

WATER PERMIT NO. 7210-3

Name of Applicant: Leroy Beitelspacher

Address: 31779 140th St, Bowdle SD 57428

Phone: 605 285-6171

Amount of Water Claimed: 79.7 AF

Total Acres: NA

Source of Water Supply: runoff

Water to be used for: fish & wildlife propagation

County: Walworth

Type of Waste Disposal System: NA

Location: 6 miles southwest of Akaska

PRIORITY

Date Received: 8-12-10

Application/License Fee: \$700

Corrected Application Received:

Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: NW ¼ SW ¼ Sec 32-T121N-R77W

Land to be Irrigated: NA

Depth of Well: NA

Well Driller: NA

Remarks:

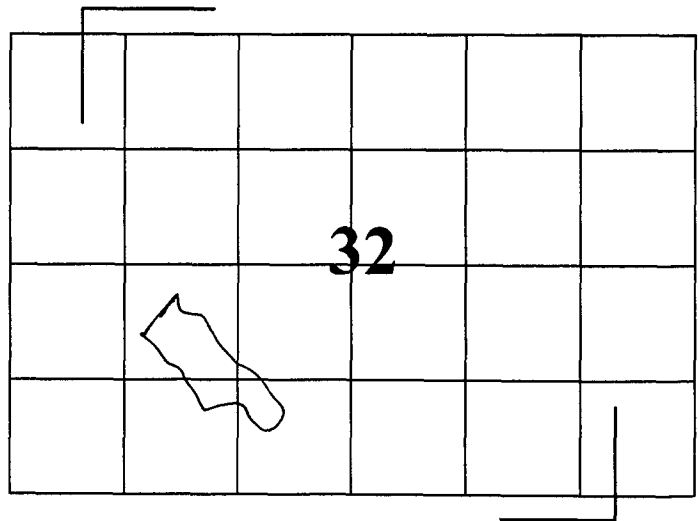
Type of Map:

Prepared by: Angela Roman, NRSC

Reviewed and the Number Assigned on: 8-12-10

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____



SD EForm - 1585 V3
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>7210-3</u> (office use only) Hydrologic Unit <u>10130105</u>
	Basin <u>Missouri River</u>
	Newspaper <u>Mobridge Tribune</u> <u>P.O. Box 250</u>
	<u>605-845-3646</u> <u>57601</u>

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AUG 12 2010
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>Agriculture & Wildlife use</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 Leroy Beitelspacher Phone (605) 285-6171
(check one) ☐ Owner ☐ Tenant/lessee
- Mailing Address 31779 140th St. Bowdle State SD 57428
(Street, RR, or Box and City) (Zip Code)
2. Amount of water claimed *CFS or **GPM 79.7 ***AF
(*Cubic Feet per Second) (**Gallons per Minute) (***Acre Feet - storage capacity of dam/dugout or annual use if applicable)
3. Source of water supply Surface Runoff
4. Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) County Walworth
NW 1/4, SW1/4, SECTION 32 T121N - R77W
5. County or counties where water will be used Walworth
6. Annual period during which water is to be used Jan 1 - Dec 31
7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

The project consists of a 15.7 foot high, 835 foot wire earthen dam which will on average pond 79.7 acre feet of water.

STATE OF SOUTH DAKOTA)

County of Walworth

SS

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

I, Leroy Beitelspacher, 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 Leroy Beitelspacher

Subscribed and sworn to before me this 10th day of August 20 10

Randy A. Heller
Notary Public signature

"my Commission Expires" May 6, 2016

**SOUTH DAKOTA
WATER PERMIT NO. 7210-3**

Date of first receipt of application August 12, 2010.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 7210-3 to Leroy Beitelspacher, 31779 140th St, Bowdle SD 57428 authorizing the construction of the dam use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 7210-3 authorizes impoundment 79.7 acre-feet of water from runoff by constructing a dam located in the NW 1/4 SW 1/4 Section 32 with water impounded in the SW 1/4 Section 32; all in T121N-R77W.
2. The water appropriated shall be used for fish and wildlife propagation and livestock water purposes and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 7210-3 is September 20, 2010.
5. The date from which applicant may claim right is August 12, 2010.
6. One-fifth of the construction is to be completed on or before March 20, 2013.
7. All construction is to be completed on or before September 20, 2015.
8. Water is to be put to beneficial use on or before September 20, 2019.
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. 7210-3 authorizes a dam with a storage capacity of 79.7 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.

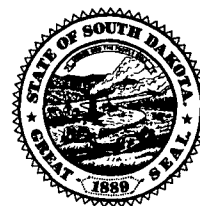
WATER MANAGEMENT BOARD

By: Garland Erbele

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

SEP 27 2010

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

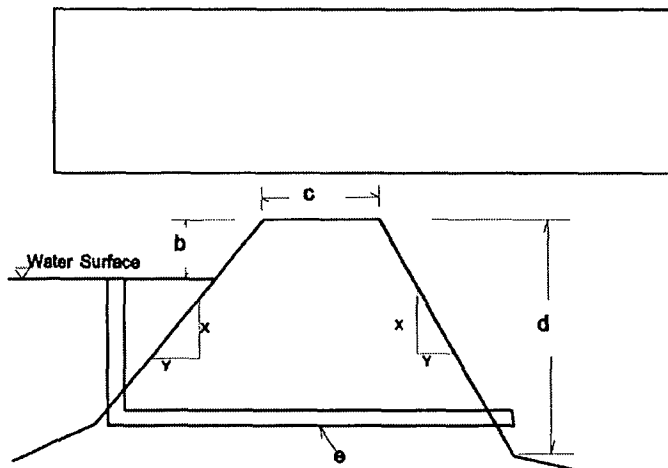
3. Dugout Information

- 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:



- b) Freeboard _____ 4.4'
- c) Crest Width _____ 12'
- Crest Length _____ 835'
- d) Height _____ 16.4
- e) Primary Outlet Capacity _____ 27.4
If pipe, diameter _____ 18"
- f) Secondary Spillway Capacity _____ 402cfs
Spillway Width _____ 100'
- g) X & Y Slope _____
Upstream _____ 3:1
Downstream _____ 3:1
- h) Surface Area of Impoundment _____ 19.4
- i) Storage _____ 79.7 Acre Feet
- j) Drainage Area Above Dam _____ 1,204.6 Acres

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 8/12, 2010

RECEIVED OF LeRoy Beffelsbacher 31779 140th St Bowdle SD 57428

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

Fee for Application for Permit No. <u>7210-3</u> to Appropriate Water, to construct and to put water to beneficial use	500	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>7210-3</u>	200	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	700 00

No.

04590

By [Signature]
Chief Engineer

United States Department of Agriculture



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

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

August 3, 2010

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

Mr. Tim Schaal,

Attached are plans, specifications and design data for a dam in Walworth County for LeRoy Beitelspacher. This dam will require a water rights permit and safety of dams review. Construction is anticipated this fall.

Mr. Beitelspacher will be sending in the signed water rights and surface water discharge permit applications, along with a check for \$700.

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

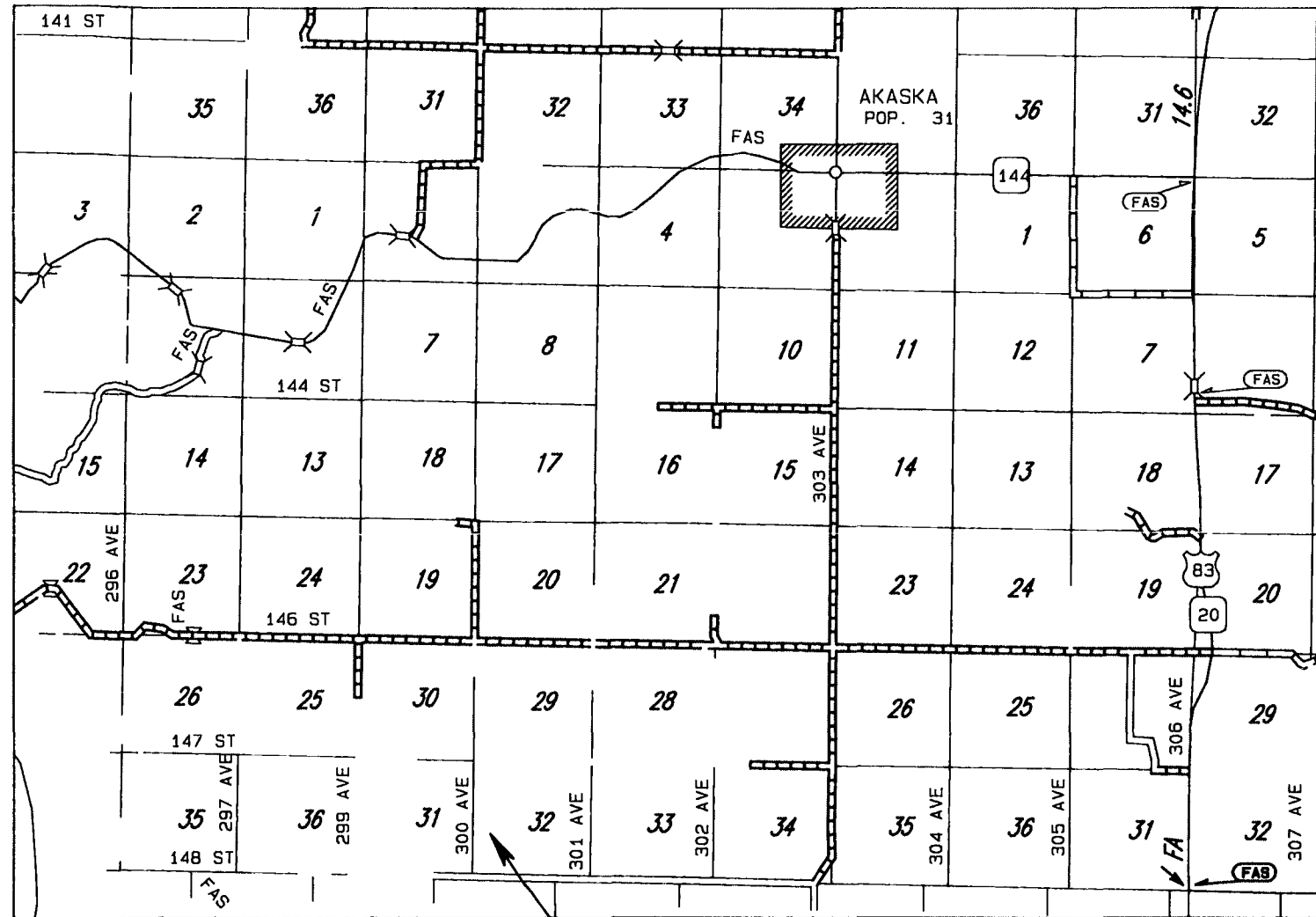
Thank You,

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

ANGELA ROMAN
Agricultural Engineer

Attachments

LeRoy Beitelspacher Pond (SW 1/4, Section 32, T121N, R77W)



Hazard Class A
Job Class IV

PLAN NOTES:

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

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

Sheet Index

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

Contact Information

LeRoy Beitelspacher
31779 140th St.
Bowdle, SD 57428
605-285-6171

TABLE OF QUANTITIES

ITEM	UNIT	QUANTITY	'AS BUILT' QUANTITY
Excavation Core Trench	Cu. Yd.	896	
Spillway	Cu. Yd.	1,018	
Earth Fill Class S	Cu. Yd.	13,031	
Topsoil (Emergency Spillway)	Cu. Yd.	609	
Seeding	Acre	2.0	
30" dia. x 4.5' deep concrete drop structure	Each	1	
18" dia. PVC SDR 26 min.	LF	86	
18" dia. PVC SDR 26 min. Elbow	Each	1	
Rock Riprap	Cu. Yd.	10	
Geotextile Cloth	Sq. Yd.	27	
Fine Drainfill	Cu. Yd.	14	
Trash Rack	Each	1	
Pipe Outlet Structure	Each	1	

Construction Specifications

Clearing and Grubbing	SD-2
Stripping	SD-4
Excavation	SD-5
Earth Fill, Class S	SD-7
Rock Riprap	SD-61C
Drainfill	SD-24A
Salvaging and Spreading Topsoil	SD-10
Concrete for Minor Structures	SD-12B
Steel Reinforcement	SD-13
PVC Pipe	SD-19
Wood Fabrication and Installation	SD-16
Seeding	SD-28
Geotextile Material Spec	SD-592
Hydraulic Data	
Drainage Area	1,204 Acres
Time of Concentration	3.33 hours
Runoff Curve Number	81
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 (Q2)	27 CFS
Emergency Spillway Discharge (Q50)	402 CFS
Estimated 25 year Sediment Yield	67.3 AcFt
Estimated Sediment Yield Below Crest	53.8 AcFt
Estimated Sediment Yield Above Crest	13.5 AcFt
Crest of Normal Pool	19.4 Acres 79.7 AcFt
Crest of Emergency Spillway	27.9 Acres 121.2 AcFt
Top of Dam	41.6 Acres 209.2 AcFt

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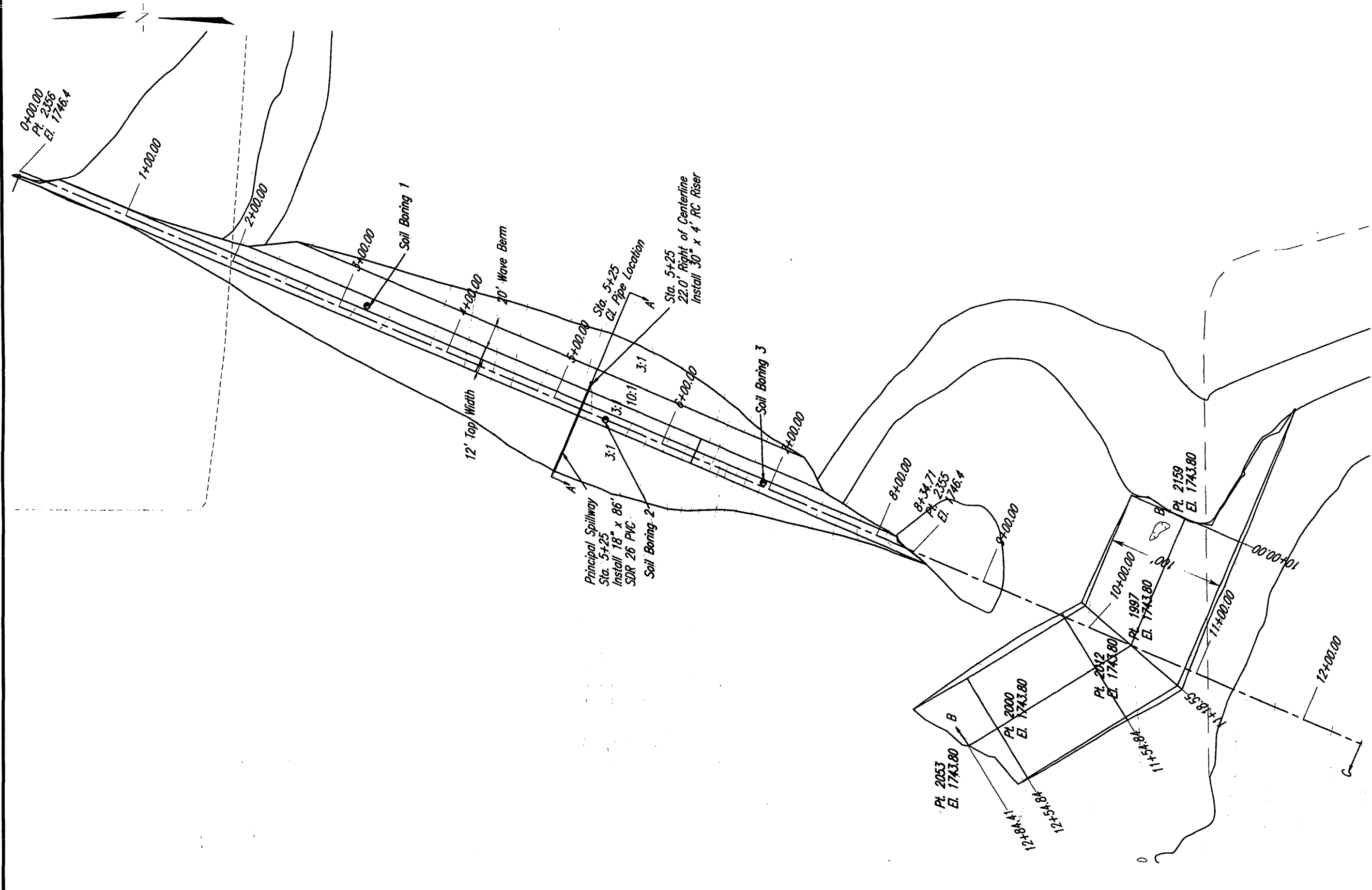
Date 8/13/2010
Designed A. Roman
Drawn A. Roman
Checked LeRoy Beitelspacher
Approved Angela Roman

PRODUCER LeRoy Beitelspacher
NW 1/4 SECT. 32 T.121 North R. 77 West
Wellworth COUNTY
Wellworth CONSERVATION DISTRICT

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

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Sheet 1 of 9



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United States Department of Agriculture

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Drawing No.

