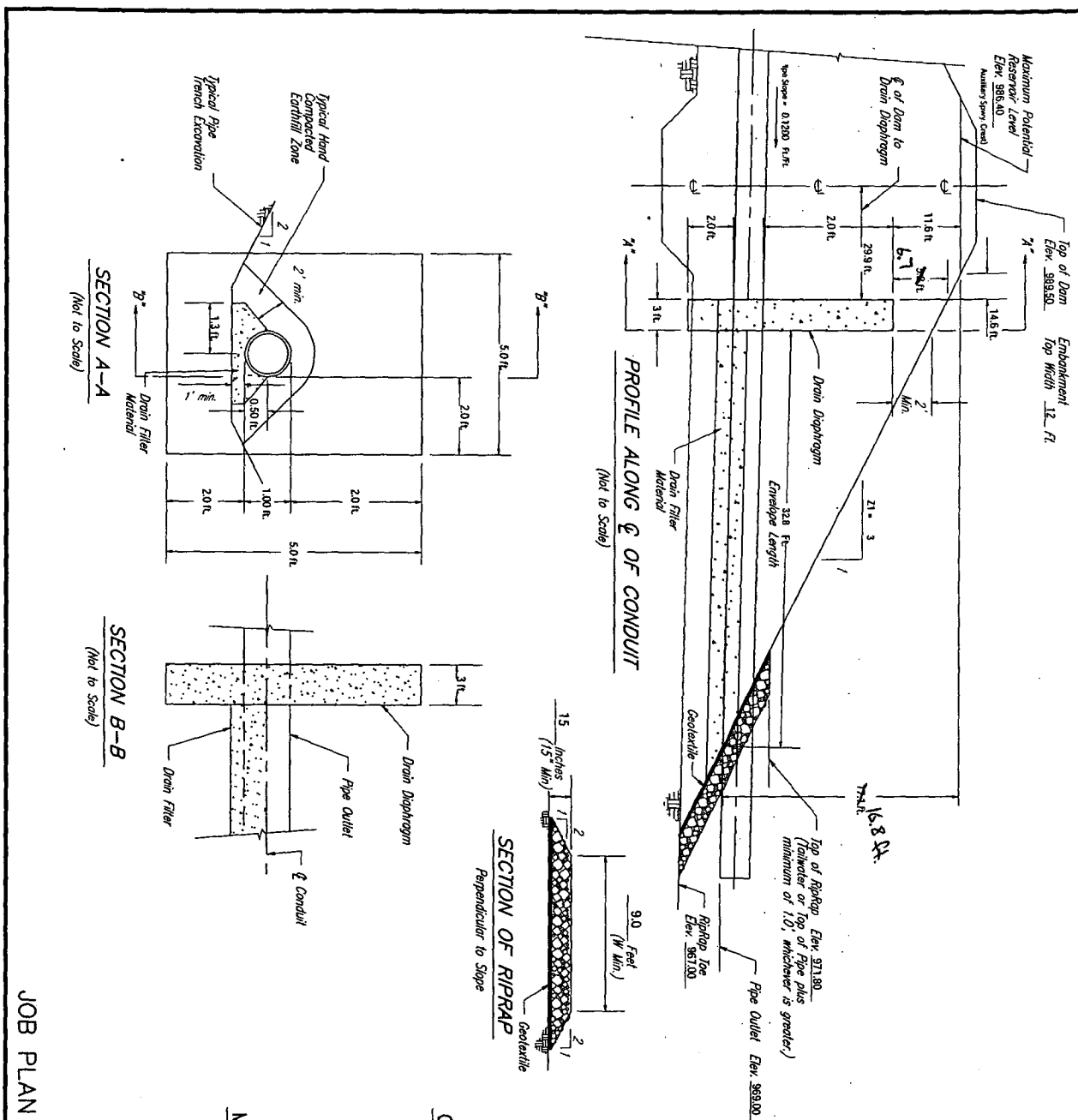
Pond on Fenceline

| Who /When | Who (initials)                          | When (MM/DD/YY) |
|-----------|-----------------------------------------|-----------------|
| Designed  | JRW                                     | 08/18/08        |
| Drawn     | JRW                                     | 08/18/08        |
| Checked   |                                         |                 |
| Approved  | Original Signature Required on Job Plan |                 |

Print Form

Fill in yellow shaded data fields on Guide Plan sheet, the light green shaded boxes indicate calculated values which can be overridden by the user.





# SUMMARY OF DESIGN AND DIMENSIONS

| DESIGN DATA                                    |                               |
|------------------------------------------------|-------------------------------|
| H = 11.6 Feet                                  | Hd = 7.75 Feet                |
| X = 2.0 Feet                                   | D = 12.0 Inches               |
| R = 2.0 Feet                                   | Y = 2.0 Feet                  |
| C = 14.6 Feet                                  | Aggregate Gradation #1        |
| Embankment                                     |                               |
| Backslope (Z1) = 3                             | Pipe Slope (S) 0.1200 Ft./Ft. |
| DIMENSIONS                                     |                               |
| W = 5.0 Feet (Total Width of Drain Diaphragm)  |                               |
| T = 5.0 Feet (Total Height of Drain Diaphragm) |                               |
| I = 3 Feet (Thickness of Single Filter)        |                               |

## ESTIMATED QUANTITIES

Drain Filter Material 6.3 Cubic Yards  
 Geotextile 23.6 Square Yards  
 Rock Riprap 8.1 Cubic Yards

| SIEVE SIZE | PERCENT PASSING | PERCENT SMALLER | WEIGHT (LBS.) | AVERAGE DIMENSION |
|------------|-----------------|-----------------|---------------|-------------------|
| 3/8 in.    | 100             | 100             | 50 lb.        | 10"               |
| #4         | 95-100          | 80-100          | 30 lb.        | 7"                |
| #8         | 80-100          | 50-85           | 10 lb.        | 5"                |
| #16        | 50-85           | 25-60           | 3 lb.         | 3"                |
| #30        | 25-60           | 10-15           |               |                   |
| #60        | 10-15           |                 |               |                   |
| #100       | 0-10            |                 |               |                   |

ASTM C-433  
 FINE CONCRETE  
 AGGREGATE

## CONSTRUCTION NOTES

- 1.) No compaction of the Drain Filter Material extending from the Diaphragm to the D.S. embankment face is required beyond that resulting from the placing and spreading operations.
- 2.) The Drainage Diaphragm and envelope will be installed by placing Drain Filter Material in 15 inch thick lifts prior to compaction. Each lift will be saturated uniformly with approximately 1.2 gallons of water per cubic foot of loose Drain Filter Material prior to compaction. Each lift will be compacted by a minimum of two passes of a hand-directed vibratory compactor over the entire lift surface. No compaction of the drain envelope above the pipe invert is necessary. The maximum height of drop of the Riprap onto the Geotextile in the pipe outlet area shall be 3 feet.
- 3.) The Geotextile shall conform to the Class I requirements specified in Table 2 for Nonwoven Geotextiles in Material Specification SD-592.

## MATERIAL NOTES

## DRAINAGE DIAPHRAGM DETAILS

JOB PLAN 3.8 (01/2008)

| DATE      | REVISION | BY |
|-----------|----------|----|
| 2/11/2008 | 1        | 1  |



USDA - NRCS  
 State Office Engineering Staff  
 200 Fourth Street SW  
 Huron, South Dakota 57350

PRODUCER Jon Williams  
 SECTION 20 T. 94N R. 61W  
 Bon Homme COUNTY  
 Bon Homme CONSERVATION DISTRICT

|          |     |               |
|----------|-----|---------------|
| Designed | JRW | Date 08/18/08 |
| Drawn    | JRW | 08/18/08      |
| Checked  |     |               |
| Approved |     |               |

# Structural Design of Solid Wall, Plastic Pipe

Version 1.0 (1/30/06)

Ref: Part 636 Structural Engineering National Engineering Handbook  
Chapter 52 Structural Design of Flexible Conduits

By: Jon Weidemann 8/4/08

## Proposed Pipe

|                             |                                   |     |                    |
|-----------------------------|-----------------------------------|-----|--------------------|
| Description                 | PVC (SDR-PR)-(IPS) 21 nonthreaded |     |                    |
| $D_o$                       | 12.5                              | in  |                    |
| SDR or SDR?                 | SDR                               | 21  |                    |
| wall thickness, $t$         | 0.606                             | in  | Table 52C-15       |
| $E_{long}$                  | 140,000                           | psi | Page 52-12         |
| $E_{short}$                 | 400,000                           | psi | Page 52B-25        |
| allow comp stress, $\sigma$ | 2000                              | psi | (from table 52C-1) |

## Loads

|                                 |          |       |
|---------------------------------|----------|-------|
| <b>SOIL</b>                     |          |       |
| depth of soil cover, $h$        | 13.5     | ft    |
| unit weight of soil, $\gamma_s$ | 120      | psf   |
| water ht. above pipe, $h_w$     | 2.5      | ft    |
| $P_s$                           | 1521     | psf   |
| $W_s$                           | 1584.375 | lb/ft |

|               |        |       |
|---------------|--------|-------|
| <b>VACUUM</b> |        |       |
| $P_v$         | 0      | psf   |
| $U_i$         | 11.288 | in    |
| $W_v$         | 0.0    | lb/ft |

|                      |                 |                        |
|----------------------|-----------------|------------------------|
| <b>WHEEL</b>         |                 |                        |
| Load class           | Field Equipment |                        |
| Load, $P_L$          | 10,000          | lb                     |
| Do-t < 2.67h x 12 ?  | N/A             | (b14>2, use Eq. 52-22) |
| Impact factor, $I_f$ | 1               |                        |
| $W_L$                | 19              | lb/ft                  |
| $P_w$                | 18              | psf                    |

|                   |       |     |
|-------------------|-------|-----|
| Total Load        | 1,539 | psf |
| $P_s + P_w + P_v$ |       |     |

## 1. Wall Crushing (solid wall pipe)

|                               |       |                     |
|-------------------------------|-------|---------------------|
| Thrust in pipe wall, $T_{pw}$ | 802   | lb/ft               |
| Required wall area, $A_{pw}$  | 0.033 | in <sup>2</sup> /in |
| Thickness, $t$                | 0.606 | in                  |

**Proposed Pipe okay for wall crushing**

## 2. Deflection (solid wall pipe)

|                                |     |                          |
|--------------------------------|-----|--------------------------|
| Deflection Lag Factor, $D_L$   | 1.5 | (varies from 1.0 to 1.5) |
| Bedding Constant, $K$          | 0.1 | (generally 0.1)          |
| Modulus of soil reaction, $E'$ | 200 | (see table 52-2)         |

Using Eq. 52-29 for SDR pipe

|                                |      |   |
|--------------------------------|------|---|
| Deflection (% $\Delta X / D$ ) | 3.51 | % |
| Maximum deflection             | 5.0  | % |

**Proposed Pipe okay for deflection**

## 3. Wall Buckling

|                                 |            |                      |
|---------------------------------|------------|----------------------|
| Use $E_{long}$ or $E_{short}$ ? | $E_{long}$ |                      |
| $E =$                           | 140,000    | psi                  |
| Factor of Safety, $FS$          | 2.5        | $h / (D_o/12) > 2$   |
| $R_w$                           | 0.9        | ft                   |
| Coeff of elastic support, $B'$  | 0.666      |                      |
| Moment of Inertia, $I_{pw}$     | 0.019      | in <sup>4</sup> / in |
| Modulus of soil reaction, $E'$  | 200        | psi                  |
| Allowable buckling, $q_a$       | 29.17      | psi                  |
| Reduction factor, $C$           | 0.73       |                      |
| Adj. allow. Buckling, $q_a C$   | 21.31      | psi                  |
| $q_a C$                         | 3,069      | psf                  |
| Total pressure, $P$             | 1,539      | psf                  |

**Proposed Pipe okay for wall buckling**

## 4. Strain (solid wall pipe)

|                                |        |                 |
|--------------------------------|--------|-----------------|
| Max strain, flexure, $e_f$     | 0.0054 |                 |
| Max strain, hoop strain, $e_h$ | 0.0003 |                 |
| $e_h$ due to external load?    | Yes    |                 |
| Max combined strain, $e$       | 0.0051 | $e = e_f - e_h$ |
| Allowable strain, $e_{all}$    | 0.05   |                 |

**Proposed Pipe okay for strain**

2

30 Riser

w/ 12" PVC

PS 983.0

Pendon FL

DROP Inlet

Project Name:

Computed by:

Date:

Checked by:

Date:

laDropInlet.xls Ver 1.02

|                                                                               |            |       | Outflow, CFS |          |                 |                  |                   | Structure<br>Outflow,<br>CFS | Controlling<br>Factor |
|-------------------------------------------------------------------------------|------------|-------|--------------|----------|-----------------|------------------|-------------------|------------------------------|-----------------------|
|                                                                               |            |       | Elev         | HW<br>Ft | Weir<br>Orifice | Inlet<br>Orifice | Barrel<br>Orifice | Full Pipe                    |                       |
| <b>Input Data</b>                                                             |            |       | 983.0        | 0.0      | 0.00            | 0.00             | 7.07              | 9.26                         | 0.00                  |
| Riser Type & Diameter (in)                                                    | Circular   | 30    | 983.1        | 0.1      | 0.72            | 7.47             | 7.18              | 9.30                         | 0.72                  |
| Length of Weir Obstruction (ft)                                               |            | 0.5   | 983.2        | 0.2      | 2.04            | 10.57            | 7.27              | 9.34                         | 2.04                  |
|                                                                               |            | 6     | 983.3        | 0.3      | 3.75            | 12.95            | 7.37              | 9.38                         | 3.75                  |
| Principal Spillway Crest Elev (ft)                                            |            | 983   | 983.4        | 0.4      | 5.77            | 14.95            | 7.47              | 9.42                         | 5.77                  |
| Invert of Barrel Elevation (ft)                                               |            | 979   | 983.5        | 0.5      | 8.06            | 16.71            | 7.56              | 9.46                         | 7.56                  |
| Barrel Orifice Coefficient (C)                                                |            | 0.6   | 983.6        | 0.6      | 10.60           | 18.31            | 7.66              | 9.50                         | 7.66                  |
| Pipe Diameter (in)                                                            |            | 12    | 983.7        | 0.7      | 13.35           | 19.77            | 7.75              | 9.54                         | 7.75                  |
| Pipe Length (ft)                                                              |            | 105   | 983.8        | 0.8      | 16.31           | 21.14            | 7.84              | 9.58                         | 7.84                  |
| Entrance Coefficient 'Ke'                                                     |            | 1     | 983.9        | 0.9      | 19.46           | 22.42            | 7.93              | 9.61                         | 7.93                  |
| Mannings 'n-value'                                                            |            | 0.013 | 984.0        | 1.0      | 22.80           | 23.64            | 8.02              | 9.65                         | 8.02                  |
| Elbow Elev (if None, Leave 'BLANK')                                           |            |       | 984.1        | 1.1      | 26.30           | 24.79            | 8.11              | 9.69                         | 8.11                  |
| Length of Outlet ('BLANK' if none)                                            |            |       | 984.2        | 1.2      | 29.97           | 25.89            | 8.20              | 9.73                         | 8.20                  |
| Outlet Type                                                                   | Cantilever |       | 984.3        | 1.3      | 33.79           | 26.95            | 8.29              | 9.77                         | 8.29                  |
| Outlet Elevation (ft)                                                         |            | 971   | 984.4        | 1.4      | 37.76           | 27.97            | 8.37              | 9.81                         | 8.37                  |
| Tailwater Elev (if unknown, leave 'Blank')                                    |            |       | 984.5        | 1.5      | 41.88           | 28.95            | 8.46              | 9.85                         | 8.46                  |
| Auxiliary Spillway Elev (ft)                                                  |            | 986.4 | 984.6        | 1.6      | 46.14           | 29.90            | 8.54              | 9.88                         | 8.54                  |
| Maximum Headwater Elev (ft)                                                   |            | 989.5 | 984.7        | 1.7      | 50.53           | 30.82            | 8.62              | 9.92                         | 8.62                  |
| Elev Increment After Full Pipe Flow                                           |            | 0.1   | 984.8        | 1.8      | 55.05           | 31.71            | 8.71              | 9.96                         | 8.71                  |
|                                                                               |            |       | 984.9        | 1.9      | 59.71           | 32.58            | 8.79              | 10.00                        | 8.79                  |
| <b>Basic Output</b>                                                           |            |       | 985.0        | 2.0      | 64.48           | 33.43            | 8.87              | 10.04                        | 8.87                  |
| Full Pipe Flow - Max. Outflow (cfs):                                          | 11.60      |       | 985.1        | 2.1      | 69.38           | 34.25            | 8.95              | 10.07                        | 8.95                  |
| Full Pipe Flow - Max. Velocity (fps):                                         | 14.77      |       | 985.2        | 2.2      | 74.39           | 35.06            | 9.03              | 10.11                        | 9.03                  |
| Useable Weir Length (Ft):                                                     | 7.35       |       | 985.3        | 2.3      | 79.52           | 35.84            | 9.11              | 10.15                        | 9.11                  |
| Riser Area (Sq Ft):                                                           | 4.91       |       | 985.4        | 2.4      | 84.76           | 36.62            | 9.19              | 10.18                        | 9.19                  |
| Barrel Area (Sq Ft):                                                          | 0.79       |       | 985.5        | 2.5      | 90.11           | 37.37            | 9.26              | 10.22                        | 9.26                  |
| Kp: 0.031292                                                                  |            |       | 985.6        | 2.6      | 95.57           | 38.11            | 9.34              | 10.26                        | 9.34                  |
| Friction Slope (HW at the A.S. Crest):                                        | 0.08762    |       | 985.7        | 2.7      | 101.14          | 38.84            | 9.42              | 10.29                        | 9.42                  |
| Pipe Slope:                                                                   | 0.07641    |       | 985.8        | 2.8      | 106.81          | 39.55            | 9.49              | 10.33                        | 9.49                  |
| Outlet Elbow Angle (deg):                                                     | 0.0        |       | 985.9        | 2.9      | 112.59          | 40.25            | 9.57              | 10.37                        | 9.57                  |
| Maximum Barrel Invert Elevation for<br>avoiding Barrel Orifice Control:       | 976.77     |       | 986.0        | 3.0      | 118.46          | 40.94            | 9.64              | 10.40                        | 9.64                  |
| Km: 0.00000                                                                   |            |       | 986.1        | 3.1      | 124.43          | 41.61            | 9.72              | 10.44                        | 9.72                  |
| Tailwater Elev Used For Full Pipe Flow:                                       | 971.6      |       | 986.2        | 3.2      | 130.50          | 42.28            | 9.79              | 10.48                        | 9.79                  |
|                                                                               |            |       | 986.3        | 3.3      | 136.66          | 42.94            | 9.86              | 10.51                        | 9.86                  |
|                                                                               |            |       | 986.4        | 3.4      | 142.92          | 43.58            | 9.93              | 10.55                        | 9.93                  |
|                                                                               |            |       | 986.5        | 3.5      | 149.27          | 44.22            | 10.01             | 10.58                        | 10.01                 |
|                                                                               |            |       | 986.6        | 3.6      | 155.72          | 44.85            | 10.08             | 10.62                        | 10.08                 |
|                                                                               |            |       | 986.7        | 3.7      | 162.25          | 45.46            | 10.15             | 10.65                        | 10.15                 |
|                                                                               |            |       | 986.8        | 3.8      | 168.87          | 46.07            | 10.22             | 10.69                        | 10.22                 |
|                                                                               |            |       | 986.9        | 3.9      | 175.58          | 46.68            | 10.29             | 10.72                        | 10.29                 |
|                                                                               |            |       | 987.0        | 4.0      | 182.38          | 47.27            | 10.36             | 10.76                        | 10.36                 |
|                                                                               |            |       | 987.1        | 4.1      | 189.26          | 47.86            | 10.43             | 10.79                        | 10.43                 |
|                                                                               |            |       | 987.2        | 4.2      | 196.23          | 48.44            | 10.49             | 10.83                        | 10.49                 |
|                                                                               |            |       | 987.3        | 4.3      | 203.28          | 49.01            | 10.56             | 10.86                        | 10.56                 |
|                                                                               |            |       | 987.4        | 4.4      | 210.41          | 49.58            | 10.63             | 10.90                        | 10.63                 |
|                                                                               |            |       | 987.5        | 4.5      | 217.62          | 50.14            | 10.70             | 10.93                        | 10.70                 |
|                                                                               |            |       | 987.6        | 4.6      | 224.92          | 50.69            | 10.76             | 10.97                        | 10.76                 |
|                                                                               |            |       | 987.7        | 4.7      | 232.29          | 51.24            | 10.83             | 11.00                        | 10.83                 |
|                                                                               |            |       | 987.8        | 4.8      | 239.74          | 51.78            | 10.89             | 11.03                        | 10.89                 |
|                                                                               |            |       | 987.9        | 4.9      | 247.27          | 52.32            | 10.96             | 11.07                        | 10.96                 |
|                                                                               |            |       | 988.0        | 5.0      | 254.88          | 52.85            | 11.03             | 11.10                        | 11.03                 |
|                                                                               |            |       | 988.1        | 5.1      | 262.57          | 53.38            | 11.09             | 11.14                        | 11.09                 |
|                                                                               |            |       | 988.2        | 5.2      | 270.33          | 53.90            | 11.15             | 11.17                        | 11.15                 |
|                                                                               |            |       | 988.3        | 5.3      | 278.16          | 54.41            | 11.22             | 11.20                        | 11.20                 |
|                                                                               |            |       | 988.4        | 5.4      | 286.07          | 54.92            | 11.28             | 11.24                        | 11.24                 |
|                                                                               |            |       | 988.5        | 5.5      | 294.05          | 55.43            | 11.35             | 11.27                        | 11.27                 |
|                                                                               |            |       | 988.6        | 5.6      | 302.11          | 55.93            | 11.41             | 11.30                        | 11.30                 |
|                                                                               |            |       | 988.7        | 5.7      | 310.24          | 56.43            | 11.47             | 11.34                        | 11.34                 |
|                                                                               |            |       | 988.8        | 5.8      | 318.44          | 56.92            | 11.53             | 11.37                        | 11.37                 |
|                                                                               |            |       | 988.9        | 5.9      | 326.71          | 57.41            | 11.59             | 11.40                        | 11.40                 |
|                                                                               |            |       | 989.0        | 6.0      | 335.05          | 57.89            | 11.66             | 11.44                        | 11.44                 |
|                                                                               |            |       | 989.1        | 6.1      | 343.46          | 58.38            | 11.72             | 11.47                        | 11.47                 |
|                                                                               |            |       | 989.2        | 6.2      | 351.94          | 58.85            | 11.78             | 11.50                        | 11.50                 |
|                                                                               |            |       | 989.3        | 6.3      | 360.49          | 59.32            | 11.84             | 11.53                        | 11.53                 |
|                                                                               |            |       | 989.4        | 6.4      | 369.11          | 59.79            | 11.90             | 11.57                        | 11.57                 |
|                                                                               |            |       | 989.5        | 6.5      | 377.79          | 60.26            | 11.96             | 11.60                        | 11.60                 |
| <b>Notes &amp; Warnings</b>                                                   |            |       |              |          |                 |                  |                   |                              |                       |
| NOTE: Barrel Orifice control can be eliminated by increasing the riser depth. |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |
|                                                                               |            |       |              |          |                 |                  |                   |                              |                       |

12" PVC

PS=983 - Pond on FL

laHoodInlet.xls Ver 1.10

Project Name:

Computed by:

Date:

