

WATER PERMIT NO. 2603-2

Name of Applicant: Bernard Stoesser

Address: 4305 Sandwedge Dr, Pierre SD 57501

Phone: 605 224-4840

Amount of Water Claimed: 40.30 AF

Total Acres: NA

Source of Water Supply: runoff

Water to be used for: fish & wildlife propagation, recreation, domestic

County: Stanley

Type of Waste Disposal System:

Location: 15 miles west of Pierre

PRIORITY Date Received: 9-11-06

Application/License Fee: \$200

Corrected Application Received:

Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: NW ¼ SE ¼ Sec 30-T5N-R29^E

Water Impounded:

Depth of Well: NA

Well Driller:

Remarks:

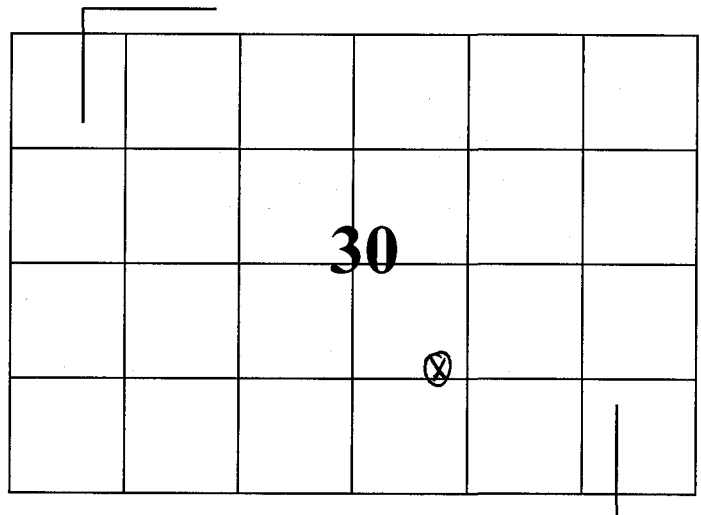
Type of Map: topo

Prepared by: Angela Roman, NRCS

Reviewed and the Number Assigned on: XX

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



SD EForm - 1585 V1
FORM 2: Application for uses other than irrigation
(type or print)

Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	No. <u>2603-2</u> (office use only) Hydrologic Unit <u>10140102</u>
	Basin <u>Bad River</u>
	Newspaper <u>Capital Journal, Pierre</u>

RECEIVED

SEP 11 2006

WATER RIGHTS
PROGRAM

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

Check use(s) of water:

☐ Municipal	☐ Suburban Housing	☒ Recreational	☐ Institutional
☐ Rural Water System	☐ Commercial	☒ Fish & Wildlife	☐ Geothermal Heat
☐ Domestic (over 18 gpm)	☐ Industrial	☒ Other <u>Agricultural</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 Bernard Stoesser Phone (605) 224-4840
(check one) ☒ Owner ☐ Tenant/lessee
Mailing Address 4305 Sandwedge Drive Pierre State SD 57501
(Street, RR, or Box and City) (Zip Code)

2. Amount of water claimed _____ *CFS or _____ **GPM 40.30 ***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 from 1299 acres

4. Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) County Stanley
NW 1/4 SE 1/4 of Section 30, T5N, R29E Water Impounded: NW SE, NESW, SE NW, SW NW

5. County or counties where water will be used Stanley

6. Annual period during which water is to be used 365 days 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)

Embankment Pond to be constructed in the dry draw

STATE OF SOUTH DAKOTA) SS
County of Stanley)

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, Bernard Stoesser, 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 Bernard Stoesser

Subscribed and sworn to before me this 11th day of September 20 06

My Commission expires
7-20-2012

[Signature]
Notary Public signature

**SOUTH DAKOTA
WATER PERMIT NO. 2603-2**

Date of first receipt of application September 11, 2006.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 2603-2 to Bernard Stoeser, 4305 Sandwedge Drive, Pierre SD 57501 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. 2603-2 authorizes impoundment of 40.30 acre-feet of water from runoff by constructing a dam located in the NW 1/4 SE 1/4 Section 30 with water impounded in the NW 1/4 SE 1/4, NE 1/4 SW 1/4, SE 1/4 NW 1/4, SW 1/4 NE 1/4 Section 30; all in T5N-R29E.
2. The water appropriated shall be used for the purpose of fish and wildlife propagation, recreational and livestock water and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 2603-2 is November 13, 2006.
5. The date from which applicant may claim right is September 11, 2006.
6. One-fifth of the construction is to be completed on or before May 13, 2009.
7. All construction is to be completed on or before November 13, 2011.
8. Water is to be put to beneficial use on or before November 13, 2015.
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. 2603-2 authorizes a dam with a storage capacity of 40.3 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

DEC 22 2006
date



(type or print in ink)

1. Well Information - Proposed Construction

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

2. Wastewater Disposal System Information

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

3. Dugout Information

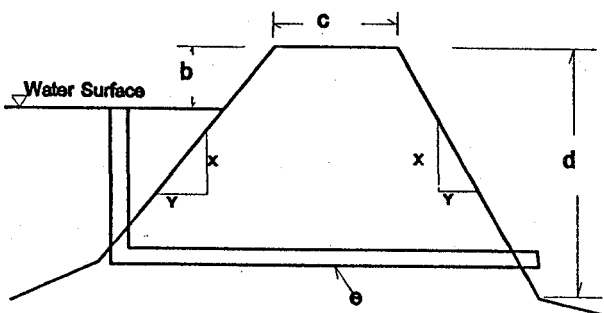
- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

4. Water Storage Dams

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

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

USDA-Natural Resources Conservation Service
1717 North Lincoln, Suite #104
Pierre, SD 57501



- b) Freeboard _____ 6'
- c) Crest Width _____ 12'
- Crest Length _____ 625'
- d) Height _____ 24.5'
- e) Primary Outlet Capacity _____ 113 cfs
- If pipe, diameter _____ 30"
- f) Secondary Spillway Capacity _____ 924 cfs
- Spillway Width _____ 100'
- g) X & Y Slope _____ 3:1
- Upstream _____ 3:1
- Downstream _____ 3:1
- h) Surface Area of Impoundment 9.16 acres
- i) Storage 40.3 ~~72.5~~ Acre Feet
- j) Drainage Area Above Dam 1,299.0 Acres

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date SEPTEMBER 11, 20 06

RECEIVED OF Bernard Stoesser, 4305 Sandwedge Dr., Pierre SD 57501

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

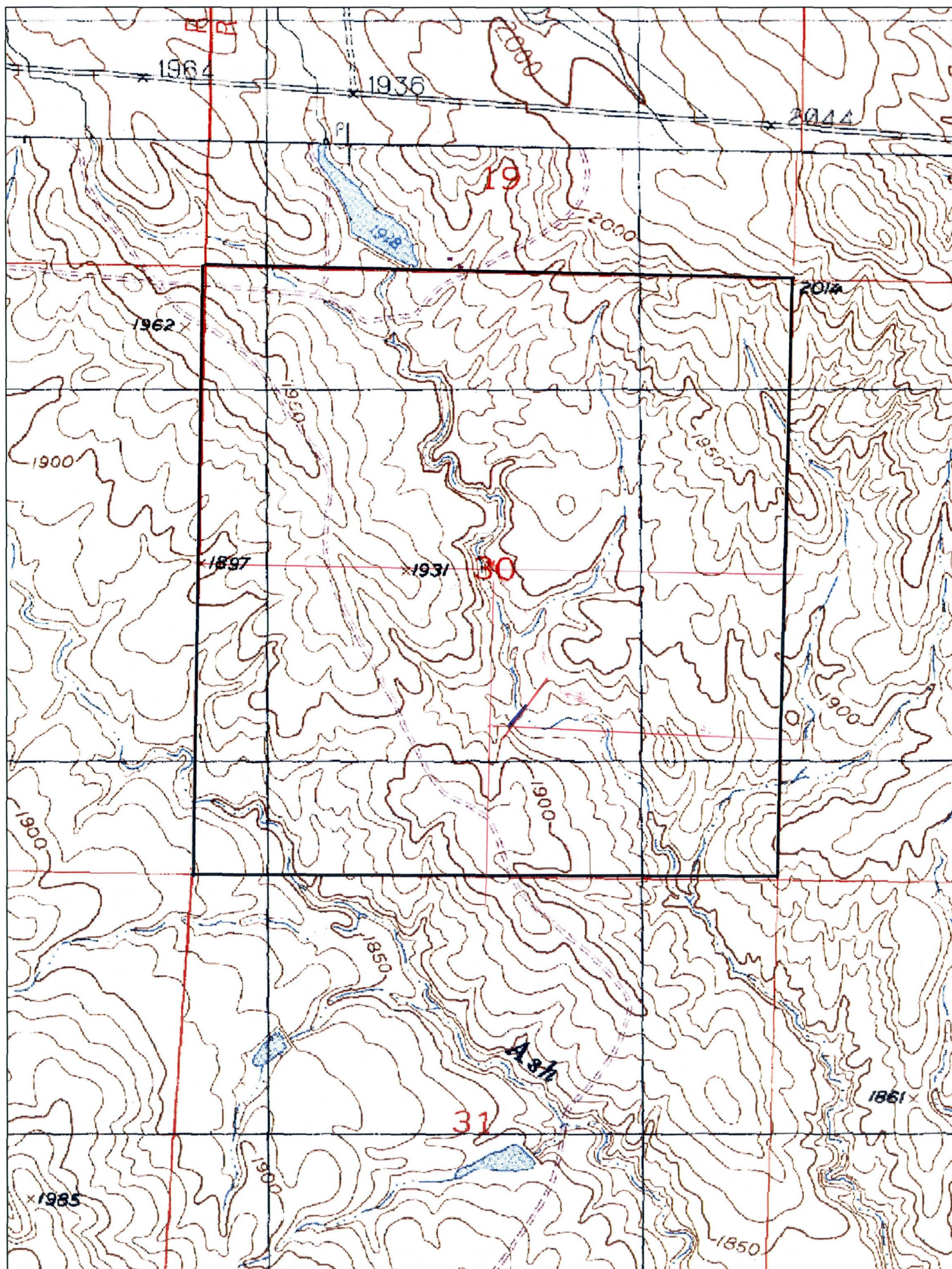
Fee for Application for Permit No. <u>2603-2</u> to Appropriate Water, to construct and to put water to beneficial use	150	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>2603-2</u>	50	00
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	200.00

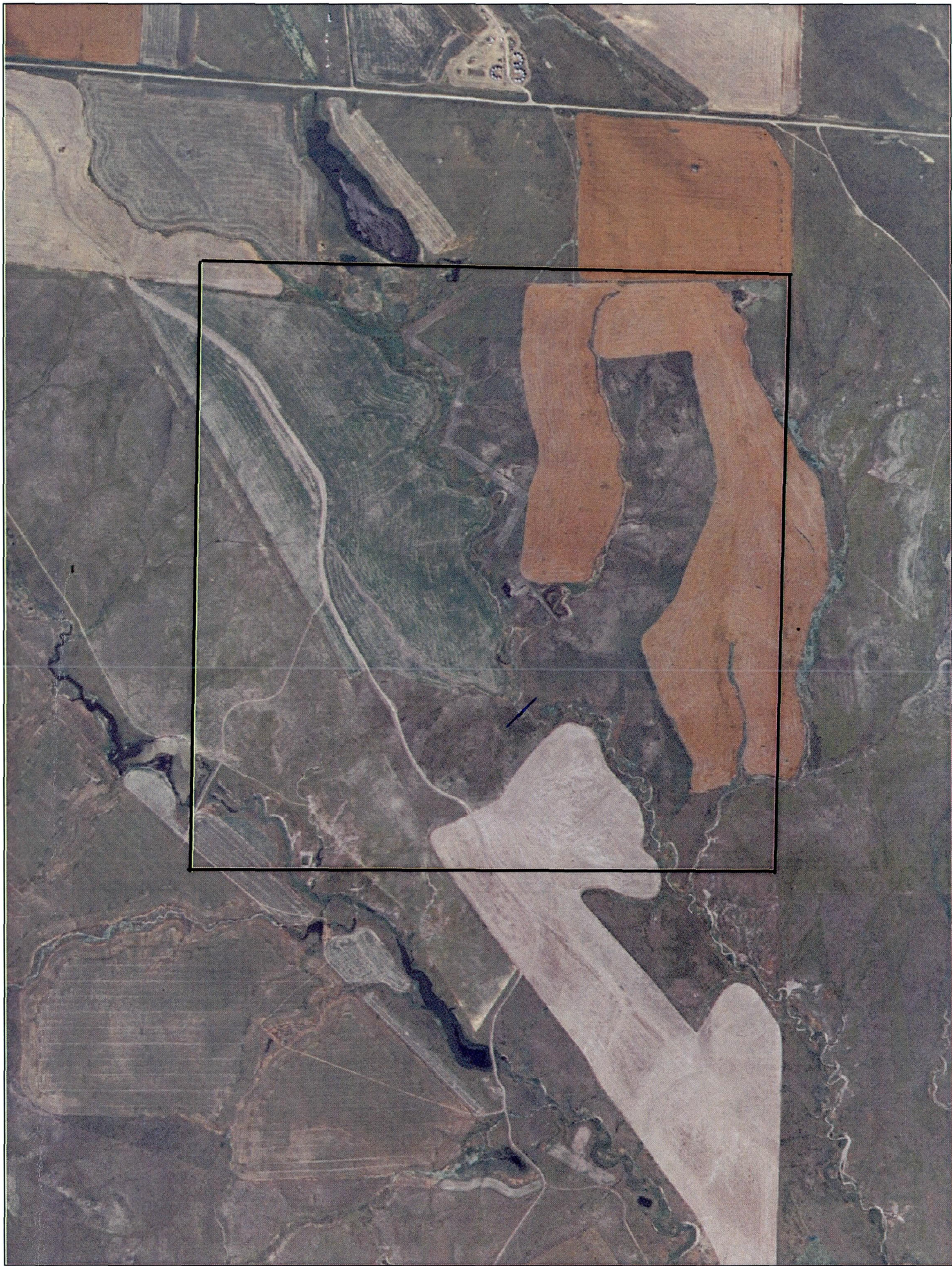
No.

02579

By

Darland Ebel
Chief Engineer *gm*





Water Permit Application No. 2603-2

Bernard Stoesser

Top of Dam Elev. - 105
 2nd Spillway Elev. - 101.8
 P. Spillway Elev. - 99
 O/S Emb. Toe Elev. - 80.5

Cat. 3 - Low Hazard Dam

Ht = 24.5 ft

Normal Storage Capacity - 40.3 Ac-Ft
 Int. Storage Capacity - 72.5
 Max. Storage Capacity - 127.8

Int. Capacity $\times$ Eff. Ht. = $72.5 \times 19.3 = 1399 < 3000 \therefore 25\text{yr}$
Minimum Spillway Design

From USGS WRI Report 98-4055 "Tech for Est Peak Flows... in SD"
 DA = 1299 Ac = 2.03 mi.²
 Region D

$$\begin{aligned}
 Q_{25} &= 676 CA^{.585} & Q_{50} &= 944 CA^{.627} & Q_{100} &= 1270 CA^{.663} \\
 &= 676(2.03)^{.585} & &= 944(2.03)^{.627} & &= 1270(2.03)^{.663} \\
 &= \underline{1022 \text{ cfs}} & &= \underline{1472 \text{ cfs}} & &= \underline{2031 \text{ cfs}}
 \end{aligned}$$

Secondary Spillway Capacity

$$\begin{aligned}
 Q &= CLH^{3/2} & C &= 2.6 \\
 &= 2.6(100)(3.2)^{1.5} & L &= 100 \\
 &= \underline{1490 \text{ cfs}} & H &= 3.2 \text{ ft}
 \end{aligned}$$

Section 74:02:08:09

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

NRCS Annual Yield

$$DA = 1299 \quad ISO = 2 \quad CN = 83$$

$$\begin{aligned}
 80\% \text{ chance} &= 0.40 \\
 0.40 \times 1299^{1/2} &= \underline{43.3 \text{ Ac-Ft}}
 \end{aligned}$$

$$\begin{aligned}
 50\% \text{ chance} &= 0.90 \\
 0.90 \times 1299^{1/2} &= \underline{97.4 \text{ Ac-Ft}}
 \end{aligned}$$

$$\begin{aligned}
 10\% \text{ chance} &= 3.30 \\
 3.3 \times 1299^{1/2} &= \underline{357 \text{ Ac-Ft}}
 \end{aligned}$$



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

October 16, 2006

Bernard Stoesser
4305 Sandwedge Dr.
Pierre, SD 57501

Dear Mr. Stoesser:

We have reviewed the plans and specifications for your dam project located in the SE ¼ of Sec. 30-T5N-R29E, in Stanley County. The plans and specifications for the construction of 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. 2603-2 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 Stoesser Dam No.4 will be classified as a small size Category 3, Low Hazard dam with a dam height of 24.5 ft. and a normal storage capacity of 40.3 acre-feet and a maximum storage capacity of 128 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: Angela Roman, NRCS, Pierre

Inspection Plan for Bernard Stoeser

for

Pond located in the SE ¼ of Section 30, T5N, and R29E

Fall 2006

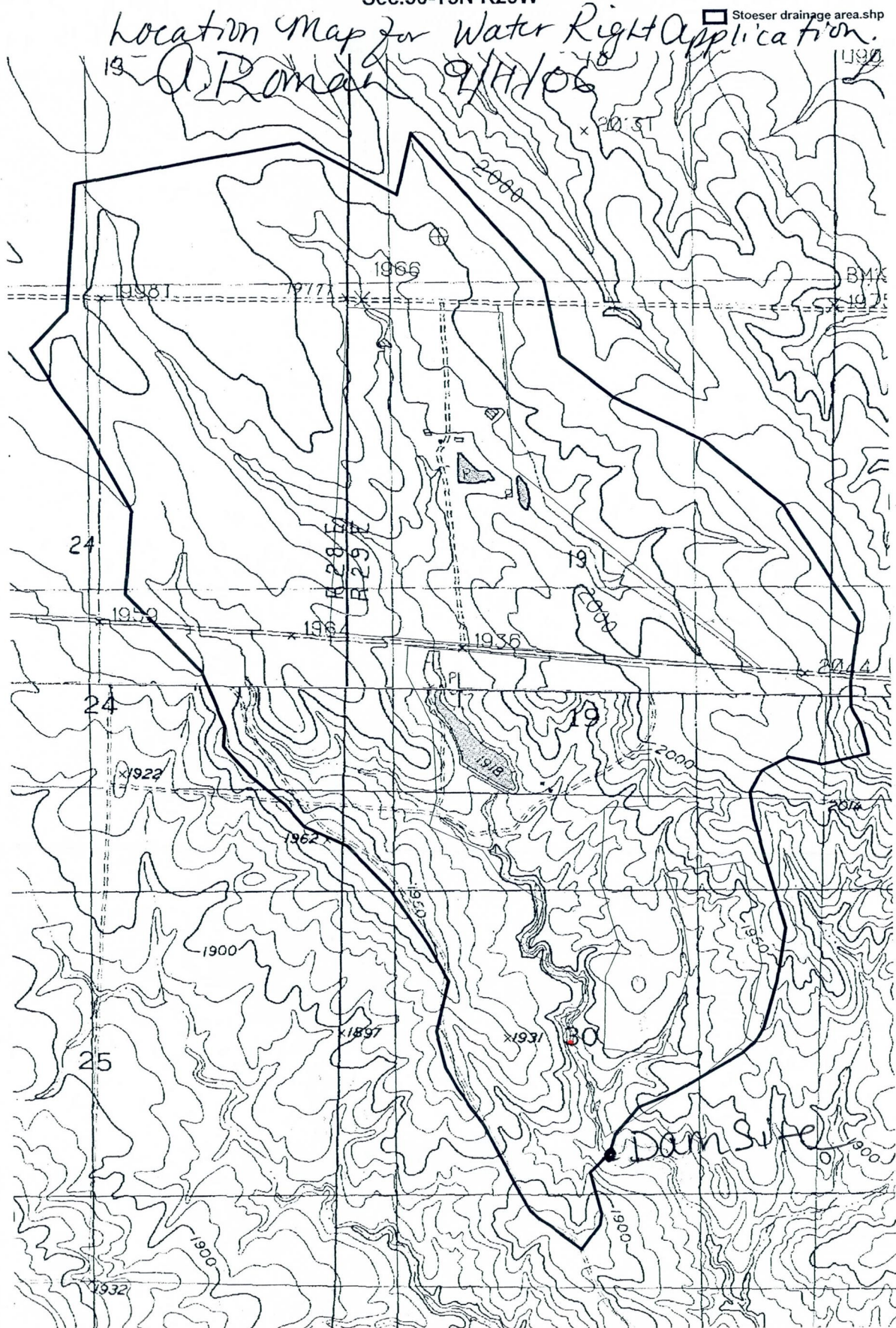
Inspection should be completed by personnel with Class V construction job approval authority. If a qualified inspector is not available, an inspector with Class IV approval authority may be used with supervision of a Class V inspector.

- There will be continuous inspection of the core trench excavation and the principal spillway installation. The core trench and principal spillway may not be backfilled without approval by the inspector.
- The rest of the project will be inspected periodically. Critical items include stripping of the foundation, earthfill placement and topsoiling. Stripping must be inspected before earthfill placement begins.

Stoeser WHIP Pond
Drainage Area= 1299 Acres
890 Ac. Cropped 409 Ac. Grass/Hayland
Watershed Length= 13,970'
A. Roman 7/12/06
Sec.30-T5N-R29W



Location Map for Water Right Application
A. Roman 9/11/06



1000 0 1000 2000 3000 4000 Feet

United States Department of Agriculture



Natural Resources Conservation Service
Field Support Office
1717 North Lincoln Avenue, Suite #104
Pierre, SD 57501-1258

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

September 6, 2006

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

To Whom It May Concern:

Attached are plans, specifications, and design data for a dam for Bernard Stoesser in Stanley County. Mr. Stoesser will be sending in the water rights permit application soon. The producer wishes to construct this dam this summer, your promptness is greatly appreciated.

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

A handwritten signature in blue ink that reads "Angela Roman".

ANGELA D. ROMAN
Agricultural Engineer

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Attachments

cc: Dana Edwards, Civil Engineer, NRCS, Pierre, SD
Bernard Stoesser, Landowner, Pierre, SD, without attachments



U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

**CONSTRUCTION PLANS AND SPECIFICATIONS
FOR
BERNARD STOESER**

Pond-378
Section 30 T5N R29E

Prepared by:

USDA-NATURAL RESOURCES CONSERVATION SERVICE
Pierre Field Support Office
605-224-2476, ext. 5

Assisting:

Stanley County Conservation District

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

1-800-781-7474

CLEARING AND GRUBBING (SD-2)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Protection of Existing Vegetation

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

3. Marking

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

4. Clearing and Grubbing

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

5. Disposal

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

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

STRIPPING (SD-4)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. General

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

3. Foundation Stripping

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

4. Borrow Area Stripping

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

EXCAVATION (SD-5)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Classification

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

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

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

3. Use of Excavated Materials

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

4. Disposal of Waste Materials

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

5. Excavation Limits

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

7. Borrow Excavation

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

EARTH FILL-CLASS S (SD-7S)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Materials

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

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

3. Foundation Preparation

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

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

4. Placement

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

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

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

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

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

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

DRAINFILL AND FILTER (SD-9)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Materials

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

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

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

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

3. Subgrade Preparation

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

4. Placement

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

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

SALVAGING AND SPREADING TOPSOIL (SD-10)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Quality of Topsoil

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

3. Excavation

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

4. Spreading

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

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

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

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

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Materials

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

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

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

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

3. Concrete Mix Design

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

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

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

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

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

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

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

4. Concrete Forms

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

5. Placing Concrete

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

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

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

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

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

6. Curing

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

7. Defective Concrete

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

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

STEEL REINFORCEMENT (SD-13)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Materials

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

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

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

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

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

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

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

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

3. Cutting and Bending

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

4. Splicing Bar Reinforcement

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

5. Splicing Welded Wire Fabric

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

6. Placing

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

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

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

WOOD FABRICATION AND INSTALLATION (SD-16)

CONSTRUCTION SPECIFICATION

1. Scope

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

2. Plywood Material

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

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

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

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

3. Structural Timber and Lumber Material

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

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

Cresote

Pentachlorophenol

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

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

4. Metal Hardware

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

5. Installation

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

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

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

SEEDING (SD-28)
CONSTRUCTION SPECIFICATION

1. Scope

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

2. General

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

Dates:

upon completion of the pond

3. Fertilizer

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

Types and rates:

N/A

4. Seed

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

20 lbs pk per acre

5. Seedbed Preparation

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

6. Cover and/or Nurse Crops

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

N/A

7. Sowing Seed

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

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

8. Mulching

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

SEEDING PLAN AND RECORD

MLRA

63A

Cooperator

Bern Stoeser

Cons. District **Stanley**

Program

WHIP

Practice No. 550

Practice Name: Range Seeding

CI or Referral No.

Seeded by:

PLANNED**APPLIED**

Field Number	1	
Seedbed Preparation	Clean, smooth, weed free seedbed will be prepared	
Seeding Equipment	Broadcast and drag	
Acres	2	
Date Planted	Late Summer 8/1 to 9/1	
Ecological Site or Forage Group	Cy	
Protection Provided	Clip weeds before they compete for moisture and light	

PLANNED[illegible]

APPLIED

1/ The origin of **Common** seed must be ND, SD, NE, MT, WY, MN, or IA

[illegible]

* Pubescent wheatgrass may be substituted for Intermediate wheatgrass at any time.

** Thickspike wheatgrass may be substituted for western wheatgrass if the later is not available and only west of the Missouri River. Multiply the western wheatgrass seeding rate by .72

LOCATION MAP

LOCATION NAME	

N

S.

T.

B.

Tract

Planning Assistance By:

Kevin Paulsen

8/10/2006

(Name and Date)

Practice Meets SD Standards and Specifications:

Yes

No

Certified By:

(Name and Date)

Recheck of Quantities By:

(Name and Date)

PLASTIC PIPE (SD-55)
MATERIAL SPECIFICATION

1. Scope

This specification covers the quality of Poly Vinyl Chloride (PVC), Polyethylene (PE), High Density Polyethylene (HDPE), and Acrylonitrile-Butadiene-Styrene (ABS) plastic pipe, fittings, and joint materials.