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Sheet 3 of 9

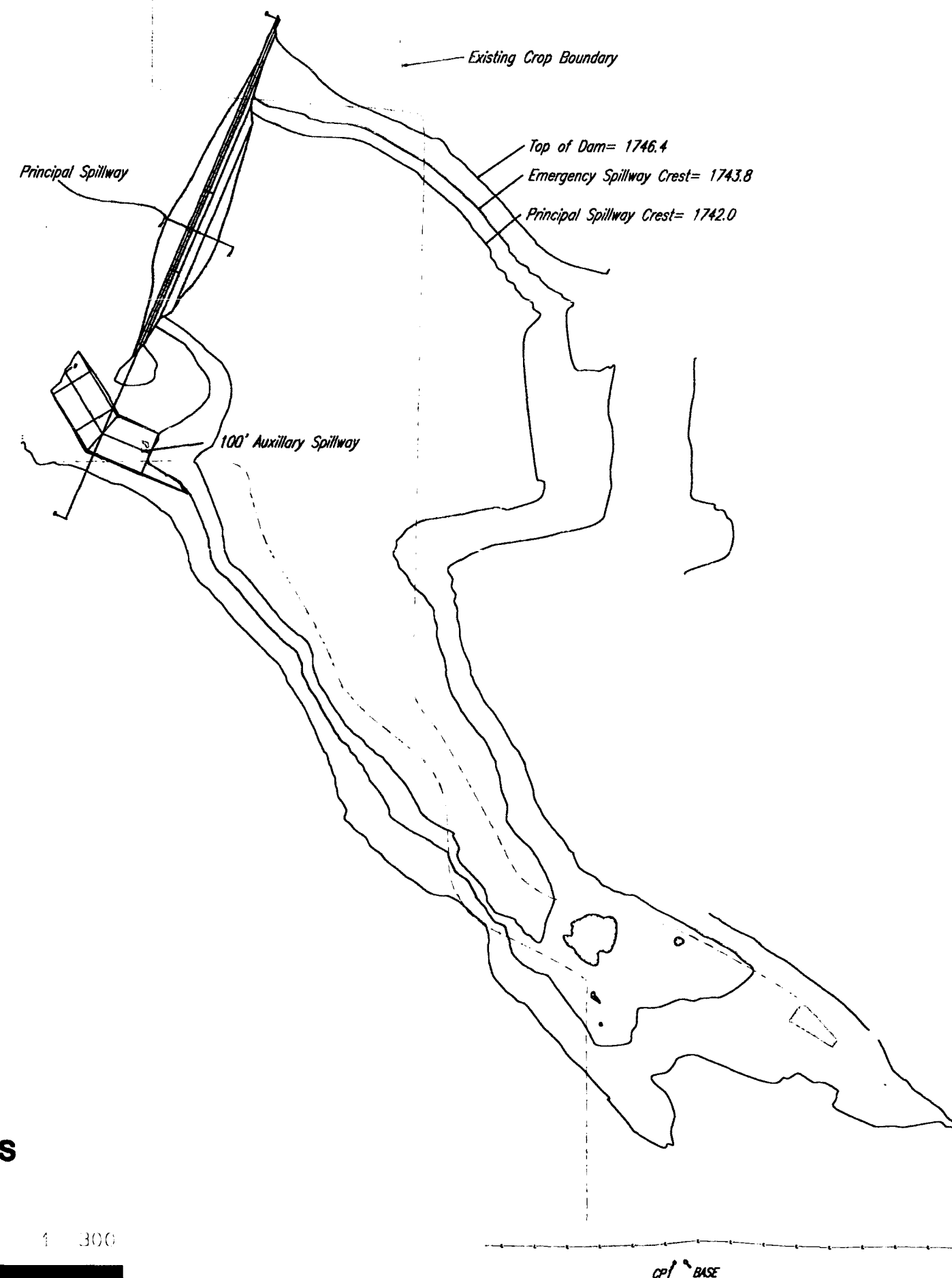
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PIERRE, SOUTH DAKOTA 57501

PRODUCER LeRoy Beitelspacher
NE 1/4, SECT. 32, T.121 North R. 27 West
Wellworth COUNTY
Wellworth CONSERVATION DISTRICT

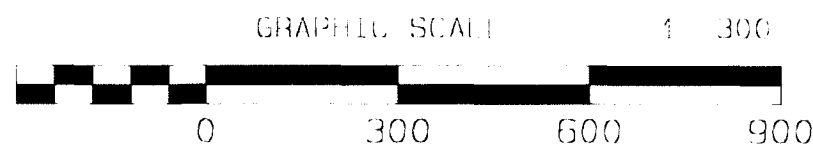
Designed A. Roman Date 8/3/2010
Drawn A. Roman Date 8/3/2010
Checked Kim Roman Date 8/3/10
Approved Michael Roman Date 8/3/10

Construction Notes

1. Clear and Grub the entire area within the Work Limits.
2. Emergency spillway excavation shall be subsidiary to the earth fill.
3. Spread topsoil on all surfaces of the emergency spillway and dam embankment downstream of the bottom edge of the wave berm (@ elev. 1740.7), 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 earth fill.
5. All borrow material must be suitable as described in Specification SD-75.
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



CPI BASE

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DATE	APPROVED	WILL

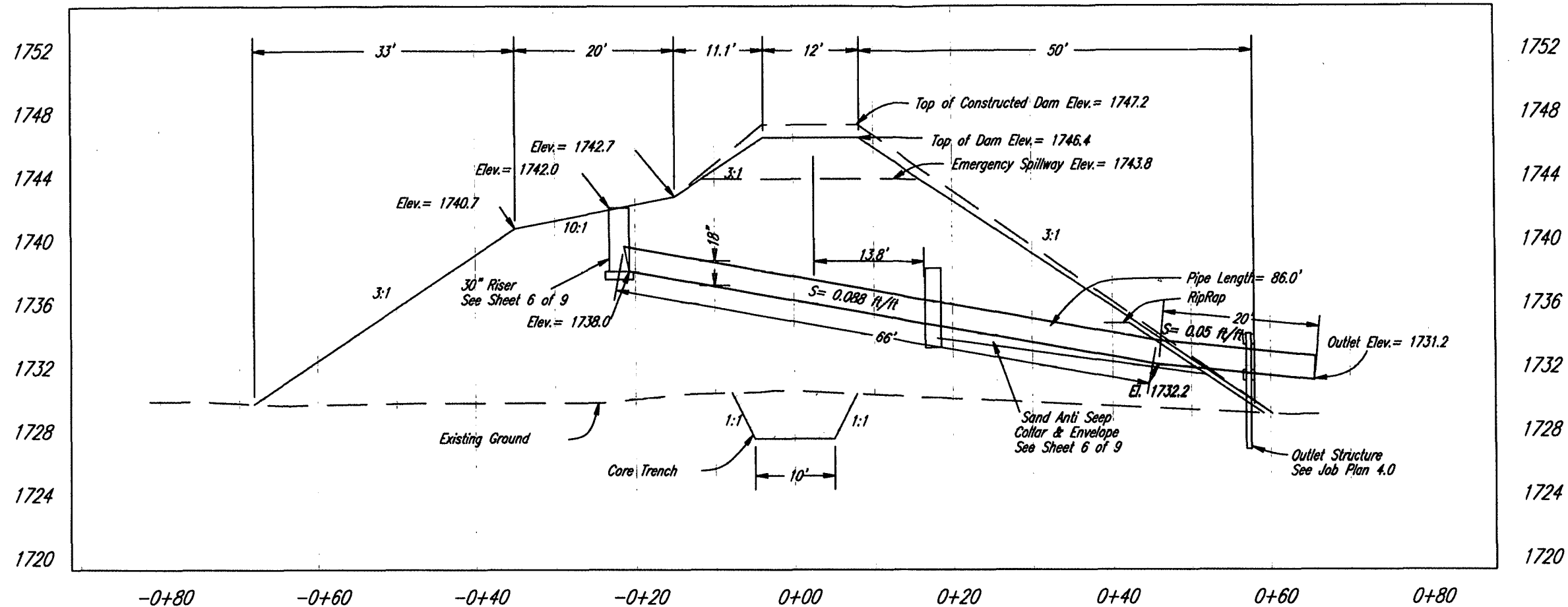
Date	8/2/2010
Designed	A. Roman
Drawn	A. Roman
Checked	8/2/10
Approved	8/3/10

PRODUCER LeRoy Beitelspacher
NE 1/4 SECT. 32 T. 121 North R. 77 West
Walworth COUNTY
Walworth CONSERVATION DISTRICT

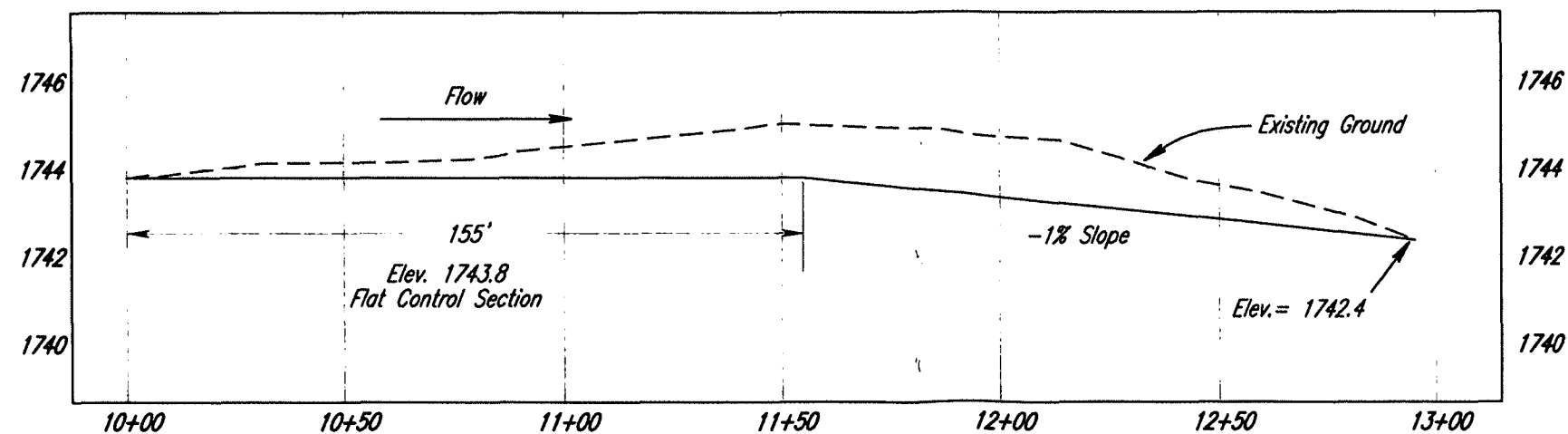
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1717 N. LINCOLN AVE. SUITE 104
PIERRE, SOUTH DAKOTA 57501



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8/2/2010 10:29AM
Sheet 2 of 9



CROSS SECTION OF DAM A-A
Vertical Scale: 1"=8'; Horizontal Scale: 1"=16'



EMERGENCY SPILLWAY PROFILE SECTION B-B
Vertical Scale: 1"=4'; Horizontal Scale: 1"=40'

REVISIONS		
DATE	APPROVED	TIME

Date 8/3/2010
Designed A. Roman
Drawn A. Roman
Checked [Signature]
Approved [Signature]

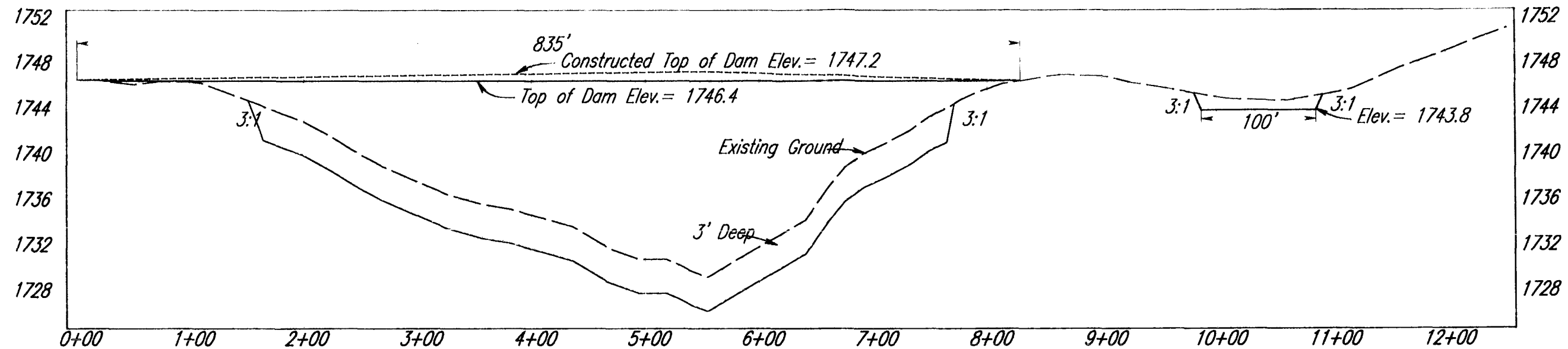
PRODUCER LeRoy Beitelspacher
NE 1/4 SECT. 32 T.12N R. 27W
Walworth COUNTY
Walworth CONSERVATION DISTRICT