Checked by: \_\_\_\_\_

Date:

|                                            |            | Outflow, CFS |              |           | Structure<br>Outflow,<br>CFS | Controlling<br>Factor      |
|--------------------------------------------|------------|--------------|--------------|-----------|------------------------------|----------------------------|
|                                            |            | Weir         | Slug<br>Flow | Full Pipe |                              |                            |
|                                            | Elev       | HW<br>Ft     |              |           |                              |                            |
| <b>Input Data</b>                          |            |              |              |           |                              |                            |
|                                            | 979.0      | 0.0          | 0.00         | 0.00      | 9.73                         | 0.00 Weir Flow             |
|                                            | 979.1      | 0.1          | 0.08         | 0.00      | 9.78                         | 0.08 Weir Flow             |
|                                            | 979.2      | 0.2          | 0.16         | 0.00      | 9.83                         | 0.16 Weir Flow             |
|                                            | 979.3      | 0.3          | 0.31         | 0.00      | 9.88                         | 0.31 Weir Flow             |
| Principal Spillway Crest Elev (ft)         | 979        | 979.4        | 0.4          | 0.46      | 0.00                         | 9.93 0.46 Weir Flow        |
|                                            |            | 979.5        | 0.5          | 0.65      | 0.00                         | 9.99 0.65 Weir Flow        |
| Inside Wall - Type                         | Smooth     | 979.6        | 0.6          | 0.88      | 0.00                         | 10.04 0.88 Weir Flow       |
| Pipe Diameter (in)                         | 12         | 979.7        | 0.7          | 1.22      | 0.00                         | 10.09 1.22 Weir Flow       |
| Pipe Length (ft)                           | 105        | 979.8        | 0.8          | 1.56      | 0.00                         | 10.14 1.56 Weir Flow       |
| Entrance Coefficient 'Ke'                  | 1          | 979.9        | 0.9          | 1.88      | 0.00                         | 10.19 1.88 Weir Flow       |
| Mannings 'n-value'                         | 0.01       | 980.0        | 1.0          | 2.20      | 0.00                         | 10.23 2.20 Weir Flow       |
| Elbow Elev (if None, Leave 'BLANK')        |            | 980.1        | 1.1          | 2.50      | 2.00                         | 10.28 2.50 Weir Flow       |
| Length of Outlet ('BLANK' if none)         |            | 980.2        | 1.2          | 2.80      | 6.00                         | 10.33 6.00 Slug Flow       |
| Outlet Type                                | Cantilever | 980.3        | 1.3          | 3.05      | 10.00                        | 10.38 10.00 Slug Flow      |
| Outlet Elevation (ft)                      | 969        | 980.4        | 1.4          | 3.30      | 14.00                        | 10.43 10.43 Full Pipe Flow |
| Tailwater Elev (if unknown, leave 'Blank') |            | 980.5        | 1.5          | 3.55      | 18.00                        | 10.48 10.48 Full Pipe Flow |
| Auxiliary Spillway Elev (ft)               | 986.4      | 980.6        | 1.6          | 3.80      | 22.00                        | 10.53 10.53 Full Pipe Flow |
| Maximum Headwater Elev (ft)                | 990        | 980.7        | 1.7          | 4.05      | 26.00                        | 10.57 10.57 Full Pipe Flow |
| Elev Increment After Full Pipe Flow        | 0.1        | 980.8        | 1.8          | 4.30      | 30.00                        | 10.62 10.62 Full Pipe Flow |
| <b>Basic Output</b>                        |            |              |              |           |                              |                            |
|                                            |            | 980.9        | 1.9          |           | 10.67                        | 10.67 Full Pipe Flow       |
|                                            |            | 981.0        | 2.0          |           | 10.72                        | 10.72 Full Pipe Flow       |
| Full Pipe Flow - Max. Outflow (cfs):       | 14.33      | 981.1        | 2.1          |           | 10.76                        | 10.76 Full Pipe Flow       |
| Full Pipe Flow - Max. Velocity (fps):      | 18.25      | 981.2        | 2.2          |           | 10.81                        | 10.81 Full Pipe Flow       |
|                                            |            | 981.3        | 2.3          |           | 10.86                        | 10.86 Full Pipe Flow       |
|                                            |            | 981.4        | 2.4          |           | 10.90                        | 10.90 Full Pipe Flow       |
| Barrel Area (Sq Ft):                       | 0.79       | 981.5        | 2.5          |           | 10.95                        | 10.95 Full Pipe Flow       |
| Kp: 0.018516                               |            | 981.6        | 2.6          |           | 10.99                        | 10.99 Full Pipe Flow       |
| Friction Slope (HW at the A.S. Crest):     | 0.07887    | 981.7        | 2.7          |           | 11.04                        | 11.04 Full Pipe Flow       |
| Pipe Slope: 0.09567                        |            | 981.8        | 2.8          |           | 11.08                        | 11.08 Full Pipe Flow       |
| Outlet Elbow Angle (deg):                  | 0.0        | 981.9        | 2.9          |           | 11.13                        | 11.13 Full Pipe Flow       |
|                                            |            | 982.0        | 3.0          |           | 11.18                        | 11.18 Full Pipe Flow       |
|                                            |            | 982.1        | 3.1          |           | 11.22                        | 11.22 Full Pipe Flow       |
| Km: 0.00000                                |            | 982.2        | 3.2          |           | 11.27                        | 11.27 Full Pipe Flow       |
| Tailwater Elev Used For Full Pipe Flow:    | 969.6      | 982.3        | 3.3          |           | 11.31                        | 11.31 Full Pipe Flow       |
|                                            |            | 982.4        | 3.4          |           | 11.35                        | 11.35 Full Pipe Flow       |
| <b>Notes &amp; Warnings</b>                |            |              |              |           |                              |                            |
|                                            |            | 982.5        | 3.5          |           | 11.40                        | 11.40 Full Pipe Flow       |
|                                            |            | 982.6        | 3.6          |           | 11.44                        | 11.44 Full Pipe Flow       |
|                                            |            | 982.7        | 3.7          |           | 11.49                        | 11.49 Full Pipe Flow       |
|                                            |            | 982.8        | 3.8          |           | 11.53                        | 11.53 Full Pipe Flow       |
|                                            |            | 982.9        | 3.9          |           | 11.57                        | 11.57 Full Pipe Flow       |
|                                            |            | 983.0        | 4.0          |           | 11.62                        | 11.62 Full Pipe Flow       |
|                                            |            | 983.1        | 4.1          |           | 11.66                        | 11.66 Full Pipe Flow       |
|                                            |            | 983.2        | 4.2          |           | 11.70                        | 11.70 Full Pipe Flow       |
|                                            |            | 983.3        | 4.3          |           | 11.75                        | 11.75 Full Pipe Flow       |
|                                            |            | 983.4        | 4.4          |           | 11.79                        | 11.79 Full Pipe Flow       |
|                                            |            | 983.5        | 4.5          |           | 11.83                        | 11.83 Full Pipe Flow       |
|                                            |            | 983.6        | 4.6          |           | 11.87                        | 11.87 Full Pipe Flow       |
|                                            |            | 983.7        | 4.7          |           | 11.92                        | 11.92 Full Pipe Flow       |
|                                            |            | 983.8        | 4.8          |           | 11.96                        | 11.96 Full Pipe Flow       |
|                                            |            | 983.9        | 4.9          |           | 12.00                        | 12.00 Full Pipe Flow       |
|                                            |            | 984.0        | 5.0          |           | 12.04                        | 12.04 Full Pipe Flow       |
|                                            |            | 984.1        | 5.1          |           | 12.08                        | 12.08 Full Pipe Flow       |
|                                            |            | 984.2        | 5.2          |           | 12.13                        | 12.13 Full Pipe Flow       |
|                                            |            | 984.3        | 5.3          |           | 12.17                        | 12.17 Full Pipe Flow       |
|                                            |            | 984.4        | 5.4          |           | 12.21                        | 12.21 Full Pipe Flow       |
|                                            |            | 984.5        | 5.5          |           | 12.25                        | 12.25 Full Pipe Flow       |
|                                            |            | 984.6        | 5.6          |           | 12.29                        | 12.29 Full Pipe Flow       |
|                                            |            | 984.7        | 5.7          |           | 12.33                        | 12.33 Full Pipe Flow       |
|                                            |            | 984.8        | 5.8          |           | 12.37                        | 12.37 Full Pipe Flow       |
|                                            |            | 984.9        | 5.9          |           | 12.41                        | 12.41 Full Pipe Flow       |
|                                            |            | 985.0        | 6.0          |           | 12.45                        | 12.45 Full Pipe Flow       |

Project Name:

laHoodInlet.xls Ver 1.10

Computed by:

Date:

Checked by: \_\_\_\_\_

Date:

| Elev  | HW<br>Ft | Outflow, CFS |              |           | Structure<br>Outflow,<br>CFS | Controlling<br>Factor |
|-------|----------|--------------|--------------|-----------|------------------------------|-----------------------|
|       |          | Weir         | Slug<br>Flow | Full Pipe |                              |                       |
| 985.1 | 6.1      |              |              | 12.49     | 12.49                        | Full Pipe Flow        |
| 985.2 | 6.2      |              |              | 12.53     | 12.53                        | Full Pipe Flow        |
| 985.3 | 6.3      |              |              | 12.57     | 12.57                        | Full Pipe Flow        |
| 985.4 | 6.4      |              |              | 12.61     | 12.61                        | Full Pipe Flow        |
| 985.5 | 6.5      |              |              | 12.65     | 12.65                        | Full Pipe Flow        |
| 985.6 | 6.6      |              |              | 12.69     | 12.69                        | Full Pipe Flow        |
| 985.7 | 6.7      |              |              | 12.73     | 12.73                        | Full Pipe Flow        |
| 985.8 | 6.8      |              |              | 12.77     | 12.77                        | Full Pipe Flow        |
| 985.9 | 6.9      |              |              | 12.81     | 12.81                        | Full Pipe Flow        |
| 986.0 | 7.0      |              |              | 12.85     | 12.85                        | Full Pipe Flow        |
| 986.1 | 7.1      |              |              | 12.89     | 12.89                        | Full Pipe Flow        |
| 986.2 | 7.2      |              |              | 12.93     | 12.93                        | Full Pipe Flow        |
| 986.3 | 7.3      |              |              | 12.97     | 12.97                        | Full Pipe Flow        |
| 986.4 | 7.4      |              |              | 13.01     | 13.01                        | Full Pipe Flow        |
| 986.5 | 7.5      |              |              | 13.05     | 13.05                        | Full Pipe Flow        |
| 986.6 | 7.6      |              |              | 13.09     | 13.09                        | Full Pipe Flow        |
| 986.7 | 7.7      |              |              | 13.12     | 13.12                        | Full Pipe Flow        |
| 986.8 | 7.8      |              |              | 13.16     | 13.16                        | Full Pipe Flow        |
| 986.9 | 7.9      |              |              | 13.20     | 13.20                        | Full Pipe Flow        |
| 987.0 | 8.0      |              |              | 13.24     | 13.24                        | Full Pipe Flow        |
| 987.1 | 8.1      |              |              | 13.28     | 13.28                        | Full Pipe Flow        |
| 987.2 | 8.2      |              |              | 13.31     | 13.31                        | Full Pipe Flow        |
| 987.3 | 8.3      |              |              | 13.35     | 13.35                        | Full Pipe Flow        |
| 987.4 | 8.4      |              |              | 13.39     | 13.39                        | Full Pipe Flow        |
| 987.5 | 8.5      |              |              | 13.43     | 13.43                        | Full Pipe Flow        |
| 987.6 | 8.6      |              |              | 13.46     | 13.46                        | Full Pipe Flow        |
| 987.7 | 8.7      |              |              | 13.50     | 13.50                        | Full Pipe Flow        |
| 987.8 | 8.8      |              |              | 13.54     | 13.54                        | Full Pipe Flow        |
| 987.9 | 8.9      |              |              | 13.58     | 13.58                        | Full Pipe Flow        |
| 988.0 | 9.0      |              |              | 13.61     | 13.61                        | Full Pipe Flow        |
| 988.1 | 9.1      |              |              | 13.65     | 13.65                        | Full Pipe Flow        |
| 988.2 | 9.2      |              |              | 13.69     | 13.69                        | Full Pipe Flow        |
| 988.3 | 9.3      |              |              | 13.72     | 13.72                        | Full Pipe Flow        |
| 988.4 | 9.4      |              |              | 13.76     | 13.76                        | Full Pipe Flow        |
| 988.5 | 9.5      |              |              | 13.80     | 13.80                        | Full Pipe Flow        |
| 988.6 | 9.6      |              |              | 13.83     | 13.83                        | Full Pipe Flow        |
| 988.7 | 9.7      |              |              | 13.87     | 13.87                        | Full Pipe Flow        |
| 988.8 | 9.8      |              |              | 13.91     | 13.91                        | Full Pipe Flow        |
| 988.9 | 9.9      |              |              | 13.94     | 13.94                        | Full Pipe Flow        |
| 989.0 | 10.0     |              |              | 13.98     | 13.98                        | Full Pipe Flow        |
| 989.1 | 10.1     |              |              | 14.01     | 14.01                        | Full Pipe Flow        |
| 989.2 | 10.2     |              |              | 14.05     | 14.05                        | Full Pipe Flow        |
| 989.3 | 10.3     |              |              | 14.09     | 14.09                        | Full Pipe Flow        |
| 989.4 | 10.4     |              |              | 14.12     | 14.12                        | Full Pipe Flow        |
| 989.5 | 10.5     |              |              | 14.16     | 14.16                        | Full Pipe Flow        |
| 989.6 | 10.6     |              |              | 14.19     | 14.19                        | Full Pipe Flow        |
| 989.7 | 10.7     |              |              | 14.23     | 14.23                        | Full Pipe Flow        |
| 989.8 | 10.8     |              |              | 14.26     | 14.26                        | Full Pipe Flow        |
| 989.9 | 10.9     |              |              | 14.30     | 14.30                        | Full Pipe Flow        |
| 990.0 | 11.0     |              |              | 14.33     | 14.33                        | Full Pipe Flow        |

# SURFACE TO SURFACE VOLUME REPORT

Trimble  
 5475 Kellenburger Road  
 Dayton, Ohio 45424-1099, USA  
 1-937-233-8921

Project: C:\Jon\_Williams\_BonHomme\_Pond\Terramodel\Jon\_Williams\_PondFL.pro  
 Report Generated: Thursday, October 16, 2008 3:30:11 PM

-----  
 Where the second surface is above the first the volume is reported as fill.  
 Where the second surface is below the first the volume is reported as  
 excavation.  
 -----

|                          |            |        |      |        |
|--------------------------|------------|--------|------|--------|
| Shrinkage/swell factors: | Excavation | 1.0000 | Fill | 1.0000 |
|--------------------------|------------|--------|------|--------|

|                             |                     |                              |                     |
|-----------------------------|---------------------|------------------------------|---------------------|
| First Surface<br>Layer Name | Number<br>of Points | Second Surface<br>Layer Name | Number<br>of Points |
| -----                       | -----               | -----                        | -----               |
| POINTS                      | 953                 | DAM                          | 83                  |

|                             |                       |
|-----------------------------|-----------------------|
| Excavation Volume (Cu. Yd.) | Fill Volume (Cu. Yd.) |
| -----                       | -----                 |
| 3.3                         | 10,380.8              |

Net Difference: 10,377.5 Cu. Yd. Borrow

# SURFACE TO SURFACE VOLUME REPORT

Trimble  
5475 Kellenburger Road  
Dayton, Ohio 45424-1099, USA  
1-937-233-8921

Project: C:\Jon\_Williams\_BonHomme\_Pond\Terramodel\Jon\_Williams\_PondFL.pro  
Report Generated: Thursday, October 16, 2008 3:30:55 PM

Where the second surface is above the first the volume is reported as fill.  
Where the second surface is below the first the volume is reported as excavation.

| Shrinkage/swell factors: |                  | Excavation                | 1.0000 | Fill             | 1.0000 |
|--------------------------|------------------|---------------------------|--------|------------------|--------|
| First Surface Layer Name | Number of Points | Second Surface Layer Name |        | Number of Points |        |
| POINTS                   | 953              | BERM                      |        | 13               |        |

|                             |                       |
|-----------------------------|-----------------------|
| Excavation Volume (Cu. Yd.) | Fill Volume (Cu. Yd.) |
| 0.0                         | 125.4                 |

Net Difference: 125.4 Cu. Yd. Borrow

# SURFACE TO SURFACE VOLUME REPORT

Trimble  
5475 Kellenburger Road  
Dayton, Ohio 45424-1099, USA  
1-937-233-8921

Project: C:\Jon\_Williams\_BonHomme\_Pond\Terramodel\Jon\_Williams\_PondFL.pro  
Report Generated: Thursday, October 16, 2008 3:31:52 PM

Where the second surface is above the first the volume is reported as fill.  
Where the second surface is below the first the volume is reported as excavation.

| Shrinkage/swell factors:    |                     | Excavation                   | 1.0000              | Fill | 1.0000 |
|-----------------------------|---------------------|------------------------------|---------------------|------|--------|
| First Surface<br>Layer Name | Number<br>of Points | Second Surface<br>Layer Name | Number<br>of Points |      |        |
| POINTS                      | 953                 | SPILLWAY_FL                  | 90                  |      |        |
| Excavation Volume (Cu. Yd.) |                     | Fill Volume (Cu. Yd.)        |                     |      |        |
| 6,006.5                     |                     | 0.0                          |                     |      |        |

Net Difference: 6,006.5 Cu. Yd. Waste

# SURFACE TO SURFACE VOLUME REPORT

Trimble  
5475 Kellenburger Road  
Dayton, Ohio 45424-1099, USA  
1-937-233-8921

Project: C:\home\Jon\_Williams\_BonHomme\_Pond\Terramodel\  
Jon\_Williams\_PondFL\_Fish.pro  
Report Generated: Friday, March 13, 2009 8:14:01 AM

-----  
Where the second surface is above the first the volume is reported as fill.  
Where the second surface is below the first the volume is reported as  
excavation.  
-----

|                          |            |        |      |        |
|--------------------------|------------|--------|------|--------|
| Shrinkage/swell factors: | Excavation | 1.0000 | Fill | 1.0000 |
|--------------------------|------------|--------|------|--------|

|                             |                     |                              |                     |
|-----------------------------|---------------------|------------------------------|---------------------|
| First Surface<br>Layer Name | Number<br>of Points | Second Surface<br>Layer Name | Number<br>of Points |
| -----                       | -----               | -----                        | -----               |
| POINTS                      | 953                 | FISH_DUGOUT                  | 131                 |

|                             |                       |
|-----------------------------|-----------------------|
| Excavation Volume (Cu. Yd.) | Fill Volume (Cu. Yd.) |
| -----                       | -----                 |
| 7,230.7                     | 3.0                   |

Net Difference: 7,230.7 Cu. Yd. Waste

NRCS-ENG-523A Rev. 10-97

|                               |                    |                                  |                     |                            |
|-------------------------------|--------------------|----------------------------------|---------------------|----------------------------|
| STATE <u>SD</u>               |                    | PROJECT <u>Jon Williams Pond</u> |                     |                            |
| BY <u>J. Weidemann</u>        | DATE <u>9/5/08</u> | CHECKED BY <u>A. Roman</u>       | DATE <u>9/18/08</u> | JOB NO.                    |
| SUBJECT <u>Sediment Yield</u> |                    |                                  |                     | SHEET <u>1</u> OF <u>1</u> |

Pond positioned along fence line

Sediment Calculation

Expected erosion - Area H (25-50% cultivated) = 0.0011 AF/ac ✓ (EFH 11-66)

Sediment delivery Ratio = 29.0% ✓ (EFH 11-74)  
(median)

$$= 0.0011 \frac{\text{AF}}{\text{ac}} (655 \text{ Ac}) = 0.7205 (0.29) = \underline{0.21 \text{ AcF/yr}} \checkmark$$

$$0.21 \text{ AcF/yr} (20 \text{ yrs}) = 4.2 \text{ AcF of sediment} \checkmark$$

$$\text{Below Crest} = .80 (4.2) = 3.36 \checkmark$$

$$\text{Above Crest} = .20 (4.2) = 0.84 \checkmark$$

$$\frac{22.9 \text{ AcF}}{.80} = \frac{0.80x}{.80} \Rightarrow x = \frac{28.63 \text{ AcF}}{.21 \text{ AcF/yr}} = 136 \text{ yrs. of sediment storage} \checkmark$$

NRCS-ENG-523A Rev. 10-97

|         |              |         |                   |              |
|---------|--------------|---------|-------------------|--------------|
| STATE   | SD           | PROJECT | Jon Williams Pond |              |
| BY      | J. Weidemann | DATE    | 9/5/08            | CHECKED BY   |
|         |              |         |                   | A. Roman     |
|         |              | DATE    | 9/18/08           | JOB NO.      |
| SUBJECT | Annual Yield |         |                   | SHEET 1 OF 1 |

Jon Williams Pond - Ben Homme Co. - Dam positioned along fence line

| Elev.          | Area (Ac.) | (Ac Ft/Ft) | Cum.<br>Total (Ac Ft) |
|----------------|------------|------------|-----------------------|
| 968            | 0.87       |            |                       |
| 969            | 0.91       | 0.89       | 0.89                  |
| 970            | 0.95       | 0.93       | 1.82                  |
| 971            | 0.98       | 0.97       | 2.79                  |
| 972            | 1.02       | 1.00       | 3.79                  |
| 973            | 1.06       | 1.04       | 4.83                  |
| 974            | 1.10       | 1.08       | 5.91                  |
| 975            | 1.25       | 1.18       | 7.09                  |
| 976            | 1.37       | 1.31       | 8.40                  |
| 977            | 1.50       | 1.44       | 9.84                  |
| 978            | 1.81       | 1.66       | 11.50                 |
| 979            | 2.27       | 2.04       | 13.54                 |
| 980            | 2.79       | 2.53       | 16.07                 |
| 981            | 3.45       | 3.12       | 19.19                 |
| 982            | 3.93       | 3.69       | 22.88                 |
| P.S. 983       | 4.29       | 4.10       | 26.98                 |
| 984            | 5.06       | 4.68       | 31.66                 |
| 985            | 5.66       | 5.36       | 37.02                 |
| E.S. 986       | 6.26       | 5.96       | 42.98                 |
| 987            | 6.93       | 6.60       | 49.58                 |
| 988            | 7.61       | 7.27       | 56.85                 |
| 989            | 8.49       | 8.05       | 64.90                 |
| Top of Dam 990 | 9.29       | 8.89       | 73.79                 |

$$\text{Annual Yield} = 0.42 (655 \text{ Ac}) = 275.1/12' = \underline{22.9 \text{ Ac Ft}} \checkmark$$

(Ref: EFH 2-83)

$$\text{Isogram \#3, CN=72} \quad 0.42 \checkmark$$

\* Add 20 year sediment yield to annual yield to determine Principal Spillway elevation.

$$22.9 \text{ Ac Ft} + 4.2 \text{ Ac Ft} = 27.1 \text{ Ac Ft} = \underline{\text{elev. 983}}$$

## DOCUMENTATION FOR HAZARD CLASSIFICATION

RECEIVED  
APR - 9 2009  
WATER RIGHTS  
PROGRAM

Producer: **Jon Williams** Name of Site: **Jon Williams Pond**  
County: **Bon Homme**  
Field #:  Watershed:   
Location:  
1/4 Section: **NE** Section: **20** Township: **T94N** Range: **R61W**  
Latitude:  Longitude:

Dam in Series: **No**

Explain:

### Dam and Reservoir Data

|                                                |       |
|------------------------------------------------|-------|
| Assumed Job Class                              | IV    |
| Assumed Hazard Class                           | A     |
| Centerline Elevation Channel Bottom*           | 968   |
| Centerline Elevation Flood Plain*              | 0     |
| Centerline Elevation Top of Dam*               | 989.5 |
| Centerline Elevation Auxiliary Spillway Crest* | 986.4 |

\*Elevation is based on Mean Sea Level Datum

Max. Depth of Water within Reservoir **21.5** Ft.

### Storage

|                                                           |      |         |
|-----------------------------------------------------------|------|---------|
| Storage Below Principal Spillway                          | 27   | Ac.-Ft. |
| Storage between Principal Spillway and Auxiliary Spillway | 18.6 | Ac.-Ft. |
| Storage between Auxiliary Spillway and Top of Dam         | 23.8 | Ac.-Ft. |
| Other                                                     |      | Ac.-Ft. |
| Total Storage to Top of Dam                               | 69.4 | Ac.-Ft. |

45.6

### Downstream Conditions

|                                              |                       |       |     |
|----------------------------------------------|-----------------------|-------|-----|
| 1. Valley Conditions Downstream of Structure | Parallel              |       |     |
| Approximate Slope of Channel                 | 1%                    |       |     |
| 2. Stream Channel Size                       | Depth                 | 1     | Ft. |
|                                              | Bottom Width          | 2     | Ft. |
|                                              | Top Width             | 8     | Ft. |
| 3. Valley Characteristics                    | Width                 | 600   | Ft. |
|                                              | Roughness Coefficient | 0.035 |     |
|                                              | Slope                 | 16%   |     |

Downstream valley may be described in breach routing rather than on this form.

| Describe Type of Infrastructure, Distance Downstream and Distance Above Floodplain Elevation                                                                                                                                                                       | Distance Downstream From Dam | Approx. Distance Above Floodplain Elevation | Location in Potential Impact Area? |                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------|------------------------------------|----------------------------------|
|                                                                                                                                                                                                                                                                    |                              |                                             | YES                                | NO                               |
| <b>Roads</b>                                                                                                                                                                                                                                                       |                              |                                             |                                    |                                  |
| Township or County Paved Road, D<2'                                                                                                                                                                                                                                | 0.75 miles                   | 8.0'                                        | <input checked="" type="radio"/>   | <input type="radio"/>            |
| Other, Describe:<br>timber bridge with low girders                                                                                                                                                                                                                 |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
|                                                                                                                                                                                                                                                                    |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
| <b>Bridges:</b> Describe type and opening size                                                                                                                                                                                                                     |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
|                                                                                                                                                                                                                                                                    |                              |                                             |                                    |                                  |
| <b>Railroads:</b>                                                                                                                                                                                                                                                  |                              |                                             |                                    |                                  |
| Major Railroad, Describe:                                                                                                                                                                                                                                          |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
|                                                                                                                                                                                                                                                                    |                              |                                             |                                    |                                  |
| <b>Buildings and Utilities:</b>                                                                                                                                                                                                                                    |                              |                                             |                                    |                                  |
| Farm Building(s)                                                                                                                                                                                                                                                   | 1.1 miles                    | 5.6'                                        | <input checked="" type="radio"/>   | <input type="radio"/>            |
| Public, Industrial or Commercial Buildings                                                                                                                                                                                                                         |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
| Rel. Import. Utility serving mult. rural users                                                                                                                                                                                                                     |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
|                                                                                                                                                                                                                                                                    |                              |                                             | <input type="radio"/>              | <input checked="" type="radio"/> |
| Describe: The county gravel road south of the dam contains a 72" culvert with 10' of fill over the top of the pipe. Due to the size of the pipe and the amount of fill over the pipe, minimal damage is expected to the county road in the event of a dam failure. |                              |                                             |                                    |                                  |

**Location:**

Is Dam located within five miles of urban development?