2. Material

The pipe and fittings shall be free of visible cracks, holes, foreign inclusions, or other defects, and shall have dimensions measured as prescribed in ASTM D2122. Joints and fittings shall be as described in the pipe AWWA or ASTM specification and shall be compatible with and have pressure ratings at least equal to the specified pipe. Rubber gaskets for pipe joints shall conform to ASTM F477 Elastomeric Seals (Gaskets for Joining Plastic Pipe). Except as otherwise specified, pipe must conform to the following specifications.

Poly vinyl chloride (PVC) Pipe

Plastic pipe - Schedule 40, 80, or 120	ASTM D1785 or D2466
Pressure rated pipe - SDR Series	AWWA C900 or ASTM D2241
Plastic drain, waste, and vent pipe and fittings	ASTM D2665
Composite sewer pipe	ASTM D2680
Type PSM PVC sewer pipe and fittings	ASTM F3034
Large-diameter gravity sewer pipe and fittings	ASTM F679
Smooth-wall Underdrain Systems for Highway, Airport, and Similar Drainage	ASTM F758
Type PS-46 gravity flow sewer pipe and fittings	ASTM F789
Profile gravity sewer pipe and fittings based on controlled inside diameter	ASTM F794
Corrugated sewer pipe with a smooth interior and fittings	ASTM F949
Pressure pipe, 4-inch through 12-inch for water distribution	AWWA C900
Water transmission pipe, nominal diameters 14-inch through 36-inch	AWWA C905

Polyethylene (PE) pipe

Schedule 40	ASTM D2104
SIDR-PR based on controlled inside diameter	ASTM D2239
Schedules 40 and 80 based on outside diameter	ASTM D2447
SDR-PR based on controlled outside diameter	ASTM D3035

High density polyethylene (HDPE) pipe

Plastic pipe and fittings	ASTM D3350
SDR-PR based on controlled outside diameter	ASTM F714
Plastic moldings and extrusion compounds	ASTM D1248
Heat joining polyolefin pipe and fittings	ASTM D2657

Acrylonitrile-butadiene-styrene (ABS) pipe

Plastic pipe, schedules 40 and 80

ASTM D1527

Plastic pipe, SDR-PR

ASTM D2282

Schedule 40 plastic drain, waste, and vent pipe

ASTM D2661

Composite sewer pipe

ASTM D2680

Sewer pipe and fittings

ASTM 2751

3. Perforations

Except as otherwise specified, perforations of perforated pipe shall meet the following requirements.

- a. Perforations may be circular or slots, but must be free of materials that reduce effective openings.
- b. Circular perforations shall be 3/16 to 5/16 inch diameter holes arranged in rows parallel to the axis of the pipe. Center-to-center perforation spacing along rows shall not exceed 2.5 inches. Perforations may appear at the ends of short and random lengths.
Rows shall be arranged in equal groups at equal distance from pipe bottom vertical centerline. Lowermost rows shall be separated by 60 to 125 degrees. Uppermost rows shall be separated by an arc of 166 degrees or less. Other rows shall be uniformly spaced.
- c. Slot perforations shall be located within two rows, with one row in each of the lower quadrants of the pipe. Slots shall be no wider than 1/8 inch and spaced no more than 1.5 inches apart.
- d. Row numbers and minimum openings must be as follows.

Nominal pipe size, inch	Perforations		Minimum opening/foot, square inches
	Minimum number of rows circular	slot	
3 to 4	2	2	0.22
6 to 10	4	2	0.44
12 or larger	6	2	0.66

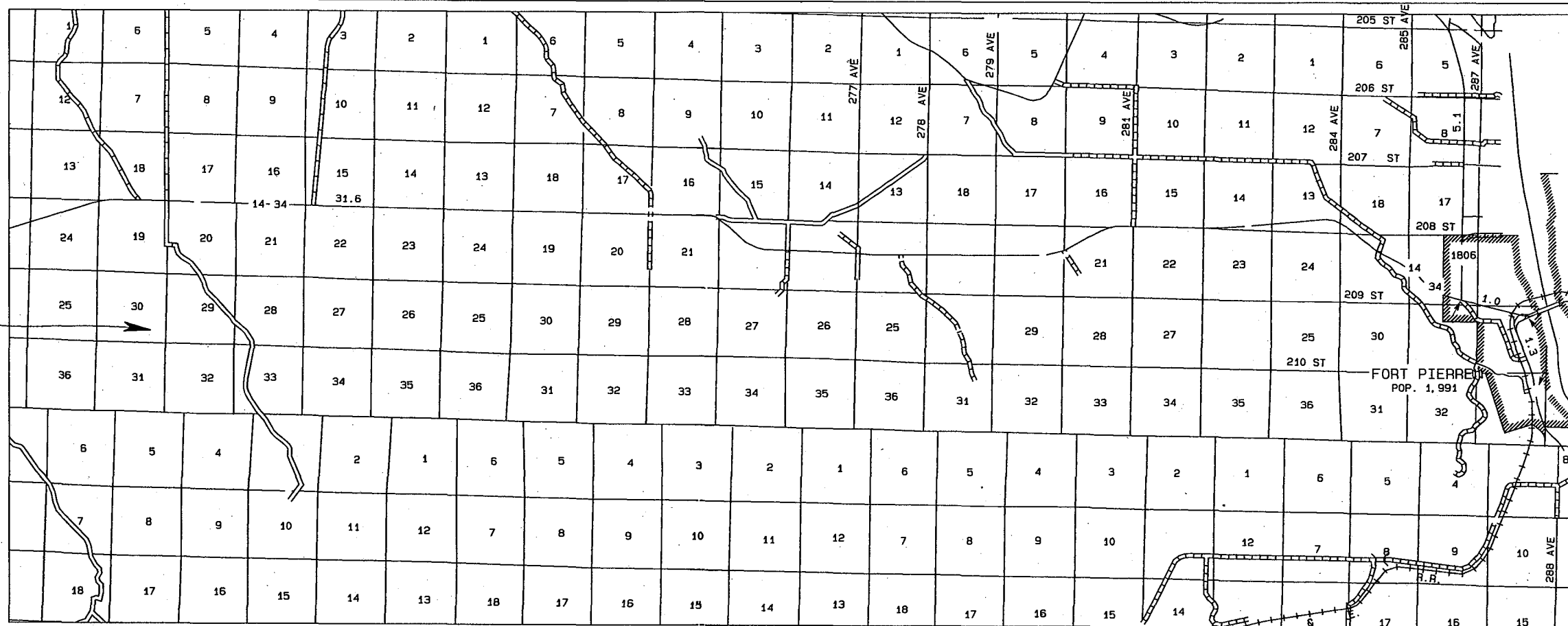
4. Potable use pipeline

Pipelines specified for use to carry potable water shall meet requirements of the National Sanitation Foundation (NSF).



Contact Information
Bernard Stoesser
4305 Sandwedge Drive
Pierre, SD 57501
605-224-4840

Hazard Class A
Job Class V



- 1. A preconstruction meeting is required before construction between NRCS, the Landowner, and the contractor.**
- 2. Water Rights Permit and Location Notice is required by South Dakota Department of Environment and Natural Resources. This is the responsibility of the landowner.**

ITEM	UNIT	QUANTITY	'AS BUILT' QUANTITY
Excavation			
Core Trench	cu. yd.	1,152	
Earthfill Class S	cu. yd.	12,124	
Topsoil	sq. yd.	5,538	
Seeding	acre	2.3	
60" dia. x 4' deep concrete drop structure	each	1	
30" dia. dual wall smooth lined PE pipe	lin. ft.	110	
4" PVC Perforated Pipe (SCH 40 min)	lin. ft.	12	
4" PVC NON Perforated Pipe (SCH 40 min)	lin. ft.	70	
Fine Drainfill	cu.yd.	15	
Timber Structure	BD.FT.	172	

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

Clearing and Grubbing
Stripping
Excavation
Earth Fill, Class S
Drain Fill and Filter
Salvaging and Spreading Topsoil
Concrete for Minor Structures
Steel Reinforcement
Wood Fabrication and Installation
Seeding
Plastic Pipe

SD-2
SD-4
SD-5
SD-7
SD-9
SD-10
SD-12B
SD-13
SD-16
SD- 28
SD-55

Drainage Area
Time of Concentration
Runoff Curve Number

Principal Spillway, 2 yr, 24-hr. Rainfall
Emergency Spillway 50 yr, 24-hr. Rainfall

1,299 Acres
2.4 hours
83

Principal Spillway Discharge at ES
Emergency Spillway Discharge

113 CFS
924 CFS

Estimated 20 year Sediment Yield	Estimated Sediment Yield Below Crest	Estimated Sediment Yield Above Crest
1000	500	500
2000	1000	1000
3000	1500	1500
4000	2000	2000
5000	2500	2500
6000	3000	3000
7000	3500	3500
8000	4000	4000
9000	4500	4500
10000	5000	5000

36.48 AcFt
29.18 AcFt
7.30 AcFt

**Crest of Normal Pool
Crest of Emergency Spillway
Top of Dam**

9.16 Acres 40.3 AcFt
14.01 Acres 72.5 AcFt
20.85 Acres 127.8 AcFt

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

RECEIVED
SEP - 7 2006
WATER RIGHTS
PROGRAM

Approved by: [Signature]
Title: SCE

Title: _____

Date: 8/10/06
 Designed by: A. Roman
 Drawn by: A. Roman
 Traced by: D. Edwards
 Checked by: 8/25/06

NRCS NATURAL RESOURCES
CONSERVATION SERVICE

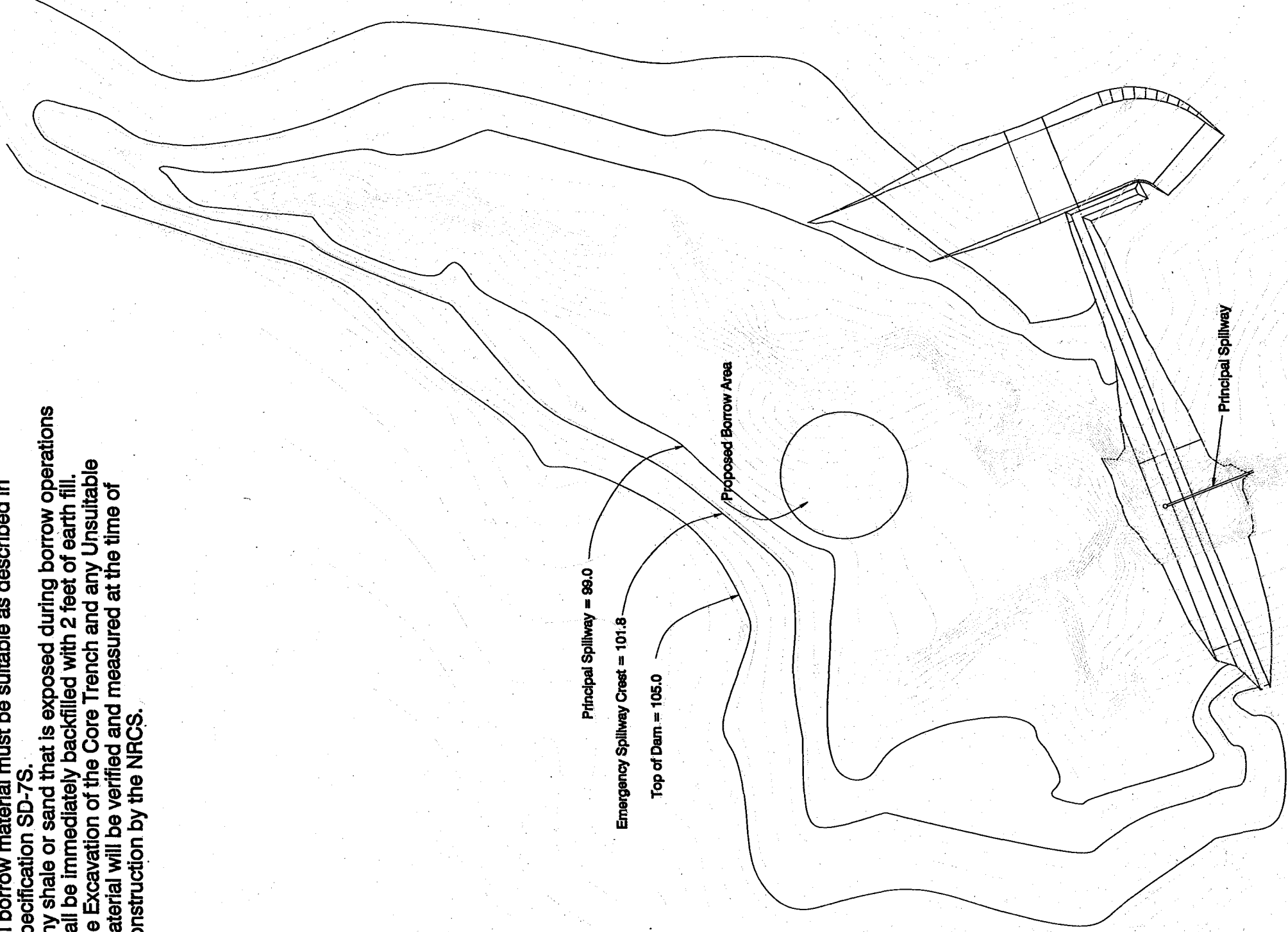
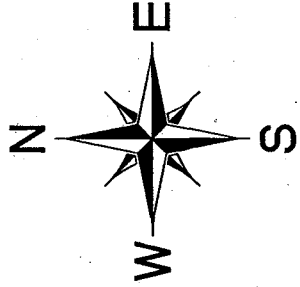
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
1717 North Lincoln Avenue Suite #104
PIERRE, SOUTH DAKOTA 57501

Bernard Stoesser
SE 1/4, Sec. 30, T5N, R29E
Stanley County, South Dakota

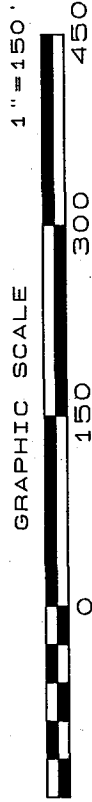
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StoeserWHP.pro
Sheet No: 1 of 9

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 embankment downstream of elevation 97.7, to a depth of not less than 0.5 feet.
4. Topsoil quantity based only on emergency spillway volume. Topsoil on embankment is subsidiary to earthfill.
5. All borrow material must be suitable as described in Specification SD-7S.
6. Any shale or sand that is exposed during borrow operations shall be immediately backfilled with 2 feet of earth fill.
7. The Excavation of the Core Trench and any Unsuitable Material will be verified and measured at the time of construction by the NRCS.



1' Contour Intervals



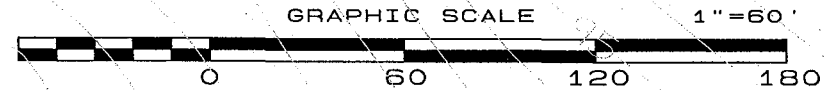
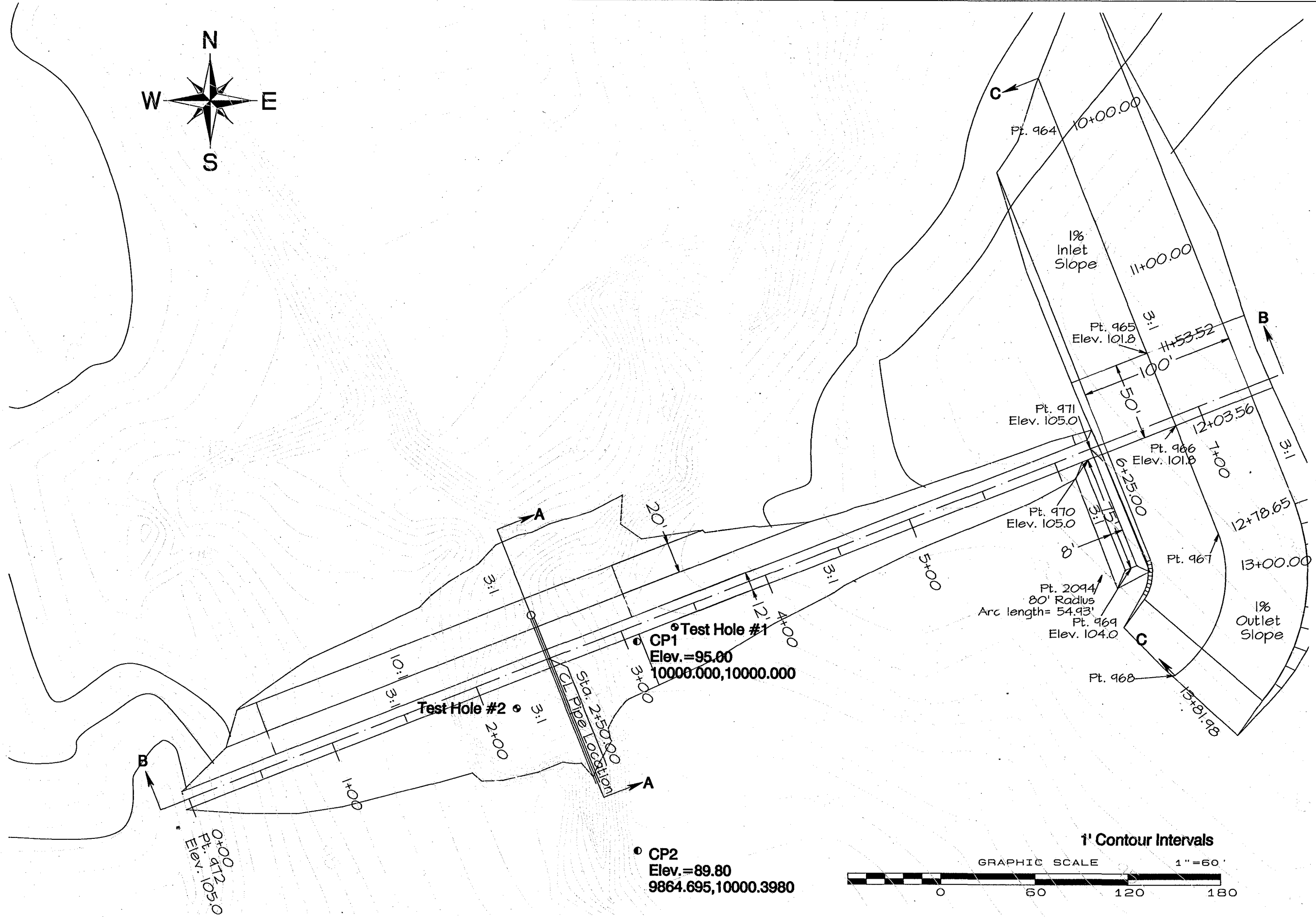
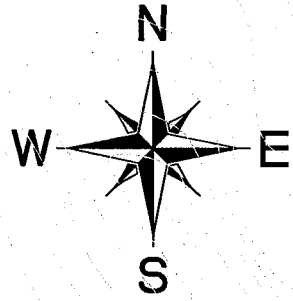
Bernard Stoesser
SE 1/4, Sec. 30, T5N, R29E
Stanley County, South Dakota

 **NATURAL RESOURCES
CONSERVATION SERVICE**

USDA-NRCS PIERRE FIELD SUPPORT OFFICE
1717 North Lincoln Avenue Suite #104
PIERRE, SOUTH DAKOTA 57501-1258

Designed by: A. Roman 7/24/06
Drawn by: A. Roman 9/6/06
Traced by: _____
Checked by: _____

Date: _____
Approved by: _____
Title: _____
Title: _____

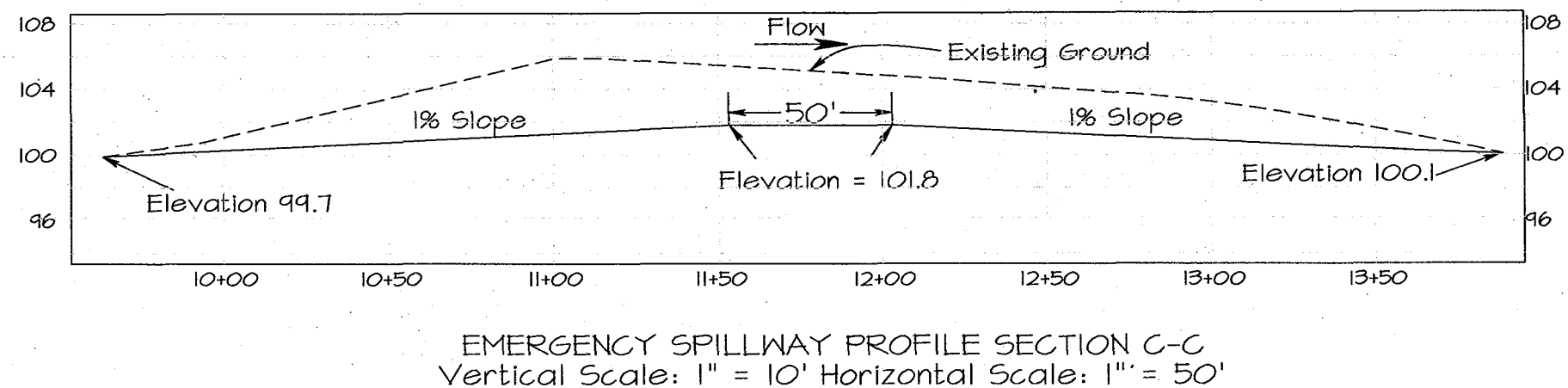
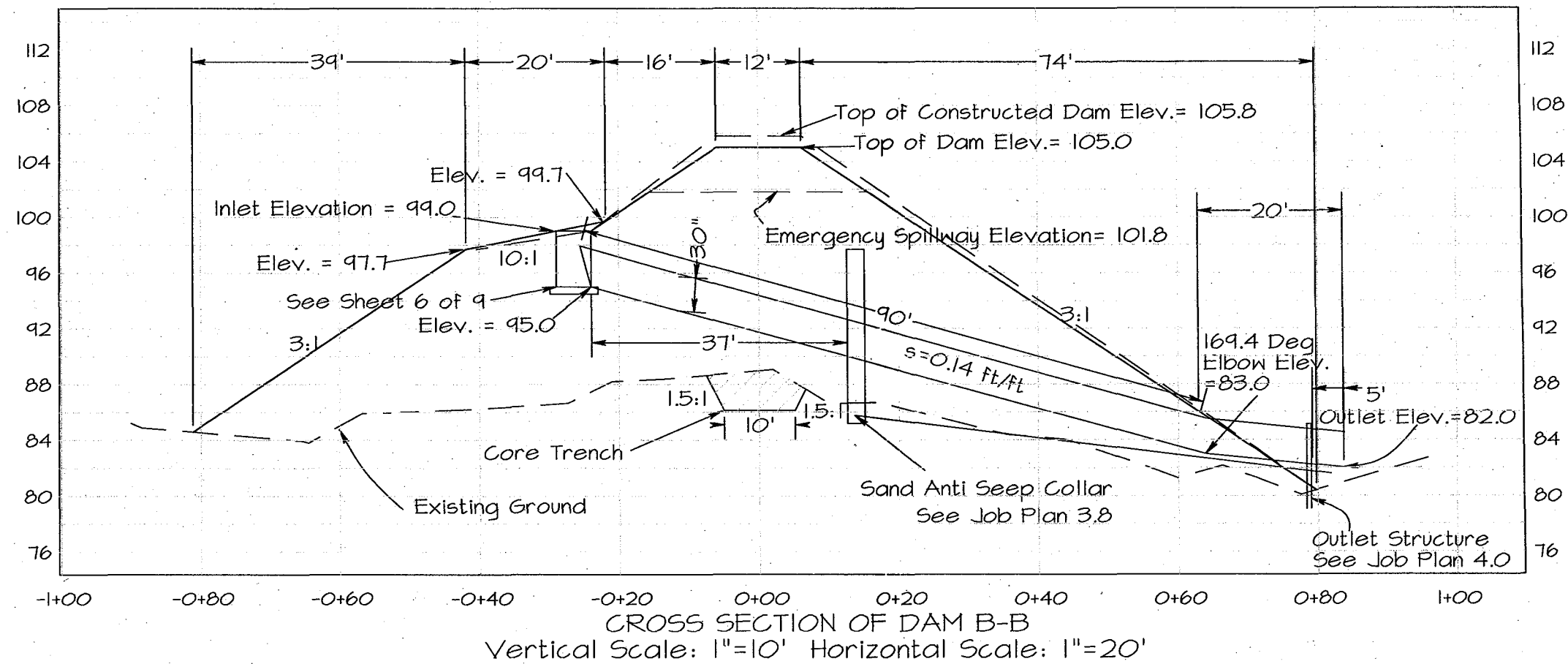


Approved by: _____
Title: _____
Date: 7/24/06
Designed by: A. Roman
Drawn by: A. Roman
Traced by: _____
Checked by: _____

NRCS NATURAL RESOURCES
CONSERVATION SERVICE
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
1717 North Lincoln Avenue Suite #104
PIERRE, SOUTH DAKOTA 57501-1258

Bernard Stoesser
SE 1/4, Sec. 30, T5N, R29E
Stanley County, South Dakota

Drawing No:
Stoesser\WIP.pro
Sheet No: 3 of 9



Note: Excavation of Emergency Spillway (4,590 CY) and Stripping (940 CY) is subsidiary to Earth Fill.