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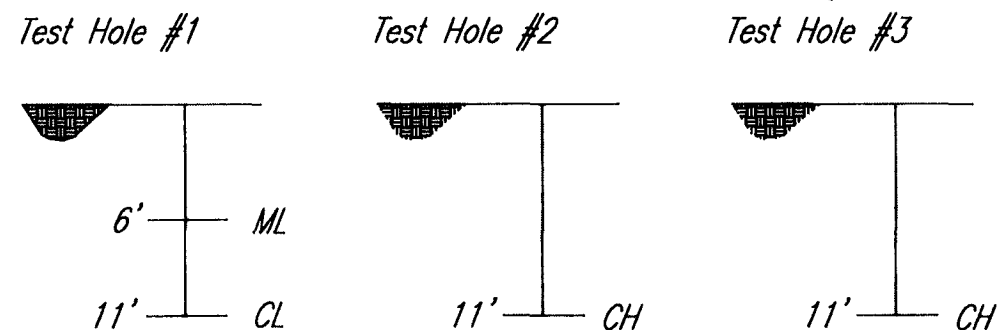
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Sheet 4 of 9



DAM PROFILE
 Vertical Scale: 1"=10'; Horizontal Scale: 1"=100'

LOG OF TEST HOLES
 Vertical Scale: 1"=10'



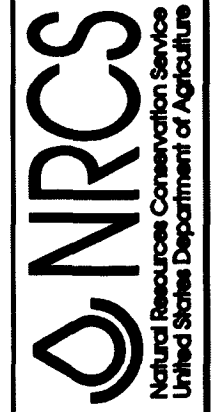
Control Points Coordinate Table				
Pt #	Northing	Easting	Elevation	Descriptor
1	9998.4680	9974.2450	1751.19	CP1
BASE	10000.0000	10000.0000	1750.00	BASE

Coordinate Table				
Pt #	Northing	Easting	Elevation	Descriptor
1997	11904.5678	8659.7567	1743.80	11+18.55 Spillway
2000	12020.6743	8588.3759	1742.80	12+54.84 Spillway
2012	11935.4857	8640.7488	1743.80	11+54.84 Spillway
2053	12045.8690	8572.8865	1742.40	12+84.41 Spillway
2159	11858.1024	8768.8602	1743.80	10+00 Spillway
2355	12092.8601	8739.9474	1746.50	CL Dam Sta. 8+35
2356	12860.8255	9067.0114	1746.50	CL Dam Sta. 0+00

Date 8/2/2010
 Designed A. Roman
 Drawn A. Roman
 Checked Karriemba
 Approved [Signature]

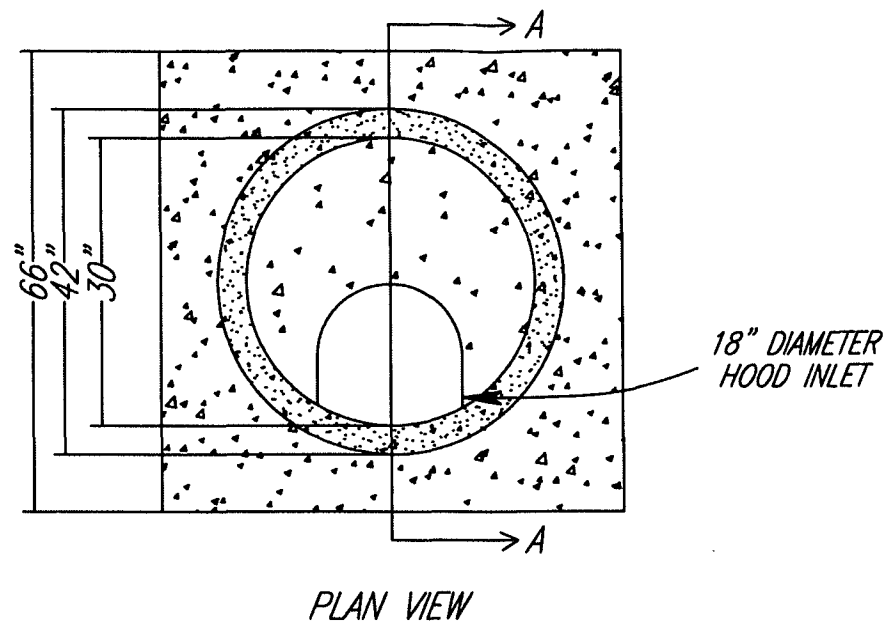
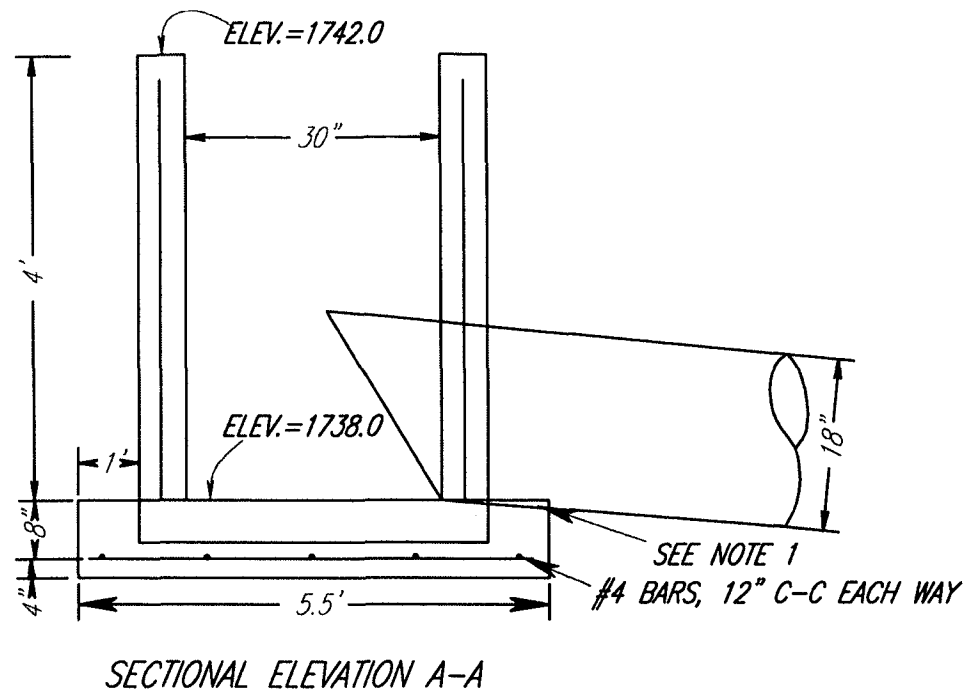
PRODUCER LeRoy Beitelspacher
 NE 1/4 SECT. 32 T.121N R. 27W
 Walworth COUNTY
 Walworth CONSERVATION DISTRICT

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 PIERRE, SOUTH DAKOTA 57501



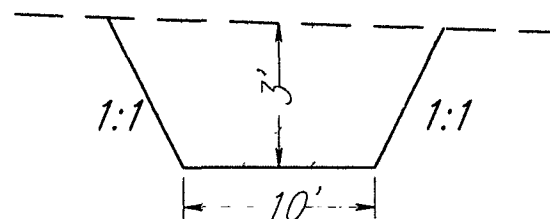
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 Sheet 5 of 9

REVISIONS		
DATE	APPROVED	REVISION



- Note 1) BOTTOM OF PIPE NEEDS TO BE EMBEDDED IN CONCRETE FLOOR TO ACHIEVE DESIGN INVERT ELEVATION SO RISER WILL DRAIN
- Note 2) CONCRETE AROUND PIPE NEEDS TO BE VIBRATED TO INSURE A GOOD SEAL AROUND PIPE.
- Note 3) DROP STRUCTURE TO BE PRECAST REINFORCED CONCRETE.
- Note 4) BASE FOR CONCRETE RISER WILL REQUIRE 1.2 CY CONCRETE.
- Note 5) FILTER MATERIAL SHALL BE COMPACTED ACCORDING TO CLASS II COMPACTION AS DESCRIBED IN CONSTRUCTION SPECIFICATION 24A OR AS DESCRIBED UNDER SECTION 9-B-4 OF CONSTRUCTION SPECIFICATION 24A.
- Note 6) WIDTH OF COARSE AGGREGATE AND ROCK RIP RAP TO BE EQUIVALENT TO WIDTH OF ENVELOPE.

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



Date 7/30/2010
Designed A. Roman
Drawn A. Roman
Checked 8/2/10
Approved 8/2/10

PRODUCER LeRoy Beitelspacher
NE 1/4 SECT. 32 T.121 North R. 22 West
Wetmore COUNTY
Wetmore CONSERVATION DISTRICT

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PIERRE, SOUTH DAKOTA 57501

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United States Department of Agriculture

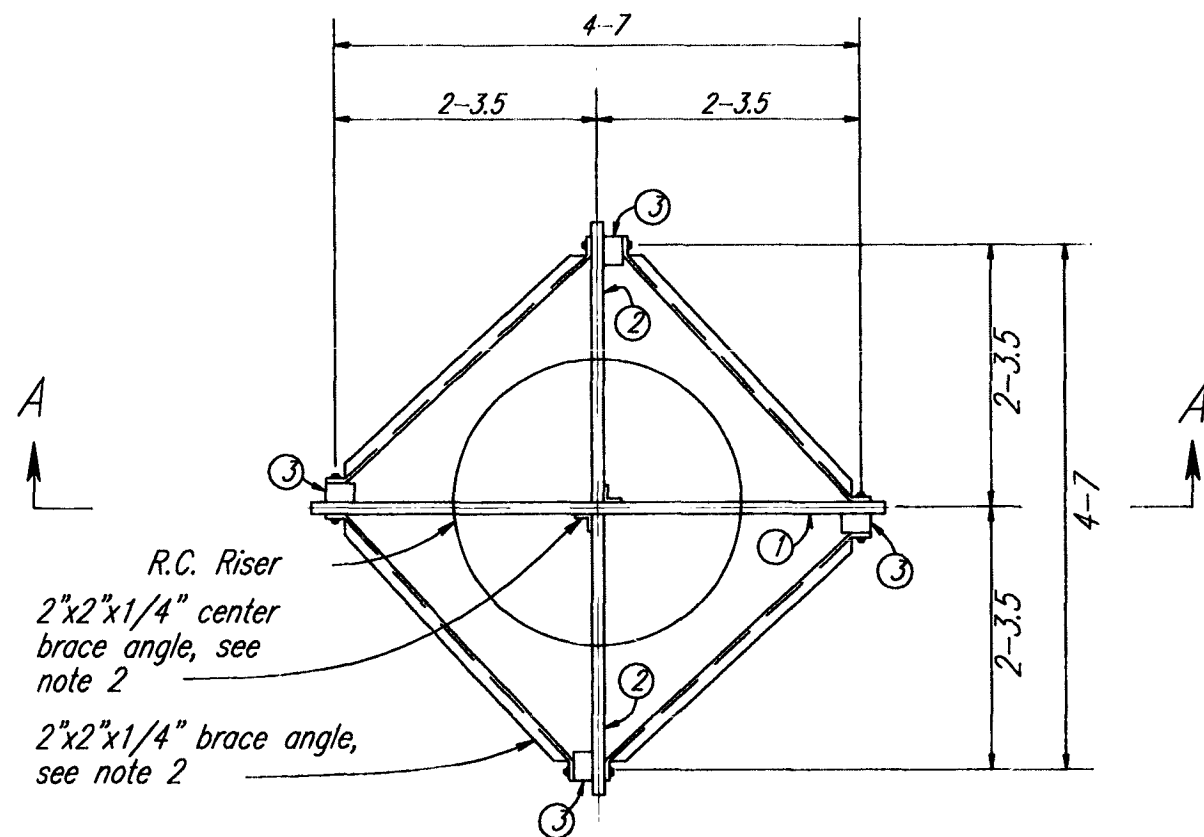
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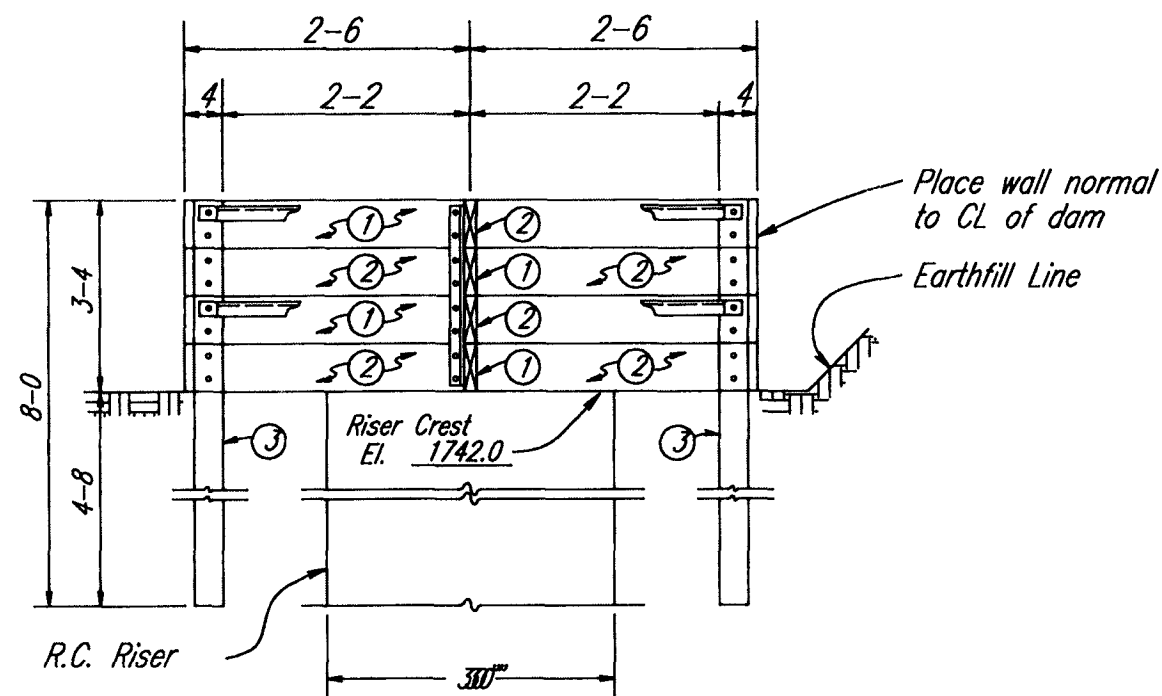
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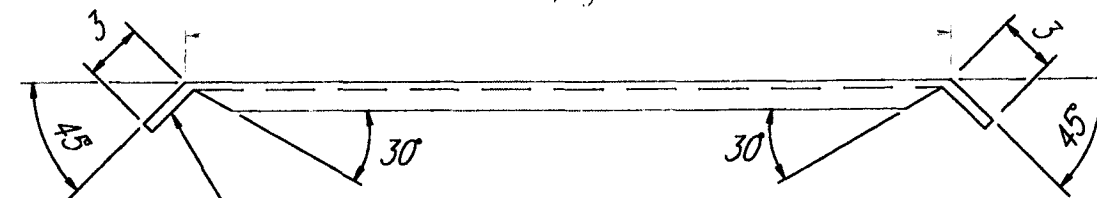
Sheet 6 of 9



PLAN VIEW



SECTIONAL ELEVATION A-A



PLAN VIEW OF BRACE ANGLE

TABLE OF QUANTITIES

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

NOTES:

- To 4" x 4" posts (4 required) bolt 2" x 10" boards using two 5/8" x 8" bolts per 2" x 10" board. Do not place bolts closer than 1 1/2" from edge of board.
- For center brace angles drill 8 - 9/16" holes 5/8" from outer edge of each leg of each angle and centered 5 1/4" apart along the leg.
- Attach brace angles to top bolt on top 2" x 10" board and to top bolt on next to bottom board.