Yes

Describe Potential Development:

The dam is located 4 miles south of Avon city limits. The dam is downstream from the town of Avon.

**Rational For Determining Hazard Class:**

The site is located downstream of the town of Avon. A county gravel road and a farm site may come in close vicinity of the flood waters.

Method Used for Evaluation of Impact Area

Simple Dam Break

Further Evaluation Needed

No

Attached: Breach Routings ☒

Maps ☒

Other supporting documents:

Actual Hazard Class\*

A

Final Job Class

IV

Hazard Analysis by: Don Wellman - Ag Engineer

Date: 3/19/2009

Approved by: Dana Edwards - Civil Engineer

Date: 3/19/2009

\*Definition of Hazard Classification in National Engineering Manual 520.21 and SD Amendment 19

**Jon Williams Pond  
Storm Water Pollution Prevention Plan (SWPPP)**

**Project Name**

Jon Williams Pond, operated by Jon Williams.

**Project Type**

Construction of a 22.5' tall, 380' long earthen dam and a 60' wide auxiliary spillway.

**Project Location**

The project is located in the SE 1/4, NE 1/4 of Section 20, Township 94 North, Range 61 West in Bon Homme County, South Dakota.

**Soils**

The following soil identifications were taken from the United States Department of Agriculture (USDA) General Soils Maps.

EmE – Ethan-Betts loams, 15 to 40 Percent Slopes

EmE – ETHAN-BETTS LOAM, 15 TO 40 PERCENT SLOPES – The Betts series consists of very deep, well drained soils formed in glacial till. Permeability is moderate in the upper part and moderately slow in the underlying glacial till. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EmE – ETHAN-BETTS LOAMS, 15 TO 40 PERCENT SLOPES – The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

**Estimate of Project Size**

Total area disturbed will be approximately 1.44 acres.

**Description of the Nature of the Activity**

Project activities include constructing an earthen embankment and an auxiliary earthen spillway. A core trench will be excavated along the centerline of the dam and will be filled shortly after excavation. The disturbed area will be seeded immediately following construction.

**Proposed Timetable for Construction Activities**

Construction is expected during the 2009 construction season. Weather permitting, spring construction is anticipated. The length of construction is estimated at approximately 30 days. A more defined schedule will be available once a contractor has been chosen by the landowner.

**Name of Receiving Waters**

The receiving waters will be an unnamed tributary to Choteau Creek on the Bon Homme Charles Mix county line.

**Conservation Practices to be Used**

The following practices will be installed as necessary according to NRCS Standards:

1. If areas exist during construction with signs of visible soil erosion, temporary seeding, mulching, and silt fences will be utilized for erosion reduction.

**Storm Water Discharges**

No additional storm water discharges are anticipated due to construction activities associated with this project.

**Inspections**

Inspections will be routinely performed by the Owner or Owner's Representative of all disturbed areas of the construction site that have not been finally stabilized. Inspections shall be performed after every major runoff event.

Based on the inspections, revisions to this plan will be made, as needed, within seven days.

Inspections shall be recorded and kept on file with this plan for a period of three years following final site stabilization.

**Record Keeping**

A copy of this plan shall be kept at the construction site until all stabilization measures are completed. Copies of all reports and this plan shall be kept for a period of three years following completion of final site stabilization.

**Plan Updating**

If there is a change in design, construction, operation or maintenance, which may impact the potential for pollutants to be discharged; or if this Storm Water Pollution Prevention Plan proves to be ineffective in controlling the discharge of pollutants, then this Plan must be amended.

**Certification**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Bon Homme County, South Dakota  
Non Technical Soil Descriptions--Continued

EhB - Ethan-Alcester Complex, 1 To 6 Percent Slopes

EhB ETHAN-ALCESTER COMPLEX, 1 TO 6 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EhB ETHAN-ALCESTER COMPLEX, 1 TO 6 PERCENT SLOPES - The Alcester series consists of deep, well and moderately well drained soils formed in silty colluvial-alluvial sediments on terraces and foot slopes. Permeability is moderate. This soil has high available water capacity and high organic matter content. Flooding is NONE.

EhC - Ethan-Alcester Complex, 1 To 9 Percent Slopes

EhC ETHAN-ALCESTER COMPLEX, 1 TO 9 PERCENT SLOPES - The Alcester series consists of deep, well and moderately well drained soils formed in silty colluvial-alluvial sediments on terraces and foot slopes. Permeability is moderate. This soil has high available water capacity and high organic matter content. Flooding is NONE.

EhC ETHAN-ALCESTER COMPLEX, 1 TO 9 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EmE - Ethan-Betts Loams, 15 To 40 Percent Slopes

EmE ETHAN-BETTS LOAMS, 15 TO 40 PERCENT SLOPES - The Betts series consists of very deep, well drained soils formed in glacial till. Permeability is moderate in the upper part and moderately slow in the underlying glacial till. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EmE ETHAN-BETTS LOAMS, 15 TO 40 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EnC - Ethan-Bonilla Loams, 1 To 9 Percent Slopes

EnC ETHAN-BONILLA LOAMS, 1 TO 9 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EnC ETHAN-BONILLA LOAMS, 1 TO 9 PERCENT SLOPES - The Bonilla series consists of very deep, moderately well drained soils formed in loamy glacial drift in drainageways and swales of the uplands. Permeability is moderate in the solum and moderately slow or moderate in the underlying material. This soil has high available water capacity and high organic matter content. Flooding is NONE.

EoD - Ethan-Davis Loams, 9 To 15 Percent Slopes

EoD ETHAN-DAVIS LOAMS, 9 TO 15 PERCENT SLOPES - The Davis series consists of deep, well drained and moderately well drained soils formed in loamy sediments on foot slopes, fans and high bottom lands. Permeability is moderate. This soil has high available water capacity and high organic matter content. Flooding is NONE.

EoD ETHAN-DAVIS LOAMS, 9 TO 15 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

EpC - Ethan-Homme Complex, 6 To 9 Percent Slopes

EpC ETHAN-HOMME COMPLEX, 6 TO 9 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

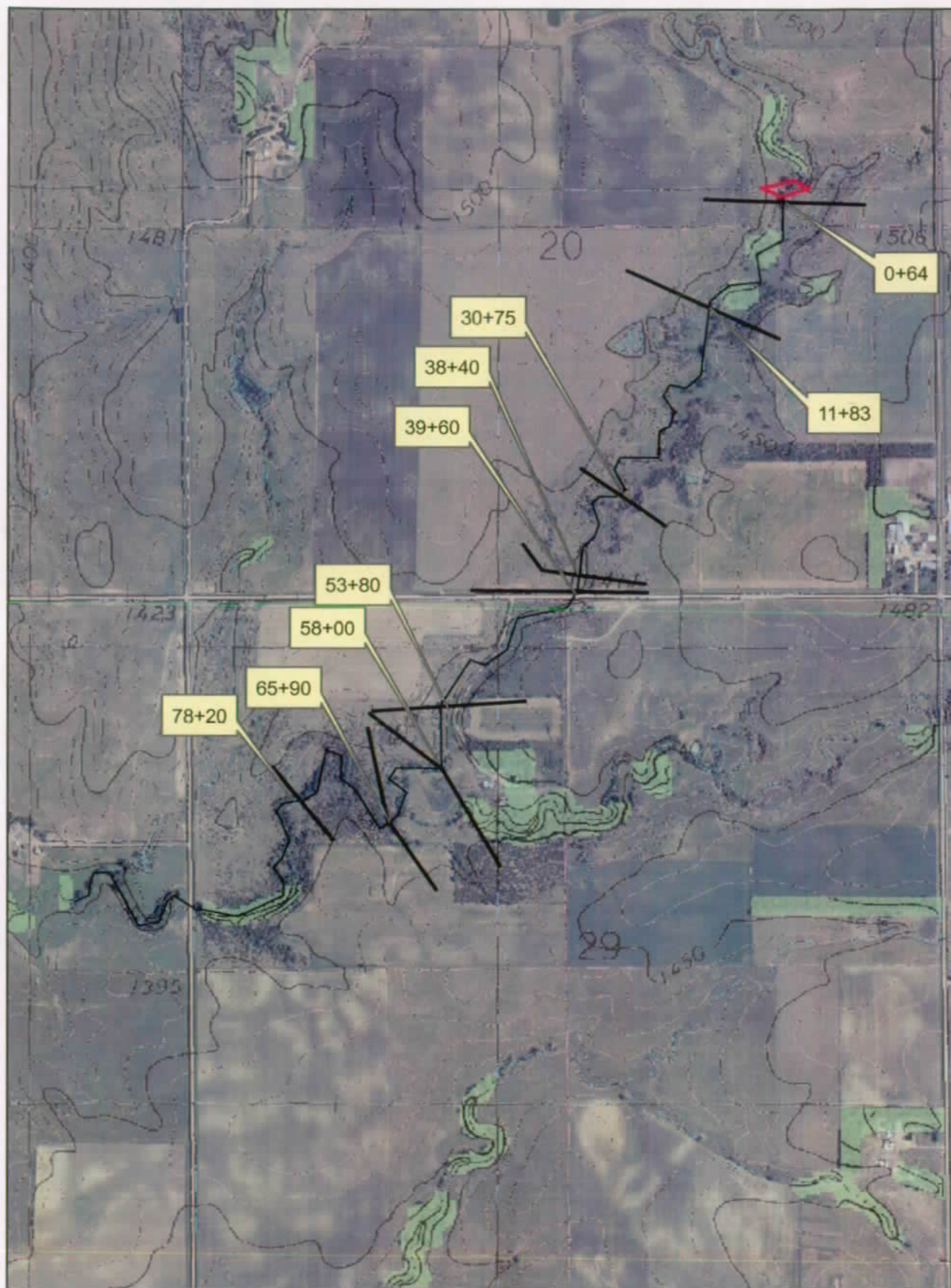
EpC ETHAN-HOMME COMPLEX, 6 TO 9 PERCENT SLOPES - The Homme series consists of deep, well and moderately well drained soils formed in silty sediments over loamy glacial drift on uplands. Permeability is moderately slow. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

GeE - Gavins-Ethan Loams, 15 To 40 Percent Slopes

GeE GAVINS-ETHAN LOAMS, 15 TO 40 PERCENT SLOPES - The Gavins series consists of well drained and somewhat excessively drained soils formed in sediments weathered from soft siltstone on uplands. These soils have moderate permeability above the bedrock. This soil has very low available water capacity and moderate organic matter content. Flooding is NONE.

GeE GAVINS-ETHAN LOAMS, 15 TO 40 PERCENT SLOPES - The Ethan series consists of deep, well drained soils formed in glacial till. They have moderate permeability in the solum and moderately slow permeability in the underlying material. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

Jon Williams Pond



1 inch equals 1,000 feet

SIMPLIFIED DAMBREAK MODEL (SMPDBK) VERSION: 9/91  
 BY D.L. FREAD, J.M. LEWIS, & J.N. WETMORE - PHONE: (301) 427-7640  
 NWS HYDROLOGIC RESEARCH LAB W/OH3, 1325 EAST-WEST HIGHWAY,  
 SILVER SPRING, MD 20910

Jon Williams Dam 10-16-08

Unnamed

|      | IBC         | ISH    | JNK     | IDAM        | IPLT | IREC |      |
|------|-------------|--------|---------|-------------|------|------|------|
|      | 1           | 0      | 0       | 0           | 1    | 0    |      |
|      | HDE         | BME    | VOL     | SA          | BW   | TFM  | QO   |
| C4   | 1457.3      | 1435.0 | 69.     | 8.9         | 59.6 | 10.4 | 1.   |
| C5   | NS= 9       | NCS= 5 | CMS=.50 | DISTTN= .75 |      |      |      |
|      | X-S NO. 1   |        |         |             |      |      |      |
| C6-1 | D= .00      | FLD=   | 5.00    |             |      |      |      |
| C7-1 | HS= 1435.00 | BS=    | 28.     | BSS=        | 0.   | CM=  | .050 |
| C7-2 | HS= 1440.00 | BS=    | 85.     | BSS=        | 0.   | CM=  | .050 |
| C7-3 | HS= 1445.00 | BS=    | 190.    | BSS=        | 0.   | CM=  | .050 |
| C7-4 | HS= 1450.00 | BS=    | 464.    | BSS=        | 0.   | CM=  | .050 |
| C7-5 | HS= 1460.00 | BS=    | 590.    | BSS=        | 0.   | CM=  | .050 |
|      | X-S NO. 2   |        |         |             |      |      |      |
| C6-2 | D= .22      | FLD=   | 5.00    |             |      |      |      |
| C7-1 | HS= 1425.00 | BS=    | 42.     | BSS=        | 0.   | CM=  | .050 |
| C7-2 | HS= 1430.00 | BS=    | 128.    | BSS=        | 0.   | CM=  | .050 |
| C7-3 | HS= 1435.00 | BS=    | 246.    | BSS=        | 0.   | CM=  | .050 |
| C7-4 | HS= 1440.00 | BS=    | 358.    | BSS=        | 0.   | CM=  | .050 |
| C7-5 | HS= 1445.00 | BS=    | 452.    | BSS=        | 0.   | CM=  | .050 |
|      | X-S NO. 3   |        |         |             |      |      |      |
| C6-3 | D= .58      | FLD=   | 5.00    |             |      |      |      |
| C7-1 | HS= 1408.00 | BS=    | 93.     | BSS=        | 0.   | CM=  | .050 |
| C7-2 | HS= 1415.00 | BS=    | 159.    | BSS=        | 0.   | CM=  | .050 |
| C7-3 | HS= 1420.00 | BS=    | 221.    | BSS=        | 0.   | CM=  | .050 |
| C7-4 | HS= 1430.00 | BS=    | 331.    | BSS=        | 0.   | CM=  | .050 |
| C7-5 | HS= 1440.00 | BS=    | 441.    | BSS=        | 0.   | CM=  | .050 |
|      | X-S NO. 4   |        |         |             |      |      |      |
| C6-4 | D= .73      | FLD=   | 5.00    |             |      |      |      |
| C7-1 | HS= 1398.00 | BS=    | 86.     | BSS=        | 0.   | CM=  | .050 |
| C7-2 | HS= 1405.00 | BS=    | 146.    | BSS=        | 0.   | CM=  | .050 |
| C7-3 | HS= 1410.00 | BS=    | 184.    | BSS=        | 0.   | CM=  | .050 |
| C7-4 | HS= 1420.00 | BS=    | 340.    | BSS=        | 0.   | CM=  | .050 |
| C7-5 | HS= 1430.00 | BS=    | 639.    | BSS=        | 0.   | CM=  | .050 |
|      | X-S NO. 5   |        |         |             |      |      |      |
| C6-5 | D= .75      | FLD=   | 5.00    |             |      |      |      |
| C7-1 | HS= 1397.00 | BS=    | 36.     | BSS=        | 0.   | CM=  | .050 |
| C7-2 | HS= 1400.00 | BS=    | 89.     | BSS=        | 0.   | CM=  | .050 |
| C7-3 | HS= 1410.00 | BS=    | 172.    | BSS=        | 0.   | CM=  | .050 |
| C7-4 | HS= 1420.00 | BS=    | 593.    | BSS=        | 0.   | CM=  | .050 |
| C7-5 | HS= 1430.00 | BS=    | 851.    | BSS=        | 0.   | CM=  | .050 |
|      | X-S NO. 6   |        |         |             |      |      |      |
| C6-6 | D= 1.02     | FLD=   | 5.00    |             |      |      |      |
| C7-1 | HS= 1385.00 | BS=    | 24.     | BSS=        | 0.   | CM=  | .050 |
| C7-2 | HS= 1390.00 | BS=    | 70.     | BSS=        | 0.   | CM=  | .050 |
| C7-3 | HS= 1400.00 | BS=    | 324.    | BSS=        | 0.   | CM=  | .050 |
| C7-4 | HS= 1410.00 | BS=    | 493.    | BSS=        | 0.   | CM=  | .050 |
| C7-5 | HS= 1415.00 | BS=    | 778.    | BSS=        | 0.   | CM=  | .050 |
|      | X-S NO. 7   |        |         |             |      |      |      |
| C6-7 | D= 1.10     | FLD=   | 5.00    |             |      |      |      |

|      |             |           |         |          |
|------|-------------|-----------|---------|----------|
| C7-1 | HS= 1380.00 | BS= 96.   | BSS= 0. | CM= .063 |
| C7-2 | HS= 1385.00 | BS= 470.  | BSS= 0. | CM= .053 |
| C7-3 | HS= 1390.00 | BS= 620.  | BSS= 0. | CM= .050 |
| C7-4 | HS= 1395.00 | BS= 800.  | BSS= 0. | CM= .050 |
| C7-5 | HS= 1400.00 | BS= 995.  | BSS= 0. | CM= .050 |
|      | X-S NO. 8   |           |         |          |
| C6-8 | D= 1.25     | FLD= 5.00 |         |          |
| C7-1 | HS= 1375.00 | BS= 80.   | BSS= 0. | CM= .063 |
| C7-2 | HS= 1380.00 | BS= 240.  | BSS= 0. | CM= .054 |
| C7-3 | HS= 1390.00 | BS= 685.  | BSS= 0. | CM= .050 |
| C7-4 | HS= 1400.00 | BS= 1006. | BSS= 0. | CM= .050 |
| C7-5 | HS= 1410.00 | BS= 1278. | BSS= 0. | CM= .050 |
|      | X-S NO. 9   |           |         |          |
| C6-9 | D= 1.48     | FLD= 5.00 |         |          |
| C7-1 | HS= 1360.00 | BS= 45.   | BSS= 0. | CM= .063 |
| C7-2 | HS= 1365.00 | BS= 95.   | BSS= 0. | CM= .051 |
| C7-3 | HS= 1370.00 | BS= 139.  | BSS= 0. | CM= .050 |
| C7-4 | HS= 1380.00 | BS= 329.  | BSS= 0. | CM= .050 |
| C7-5 | HS= 1390.00 | BS= 550.  | BSS= 0. | CM= .050 |

\*\*\*\*\* DISTANCE TO PRIMARY POINT OF INTEREST MOVED TO THE CROSS SECTION  
 \*\*\*\*\* CLOSEST TO THIS LOCATION (MI .75)

THE DATA FOR THIS DAM IS AS FOLLOWS:

|                                             |               |
|---------------------------------------------|---------------|
| TYPE OF DAM (IDAM)                          | EARTH         |
| DAM BREACH ELEVATION (HDE)                  | 1457.30 FT    |
| FINAL BREACH ELEVATION (BME)                | 1435.00 FT    |
| VOLUME OF RESERVOIR (VOL)                   | 69. ACRE-FT   |
| SURFACE AREA OF RESERVOIR (SA)              | 8.89 ACRES    |
| FINAL BREACH WIDTH (BW)                     | 59.59 FT      |
| TIME OF DAM FAILURE (TFM)                   | 10.42 MINUTES |
| NON-BREACH FLOW (QO)                        | 1.00 CFS      |
| DISTANCE TO PRIMARY PT OF INTEREST (DISTTN) | .75 MILES     |
| DEAD STORAGE EQUIV. MANN. N (CMS)           | .50           |

CROSS SECTION NO. 1

FLOOD DEPTH (FLD) 5.00 FT

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| ELEV. (FT) (HS)        | 1435.0 | 1440.0 | 1445.0 | 1450.0 | 1460.0 |
| TWIDTHS (FT) (BS)      | 28.0   | 85.0   | 190.0  | 464.0  | 590.0  |
| INACTIVE TW (FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)         | .050   | .050   | .050   | .050   | .050   |

CROSS SECTION NO. 2

REACH LENGTH (D) .22 MI

FLOOD DEPTH (FLD) 5.00 FT

|                        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|
| ELEV. (FT) (HS)        | 1425.0 | 1430.0 | 1435.0 | 1440.0 | 1445.0 |
| TWIDTHS (FT) (BS)      | 42.0   | 128.0  | 246.0  | 358.0  | 452.0  |
| INACTIVE TW (FT) (BSS) | .0     | .0     | .0     | .0     | .0     |

|                |      |      |      |      |      |
|----------------|------|------|------|------|------|
| MANNING N (CM) | .050 | .050 | .050 | .050 | .050 |
|----------------|------|------|------|------|------|

CROSS SECTION NO. 3

|                  |        |
|------------------|--------|
| REACH LENGTH (D) | .58 MI |
|------------------|--------|

|                   |         |
|-------------------|---------|
| FLOOD DEPTH (FLD) | 5.00 FT |
|-------------------|---------|

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1408.0 | 1415.0 | 1420.0 | 1430.0 | 1440.0 |
| TWIDTHS(FT) (BS)      | 93.0   | 159.0  | 221.0  | 331.0  | 441.0  |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .050   | .050   | .050   | .050   | .050   |

CROSS SECTION NO. 4

|                  |        |
|------------------|--------|
| REACH LENGTH (D) | .73 MI |
|------------------|--------|

|                   |         |
|-------------------|---------|
| FLOOD DEPTH (FLD) | 5.00 FT |
|-------------------|---------|

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1398.0 | 1405.0 | 1410.0 | 1420.0 | 1430.0 |
| TWIDTHS(FT) (BS)      | 86.0   | 146.0  | 184.0  | 340.0  | 639.0  |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .050   | .050   | .050   | .050   | .050   |

CROSS SECTION NO. 5

|                  |        |
|------------------|--------|
| REACH LENGTH (D) | .75 MI |
|------------------|--------|

|                   |         |
|-------------------|---------|
| FLOOD DEPTH (FLD) | 5.00 FT |
|-------------------|---------|

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1397.0 | 1400.0 | 1410.0 | 1420.0 | 1430.0 |
| TWIDTHS(FT) (BS)      | 36.0   | 89.0   | 172.0  | 593.0  | 851.0  |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .050   | .050   | .050   | .050   | .050   |

CROSS SECTION NO. 6

|                  |         |
|------------------|---------|
| REACH LENGTH (D) | 1.02 MI |
|------------------|---------|

|                   |         |
|-------------------|---------|
| FLOOD DEPTH (FLD) | 5.00 FT |
|-------------------|---------|

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1385.0 | 1390.0 | 1400.0 | 1410.0 | 1415.0 |
| TWIDTHS(FT) (BS)      | 24.0   | 70.0   | 324.0  | 493.0  | 778.0  |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .050   | .050   | .050   | .050   | .050   |

CROSS SECTION NO. 7

|                  |         |
|------------------|---------|
| REACH LENGTH (D) | 1.10 MI |
|------------------|---------|

|                   |         |
|-------------------|---------|
| FLOOD DEPTH (FLD) | 5.00 FT |
|-------------------|---------|

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1380.0 | 1385.0 | 1390.0 | 1395.0 | 1400.0 |
| TWIDTHS(FT) (BS)      | 96.0   | 470.0  | 620.0  | 800.0  | 995.0  |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .063   | .053   | .050   | .050   | .050   |

CROSS SECTION NO. 8

|                  |         |
|------------------|---------|
| REACH LENGTH (D) | 1.25 MI |
|------------------|---------|

|                   |         |
|-------------------|---------|
| FLOOD DEPTH (FLD) | 5.00 FT |
|-------------------|---------|

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1375.0 | 1380.0 | 1390.0 | 1400.0 | 1410.0 |
| TWIDTHS(FT) (BS)      | 80.0   | 240.0  | 685.0  | 1006.0 | 1278.0 |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .063   | .054   | .050   | .050   | .050   |

CROSS SECTION NO. 9  
 REACH LENGTH (D) 1.48 MI  
 FLOOD DEPTH (FLD) 5.00 FT

|                       |        |        |        |        |        |
|-----------------------|--------|--------|--------|--------|--------|
| ELEV.(FT) (HS)        | 1360.0 | 1365.0 | 1370.0 | 1380.0 | 1390.0 |
| TWIDTHS(FT) (BS)      | 45.0   | 95.0   | 139.0  | 329.0  | 550.0  |
| INACTIVE TW(FT) (BSS) | .0     | .0     | .0     | .0     | .0     |
| MANNING N (CM)        | .063   | .051   | .050   | .050   | .050   |

AN ASTERISK (\*) BESIDE A PARAMETER IMPLIES THAT A DEFAULT VALUE WAS COMPUTED

NAME OF DAM: Jon Williams Dam 10 NAME OF RIVER: Unnamed

| RVR MILE | MAX FLOW | MAX ELEV | MAX DEPTH | TIME(HR)  | TIME(HR) | TIME(HR) | FLOOD     |
|----------|----------|----------|-----------|-----------|----------|----------|-----------|
| FROM DAM | (CFS)    | (FT-MSL) | (FT)      | MAX DEPTH | FLOOD    | DEFLOOD  | DEPTH(FT) |
| *****    | *****    | *****    | *****     | *****     | *****    | *****    | *****     |

ITERATIVE SOLUTION FOR SUBMERGENCE EFFECT DID NOT CONVERGE.  
 DISCHARGE MAY VARY BY + OR - 111.69 CFS

|       |      |        |         |       |     |     |     |      |
|-------|------|--------|---------|-------|-----|-----|-----|------|
| 0+64  | .00  | 10169. | 1445.99 | 10.99 | .17 | .03 | .17 | 5.00 |
| 11+83 | .22  | 8874.  | 1433.47 | 8.47  | .21 | .09 | .22 | 5.00 |
| 30+75 | .58  | 7690.  | 1414.75 | 6.75  | .25 | .18 | .27 | 5.00 |
| 38+40 | .73  | 7468.  | 1404.68 | 6.68  | .27 | .20 | .29 | 5.00 |
| 39+60 | .75  | 7394.  | 1404.68 | 7.68  | .29 | .18 | .32 | 5.00 |
| 53+80 | 1.02 | 6930.  | 1394.72 | 9.72  | .33 | .19 | .38 | 5.00 |
| 58+00 | 1.10 | 6563.  | 1384.44 | 4.44  | .33 | .00 | .00 | 5.00 |
| 65+90 | 1.25 | 6247.  | 1380.65 | 5.65  | .38 | .35 | .40 | 5.00 |
| 78+20 | 1.48 | 5732.  | 1367.25 | 7.25  | .44 | .32 | .51 | 5.00 |

ANALYSIS IS COMPLETE

#### Notes:

The maximum elevation at station 39+60 was calculated at 1404.68'. This appears to be close to the top of the first county road south of the dam. The maximum elevation at station 58+00 was calculated at 1384.49'. This appears to be below the elevation of the farm site near this station. The buildings on the farm site appear to be at elevation 1390 according to the quad map. A survey of the road and farm site were not conducted.