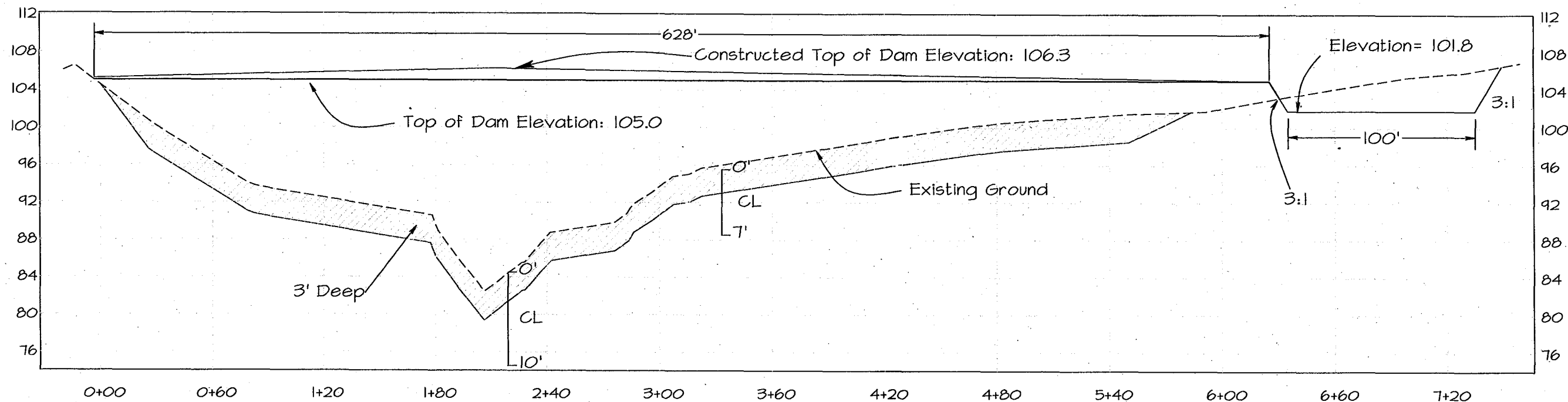
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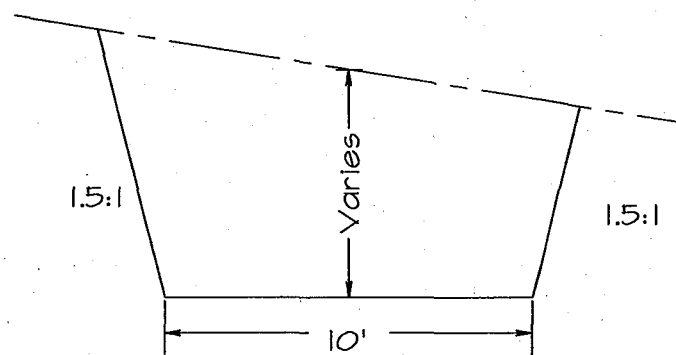
NRCS NATURAL RESOURCES
CONSERVATION SERVICE
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
1717 North Lincoln Avenue Suite #104
PIERRE, SOUTH DAKOTA 57501-1258

Bernard Stoesser
SE 1/4, Sec. 30, T5N, R29E
Stanley County, South Dakota

Drawing No:
Stoesser/WHIP.pro
Sheet No: 4 of 9



DAM PROFILE A-A
Vertical Scale: 1"= 12' Horizontal Scale: 1"=60'

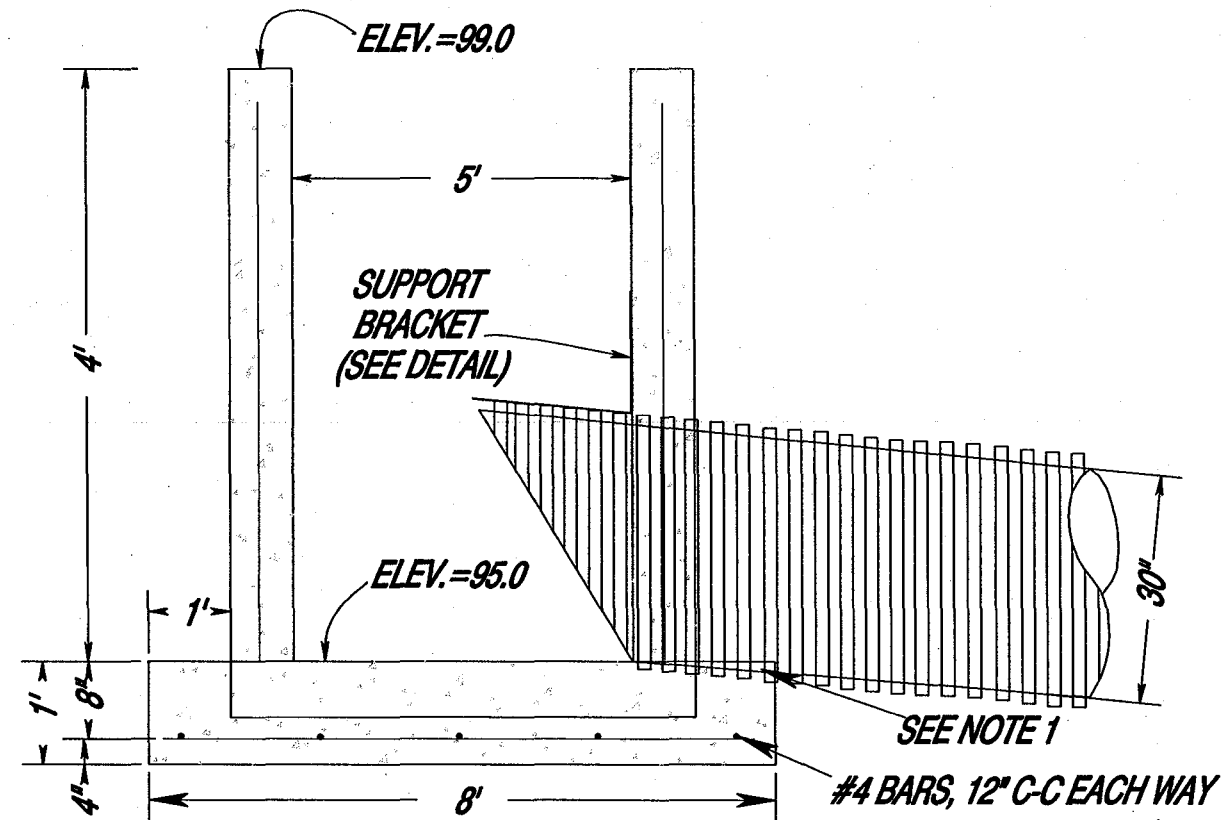


TYPICAL CORE TRENCH
Dam Centerline - 1.5 Side Slopes
(NOT TO SCALE)

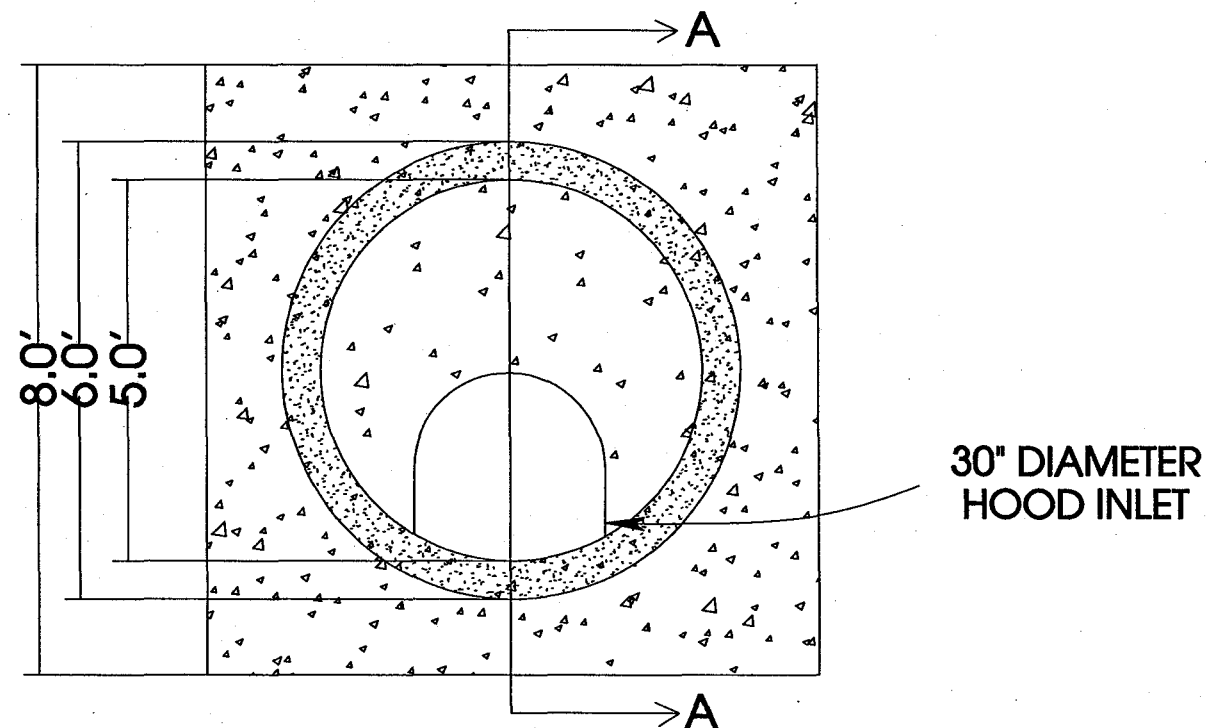
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Pt #	Northing	Easting	Elevation	Descriptor
983	10000.0000	10000.0000	95.00	cpl
1294	9864.6950	10000.3980	89.80	cp2

Coordinate Table				
Pt #	Northing	Easting	Elevation	Descriptor
964	10330.1707	10272.8940		CL Emergency Spillway
965	10187.3524	10329.0486	101.80	CL Emergency Spillway
966	10140.8201	10347.3446	101.80	CL Emergency Spillway
967	10052.5980	10328.4666		CL Emergency Spillway
968	9960.7203	10299.6717		CL Emergency Spillway
969	10048.7960	10318.2621	104.00	CL End Dike
970	10118.5944	10290.8180	105.00	CL Begin Dike
971	10125.6420	10292.3451	105.00	CL Dam Sta. 5+75
972	9896.9414	9710.6914	105.00	CL Dam Sta. 0+00

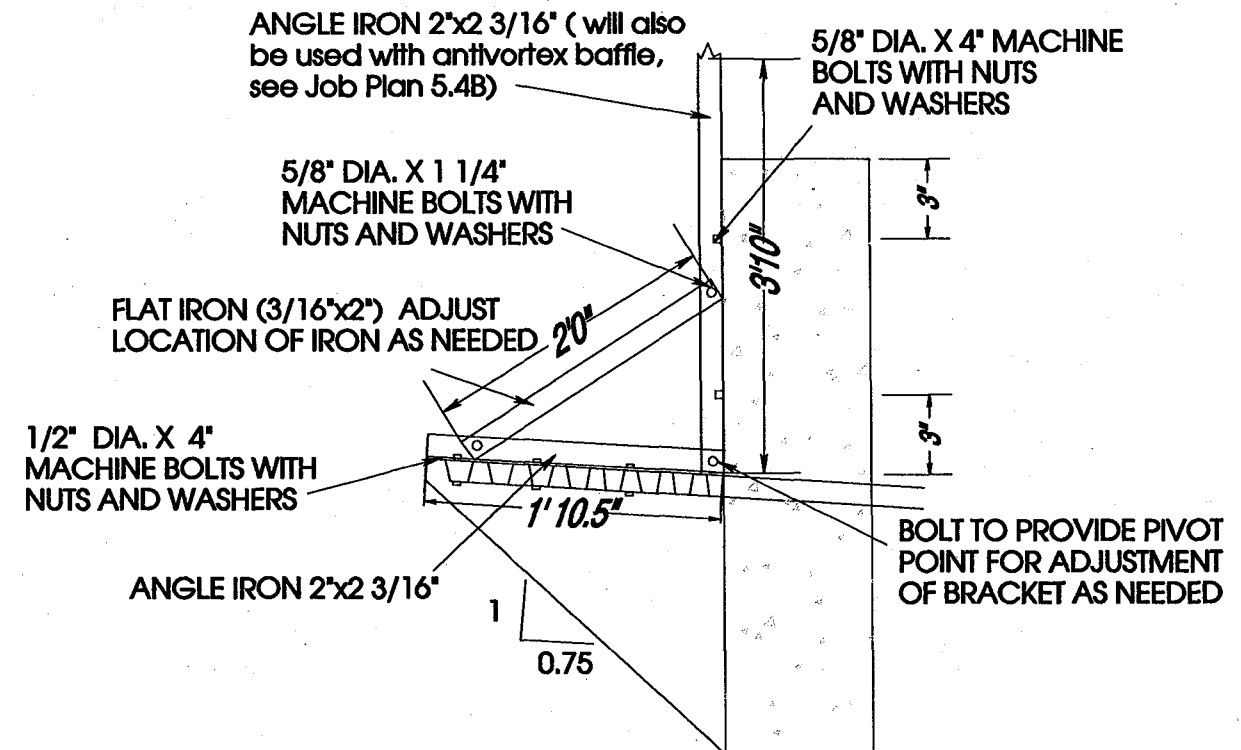
Radius Point				
Pt #	Northing	Easting	Elevation	Descriptor
2094	10044.0632	10299.6325		80' Rad.



SECTIONAL ELEVATION A-A



PLAN VIEW



SUPPORT BRACKET DETAIL

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 2.4 CY CONCRETE.

CONCRETE RISER
AND PE HOOD INLET
COMBINATION

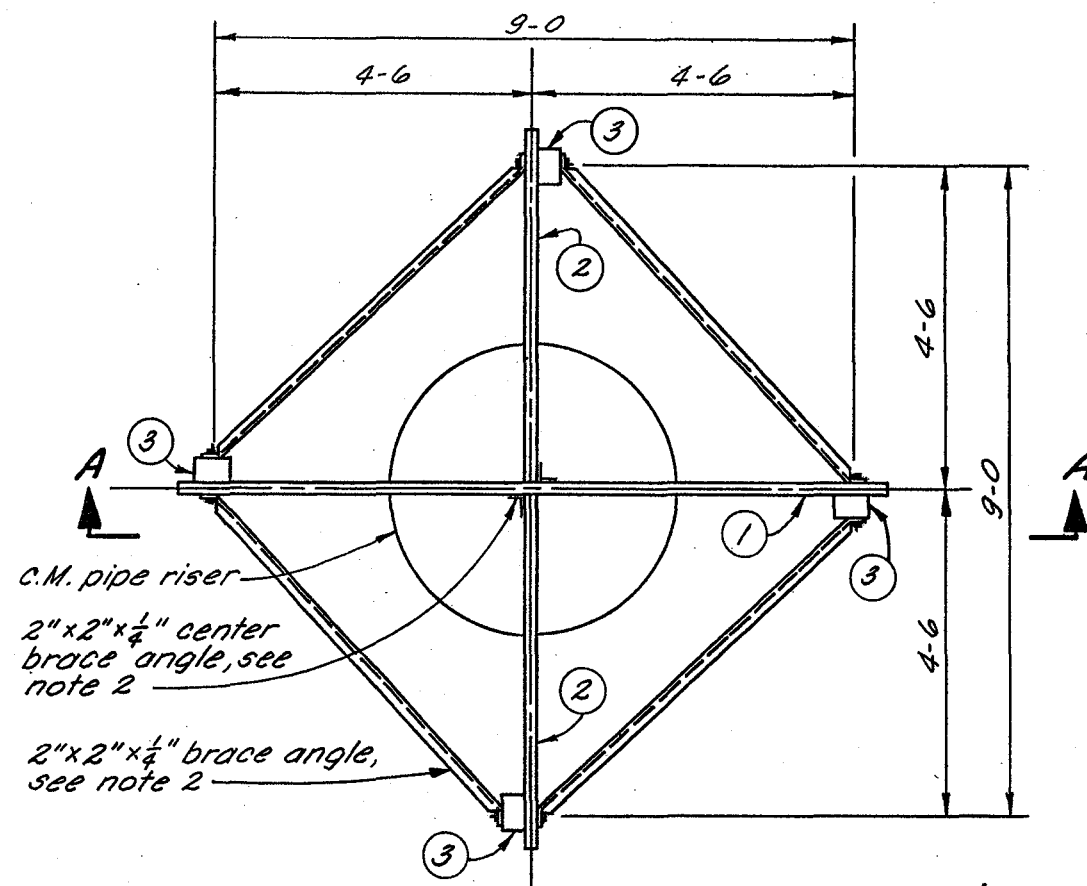
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Title: _____

Date: 1/24/06
Designed by: A. Roman
Drawn by: A. Roman
Traced by: _____
Checked by: _____

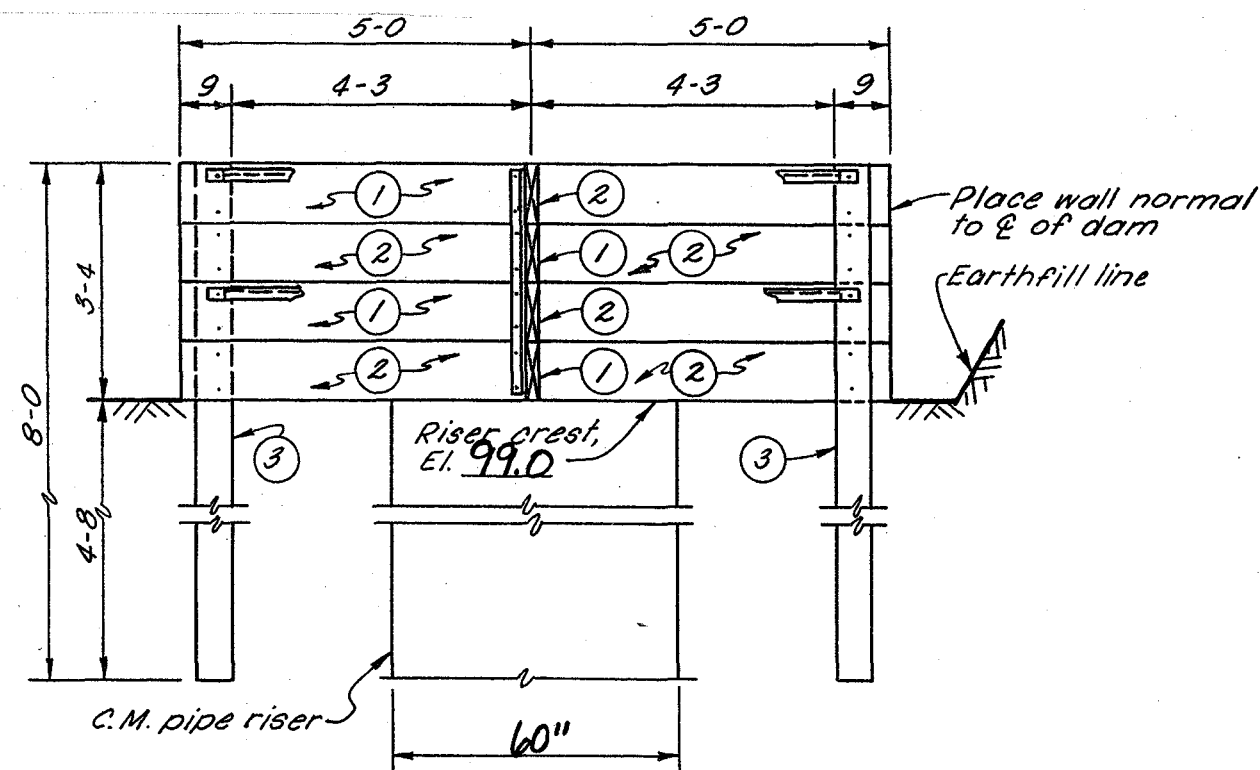
NRCS NATURAL RESOURCES
CONSERVATION SERVICE
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
1717 North Lincoln Avenue Suite #104
PIERRE, SOUTH DAKOTA 57501-1258

Bernard Stoesser
SE 1/4, Sec. 30, T5N, R29E
Stanley County, South Dakota

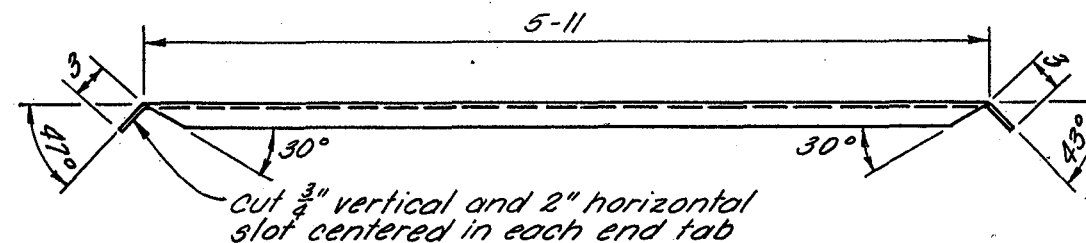
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Sheet No: 6 of 9



PLAN VIEW



SECTIONAL ELEVATION A-A



PLAN VIEW OF BRACE ANGLE

TABLE OF QUANTITIES

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

NOTES:

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

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

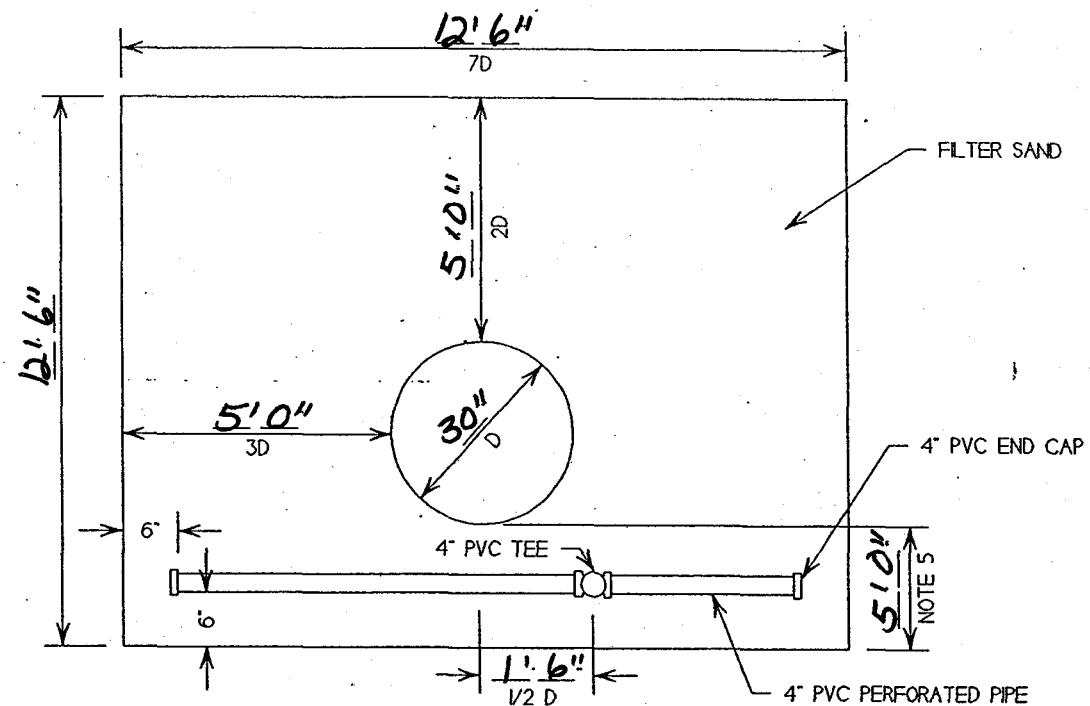
OPERATOR: Bernard Strosier
CONSERVATION DISTRICT: Stanley Cty.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

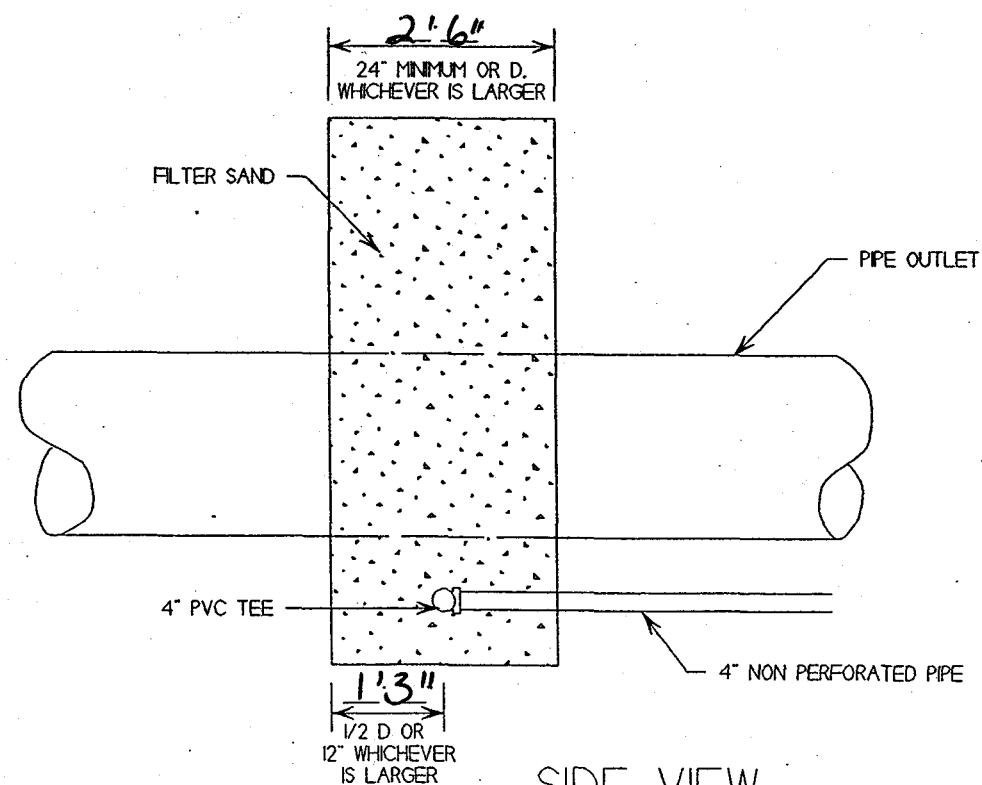
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Drawn: A. Roman 7/24/06 Title:
Traced: WMP 8/1/06 Title:
Checked: D. Edwards 8/1/06 Sheet: 7 Drawing No.: 9

JOB PLAN NO. 6.4

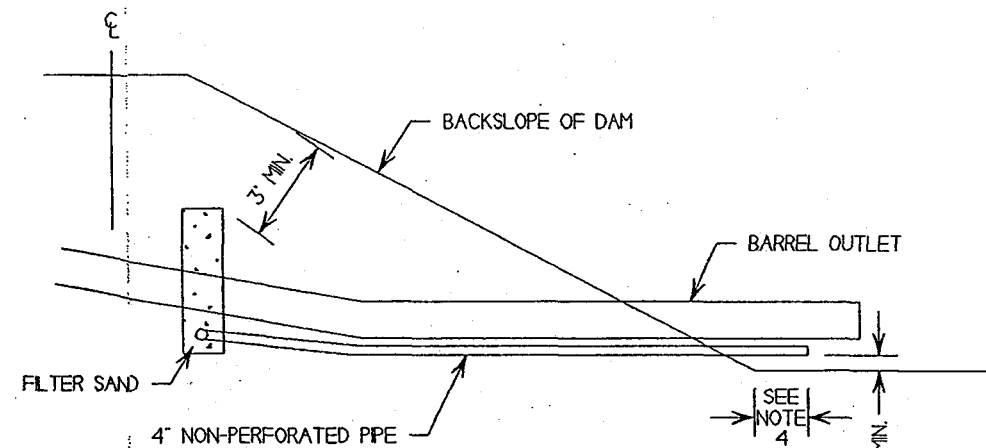
5, N-29, 073.6-4a



UPSTREAM VIEW



SIDE VIEW



OUTLET DETAIL

FILTER GRADATION

SIEVE SIZE	PERCENT PASSING
3/8"	100
4	85-100
8	80-100
16	50-85
30	25-60
50	10-30
100	2-10

- NOTE: 1. THE 4" DIA. PIPE SHALL BE SDR 35 PVC OR STRONGER.
2. PROVIDE AN ANIMAL GUARD ON DRAIN OUTLET PIPE. DRILL 2-2 1/2" HOLES ON G. 6" FROM END OF PIPE AND PLACE A 3/8" DIA. 5 1/2" LONG GALVANIZED STEEL BOLT THRU THEM AND SECURE WITH A NUT (PLACE BOLT HORIZONTAL).
3. FILTER SAND WILL BE CLEAN CONCRETE SAND.
4. 4" PIPE WILL BE SECURED TO PIPE SUPPORT AND EXTEND A MIN. OF 2' BEYOND SUPPORT.
5. DISTANCE EQUALS 18" MINIMUM IF BARREL AND 4" PIPE ARE LOCATED IN ORIGINAL FOUNDATION MATERIAL AND 2D MINIMUM IF LOCATED IN FILL MATERIAL FOR DAM.
6. INSTALL COLLAR IN LOWER SEGMENT OF MIDDLE 1/3 OF DAM CROSS SECTION INTERCEPTED BY THE PRINCIPAL SPILLWAY.