TRASH RACK AND BAFFLE
FOR 30" DIA. RISER

Date 7/30/2010
Designed A. Roman
Drawn A. Roman
Checked [Signature]
Approved [Signature]

PRODUCER LeRoy Beitelspacher
NE 1/4 SECT. 32 T.121 North R. 22 West
Wellworth COUNTY
Wellworth CONSERVATION DISTRICT

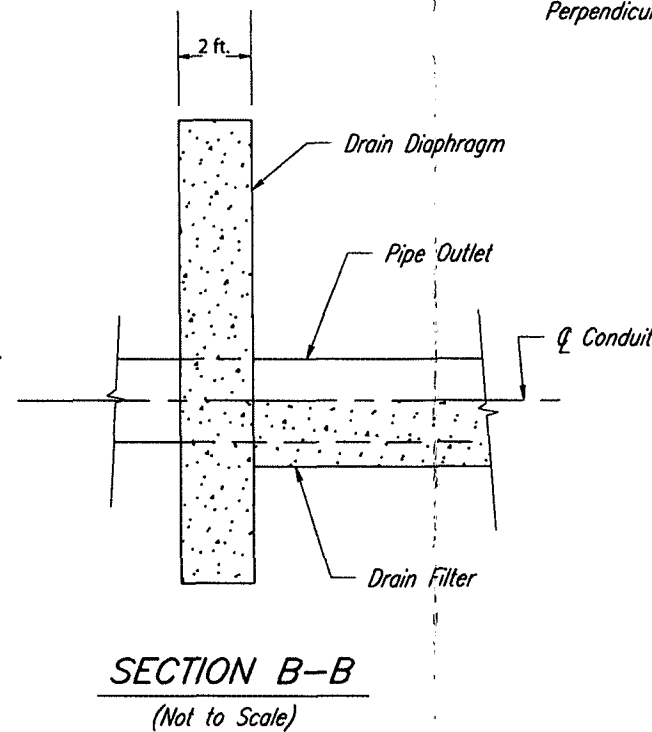
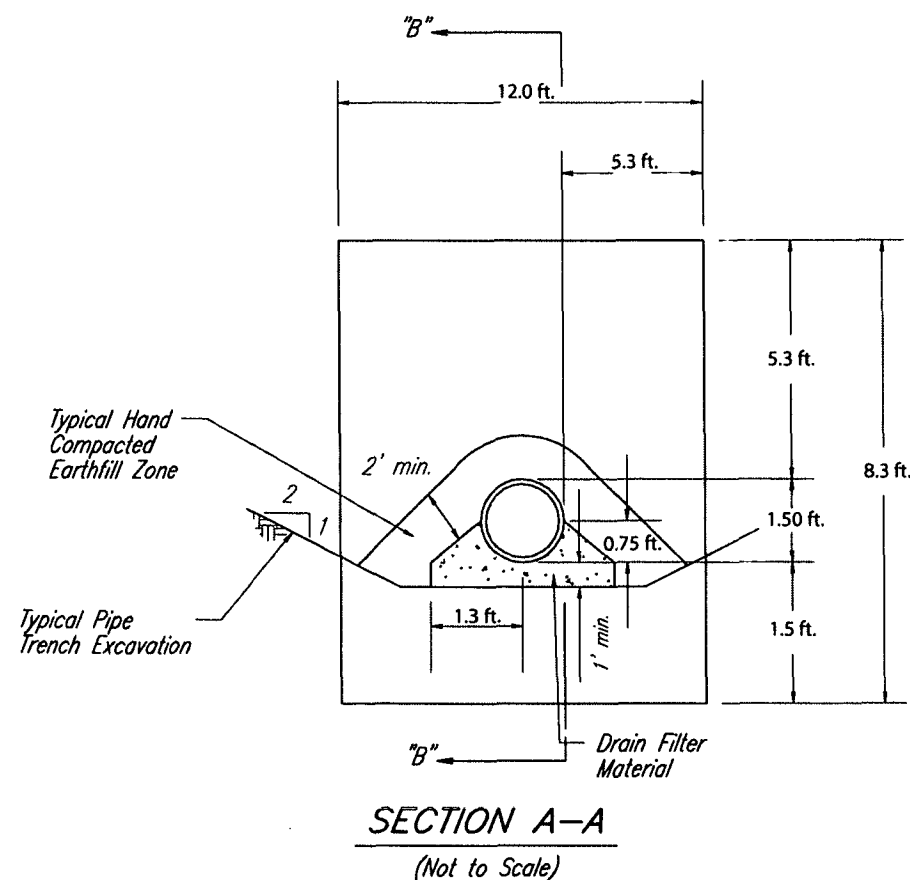
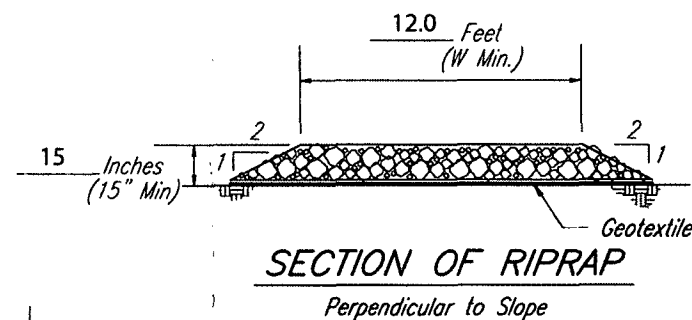
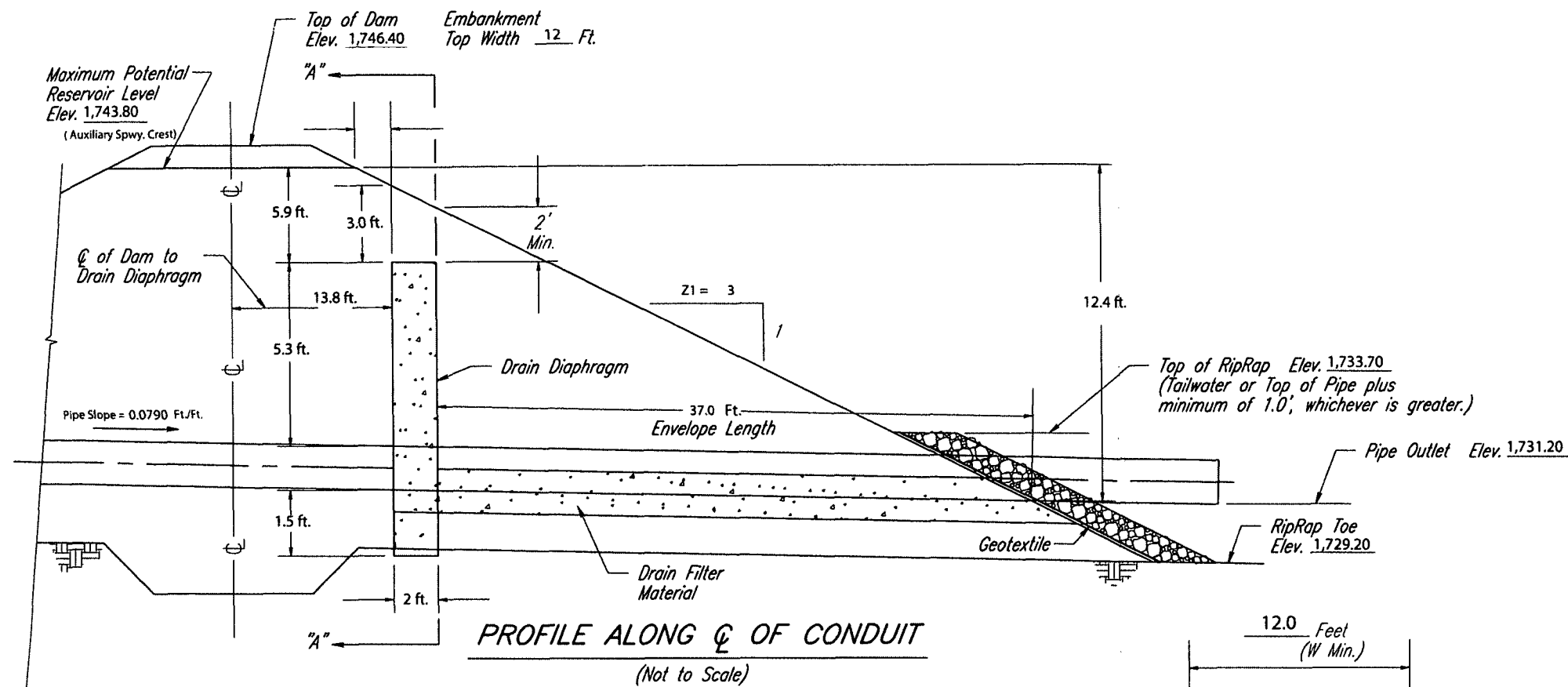
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DATE	APPROVED	BY

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Sheet 8 of 9



SUMMARY OF DESIGN AND DIMENSIONS

DESIGN DATA	
H = 5.9 Feet	Hd = 12.35 Feet
X = 5.3 Feet	D = 18 Inches
R = 1.5 Feet	Y = 5.3 Feet
C = Feet	Aggregate Gradation #1
Embankment Backslope (Z1) = 3	Pipe Slope (S) 0.0790 Ft./Ft.

DIMENSIONS	
W = 12.0 Feet	(Total Width of Drain Diaphragm)
T = 8.3 Feet	(Total Height of Drain Diaphragm)
t = 2 Feet	(Thickness of Single Filter)

ESTIMATED QUANTITIES

Drain Filter Material	13.8 Cubic Yards
Geotextile	26.9 Square Yards
Rock Riprap	9.6 Cubic Yards

DRAIN FILTER MATERIAL GRADATION

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

ASTM C-#33
FINE CONCRETE
AGGREGATE GRADATION

ROCK RIPRAP GRADATION

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

CONSTRUCTION NOTES

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

MATERIAL NOTES

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

DRAINAGE DIAPHRAGM DETAILS

JOB PLAN 3.8 (07/2009)

REVISIONS		
DATE	APPROVED	TITLE
07/31/09	Jay S. Gable	State Construction Engineer

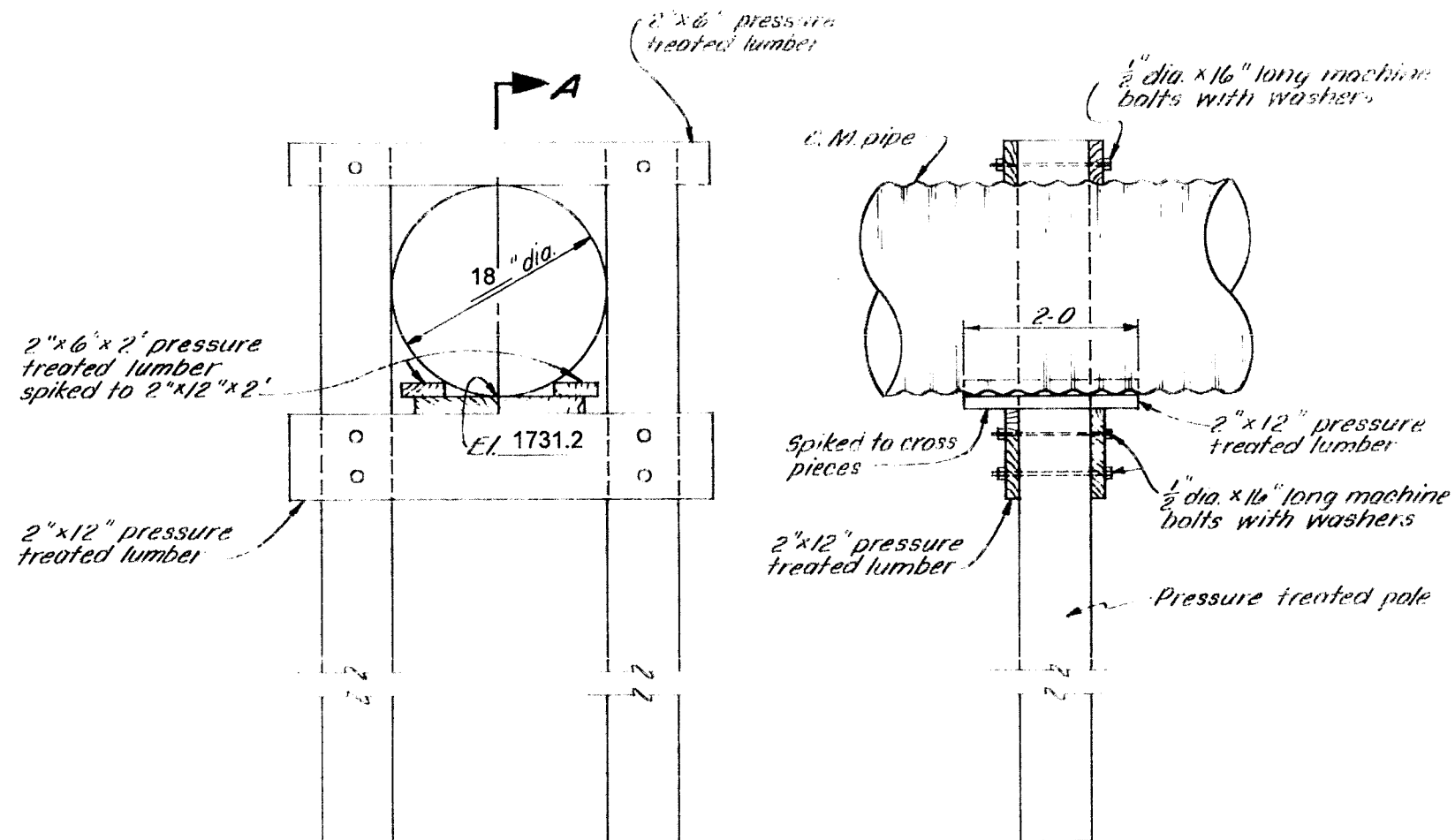
Designed	A. Roman	7/30/10
Drawn	A. Roman	7/30/10
Checked	John D. Gable	8/2/10
Approved	Cheryl A. Roman	8/3/10

PRODUCER	LeRoy Beitspacher
SECTION	32
Walworth COUNTY	CONSERVATION DISTRICT

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



File Name:	JobPlan_DrainageDiaphragm07_31_09.dwg
Drawing No.	
Date	7/16/2009 1:16PM
Sheet	1 of 1



ELEVATION

SECTIONAL ELEVATION A-A

TABLE OF QUANTITIES

ITEM	LENGTH FOR 18" DIA. C.M. PIPE	UNIT	QUANTITY
PRESSURE TREATED POLE 8" DIA.	8'	EACH	2
2" X 12" PRESSURE TREATED LUMBER	4'	EACH	6
2" X 6" PRESSURE TREATED LUMBER	4'	EACH	2
2" X 12" PRESSURE TREATED LUMBER	2'	EACH	3
2" X 6" PRESSURE TREATED LUMBER	2'	EACH	2
1/2" DIA. MACHINE BOLTS WITH NUTS	1' 4"	EACH	10
1/2" DIA. WASHERS		EACH	20