TABLE OF QUANTITIES AND COST ESTIMATE  
**(This is a preliminary estimate only!)**

Based on 2008 EQIP Cost Docket

**RECEIVED**

**APR - 9 2009**

**WATER RIGHTS  
PROGRAM**

Cooperator: Jon Williams  
 County: Bon Homme  
 Project: Pond  
 Computations by: Jon Weidemann  
 Checked by:

U.S. Department of Agriculture  
 Natural Resources Conservation Service  
 Conservation District:  
 Date: 03/19/09  
 Date:

| Item                                               | Unit  | Quantity | Unit Cost | Total Cost         |
|----------------------------------------------------|-------|----------|-----------|--------------------|
| <b>EXCAVATION:</b>                                 |       |          |           |                    |
| Stripping (Dam Only)                               | CU YD | 651      | 1.20      | 781.20             |
| Core Trench                                        | CU YD | 1,311    | 1.20      | 1,573.20           |
| Emergency Spillway                                 | CU YD | 6,007    | N/C       | 0.00               |
| <b>EARTHFILL: (Dam Embankment)</b>                 |       |          |           |                    |
| Pond Embankment (Dam)                              | CU YD | 10,507   | 1.56      | 16,390.92          |
| Core Trench                                        | CU YD | 1,311    | 1.56      | 2,045.16           |
| Top Dressing<br>(Spillway - Stripping and Topsoil) | SQ YD | 3,087    | 0.50      | 1,543.50           |
| <b>SEEDING:</b>                                    |       |          |           |                    |
| Native Grass Mix                                   | AC    | 1.32     | 100.00    | 132.00             |
| Weed Control                                       |       |          |           |                    |
| Medium Seedbed Preparation                         |       |          |           |                    |
| Critical Area Planting                             |       |          |           |                    |
| Seeding Operation                                  |       |          |           |                    |
| 107 LF 12" PVC pipe SDR 21 min.                    | LF    | 107      | 19.78     | 2,116.46           |
| PVC 11 Degree Elbow SDR 21 min.                    | EACH  | 1        | 290.94    | 290.94             |
| 30" Dia. Concrete Drop Inlet Structure             | EACH  | 1        | 1,000.00  | 1,000.00           |
| Trash Screen                                       | EACH  | 1        | 400.00    | 400.00             |
| Timber Structure                                   | BDFT  | 107      | 1.30      | 139.10             |
| Fine Drainfill                                     | CU YD | 7.0      | 70.00     | 490.00             |
| Geotextile Cloth                                   | SQ YD | 24.0     | 2.00      | 48.00              |
| Rock Riprap                                        | CU YD | 9.0      | 50.00     | 450.00             |
| <b>TOTAL</b>                                       |       |          |           | <b>\$27,400.48</b> |

This is an **estimate** of construction costs to implement the above mentioned conservation practice(s), and **does not** represent the amount or rate of cost share money that may be received.

## PARTICIPANT RESPONSIBILITIES

|                          |  |                  |       |       |
|--------------------------|--|------------------|-------|-------|
| PARTICIPANT Jon Williams |  | County Bon Homme |       |       |
| PRACTICE(S) Pond (378)   |  |                  |       |       |
| LEGAL DESCRIPTION NE ¼   |  | Sec. 20          | T 94N | R 61W |
| GPS                      |  |                  |       |       |

GENERAL: Policies and regulations of the United States Department of Agriculture (USDA) assistance programs place responsibility on the participant for obtaining necessary local, state, and federal permits, adequate real property rights and interests, applicable water rights, and necessary approvals, easements, and licenses. The participant must also meet requirements for installation, inspection, and operation and maintenance. For copies of South Dakota (SD) laws, please see the Internet at:  
<http://www.state.sd.us/state/legis/lrc/statutes/lrcmenu.htm>.

For ALL conservation practices, if the participant elects to install proposed practices in locations **other than where approved by the Natural Resources Conservation Service (NRCS)**, the participant may be in violation of applicable NRCS policy, federal, state, or Tribal laws, and said action may result in the termination of their NRCS contract or withdrawal of financial and technical assistance related to the project. By initialing, the producer **acknowledges understanding of their responsibilities**: \_\_\_\_\_ [Producer initials here.]

### 1. CULTURAL/HISTORICAL RESOURCES

An NRCS approved cultural/historical evaluation **must** be made of all contracted and/or technically assisted practices that have the potential to affect historic properties or culturally significant sites **prior** to construction. If the NRCS approved construction activities expose cultural/historical resources, human remains (bones), or similar objects, the participant and/or contractor **must** immediately stop construction and notify the NRCS. Any further construction without clearance **could jeopardize assistance** (financial/technical) and may be a **violation of state or federal law**. By initialing, the producer **acknowledges understanding of their responsibilities** under this section: \_\_\_\_\_ [Producer initials here.]

### 2. ENDANGERED AND THREATENED SPECIES

For ALL conservation practices, occasional and/or transient endangered species may visit the project site or site vicinity. If any endangered species visits the site or vicinity of the site then the participant, Technical Service Provider (TSP), and/or the contractor must stop work immediately and contact the local NRCS office. By initialing, the producer **acknowledges understanding of their responsibilities** under this section: \_\_\_\_\_ [Producer initials here.]

### 3. CLEAN WATER ACT

Clean Water Act Section 10 or 404 permits from the US Army Corps of Engineers (COE) 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: <https://www.nwo.usace.army.mil/html/od-rsd/applications.html>.

National Pollutant Discharge Elimination System permits or approval from the **SD 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 one acre. Information is available by telephone at (605) 773-3351, or on the Internet at:  
<http://www.state.sd.us/denr/DES/Surfacewater/surface.htm>.

#### 4. WATER RIGHTS, CONSTRUCTION PERMIT, AND LOCATION NOTICE

**South Dakota Codified Law 46-5** requires securing a permit from the **SD 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 are available on the Internet at:  
<http://www.state.sd.us/denr/DES/WaterRights/waterprg.htm>.

Compliance with all requirements of SD 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 **SD 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 SD, generally through **County Drainage Commissions**. **Administrative Rules (Dam Safety, etc.)** are located at:  
[http://www.state.sd.us/denr/DES/WaterRights/WR\\_laws.htm](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.

#### 5. 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.

#### 6. CONSTRUCTION SUPERVISION AND INSPECTION PARTICIPANT RESPONSIBILITIES

(A) **South Dakota Codified Law 49-7A**, (also know as **SD 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).

The NRCS makes no representation as to the existence or nonexistence 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 practice standards (CPS) require onsite 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:

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

(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, any changes to project location and/or design such as sizes, grades, elevations, etc., **must be approved by the NRCS** for permits, certifications, and payment to be assured. **Get approvals before construction!**

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

(F) The NRCS designed practices, as well as, financially assisted practices designed by contractors (or others), must meet NRCS CPSs and must be approved by a NRCS employee with appropriate Job Approval Authority prior to construction.

#### 7. OPERATION AND MAINTENANCE (O&M)

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

#### 8. PARTICIPANT RESPONSIBILITIES AND CERTIFICATION

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

Participant signature: \_\_\_\_\_ Date: \_\_\_\_\_

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

NRCS \_\_\_\_\_ Date: \_\_\_\_\_  
Employee: \_\_\_\_\_

# OPERATION AND MAINTENANCE PLAN

## POND CODE 378

Landowner/Operator Jon Williams

Job Location NE 1/4 Sec. 20, T94N, R61W GPS

Prepared by  Date

### 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 10-20 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.
- ☐ Remove all shrubs and woody vegetation. This includes shrubs and trees that are growing close enough to the structure to impact earth embankments with root growth.
- ☐ If fences are installed, they must be maintained to prevent unauthorized entry.

Other

# CONSTRUCTION SPECIFICATION

## SD-2 CLEARING AND GRUBBING

### 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 Natural Resources Conservation Service 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.

# **CONSTRUCTION SPECIFICATION**

## **SD-4 STRIPPING**

### **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 Natural Resources Conservation Service (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.

# CONSTRUCTION SPECIFICATION

## SD-5 EXCAVATION

### 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 Natural Resources Conservation Service (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.

# CONSTRUCTION SPECIFICATION

## SD-7S EARTHFILL-CLASS S

### 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 Natural Resources Conservation Service 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, stream flow, 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 recompacted 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.

| <b>Concrete Structure</b>                                                           | <b>Days After Concrete Placement</b> |
|-------------------------------------------------------------------------------------|--------------------------------------|
| 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                                    |

# Construction Specification 61C—Rock Riprap

## 1. Scope

The work shall consist of the construction of rock riprap revetments and blankets, including filter or bedding where specified.

## 2. Material

Rock riprap shall conform to the requirements of Material Specification 523, Rock for Riprap, or if so specified, shall be obtained from designated sources. It shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits.

At least 30 days before rock is delivered from other than designated sources, the contractor shall designate in writing the source from which rock material will be obtained and provide information satisfactory to the contracting officer that the material meets contract requirements. The contractor shall provide the contracting officer's technical representative (COTR) free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock shall be as specified in section 8.

Rock from approved sources shall be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

When specified in section 8 or requested by the contracting officer, a gradation quality control check shall be made by the contractor and be subject to inspection by the COTR. The test shall be performed at the worksite in accordance to ASTM D 5519 Test Method B Size, Size-Range Grading, on a test pile of representative rock. The weight or size of the test pile shall be large enough to ensure a representative gradation of rock from the source and to provide test results within a 5 percent accuracy.

Based on a specific gravity of 2.65 (typical of limestone and dolomite) and assuming the individual rock is shaped midway between a sphere and a cube, typical size/weight relationships are:

| Sieve size<br>of rock | Approx. weight<br>of rock | Weight of<br>test pile |
|-----------------------|---------------------------|------------------------|
| 16 inches             | 300 pounds                | 6,000 pounds           |
| 11 inches             | 100 pounds                | 2,000 pounds           |
| 6 inches              | 15 pounds                 | 300 pounds             |

The results of the test shall be compared to the gradation required for the project. Test pile results that do not meet the construction specifications shall be cause for the rock to be rejected. The test pile that meets contract requirements shall be left on the job site as a sample for visual comparison. The test pile shall be used as part of the last rock riprap to be placed.

**Filter or bedding aggregates** when required shall conform to Material Specification 521, Aggregates for Drainfill and Filters, unless otherwise specified. Geotextiles shall conform to Material Specification 592, Geotextile.

### **3. Subgrade preparation**

The subgrade surface on which the rock riprap, filter, bedding, or geotextile is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved material and shall conform to the requirements of the specified class of earthfill.

Rock riprap, filter, bedding, or geotextile shall not be placed until the foundation preparation is completed and the subgrade surface has been inspected and approved.

### **4. Equipment-placed rock riprap**

The rock riprap shall be placed by equipment on the surface and to the depth specified. It shall be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying material. The rock for riprap shall be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. Some hand placing may be required to provide a neat and uniform surface.

Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

### **5. Hand placed rock riprap**

The rock riprap shall be placed by hand on the surface and to the depth specified. It shall be securely bedded with the larger rocks firmly in contact one to another without bridging. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on its vertical edge except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

### **6. Filter or bedding**

When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material shall be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate is not required, but the surface of such material shall be finished reasonably smooth and free of mounds, dips, or windrows.

### **7. Measurement and payment**

For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap and filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8.

No separate payment is made for testing the gradation of the test pile. Compensation for testing is included in the appropriate bid item for riprap.

## 8. Items of work and construction details

Items of work to be performed in conformance with this specification and construction details are:

### a. Riprap

- (1) This item consists of furnishing and placing the rock riprap, complete in place, for outlet of the drain, as shown on the drawings.
- (2) Rock riprap shall conform to the requirements of Material Specification 523, Rock for Riprap, Rock Type 1.
- (3) The riprap may be equipment placed.
- (4) All rock materials shall be graded to meet the following requirements:

| <u>Stone Weight</u><br><u>Pounds</u> | <u>Minimum %</u><br><u>Larger Than</u> | <u>Maximum %</u><br><u>Larger than</u> |
|--------------------------------------|----------------------------------------|----------------------------------------|
| 50                                   | 0                                      | 0                                      |
| 30                                   | 20                                     | 50                                     |
| 10                                   | 50                                     | 85                                     |
| 3                                    | 85                                     | 100                                    |

- (5) Payment will constitute full compensation for related Subsidiary Item:

Contractor Quality Control.

## **Construction Specification 24A—Drainfill**

### **1. Scope**

The work consists of furnishing, placing, and compacting drainfill required in the construction of structure drainage systems.

### **2. Material**

Drainfill material shall conform to the requirements of Material Specification 521, Aggregates for Drainfill and Filters. A minimum of 30 days before delivery of materials to the site, the contractor shall inform the engineer in writing of the source(s) from which drainfill material will be obtained. The contractor shall provide the engineer free access to the source(s) for the purpose of obtaining samples for testing.

### **3. Base preparation**

Foundation surface and trenches shall be clean and free of organic matter, loose soil, foreign substance, and standing water when the drainfill is placed. Earth surfaces upon or against which drainfill will be placed shall not be scarified.

### **4. Placement**

Drainfill shall not be placed until the subgrade has been inspected and approved by the engineer. Drainfill shall not be placed over or around pipe or drain tile until the installation of the pipe or tile has been inspected and approved.

Drainfill shall be placed uniformly in layers not to exceed 12 inches thick before compaction. When compaction is accomplished by manually controlled equipment, the layers shall not exceed 8 inches thick. The material shall be placed to avoid segregation of particle sizes and to ensure the continuity and integrity of all zones. No foreign material shall be allowed to become intermixed with or otherwise contaminate the drainfill.

Traffic shall not be permitted to cross over drains at random. Equipment cross-overs shall be maintained, and the number and location of such crossovers shall be established and approved before the beginning of drainfill placement. Each crossover shall be cleaned of all contaminating material and shall be inspected and approved by the engineer before the placement of additional drainfill material.

Any damage to the foundation surface or the trench sides or bottom occurring during placement of drainfill shall be repaired before drainfill placement is continued.

The upper surface of drainfill constructed concurrently with adjacent zones of earthfill shall be maintained at a minimum elevation of 1 foot above the upper surface of adjacent earthfill.

Drainfill over and/or around pipe or drain tile shall be placed to avoid any displacement in line or grade of the pipe or tile.

Drainfill shall not be placed adjacent to structures until the concrete has attained the strength specified in section 9 of this specification. The strength shall be determined by compression testing of concrete test cylinders cast and field cured at the project site in accordance with ASTM Method C 31 for determining when a structure may be placed into service.

When the required strength of the concrete is not specified as described above, placement of drainfill adjacent to concrete structures shall not be commenced until the following item intervals have elapsed following placement of the concrete:

| Structure type                                                                                           | Time interval (days) |
|----------------------------------------------------------------------------------------------------------|----------------------|
| Vertical or near-vertical wall with earth loading on one side only<br>(retaining walls and counterforts) | 14                   |
| Walls backfilled on both sides simultaneously                                                            | 7                    |
| Conduits and galleries, cast-in-place<br>(with inside forms in place)                                    | 7                    |
| (inside forms removed)                                                                                   | 14                   |
| Conduits, precast, cradled                                                                               | 2                    |
| Conduits, precast, bedded                                                                                | 1                    |
| Cantilever outlet bents backfilled on both sides simultaneously                                          | 3                    |

#### 5. Control of moisture

The moisture content of drainfill material shall be controlled as specified in section 9 of this specification. When additional water is required, it shall be applied in a manner to avoid excessive wetting to adjacent earthfill. Except as specified in section 9 of this specification, control of moisture content will not be required.

#### 6. Compaction

Drainfill shall be compacted according to the following requirements for the class of compaction specified:

**Class A compaction**—For drainfill materials with more than 70 percent passing the 3/4 inch sieve, each layer of drainfill shall be compacted to a minimum dry density of not less than the density specified in section 9 of this specification as determined by ASTM D 698. For drainfill materials with 70 percent or less passing the 3/4 inch sieve, each layer of drainfill shall be compacted to a relative density of not less than 70 percent as determined by ASTM D 4254.

**Class I compaction**—Each layer of drainfill shall be compacted by a minimum of two passes over the entire surface with a steel-drum vibrating roller weighing at least 5 tons and exerting a vertical vibrating force of not less than 20,000 pounds at a minimum frequency of 1,200 times per minute, or by an approved equivalent method.

**Class II compaction**—Each layer of drainfill shall be compacted by one of the following methods or by an approved equivalent method. (A pass is defined as at least one complete coverage of the roller wheel, tire, or drum over the entire surface for each layer.)

- a. A minimum of two passes over the entire surface with a pneumatic-tired roller exerting a minimum pressure of 75 pounds per square inch.
- b. A minimum of four passes over the entire surface with the track of a crawler-type tractor weighing at least 20 tons.
- c. Controlled movement of the hauling equipment so that the entire surface is traversed by not less than one tread track of the loaded hauling equipment.

**Class III compaction**—No compaction will be required beyond that resulting from the placing and spreading operations.

When compaction other than Class III compaction is specified, material placed in trenches or other locations inaccessible to heavy equipment shall be compacted by manually controlled pneumatic or vibrating tampers as specified in section 9 of this specification.

Heavy equipment shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from cranes, hoists, or similar equipment will not be permitted.

#### **7. Testing**

The contractor shall conduct such tests as necessary to verify that the drainfill material and the inplace drainfill meets the specification requirements.

The engineer shall be granted access to perform such tests as are required to verify that the drainfill materials and the drainfill in place meets the requirements of the specifications. These tests are not intended to provide the contractor with information needed to assure that the materials and workmanship meet the specification requirements. These verification tests will not relieve the contractor of the responsibility of performing required tests for that purpose.

#### **8. Measurement and payment**

For items of work for which specific unit prices are established in the contract, the volume of drainfill within the neat lines shown on the drawings are measured and computed to the nearest cubic yard. Where the engineer directs placement of drainfill outside the neat lines to replace unsuitable foundation material, the volume of such drainfill is included. The volume included is only to the extent that the unsuitable condition is not a result of the contractor's improper construction operation in the determination of the engineer.

Payment for drainfill is made at the contract unit price for each type of drainfill, complete in place. Except as otherwise specified in section 9 of this specification, such payment will constitute full compensation for all labor, equipment, material, and all other items necessary and incidental to the performance of the work.

Compensation for any item of work described in the contract, but not included in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 9 of this specification.

## 9. Items of work and construction details

Items of work to be performed in conformance with this specification and construction details are:

### b. Drainfill, Coarse Type

- (1) This item consists of providing and installing the coarse aggregate used as an outlet to the drain, as shown on the drawings.
- (2) The material shall be graded as follows:

| <u>U.S. Sieve Designation</u> | <u>Percent Passing Sieve</u> |
|-------------------------------|------------------------------|
| 1 1/2" (37.5 mm)              | 100                          |
| 1" (25 mm)                    | 95-100                       |
| 1/2" (12.5 mm)                | 25-800                       |
| #4 (4.75 mm)                  | 0 to 20                      |
| #8 (2.36 mm)                  | 0 to 5                       |

- (3) Crushed limestone aggregate shall meet the gradation requirements of Material Specification 521, section 2.
- (4) Compaction shall be Class III.
- (5) Payment will constitute full compensation for the following related Subsidiary Items: Excavation, Drainage System; Earthfill, Backfill of Drainage System Excavation; and Contractor Quality Control.

### b. Drainfill, Fine Type

- (1) This item shall consist of providing and installing the fine aggregate used in the foundation trench drain, drainage diaphragm, and diaphragm outlet as shown on the drawings.
- (2) The material shall be graded as follows:

| <u>U.S. Sieve Designation</u> | <u>Percent Passing Sieve</u> |
|-------------------------------|------------------------------|
| 3/8                           | 100                          |
| No. 4                         | 95-100                       |
| No. 8                         | 80-100                       |
| No. 16                        | 50-85                        |
| No. 30                        | 25-60                        |
| No. 50                        | 5-30                         |
| No. 100                       | 0-10                         |

- (3) Compaction shall be Class III except for the drainfill in the drainage diaphragm which shall be Class II

- (4) An approved equivalent method of compacting drainfill for Class II compaction shall be:
  - (a) Each layer of drainfill shall be saturated prior to compaction. Water used shall be clean from injurious amounts of sediment, organic matter or other deleterious substances.
  - (b) Each layer shall be compacted by 2 passes of a hand directed vibratory compactor over the entire layer surface.
  - (c) Compaction shall be accomplished while the drainfill is wet from step (a) above.
  - (d) Layer thickness shall not exceed 12 inches after compaction.
- (5) Payment will constitute full compensation for the following related Subsidiary Items: Excavation, Drainage System; Earthfill, Backfill of Drain Excavation; Drainfill, Backfill of Overexcavated Drain Trench; and Contractor Quality Control.

c. Subsidiary Item, Drainfill, Backfill of Overexcavated Drain Trench

- (1) This item shall consist of the backfilling of any excavation for the foundation drainage system below the top of the drain which extends beyond the neat lines of the drain as shown on the drawings. This includes overexcavation of the drain trench and sloughing of material from the sides of the trench.
- (2) Backfill material shall be fine drainfill as defined for Drainfill, Fine Type (paragraph b., above). Backfilling with compacted earthfill will not be permitted.
- (3) Placement and compaction of backfill material shall be as defined for Drainfill, Fine Type.
- (4) No separate payment will be made for Drainfill, Backfill of Overexcavated Drain Trench. Compensation for this item will be included in the payment for the following Bid Item: Drainfill, Fine Type.

# **CONSTRUCTION SPECIFICATION**

## **SD-10 SALVAGING AND SPREADING TOPSOIL**

### **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 Natural Resources Conservation Service 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.

**CONSTRUCTION SPECIFICATION**  
**SD-12B CONCRETE FOR MINOR STRUCTURES**  
**(GENERALLY FOR STRUCTURES <10 CU. YD.)**

**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 3,000 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 the Natural Resources Conservation Service 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 false work 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 one and one-half 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.

# CONSTRUCTION SPECIFICATION

## SD-13 STEEL REINFORCEMENT

### 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 Natural Resources Conservation Service (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.

**CONSTRUCTION SPECIFICATION**  
**SD-19 PVC DRAIN FOR SEDIMENT BASIN (CNMS)**

**1. Scope**

The work shall consist of furnishing and installing polyvinyl chloride (PVC) plastic pipe, fittings, and appurtenances as shown on the drawings. This specification covers sediment basin drains. It is not applicable to water supply, sewer, or drain lines.

**2. Material**

**Pipe** shall have a minimum 160 pounds per square inch (PSI) pressure rating, shall meet ASTM D1785 or D2241, and shall be defect free. Pipe compound shall meet ASTM D1784, Class 12454-B.

**Fittings and appurtenances** shall be made of the same material as the pipe and be designed for use with the pipe at a minimum pressure rating of 160 PSI, except as otherwise specified.

**Solvent cement for pipe joints** shall meet ASTM D2564.

**Rubber gasket joints** shall conform to ASTM D3139.

**3. Trench Construction**

The trench bottom must provide uniform support for the pipe at specified lines and grades. Clods, rocks, and other hard objects that may contact the pipe must be removed. Where rocks and other hard objects cannot be completely removed, the trench bottom must be undercut four inches minimum and backfilled to grade with compacted fine-grained soil.

**4. Pipe Placement**

Pipe must be installed to specified lines and grades without blocking, distortion or damage. The pipe must be uniformly supported on firm stable soil (or other specified bedding) over its entire length.

**5. Backfill**

All backfill recommendations of the pipe manufacturer shall be met. Vehicles or construction equipment shall not cross the pipe until earth cover over the pipe exceeds two feet.