LIST OF MATERIALS

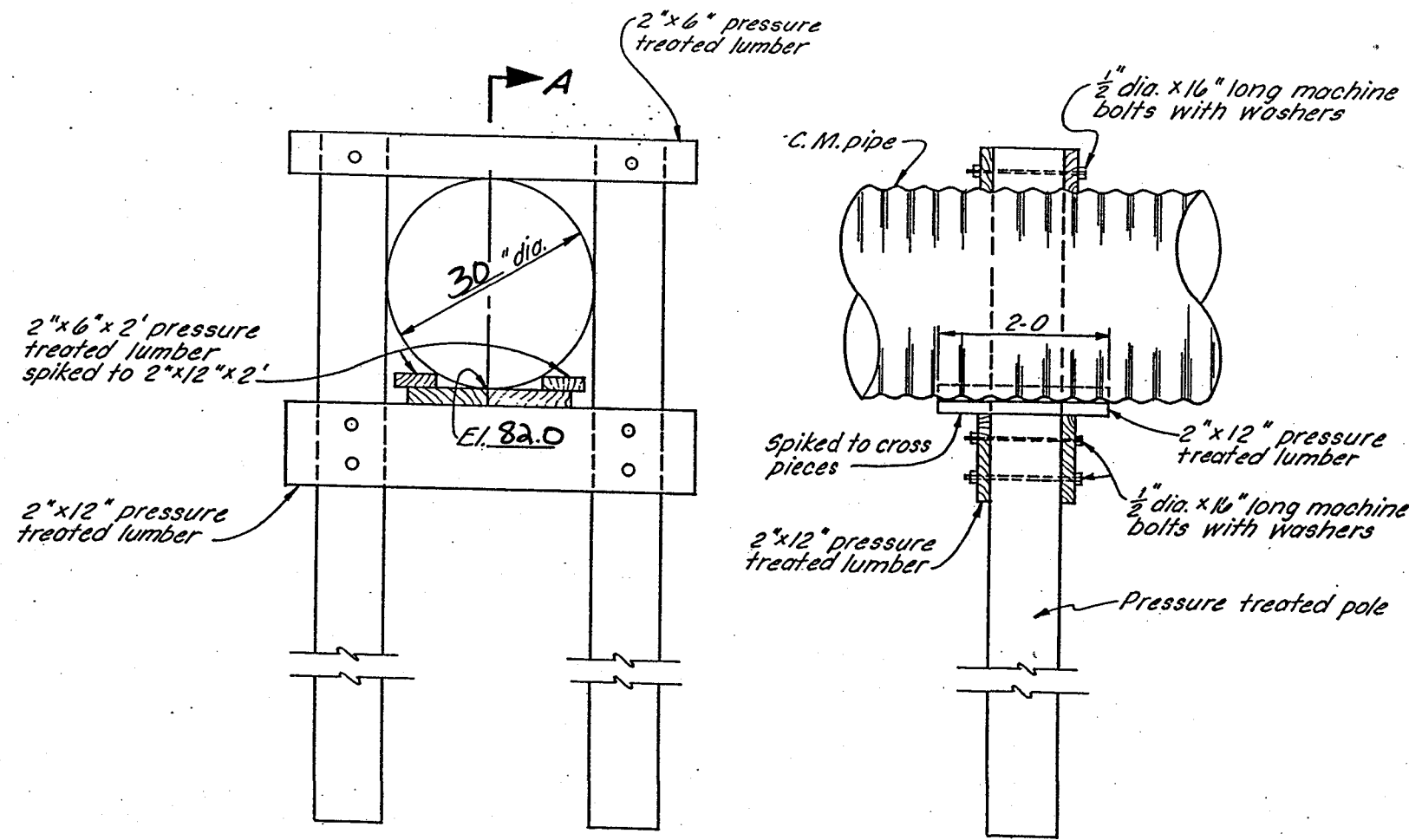
ITEM NO.	ITEM	UNIT	QUANTITY
1	4" PVC PERFORATED PIPE	lf.	12
2	4" PVC NON-PERFORATED PIPE	lf.	70
3	4" PVC END CAP	ea.	2
4	4" PVC TEE	ea.	1
5	SAND	cy.	15
6	ANIMAL GUARD (see note 2)	ea.	1

SAND ANTISEEP COLLAR

Bernard Stoesser
Stanley County
South Dakota

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

DESIGNED BY *A. Roman 7/20/06* APPROVED BY _____
DRAFTED BY *A. Roman* TITLE _____
DATE *7/20/06* SHEET *8* OF *9* DWG NO. *sandasep.gcd*



ELEVATION
SECTIONAL ELEVATION A-A

TABLE OF QUANTITIES

ITEM	LENGTH FOR 30" DIA. PE PIPE	UNIT	QUANTITY	BD. FT.
PRESSURE TREATED POLE 10" DIA.	10'	EACH	2	130
2" X 12" PRESSURE TREATED LUMBER	5'	EACH	2	20
2" X 6" PRESSURE TREATED LUMBER	5'	EACH	2	10
2" X 12" PRESSURE TREATED LUMBER	2'	EACH	2	8
2" X 6" PRESSURE TREATED LUMBER	2'	EACH	2	4
1/2" DIA. MACHINE BOLTS WITH NUTS	16"	EACH	6	
1/2" DIA. WASHERS		EACH	12	

172 BD. FT.

NOTES:

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

REFERENCE: GUIDE PLAN NO. 4.0

JOB PLAN NO. 4.0

TIMBER PIPE SUPPORT			
OPERATOR: <u>Bernard Storer</u>			
CONSERVATION DISTRICT: <u>Stanley City</u>			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed by <u>A. Roman</u> 8/8/06	Date <u>8/8/06</u>	Approved by _____	
Drawn <u>A. Roman</u> 8/8/06	Title _____	Title _____	
Traced <u>W. M. T.</u> 8/8/06	Sheet No. <u>9</u>	Drawing No. _____	
Checked <u>D. Edwards</u> 8/8/06	of <u>9</u>		

5, N-29,073.4a

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

STROESER, STANLEY COUNTY
 TRIB. TO ASH CRK, TRIB TO BAD

	IBC	ISH	JNK	IDAM	IPLT	IREC
	1	0	0	0	1	0
	HDE	BME	VOL	SA	BW	TFM
QO						
1.						
C4	1889.5	1865.0	118.	19.8	69.7	12.6
C5	NS= 7	NCS= 6	CMS=.50	DISTTN= 8.34		
	X-S NO. 1					
C6- 1	D= .00	FLD= .12				
C7-1	HS= 1865.00	BS= 0.	BSS=	0.	CM= .060	
C7-2	HS= 1873.00	BS= 52.	BSS=	0.	CM= .060	
C7-3	HS= 1877.00	BS= 145.	BSS=	0.	CM= .060	
C7-4	HS= 1881.00	BS= 265.	BSS=	0.	CM= .060	
C7-5	HS= 1885.00	BS= 425.	BSS=	0.	CM= .060	
C7-6	HS= 1891.00	BS= 720.	BSS=	0.	CM= .060	
	X-S NO. 2					
C6- 2	D= .76	FLD= 6.00				
C7-1	HS= 1834.50	BS= 0.	BSS=	0.	CM= .060	
C7-2	HS= 1835.00	BS= 5.	BSS=	0.	CM= .060	
C7-3	HS= 1840.00	BS= 92.	BSS=	0.	CM= .060	
C7-4	HS= 1850.00	BS= 198.	BSS=	0.	CM= .060	
C7-5	HS= 1860.00	BS= 576.	BSS=	0.	CM= .060	
C7-6	HS= 1870.10	BS= 890.	BSS=	0.	CM= .060	
	X-S NO. 3					
C6- 3	D= 1.49	FLD= 6.00				
C7-1	HS= 1796.00	BS= 0.	BSS=	0.	CM= .060	
C7-2	HS= 1800.00	BS= 56.	BSS=	0.	CM= .060	
C7-3	HS= 1810.00	BS= 151.	BSS=	0.	CM= .060	
C7-4	HS= 1820.00	BS= 307.	BSS=	0.	CM= .060	
C7-5	HS= 1830.00	BS= 508.	BSS=	0.	CM= .060	
C7-6	HS= 1840.00	BS= 679.	BSS=	0.	CM= .060	
	X-S NO. 4					
C6- 4	D= 2.27	FLD= 3.00				
C7-1	HS= 1768.00	BS= 0.	BSS=	0.	CM= .060	
C7-2	HS= 1770.00	BS= 59.	BSS=	0.	CM= .060	
C7-3	HS= 1780.00	BS= 134.	BSS=	0.	CM= .060	
C7-4	HS= 1790.00	BS= 229.	BSS=	0.	CM= .060	
C7-5	HS= 1800.00	BS= 504.	BSS=	0.	CM= .060	
C7-6	HS= 1810.00	BS= 655.	BSS=	0.	CM= .060	
	X-S NO. 5					
C6- 5	D= 5.26	FLD= 3.00				
C7-1	HS= 1691.00	BS= 0.	BSS=	0.	CM= .060	
C7-2	HS= 1700.00	BS= 128.	BSS=	0.	CM= .060	
C7-3	HS= 1710.00	BS= 372.	BSS=	0.	CM= .060	
C7-4	HS= 1720.00	BS= 597.	BSS=	0.	CM= .060	
C7-5	HS= 1730.00	BS= 798.	BSS=	0.	CM= .060	
C7-6	HS= 1740.00	BS= 861.	BSS=	0.	CM= .060	
	X-S NO. 6					
C6- 6	D= 6.30	FLD= 3.00				
C7-1	HS= 1658.00	BS= 0.	BSS=	0.	CM= .060	
C7-2	HS= 1660.00	BS= 52.	BSS=	0.	CM= .060	
C7-3	HS= 1670.00	BS= 133.	BSS=	0.	CM= .060	
C7-4	HS= 1680.00	BS= 561.	BSS=	0.	CM= .060	

ELEV.(FT) (HS)	1796.0	1800.0	1810.0	1820.0	1830.0	1840.0
TWIDTHS(FT) (BS)	.0	56.0	151.0	307.0	508.0	679.0
INACTIVE TW(FT) (BSS)	.0	.0	.0	.0	.0	.0
MANNING N (CM)	.060	.060	.060	.060	.060	.060

CROSS SECTION NO. 4

REACH LENGTH (D) 2.27 MI

FLOOD DEPTH (FLD) 3.00 FT

ELEV.(FT) (HS)	1768.0	1770.0	1780.0	1790.0	1800.0	1810.0
TWIDTHS(FT) (BS)	.0	59.0	134.0	229.0	504.0	655.0
INACTIVE TW(FT) (BSS)	.0	.0	.0	.0	.0	.0
MANNING N (CM)	.060	.060	.060	.060	.060	.060

CROSS SECTION NO. 5

REACH LENGTH (D) 5.26 MI

FLOOD DEPTH (FLD) 3.00 FT

ELEV.(FT) (HS)	1691.0	1700.0	1710.0	1720.0	1730.0	1740.0
TWIDTHS(FT) (BS)	.0	128.0	372.0	597.0	798.0	861.0
INACTIVE TW(FT) (BSS)	.0	.0	.0	.0	.0	.0
MANNING N (CM)	.060	.060	.060	.060	.060	.060

CROSS SECTION NO. 6

REACH LENGTH (D) 6.30 MI

FLOOD DEPTH (FLD) 3.00 FT

ELEV.(FT) (HS)	1658.0	1660.0	1670.0	1680.0	1690.0	1700.0
TWIDTHS(FT) (BS)	.0	52.0	133.0	561.0	677.0	861.0
INACTIVE TW(FT) (BSS)	.0	.0	.0	.0	.0	.0
MANNING N (CM)	.060	.060	.060	.060	.060	.060

CROSS SECTION NO. 7

REACH LENGTH (D) 8.34 MI

FLOOD DEPTH (FLD) 3.00 FT

ELEV.(FT) (HS)	1608.0	1610.0	1620.0	1630.0	1640.0	1650.0
TWIDTHS(FT) (BS)	.0	52.0	104.0	380.0	577.0	861.0
INACTIVE TW(FT) (BSS)	.0	.0	.0	.0	.0	.0
MANNING N (CM)	.060	.060	.060	.060	.060	.060

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

NAME OF DAM: STROESER, STANELY COU NAME OF RIVER: TRIB. TO ASH CRK, TR

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)						
*****	*****	*****	*****	*****	*****	*****

.00	8919.	1880.25	15.25	.21	.00	.00
.12						
.76	6798.	1845.07	10.57	.35	.19	.51
6.00						
1.49	6189.	1807.04	11.04	.45	.29	.65
6.00						
2.27	5295.	1777.14	9.14	.60	.40	.90

3.00	5.26	3925.	1700.84	9.84	1.27	1.07	1.77
3.00	6.30	2818.	1665.90	7.90	1.76	1.57	2.47
3.00	8.34	2329.	1615.81	7.81	2.34	2.16	3.22
3.00							

ANALYSIS IS COMPLETE

STATE	SD	PROJECT	Stoesser, Stanley County		
BY	WMD	DATE	9/22	CHECKED BY	DATE
SUBJECT	Breach Routing			JOB NO.	314, Sec 30 T5N, R29E
				SHEET	1 OF 4

Stoesser is located in rural Stanley Co, on a trib to Ash Creek which is a Trib to BAD River

DATA Fields

$$\text{Top of Dam} = 104.5 = 1889.5 - \text{col. 1}$$

$$\text{LWRPT on Q} = 80 = 1865 \text{ USBS DATUM, col. 2}$$

Volume Reservoir in AC. Ft to Top of Dam

$$\text{Col. 3} = 118$$

col 4 Reservoir Surface Area 19.8 T.O.D.

col 5 Breach width, W_b

$$W_b = 9.5 K_o (V_r H)^{1/4}$$

$K_o = 1.0$ for overtopping
 0.7 for piping

$$= 9.5 (1.0) (118 \cdot 24.5)^{1/4}$$

$$= 9.5 (1.0) (7.33)$$

$$H = 104.5 - 80 = 24.5$$

$$= \underline{\underline{69.66}}$$

Time of Failure in minutes

$$T_f = 0.3 (V_r^{0.53}) / H_d^{0.9}$$

$H_d = \text{height of Dam}$

$$= 0.3 (118)^{0.53} / (24.5)^{0.9}$$

$$= 24.5$$

$$= 0.2113 \text{ hrs} = 12.6 \text{ minutes}$$

COMPUTATION SHEET

NRCS-ENG-523A Rev. 10-97

U. S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

STATE	SD	PROJECT	Stroeser Break Road		
BY	WMD	DATE	0/22	CHECKED BY	JOB NO.
SUBJECT	X-section				SHEET 2 OF 4

@ DAM

Distance 0

Channel Depth = 12

	Elev	Topwidth
88	1873	52
92	1877	145
96	1881	265
100	1885	425
106	1891	720

X-section 2

Dist = 0.756

Depth = 6

1834.5	0
1835	5
1840	92
1850	198
1860	576
1870	890

1066.7699 / 10 ft

~~1890 - 1850~~ 1840 - 1830

bottom channel = 1840

$$\begin{array}{r} - 5.5 \\ 1834.5 \end{array}$$

X-section 3 @ Ash Creek Distance 1.49 Depth 6

1796 0

Contour interval = $\frac{10'}{2092'}$

1800 56

$$1800 - 828 \left(\frac{10}{2092} \right) = 1796$$

1810 151

1820 307

1830 508

1840 679

COMPUTATION SHEET

NRCS-ENG-523A Rev. 10-97

U. S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

STATE	SD	PROJECT	Stoers Branch map	
BY	WMD	DATE	8/22/00	CHECKED BY
SUBJECT			DATE	JOB NO.
			SHEET 3	OF 4

X-Section #4	Below Ash Creek Confluence		
ETC	TD (Depth)	Dist 2.27	Depth 3
1768	0		
1770	59		
1780	134		
1790	229		
1800	504		
1810	655		
X-Section 5		Dist = 5.26	Depth = 3
1691	0		
1700	128		
1710	372		
1720	597		
1730	758		
1740	861		
X-Section 6		Dist = 6.32	Depth 3
1658	0	Brgh H ₂ O level = 1665.85	
1660	52	Depth = 7.9	
1670	133		
1680	561		
1690	677		
1700	750		

STATE	SD	PROJECT	Stoesser Breach		
BY	WMD	DATE	8/28/06	CHECKED BY	
SUBJECT					JOB NO.
					SHEET 4 OF 4

X Section 7

Dist 8.34

1608

0

Breach elev 1615.8

1610

51

Depth 2.81

1620

104

1630

380

1640

572

1650

800

Compare Washington Tech Note To Simple Breach
 Breach Peak 8919 CFS
 Peak @ 8.34 miles 7329 CFS

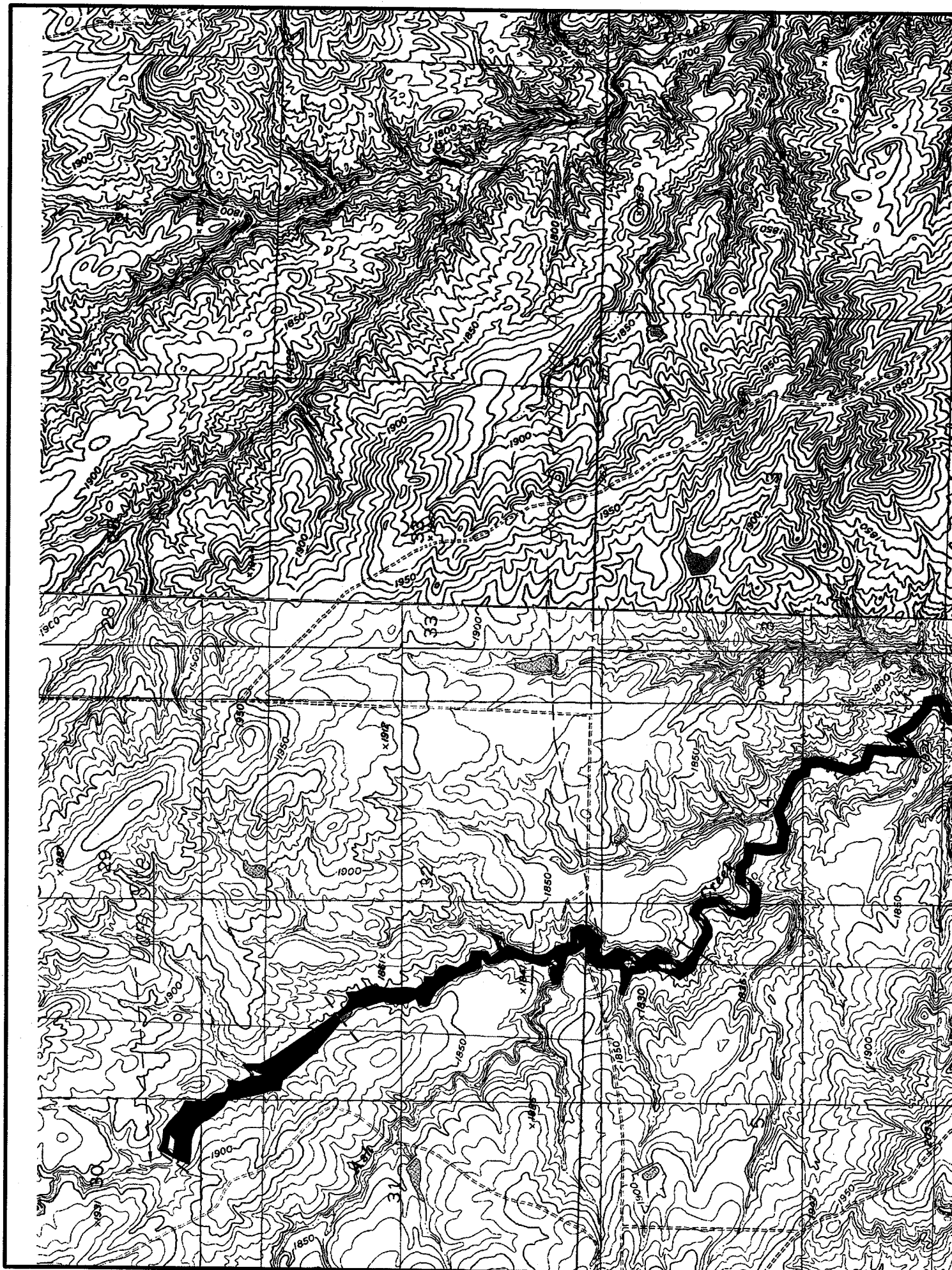
Wash. Fig 5

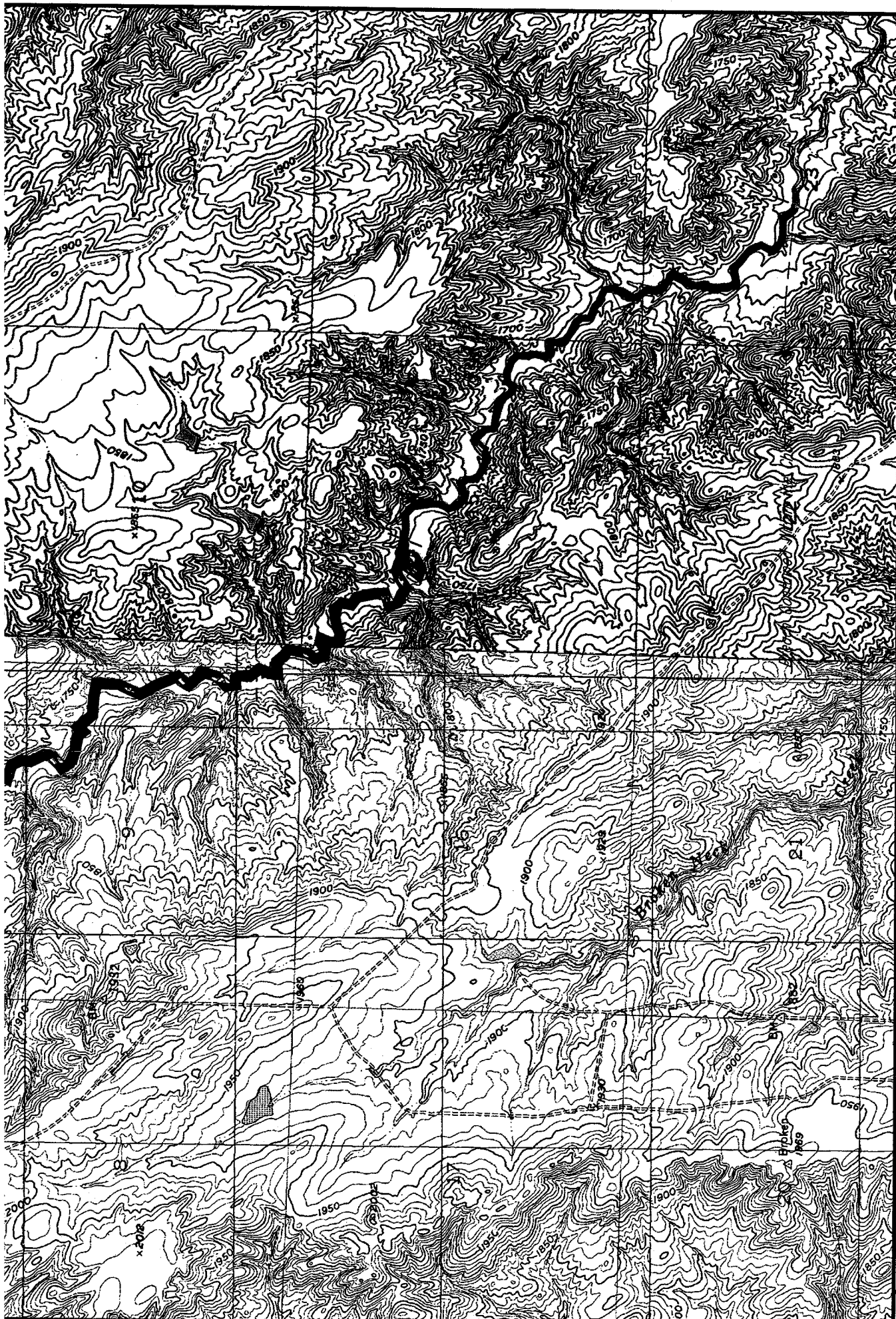
Start 118 AC.Ft

$$\text{Read } \frac{Q_x}{Q_P} = 0.13$$

$$Q_x = 0.13 (8919) \\ = 1,159 \text{ CFS}$$

By Adding or deleting x sections the peaks vary with the x sectional areas that are used. Wider x-sections = more roughness + more attenuation. However the higher the n the larger deeper the x section required to pass the flow. on Stoesser the flow depth increased on the upper end + decreased @ the lower end





Designed	wmd	Date	8-25-2006
Drawn	wmd		8/26/2006
Checked			
Approved	###		###

STOESER DAM BREACH INUNDATION MAP

Page 1 of 1



Natural Resources Conservation Service
United States Department of Agriculture

File No.
Stoeserda.dwg

Drawing No.
###

8/22/2006 3:19 PM

Stanley County, SD

#####

**Design Report
Bernard Stoesser
Stanley County**

Summary

This is a multi-purpose dam for sediment control, livestock water, and wildlife. This is a new construction of the dam. Funding for this project will be provided by WHIP and Bernard Stoesser.