NOTES:

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

TIMBER PIPE SUPPORT

OPERATOR: Le Roy Beitelspacher

CONSERVATION DISTRICT: Walworth

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

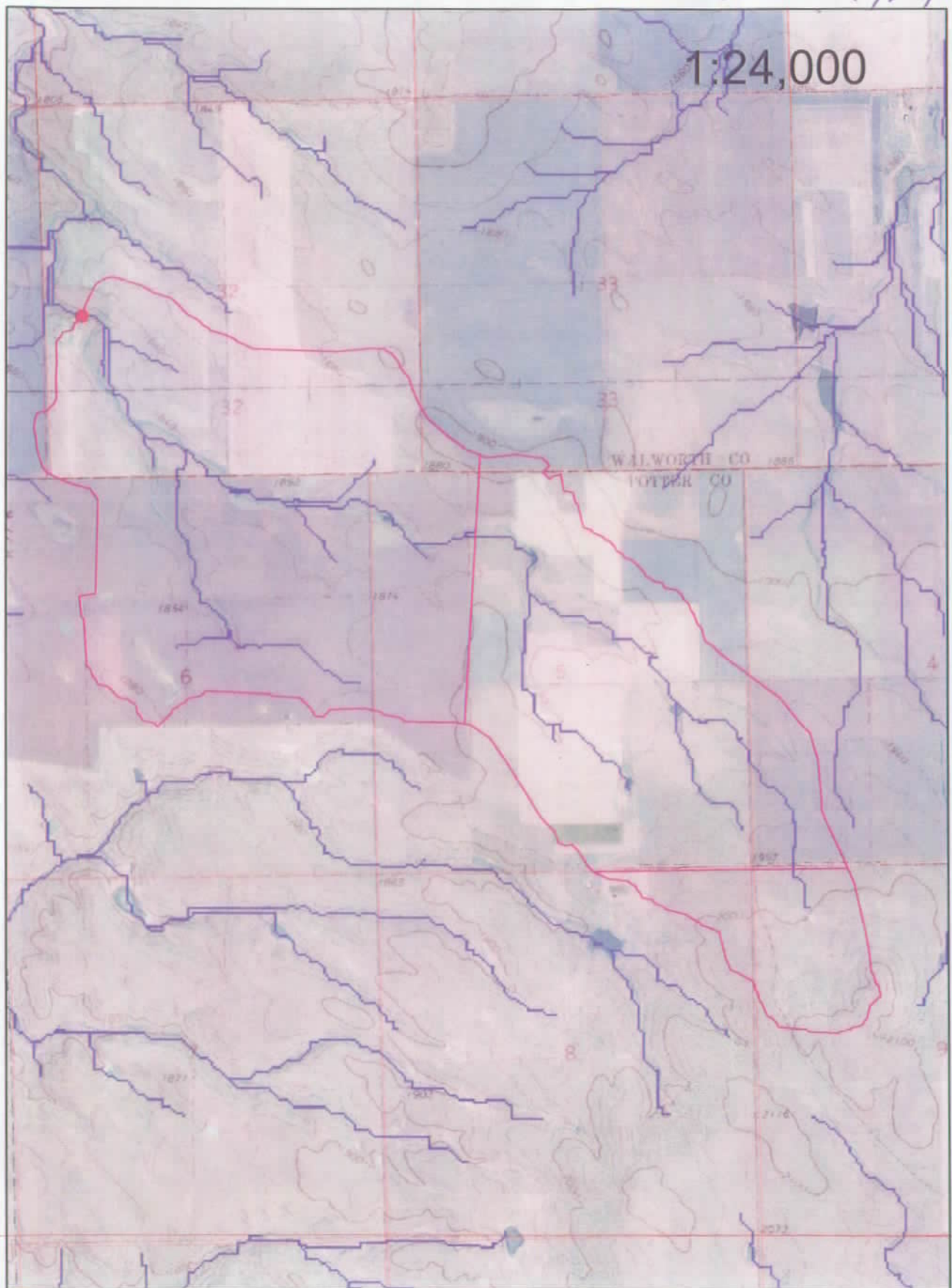
Designed <u>A. Roman</u>	Date <u>8/10</u>	Approved by <u>A. Roman</u>	Title <u>Agricultural Engineer</u>
Drawn <u>A. Roman</u>	Date <u>8/10</u>		
Traced		Sheet <u>9</u>	Drawing No.
Checked <u>A. Roman</u>	Date <u>8/10</u>	No. <u>9</u>	of <u>9</u>

REFERENCE: GUIDE PLAN NO. 4.0

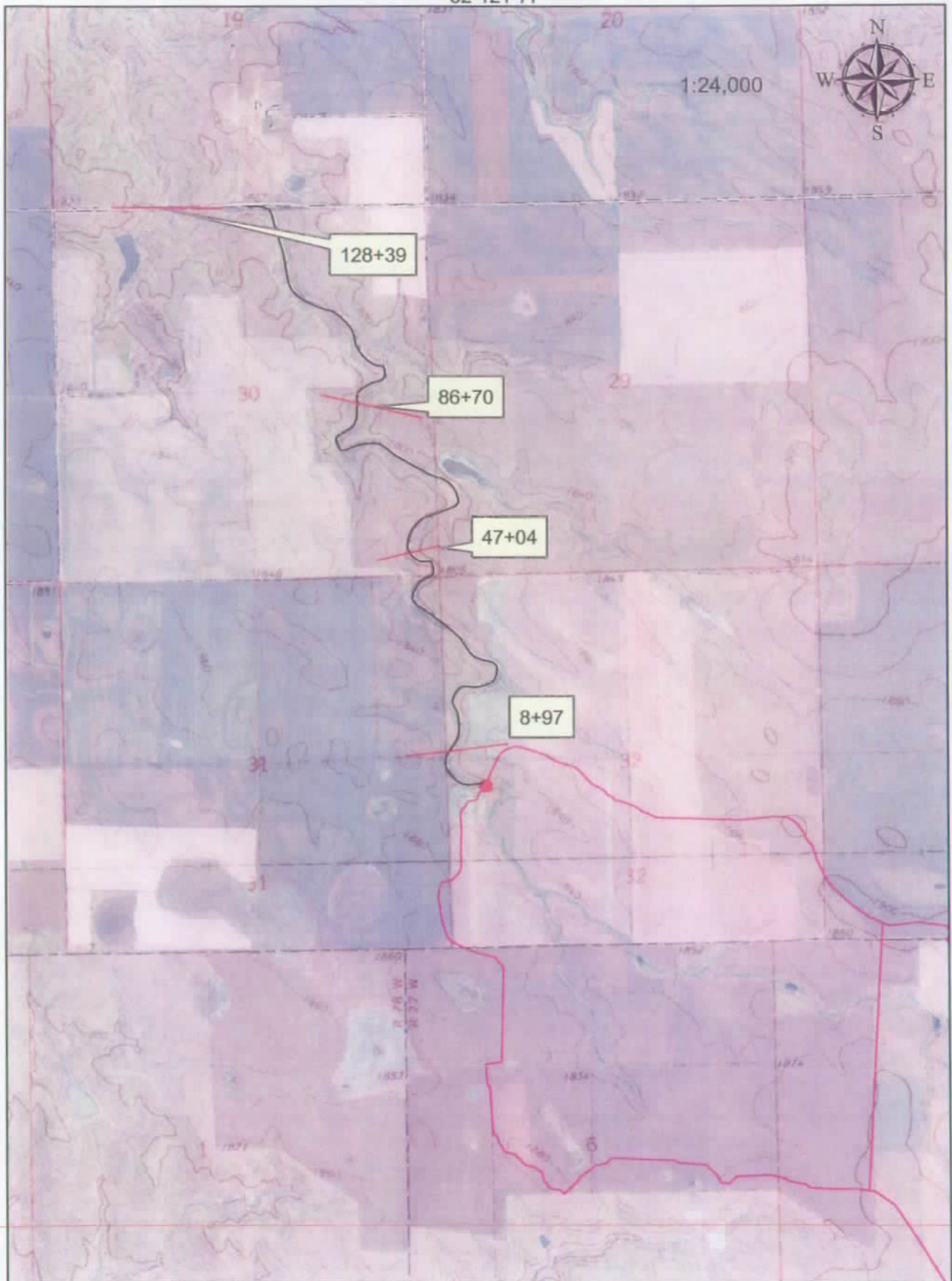
JOB PLAN NO. 4.0

5, N-29,073.4a

A Reman 7/16/10



Breach Routing
Beitelspacher Dam
32-121-77



Topog Map

Customer(s): LEROY BEITELSPACHER

Field Office: SELBY SERVICE CENTER

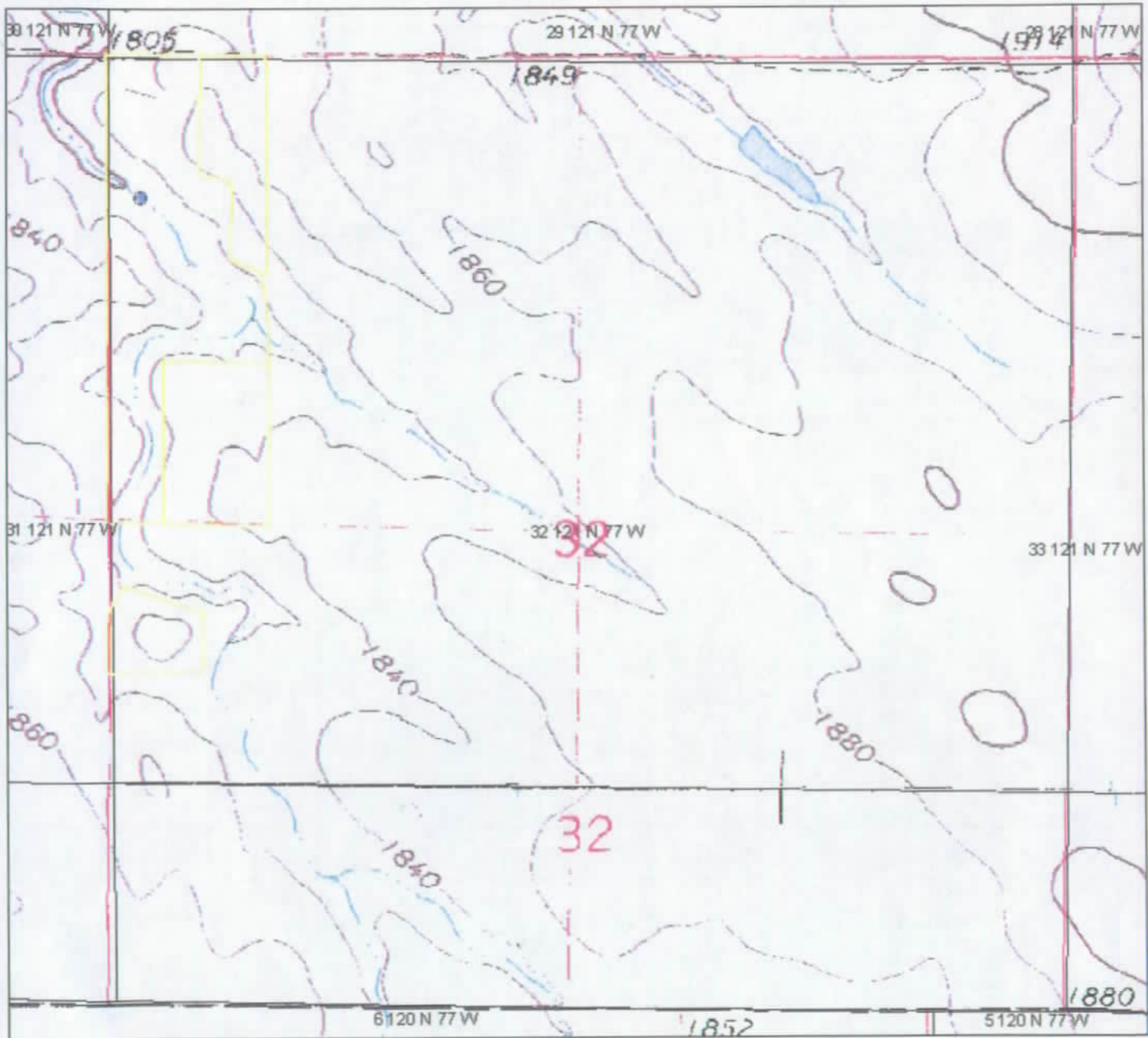
Agency: NRCS

Assisted By: Denis J Bachman

Approximate Acres: 58.2

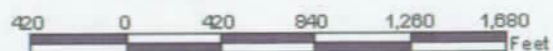
Legal Description: Sec. 32 121-77

Land Units:



Legend

-  Planned Pond
-  Whip_2008
-  Sections



BREACHOU

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

W. R. R. 7/14/10

Beitelspacher Dam

	IBC	ISH	JNK	IDAM	IPLT	IREC	
	1	0	0	0	1	0	
	HDE	BME	VOL	SA	BW	TFM	QO
C4	1834.4	1818.0	209.	41.6	72.7	24.6	1.
C5	NS= 5	NCS= 4	CMS=.50	DISTTN= 2.30			
	X-S NO. 1						
C6-1	D= .00	FLD=	5.00				
C7-1	HS= 1818.00	BS=	13.	BSS=	0.	CM=	.040
C7-2	HS= 1820.00	BS=	69.	BSS=	0.	CM=	.040
C7-3	HS= 1830.00	BS=	103.	BSS=	0.	CM=	.040
C7-4	HS= 1840.00	BS=	149.	BSS=	0.	CM=	.040
	X-S NO. 2						
C6-2	D= .17	FLD=	5.00				
C7-1	HS= 1817.00	BS=	16.	BSS=	0.	CM=	.040
C7-2	HS= 1820.00	BS=	69.	BSS=	0.	CM=	.040
C7-3	HS= 1830.00	BS=	210.	BSS=	0.	CM=	.040
C7-4	HS= 1840.00	BS=	358.	BSS=	0.	CM=	.040
	X-S NO. 3						
C6-3	D= .89	FLD=	5.00				
C7-1	HS= 1791.00	BS=	16.	BSS=	0.	CM=	.040
C7-2	HS= 1800.00	BS=	69.	BSS=	0.	CM=	.040
C7-3	HS= 1820.00	BS=	243.	BSS=	0.	CM=	.040
C7-4	HS= 1840.00	BS=	397.	BSS=	0.	CM=	.040
	X-S NO. 4						
C6-4	D= 1.64	FLD=	5.00				
C7-1	HS= 1772.00	BS=	16.	BSS=	0.	CM=	.040
C7-2	HS= 1780.00	BS=	144.	BSS=	0.	CM=	.040
C7-3	HS= 1800.00	BS=	433.	BSS=	0.	CM=	.040
C7-4	HS= 1820.00	BS=	613.	BSS=	0.	CM=	.040
	X-S NO. 5						
C6-5	D= 2.43	FLD=	5.00				
C7-1	HS= 1750.00	BS=	16.	BSS=	0.	CM=	.040
C7-2	HS= 1760.00	BS=	66.	BSS=	0.	CM=	.040
C7-3	HS= 1780.00	BS=	456.	BSS=	0.	CM=	.040
C7-4	HS= 1800.00	BS=	784.	BSS=	0.	CM=	.040

***** DISTANCE TO PRIMARY POINT OF INTEREST MOVED TO THE CROSS SECTION
 ***** CLOSEST TO THIS LOCATION (MI 2.43)

THE DATA FOR THIS DAM IS AS FOLLOWS:

TYPE OF DAM (IDAM)	EARTH
DAM BREACH ELEVATION (HDE)	1834.40 FT
FINAL BREACH ELEVATION (BME)	1818.00 FT
VOLUME OF RESERVOIR (VOL)	209. ACRE-FT
SURFACE AREA OF RESERVOIR (SA)	41.60 ACRES
FINAL BREACH WIDTH (BW)	72.71 FT
TIME OF DAM FAILURE (TFM)	24.65 MINUTES
NON-BREACH FLOW (QO)	1.00 CFS
DISTANCE TO PRIMARY PT OF INTEREST (DISTTN)	2.43 MILES
DEAD STORAGE EQUIV. MANN. N (CMS)	.50

			BREACHOU				
1.64	5161.	1779.99	7.99	.66	.39	1.04	5.00
2.43	5110.	1762.03	12.03	.78	.44	1.26	5.00

ANALYSIS IS COMPLETE

**LeRoy Beitelspacher Pond
Storm Water Pollution Prevention Plan (SWPPP)**

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**WATER RIGHTS
PROGRAM**

Project Name

LeRoy Beitelspacher Pond, operated by LeRoy Beitelspacher.