**Initial backfill** to six inches above top of pipe is required. Except as otherwise specified, earth haunching and initial backfill shall consist of soil that is free of rocks, hard clods, or other objects more than one inch in diameter. Earth fill shall be worked and compacted under the haunches of the pipe to provide continuous support in layers not more than six inches thick. Care shall be taken to insure the pipe is not deformed, damaged, or displaced.

**Final backfill** shall consist of remaining backfill from top of initial backfill to ground surface, including mounding for settlement. Final backfill shall be free of debris, rocks, or other objects three inches nominal diameter or larger. Final backfill shall be placed in approximately uniform, void free, compacted layers.

**6. Protection from Ultraviolet Light**

Portions of pipe that will be permanently exposed to sunlight must be primed with PVC solvent and painted with two coats of high quality exterior latex paint.

**7. Measurement and Payment**

The quantity of each pipe item will be measured to the nearest foot by measurement of laid length along invert centerline. Payment for each pipe item will be made at the contract unit price. Such payment will constitute full compensation for furnishing, transporting, and installing the pipe complete in place.

# CONSTRUCTION SPECIFICATION

## SD-16 WOOD FABRICATION AND INSTALLATION

### 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 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.

## Instructions for Completing the Seeding Specification (SD-28 Seeding)

The seeding specification follows the Critical Area Planting (342) Standard. If the seeding is completed according to this specification it will meet all the requirements of the Critical Area Planting Standard.

### ITEMS

#### 2. General

Three times periods are allowed for the permanent seeding:

**Early Spring:** Early spring prior to 5/15 – Cool-season species only

**Late Summer:** Late summer 8/1 to 9/1 – Cool-season species with a cover crop

**Dormant:** Dormant season seeding 11/1 to spring thaw; cool season species with mulch.

Permanent seeding must be done as soon as possible during the first allowable seeding time period after construction. These seeding dates must be followed unless a variance is given.

Consider the previous two years of herbicide application. Any potential carryover problems should be addressed by delaying construction and seeding, establishing a cover crop, and/or changing species to be planted.

A warm season species may be planted that follows the installation guidelines of the Critical Area Planting Standard. Warm-season species may not be used for practices if velocities exceed 2.5 feet per second (fps).

#### 3. Fertilizer

Fertilizer is optional. The designer may specify fertilization. Do not use manure on areas that will drain directly into a water body or stream. On medium-textured soils the addition of 5 to 10 pounds of zinc per acre may speed up growth.

#### 4. Permanent Seeding

The permanent seeding rates are double the normal full seeding rates as found in Range Technical Note Number 4. Reed canarygrass may be seeded on wet sites. Smooth brome grass is not recommended for designs where the adjacent vegetation is predominantly native, as smooth brome grass is highly invasive.

#### 5. Cover Crops

Cover crops are required for all practices constructed after the early spring seeding period and before September 15 (those designed to be seeded between August 1 to September 1). Cover crops are not recommended to be seeded between September 15 and November 1 since it is likely that most of the seeds will remain in the soil and compete with the planned seeded species.

#### 6. Companion Crops

Companion crops will only be used only for warm-season species seeded in the late spring period (5/15 to 6/15) and with design velocities not more than 2.5 fps. Companion crops are required in this situation when planting into a bare seedbed and the design velocity is less than 2.5 fps. Companion crops shall be seeded at the same time as the permanent seeding.

#### 9. Mulching

Mulching is encouraged but not required for all construction and seeding dates. Mulching is required for all waterways constructed between September 15 and the spring thaw and when seeding into a bare seeded bed during the early spring period and the design velocity is greater than 2.5 fps.

# CONSTRUCTION SPECIFICATION SD-28 SEEDING

## 1. Scope

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

## 2. General

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

**Early Spring prior to 5/15 or**

**Late Summer 8/1 to 9/1 or**

**Dormant 11/1 to Spring Thaw**

Permanent seeding must be completed as soon as possible during the first allowable seeding time period after construction. If construction ends between 5/15 and 9/15, a cover crop shall be planted immediately after construction.

## 3. Fertilizer

Fertilizer is ☐ Required ☒ Not Required

If fertilizer is used it shall be supplied and applied as follows: Apply fertilizer based on the recommendations from a soil test or apply 30 to 40 pounds of actual N and 40 to 60 pounds of P<sub>2</sub>O<sub>5</sub> per acre. Ten to 15 tons of manure per acre may be used in lieu of the commercial fertilizer and will also increase organic matter. Five to 10 pounds of zinc per acre may be added to speed up growth on medium-textured soils. Thoroughly mix all fertilizer and/or manure into the upper three to five inches of the soil during final seedbed preparation.

## 4. Permanent Seeding

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.

|                                     | Grass                             | Seeding Rate<br>(PLS/Acre) |           |
|-------------------------------------|-----------------------------------|----------------------------|-----------|
|                                     |                                   | Drilled                    | Broadcast |
| <input checked="" type="checkbox"/> | Smooth Brome <sup>1</sup>         | 16                         | 20        |
| <input type="checkbox"/>            | Western Wheatgrass                | 10                         | 12        |
| <input type="checkbox"/>            | Intermediate Wheatgrass           | 10                         | 12        |
| <input type="checkbox"/>            | Slender Wheatgrass                | 3                          | 3         |
| <input type="checkbox"/>            | Western Wheatgrass                | 20                         | 25        |
| <input type="checkbox"/>            | Reed Canarygrass                  | 5                          | 7         |
| <input type="checkbox"/>            | Other, See Attached Seeding Sheet |                            |           |

<sup>1</sup> Smooth brome<sup>1</sup> is not recommended where the adjacent vegetation is predominantly native, as smooth brome<sup>1</sup> is highly invasive

5. **Cover Crops**

If permanent seeding is not completed during the early spring period, a cover crop meeting the following rates and dates will be planted immediately after construction.

| Cover Crop | Seeding rate<br>(lbs./acre) | Spring Dates   | Fall Dates |
|------------|-----------------------------|----------------|------------|
| Millet     | 10-15                       | May 15-Aug. 15 | None       |

The cover crop will be clipped to 8-10 inches in height or chemically killed during the boot stage to prevent seed formation. Remove or spread excess residues that would interfere with drilling the perennial species.

6. **Companion Crops**

Companion Crops are ☐ Required ☒ Not Required  
to be seeded during the permanent seeding period. The companion crops shall be seeded as follows:

| Crop | Seeding rate<br>(lbs./acre) |
|------|-----------------------------|
| None |                             |

The companion crop should be clipped and removed or mowed before it becomes competitive with the perennial species or sets seed.

7. **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. The seedbed will be worked to a depth of three to five inches. Drag or pack to break up large clods and firm the seedbed. Prior to seeding, required fertilizer shall be applied and mixed with the soil surface to a depth of three inches. The seedbed should be firm enough so that the boot heel of an average adult penetrates the soil to a depth of approximately one-half inch. The contractor shall suspend operations when the soil is too wet.

8. **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. Optimum seeding depths are  $\frac{1}{4}$  to  $\frac{3}{4}$  inch.

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.).

9. **Mulching**

Mulching is ☒ Required ☐ Not Required

Except as otherwise specified, required mulching must be performed as soon as possible after seeding. Mulch shall be applied uniformly as follows. Straw will be applied uniformly at a rate of 3,000 pounds minimum to 4,000 pounds maximum per acre. The straw will be anchored using an anchoring tool (or a farm disk set straight with adequate weight) that has serrated straight disk blades spaced 6-10" apart that punches mulch into the ground with a depth of approximately 2 inches. All anchoring should be at right angles to the slope.

If late summer or dormant seeding dates are used, seed just prior to mulching.

# GEOTEXTILE (SD-592)

## MATERIAL SPECIFICATION

### 1. Scope

This specification covers the quality of geotextile.

### 2. General Requirements

Geotextiles shall be a minimum of 85 percent by weight polypropylenes, polyesters, polyamides, polyethylene, polyolefins, or polyvinylidenechlorides. They shall be formed into a stable network of filaments or yarns retaining dimensional stability relative to each other. The geotextile shall be defect free and conform to Table 1 or 2 requirements as applicable to the material specified. The geotextile shall be free of chemical treatments or coatings that reduce its porosity. Geotextiles shall have enhanced resistance to ultraviolet light.

Thread used for sewing shall be high strength polypropylene, polyester, or polyamide, and shall be at least as resistant to ultraviolet light as the geotextile.

### 3. Classification

**Woven** - Fabrics formed by interweaving monofilament yarn, creating distinct and measurable openings. The edges of woven fabric shall be selvaged or otherwise finished to prevent the outer yarn from unraveling.

**Nonwoven** - Fabrics formed by random placement of threads in a mat and bonded by needle punching.

### 4. Shipping and Storage

Geotextile shall be shipped in rolls wrapped with a cover. Each roll shall be labeled to clearly identify the brand, class, and production run following ASTM D4873.

**Table 1. Requirements for Woven Geotextile**

| Property                                      | Test Method                | Class I                                        | Class II&III                     | Class IV                        |
|-----------------------------------------------|----------------------------|------------------------------------------------|----------------------------------|---------------------------------|
| Tensile strength, lb. <sup>1/</sup>           | ASTM D4632                 | 200 min.                                       | 120 min.                         | 180 min.                        |
| Elongation at failure, % <sup>1/</sup>        | ASTM D4632                 | <50                                            | <50                              | <50                             |
| Puncture, lb. <sup>1/</sup>                   | ASTM D4833                 | 90 min.                                        | 60 min.                          | 60 min.                         |
| Ultraviolet light,                            | ASTM D4355                 | 70 min.                                        | 70 min.                          | 70 min.                         |
| % residual tensile strength                   | 150-hr. exposure           |                                                |                                  |                                 |
| Apparent opening size (AOS)                   | ASTM D4751                 | As specified, but >.212mm (#70 <sup>2/</sup> ) | As specified, but >.212 mm (#70) | As specified, but >.212mm (#70) |
| Percent open area (%)                         | CWO-02215-86 <sup>3/</sup> | 4.0 min.                                       | 4.0 min                          | 1.0 min.                        |
| Permeability, permittivity Sec. <sup>-1</sup> | ASTM D4491                 | 0.10 min.                                      | 0.10 min.                        | 0.10 min.                       |

**Table 2. Requirements for Needle-Punched Nonwoven Geotextile**

| Property                                    | Test Method      | Class I                             | Class II                            | Class III                           | Class IV                            |
|---------------------------------------------|------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Tensile Strength, lb. <sup>1/</sup>         | ASTM D4632       | 180 min.                            | 120 min.                            | 90 min.                             | 115 min.                            |
| Elongation at failure, % <sup>1/</sup>      | ASTM D4632       | ≥ 50                                | ≥ 50                                | ≥ 50                                | ≥ 50                                |
| Puncture, lb.                               | ASTM D4833       | 80 min.                             | 60 min.                             | 40 min.                             | 40 min.                             |
| Ultraviolet light,                          | ASTM D4355       | 70 min.                             | 70 min.                             | 70 min.                             | 70 min.                             |
| % residual tensile strength                 | 150-hr. exposure |                                     |                                     |                                     |                                     |
| Apparent Opening Size (AOS)                 | ASTM D4751       | As specified max. #40 <sup>2/</sup> | As specified max. #40 <sup>2/</sup> | As specified max. #40 <sup>2/</sup> | As specified max. #40 <sup>2/</sup> |
| Permeability permittivity sec <sup>-1</sup> | ASTM D4491       | 0.70 min.                           | 0.70 min.                           | 0.70 min.                           | 0.70 min.                           |

<sup>1/</sup> Minimum average roll value (weakest principal direction).

<sup>2/</sup> US standard sieve size.

<sup>3/</sup> CWO is a US Army Corps of Engineers reference.

## TABLE OF QUANTITIES

| ITEM                                       | UNIT    | QUANTITY | "AS BUILT" QUANTITY |
|--------------------------------------------|---------|----------|---------------------|
| Excavation                                 |         |          |                     |
| Core Trench                                | Cu. Yd. | 1,311    |                     |
| Spillway                                   | Cu. Yd. | 6,007    |                     |
| Earthfill Class S                          | Cu. Yd. | 10,507   |                     |
| Topsoil                                    | Sq. Yd. | 3,087    |                     |
| Seeding                                    | Acre    | 1.5      |                     |
| 30" dia. X 4' deep concrete drop structure | Each    | 1        |                     |
| 12" dia. PVC SDR 21min.                    | LF.     | 107      |                     |
| Rock Riprap                                | Cu. Yd. | 9        |                     |
| Geotextile Cloth                           | Sq. Yd. | 24       |                     |
| Fine Drainfill (compacted cu. yds.)        | Cu. Yd. | 7        |                     |
| Trash Rack                                 | Each    | 1        |                     |
| Pipe Outlet Structure                      | Each    | 1        |                     |

RECEIVED

## Construction Specifications

APR - 9 2009

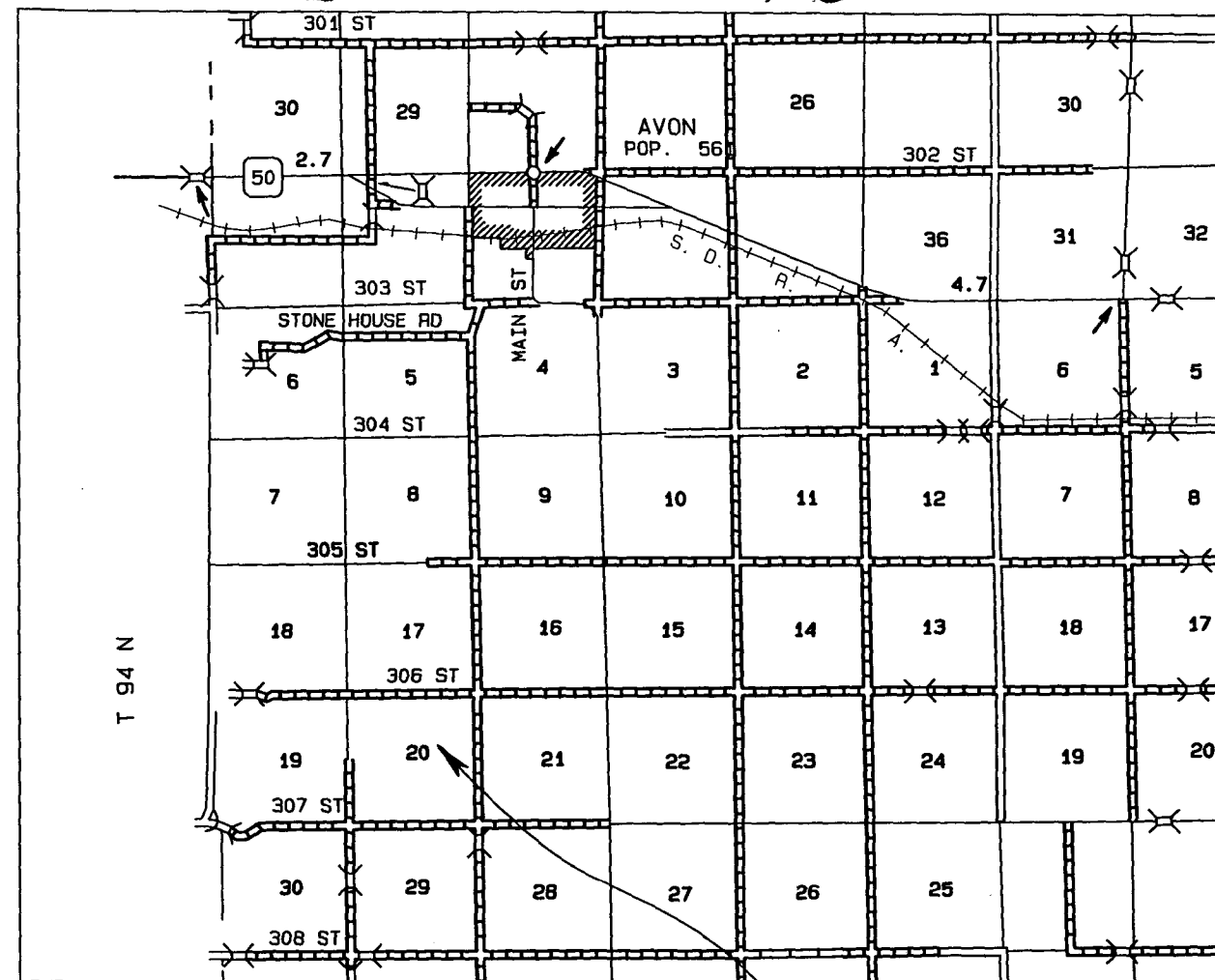
Clearing and Grubbing  
 Stripping  
 Excavation  
 Earth Fill, Class S  
 Rock Riprap  
 Drainfill  
 Salvaging and Spreading Topsoil  
 Concrete for Minor Structures  
 Steel Reinforcement  
 PVC Pipe  
 Wood Fabrication and Installation  
 Seeding  
 Geotextile Material Spec

WATER RIGHTS PROGRAM

SD-2  
 SD-4  
 SD-5  
 SD-7  
 SD-61C  
 SD-24A  
 SD-10  
 SD-12B  
 SD-13  
 SD-19  
 SD-16  
 SD-28  
 SD-592

## Hydraulic Data

|                                            |            |
|--------------------------------------------|------------|
| Drainage Area                              | 655 Acres  |
| Time of Concentration                      | 1.80 Hours |
| Runoff Curve Number                        | 72         |
| Principal Spillway, 2 yr, 24-hr. Rainfall  | 2.6 Inches |
| Emergency Spillway, 25 yr, 24-hr. Rainfall | 4.6 Inches |
| Principal Spillway Discharge at ES         | 13.0 CFS   |
| Emergency Spillway Discharge               | 308.5 CFS  |
| Estimated 20 year Sediment Yield           | 4.2 AcFt   |
| Estimated Sediment Yield Below Crest       | 3.36 AcFt  |
| Estimated Sediment Yield Above Crest       | 0.84 AcFt  |
| Crest of Normal Pool                       | 4.29 Acres |
| Crest of Emergency Spillway                | 6.53 Acres |
| Top of Dam                                 | 8.89 Acres |
|                                            | 27.0 AcFt  |
|                                            | 45.6 AcFt  |
|                                            | 69.4 AcFt  |



Hazard Class A  
 Job Class IV

R 61 W

Project Location

## Contact Information

Jon Williams  
 40451 S. Stone House Road  
 Avon, SD 57315  
 (605)-286-3734

## Sheet Index

- 1 Cover
- 2 Plan
- 3 General Layout
- 4 Cross Section of Dam
- 5 Profile of Dam
- 6 Concrete Riser
- 7 Drainage Diaphragm
- 8 Trash Rack
- 9 Timber Pipe Support

## PLAN NOTES:

1. A Preconstruction meeting is required before construction between NRCS, the Landowner, and the contractor.
2. Safety of Dams Review and Water Rights Permit are required by South Dakota Department of Environment and Natural Resources. This is the responsibility of the landowner.

According to State Law, no excavator may begin any excavation without first notifying the One-Call Notification Center of the proposed excavation. 1-800-781-7474

| REVISIONS |          |       |
|-----------|----------|-------|
| DATE      | APPROVED | TITLE |
|           |          |       |
|           |          |       |

Date 3/13/2009  
 Designed J. Weidemann  
 Drawn J. Weidemann  
 Checked JRS  
 Approved J. Edwards

PRODUCER Jon Williams  
 NE 1/4 SECT. 20 T. 94 North R. 61 West  
 Bon Homme COUNTY  
 CONSERVATION DISTRICT

USDA - NRCS  
 FIELD SUPPORT OFFICE  
 1717 N. LINCOLN AVE. SUITE 104  
 PIERRE, SOUTH DAKOTA 57501

**NRCS**  
 Natural Resources Conservation Service  
 United States Department of Agriculture

File Name  
 Jon\_Williams\_PondR

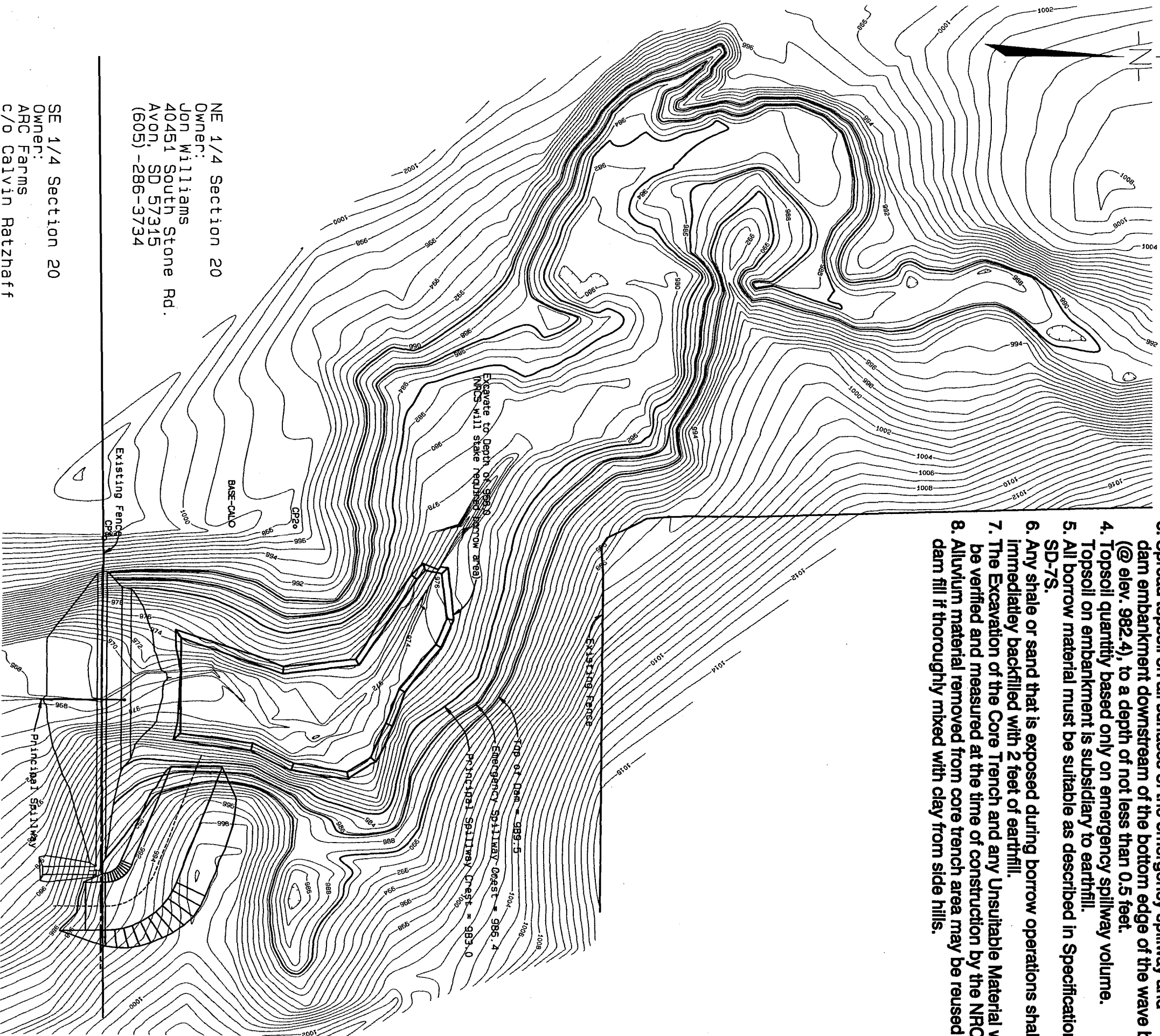
Drawing No.

3/13/2009 3:27PM

Sheet 1 of 9

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 dam embankment downstream of the bottom edge of the wave berm (@ elev. 982.4), to a depth of not less than 0.5 feet.
4. Topsoil quantity based only on emergency spillway volume.
5. 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 earthfill.
7. The Excavation of the Core Trench and any Unsuitable Material will be verified and measured at the time of construction by the NRCS.
8. Alluvium material removed from core trench area may be reused for dam fill if thoroughly mixed with clay from side hills.