Job Description

This site is a Hazard "A" and Job Class V structure as identified by the product number of 1399 and a drainage area of 1,299 acres. In the event of a breach, cropland and rangeland could be damaged. The principal spillway of this site is a hooded 30" diameter corrugated smooth lined polyethlelyne pipe, with a 60" dia. drop structure.

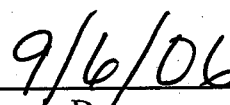
Basis for Design

Overall design of this structure was governed by the 378 Pond standard. The design is routing the 2yr- 24 hr storm through the principal spillway and a 50yr-24hr storm through the emergency spillway. SITES program was used to flood route the design.

General Basic Data

Hydraulic Data Summary	
Drainage Area	1,299 Acres
Time of Concentration	1.87 hours
Runoff Curve Number	83
Principal Spillway, 2 yr 24-hr. Rainfall	2.1 inches
Emergency Spillway, 50 yr 24-hr. Rainfall	4.4 inches
Principal Spillway Discharge at ES	113 CFS
Emergency Spillway Discharge	924 CFS
Estimated 20 year sediment storage	36.48 ACFT
Estimated Sediment Yield Below Crest	29.18 ACFT
Estimated Sediment Yield Above Crest	7.30 ACFT
Crest of Normal Pool	9.16 Acres 40.3 ACFT storage
Crest of Emergency Spillway	14.01 Acres 72.5 ACFT storage
Top of Dam	20.85 Acres 127.8 ACFT storage


Angela Roman
Agricultural Engineer


Date

PARTICIPANT RESPONSIBILITIES

PARTICIPANT Bernard Stoesser		County Stanley		
PRACTICE Pond -378				
LEGAL DESCRIPTION SE 1/4		Sec.30	T 5N	R 29E
GPS				

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

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

1. CULTURAL/HISTORICAL RESOURCES

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

2. WATER RIGHTS, CONSTRUCTION PERMIT, AND LOCATION NOTICE

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

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

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

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

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

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

3. PROPERTY RIGHTS (INCLUDING WETLAND EASEMENTS)

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

4. CLEAN WATER ACT

Clean Water Act Section 10 or 404 permits from the **US Army Corps of Engineers** are required where proposed construction will involve dredging or filling a wetland, or stream. Information may be obtained by contacting: **US Army Corps of Engineers, South Dakota Regulatory Office, 28563 Powerhouse Road, Room 120, Pierre SD 57501, (Phone 605 224 8531)**.

Forms are available on the internet at: <http://www.usace.army.mil/inet/usace-docs/forms/formlib-all/e4345.pdf>.

National Pollutant Discharge Elimination System (NPDES) permits or approval from the **South Dakota Department of Environment and Natural Resources (DENR)** may be needed where discharge of polluted water or wastewater (ag waste etc.) to waters of the state (including wetlands) may occur or have occurred. In addition, a **Storm Water Permit** is needed for any **construction disturbance** of over 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>

5. PARTICIPANT RESPONSIBILITIES IN CONSTRUCTION SUPERVISION AND INSPECTION

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

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

Inspection of fill placement.

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

Pipe Installation. Core Trench Excavation.

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

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

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

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

6. OPERATION AND MAINTENANCE (O&M)

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

Attached

7. PARTICIPANT RESPONSIBILITIES AND CERTIFICATION

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

Participant signature: _____ Date: _____

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

NRCS Employee: _____ Date: _____

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

OPERATION AND MAINTENANCE PLAN
POND
CODE 378

Landowner/Operator Bernard Stoesser
Job Location 30-T5N-R29E GPS _____
Prepared by Angela Roman Date 7/25/06

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.
- ☐ If fences are installed, they must be maintained to prevent unauthorized entry.

Other _____

TABLE OF QUANTITIES AND COST ESTIMATE

(This is a preliminary estimate only!)

Based on 2006 EQIP Cost Docket

Cooperator: Bernard Stoesser
 County: Stanley
 Project: Pond
 Computations by: Angela Roman
 Checked by:

U.S. Department of Agriculture
 Natural Resources Conservation Service
 Conservation District:

Date: 08/22/06

Date:

Item	Unit	Quantity	Unit Cost	Total Cost
EXCAVATION:				
Core Trench	CU YD	1,152	1.20	1,382.40
Emergency Spillway	CU YD	4,590	N/C	0.00
Stripping	CU YD	940	1.20	1,128.00
EARTHFILL (Class S):				
Pond Embankment	CU YD	12,124	1.40	16,973.60
Core Trench	CU YD	1,152	1.40	1,612.80
Top Dressing	SQ YD	5,538	0.60	3,322.80
SEEDING				
Light Seedbed Preparation	AC	2.30	5.00	11.50
Seeding Operation	AC	2.30	32.00	73.60
Introduced/Native Grass Mix	AC	2.30	60.00	138.00
Weed Control-Chemical	AC	2.30	20.00	46.00
108 LF 30" Double walled PE pipe	DIA.FT	3,300	2.75	9,075.00
60" Dia. Concrete Drop Inlet Structure	EACH	1	1,000.00	1,000.00
Trash Screen	EACH	1	400.00	400.00
Timber Structure	BDFT	172	3.00	516.00
4" PVC preforated pipe	DIA.FT	12	2.15	25.80
4" PVC non preforated pipe	DIA.FT	70	2.15	150.50
Drain Fill	CU YD	15	70.00	1,050.00
TOTAL				\$36,906.00

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.

Project Name: *Stoeser Whip Pond*
 Computed by: *A. Roman*

laHoodInlet.xls Ver 1.10

Date: *8/24/2006*
 Checked by: *W. M. M.*
 Date: *9/13/06*

			Outflow, CFS				Structure Outflow, CFS	Controlling Factor
Elev	HW Ft		Weir	Slug Flow	Full Pipe			
Input Data			95.0	0.0	0.00	0.00	84.72	0.00
			95.1	0.1	0.32	0.00	85.09	0.32
			95.2	0.2	0.63	0.00	85.45	0.63
			95.3	0.3	0.95	0.00	85.82	0.95
Principal Spillway Crest Elev (ft)	<i>95</i>		95.4	0.4	1.26	0.00	86.18	1.26
			95.5	0.5	1.58	0.00	86.54	1.58
Inside Wall - Type	<i>Smooth</i>		95.6	0.6	2.17	0.00	86.90	2.17
Pipe Diameter (in)	<i>30</i>		95.7	0.7	2.77	0.00	87.26	2.77
Pipe Length (ft)	<i>110</i>		95.8	0.8	3.36	0.00	87.62	3.36
Entrance Coefficient 'Ke'	<i>1</i>		95.9	0.9	3.95	0.00	87.97	3.95
Mannings 'n-value'	<i>0.009</i>		96.0	1.0	4.55	0.00	88.33	4.55
Elbow Elev (if None, Leave 'BLANK')			96.1	1.1	5.30	0.00	88.68	5.30
Length of Outlet ('BLANK' if none)			96.2	1.2	6.05	0.00	89.03	6.05
Outlet Type	<i>Cantilever</i>		96.3	1.3	6.88	0.00	89.38	6.88
Outlet Elevation (ft)	<i>82</i>		96.4	1.4	7.79	0.00	89.73	7.79
Tailwater Elev (if unknown, leave 'Blank')			96.5	1.5	8.70	0.00	90.08	8.70
Auxiliary Spillway Elev (ft)	<i>101.8</i>		96.6	1.6	10.04	0.00	90.42	10.04
Maximum Headwater Elev (ft)	<i>105</i>		96.7	1.7	11.38	0.00	90.77	11.38
Elev Increment After Full Pipe Flow	<i>1</i>		96.8	1.8	12.73	0.00	91.11	12.73
			96.9	1.9	14.07	0.00	91.45	14.07
Basic Output			97.0	2.0	15.42	0.00	91.79	15.42
Full Pipe Flow - Max. Outflow (cfs):	<i>115.84</i>		97.1	2.1	16.68	0.00	92.13	16.68
Full Pipe Flow - Max. Velocity (fps):	<i>23.60</i>		97.2	2.2	17.95	0.00	92.47	17.95
			97.3	2.3	19.21	0.00	92.81	19.21
			97.4	2.4	20.48	0.00	93.14	20.48
Barrel Area (Sq Ft):	<i>4.91</i>		97.5	2.5	21.74	0.00	93.48	21.74
Kp:	<i>0.00442</i>		97.6	2.6	22.93	0.00	93.81	22.93
Friction Slope (HW at the A.S. Crest):	<i>0.03254</i>		97.7	2.7	24.11	11.86	94.14	24.11
Pipe Slope:	<i>0.11902</i>		97.8	2.8	25.30	27.67	94.47	27.67
Outlet Elbow Angle (deg):	<i>0.0</i>		97.9	2.9	26.48	43.48	94.80	43.48
			98.0	3.0	27.67	59.29	95.13	59.29
			98.1	3.1	28.66	75.10	95.46	75.10
Km:	<i>0.00000</i>		98.2	3.2	29.65	90.92	95.79	90.92
Tailwater Elev Used For Full Pipe Flow:	<i>83.5</i>		98.3	3.3	30.63	106.73	96.11	96.11
			99.0	4.0	37.55	217.41	98.36	98.36
Notes & Warnings			100.0	5.0			101.48	101.48
			101.0	6.0			104.51	104.51
			102.0	7.0			107.46	107.46
			103.0	8.0			110.32	110.32
			104.0	9.0			113.11	113.11
			105.0	10.0			115.84	115.84

Project Name: Stoesser WHIP Pond

laDropInlet.xls Ver 1.02

Computed by: A. Roman

Date: 8/24/2006

Checked by: *WMP*

Date: 8/31/06

			Outflow, CFS					Structure Outflow, CFS	Controlling Factor
			Elev	HW Ft	Weir	Inlet Orifice	Barrel Orifice	Full Pipe	
Input Data			-99.0	0.0	0.00	0.00	39.19	98.36	0.00
Riser Type & Diameter (in)	Circular	60	99.1	0.1	1.49	29.90	39.90	98.67	1.49
Length of Weir Obstruction (ft)		0.5	99.2	0.2	4.22	42.28	40.60	98.99	4.22
		6	99.3	0.3	7.75	51.78	41.28	99.30	7.75
Principal Spillway Crest Elev (ft)		✓ 99	99.4	0.4	11.93	59.79	41.95	99.62	11.93
Invert of Barrel Elevation (ft)		95	99.5	0.5	16.67	66.85	42.61	99.93	16.67
Barrel Orifice Coefficient (C)		0.6	99.6	0.6	21.91	73.23	43.26	100.24	21.91
Pipe Diameter (in)		30	99.7	0.7	27.61	79.10	43.90	100.55	27.61
Pipe Length (ft)		110	99.8	0.8	33.73	84.56	44.53	100.86	33.73
Entrance Coefficient 'Ke'		1	99.9	0.9	40.25	89.69	45.16	101.17	40.25
Mannings 'n-value'		0.009	100.0	1.0	47.14	94.54	45.77	101.48	45.77
Elbow Elev (if None, Leave 'BLANK')			100.1	1.1	54.39	99.16	46.38	101.79	46.38
Length of Outlet ('BLANK' if none)			100.2	1.2	61.97	103.57	46.97	102.09	46.97
Outlet Type	Cantilever		100.3	1.3	69.88	107.79	47.57	102.40	47.57
Outlet Elevation (ft)		✓ 82	100.4	1.4	78.10	111.86	48.15	102.70	48.15
Tailwater Elev (if unknown, leave 'Blank')			100.5	1.5	86.61	115.79	48.73	103.01	48.73
Auxiliary Spillway Elev (ft)		101.8	100.6	1.6	95.41	119.59	49.30	103.31	49.30
Maximum Headwater Elev (ft)		105	100.7	1.7	104.50	123.27	49.86	103.61	49.86
Elev Increment After Full Pipe Flow		0.1	100.8	1.8	113.85	126.84	50.42	103.91	50.42
Basic Output			100.9	1.9	123.47	130.32	50.97	104.21	50.97
Full Pipe Flow - Max. Outflow (cfs):			101.0	2.0	133.35	133.70	51.51	104.51	51.51
Full Pipe Flow - Max. Velocity (fps):			101.1	2.1	143.47	137.00	52.05	104.81	52.05
Useable Weir Length (Ft):			101.2	2.2	153.84	140.23	52.59	105.11	52.59
Riser Area (Sq Ft):			101.3	2.3	164.45	143.38	53.11	105.40	53.11
Barrel Area (Sq Ft):			101.4	2.4	175.29	146.46	53.64	105.70	53.64
Kp:			101.5	2.5	186.36	149.48	54.16	105.99	54.16
Friction Slope (HW at the A.S. Crest):			101.6	2.6	197.65	152.44	54.67	106.29	54.67
Pipe Slope:			101.7	2.7	209.16	155.35	55.18	106.58	55.18
Outlet Elbow Angle (deg):			101.8	2.8	220.89	158.20	55.68	106.87	55.68
Maximum Barrel Invert Elevation for			101.9	2.9	232.83	161.00	56.18	107.16	56.18
avoiding Barrel Orifice Control:			102.0	3.0	244.97	163.75	56.68	107.46	56.68
Km:			102.1	3.1	257.32	166.46	57.17	107.75	57.17
Tailwater Elev Used For Full Pipe Flow:			102.2	3.2	269.87	169.12	57.65	108.03	57.65
			102.3	3.3	282.62	171.74	58.14	108.32	58.14
			102.4	3.4	295.56	174.33	58.61	108.61	58.61
			102.5	3.5	308.70	176.87	59.09	108.90	59.09
			102.6	3.6	322.02	179.38	59.56	109.18	59.56
			102.7	3.7	335.53	181.85	60.03	109.47	60.03
			102.8	3.8	349.23	184.30	60.49	109.75	60.49
			102.9	3.9	363.10	186.71	60.95	110.04	60.95
			103.0	4.0	377.16	189.08	61.41	110.32	61.41
			103.1	4.1	391.39	191.43	61.86	110.60	61.86
			103.2	4.2	405.79	193.75	62.31	110.89	62.31
			103.3	4.3	420.37	196.05	62.76	111.17	62.76
			103.4	4.4	435.12	198.31	63.20	111.45	63.20
			103.5	4.5	450.04	200.55	63.64	111.73	63.64
			103.6	4.6	465.12	202.77	64.08	112.01	64.08
			103.7	4.7	480.37	204.96	64.51	112.28	64.51
			103.8	4.8	495.79	207.13	64.94	112.56	64.94
			103.9	4.9	511.36	209.28	65.37	112.84	65.37
			104.0	5.0	527.09	211.40	65.80	113.11	65.80
			104.1	5.1	542.99	213.51	66.22	113.39	66.22
			104.2	5.2	559.03	215.59	66.64	113.67	66.64
			104.3	5.3	575.24	217.65	67.06	113.94	67.06
			104.4	5.4	591.59	219.70	67.47	114.21	67.47
			104.5	5.5	608.10	221.72	67.89	114.49	67.89
			104.6	5.6	624.76	223.73	68.30	114.76	68.30
			104.7	5.7	641.57	225.72	68.71	115.03	68.71
			104.8	5.8	658.53	227.69	69.11	115.30	69.11
			104.9	5.9	675.63	229.64	69.51	115.57	69.51
			105.0	6.0	692.88	231.58	69.91	115.84	69.91

Notes & Warnings

NOTE: Pipe slope computed to be greater than friction slope - a 2D riser might improve flow characteristics.

NOTE: Barrel Orifice control can be eliminated by increasing the riser depth.

Principal Spillway
Routing

1*****

SITES XEQ 08/18/2006 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM
VER 2005.0.1 (USER MANUAL - DATED MAY 2001)
TIME 11:43:48

A. Roman 8/18/06

VWMD 8/31

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

SITES 01/01/2005 Stoesser WHIP Pond 2.0296875 H7
SAVMOV 0 101
SAVMOV 101 1 1
* WHIP Pond for Bernie Stoesser
STRUCTURE WHIP Pond
84 .0016
85 .0684
86 .1810
87 .3345
88 .5208
89 .7277
90 1.0011
91 1.3766
92 1.9117
93 2.5314
94 3.2600
95 4.3013
96 5.3660
97 6.4388
98 7.6783
99 9.1596 0
100 10.7420 47.14✓
101 12.5563 104.51✓
103 16.2316 110.32✓
105 20.8545 115.84✓
ENDTABLE
WSDATA 5A1 AC 83 1299 13970 4.5
PDIRECT 2.1 4.40 4.00
POOLDATA ELEV 99 84 99 82.5 82.5
ASDATA 30D050 3 .01 3
BTMWIDTH FEET 100
GRAPHICS I
GO, DESIGN NL TYPE2 24 TYPE2378 24
SAVMOV 2 101 1
ENDJOB

1SITES XEQ 08/18/2006 ----- COMMENT PAGE -----
VER 2005.0.1 Stoesser WHIP Pond WSID =

WHIP Pond for Bernie Stoesser

***** 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 08/18/2006 Stoesser WHIP Pond WSID=

VER 2005.0.1
TIME 11:43:48

WHIP Pond
SITE = S 1

PASS= 1
SUBW= A
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	
2.10	0.00	4.40	4.00	
WSDATA - CN	DA-SM	TC/L	-/H	QRF
83.00	2.03	13970.00	4.50	0.00
SITEDATA- PERM POOL	CREST PS	FP SED	VALLEY FL	378?
99.00	84.00	99.00	82.50	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.	RETARDANCE	TIE STATION	INLET LENGTH	
30	D	0.00	0	
AUX.DATA - INLET N	SIDE SLOPE	EXIT N	EXIT SLOPE	ACTUAL AUX?
0.000	3.00	0.000	0.010	NO
BTM WIDTH - BW1	BW2	BW3	BW4	BW5
ft 100.00	0.00	0.00	0.00	0.00

***** NOTE - THIS IS ONLY A PRELIMINARY AUX. SPILLWAY RATING CURVE OF
DISCHARGE/FT OF WIDTH AND DOES NOT INCLUDE SIDESLOPE CORRECTION
OR A REVISED RATING USING THE ACTUAL AUX. SPILLWAY CONFIGURATION.

AUX. SPILLWAY ID CODE ...30D050	ELEVATION INCREMENT (FT)= 0.200		
DISCHARGES-Q1	Q2	Q3	Q4
0.020	0.080	0.320	0.950
Q5	Q6	Q7	Q8
1.580	2.350	3.270	4.350
Q9	Q10	Q11	Q12
5.610	7.030	8.630	10.400

AUXILIARY SPILLWAY RATING BASED ON PRECOMPUTED SUBCRITICAL FLOW METHOD
USING PROFILE NUMBER 30.

1SITES -----

XEQ 08/18/2006
VER 2005.0.1
TIME 11:43:48

Stoeser WHIP Pond
WHIP Pond
SITE = S 1

PASS= 1
WSID=
SUBW= A
PART= 2

PERM POOL 99.00 FT 40.3 ACFT 9.16 AC 0.0 CFS
CREST PS 84.00 FT 0.0 ACFT 0.00 AC 0.0 CFS
SED ACCUM 99.00 FT 40.3 ACFT 9.16 AC 0.0 CFS
START ELEV 99.00 FT 40.3 ACFT 9.16 AC 0.0 CFS
NRCS-PSH D= 24.00 HR P= 2.10 IN Q= 0.76 IN DA= 2.03 SM
TC= 1.87 HR CN= 83.00 VOL= 82.7 ACFT
PEAK = 324.5 CFS, AT 13.3 HRS.

ROUTED RESULT - HYD TYPE EMAX VOL-MAX AMAX QMAX
NRCS-PSH 101.76 FT 71.9 ACFT 13.95 AC 106.5 CFS

PS STORAGE 31.6 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

DRAWDOWN (DDT) TEST 84.00 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 99.00 FT, 40.3 ACFT, 0.0 CFS.

DRAWDOWN TIME = 1.66 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

RATING TABLE DEVELOPED, SITE = S 1:
WITH PS GIVEN AND ASRATING FOR AUX.
AUX. RATING FROM ASFILE PROFILE NO. 30.

RATING TABLE NUMBER 1						
	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	84.00	0.00	0.00	0.00	0.00	0.00
2	85.00	0.00	0.00	0.00	0.04	0.07
3	86.00	0.00	0.00	0.00	0.16	0.18
4	87.00	0.00	0.00	0.00	0.42	0.33
5	88.00	0.00	0.00	0.00	0.85	0.52
6	89.00	0.00	0.00	0.00	1.47	0.73
7	90.00	0.00	0.00	0.00	2.33	1.00
8	91.00	0.00	0.00	0.00	3.52	1.38
9	92.00	0.00	0.00	0.00	5.17	1.91
10	93.00	0.00	0.00	0.00	7.39	2.53
11	94.00	0.00	0.00	0.00	10.28	3.26
12	95.00	0.00	0.00	0.00	14.06	4.30
13	96.00	0.00	0.00	0.00	18.90	5.37
14	97.00	0.00	0.00	0.00	24.80	6.44
15	98.00	0.00	0.00	0.00	31.86	7.68
16	99.00	0.00	0.00	0.00	40.28	9.16
17	100.00	47.14	47.14	0.00	50.23	10.74
18	101.00	104.51	104.51	0.00	61.88	12.56
19	103.00	110.32	110.32	0.00	90.67	16.23
20	105.00	115.84	115.84	0.00	127.75	20.85

1SITES

XEQ 08/18/2006
VER 2005.0.1
TIME 11:43:48

Stoeser WHIP Pond
WHIP Pond
SITE = S 1

WSID=
SUBW= A
PART= 3
PASS= 1

AUX. CREST 101.76 FT 71.9 ACFT 13.95 AC 106.5 CFS

PS STORAGE 31.6 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

START ELEV 99.00 FT 40.3 ACFT 9.16 AC 0.0 CFS

EFFECTIVE HEIGHT(H) = 19.3 FEET, PRODUCT= $\sqrt{1385}$. (H * STORAGE AT CREST AUX.).

INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT. *Qc ok*

NRCS-SDH D= 24.00 HR P= 4.40 IN Q= 2.64 IN DA= 2.03 SM
TC= 1.87 HR CN= 83.00 VOL= 285.4 ACFT

PEAK = 1195.9 CFS, AT 13.2 HRS.

NRCS-FBH D= 24.00 HR P= 4.00 IN Q= 2.29 IN DA= 2.03 SM
TC= 1.87 HR CN= 83.00 VOL= 247.5 ACFT

PEAK = 1034.7 CFS, AT 13.2 HRS.

***** MESSAGE - AUXILIARY SPILLWAY RATING EXTENDED ABOVE ELEVATION 103.38.

RATING TABLE DEVELOPED, SITE = S 1:
WITH PS GIVEN AND ASRATING FOR AUX.
AUX. RATING FROM ASFILE PROFILE NO. 30.

RATING TABLE NUMBER 2

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	84.00	0.00	0.00	0.00	0.00	0.00
2	85.48	0.00	0.00	0.00	0.08	0.12
3	86.96	0.00	0.00	0.00	0.40	0.33
4	88.44	0.00	0.00	0.00	1.09	0.61
5	89.92	0.00	0.00	0.00	2.25	0.98
6	91.40	0.00	0.00	0.00	4.11	1.59
7	92.88	0.00	0.00	0.00	7.09	2.46
8	94.36	0.00	0.00	0.00	11.52	3.63
9	95.84	0.00	0.00	0.00	18.04	5.19
10	97.32	0.00	0.00	0.00	26.91	6.83
11	98.80	0.00	0.00	0.00	38.46	8.86
12	100.28	63.07	63.07	0.00	53.28	11.25
13	101.76	106.71	106.71	0.00	71.92	13.95
14	101.92	108.81	107.18	1.63	74.20	14.25
15	102.08	113.44	107.65	5.78	76.53	14.54
16	102.37	146.27	108.50	37.77	80.86	15.08
17	102.73	263.34	109.54	153.80	86.35	15.74
18	103.38	581.63	111.37	470.26	96.98	17.11
19	104.19	1259.86	113.60	1146.26	111.61	18.98
20	105.00	2075.28	115.84	1959.44	127.75	20.85

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.-HP FT	VOL-AUX. ACFT
-------------------	-----------------	----------------	-----------------	----------------	---------------	------------------

NRCS-SDH 100.0 103.94 106.9 18.4 2.18 35.0

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGE = 113. 929. 1042.

	CRITICAL DEPTH	CRITICAL VELOCITY	CRITICAL SLOPE-Sc	25% OF Q Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.37	6.51	0.000	0.000

AUXILIARY SPILLWAY DURATION FLOW = 9.0 HOURS

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 5.77 FT/SEC
 AT DEPTH = 1.54 FT
 COMPUTED N = 0.0335
 RETARDANCE = D
 EXIT SLOPE = 0.0100

DRAWDOWN USING FREEBOARD STORM FOLLOWS, STARTING AT ELEVATION 101.76 FT.