Project Type

Construction of a 16.5' tall, 835' long earthen dam and an 100' wide auxiliary spillway.

Project Location

The project is located in the NW 1/4, SW 1/4 of Section 32, Township 121 North, Range 77 West in Walworth County, South Dakota.

Soils

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

OpC – Opal Clay, 2 To 9 Percent Slopes

OpC – OPAL CLAY, 2 TO 9 PERCENT SLOPES – Opal series consists of moderately deep, well drained soils formed in clayey sediments weathered from clay shale on uplands.

Permeability is very slow. This soil has low available water capacity and moderate organic matter content. Flooding is NONE.

AgB – Agar Silt Loam, 2 To 6 Percent Slopes

AgB – AGAR SILT LOAM, 2 TO 6 PERCENT SLOPES – The Agar series consists of deep, well drained soils formed in loess on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding in NONE.

Estimate of Project Size

Total area disturbed will be approximately 2.0 acres.

Description of the Nature of the Activity

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

Proposed Timetable for Construction Activities

Construction is expected during the 2010 construction season. Weather permitting, fall construction is anticipated. The length of construction is estimated at approximately 30 days. A more defined schedule will be available once a contractor has been chosen by the landowner.

Name of Receiving Waters

The receiving waters will be an unnamed tributary to Swan Creek in Walworth County.

Conservation Practices to be Used

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

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

Storm Water Discharges

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

Inspections

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

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

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

Record Keeping

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

Plan Updating

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

Certification

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

Signature: _____

Title: _____

**CONSTRUCTION SPECIFICATION
SD-2 CLEARING AND GRUBBING**

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**WATER RIGHTS
PROGRAM**

1. Scope

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

2. Protection of Existing Vegetation

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

3. Marking

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

4. Clearing and Grubbing

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

5. Disposal

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

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

CONSTRUCTION SPECIFICATION

SD-4 STRIPPING

1. **Scope**

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

2. **General**

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

3. **Foundation Stripping**

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

4. **Borrow Area Stripping**

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

CONSTRUCTION SPECIFICATION

SD-5 EXCAVATION

1. Scope

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

2. Classification

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

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

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

3. Use of Excavated Materials

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

4. Disposal of Waste Materials

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

5. Excavation Limits

Excavated surfaces too steep to be safe without support, shall be supported as necessary to safeguard the work and workers. The width of the excavation shall be increased if necessary to provide space for sheeting, bracing, shoring, and other supporting installations. The contractor shall furnish, place, and subsequently remove such supporting installations. Excavation side slopes may be flattened for safety reasons where approved by the NRCS inspector.

Excavations shall be completed to specified lines and grades prior to placement of earth fill or construction of structures.

7. Borrow Excavation

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

CONSTRUCTION SPECIFICATION

SD-7S EARTHFILL-CLASS S

1. Scope

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

2. Materials

All fill materials shall be obtained from required excavations and designated borrow areas. Selection, blending, placement, and compaction of fill will be subject to approval of the Natural Resources Conservation Service inspector.

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

3. Foundation Preparation

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

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

4. Placement

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

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

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

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

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

5. Control of Moisture Content

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

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

6. Compaction (Class S)

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

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

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

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

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

Construction Specification 61C—Rock Riprap

1. Scope

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

2. Material

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

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

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

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

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

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

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

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

3. Subgrade preparation

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

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

4. Equipment-placed rock riprap

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

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

5. Hand placed rock riprap

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

6. Filter or bedding

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

7. Measurement and payment

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

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

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

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

8. Items of work and construction details

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

a. Riprap

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

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

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

Contractor Quality Control.

Construction Specification 24A—Drainfill

1. Scope

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

2. Material

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

3. Base preparation

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

4. Placement

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

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

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

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

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

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

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

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

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

5. Control of moisture

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

6. Compaction

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

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

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

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

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

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

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

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

7. Testing

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

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

8. Measurement and payment

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

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

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

9. Items of work and construction details

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

b. Drainfill, Coarse Type

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

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

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

b. Drainfill, Fine Type

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

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

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

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

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

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

CONSTRUCTION SPECIFICATION
SD-10 SALVAGING AND SPREADING TOPSOIL

1. Scope

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

2. Quality of Topsoil

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

3. Excavation

Topsoil shall be removed after clearing, grubbing and removing vegetation and shall be stockpiled. *Objectionable materials shall be removed and buried, or disposed of, at locations approved by the Natural Resources Conservation Service inspector.*

4. Spreading

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

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

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

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

1. Scope

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

2. Materials

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

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

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

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

3. Concrete Mix Design

The contractor or person in charge of construction shall be responsible for designing a concrete mix that will produce 3,000 pounds per square inch compressive strength at 28 days and meet the following requirements:

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

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

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

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

Use of ready mixed concrete meeting this specification is encouraged. Upon request, the vendor must provide the owner and the Natural Resources Conservation Service inspector a signed delivery ticket giving the quantities of concrete, cement, fine aggregate, coarse aggregate, and water contained in the batch.

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

4. Concrete Forms

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

5. Placing Concrete

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

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

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

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

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

6. Curing

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

7. Defective Concrete

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

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

CONSTRUCTION SPECIFICATION

SD-13 STEEL REINFORCEMENT

1. Scope

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

2. Materials

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

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

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

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

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

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

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

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

3. Cutting and Bending

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

4. Splicing Bar Reinforcement

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

5. Splicing Welded Wire Fabric

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

6. Placing

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

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

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

CONSTRUCTION SPECIFICATION

SD-19 PVC DRAIN FOR SEDIMENT BASIN (CNMS)

1. Scope

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

2. Material

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

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

Solvent cement for pipe joints shall meet ASTM D2564.

Rubber gasket joints shall conform to ASTM D3139.

3. Trench Construction

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

4. Pipe Placement

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

5. Backfill

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

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

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

6. Protection from Ultraviolet Light

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

7. Measurement and Payment

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

CONSTRUCTION SPECIFICATION

SD-16 WOOD FABRICATION AND INSTALLATION

1. Scope

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

2. Plywood Material

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

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

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

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

3. Structural Timber and Lumber Material

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

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

Cresote

Pentachlorophenol

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

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

4. Metal Hardware

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

5. Installation

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

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

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

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

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

ITEMS

2. General

Three times periods are allowed for the permanent seeding:

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

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

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

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

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

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

3. Fertilizer

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

4. Permanent Seeding

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

5. Cover Crops

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

6. Companion Crops

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

9. Mulching

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

CONSTRUCTION SPECIFICATION SD-28 SEEDING

1. Scope

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

2. General

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

Early Spring prior to 5/15 or

Late Summer 8/1 to 9/1 or

Dormant 11/1 to Spring Thaw

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

3. Fertilizer

Fertilizer is ☐ Required ☒ Not Required

If fertilizer is used it shall be supplied and applied as follows: Apply fertilizer based on the recommendations from a soil test or apply 30 to 40 pounds of actual N and 40 to 60 pounds of P₂O₅ per acre. Ten to 15 tons of manure per acre may be used in lieu of the commercial fertilizer and will also increase organic matter. Five to 10 pounds of zinc per acre may be added to speed up growth on medium-textured soils. Thoroughly mix all fertilizer and/or manure into the upper three to five inches of the soil during final seedbed preparation.

4. Permanent Seeding

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

	Grass	Seeding Rate (PLS/Acre)	
		Drilled	Broadcast
☐	Smooth Brome grass ¹	16	20
☒	Western Wheatgrass	10	12
	Intermediate Wheatgrass	10	12
	Slender Wheatgrass	3	3
☐	Western Wheatgrass	20	25
☐	Reed Canarygrass	5	7
☐	Other, See Attached Seeding Sheet		

¹ Smooth brome grass is not recommended where the adjacent vegetation is predominantly native, as smooth brome grass is highly invasive

5. **Cover Crops**

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

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

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

6. **Companion Crops**

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

Crop	Seeding rate (lbs./acre)
None	

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

7. **Seedbed Preparation**

The area to be seeded shall be made reasonably smooth and firm. Ditches shall be filled to conform to design lines and grades before seedbed preparation is begun. The seedbed will be worked to a depth of three to five inches. Drag or pack to break up large clods and firm the seedbed. Prior to seeding, required fertilizer shall be applied and mixed with the soil surface to a depth of three inches. The seedbed should be firm enough so that the boot heel of an average adult penetrates the soil to a depth of approximately one-half inch. The contractor shall suspend operations when the soil is too wet.

8. **Sowing Seed**

Except as otherwise specified, seeding shall be performed immediately after seedbed preparation. Seeding shall be drilled or broadcast and incorporated in a manner that will achieve uniform distribution of seed placed at appropriate soil depth. Optimum seeding depths are $\frac{1}{4}$ to $\frac{3}{4}$ inch.

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

9. **Mulching**

Mulching is ☒ Required ☐ Not Required

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

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

GEOTEXTILE (SD-592)

MATERIAL SPECIFICATION

1. Scope

This specification covers the quality of geotextile.

2. General Requirements

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

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

3. Classification

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

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

4. Shipping and Storage

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

Table 1. Requirements for Woven Geotextile

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

Table 2. Requirements for Needle-Punched Nonwoven Geotextile

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

^{1/} Minimum average roll value (weakest principal direction).

^{2/} US standard sieve size.

^{3/} CWO is a US Army Corps of Engineers reference.

DOCUMENTATION FOR HAZARD CLASSIFICATION

Producer: **LeRoy** Name of Site: **Beitelspacher**
County: **Walworth**
Field #: Watershed:
Location
1/4 Section: **SW** Section: **32** Township: **121N** Range: **77W**
Latitude: Longitude:

Dam in Series: **No**

Explain:

Dam and Reservoir Data

Assumed Job Class	IV
Assumed Hazard Class	A
Centerline Elevation Channel Bottom*	1818
Centerline Elevation Flood Plain*	0
Centerline Elevation Top of Dam*	1834.5
Centerline Elevation Auxiliary Spillway Crest*	1831.9

*Elevation is based on Mean Sea Level Datum

Max. Depth of Water within Reservoir 16.5 Ft.

Storage

Storage Below Principal Spillway	79.7 Ac.-Ft.
Storage between Principal Spillway and Auxiliary Spillway	43.3 Ac.-Ft.
Storage between Auxiliary Spillway and Top of Dam	90.6 Ac.-Ft.
Other	Ac.-Ft.
Total Storage to Top of Dam	213.6 Ac.-Ft.

Downstream Conditions

1. Valley Conditions Downstream of Structure	Parallel
Approximate Slope of Channel	1%
2. Stream Channel Size	Depth 2 Ft.
	Bottom Width 80 Ft.
	Top Width 430 Ft.
3. Valley Characteristics	Width 500 Ft.
	Roughness Coefficient 0.035
	Slope 6%

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

Describe Type of Infrastructure, Distance Downstream and Distance Above Floodplain Elevation	Distance Downstream From Dam	Approx. Distance Above Floodplain Elevation	Location in Potential Impact Area?	
			YES	NO
Roads				
Township or County Paved Road, D<2'			☐	☒
Other, Describe:			☐	☒
gravel road serves as access to fields 2.43 miles downstream of proposed dam			☒	☐
Bridges: Describe type and opening size			☐	☒
Railroads:				
Major Railroad, Describe:			☐	☒
Buildings and Utilities:				
Farm Building(s)			☐	☒
Public, Industrial or Commercial Buildings			☐	☒
Rel. Import. Utility serving mult. rural users			☐	☒
☐			☐	☒
Describe:				

Location:

Is Dam located within five miles of urban development?

No

Describe Potential Development:

No potential development anticipated.

Rational For Determining Hazard Class:

Site is located 6 miles south and 3 miles west from Akaska, SD. Development in this area is unlikely. No homes or buildings for at least a mile downstream of proposed dam.

Method Used for Evaluation of Impact Area

Simple Dam Break

Further Evaluation Needed

No

Attached: Breach Routings ☒

Maps ☒

Other supporting documents:

Map of channel represented in breach routing.

Actual Hazard Class*

A

Final Job Class

IV

Hazard Analysis by:

Angela Roman

Date: 7/16/2010

Approved by

Angela Roman

Date: 7/16/10

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

Walworth County, South Dakota
Nontechnical Soil Descriptions

AgA - Agar Silt Loam, 0 To 2 Percent Slopes

AgA AGAR SILT LOAM, 0 TO 2 PERCENT SLOPES - The Agar series consists of deep, well drained soils formed in loess on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

AgB - Agar Silt Loam, 2 To 6 Percent Slopes

AgB AGAR SILT LOAM, 2 TO 6 PERCENT SLOPES - The Agar series consists of deep, well drained soils formed in loess on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

AgC - Agar Silt Loam, 6 To 9 Percent Slopes

AgC AGAR SILT LOAM, 6 TO 9 PERCENT SLOPES - The Agar series consists of deep, well drained soils formed in loess on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

AkA - Akaska Silt Loam, 0 To 2 Percent Slopes

AkA AKASKA SILT LOAM, 0 TO 2 PERCENT SLOPES - The Akaska series consists of moderately deep to sand and gravel, well drained soils on terraces and outwash plains. Permeability is moderate in the solum and rapid in the underlying sand and gravel. They formed in silty sediments over sand and gravel. This soil has moderate available water capacity and moderate organic matter content. Flooding is NONE.

AkB - Akaska Silt Loam, 2 To 6 Percent Slopes

AkB AKASKA SILT LOAM, 2 TO 6 PERCENT SLOPES - The Akaska series consists of moderately deep to sand and gravel, well drained soils on terraces and outwash plains. Permeability is moderate in the solum and rapid in the underlying sand and gravel. They formed in silty sediments over sand and gravel. This soil has moderate available water capacity and moderate organic matter content. Flooding is NONE.