NE 1/4 Section 20  
Owner:  
Jon Williams  
40451 South Stone Rd.  
Avon, SD 57315  
(605) -286-3734

SE 1/4 Section 20  
Owner:  
ARC Farms  
c/o Calvin Ratzhaff  
40596 307th St.  
Avon, SD 57315  
(605) -286-3892

\* Property easement between landowners signed March 9, 2009

Scale: 1" = 130'

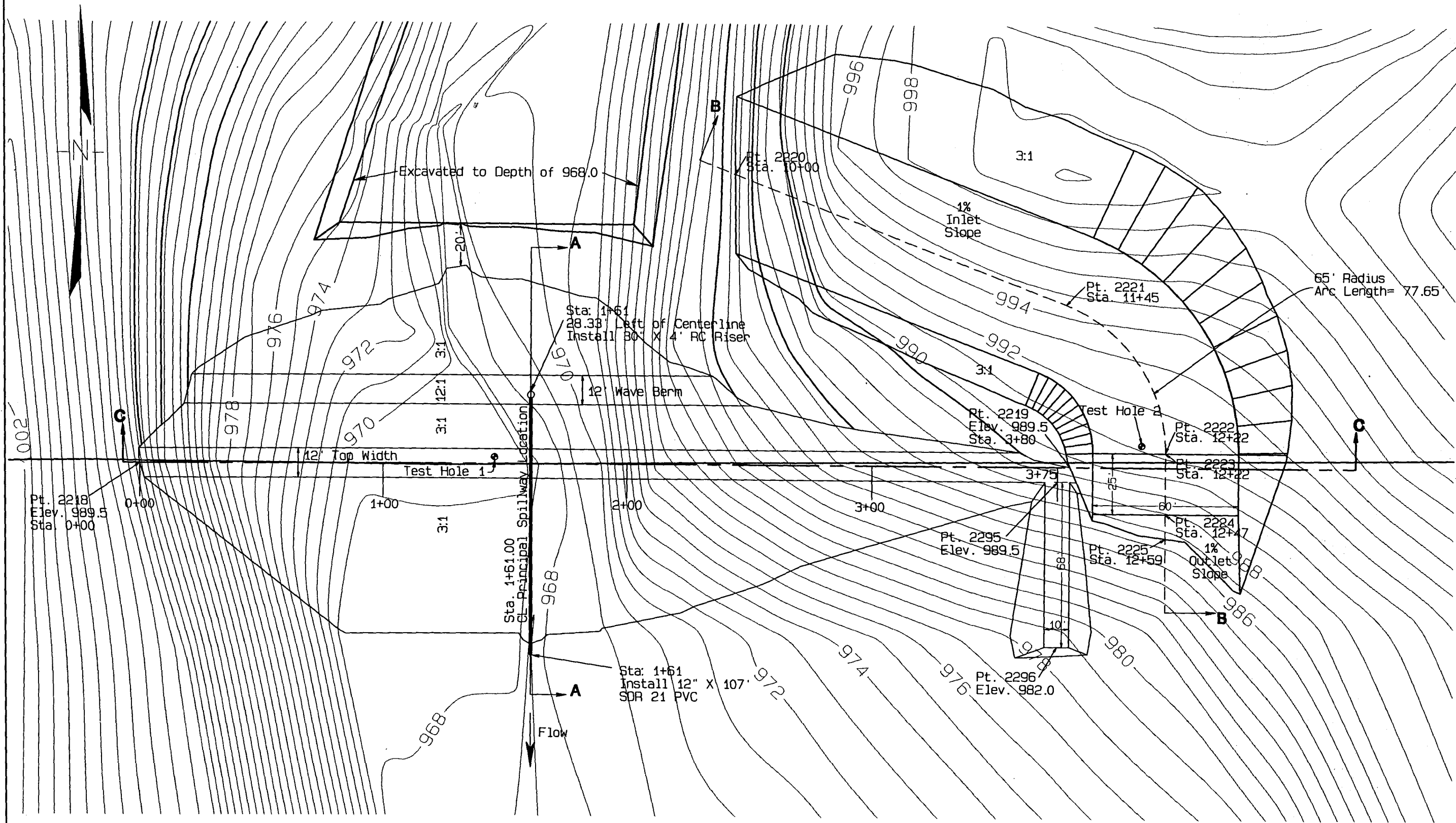
| REVISIONS |  | DATE | APPROVED | TITLE |
|-----------|--|------|----------|-------|
|           |  |      |          |       |
|           |  |      |          |       |

|              |                  |             |              |           |
|--------------|------------------|-------------|--------------|-----------|
| Sheet 2 of 9 | 3/13/2009 3:29PM | Drawing No. | Jon Williams | 3/13/2009 |
|              |                  | Produced By | Jon Williams |           |
|              |                  | Checked By  | Jon Williams |           |
|              |                  | Approved By | Jon Williams |           |

USDA - NRCS  
FIELD SUPPORT OFFICE  
1717 N. LINCOLN AVE. SUITE 104  
PIERRE, SOUTH DAKOTA 57501

PRODUCER Jon Williams  
NE 1/4 SECT. 20 T. 94 North R. 61 West  
Bon Homme COUNTY  
Bon Homme CONSERVATION DISTRICT

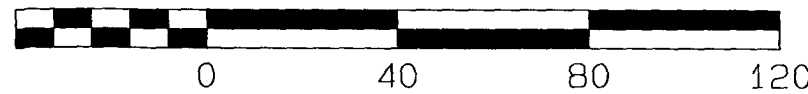
Designed J. Williams 3/13/2009  
Drawn J. Williams 3/13/2009  
Checked J. Williams 3/13/09  
Approved J. Williams 3/13/09



1' Contour Interval

GRAPHIC SCALE

1"=40'



| REVISIONS |          |       |
|-----------|----------|-------|
| DATE      | APPROVED | TITLE |
|           |          |       |
|           |          |       |

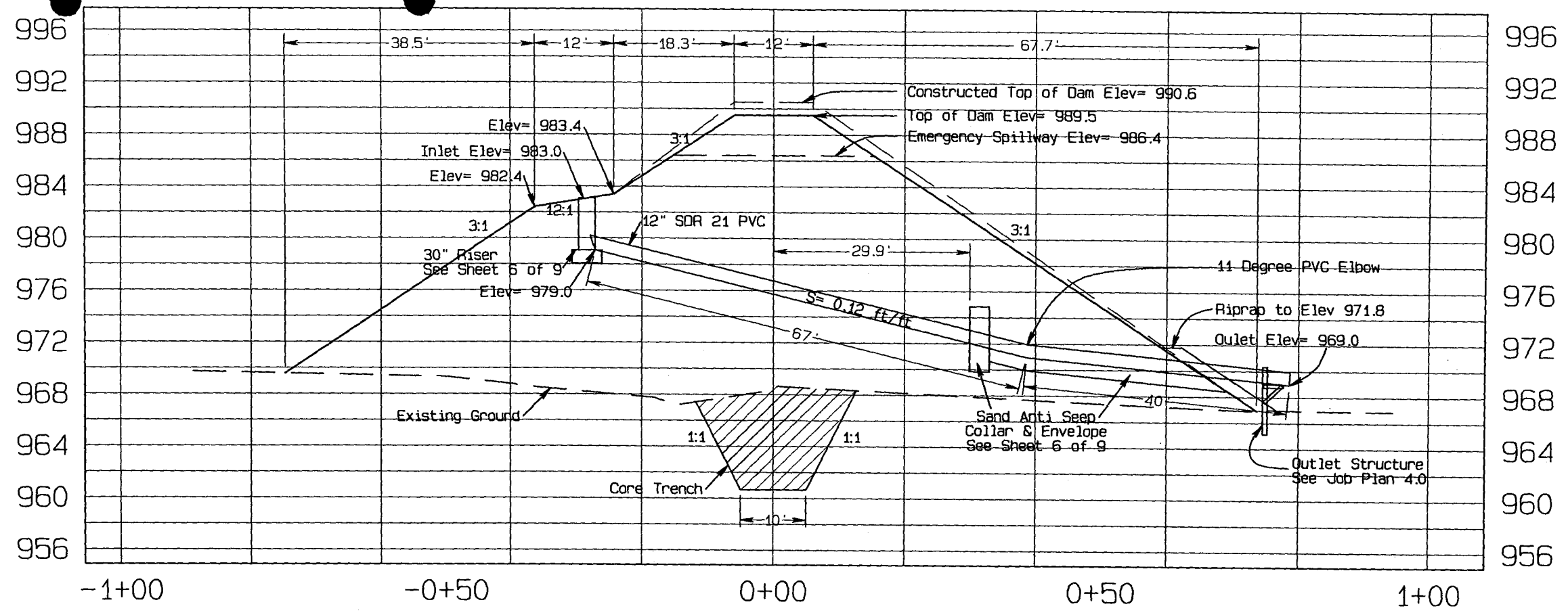
Date  
 Designed J. Weidemann 3/13/2009  
 Drawn J. Weidemann 3/13/2009  
 Checked J. Weidemann 3/13/09  
 Approved J. Weidemann 3/13/09

PRODUCER Jon Williams  
 NE 1/4 SECT. 20, T. 94 North R. 51 West  
 Ben Hamme COUNTY  
 Ben Hamme CONSERVATION DISTRICT

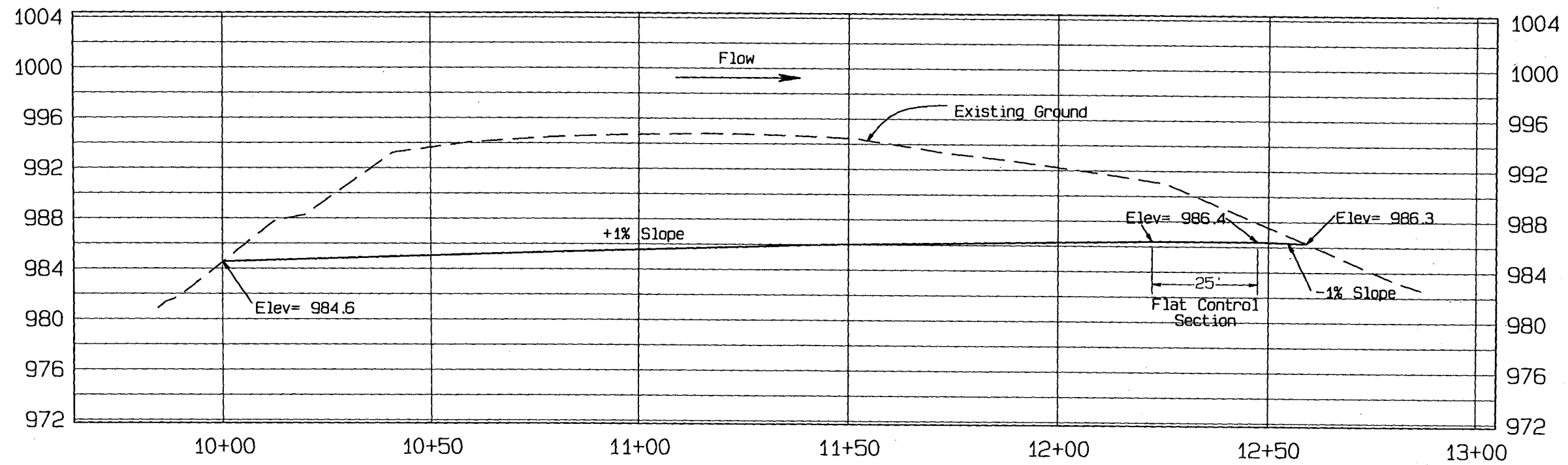
USDA - NRCS  
 FIELD SUPPORT OFFICE  
 1717 N. LINCOLN AVE. SUITE 104  
 PIERRE, SOUTH DAKOTA 57501

**NRCS**  
 Natural Resources Conservation Service  
 United States Department of Agriculture

File Name: Jon\_Williams\_PondR.  
 Drawing No.  
 3/13/2009 3:30PM  
 Sheet 3 of 9



CROSS SECTION OF DAM A-A  
Vertical Scale: 1'=10'; Horizontal Scale: 1"=20'



EMERGENCY SPILLWAY PROFILE SECTION B-B  
Vertical Scale: 1"=10'; Horizontal Scale: 1"=30'

Date  
3/13/2009  
Designed  
J. Weidemann  
Drawn  
J. Weidemann  
Checked  
J. Weidemann  
Approved  
J. Weidemann

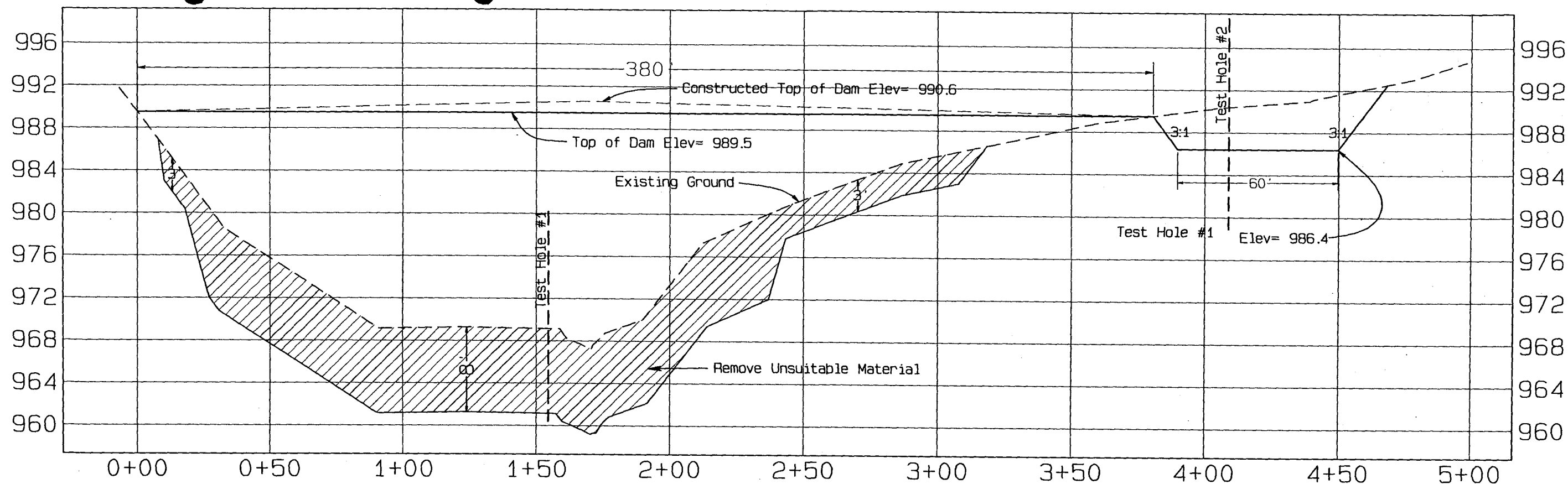
PRODUCER  
Jan Williams  
NE 1/4 SECT. 20, T. 94 North R. 61 West  
Bentham COUNTY  
Bentham CONSERVATION DISTRICT

USDA - NRCS  
FIELD SUPPORT OFFICE  
1717 N. LINCOLN AVE. SUITE 104  
PIERRE, SOUTH DAKOTA 57501

**NRCS**  
Natural Resources Conservation Service  
United States Department of Agriculture

File Name:  
Jan Williams Pond FL  
Drawing No.  
3/13/2009 3:31PM  
Sheet 4 of 9

| REVISIONS |          |       |
|-----------|----------|-------|
| DATE      | APPROVED | TITLE |
|           |          |       |
|           |          |       |



DAM PROFILE C-C  
Vertical Scale: 1"=10'; Horizontal Scale: 1"=50'

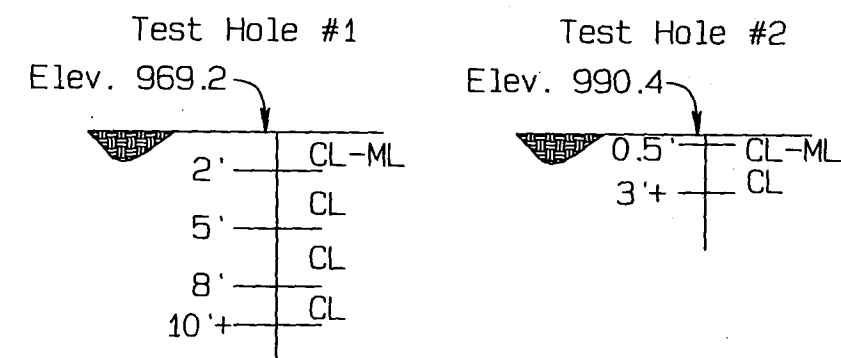
| Control Points |          |          |           |                   |
|----------------|----------|----------|-----------|-------------------|
| Pt. #          | Northing | Easting  | Elevation | Descriptor        |
| 9999           | 10000.00 | 10000.00 | 1000.00   | Base - not marked |
| 6006           | 9840.08  | 10019.30 | 1000.45   | CP 1 - 1/2" rebar |
| 6007           | 10079.93 | 10002.54 | 997.91    | CP 2 - 1/2" rebar |

| Coordinate Table |          |          |           |                  |
|------------------|----------|----------|-----------|------------------|
| Pt. #            | Northing | Easting  | Elevation | Descriptor       |
| 2218             | 9838.03  | 10061.74 | 989.50    | CL Dam Sta. 0+00 |
| 2219             | 9838.03  | 10442.18 | 989.50    | CL Dam Sta. 3+80 |
| 2295             | 9832.02  | 10436.97 | 989.50    | CL Begin Dike    |
| 2296             | 9764.36  | 10436.97 | 982.00    | CL End Dike      |
| 2220             | 9957.31  | 10305.62 | 984.60    | CL Spillway      |
| 2221             | 9904.71  | 10440.10 | 986.00    | CL Spillway      |
| 2222             | 9844.39  | 10481.42 | 986.40    | CL Spillway      |
| 2223             | 9844.02  | 10481.42 | 986.40    | CL Spillway      |
| 2224             | 9819.02  | 10481.42 | 986.40    | CL Spillway      |
| 2225             | 9807.54  | 10481.42 | 986.30    | CL Spillway      |

| Radius Points |          |          |           |            |
|---------------|----------|----------|-----------|------------|
| Pt. #         | Northing | Easting  | Elevation | Descriptor |
| 1842          | 9844.18  | 10416.42 |           | 65' Radius |

## LOG OF TEST HOLES

Vertical Scale: 1"=10'



Note: Test hole 1 showed stratification of sand & gravel at the 5 and 8 foot levels. Therefore this material should be removed from the core trench location.

Date 3/13/2009  
Designed J. Weidemann  
Drawn J. Weidemann  
Checked J. Weidemann  
Approved J. Weidemann

PRODUCER Jon Williams  
NE 1/4 SECT. 20 T. 94 North R. 61 West  
Bentley County  
CONSERVATION DISTRICT

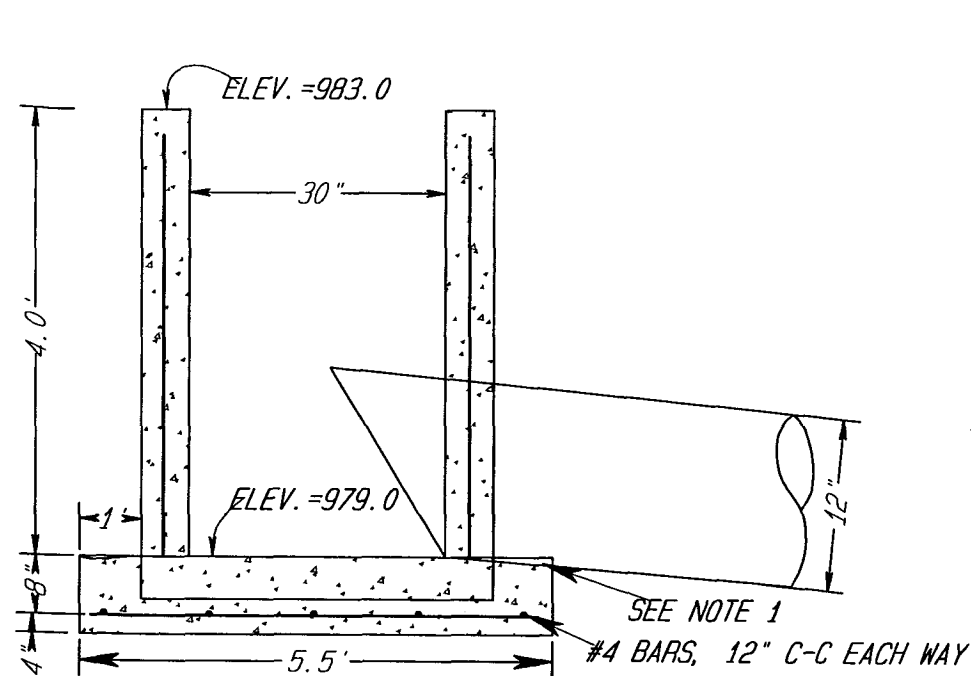
USDA - NRCS  
FIELD SUPPORT OFFICE  
1717 N. LINCOLN AVE. SUITE 104  
PIERRE, SOUTH DAKOTA 57501

**NRCS**  
Natural Resources Conservation Service  
United States Department of Agriculture

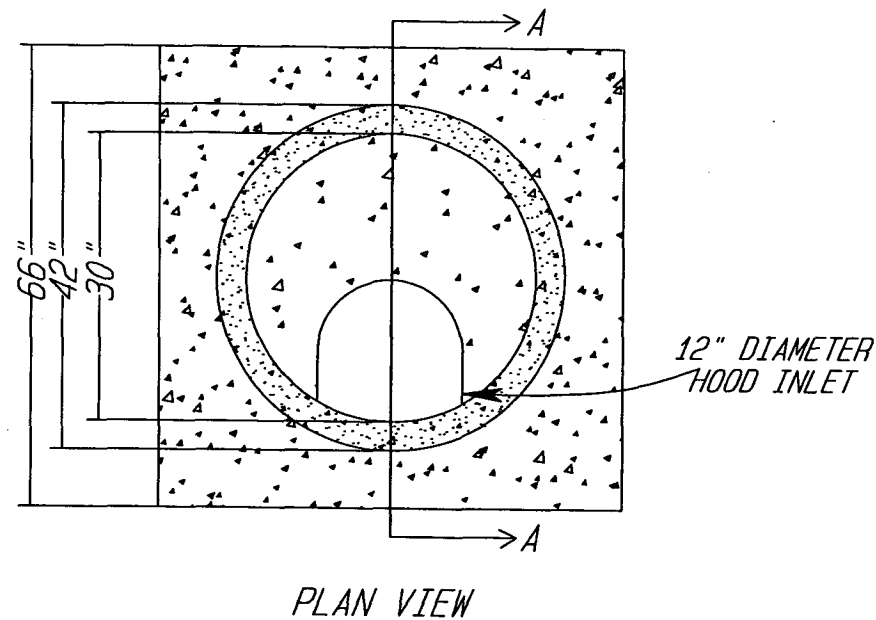
File Name:  
Jon\_Williams\_PondFL

Drawing No.

| REVISIONS        |          |       |
|------------------|----------|-------|
| DATE             | APPROVED | TITLE |
| 3/13/2009 8:24AM |          |       |