DRAWDOWN (DDT) TEST 99.00 FT 40.3 ACFT 7.75 CFS
 CONTROL IS 0.000 DETENTION STORAGE

DRAWDOWN TIME = 0.49 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.-HP FT	VOL-AUX. ACFT
NRCS-FBH	100.0	103.73	103.1	17.9	1.97	31.2

***** NOTE -- ACTUAL Hp OF 1.97 RAISED TO MEET MIN. 378 CRITERIA.

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGE = 112.2 753.0 865.2

	CRITICAL DEPTH	CRITICAL VELOCITY	CRITICAL SLOPE-Sc	25% OF Q Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.19	6.09	0.000	0.000

AUXILIARY SPILLWAY DURATION FLOW = 8.1 HOURS
 ATTACK, OE/B = 1.1 ACFT/FT

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 5.22 FT/SEC
 AT DEPTH = 1.38 FT
 COMPUTED N = 0.0343
 RETARDANCE = D
 EXIT SLOPE = 0.0100

>>>>> NHCP378 RUN - MINIMUM DEPTH, CREST AUX. TO TOP OF DAM IS 2.00 FT.
 NEW TOP OF DAM ELEVATION = 103.76.

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.HP FT	VOL-AUX. ACFT
MINIMUM AUX.	100.0	103.76	103.8	18.0	2.01	31.9

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGES = 112.3 786.2 898.5

	CRITICAL DEPTH	CRITICAL VELOCITY	CRITICAL SLOPE-Sc	25% OF Q Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.23	6.18	0.000	0.000

>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED
FOR THIS PASS. NEW TOP OF DAM ELEVATION = 104.73.

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.HP FT	VOL-AUX. ACFT
MINIMUM AUX.	100.0	104.73	122.3	20.2	2.98	50.4

PEAK - CFS DISCHARGES =	Q-PS	Q-AUX.	Q-TOT.
	115.0	1686.6	1801.7

AUXILIARY SPILLWAY ---	CRITICAL DEPTH FT	CRITICAL VELOCITY FT/SEC	CRITICAL SLOPE-Sc FT/FT	25% OF Q Sc FT/FT
	2.02	7.85	0.000	0.000

Inflow Hyd 1 PSH-Peak = 106.54 CFS at 15.16 hrs., Location Point
Inflow Hyd 1 SDH-Peak = 1041.65 CFS at 13.54 hrs., Location Point
Inflow Hyd 1 FBH-Peak = 865.22 CFS at 13.66 hrs., Location Point
HYDOUT 1

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

Stoeser WHIP Pond

0 SUBWATERSHED(S) ANALYZED.

1 STRUCTURE(S) ANALYZED.

3 HYDROGRAPHS ROUTED AT LOWEST SITE.

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

SITES.....COMPUTATIONS COMPLETE

>>>	SITE ID	SUBWS ID	SUBWS DA (SQ MI)	CURVE NO.	TC (HRS)	TOTAL DA (SQ MI)	TYPE DESIGN	STRUC CLASS	<<<
	S 1	A	2.03	83.	1.87	2.03	378-R	A1	

PASS NO.	DIA./ WIDTH (IN/FT)	AUX.CREST ELEV (FT)	BTM. WIDTH (FT)	MAX. HP (FT)	MAX. ELEV (FT)	EMB. VOL. (CY)	INTEGR.* DIST. (FT)	EXIT* VEL. (FT/SEC)	TYPE HYD
1	0.0	101.8	100.0	3.0	104.7	0.	0.	5.2	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.

Emergency
Routing

1*****

SITES XEQ 08/18/2006 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM
VER 2005.0.1 (USER MANUAL - DATED MAY 2001)
TIME 11:49:39

A. Roman 8/18/06

✓ WMT 8/31/06

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

SITES 01/01/2005 Stoesser WHIP Pond 2.0296875 H4
SAVMOV 0 101
SAVMOV 101 1 1
* WHIP Pond for Bernie Stoesser
STRUCTURE WHIP Pond
84 .0016
85 .0684
86 .1810
87 .3345
88 .5208
89 .7277
90 1.0011
91 1.3766
92 1.9117
93 2.5314
94 3.2600
95 4.3013
96 5.3660
97 6.4388
98 7.6783
99 9.1596 0
100 10.7420 47.14
101 12.5563 104.51
103 16.2316 110.32
105 20.8545 115.84
ENDTABLE
WSDATA 5A1 AC 83 1299 13970 4.5
PDIRECT 4.40✓ 4.00
POOLDATA ELEV 99 84 99 82.5 82.5
ASDATA 30D050 3 .01 3
ASCREST ELEV 101.8✓
BTMWIDTH FEET 100
GRAPHICS I
GO, DESIGN NL TYPE2 24 TYPE2378 24
SAVMOV 2 101 1
ENDJOB

1SITES XEQ 08/18/2006 ----- COMMENT PAGE -----
VER 2005.0.1 Stoesser WHIP Pond WSID =

WHIP Pond for Bernie Stoesser

***** 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 08/18/2006
VER 2005.0.1
TIME 11:49:39

Stoesser WHIP Pond
WHIP Pond
SITE = S 1

WSID=
SUBW= A
PART= 1
PASS= 1

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

STORM DISTRIBUTION-PSH 24 HOUR TYPE II RAINFALL DISTRIBUTION

STORM DISTRIBUTION AUX. -24 HOUR TYPE II RAINFALL DISTRIBUTION

PRECIP. - Q-PS, 1-DAY	Q-PS, 10-DAY	P-SD	P-FB	
0.00	0.00	4.40	4.00	
WSDATA - CN	DA-SM	TC/L	-/H	QRF
83.00	2.03	13970.00	4.50	0.00
SITEDATA- PERM POOL	CREST PS	FP SED	VALLEY FL	378?
99.00	84.00	99.00	82.50	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
101.80	0.00	0.00	0.00	0.00
AUX.DATA - REF.NO.	RETARDANCE	TIE STATION	INLET LENGTH	
30	D	0.00	0	
AUX.DATA - INLET N	SIDE SLOPE	EXIT N	EXIT SLOPE	ACTUAL AUX?
0.000	3.00	0.000	0.010	NO
BTM WIDTH - BW1	BW2	BW3	BW4	BW5
ft 100.00	0.00	0.00	0.00	0.00

***** NOTE - THIS IS ONLY A PRELIMINARY AUX. SPILLWAY RATING CURVE OF
DISCHARGE/FT OF WIDTH AND DOES NOT INCLUDE SIDESLOPE CORRECTION
OR A REVISED RATING USING THE ACTUAL AUX. SPILLWAY CONFIGURATION.

AUX. SPILLWAY ID CODE ...30D050	ELEVATION INCREMENT (FT)= 0.200		
DISCHARGES-Q1	Q2	Q3	Q4
0.020	0.080	0.320	0.950
Q5	Q6	Q7	Q8
1.580	2.350	3.270	4.350
Q9	Q10	Q11	Q12
5.610	7.030	8.630	10.400

AUXILIARY SPILLWAY RATING BASED ON PRECOMPUTED SUBCRITICAL FLOW METHOD
USING PROFILE NUMBER 30.

1SITES

XEQ 08/18/2006
VER 2005.0.1
TIME 11:49:39

Stoeser WHIP Pond
WHIP Pond
SITE = S 1

PASS= 1
WSID=
SUBW= A
PART= 2

PERM POOL	99.00 FT	40.3 ACFT	9.16 AC	0.0 CFS
CREST PS	84.00 FT	0.0 ACFT	0.00 AC	0.0 CFS
SED ACCUM	99.00 FT	40.3 ACFT	9.16 AC	0.0 CFS
START ELEV	99.00 FT ✓	40.3 ACFT	9.16 AC	0.0 CFS

1SITES

XEQ 08/18/2006
VER 2005.0.1
TIME 11:49:39

Stoeser WHIP Pond
WHIP Pond
SITE = S 1

PASS= 1
WSID=
SUBW= A
PART= 3

AUX. CREST	101.80 FT ✓	72.5 ACFT ✓	14.03 AC	106.7 CFS
PS STORAGE 32.2 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.				

START ELEV	99.00 FT	40.3 ACFT	9.16 AC	0.0 CFS
------------	----------	-----------	---------	---------

EFFECTIVE HEIGHT(H)= 19.3 FEET, PRODUCT= 1399. (H * STORAGE AT CREST AUX.).

INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT.

NRCS-SDH	D= 24.00 HR	P= 4.40 IN	Q= 2.64 IN	DA= 2.03 SM
	TC= 1.87 HR	CN= 83.00	VOL= 285.4 ACFT	

PEAK = 1195.9 CFS, AT 13.2 HRS.

NRCS-FBH	D= 24.00 HR	P= 4.00 IN	Q= 2.29 IN	DA= 2.03 SM
	TC= 1.87 HR	CN= 83.00	VOL= 247.5 ACFT	

PEAK = 1034.7 CFS, AT 13.2 HRS.

***** MESSAGE - AUXILIARY SPILLWAY RATING EXTENDED ABOVE ELEVATION 103.40.

RATING TABLE DEVELOPED, SITE = S 1:
WITH PS GIVEN AND ASRATING FOR AUX.
AUX. RATING FROM ASFILE PROFILE NO. 30.

RATING TABLE NUMBER 2

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	84.00	0.00	0.00	0.00	0.00	0.00
2	85.48	0.00	0.00	0.00	0.08	0.12
3	86.97	0.00	0.00	0.00	0.41	0.33
4	88.45	0.00	0.00	0.00	1.10	0.61
5	89.93	0.00	0.00	0.00	2.27	0.98
6	91.42	0.00	0.00	0.00	4.14	1.60
7	92.90	0.00	0.00	0.00	7.14	2.47
8	94.38	0.00	0.00	0.00	11.61	3.66
9	95.87	0.00	0.00	0.00	18.19	5.22
10	97.35	0.00	0.00	0.00	27.13	6.87

11	98.83	0.00	0.00	0.00	38.77	8.91
12	100.32	65.31	65.31	0.00	53.72	11.32
13	101.80	106.83	106.83	0.00	72.51	14.03
14	101.96	108.91	107.30	1.61	74.78	14.32
15	102.12	113.42	107.76	5.65	77.09	14.61
16	102.41	143.76	108.60	35.16	81.38	15.14
17	102.76	259.22	109.62	149.60	86.82	15.79
18	103.40	567.32	111.42	455.89	97.34	17.16
19	104.20	1228.52	113.63	1114.89	111.81	19.01
20	105.00	2031.62	115.84	1915.78	127.75	20.85

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.-HP FT	VOL-AUX. ACFT
NRCS-SDH	100.0	103.98	107.6	18.5	2.18	35.1

PEAK - CFS DISCHARGE = Q-PS 113. Q-AUX. 1024. Q-TOT. 1037.

	CRITICAL DEPTH FT	CRITICAL VELOCITY FT/SEC	CRITICAL SLOPE-Sc FT/FT	25% OF Q Sc FT/FT
AUXILIARY SPILLWAY ---	1.37	6.50	0.000	0.000

AUXILIARY SPILLWAY DURATION FLOW = 9.0 HOURS

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 5.76 FT/SEC
 AT DEPTH = 1.53 FT
 COMPUTED N = 0.0336
 RETARDANCE = D
 EXIT SLOPE = 0.0100

DRAWDOWN USING FREEBOARD STORM FOLLOWS, STARTING AT ELEVATION 101.80 FT.

DRAWDOWN (DDT) TEST 99.00 FT 40.3 ACFT 6.58 CFS
 CONTROL IS 0.000 DETENTION STORAGE

DRAWDOWN TIME = 0.51 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.-HP FT	VOL-AUX. ACFT
NRCS-FBH	100.0	103.77	103.8	18.0	1.97	31.3

***** NOTE -- ACTUAL Hp OF 1.97 RAISED TO MEET MIN. 378 CRITERIA.

PEAK - CFS DISCHARGE = Q-PS 112.3 Q-AUX. 749.4 Q-TOT. 861.7

	CRITICAL DEPTH FT	CRITICAL VELOCITY FT/SEC	CRITICAL SLOPE-Sc FT/FT	25% OF Q Sc FT/FT
AUXILIARY SPILLWAY ---	1.19	6.09	0.000	0.000

AUXILIARY SPILLWAY DURATION FLOW = 8.1 HOURS
 ATTACK, OE/B = 1.1 ACFT/FT

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 5.21 FT/SEC
 AT DEPTH = 1.38 FT
 COMPUTED N = 0.0344
 RETARDANCE = D
 EXIT SLOPE = 0.0100

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

NEW TOP OF DAM ELEVATION = 103.80.

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.HP FT	VOL-AUX. ACFT
MINIMUM AUX.	100.0	103.80	104.6	18.1	2.01	32.1
PEAK - CFS DISCHARGES =		Q-PS 112.4	Q-AUX. 785.6	Q-TOT. 897.9		
		CRITICAL DEPTH FT	CRITICAL VELOCITY FT/SEC	CRITICAL SLOPE-Sc FT/FT	25% OF Q Sc FT/FT	
AUXILIARY SPILLWAY ---		1.23	6.17	0.000	0.000	

>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED
FOR THIS PASS. NEW TOP OF DAM ELEVATION = 104.77.

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.HP FT	VOL-AUX. ACFT
MINIMUM AUX.	100.0	104.77	123.1	20.3	2.97	50.6
PEAK - CFS DISCHARGES =		Q-PS 115.1	Q-AUX. 1681.9	Q-TOT. 1797.0		
		CRITICAL DEPTH FT	CRITICAL VELOCITY FT/SEC	CRITICAL SLOPE-Sc FT/FT	25% OF Q Sc FT/FT	
AUXILIARY SPILLWAY ---		2.02	7.85	0.000	0.000	

Inflow Hyd 1 SDH-Peak = 1037.32 CFS at 13.54 hrs., Location Point

Inflow Hyd 1 FBH-Peak = 861.66 CFS at 13.66 hrs., Location Point
HYDOUT 1

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

Stoeser WHIP Pond

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 ID	SUBWS ID	SUBWS DA (SQ MI)	CURVE NO.	TC (HRS)	TOTAL DA (SQ MI)	TYPE DESIGN	STRUC CLASS	<<<
	S	1	A	2.03	83.	1.87	2.03	378-R	A1

PASS NO.	DIA./ WIDTH (IN/FT)	AUX.CREST ELEV (FT)	BTM. WIDTH (FT)	MAX. HP (FT)	MAX. ELEV (FT)	EMB. VOL. (CY)	INTEGR.* DIST. (FT)	EXIT* VEL. (FT/SEC)	TYPE HYD
1	0.0	101.8	100.0	3.0	104.8	0.	0.	5.2	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 2005.0.1,01/01/2005
FILES

INPUT = C:\home\angela.roman\Sites Files\StoesserWHIP\Sites30weirESC.D2C
OUTPUT = C:\home\angela.roman\Sites Files\StoesserWHIP\Sites30weirESC.OUT
DATED 08/18/2006 11:49:39

GRAPHICS FILES GENERATED

OPTION "L" = C:\home\angela.roman\Sites Files\StoesserWHIP\Sites30weirESC.DRG DATED 08/18,
OPTION "P" = C:\home\angela.roman\Sites Files\StoesserWHIP\Sites30weirESC.DHY DATED 08/18,
OPTION "E" = C:\home\angela.roman\Sites Files\StoesserWHIP\Sites30weirESC.DEM DATED 08/18,

Client: Bernie Stoesser
 County: STANLEY
 Practice: WHIP Pond
 Calculated By: A. Roman
 Checked By: WMD

State: SD

Date: 7/13/2006

Date: 9/18/06

Drainage Area: 1299 Acres (provided from RCN Calculator)
 Curve Number: 83 (provided from RCN Calculator)
 Watershed Length: 13970 Feet
 Watershed Slope: 45 ~~5.9~~ Percent
 Time of Concentration: 1.63 Hours (calculated value)
 Rainfall Type: II

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.80	2.10	2.90	3.40	4.00	4.40	5.10
Ia/P Ratio	0.23	0.20	0.14	0.12	0.10	0.09	0.08
Used	0.23	0.20	0.14	0.12	0.10	0.10	0.10
Runoff (in)	0.56	0.76	1.37	1.77	2.29	2.64	3.26
(ac-ft)	60.62	82.27	148.30	191.60	247.89	285.78	352.90
Unit Peak Discharge (cfs/acre/in)	0.359	0.371	0.391	0.399	0.405	0.406	0.406
Peak Discharge (cfs)	262	368	694	919	1,204	1,392	1,723

Curve number Computation

Client: Bernie Stoesser
 County: STANLEY
 Practice: WHIP Pond
 Calculated By: A. Roman
 Checked By: WMD

State: SD

Date: 7/13/2006

Date: 8/19/06

COVER DESCRIPTION	Acres (CN)			
	Hydrologic Soil Group			
	A	B	C	D
CULTIVATED AGRICULTURAL LANDS				
Small grain SR + Crop residue good	-	-	-	890(84)
OTHER AGRICULTURAL LANDS				
Pasture, grassland or range good	-	-	-	409(80)
Total Area (by Hydrologic Soil Group)				1299
TOTAL DRAINAGE AREA: 1299 Acres		WEIGHTED CURVE NUMBER: 83		

NRCS-ENG-523A Rev. 10-97

STATE	SD	PROJECT	Bernie Stocser WHIP Pond		
BY	A. Roman	DATE	7-13-06	CHECKED BY	WMP
				DATE	8/18/06
SUBJECT	Sediment & Runoff				JOB NO.
					SHEET OF

Expected Erosion from EFH 11-66
 $0.0054 \text{ A/Fac} = 50-75\% \text{ Cult. Area P} \checkmark$

Expected Delivery Rate - EFH 11-74
 Median time $\rightarrow 26\% \checkmark$

Expected Annual Yield (Sediment)
 $= 0.0054 \frac{\text{AcFt}}{\text{Ac}} \times 1299 \text{ Ac} \times 26\% \text{ Delivery}$
 $= 1.82 \text{ acFt/yr} \checkmark$

Minimum storage required for 20 year life span:

$1.82 \text{ acFt/yr} \times 20 \text{ yrs} = \cancel{36.5} \underline{\underline{36.48 \text{ AcFt}}} \checkmark$

Sub. 80% = 29.18 AcFt
 Acc. 20% = 7.30 AcFt

Storage at PS = 40.3 AcFt

Life expectancy = $1.82 \text{ acFt/yr} \times 80\% = 1.45 \text{ acFt/year}$
 $40.3 \div 1.45 = 27.8 \text{ years} \checkmark$

Annual Surface Yield Ref: EFH 2-86

CN=83 = 0.4 Acres Inches/yr Total Surface Annual Runoff

$1299 \text{ Acres} \times 0.4 \frac{\text{Ac Inch}}{\text{yr}} \times \frac{1 \text{ Ft}}{12 \text{ Inch}} = \underline{\underline{43.3 \text{ AcFt}}} \text{ OK}$

80% chance

Grid Method					Grid Method		
Contour Interval	20				Contour Interval	10	
Segment	Length	Contours			Segment	Length	Contours
A	4600	6			A		
B	5400	8			B		
C	6200	10			C		
D	7000	11			D		
E	7700	12			E		
F	6900	11			F		
G					G	5300	15
H					H	4200	17
I					I	3600	10
J					J	3000	11
K					K	1100	3
L					L		
M					M		
N					N		
1	3400	4			1		
2	5750	5			2		
3	5900	7			3	1600	8
4	5350	5			4	2350	7
5	5100	7			5	5050	13
6	3400	5			6	5100	15
7	2850	3			7	4150	12
8	2100	2			8	750	0
9					9	350	2
	71650	96				36550	113
0.042097976	Slope =	4.21%			0.048569904	Slope =	4.86%
Average Watershed Slope= 4.5%							

DRILLING LOG DOCUMENTATION

Cooperator Bernard Stoeser County Stanley Date August 17, 2006

Practice Pond Cons. District Hughes-Stanley Hole No. 1

Farm Tract Field Sec T R Soil Name

Investigator A. Roman, K. Paulsen, M. McPherson Hole El. 95.5 Sampled Drilling Location East bank of draw

Depth, feet	Unified Symbol	Group Name Soil Material	Description of Material					
			Depth feet	Munsell Color	USDA Texture	Unified Classification	Geological Material (Oxidized ?)	WT: Permeability Group
0		Lean Clay				CL		
5	CL							
10								
15								
20								
25								

Notes:

Agricultural Waste Management Field Handbook, Chapter 10									
Unified Symbols and Group Names					Table 10D-3 (1161 test results)				
GW	=	Well graded gravel, gravel-sand mix, few fines			Soil Group	Median K, cm/s	Median K, ft/d	Unified Class	Perm Group
GP	=	Poorly graded gravel, gravel-sand mix, few fines			I	7.2x10-4	2.0	CH	I N S U
GC	=	Clayey gravel, gravel-sand-clay mix			I	3.5x10-4	1.0	MH	N S U S
GM	=	Silty gravel, gravel-sand-silt mix						CL	N S U S
SW	=	Well graded sand, gravelly sand with few fines			II	4.8x10-6	0.014	ML	N U S N
SP	=	Poorly graded sand, gravelly sand with few fines			II	1.5x10-6	0.004	CL-ML	N A N N
SC	=	Clayey sand, sand-clay mix						GC	N S U S
SM	=	Silty sand, sand-silt mix						GM	S U S S
CL	=	Lean inorganic clay, low to medium plastic			III	8.8x10-7	0.0025	GW	A N N N
CH	=	Fat inorganic clay, gravelly/sandy/silty clay			III	2.1x10-7	0.0006	SM	S S S S
CL-ML	=	Silty Clay						SC	N N U S
OL	=	Organic silts and organic silty clays, low plasticity			IV	4.9x10-7	0.0014	SW	A N N N
OH	=	Organic silt/clay, medium to high plasticity						SP	A N N N
ML	=	Inorganic silt, very fine sand, low plastic						GP	A N N N
MH	=	Inorganic silt, fine sand or silty soils							

Location In Section (x)



N

DRILLING LOG DOCUMENTATION

Cooperator Bernard Stoesser County Stanley Date August 17, 2006
 Practice Pond Cons. District Hughes-Stanley Hole No. 2
 Farm Tract Field Soil Name

Investigator A. Roman, K. Paulsen, M. McPherson 84.5 Sampled Drilling Location On flat near bottom of draw

Depth, feet		Description of Material					
0		Unified Symbol	Group Name Soil Material	Munsell Color	USDA Texture	Unified Classification	Geological Material (Oxidized ?)
			Lean Clay			CL	
5		CL					
10							
15							
20							
25							

Notes: Moisture in soil at 3' depth.

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

Location In Section (x)



N

DRAINAGE DIAPHRAGM LOCATOR

Stoeser WHIP

Data Input	
Elev. Invert	95
Pipe slope (ft/ft)	0.14
Top of Fill	105
SS ratio	3
Dist from invert to ds edge top dam	30.4
pipe diam (ft)	2.5
dist from pipe CL to top diaphragm	6.25
Diaphragm thickness (ft)	2.5

(This solver button doesn't work

X (max dist from invert to U/S diaph.) 43

(PLAY WITH THIS UNTIL b16 AND b17
ARE EQUAL)

theta 18.43495

1/2 of top of fill to top Diaphragm 4.3475

1.019503

perp dist from to diaph to backslope 4.264331 Adjust X so that these are equal

Elevation of top of Diaphragm 96.305

A. Roman
8/22/06

V. m

Roman, Angela - Pierre, SD

From: Delp, Walter - Huron, SD
Sent: Tuesday, July 18, 2006 8:21 AM
To: Roman, Angela - Pierre, SD
Subject: RE: Stoeser Wave Berm

Angela, Sorry I did not get back to you until late yesterday. I would suggest a 20 ft. wide berm with 0.7 feet above and 1.3 feet below the inlet. 10:1 slope.