Ao - Aquolls

Ao AQUOLLS - Aquolls consist of very deep, very poorly drained, slowly permeable soils formed in alluvium in basins or flood plains. Areas are used for wildlife habitat. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

Ar - Arveson Sandy Loam, Wet

Ar ARVESON SANDY LOAM, WET - The Arveson series consists of very deep, poorly and very poorly drained soils that formed mostly in loamy glacial lacustrine or outwash sediments on glacial lake and outwash plains. These soils have moderate or moderately rapid permeability in the upper part and rapid in the lower part. This soil has moderate available water capacity and high organic matter content. Flooding is RARE.

Bn - Bon Loam

Bn BON LOAM - The Bon series consists of deep, well drained and moderately well drained soils formed in alluvium on bottom lands of the glacial till plain. Permeability is moderate. This soil has high available water capacity and high organic matter content. Flooding is OCCAS.

BoA - Bowbells Loam, 0 To 3 Percent Slopes

BoA BOWBELLS LOAM, 0 TO 3 PERCENT SLOPES - The Bowbells series consists of very deep, well and moderately well drained soils formed in glacial till and alluvium from glacial till on glacial till plains and moraines. These soils have moderate permeability in the upper part and moderately slow or slow in the substratum. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

BwA - Bowdle Loam, 0 To 2 Percent Slopes

BwA BOWDLE LOAM, 0 TO 2 PERCENT SLOPES - The Bowdle series consists of well drained soils moderately deep over sand and gravel and formed in loamy alluvium underlain by sand and gravel on outwash plains and stream terraces. Permeability is moderate in the solum and rapid in the underlying material. This soil has moderate available water capacity and moderate organic matter content. Flooding is NONE.

BwB - Bowdle Loam, 2 To 6 Percent Slopes

BwB BOWDLE LOAM, 2 TO 6 PERCENT SLOPES - The Bowdle series consists of well drained soils moderately deep over sand and gravel and formed in loamy alluvium underlain by sand and gravel on outwash plains and stream terraces. Permeability is moderate in the solum and rapid in the underlying material. This soil has moderate available water capacity and moderate organic matter content. Flooding is NONE.

Walworth County, South Dakota
Non Technical Soil Descriptions--Continued

LaB - Lehr Loam, 2 To 6 Percent Slopes

LaB LEHR LOAM, 2 TO 6 PERCENT SLOPES - The Lehr series consists of very deep, somewhat excessively drained soils shallow to sand and gravel. They formed in loamy alluvium over sand and gravel. Permeability is moderately rapid in the upper part and rapid and very rapid in the substratum. These soils are on outwash plains and stream valley terraces. This soil has low available water capacity and moderate organic matter content. Flooding is NONE.

LbB - Lehr-Bowdle Loams, 2 To 9 Percent Slopes

LbB LEHR-BOWDLE LOAMS, 2 TO 9 PERCENT SLOPES - The Lehr series consists of very deep, somewhat excessively drained soils shallow to sand and gravel. They formed in loamy alluvium over sand and gravel. Permeability is moderately rapid in the upper part and rapid and very rapid in the substratum. These soils are on outwash plains and stream valley terraces. This soil has low available water capacity and moderate organic matter content. Flooding is NONE.

LbB LEHR-BOWDLE LOAMS, 2 TO 9 PERCENT SLOPES - The Bowdle series consists of well drained soils moderately deep over sand and gravel and formed in loamy alluvium underlain by sand and gravel on outwash plains and stream terraces. Permeability is moderate in the solum and rapid in the underlying material. This soil has moderate available water capacity and moderate organic matter content. Flooding is NONE.

LoA - Lowry Silt Loam, 0 To 2 Percent Slopes

LoA LOWRY SILT LOAM, 0 TO 2 PERCENT SLOPES - The Lowry series consists of deep, well drained soils formed in calcareous silty eolian sediments on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

LoB - Lowry Silt Loam, 2 To 6 Percent Slopes

LoB LOWRY SILT LOAM, 2 TO 6 PERCENT SLOPES - The Lowry series consists of deep, well drained soils formed in calcareous silty eolian sediments on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

LoC - Lowry Silt Loam, 6 To 9 Percent Slopes

LoC LOWRY SILT LOAM, 6 TO 9 PERCENT SLOPES - The Lowry series consists of deep, well drained soils formed in calcareous silty eolian sediments on uplands. Permeability is moderate. This soil has high available water capacity and moderate organic matter content. Flooding is NONE.

Ma - Macken Silty Clay

Ma MACKEN SILTY CLAY - The Macken series consists of very deep, poorly or very poorly drained soils formed in local clayey alluvium in upland basins. Permeability is slow. This soil has moderate available water capacity and moderate organic matter content. Flooding is NONE. Ponding duration is LONG.

MdB - Maddock Loamy Fine Sand, 0 To 6 Percent Slopes

MdB MADDOCK LOAMY FINE SAND, 0 TO 6 PERCENT SLOPES - The Maddock series consists of very deep, well drained or somewhat excessively drained, rapidly permeable soils that formed in fine sands deposited by wind or water. These soils are on sandy glaciolacustrine or glaciofluvial, outwash and delta plains. This soil has low available water capacity and moderate organic matter content. Flooding is NONE.

MdC - Maddock Loamy Fine Sand, 6 To 15 Percent Slopes

MdC MADDOCK LOAMY FINE SAND, 6 TO 15 PERCENT SLOPES - The Maddock series consists of very deep, well drained or somewhat excessively drained, rapidly permeable soils that formed in fine sands deposited by wind or water. These soils are on sandy glaciolacustrine or glaciofluvial, outwash and delta plains. This soil has low available water capacity and moderate organic matter content. Flooding is NONE.

Mo - Mobridge Silt Loam

Mo MOBRIDGE SILT LOAM - The Mobridge series consists of deep, well and moderately well drained, moderately permeable soils formed in colluvial-alluvial sediments. They are mainly in upland swales. This soil has high available water capacity and high organic matter content. Flooding is NONE.

OpC - Opal Clay, 2 To 9 Percent Slopes

OpC OPAL CLAY, 2 TO 9 PERCENT SLOPES - The Opal series consists of moderately deep, well drained soils formed in clayey sediments weathered from clay shale on uplands. Permeability is very slow. This soil has low available water capacity and moderate organic matter content. Flooding is NONE.

RECEIVED

AUG - 4 2010

WATER RIGHTS
PROGRAM

1*****

SITES XEQ 08/02/2010 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM
VER 2005.1.04 (USER MANUAL - DATED DECEMBER 2005)
TIME 10:14:33

A. Roman 8/6/10

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

SITES 01/01/2005 LeRoy B South Dam 1.88125 H5
SAVMOV 0 101
SAVMOV 101 1 1
* Data from RCN Tool in ArcMap.
* Routing 2 year storm through PS.
* Routing 50 year storm through ES.

*18" PVC
30" Riser
PS = 1742.0
AS = 1743.8
TD = 1746.4*

STRUCTURE
1730 0
1731 .4
1732 .96
1733 1.9
1734 2.9
1735 3.9
1736 5.2
1737 6.7
1738 8.4
1739 10.4
1740 13
1741 16.2
1742 19.4 0
1743 24.3 22.80
1744 29.1 28.56
1745 34.8 29.74
1746 39.3 30.87
1747 46.9 31.96

ENDTABLE
WSDATA 5A1 AC 81 1204 18932 2.63
PDIRECT 2.10 4.40
POOLDATA ELEV 1742 1730 1730
ASDATA 41 150 200 3 .01 2
ASINSURF 41 .035
ASINLET 41 0.0 0.0 80 0.0 3
180 10

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

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

1SITES XEQ 08/02/2010 ----- COMMENT PAGE -----

VER 2005.1.04

LeRoy B South Dam

WSID =

Data from RCN Tool in ArcMap..

Routing 2 year storm through PS.

Routing 50 year storm through ES.

***** 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 08/02/2010 LeRoy B South Dam WSID=
VER 2005.1.04 SUBW= A
TIME 10:14:33 SITE = S 1 PASS= 1 PART= 1

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

STORM DISTRIBUTION-PSH 24 HOUR TYPE II RAINFALL DISTRIBUTION

STORM DISTRIBUTION AUX. -24 HOUR TYPE II RAINFALL DISTRIBUTION

PRECIP. - P-PS,1-DAY	P-PS,10-DAY	P-SD	P-FB	
2.10	0.00	0.00	4.40	
WSDATA - CN	DA-SM	TC/L	-/H	QRF
81.00	1.88	18932.00	2.63	0.00
SITEDATA- PERM POOL	CREST PS	FP SED	VALLEY FL	378?
1742.00	1730.00	1742.00	1730.00	YES
BASEFLOW	INITIAL EL	EXTRA VOL	SITE TYPE	
0.00	0.00	0.00	DESIGN	
PSDATA - NO. COND	COND L	DIA/W	-/H	
0.00	0.00	0.00	0.00	
PS N	KE	WEIR L	TW EL	
0.000	0.00	0.00	0.00	
2ND STG	ORF H	ORF L	START AUX.	
0.00	0.00	0.00	0.00	
ASCRESTS - AUX.1	AUX.2	AUX.3	AUX.4	AUX.5
0.00	0.00	0.00	0.00	0.00

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

41	0.00	150.00	200	
AUX.DATA - INLET N	SIDE SLOPE	EXIT N	EXIT SLOPE	ACTUAL AUX?
0.035	3.00	0.035	0.010	NO
BTM WIDTH - BW1	BW2	BW3	BW4	BW5
ft 100.00	0.00	0.00	0.00	0.00

AUXILIARY SPILLWAY RATING DEVELOPED USING WSPVRT.

1SITES -----
 XEQ 08/02/2010 LeRoy B South Dam WSID=
 VER 2005.1.04 SUBW= A
 TIME 10:14:33 SITE = S 1 PASS= 1 PART= 2

PERM POOL	1742.00 FT	79.7 ACFT	19.40 AC	0.0 CFS
CREST PS	1730.00 FT	0.0 ACFT	0.00 AC	0.0 CFS
SED ACCUM	1742.00 FT	79.7 ACFT	19.40 AC	0.0 CFS
START ELEV	1742.00 FT	79.7 ACFT	19.40 AC	0.0 CFS
NRCS-PSH	D= 24.00 HR	P= 2.10 IN	Q= 0.67 IN	DA= 1.88 SM
	TC= 3.33 HR	CN= 81.00	VOL= 67.1 ACFT	

PEAK = 164.1 CFS, AT 14.4 HRS.

ROUTED RESULT - HYD TYPE	EMAX	VOL-MAX	AMAX	QMAX
NRCS-PSH	1743.76 FT	121.3 ACFT	27.94 AC	27.1 CFS

PS STORAGE 41.7 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

DRAWDOWN (DDT) TEST 1730.00 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 1742.00 FT, 79.7 ACFT, 0.0 CFS.

DRAWDOWN TIME = 3.57 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

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

RATING TABLE NUMBER 1						
	ELEV.	Q-TOTAL	Q-PS	Q-AUX.	VOLUME	AREA
	FEET	CFS	CFS	CFS	AC-FT	ACRE
1	1730.00	0.00	0.00	0.00	0.00	0.00
2	1731.00	0.00	0.00	0.00	0.20	0.40

3	1732.00	0.00	0.00	0.00	0.88	0.96
4	1733.00	0.00	0.00	0.00	2.31	1.90
5	1734.00	0.00	0.00	0.00	4.71	2.90
6	1735.00	0.00	0.00	0.00	8.11	3.90
7	1736.00	0.00	0.00	0.00	12.66	5.20
8	1737.00	0.00	0.00	0.00	18.61	6.70
9	1738.00	0.00	0.00	0.00	26.16	8.40
10	1739.00	0.00	0.00	0.00	35.56	10.40
11	1740.00	0.00	0.00	0.00	47.26	13.00
12	1741.00	0.00	0.00	0.00	61.86	16.20
13	1742.00	0.00	0.00	0.00	79.66	19.40
14	1743.00	22.80	22.80	0.00	101.51	24.30
15	1744.00	28.56	28.56	0.00	128.21	29.10
16	1745.00	29.74	29.74	0.00	160.16	34.80
17	1746.00	30.87	30.87	0.00	197.21	39.30
18	1747.00	31.96	31.96	0.00	240.31	46.90

1SITES

XEQ 08/02/2010

LeRoy B South Dam

WSID=

VER 2005.1.04

SUBW= A

TIME 10:14:33

SITE = S 1

PASS= 1

PART= 3

AUX. CREST 1743.8 1743.76 FT 121.3 ACFT 27.94 AC 27.1 CFS

PS STORAGE 41.7 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

START ELEV 1742.00 FT 79.7 ACFT 19.41 AC 0.0 CFS

EFFECTIVE HEIGHT(H) = 13.8 FEET, PRODUCT= 1669. (H * STORAGE AT CREST AUX.).

INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT.

NRCS-FBH , D= 24.00 HR P= 4.40 IN Q= 2.46 IN DA= 1.88 SM
TC= 3.33 HR CN= 81.00 VOL= 247.0 ACFT

PEAK = 660.4 CFS, AT 14.3 HRS.

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

RATING TABLE NUMBER 2

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	1730.00	0.00	0.00	0.00	0.00	0.00
2	1731.15	0.00	0.00	0.00	0.26	0.48
3	1732.29	0.00	0.00	0.00	1.20	1.24
4	1733.44	0.00	0.00	0.00	3.24	2.34
5	1734.59	0.00	0.00	0.00	6.58	3.49
6	1735.73	0.00	0.00	0.00	11.32	4.85
7	1736.88	0.00	0.00	0.00	17.81	6.52
8	1738.03	0.00	0.00	0.00	26.37	8.45

9	1739.17	0.00	0.00	0.00	37.39	10.85
10	1740.32	0.00	0.00	0.00	51.56	14.02
11	1741.46	0.00	0.00	0.00	69.74	17.69
12	1742.61	13.94	13.94	0.00	92.44	22.40
13	1743.76	27.16	27.16	0.00	121.30	27.94
14	1743.92	37.58	28.10	9.48	125.90	28.72
15	1744.08	47.60	28.66	18.95	130.62	29.57
16	1744.37	97.26	29.00	68.25	139.49	31.23
17	1744.73	193.07	29.42	163.64	150.99	33.26
18	1745.38	468.63	30.17	438.46	173.67	36.51
19	1746.19	931.54	31.08	900.46	204.79	40.74
20	1747.00	1521.02	31.96	1489.06	240.31	46.90

SUMMARY OF AUXILIARY SPILLWAY SURFACE CONDITIONS USED IN COMPUTATIONS BY REACH

REACH	FROM STA (ft)	TO STA (ft)	SLOPE (%)	RETARDANCE CURVE INDEX@	VEGETAL COVER FACTOR	MAINT. CODE	ROOTING DEPTH (ft)	REACH LOCATION *
1	-50.	70.	-10.0	0.035	**	**	**	INLET
2	70.	150.	0.0	0.035	**	**	**	CREST
3	150.	250.	1.0	0.035	0.65	3	2.0	EXIT !

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

* Upper case indicates a reach of constructed spillway channel.