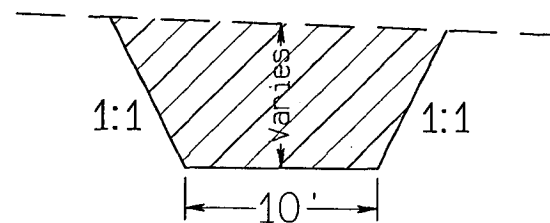


SECTIONAL ELEVATION A-A



PLAN VIEW

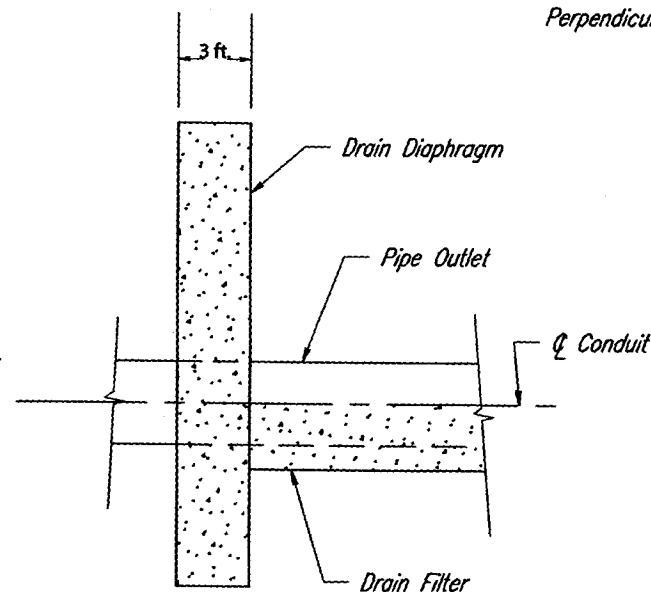
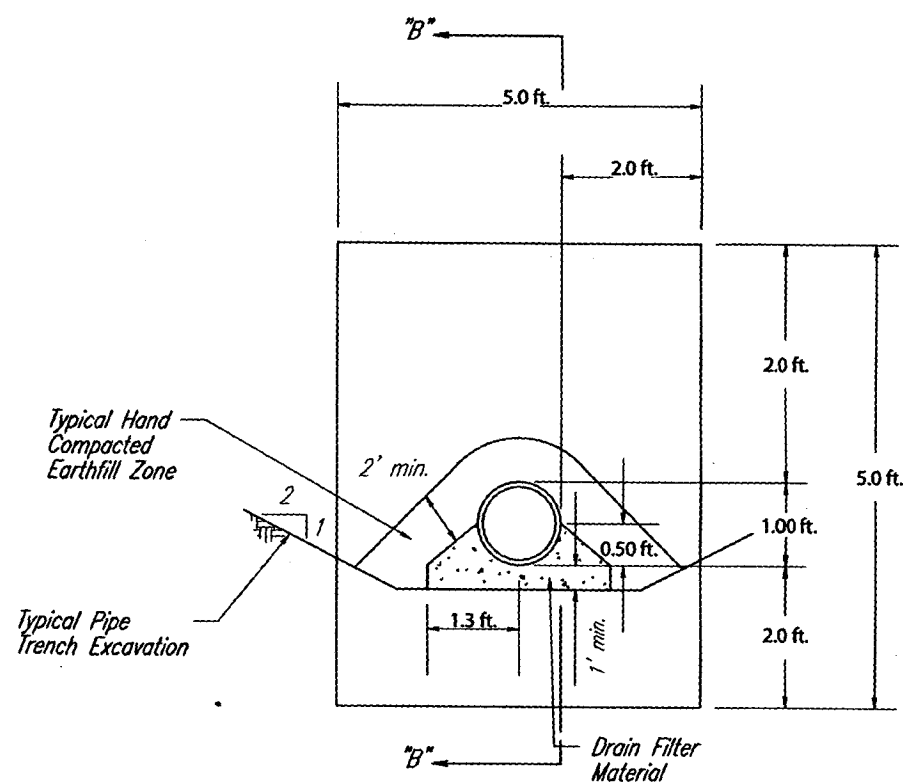
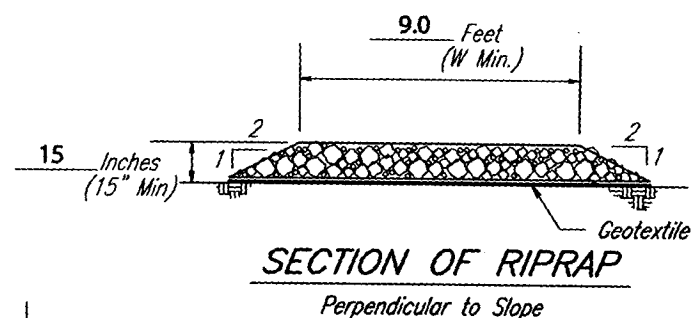
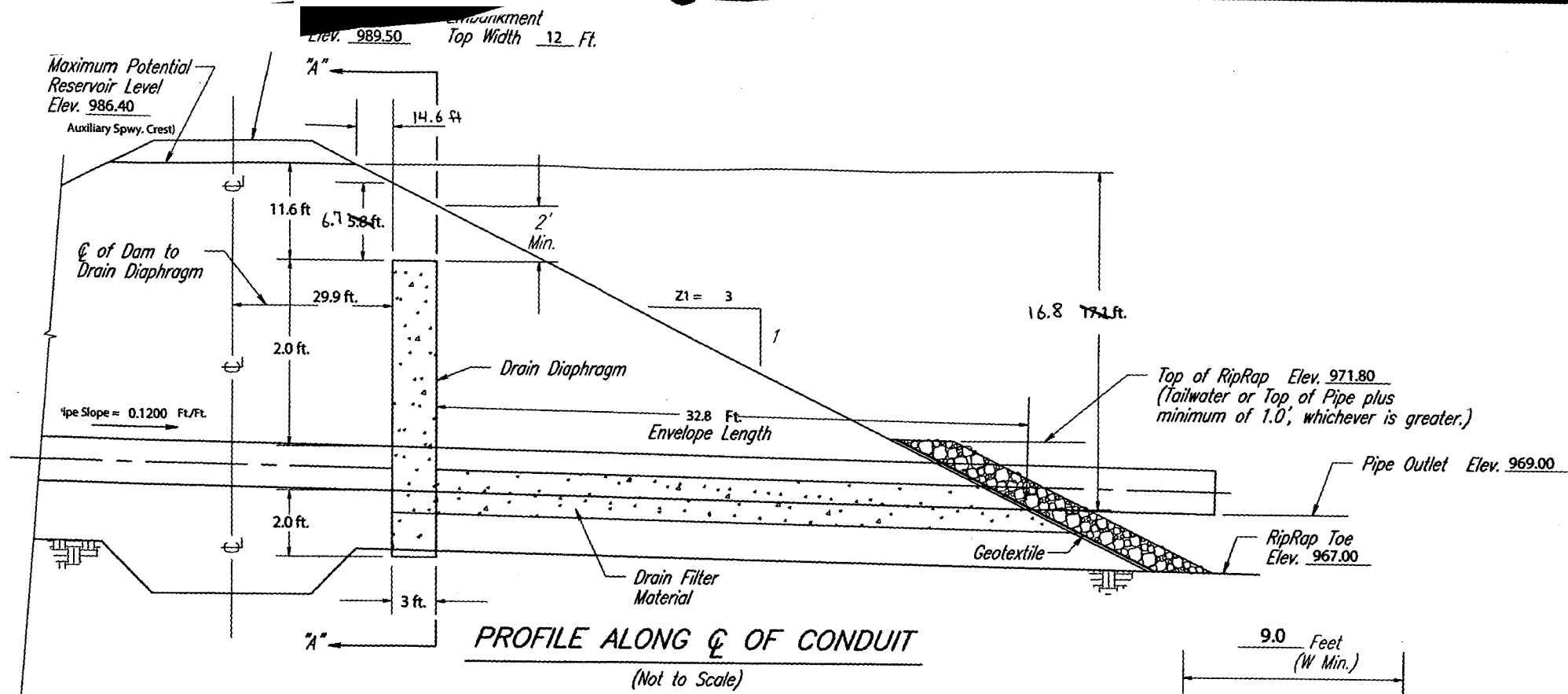
- Note 1) BOTTOM OF PIPE NEEDS TO BE EMBEDDED IN CONCRETE FLOOR TO ACHIEVE DESIGN INVERT ELEVATION SO RISER WILL DRAIN
- Note 2) CONCRETE AROUND PIPE NEEDS TO BE VIBRATED TO INSURE A GOOD SEAL AROUND PIPE.
- Note 3) DROP STRUCTURE TO BE PRECAST REINFORCED CONCRETE.
- Note 4) BASE FOR CONCRETE RISER WILL REQUIRE 1.2 CY CONCRETE.



TYPICAL CORE TRENCH  
Dam Centerline - 1:1 Side Slopes  
(NOT TO SCALE)

| REVISIONS |          |       |
|-----------|----------|-------|
| DATE      | APPROVED | TITLE |
|           |          |       |
|           |          |       |

|                                                                                                                                 |                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NRCS</b><br>Natural Resources Conservation Service<br>United States Department of Agriculture                                | File Name:<br>Jon_Williams_PondRL                                                                                                                               |
|                                                                                                                                 | Drawing No.:<br>3/13/2009 3:33PM                                                                                                                                |
|                                                                                                                                 | Sheet 6 of 9                                                                                                                                                    |
|                                                                                                                                 | USDA - NRCS<br>FIELD SUPPORT OFFICE<br>1717 N. LINCOLN AVE. SUITE 104<br>PIERRE, SOUTH DAKOTA 57501                                                             |
| PRODUCER: <u>Jon Williams</u><br>NE 1/4 SECT. 20, T. 94 North R. 61 West<br>Bon Homme COUNTY<br>Bon Homme CONSERVATION DISTRICT | Date:<br>Designed: <u>J. Weidemann</u> 3/13/2009<br>Drawn: <u>J. Weidemann</u> 3/13/2009<br>Checked: <u>DSF</u> 3/13/09<br>Approved: <u>J. Williams</u> 3/13/09 |



**SUMMARY OF DESIGN AND DIMENSIONS**

DESIGN DATA 16.8

|                    |                               |
|--------------------|-------------------------------|
| H = 11.6 Feet      | Hd = 12.45 Feet               |
| X = 2.0 Feet       | D = 12 Inches                 |
| R = 2.0 Feet       | Y = 2.0 Feet                  |
| C = 14.6 Feet      | Aggregate Gradation # 1       |
| Embankment         |                               |
| Backslope (Z1) = 3 | Pipe Slope (S) 0.1200 Ft./Ft. |

DIMENSIONS

|              |                                   |
|--------------|-----------------------------------|
| W = 5.0 Feet | (Total Width of Drain Diaphragm)  |
| T = 5.0 Feet | (Total Height of Drain Diaphragm) |
| t = 3 Feet   | (Thickness of Single Filter)      |

**ESTIMATED QUANTITIES**

|                       |                   |
|-----------------------|-------------------|
| Drain Filter Material | 6.3 Cubic Yards   |
| Geotextile            | 23.6 Square Yards |
| Rock Riprap           | 8.1 Cubic Yards   |

**DRAIN FILTER MATERIAL GRADATION**

| SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 3/8 in.    | 100             |
| #4         | 95-100          |
| #8         | 80-100          |
| #16        | 50-85           |
| #30        | 25-60           |
| #50        | 2-30            |
| #100       | 0-10            |

ASTM C-#33  
FINE CONCRETE  
AGGREGATE

**ROCK RIPRAP GRADATION**

| PERCENT SMALLER | WEIGHT RANGE (LBS.) | AVERAGE CUBIC DIMENSION |
|-----------------|---------------------|-------------------------|
| 100             | 50 lb.              | 10"                     |
| 50-80           | 30 lb.              | 7"                      |
| 15-50           | 10 lb.              | 5"                      |
| 0-15            | 3 lb.               | 3"                      |

**CONSTRUCTION NOTES**

- 1.) No compaction of the Drain Filter Material extending from the Diaphragm to the D.S. embankment face is required beyond that resulting from the placing and spreading operations.
- 2.) The Drainage Diaphragm and envelope will be installed by placing Drain Filter Material in 15 inch thick lifts prior to compaction. Each lift will be saturated uniformly with approximately 1.2 gallons of water per cubic foot of loose Drain Filter Material prior to compaction. Each lift will be compacted by a minimum of two passes of a hand-directed vibratory compactor over the entire lift surface. No compaction of the drain envelope above the pipe invert is necessary.
- 3.) The maximum height of drop of the Riprap onto the Geotextile in the pipe outlet area shall be 3 feet.

**MATERIAL NOTES**

- 1.) The Geotextile shall conform to the Class I requirements specified in Table 2 for Nonwoven Geotextiles in Material Specification SD-592.

**DRAINAGE DIAPHRAGM DETAILS**

JOB PLAN 3.8 (01/2008)

REVISIONS

| DATE       | APPROVED    | TITLE                       |
|------------|-------------|-----------------------------|
| 01/25/2008 | Jay S. Cole | State Conservation Engineer |

Date 03/13/09  
Designed JRW  
Drawn JRW  
Checked DRE  
Approved J. Edwards

PRODUCER Jon Williams  
SECTION 20 T 94N R 61W  
Bon Homme COUNTY  
Bon Homme CONSERVATION DISTRICT

USDA - NRCS  
State Office Engineering Staff  
200 Fourth Street SW  
Huron, South Dakota 57350

**NRCS**  
Natural Resources Conservation Service  
United States Department of Agriculture

File Name: 01d16m\_Drainage Diaphragm\_RL.dwg  
Drawing No.  
2/11/2008 3:51PM  
Sheet 7 of 9

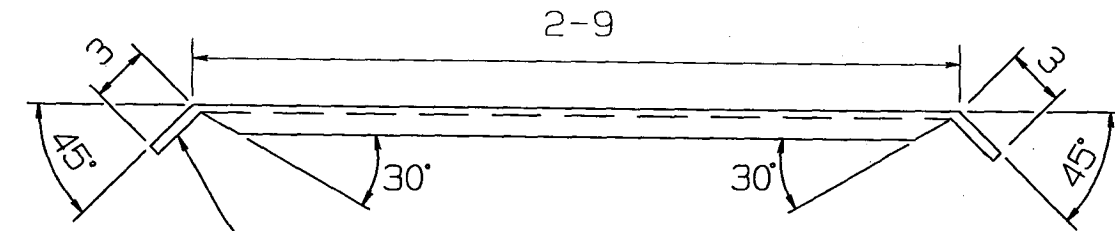
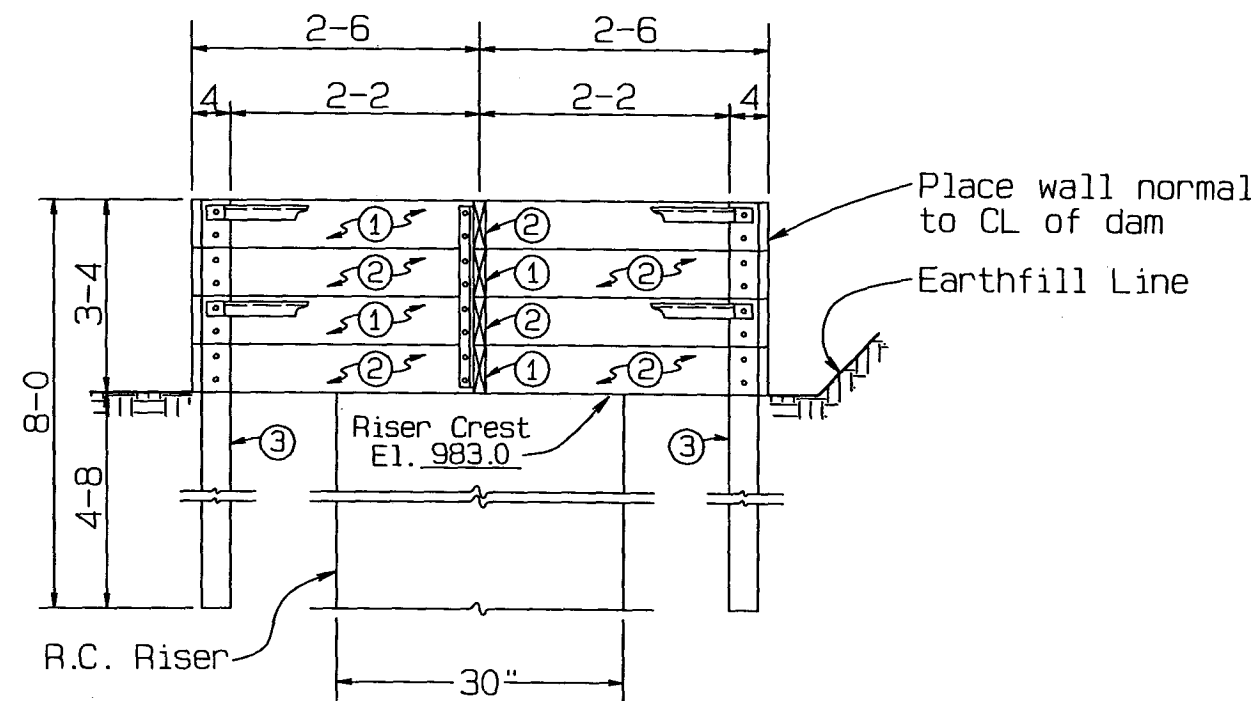
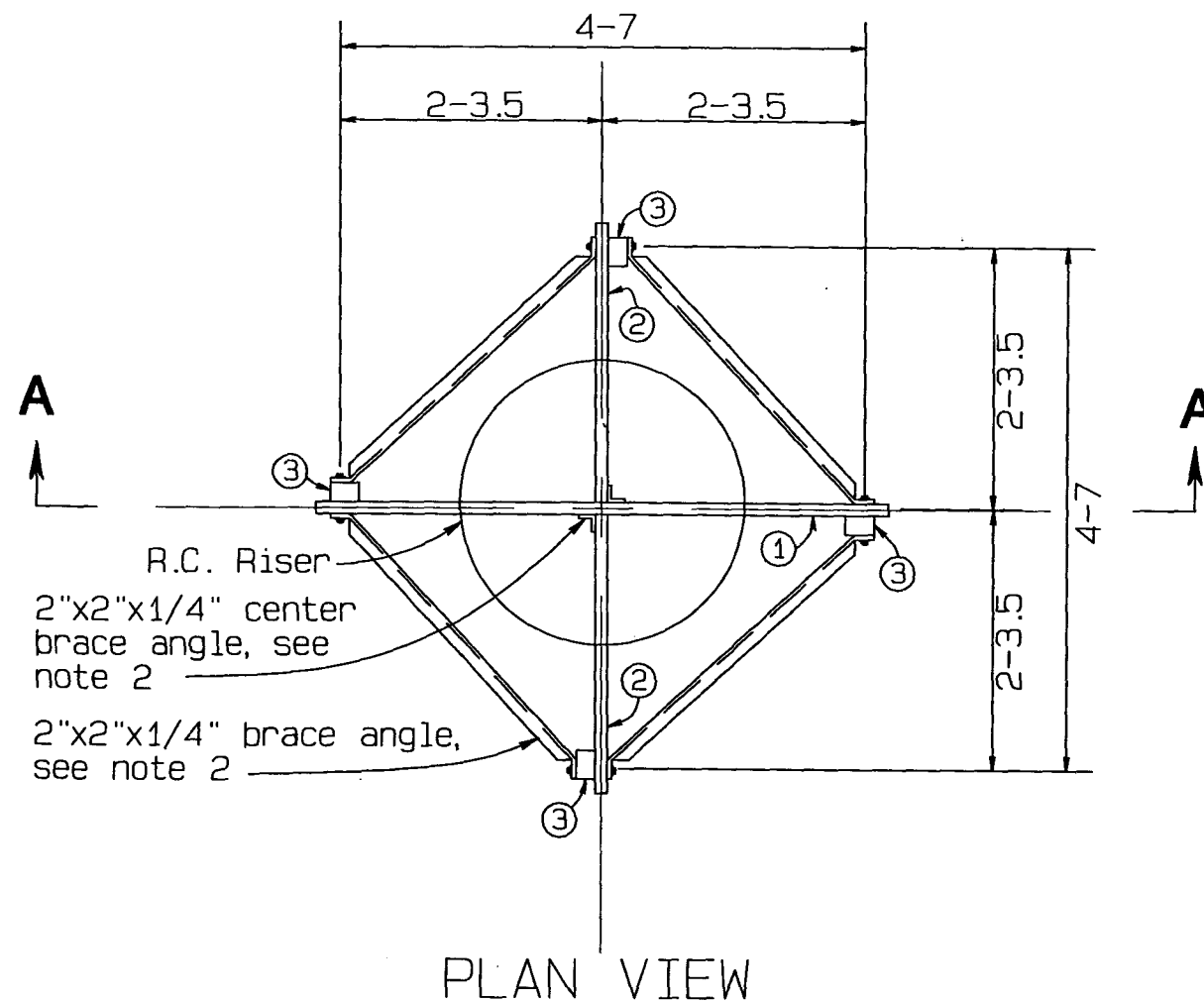


TABLE OF QUANTITIES

| ITEM                                 | MARK | NO. REQ'D. |
|--------------------------------------|------|------------|
| 2"x10"x5' Pressure Treated Lumber    | 1    | 4          |
| 2"x10"x2'-5" Pressure Treated Lumber | 2    | 8          |
| 4"x4"x8' Pressure Treated Post       | 3    | 4          |
| 2"x2"x1/4"x3'-3" Steel Angle         |      | 8          |
| 2"x2"x1/4"x3'-2" Steel Angle         |      | 2          |
| 5/8"x8" Steel Bolts, Nuts, 2 Washers |      | 32         |
| 1/2"x3" Steel Bolts, Nuts, 2 Washers |      | 32         |

NOTES:

- To 4" x 4" 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.
- 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.
- Attach brace angles to top bolt on top 2" x 10" board and to top bolt on next to bottom board.

TRASH RACK AND BAFFLE  
FOR 30" DIA. RISER

Date  
3/13/2009  
Designed  
J. Weidemann  
Drawn  
J. Weidemann  
Checked  
J. Weidemann  
Approved  
J. Weidemann

PRODUCER  
Jon Williams  
NE 1/4 SECT. 20 T. 94 North R. 61 West  
Bon Homme COUNTY  
CONSERVATION DISTRICT

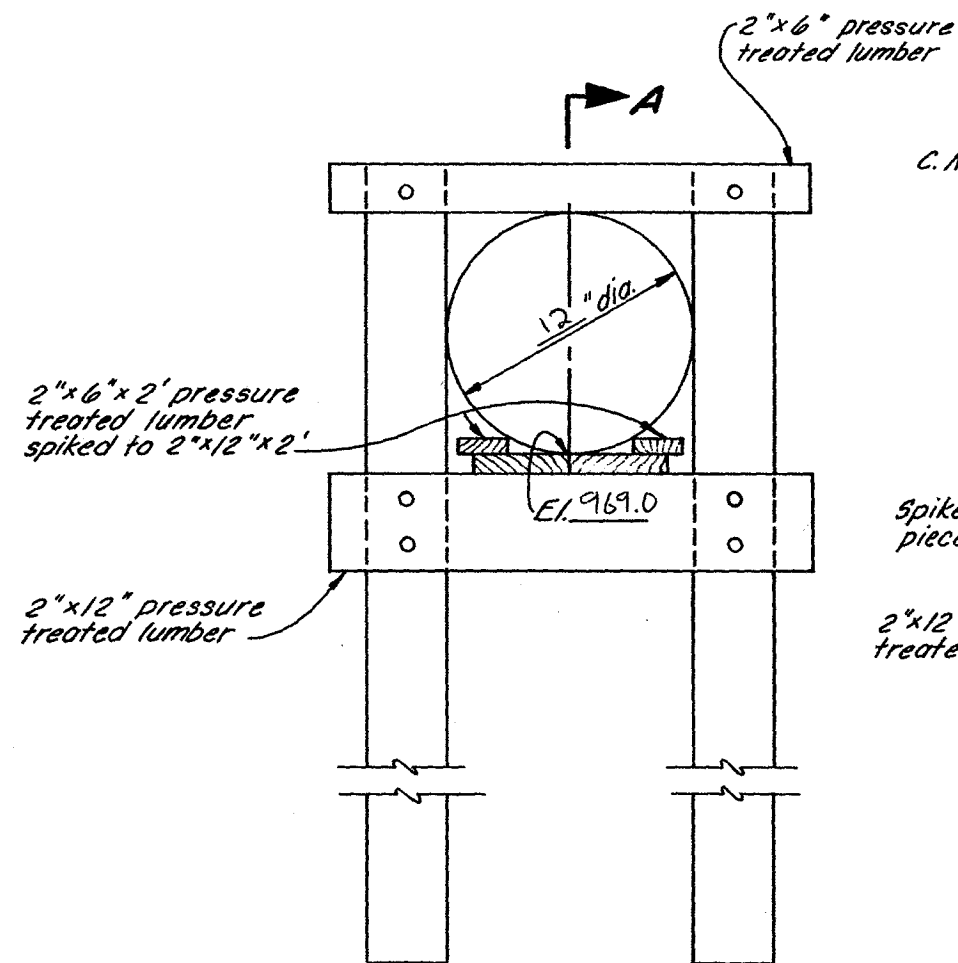
USDA - NRCS  
FIELD SUPPORT OFFICE  
1717 N. LINCOLN AVE. SUITE 104  
PIERRE, SOUTH DAKOTA 57501

**NRCS**  
Natural Resources Conservation Service  
United States Department of Agriculture

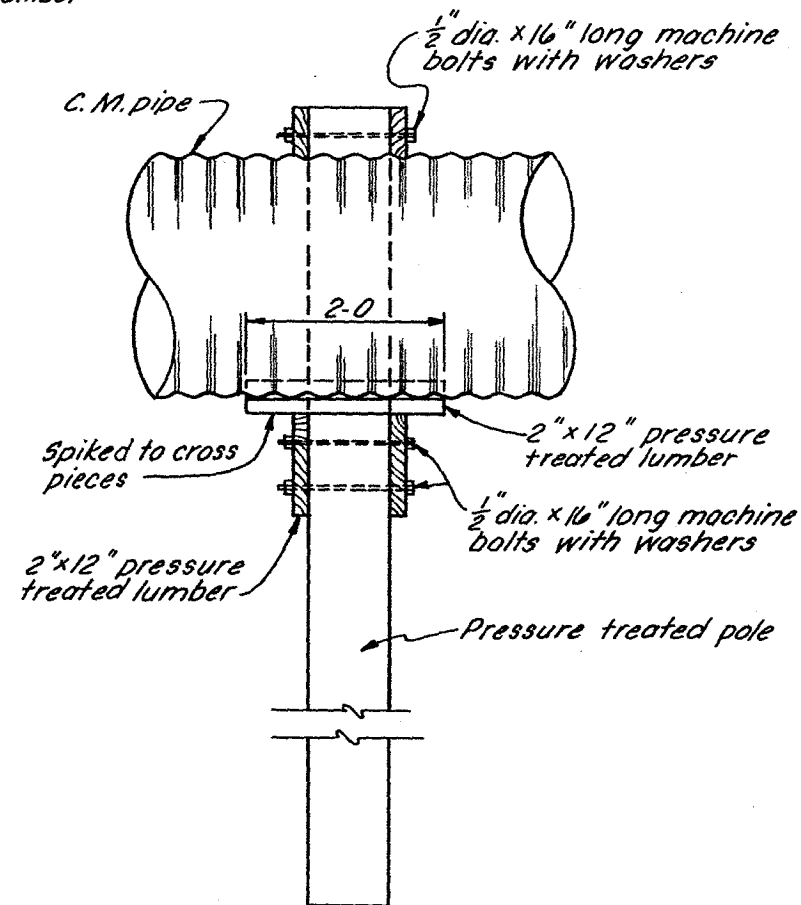
File Name:  
Jon Williams Pond

Drawing No.

| REVISIONS        |          |       |
|------------------|----------|-------|
| DATE             | APPROVED | TITLE |
| 3/13/2009 3:34PM |          |       |
| Sheet 8 of 9     |          |       |



ELEVATION



SECTIONAL ELEVATION A-A

NOTES:

- HAND OR MACHINE TAMP BACKFILL THOROUGHLY AROUND FOOTINGS AND COLUMNS.