Walt Delp, PE

Assistant State Conservation Engineer

Natural Resources Conservation Service

Federal Building, Room 203

200 Fourth St. SW

Huron, SD 57350

Phone 605-352-1229

Fax 605-352-1261

From: Roman, Angela - Pierre, SD
Sent: Monday, July 17, 2006 11:59 AM
To: Delp, Walter - Huron, SD
Subject: Stoeser Wave Berm

Thanks,
Angela



Map Unit Symbol	Acres	Percent
ChB	78.7	6%
OpA	43.3	3%
OpB	38.3	3%
OpC	294.5	23%
PrA	49.8	4%
PrB	228.2	18%
ScD	531.9	41%
W	16.4	1%
Wd	17.6	1%
Total:	1298.7	

all hydro group D

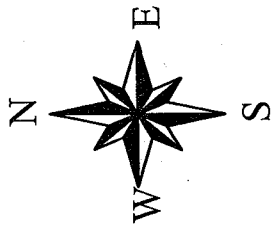
Table 1. Soil Interpretive Groups
Stanley County, South Dakota

musync	mapping_unit_name	soilc	sfid:c	pct	sl:l	sh:l	cap:c	past:c	wind:c	rsid	weg:c	l	Kt:f	T:l	hg:c
AgA	AGAR SILT LOAM, 0 TO 3 PERCENT SLOPES	AGAR	SD0070	90	0	2	llc2	F	3	SI	6	48	0.32	5	B
AgB	AGAR SILT LOAM, 3 TO 6 PERCENT SLOPES	AGAR	SD0070	90	2	6	lle1	F	3	SI	6	48	0.32	5	B
AKA	FAIRLO SILT LOAM, 0 TO 3 PERCENT SLOPES	FAIRLO	SD0420	90	0	3	llc2	F	3	SI	6	48	0.37	5	B
AKB	FAIRLO SILT LOAM, 3 TO 6 PERCENT SLOPES	FAIRLO	SD0420	90	3	6	lle1	F	3	SI	6	48	0.37	5	B
CaA	CANNING LOAM, 0 TO 3 PERCENT SLOPES	CANNING	SD0127	90	0	3	lls2	D1	6G	SI	6	48	0.28	4	B
CaB	CANNING LOAM, 3 TO 6 PERCENT SLOPES	CANNING	SD0127	90	3	6	llle6	D1	6G	SI	6	48	0.28	4	B
CaC	CANNING LOAM, 6 TO 9 PERCENT SLOPES	CANNING	SD0127	85	6	9	lve5	D1	6G	SI	6	48	0.28	4	B
Cc	CARTER-CAPA SILT LOAMS	CARTER	SD0074	55	0	2	lvs2	C	9C	Cp	6	48	0.37	5	D
Cc	CARTER-CAPA SILT LOAMS	CAPA	SD0470	35	0	2	Vis1	NS	10	DC	4	86	0.37	2	D
ChB	CHANTIER CLAY, 2 TO 9 PERCENT SLOPES	CHANTIER	SD0166	90	2	6	Vis5	NS	10	DC	4	86	0.37	2	D
Csc	CHANTIER-SANSARC CLAYS, 3 TO 15 PERCENT SLOPES	CHANTIER	SD0166	50	3	9	Vis5	NS	10	DC	4	86	0.37	2	D
Csc	CHANTIER-SANSARC CLAYS, 3 TO 15 PERCENT SLOPES	SANSARC	SD0067	40	8	15	6s5	NS	10	SwC	4	86	0.37	2	D
CWB	CHANTIER-BULLCREEK CLAYS, 2 TO 9 PERCENT SLOPES	CHANTIER	SD0166	50	2	9	Vis5	NS	10	DC	4	86	0.37	2	D
CWB	CHANTIER-BULLCREEK CLAYS, 2 TO 9 PERCENT SLOPES	BULLCREEK	SD0388	40	2	6	Vis5	NS	10	DC	4	86	0.37	5	D
Do	DORNA SILT LOAM	DORNA	SD0182	95	0	2	llc2	F	3	SI	5	56	0.37	4	B
Ho	HOVEN SILT LOAM	HOVEN	SD0056	95	0	1	Vis1	B2	10	CD	6	48	0.37	2	D
H/A	CAPA SILT LOAM, 0 TO 3 PERCENT SLOPES	CAPA	SD0470	85	0	3	Vis1	NS	10	Tcp	6	48	0.37	2	D
HS	CAPA-SLICKSPOTS COMPLEX	CAPA	SD0470	50	0	2	Vis1	NS	10	Tcp	6	48	0.37	2	D
HS	CAPA-SLICKSPOTS COMPLEX	SLICKSPOTS	SD0312	40	0	2	Vlls3	NS	10	Tcp	4	86	0.37	3	D
In	INAVALE FINE SAND	INAVALE	NE0046	90	0	2	Vle8	H	7	Sa	1	250	0.15	5	A
KeA	KIRLEY LOAM, 0 TO 3 PERCENT SLOPES	KIRLEY	SD0264	90	0	3	llc2	F	3	Cy	6	48	0.32	5	C
KeB	KIRLEY LOAM, 3 TO 6 PERCENT SLOPES	KIRLEY	SD0264	90	3	6	lle1	F	3	Cy	6	48	0.32	5	C
Ko	KOLLS CLAY	KOLLS	SD0106	90	0	1	Vw4	B2	10	CD	4	86	0.37	5	D
LaB	LAKOMA CLAY, 3 TO 6 PERCENT SLOPES	LAKOMA	SD0110	95	3	6	llle4	I	8	TU	4	86	0.37	3	D
LaC	LAKOMA CLAY, 6 TO 9 PERCENT SLOPES	LAKOMA	SD0110	45	6	9	lve4	I	8	TU	4	86	0.37	3	D
LKD	LAKOMA-OKATON CLAYS, 6 TO 15 PERCENT SLOPES	LAKOMA	SD0133	40	9	15	Vle4	NS	10	Sw	4	86	0.37	2	D
LKD	LAKOMA-OKATON CLAYS, 6 TO 15 PERCENT SLOPES	OKATON	SD0091	95	0	3	llc2	F	3	SI	5	56	0.32	5	B
LoA	LOWRY SILT LOAM, 0 TO 3 PERCENT SLOPES	LOWRY	SD0091	98	3	6	lle1	F	3	SI	5	56	0.32	5	B
LoB	LOWRY SILT LOAM, 3 TO 6 PERCENT SLOPES	LOWRY	SD0091	98	6	9	lle1	F	3	SI	5	56	0.32	5	B
LoC	LOWRY SILT LOAM, 6 TO 9 PERCENT SLOPES	LOWRY	SD0091	99	6	9	lle1	F	3	SI	5	56	0.32	5	B
McA	MCCLURE SILT LOAM, 0 TO 3 PERCENT SLOPES	MCCLURE	SD0262	85	0	3	llc2	F	3	SI	5	48	0.32	5	C
McB	MCCLURE SILT LOAM, 3 TO 6 PERCENT SLOPES	MCCLURE	SD0262	85	3	6	lle1	F	3	SI	6	48	0.32	5	C
MdA	MILLBORO SILT LOAM, 0 TO 3 PERCENT SLOPES	MILLBORO	SD0116	75	0	3	lls2	E	4	Cy	6	48	0.37	5	D
MdB	MILLBORO SILT LOAM, 3 TO 6 PERCENT SLOPES	MILLBORO	SD0116	80	3	6	llle4	E	4	Cy	6	48	0.37	5	D
MoA	MILLBORO SILT LOAM, 6 TO 9 PERCENT SLOPES	MILLBORO	SD0116	85	0	3	lls3	I	4C	Cy	4	86	0.37	5	D
MoB	MILLBORO SILTY CLAY LOAM, 0 TO 3 PERCENT SLOPES	MILLBORO	SD0116	85	3	6	llle4	I	4C	Cy	4	86	0.37	5	D
Mu	MUNJOR-INAVALE COMPLEX	MUNJOR	KS0311	55	0	2	llle7	H	1K	Sy	3	86	0.24	4	B
Mu	MUNJOR-INAVALE COMPLEX	INAVALE	NE0046	35	0	2	Vle8	H	7	Sa	1	250	0.15	5	A
Nb	NIMBRO SILTY CLAY LOAM	NIMBRO	SD0198	90	0	1	llc1	F	1K	LT	4L	86	0.32	5	B
OA	OAHE DAM	ORTHENTS	SD0304	100	0	40	Vlle10	NS	10	Sw	4L	86	0.28	5	B
OKe	OKATON-LAKOMA CLAYS, 15 TO 40 PERCENT SLOPES	OKATON	SD0133	65	15	40	Vlle8	NS	10	TU	4	86	0.37	3	D
OPa	OPAL CLAY, 0 TO 3 PERCENT SLOPES	LAKOMA	SD0110	25	15	25	Vlle8	NS	10	TU	4	86	0.37	3	D
OPb	OPAL CLAY, 3 TO 6 PERCENT SLOPES	OPAL	SD0079	95	0	3	lls3	I	4C	Cy	4	86	0.37	3	D
OPc	OPAL CLAY, 6 TO 9 PERCENT SLOPES	OPAL	SD0079	95	3	6	llle4	I	4C	Cy	4	86	0.37	3	D
OIB	OPAL-CHANTIER CLAYS, 2 TO 6 PERCENT SLOPES	OPAL	SD0079	90	6	9	lve4	I	4C	Cy	4	86	0.37	3	D
OIB	OPAL-CHANTIER CLAYS, 2 TO 6 PERCENT SLOPES	OPAL	SD0079	60	2	6	Vis5	NS	10	DC	4	86	0.37	2	D
OIC	OPAL-CHANTIER CLAYS, 6 TO 9 PERCENT SLOPES	OPAL	SD0079	60	6	9	lve5	I	4C	Cy	4	86	0.37	3	D
OIC	OPAL-CHANTIER CLAYS, 6 TO 9 PERCENT SLOPES	OPAL	SD0079	60	6	9	lve5	I	4C	Cy	4	86	0.37	3	D
OxB	OPAL-PROMISE CLAYS, 3 TO 6 PERCENT SLOPES	OPAL	SD0079	50	3	6	Vis5	NS	10	DC	4	86	0.37	3	D
OXB	OPAL-PROMISE CLAYS, 3 TO 6 PERCENT SLOPES	PROMISE	SD0071	40	3	6	llle4	I	4C	Cy	4	86	0.37	5	D

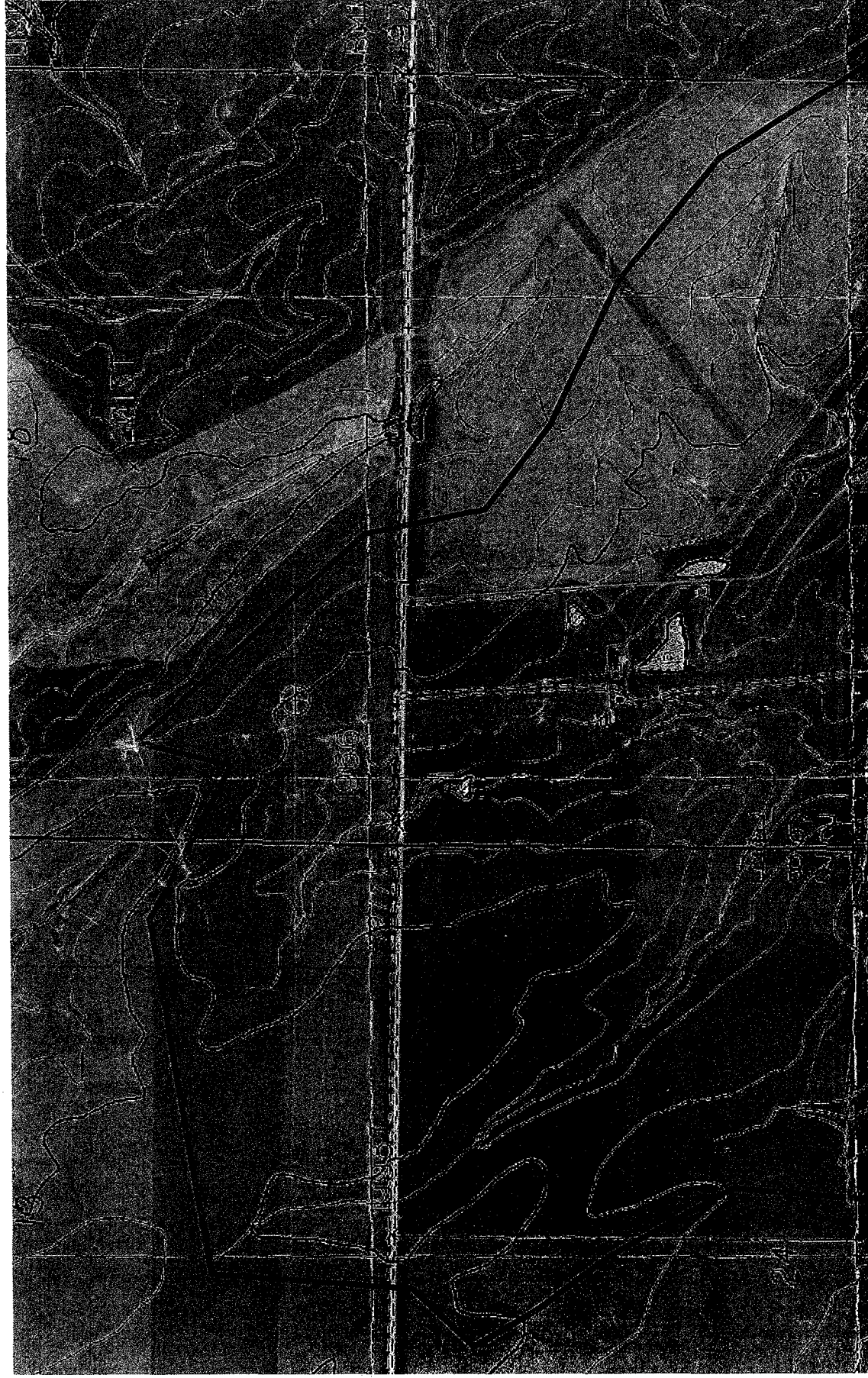
Table 1. Soil Interpretive Groups
Stanley County, South Dakota

musync	mapping_unit_name	soilc	sfidc	pct	slj	shj	capc	pastc	windc	rsid	wegc	l	kft	Ti	hg
Pg	PITS, GRAVEL	ORTHENTS	SD3003	99	0	60	Vlls2	NS	10		5	56	0.2	3	A
P/A	PROMISE CLAY, 0 TO 3 PERCENT SLOPES	PROMISE	SD0071	90	0	3	llls3	I	4C	Cy	4	86	0.37	5	D
P/B	PROMISE CLAY, 3 TO 6 PERCENT SLOPES	PROMISE	SD0071	95	3	6	llle4	I	4C	Cy	4	86	0.37	5	D
P/C	PROMISE CLAY, 6 TO 9 PERCENT SLOPES	PROMISE	SD0071	95	6	9	llle4	I	4C	Cy	4	86	0.37	5	D
Ps	PROMISE-CAPA COMPLEX	PROMISE	SD0071	68	0	2	llls3	I	4C	Cy	4	86	0.37	5	D
Ps	PROMISE-CAPA COMPLEX	CAPA	SD0470	29	0	2	Vlls1	NS	10	TCp	6	48	0.37	2	D
Rea	REE LOAM, 0 TO 3 PERCENT SLOPES	REE	SD0098	90	0	3	llle2	F	3	Sl	6	48	0.28	5	B
Reb	REE LOAM, 3 TO 6 PERCENT SLOPES	REE	SD0098	90	3	6	llle1	F	3	Sl	6	48	0.28	5	B
Rec	REE LOAM, 6 TO 9 PERCENT SLOPES	REE	SD0098	85	6	9	llle1	F	3	Sl	6	48	0.28	5	B
Rs	ROCK OUTCROP-SANSARC COMPLEX	ROCK OUTCROC	SD3006	70	25	40	Vlls1	NS	10	SwC	4	86	0.1	1	D
Rs	ROCK OUTCROP-SANSARC COMPLEX	SANSARC	SD0067	20	25	40	Vllle8	NS	10	SwC	4	86	0.37	2	D
Sae	SANSARC CLAY, 6 TO 40 PERCENT SLOPES	SANSARC	SD0067	85	25	40	Vllle8	NS	10	SwC	4	86	0.37	2	D
Sad	SANSARC-OPAL CLAYS, 6 TO 15 PERCENT SLOPES	OPAL	SD0079	45	9	15	Vllle2	NS	10	SwC	4	86	0.37	3	D
Sad	SANSARC-OPAL CLAYS, 6 TO 15 PERCENT SLOPES	OPAL	SD0067	65	25	40	Vllle8	NS	10	SwC	4	86	0.37	2	D
Sce	SANSARC-OPAL CLAYS, 15 TO 40 PERCENT SLOPES	SANSARC	SD0079	45	9	15	Vllle2	NS	10	SwC	4	86	0.37	3	D
Sce	SANSARC-OPAL CLAYS, 15 TO 40 PERCENT SLOPES	OPAL	SD0067	65	25	40	Vllle8	NS	10	SwC	4	86	0.37	2	D
Sd	SANSARC-ROCK OUTCROP COMPLEX	SANSARC	SD0079	25	25	40	Vllle8	NS	10	SwC	4	86	0.37	2	D
Sd	SANSARC-ROCK OUTCROP COMPLEX	ROCK OUTCROC	SD3006	35	25	40	Vlls1	NS	10	SwC	4	86	0.1	1	D
She	SCHAMBER GRAVELLY LOAM, 9 TO 40 PERCENT SLOPES	SCHAMBER	SD0075	85	25	40	Vlls4	NS	10	VSw	6	48	0.2	2	A
She	SCHAMBER-MURDO COMPLEX, 6 TO 15 PERCENT SLOPES	SCHAMBER	SD0075	45	9	15	Vlls4	NS	10	VSw	6	48	0.2	2	A
Smd	SCHAMBER-MURDO COMPLEX, 6 TO 15 PERCENT SLOPES	MURDO	SD0128	45	6	9	Vlls4	NS	6G	SwG	6	48	0.28	3	B
Smd	SCHAMBER-MURDO COMPLEX, 6 TO 15 PERCENT SLOPES	MURDO	SD0075	50	25	40	Vlls4	NS	10	VSw	6	48	0.2	2	A
Sme	SCHAMBER-MURDO COMPLEX, 15 TO 40 PERCENT SLOPES	MURDO	SD0128	40	15	25	Vllle1	NS	10	SwG	6	48	0.28	3	B
Sme	SCHAMBER-MURDO COMPLEX, 15 TO 40 PERCENT SLOPES	MURDO	SD0128	40	15	25	Vllle1	NS	10	SwG	6	48	0.28	3	B
Sp	SPILLWAY	SPILLWAY	SD3016	100	0	40	Vllle2	NS	10	TU	4L	86	0.28	2	B
Suc	SULLY SILT LOAM, 3 TO 9 PERCENT SLOPES	SULLY	SD0102	90	6	9	Vlls3	G	8	TU	4L	86	0.32	5	B
Sue	SULLY SILT LOAM, 9 TO 25 PERCENT SLOPES	SULLY	SD0102	90	15	25	Vlls3	NS	10	TU	4L	86	0.32	5	B
Sue	SULLY-SANSARC COMPLEX, 9 TO 25 PERCENT SLOPES	SULLY	SD0102	55	15	25	Vlls3	NS	10	TU	4L	86	0.32	5	B
Sve	SULLY-SANSARC COMPLEX, 9 TO 25 PERCENT SLOPES	SANSARC	SD0067	40	15	25	Vllle2	NS	10	SwC	4	86	0.37	2	D
Sw	BULLCREEK CLAY	BULLCREEK	SD0388	85	0	2	Vlls5	NS	10	DC	4	86	0.37	5	D
Sx	BULLCREEK-SLICKSPOTS COMPLEX	BULLCREEK	SD0388	60	0	2	Vlls5	NS	10	DC	4	86	0.37	5	D
Sx	BULLCREEK-SLICKSPOTS COMPLEX	SLICKSPOTS	SD0312	30	0	2	Vlls3	NS	10	COV	4	86	0.37	3	D
Wc	WENDTE CLAY	WENDTE	SD0197	85	0	2	Vlls3	I	4C	COV	4	86	0.37	5	D
Wd	WENDTE CLAY, CHANNELLED	WENDTE	SD0257	90	0	2	Vllw1	NS	4C	COV	4	86	0.37	5	D
Wf	ALBATON CLAY, FREQUENTLY FLOODED	ALBATON	IA0107	90	0	1	Vllw1	B2	10	COV	4	86	0.37	5	D
Wse	WESTOVER LOAM, 15 TO 40 PERCENT SLOPES	WESTOVER	SD0135	85	15	25	Vlls3	NS	10	TU	4L	86	0.28	4	B
Wt	WITTEN CLAY	WITTEN	SD0073	90	0	2	Vlls3	I	4C	COV	4	86	0.37	5	D
W	WATER (<40 ACRES)	WATER (<40 ACRES)		100											

Stoeser WHIP Pond
Drainage Area=1299 Acres
890 Ac. Cropped 409 Ac. Grass\Hayland
Watershed Length= 13,970'
A. Roman 7/12/06



 Stoeser drainage area.shp





1000 0 1000 2000 3000 4000 Feet



REPORT ON
WATER PERMIT APPLICATION No. 2603-2
Bernard Stoesser
September 26, 2006

Water Permit Application No. 2603-2 has been filed by Bernard Stoesser to impound 40.3 acre-feet of water by constructing a dam located in the NW ¼ SE ¼ of Section 30-T5N-R29E, in Stanley County. The application also requests impoundment of sufficient water to maintain water at the outlet elevation. The water will be used for recreation, fish and wildlife production and livestock watering purposes.

Discussion:

The dam will be classified as a small size, Category 3, Low Hazard dam. The Natural Resources Conservation Service (NRCS) has designed the dam. The plans and specifications have been reviewed and will be approved; however, construction of the dam can not begin until Water Permit Application No. 2603-2 is approved.

The dam will be 24.5 feet high with a normal storage capacity of 40.3 acre-feet with a reservoir level at the primary spillway elevation, and a maximum storage capacity of 128 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 1299 acres or 2.03 square miles. The dam is designed to have a 60 inch diameter concrete drop inlet structure with a 30 inch barrel as the primary spillway and a 100 foot wide earthcut spillway. A 25 year frequency event produces a peak runoff of approximately 1022 cfs and a 50 year frequency event produces a peak runoff of approximately 1472 cfs. The 100 foot wide earthcut secondary spillway will have a capacity of approximately 1490 cfs. The NRCS designed the primary spillway to handle a 2 year-24 hour event with a peak discharge of 113 cfs and the secondary spillway to handle a 50 year-24 event with a peak discharge of 924 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 43.3 acre-feet. The annual yield with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 97.4 acre-feet and the annual yield with a 10 percent chance, or 1 out of 10 years, is expected to be 357 acre-feet.

The Stoesser Dam No. 4 will be located in the NW ¼ SE¼ of Section 30-T5N-R29E on an unnamed tributary to Ash Creek about 1.0 mile upstream of the confluence of the unnamed tributary and Ash Creek and about 10 miles upstream of the tributary of Ash Creek and the Bad River. There are no existing Water Permits/Rights located on the unnamed tributary or Ash Creek between the proposed dam and the Bad River.

Conclusions:

1. Water Permit Application No. 2603-2 should be approved since unappropriated water is available and approval should not have any adverse effect on existing Water Permits/Rights.
2. If approved, the low flow bypass requirement for downstream domestic use should be a qualification on Water Permit Application No. 2603-2.



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



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2603-2, Bernard Stoesser**

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. 2603-2, Bernard Stoesser, 4305 Sandwedge Drive, Pierre SD 57501

The Chief Engineer is recommending APPROVAL of Application No. 2603-2 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. Water Permit No. 2603-2 authorizes a dam with a storage capacity of 40.3 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
October 13, 2006



RECEIVED

NOV - 8 2006

WATER RIGHTS
PROGRAM

Capital Journal

AFFIDAVIT OF PUBLICATION

State of South Dakota, County of Hughes

Hope L. Walsh of said county, being, first duly sworn, on oath, says: That he/she is the publisher or an employee of the publisher of the Capital Journal, a daily newspaper published in the City of Pierre in said County of Hughes and State of South Dakota; that he/she has full and personal knowledge of the facts herein stated, that said newspaper is a legal newspaper as defined in SDCL 17-2-2.1 through 17-2-2.4 inclusive, that said newspaper has been published within the said County of Hughes and State of South Dakota, for at least one year next prior to the first publication of the attached public notice, and that the legal display advertisement headed Notice of Application NO 2603-2

a printed copy of which, taken from the paper in which the same was published, and which is here-to attached and made a part of this affidavit, was published in said newspaper for 2 successive week(s) to wit:

<u>October 25</u>	<u>20 06</u>	_____	20
_____	20	_____	20
<u>November 01</u>	<u>20 06</u>	_____	20
_____	20	_____	20
_____	20	_____	20

That the full amount of the fee charged for the publication of the attached public notice inures to the sole benefit of the publisher or publishers; that no agreement or understanding for the division thereof has been made with any other person, and that no part thereof has been agreed to be paid to any person whomsoever; that the fees charged for the publication thereof are: \$ 49.02.

Signed: Hope L. Walsh

subscribed and sworn to before me this 7 day of November 2006

May L. Baker

Notary Public in and for the County of Hughes, South Dakota.
My Commission expires 2-19, 2009.

SNAXLP

No. 7959

2dly 10/25, 11/1

NOTICE OF APPLICATION

**NO. 2603-2 to Appropriate
Water**

Notice is given that Bernard Stoesser, 4305 Sandwedge Drive, Pierre S.D. 57501 has filed an application for a water permit to impound 4030 acre-feet of water from runoff by constructing a dam located in the NW 1/4 SE 1/4 Section 30 with water impounded in the NW 1/4 SE 1/4 NE 1/4 SW 1/4, SE 1/4 NW 1/4 SW 1/4 NE 1/4 Section 30; all in T5N-R29E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation, recreational and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2603-2 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605-773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by November 13, 2006.

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

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

October 16, 2006

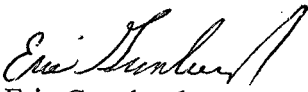
Bernard Stoesser
4305 Sandwedge Drive
Pierre SD 57501

Dear Mr. Stoesser:

Water Permit Application No. 2603-2 for fish & wildlife propagation, recreation, domestic 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 Capital Journal printed at Pierre, SD (Ph # 605-224-7301). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and a report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice 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 application.

Sincerely,


Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

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



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

October 16, 2006

Capital Journal
PO Box 878
Pierre SD 57501

ATTENTION: Legal Public Notice

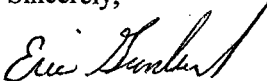
Enclosed is a Notice on Application No. 2603-2 to Appropriate Water to be published twice. Please publish the first notice on October 25, 2006 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

Please BILL the APPLICANT for the cost of publication. The APPLICANT is Bernard Stoeser, 4305 Sandwedge Drive, Pierre SD (Ph # 605-224-4840).

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. 2603-2

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

Date _____

We are in receipt of your letter of October 16, 2006 enclosing Notice to Appropriate Water by Application No. 2603-2 which was first published in our issue of _____. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

Name

Newspaper

Instruction to Newspaper - Publish first Notice on October 25, 2006 with the second publication 7 days later. The applicant is responsible for payment.

NOTICE OF APPLICATION NO. 2603-2 to Appropriate Water

Notice is given that Bernard Stoesser, 4305 Sandwedge Drive, Pierre SD 57501 has filed an application for a water permit to impound 40.30 acre-feet of water from runoff by constructing a dam located in the NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 30 with water impounded in the NW $\frac{1}{4}$ SE $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ NW $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 30; all in T5N-R29E. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation, recreational and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2603-2 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by November 13, 2006.

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.



DEC 22 2006

DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

Bernard Stoesser
4305 Sandwedge Dr
Pierre SD 57501

Dear Mr. Stoesser:

Enclosed is Water Permit No. 2603-2 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

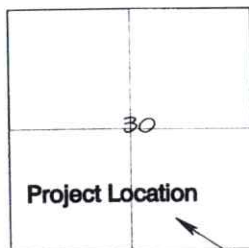
Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the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

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

Sincerely,

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

enclosures



Contact Information
 Bernard Stoeser
 4305 Sandwedge Drive
 Pierre, SD 57501
 605-224-4840

**Hazard Class A
 Job Class IV**

AS-BUILT PLANS

Notes

1. A preconstruction meeting is required before construction between NRCS, the Landowner, and the contractor.
2. Water Rights Permit and Location Notice is required by South Dakota Department of Environment and Natural Resources. This is the responsibility of the landowner.

Sheet Index

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

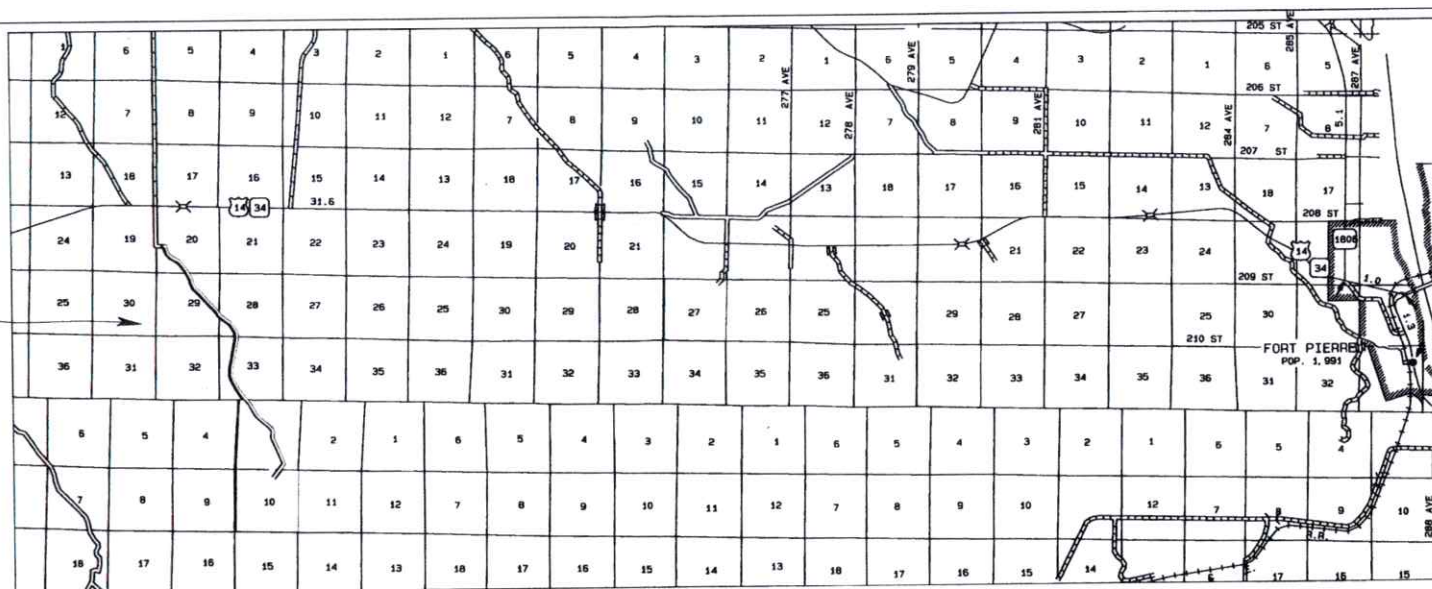


TABLE OF QUANTITIES

ITEM	UNIT	QUANTITY	"AS BUILT" QUANTITY
Excavation			
Core Trench	cu. yd.	1,152	1,152
Earthfill Class S	cu. yd.	13,047	13,047
Topsoil	sq. yd.	5,115	5,115
Seeding	acre	2.3	0
60" dia. x 4' deep concrete drop structure	each	1	1
30" dia. polymer coated corr. metal pipe	lin. ft.	110	114
Rock Riprap	cu.yd.	6	6
Course Drain Fill	cu.yd.	6	6
Fine Drainfill	cu.yd.	50	50
Timber Structure	BD.FT.	172	172
Cathodic Protection System	each	1	1

* Seeding not completed at time of inspection 1/11/08

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

Construction Specifications

Clearing and Grubbing
 Stripping
 Excavation
 Earth Fill, Class S
 Rock Riprap
 Drainfill
 Salvaging and Spreading Topsoil
 Concrete for Minor Structures
 Steel Reinforcement
 Corrugated Metal Pipe
 Wood Fabrication and Installation
 Seeding
 Cathodic Protection

Material Specification

Coated Corrugated Steel Pipe

Hydraulic Data

Drainage Area 1,299 Acres
 Time of Concentration 1.87 hours
 Runoff Curve Number 83
 Principal Spillway, 2 yr, 24-hr. Rainfall 2.1 Inches
 Emergency Spillway 50 yr, 24-hr. Rainfall 4.4 Inches
 Principal Spillway Discharge at ES 75 CFS
 Emergency Spillway Discharge 990 CFS
 Estimated 20 year Sediment Yield 36.48 AcFt
 Estimated Sediment Yield Below Crest 29.18 AcFt
 Estimated Sediment Yield Above Crest 7.30 AcFt
 Crest of Normal Pool 9.16 Acres 40.3 AcFt
 Crest of Emergency Spillway 14.95 Acres 79.8 AcFt
 Top of Dam 21.40 Acres 133.1 AcFt

NRCS
 NATURAL RESOURCES
 CONSERVATION SERVICE

Bernard Stoeser
 SE 1/4, Sec. 30, T5N, R29E
 Stanley County, South Dakota

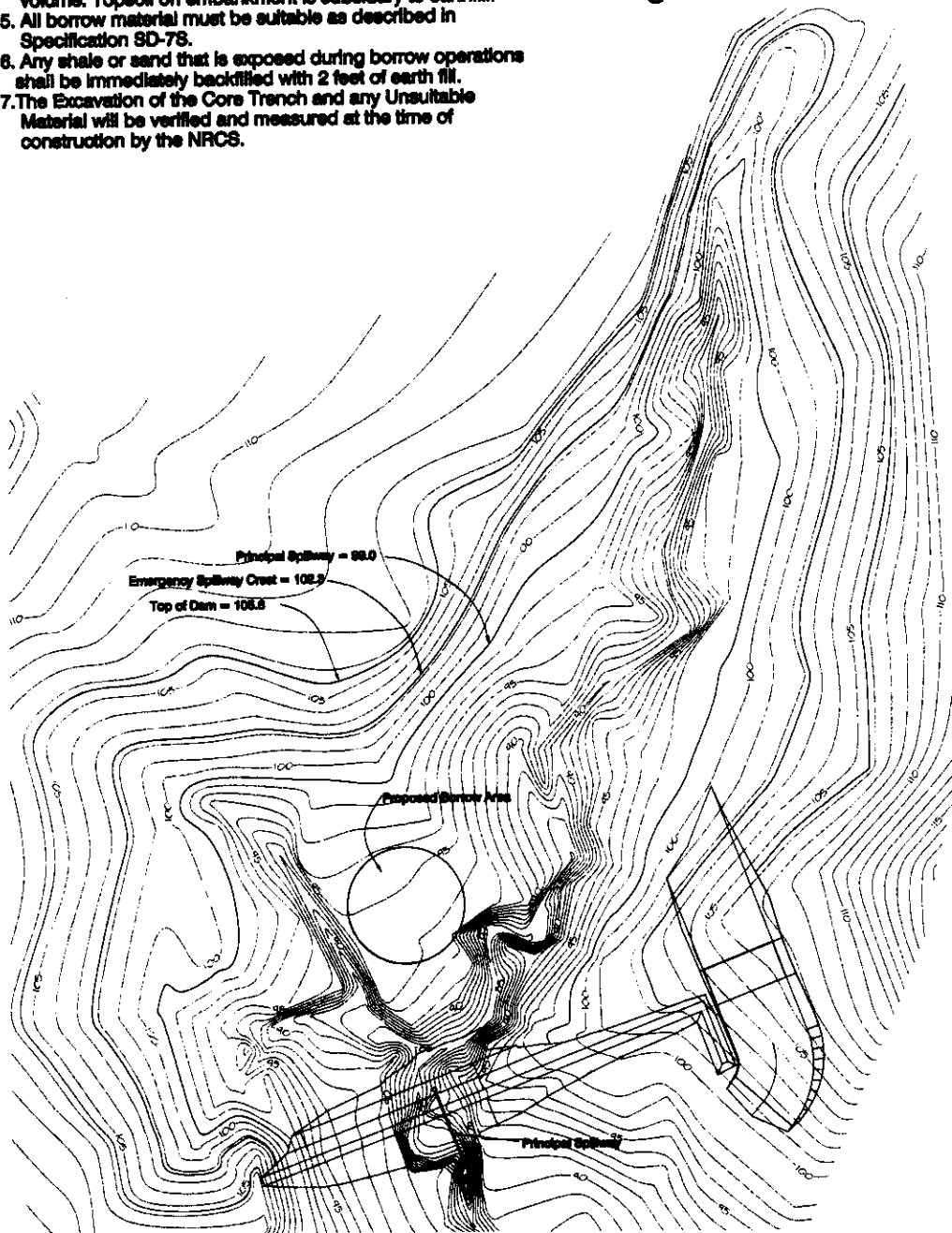
Drawing No: 1717
 Stoeser/WHP.pro
 Sheet No: 1 of 9

Date: 8/28/07
 Designed by: A. Roman
 Drawn by: A. Roman
 Checked by: A. Roman
 As Built by: A. Roman

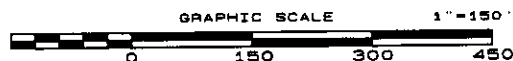
Approved by: _____
 Title: _____

Construction Notes

1. Clear and Grub the entire area within the Work Limits.
2. Emergency spillway excavation shall be subsidiary to the earthfill.
3. Spread topsoil on all surfaces of the emergency spillway and embankment downstream of elevation 97.7, to a depth of not less than 0.5 feet.
4. Topsoil quantity based only on emergency spillway volume. Topsoil on embankment is subsidiary to earthfill.
5. All borrow material must be suitable as described in Specification SD-78.
6. Any shale or sand that is exposed during borrow operations shall be immediately backfilled with 2 feet of earth fill.
7. The Excavation of the Core Trench and any Unsuitable Material will be verified and measured at the time of construction by the NRCs.



1' Contour Intervals



Bernard Stoeser
 SE 1/4, Sec. 30, T8N, R29E
 Stanley County, South Dakota

Bernard Stoeser
 SE 1/4, Sec. 30, T8N, R29E
 Stanley County, South Dakota

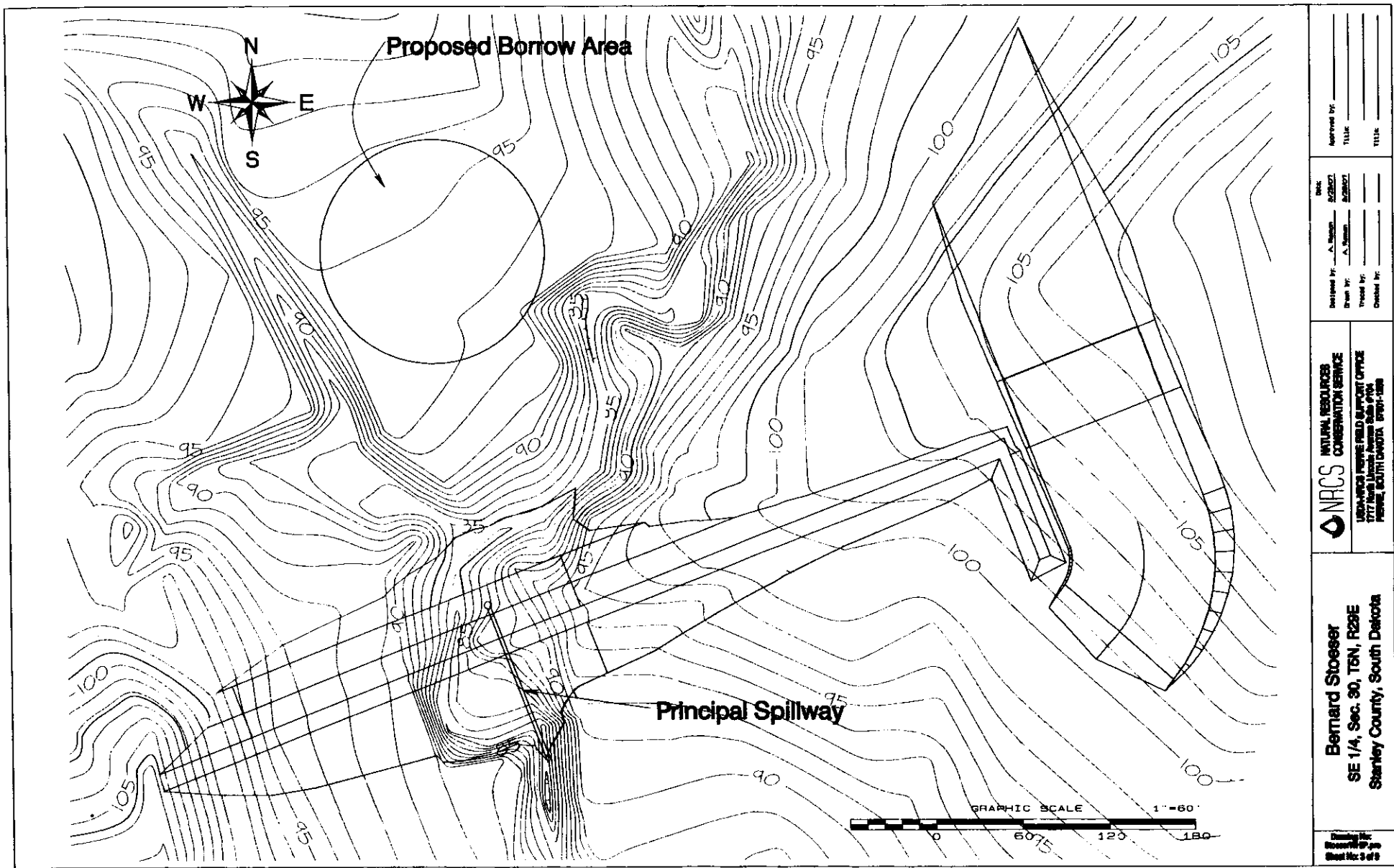


NATURAL RESOURCES
 CONSERVATION SERVICE

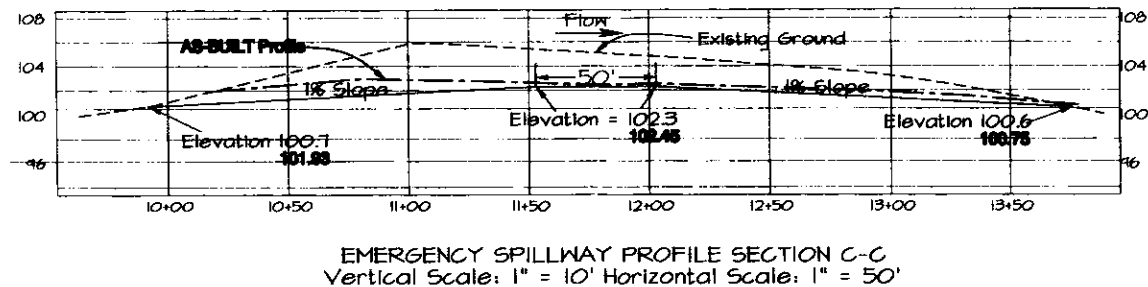
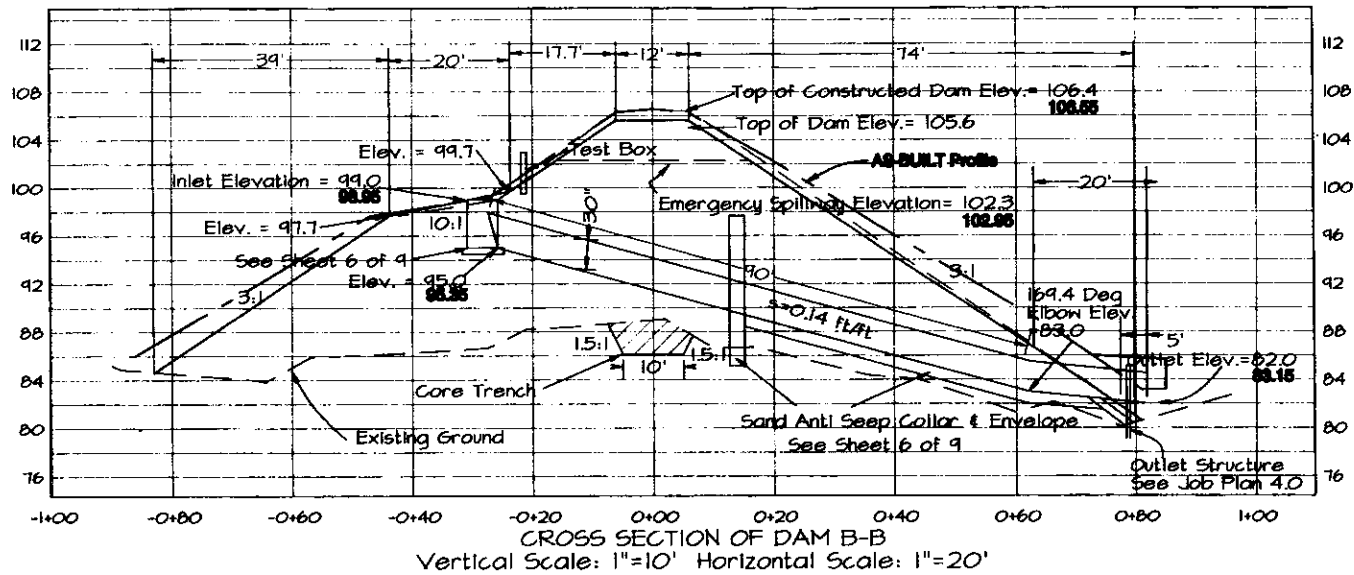
USDA-NRCS PIERRE FIELD SUPPORT OFFICE
 1717 North Lincoln Avenue Suite #104
 PIERRE, SOUTH DAKOTA 57501-1888

Date: _____
 Designed by: A. Roman 6/28/07
 Drawn by: A. Roman 6/28/07
 Checked by: _____
 As Built by: _____

Approved by: _____
 Title: _____
 Approved by: _____
 Title: _____



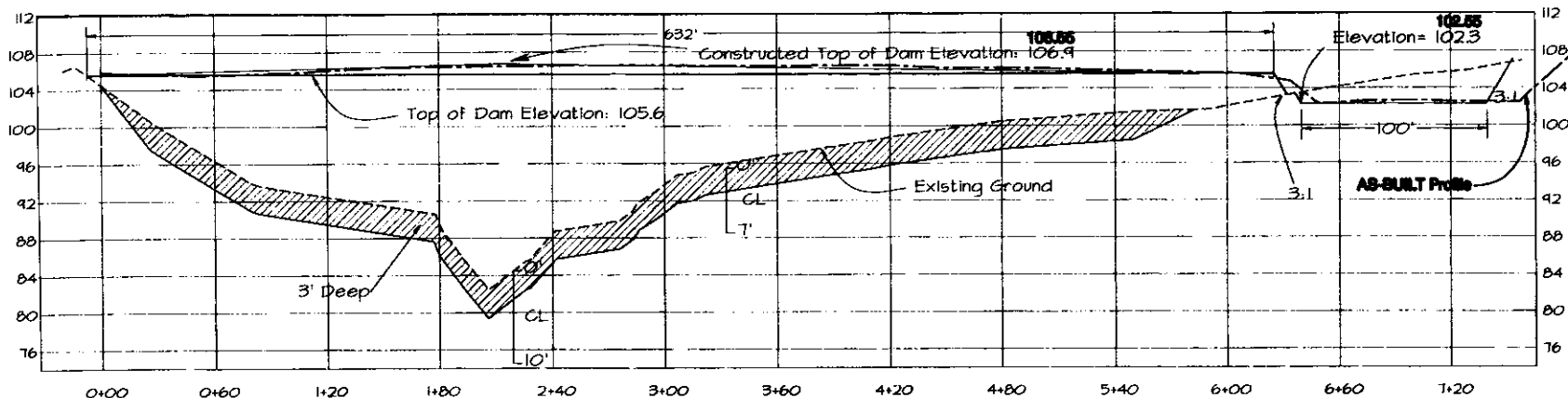
Drawing No. 2000-01-01 Sheet No. 3 of 3	Bernard Stoesser SE 1/4, Sec. 30, T6N, R29E Stanley County, South Dakota	 NRCS NATURAL RESOURCES CONSERVATION SERVICE USDA-NRCS PRAIRIE FIELD SUPPORT OFFICE 1777 North Lincoln Avenue Suite 400A PRAIRIE, SOUTH DAKOTA 57054-1000	Date: _____ Designed by: A. Smith Drawn by: A. Smith Traced by: _____ Checked by: _____	Approved by: _____ Title: _____ Title: _____
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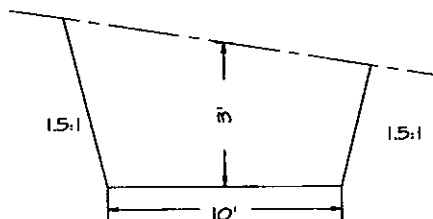
Note: Excavation of Emergency Spillway (3,975 CY) and Stripping (982 CY) is subsidiary to Earth Fill.

As-Built Approved by: A. R. Meyer
11/15/87

NRCS NATURAL RESOURCES CONSERVATION SERVICE USDA-NRCS PIERRE FIELD SUPPORT OFFICE 1777 North Lincoln Avenue, Suite 410 PIERRE, SOUTH DAKOTA 57501-1888	Designed by: A. Meyer Drawn by: A. Meyer Checked by: _____ Date: 11/15/87	Approved by: _____ Title: _____ Date: 11/15/87
	Bernard Stoesser SE 1/4, Sec. 30, T5N, R29E Stanley County, South Dakota	
	11/15/87 11/15/87	
	11/15/87 11/15/87	



DAM PROFILE A-A
Vertical Scale: 1" = 12' Horizontal Scale: 1" = 60'



TYPICAL CORE TRENCH
Dam Centerline - 1:5 Side Slopes
(NOT TO SCALE)

Control Points				
Pt #	Northing	Easting	Elevation	Descriptor
983	10000.0000	10000.0000	95.00	cp1
1294	9864.6950	10000.3980	89.80	cp2

Coordinate Table				
Pt #	Northing	Easting	Elevation	Descriptor
964	10313.0704	10288.0644		CL Emergency Spillway
965	10190.2289	10336.3644	102.30	CL Emergency Spillway
966	10143.6965	10354.6604	102.30	CL Emergency Spillway
967	10073.9426	10382.2177		CL Emergency Spillway
968	9997.5866	10369.6334	100.80	CL Emergency Spillway
969	10048.7960	10318.2621	104.60	CL End Dike
970	10118.5944	10290.8180	105.60	CL Begin Dike
971	10125.6420	10292.3451	105.60	CL Dam Sta. 5+75
972	9894.2284	9703.8143	105.60	CL Dam Sta. 0+00

Radius Point				
Pt #	Northing	Easting	Elevation	Descriptor
2094	10044.0632	10299.6325		80' Rad.

As built approved by: A. Roman 1/15/08

NRCS NATURAL RESOURCES
CONSERVATION SERVICE
LEACHES FERRY FIELD SUPPORT OFFICE
1777 North Dakota Avenue Suite 200
FARMER, SOUTH DAKOTA 58045-1288

Bernard Stoesser
SE 1/4, Sec. 80, T8N, R28E
Stanley County, South Dakota

Drawn by: B. Stoesser
Check by: B. Stoesser

Designed by: A. Roman
Drawn by: A. Roman
Checked by: A. Roman
Approved by: A. Roman
Title: 11114
Date: 11/15/08



As built by
A. Brown, 11/15/68

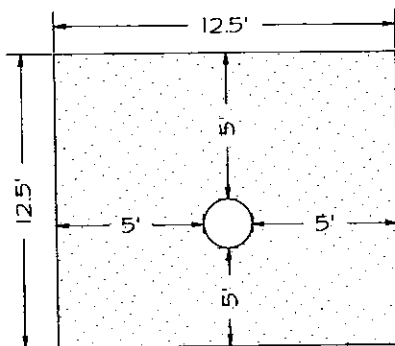
Approved By: _____
 Title: _____

 Title: _____

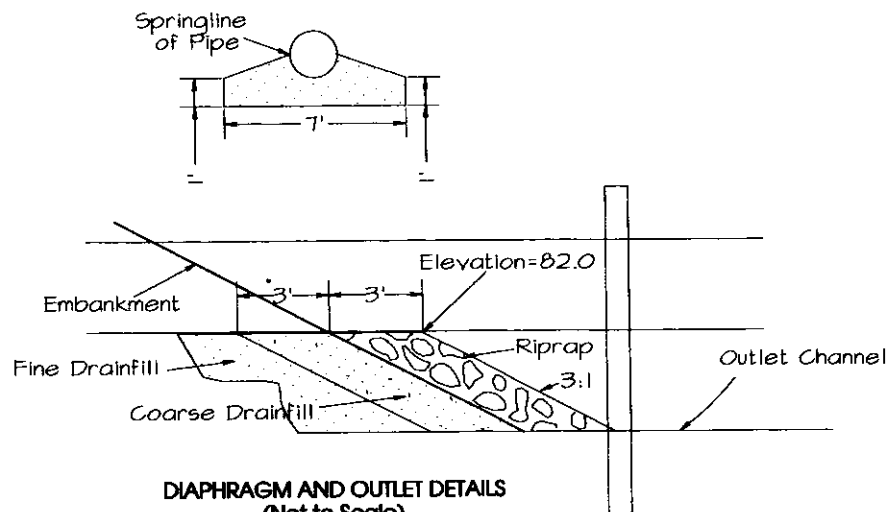
Date:	<u>8/28/07</u>
Discussed by:	<u>A. Remon</u>
Checked by:	<u>A. Remon</u>
Treated by:	<u> </u>
Checked by:	<u> </u>

NRCS
NATURAL RESOURCES
CONSERVATION SERVICE

USDA-NRCS PIERRE FIELD SUPPORT OFFICE
1717 North Lincoln Avenue Suite #104
PIERRE, SD 57501-1004
PHONE: 605/783-2400 FAX: 605/783-1100



Diaphragm is 2' thick
(not to scale)



DIAPHRAGM AND OUTLET DETAILS
(Not to Scale)

- 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 BOND AROUND PIPE
- Note 3) DROP STRUCTURE TO BE PRECAST REINFORCED CONCRETE
- Note 4) BASE FOR CONCRETE RISER WILL REQUIRE 2.4 CY CONCRETE
- Note 5) FILTER MATERIAL SHALL BE COMPACTED ACCORDING TO CLASS II COMPACTION AS DESCRIBED IN CONSTRUCTION SPECIFICATION 904 OR AS DESCRIBED UNDER SECTION 904-4 OF CONSTRUCTION SPECIFICATION 904.

Bernard Stoesser
SE 1/4, Sec. 30, T5N, R29E
Stanley County, South Dakota

During the
 2007-2008
 2008-2009