TABLE OF QUANTITIES

| ITEM                              | LENGTH FOR 12" DIA. PVC C.M. PIPE | UNIT | QUANTITY |
|-----------------------------------|-----------------------------------|------|----------|
| PRESSURE TREATED POLE 8" DIA.     | 8-0                               | EACH | 2        |
| 2" X 12" PRESSURE TREATED LUMBER  | 4-0                               | EACH | 2        |
| 2" X 6" PRESSURE TREATED LUMBER   | 4-0                               | EACH | 2        |
| 2" X 12" PRESSURE TREATED LUMBER  | 2-0                               | EACH | 2        |
| 2" X 6" PRESSURE TREATED LUMBER   | 2-0                               | EACH | 2        |
| 1/2" DIA. MACHINE BOLTS WITH NUTS | 1-4                               | EACH | 6        |
| 1/2" DIA. WASHERS                 |                                   | EACH | 12       |

REFERENCE: GUIDE PLAN NO. 4.0

JOB PLAN NO. 4.0

TIMBER PIPE SUPPORT

OPERATOR: Jon Williams

CONSERVATION DISTRICT: Bon Homme County

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

|          |              |             |         |             |                |
|----------|--------------|-------------|---------|-------------|----------------|
| Designed | J. Weidemann | Date        | 3/13/09 | Approved by | J. Edwards     |
| Drawn    | J. Weidemann | Date        | 3/13/09 | Title       | Civil Engineer |
| Checked  | J. Edwards   | Date        | 3/19/09 | Title       |                |
| Sheet    |              | Drawing No. |         |             |                |
| No 9     |              |             |         |             |                |
| of 9     |              |             |         |             |                |

5, N-29,073.4a

# DOCUMENTATION CHECKLIST

## EMBANKMENT POND (378)

### ITEM

### FORM NUMBER

#### **NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)**

- Need (FO)*
- ☐ Environmental Effects for Conservation Planning
  - ☐ Cultural Resources Field Review
  - ☐ Minimal Effect (if fill, excavation, or pool will impact wetland; use Expedited ME #9 if applicable, or use HGM)

SD-CPA-52  
SD-SSC-1  
SD-CPA-10

#### **PERMITS & CERTIFICATIONS (to be obtained by landowner)**

- ☐ Corps of Engineers Section 404 of Clean Water Act
- ☒ Location Notice for Dam/Dugout
- Need* ☐ Water Right (if storing  $\geq 25$  acre-feet)
- Need* ☐ Safety of dams review (if categorized as a dam by state law)

ENG FORM 4345  
Location Notice  
Appl. for Permit to Approp.  
Water (Forms 2 & 2A)  
Letter to DENR (Water Rights)  
from NRCS Engineer

#### **DESIGN**

- ☒ Design survey
- ☒ Log of soil borings
- ☒ Hydrologic data (with USGS topographic map)
- ☒ Hydraulic Data
- ☒ Structure Data (include the hazard class)
- ☒ Quantity Calculations
- ☒ Layout Survey

SCS-ENG-28&29 or topo survey  
SD-ENG-10 or SD-ENG-45  
SD-ENG-29, OHIO or EFM2/EFH2  
SD-ENG-29 or flood routing  
SD-ENG-29 and JP 1.0  
SD-ENG-32, AreaVol, OHIO, etc.  
SCS-ENG-28&29

#### **PLANS & SPECIFICATIONS**

- ☒ Plan view, profile, and cross-sections
- ☒ Plan sheets for principal spillway, pipe supports, etc.
- ☒ Construction notes (with SD One-Call statement)
- ☒ Construction and Material Specifications
- ☒ Table of Quantities
- ☒ Signature for designer, checker, job approval
- ☒ Operation and Maintenance Guidelines
- ☒ Cost Estimate
- ☒ Participant Responsibilities

JP 1.0  
JP 2.0, 2.1, 3.8, etc.  
JP 1.0  
SD-4, SD-5, SD-7S, etc.  
JP 1.0 or SD-ENG-12  
JP 1.0  
SD-O&M-378  
SD-ENG-12 or spreadsheet  
SD-ENG-11

#### **CONSTRUCTION**

- ☐ Construction Check Survey
- ☐ As-built drawings and quantities with compliance statement
- ☐ Certification Statement (use if NRCS did not inspect)
- ☐ Construction Inspection Report (use if NRCS inspected)

SCS-ENG-28&29  
JP 1.0  
SD-ENG-2  
SD-ENG-19

Water Permit Application No. 7172-3  
Jon Williams

Top of Dam Elev. - 989.5  
 2nd Spillway Elev. - 986.4  
 P. Spillway Elev. - 983.0  
 Dis Emb. Toe Elev. - 967

Cat. 3 - Low Hazard Dam  
 Ht. = 22.5 ft.

Normal Storage Capacity - 27 A.-Ft  
 Int. Storage Capacity - 45.6  
 Max. Storage Capacity - 69.4

Eff Ht. x Int. Capacity =  $17.5 \times 45.6 = 798 < 3000 \therefore 25 \text{ yr}$   
Minimum Spillway Design

From USGS WRI 98-4055 "Tech for Est. Peak Flows in SD"  
 $DA = 655 \text{ A.} = 1.02 \text{ m.}^2 \quad CN = 72$   
 Region B  $PII = 1.05$

$$Q_{25} = 148 CA^{.584} P_{II}^{.730}$$

$$= 148 (1.02)^{.584} (1.05)^{.730}$$

$$= 148 (1.0136) (1.0363)$$

$$= \underline{155 \text{ cfs}}$$

$$Q_{100} = 275 CA^{.675} P_{II}^{.742}$$

$$= 275 (1.02)^{.675} (1.05)^{.742}$$

$$= 275 (1.0135) (1.0369)$$

$$= \underline{290 \text{ cfs}}$$

Secondary Spillway Capacity

$$Q = CLH^{3/2} \quad C = 2.6$$

$$= (2.6)(60)(3.1)^{3/2} \quad L = 60$$

$$= \underline{850 \text{ cfs}} \quad H = 3.1$$

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 Cat. 3 - OK

NRCS Annual Yield

$DA = 655 \quad ISO = 3 \quad CN = 72$

$$80\% \text{ chance} = 0.16$$

$$0.16 \times 655^{1/2} = \underline{9 \text{ A.-Ft}}$$

$$50\% \text{ chance} = 0.60$$

$$0.60 \times 655^{1/2} = \underline{33 \text{ A.-Ft}}$$

$$10\% \text{ chance} = 2.30$$

$$2.3 \times 655^{1/2} = \underline{125 \text{ A.-Ft}}$$



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

April 16, 2009

Jon Williams  
40451 S Stone House Road  
Avon SD 57315

Dear Mr. Williams:

Thank you for submitting the *Application for a Permit to Appropriate Water* for a storage dam located in Bon Homme County. In order to complete the application the following is required.

- The application/license filing fee will be \$200.

Upon receipt of the fee, further processing of the application will continue. If you have any questions, please contact me.

Sincerely,

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



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

May 20, 2009

Jon Williams  
40451 S Stone House Road  
Avon, SD 57315

Dear Mr. Williams:

We have reviewed the plans and specifications for your dam project located in the SE ¼ NE ¼ of Sec. 20-T94N-R61W, in Bon Homme County. The plans and specifications for your dam are approved. Approval of the plans and specifications does not authorize construction of the dam. The construction of the dam may not begin until Water Permit No. 7127-3 is approved.

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

The Wolf Dam will be classified as a small size Category 3, Low Hazard dam with a dam height of 22.5 feet and a normal storage capacity of 27 acre-feet and a maximum storage capacity of 69 acre-feet.

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

Sincerely,

Timothy G. Schaal, P.E.  
Natural Resources Engineering Specialist  
for Garland Erbele, Chief Engineer  
Water Rights Program  
(605) 773-3352

c: Jon Weidemann, NRCS Pierre



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT  
APPLICATION NO. 7127-3, Jon Williams**

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. 7127-3, Jon Williams, 40451 S. Stone House Road, Avon SD 57315.

The Chief Engineer is recommending APPROVAL of Application No. 7127-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. Water Permit No. 7127-3 authorizes a dam with a storage capacity of 27.0 acre feet of water and sufficient water annually to maintain the water level to the 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  
May 20, 2009

REPORT ON  
WATER PERMIT APPLICATION No. 7127-3  
Jon Williams  
April 28, 2009

Water Permit Application No. 7127-3 has been filed by Jon Williams to impound 27 acre-feet of water from runoff by constructing a dam located in the SE ¼ NE ¼ of Section 20-T94N-R61W, in Bon Homme. The application also requests impoundment of sufficient water to maintain water to 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 dam has been designed by the Natural Resources Conservation Service (NRCS). The plans and specifications have been reviewed and will be approved; however, construction of the dam can not begin until Water Permit Application No. 7127-3 is approved.

The dam will be 22.5 feet high with a normal storage capacity of 27 acre-feet with a reservoir level at the primary spillway elevation, and a maximum storage capacity of 69 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 655 acres or 1.02 square miles. The dam is designed to have a 30 inch diameter concrete riser with a 12 inch diameter PVC barrel with 6.5 feet of freeboard as the primary spillway, and a 60 foot wide earthcut secondary spillway with 3.1 feet of freeboard. A 25 year frequency event produces a peak runoff of approximately 155 cfs and a 100 year frequency event produces a peak runoff of approximately 290 cfs. The earthcut spillway will have a capacity of approximately 850 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 9 acre-feet. The annual yield with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 33 acre-feet and the annual yield with a 10 percent chance, or 1 out of 10 years, is expected to be 125 acre-feet.

The Williams Dam will be located in the SE ¼ NE ¼ of Section 20-T94N-R61W on an unnamed tributary to Choteau Creek, about two miles upstream of the confluence of the unnamed tributary and Choteau Creek. There are no existing Water Permits/Rights filed on the unnamed tributary between the proposed dam and the Choteau Creek.

Conclusions:

1. Water Permit Application No. 7127-3 should be approved since unappropriated water is available and approval should not have any adverse effect on existing Water Permits/Rights.
2. If approved, the low flow bypass requirement for domestic use should be a qualification on Water Permit Application No. 7127-3.



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

RECEIVED  
JUN 23 2009  
WATER RIGHTS  
PROGRAM

## Affidavit of Publication

STATE OF SOUTH DAKOTA  
COUNTY OF BON HOMME  
CITY OF AOVN  
SCHOOL DISTRICT 4-1

**Jackson S. Brodeen**

Of said county and city, being duly sworn, on oath says that he is the PUBLISHER of the Avon Clarion, a weekly newspaper, printed in Armour, SD, published in Avon, said county of Bon Homme and his full and personal knowledge of all the facts herein stated; that said newspaper is by declamation the official city newspaper, the official newspaper of School District 4-1, is published 52 weeks a year, has been legally published for an excess of one year under second class permit, with an excess of 200 copies per week, and is distributed wholly or in part in the City of Avon. The above swears that the

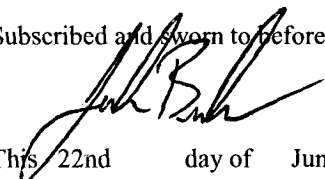
### Notice of Application No. 7127-3

A printed copy of which, taken from the paper in which the same was printed and published, is attached to this sheet, and made part of this affidavit, was published in said newspaper at least once a week for 2 successive weeks on the day of each week on which said newspaper was published, to wit:

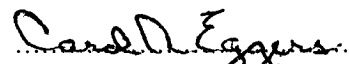
Wednesday.....June 3, 2009  
Wednesday.....June 10, 2009  
Wednesday.....  
Wednesday.....

That the full amount of fee charged for publication of this notice, 39.00. insures to the benefit of the publisher of said newspaper, that no agreement or understanding for the division thereof has made with any person, and, that no part has been agreed to be paid to any person whatsoever.

Subscribed and sworn to before me



This 22nd day of June, 2009

  
Notary Public, South Dakota

My commission expires.....7-5-2013.....

**NOTICE OF APPLICATION NO. 7127-3 to Appropriate Water**

Notice is given that Jon Williams, 40451 S Stone House Road, Avon SD 57315 has filed an application for a water permit to impound 27 acre-feet of water from runoff by constructing a dam located in the SE 1/4 NE 1/4 Section 20 with water impounded in the NE 1/4 Section 20; all in T94N-R61W. 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 No. 7127-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management

Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by June 22, 2009.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pimer, Secretary, Department of Environment and Natural Resources.

(Pub: June 3, 10, 2009)



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

May 26, 2009

Avon Clarion  
PO Box 345  
Avon SD 57315

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application No. 7127-3 to Appropriate Water to be published twice. Please publish the first notice on June 3, 2009 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 Jon Williams, 40451 S Stone House Rd., Avon SD 57315 (Ph # 605-286-3734).

**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-----

No. 7127-3

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

Date \_\_\_\_\_

We are in receipt of your letter of May 26, 2009 enclosing Notice to Appropriate Water by Application No. 7127-3 which was first published in our issue of \_\_\_\_\_. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

\_\_\_\_\_  
Name

\_\_\_\_\_  
Newspaper



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

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

May 26, 2009

Jon Williams  
40451 S Stone House Rd  
Avon SD 57315

Dear Mr. Williams:

Water Permit Application No. 7127-3 for agriculture and wildlife use has 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 Avon Clarion printed at Avon SD (Ph # 605-286-3919). 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 Notices 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

enclosures

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

Instruction to Newspaper - Publish first Notice on June 3, 2009 with the second publication 7 days later. The applicant is responsible for payment. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352 or email: Karen.schlaak@state.sd.us.

---

NOTICE OF APPLICATION NO. 7127-3 to Appropriate Water

Notice is given that Jon Williams, 40451 S Stone House Road, Avon SD 57315 has filed an application for a water permit to impound 27 acre-feet of water from runoff by constructing a dam located in the SE  $\frac{1}{4}$  NE  $\frac{1}{4}$  Section 20 with water impounded in the NE  $\frac{1}{4}$  Section 20; all in T94N-R61W. 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 No. 7127-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by June 22, 2009.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

**JUN 24 2009**

Jon Williams  
40451 S Stone House Rd  
Avon SD 57315

Dear Mr. Williams:

Enclosed is Water Permit No. 7127-3 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

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

RECEIVED

AUG 20 2009

WATER RIGHTS  
PROGRAMDate August 17, 2009

TO: Water Rights Program, DENR  
523 E. Capitol  
Pierre, SD 57501-3181

FROM: Jon Williams  
(name)  
40451 Stone House Rd  
(address)  
Auron, SD 57315 1-605-286-3734  
(city, state, zip) (phone)

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

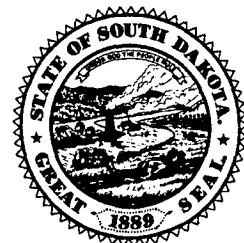
Water Permit No. 7127-3 states that the water use system is to be constructed by  
June 22, 2014 , and water is to be put to beneficial use by June 22, 2018 .  
(date) (date)

The water use system was completed on August 7, 2009 .  
(date)

Applying the water to beneficial use was completed on dam is not full yet .  
(date)

You may schedule an investigation so that the water license may be issued.

Jon Williams  
(signature)





**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

JOE FOSS BUILDING  
PMB 2020  
523 EAST CAPITOL  
PIERRE SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

August 20, 2009

7127-3

Jon Williams  
40451 Stone House Rd  
Avon SD 57315

Dear Mr. Williams:

I am writing to acknowledge receipt of the "Notice of Completion of Works" form that you sent in to let us know that you are completed with your water use system.

The system is now ready for inspection. Inspections are done on a county-by-county basis as staff time permits. You have done everything you need to do and the intervening time between the completion of your project and the staff inspection has no bearing on your water permit.

Someone from our office will contact you prior to the inspection to set up a time that is convenient for you. If you have any questions, please contact me.

Sincerely,

A handwritten signature in black ink that reads "Genny McMath". The signature is written in a cursive, flowing style.

Genny McMath  
Environmental Scientist  
Water Rights Program  
(605) 773-3352  
email: [genny.mcmath@state.sd.us](mailto:genny.mcmath@state.sd.us)

## Report of Examination of Works and/or Application of Water to Beneficial Use For Permit No. 7127-3

I have this day, May 8, 2020, made a thorough examination of the water use system constructed by Jon Williams, 40451 S. Stone House Road, Avon, SD 57315, of Permit No. 7127-3, bearing the priority of 4/9/2009 authorizing the diversion of 0.0 cu. ft. per second of the surface water runoff for fish and wildlife propagation, domestic purposes in Bon Homme County.

Inspection contact: Jon Williams, Owner

**A. Dam Information:**

- 1) Height to crest 24.1 feet from downstream toe.
- 2) Height to outlet pipe 15.8 feet from downstream toe.
- 3) Outlet is a 30-inch concrete riser with a 12-inch diameter PVC outlet pipe
- 4) Height to auxiliary spillway 19.4 feet from downstream toe.
- 5) Crest width 14 feet
- 6) Crest length 380 feet
- 7) Auxiliary Spillway width 60 feet
- 8) Approximate storage to outlet pipe 27 acre-feet
- 9) Approximate storage to auxiliary spillway 45.6 acre-ft.
- 10) Approximate storage to crest 69.4 acre-ft.
- 11) Date constructed: 2009

**B. Works used to put water to beneficial use:**

This is an earth fill embankment utilizing a 14-foot wide top trapezoidal dam with rock riprap placed around the overflow pipe outlet. The secondary spillway is a trapezoidal shaped 60-foot wide earthen structure. The water impounded in the reservoir is put to beneficial use in-place.

**C. Compliance with Permit Requirements:**

- 1) Permit qualifications being abided by: Yes
- 2) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period. N/A  
List any extended period of nonuse: N/A
- 3) Exceptions to compliance are: None

**D. Condition and Location:**

1. The system is in good condition with the point of diversion located as follows: 1,120 feet west and 1,980 feet south of the NE corner Section 20-T94N-R61W (42.94685, -98.07375). The works are capable of diverting to the place of use 0.0 cu. ft. per second of water which is to be used for fish and wildlife propagation, domestic. Water has been put to beneficial use to the maximum extent and the license should be issued for 0.0 cfs.
- 2) All structures and lands on map Yes

- E. Comments or other permit(s) associated with the project: The outlet pipe is currently plugged, and water is flowing over the auxiliary spillway. Mr. Williams is aware of this situation. The dam elevation data is based on the NRCS as-built plans. The water storage data is based on the original file data.

*Keith DeJong*

Keith DeJong  
Water Rights Inspector  
DENR, Water Rights Program

Date report completed: May 11, 2020



Looking North from the Center of the Dam at where the Pipe Outlet Should be Visible



Looking North at the Auxiliary Spillway



Looking South Southwest at the Overflowing Auxiliary Spillway.



Looking West at the 12 Inch PVC Outlet Pipe

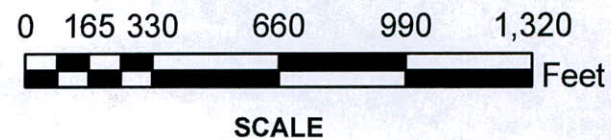
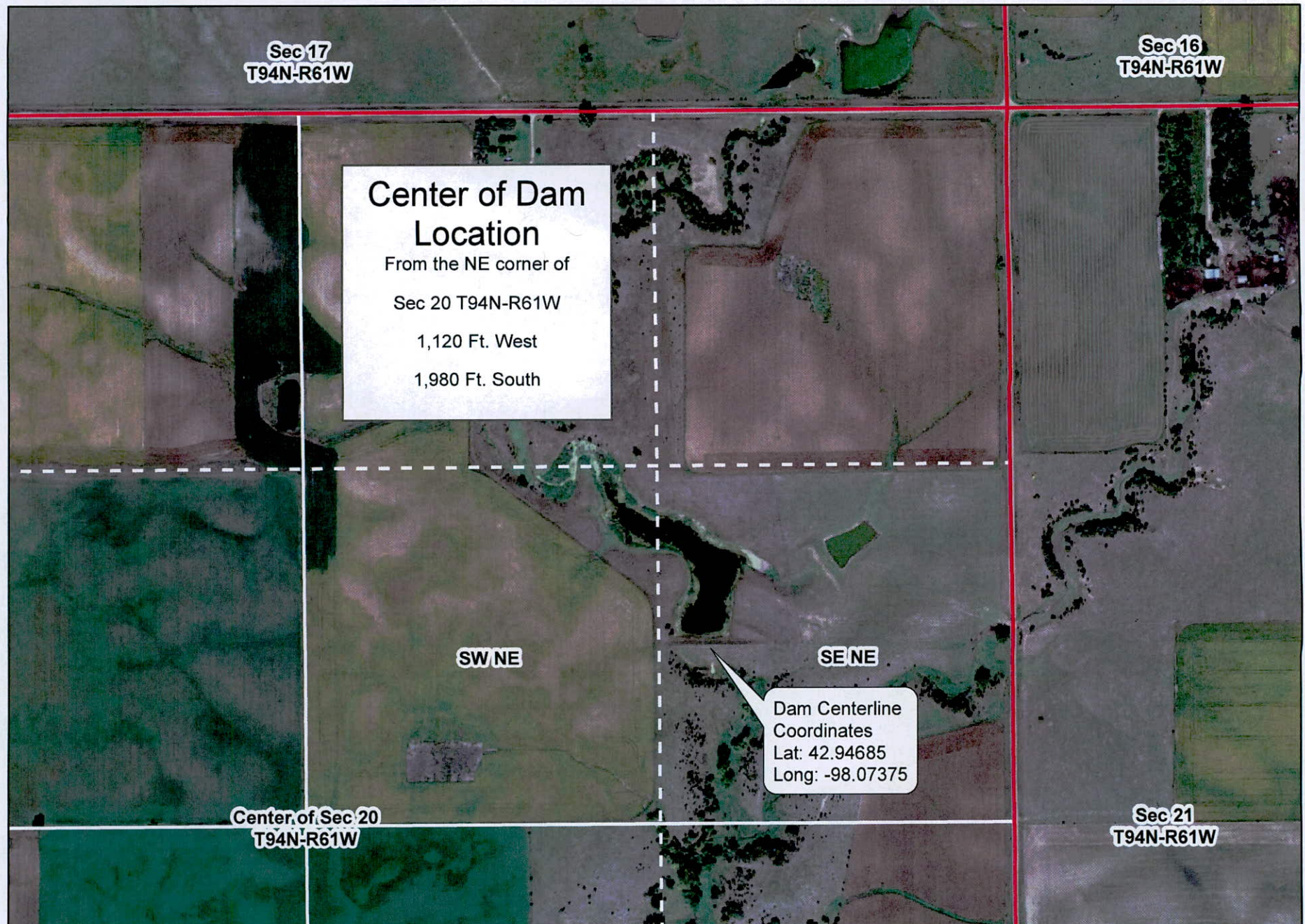


Looking South from the Center of the Dam at the  
Outlet Pipe Discharge



Looking West along the South Side of the Dam

# Water Right No.7127-3



*Keith DeJong*  
Keith DeJong, PE  
Staff Engineer  
May 8, 2020

7127-3



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE SOUTH DAKOTA 57501-3182  
<http://denr.sd.gov>

JUN 01 2020

7127-3

Jon Williams  
40451 S Stone House Rd  
Avon SD 57315

Dear Mr. Williams:

Enclosed is Water License No. 7127-3. This is the final water right document completing your process of obtaining a Water Right. Included with your license is a map prepared by the staff engineer who conducted the field investigation.

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

Sincerely,

A handwritten signature in cursive script that reads "Eric Gronlund".

Eric Gronlund, Chief Engineer  
Water Rights Program  
(605) 773-3352

enclosures

# STATE OF SOUTH DAKOTA

## WATER LICENSE NO. 7127-3

(1) Jon Williams, 40451 S Stone House Rd, Avon SD 57315 made Application No. 7127-3, April 9, 2009 for a water permit to impound 27.0 acre feet of runoff water for fish and wildlife propagation and domestic livestock water purposes in Bon Homme County, South Dakota. Permit No. 7127-3, with a priority date of April 9, 2009 was approved June 22, 2009 and issued to the applicant for diversion of water with construction of the impoundment to be completed on or before June 22, 2014 and for the application to beneficial use of water on or before June 22, 2018.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion and is entitled to impound 27.0 acre feet of water for beneficial use.

The storage dam is located as follows:

- 1,120'W and 1,980'S of the NE corner of Section 20, T94N, R61W (SE ¼ NE ¼) with water impounded in the NE ¼ Section 20. Latitude 42.94685, Longitude -98.07375

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

(4) Pursuant to South Dakota Water Law 46-5-30.1 Jon Williams, 40451 S Stone House Rd, Avon SD 57315 the holder and/or owner of Water Right No. 7127-3 is issued a license to appropriate water, the right to impound 27.0 acre feet of runoff water with a priority date of April 9, 2009 from the location specified in (2) of this license for fish and wildlife propagation and domestic livestock water purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 7127-3 and subject to the following qualifications:

- Water Right No. 7127-3 authorizes a dam with a storage capacity of 27.0 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
- Low flows as needed for downstream domestic use including livestock water and prior water rights must be bypassed.



Eric Gronlund, Chief Engineer  
Water Rights Program  
Department of Environment and Natural Resources

JUN 01 2020

date