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

! Reach 3 used in computing exit channel velocities.

DRAWDOWN USING FREEBOARD STORM FOLLOWS, STARTING AT ELEVATION 1743.76 FT.

DRAWDOWN (DDT) TEST 1742.00 FT 79.7 ACFT 6.09 CFS
CONTROL IS 0.000 DETENTION STORAGE

DRAWDOWN TIME = 1.41 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	1745.30	170.6	36.1	1.54	49.3

~~~~~ NOTE -- ACTUAL Hp OF 1.54 RAISED TO MEET MIN. 378 CRITERIA.

|                        |           |              |              |
|------------------------|-----------|--------------|--------------|
| PEAK - CFS DISCHARGE = | Q-PS 30.1 | Q-AUX. 401.9 | Q-TOT. 431.9 |
|------------------------|-----------|--------------|--------------|

|                        | CRITICAL DEPTH FT | CRITICAL VELOCITY FT/SEC | CRITICAL SLOPE-Sc FT/FT | 25% OF Q Sc FT/FT |
|------------------------|-------------------|--------------------------|-------------------------|-------------------|
| AUXILIARY SPILLWAY --- | 0.79              | 4.98                     | 0.020                   | 0.026             |

\*\*\*\*\*

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

Aux. Spillway Discharge = 402. cfs; Bottom Width = 100. ft

| REACH<br>NO. | FROM<br>STA | TO<br>STA | SLOPE<br>% | MANNING'S<br>n | VELOCITY<br>ft/s | TOTAL<br>STRESS<br>lb/ft^2 | EFFECTIVE<br>STRESS<br>lb/ft^2 |
|--------------|-------------|-----------|------------|----------------|------------------|----------------------------|--------------------------------|
| 3            | 150.        | 250.      | 1.00       | 0.035          | 4.06             | 0.60                       | 0.366                          |

\*\*\*\*\*

AUXILIARY SPILLWAY DURATION FLOW = 17.0 HOURS  
ATTACK, OE/B = 1.6 ACFT/FT

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

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 4.1 FT/SEC  
EXIT SLOPE = 0.010 FT/FT  
FLOW DEPTH = 1.0 FT

>>>> NHCP378 RUN - MINIMUM DEPTH, CREST AUX. TO TOP OF DAM IS 2.00 FT.  
NEW TOP OF DAM ELEVATION = 1745.76.

| ROUTED<br>RESULTS          | BTM WIDTH<br>FT | MAX ELEV<br>FT          | VOL-MAX<br>ACFT                | AREA-MAX<br>AC                | AUX.HP<br>FT            | VOL-AUX.<br>ACFT |
|----------------------------|-----------------|-------------------------|--------------------------------|-------------------------------|-------------------------|------------------|
| MINIMUM AUX.               | 100.0           | 1745.76                 | 188.2                          | 38.3                          | 2.01                    | 66.9             |
| PEAK - CFS<br>DISCHARGES = |                 | Q-PS<br>30.6            | Q-AUX.<br>654.4                | Q-TOT.<br>685.0               |                         |                  |
|                            |                 | CRITICAL<br>DEPTH<br>FT | CRITICAL<br>VELOCITY<br>FT/SEC | CRITICAL<br>SLOPE-Sc<br>FT/FT | 25% OF Q<br>Sc<br>FT/FT |                  |
| AUXILIARY<br>SPILLWAY ---  |                 | 1.09                    | 5.83                           | 0.018                         | 0.024                   |                  |

>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED  
FOR THIS PASS. NEW TOP OF DAM ELEVATION = 1746.30.

| ROUTED<br>RESULTS          | BTM WIDTH<br>FT | MAX ELEV<br>FT          | VOL-MAX<br>ACFT                | AREA-MAX<br>AC                | AUX.HP<br>FT            | VOL-AUX.<br>ACFT |
|----------------------------|-----------------|-------------------------|--------------------------------|-------------------------------|-------------------------|------------------|
| MINIMUM AUX.               | 100.0           | 1746.30                 | 209.5                          | 41.6                          | 2.54                    | 88.1             |
| PEAK - CFS<br>DISCHARGES = |                 | Q-PS<br>31.2            | Q-AUX.<br>977.7                | Q-TOT.<br>1008.9              |                         |                  |
|                            |                 | CRITICAL<br>DEPTH<br>FT | CRITICAL<br>VELOCITY<br>FT/SEC | CRITICAL<br>SLOPE-Sc<br>FT/FT | 25% OF Q<br>Sc<br>FT/FT |                  |
| AUXILIARY<br>SPILLWAY ---  |                 | 1.42                    | 6.62                           | 0.016                         | 0.022                   |                  |

Inflow Hyd 1 PSH-Peak = 27.07 CFS at 21.75 hrs., Location Point  
Inflow Hyd 1 FBH-Peak = 431.93 CFS at 15.56 hrs., Location Point  
HYDOUT 1

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

-----

LeRoy B South Dam

0 SUBWATERSHED(S) ANALYZED.

1 STRUCTURE(S) ANALYZED.

2 HYDROGRAPHS ROUTED AT LOWEST SITE.

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

\*\*\*\*\*

SITES.....COMPUTATIONS COMPLETE

| >>>         | SITE<br>ID                | SUBWS<br>ID               | SUBWS DA<br>(SQ MI)   | CURVE<br>NO.       | TC<br>(HRS)          | TOTAL DA<br>(SQ MI)  | TYPE<br>DESIGN            | STRUC<br>CLASS            | <<<         |
|-------------|---------------------------|---------------------------|-----------------------|--------------------|----------------------|----------------------|---------------------------|---------------------------|-------------|
|             | -----                     | -----                     | -----                 | -----              | -----                | -----                | -----                     | -----                     |             |
|             | S 1                       | A                         | 1.88                  | 81.                | 3.33                 | 1.88                 | 378NR                     | A1                        |             |
| PASS<br>NO. | DIA./<br>WIDTH<br>(IN/FT) | AUX.CREST<br>ELEV<br>(FT) | BTM.<br>WIDTH<br>(FT) | MAX.<br>HP<br>(FT) | MAX.<br>ELEV<br>(FT) | EMB.<br>VOL.<br>(CY) | INTEGR.*<br>DIST.<br>(FT) | EXIT*<br>VEL.<br>(FT/SEC) | TYPE<br>HYD |
| -----       | -----                     | -----                     | -----                 | -----              | -----                | -----                | -----                     | -----                     | -----       |
| 1           | 0.0                       | 1743.8                    | 100.0                 | 2.5                | 1746.3               | 0.                   | 0.                        | 4.1                       | MIN. AUX.   |

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

SITES.....SUMMARY TABLE 1 COMPLETED.

NRCS SITES VERSION 2005.1.04 ,01/01/2005  
FILES

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**DROP Inlet**

Project Name: *Beitelspacher*

Computed by: *A. Roman*

Date: *02/28/10*

Checked by: *A. Roman*

Date: *8/2/10*

laDropInlet.xls Ver 1.02

**Input Data**

|                                            |            |        |
|--------------------------------------------|------------|--------|
| Riser Type & Diameter (in)                 | Circular   | 30     |
| Length of Weir Obstruction (ft)            |            | 0.5    |
|                                            |            | 6      |
| Principal Spillway Crest Elev (ft)         |            | 1742   |
| Invert of Barrel Elevation (ft)            |            | 1738   |
| Barrel Orifice Coefficient (C)             |            | 0.6    |
| Pipe Diameter (in)                         |            | 18     |
| Pipe Length (ft)                           |            | 86     |
| Entrance Coefficient 'Ke'                  |            | 1      |
| Mannings 'n-value'                         |            | 0.013  |
| Elbow Elev (if None, Leave 'BLANK')        |            | 1732.2 |
| Length of Outlet ('BLANK' if none)         |            | 20     |
| Outlet Type                                | Cantilever |        |
| Outlet Elevation (ft)                      |            | 1731.2 |
| Tailwater Elev (if unknown, leave 'Blank') |            |        |
| Auxiliary Spillway Elev (ft)               |            | 1743   |
| Maximum Headwater Elev (ft)                |            | 1747   |
| Elev Increment After Full Pipe Flow        |            | 0.5    |

**Basic Output**

|                                                                      |          |
|----------------------------------------------------------------------|----------|
| Full Pipe Flow - Max. Outflow (cfs):                                 | 0.00     |
| Full Pipe Flow - Max. Velocity (fps):                                | 0.00     |
| Useable Weir Length (Ft):                                            | 7.35     |
| Riser Area (Sq Ft):                                                  | 4.91     |
| Barrel Area (Sq Ft):                                                 | 1.77     |
| Kp:                                                                  | 0.018224 |
| Friction Slope (HW at the A.S. Crest):                               | 0.05569  |
| Pipe Slope:                                                          | 0.08822  |
| Outlet Elbow Angle (deg):                                            | 2.0      |
| Maximum Barrel Invert Elevation for avoiding Barrel Orifice Control: | 1733.80  |
| Km:                                                                  | 0.00867  |
| Tailwater Elev Used For Full Pipe Flow:                              | 1732.1   |

**Notes & Warnings**

NOTE: Pipe slope computed to be greater than friction slope - a 5D riser can eliminate flow problems

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

|        |       |        | Outflow, CFS  |                |           |  |       | Structure Outflow, CFS | Controlling Factor |
|--------|-------|--------|---------------|----------------|-----------|--|-------|------------------------|--------------------|
| Elev   | HW Ft | Weir   | Inlet Orifice | Barrel Orifice | Full Pipe |  |       |                        |                    |
| 1742.0 | 0.0   | 0.00   | 0.00          | 15.34          | 23.60     |  | 0.00  | Weir Flow              |                    |
| 1742.1 | 0.1   | 0.72   | 7.47          | 15.57          | 23.71     |  | 0.72  | Weir Flow              |                    |
| 1742.2 | 0.2   | 2.04   | 10.57         | 15.80          | 23.83     |  | 2.04  | Weir Flow              |                    |
| 1742.3 | 0.3   | 3.75   | 12.95         | 16.03          | 23.95     |  | 3.75  | Weir Flow              |                    |
| 1742.4 | 0.4   | 5.77   | 14.95         | 16.26          | 24.07     |  | 5.77  | Weir Flow              |                    |
| 1742.5 | 0.5   | 8.06   | 16.71         | 16.48          | 24.18     |  | 8.06  | Weir Flow              |                    |
| 1742.6 | 0.6   | 10.60  | 18.31         | 16.70          | 24.30     |  | 10.60 | Weir Flow              |                    |
| 1742.7 | 0.7   | 13.35  | 19.77         | 16.91          | 24.42     |  | 13.35 | Weir Flow              |                    |
| 1742.8 | 0.8   | 16.31  | 21.14         | 17.12          | 24.53     |  | 16.31 | Weir Flow              |                    |
| 1742.9 | 0.9   | 19.46  | 22.42         | 17.33          | 24.65     |  | 17.33 | Barrel Orifice         |                    |
| 1743.0 | 1.0   | 22.80  | 23.64         | 17.54          | 24.76     |  | 17.54 | Barrel Orifice         |                    |
| 1743.1 | 1.1   | 26.30  | 24.79         | 17.75          | 24.87     |  | 17.75 | Barrel Orifice         |                    |
| 1743.2 | 1.2   | 29.97  | 25.89         | 17.95          | 24.99     |  | 17.95 | Barrel Orifice         |                    |
| 1743.3 | 1.3   | 33.79  | 26.95         | 18.15          | 25.10     |  | 18.15 | Barrel Orifice         |                    |
| 1743.4 | 1.4   | 37.76  | 27.97         | 18.35          | 25.21     |  | 18.35 | Barrel Orifice         |                    |
| 1743.5 | 1.5   | 41.88  | 28.95         | 18.54          | 25.32     |  | 18.54 | Barrel Orifice         |                    |
| 1743.6 | 1.6   | 46.14  | 29.90         | 18.74          | 25.43     |  | 18.74 | Barrel Orifice         |                    |
| 1743.7 | 1.7   | 50.53  | 30.82         | 18.93          | 25.54     |  | 18.93 | Barrel Orifice         |                    |
| 1743.8 | 1.8   | 55.05  | 31.71         | 19.12          | 25.65     |  | 19.12 | Barrel Orifice         |                    |
| 1743.9 | 1.9   | 59.71  | 32.58         | 19.31          | 25.76     |  | 19.31 | Barrel Orifice         |                    |
| 1744.0 | 2.0   | 64.48  | 33.43         | 19.50          | 25.87     |  | 19.50 | Barrel Orifice         |                    |
| 1744.1 | 2.1   | 69.38  | 34.25         | 19.68          | 25.98     |  | 19.68 | Barrel Orifice         |                    |
| 1744.2 | 2.2   | 74.39  | 35.06         | 19.86          | 26.09     |  | 19.86 | Barrel Orifice         |                    |
| 1744.3 | 2.3   | 79.52  | 35.84         | 20.05          | 26.19     |  | 20.05 | Barrel Orifice         |                    |
| 1744.4 | 2.4   | 84.76  | 36.62         | 20.23          | 26.30     |  | 20.23 | Barrel Orifice         |                    |
| 1744.5 | 2.5   | 90.11  | 37.37         | 20.40          | 26.41     |  | 20.40 | Barrel Orifice         |                    |
| 1744.6 | 2.6   | 95.57  | 38.11         | 20.58          | 26.51     |  | 20.58 | Barrel Orifice         |                    |
| 1744.7 | 2.7   | 101.14 | 38.84         | 20.76          | 26.62     |  | 20.76 | Barrel Orifice         |                    |
| 1744.8 | 2.8   | 106.81 | 39.55         | 20.93          | 26.73     |  | 20.93 | Barrel Orifice         |                    |
| 1744.9 | 2.9   | 112.59 | 40.25         | 21.10          | 26.83     |  | 21.10 | Barrel Orifice         |                    |
| 1745.0 | 3.0   | 118.46 | 40.94         | 21.27          | 26.93     |  | 21.27 | Barrel Orifice         |                    |
| 1745.1 | 3.1   | 124.43 | 41.61         | 21.44          | 27.04     |  | 21.44 | Barrel Orifice         |                    |
| 1745.2 | 3.2   | 130.50 | 42.28         | 21.61          | 27.14     |  | 21.61 | Barrel Orifice         |                    |
| 1745.3 | 3.3   | 136.66 | 42.94         | 21.78          | 27.25     |  | 21.78 | Barrel Orifice         |                    |
| 1745.4 | 3.4   | 142.92 | 43.58         | 21.94          | 27.35     |  | 21.94 | Barrel Orifice         |                    |
| 1745.5 | 3.5   | 149.27 | 44.22         | 22.11          | 27.45     |  | 22.11 | Barrel Orifice         |                    |
| 1745.6 | 3.6   | 155.72 | 44.85         | 22.27          | 27.55     |  | 22.27 | Barrel Orifice         |                    |
| 1745.7 | 3.7   | 162.25 | 45.46         | 22.43          | 27.66     |  | 22.43 | Barrel Orifice         |                    |
| 1745.8 | 3.8   | 168.87 | 46.07         | 22.59          | 27.76     |  | 22.59 | Barrel Orifice         |                    |
| 1745.9 | 3.9   | 175.58 | 46.68         | 22.75          | 27.86     |  | 22.75 | Barrel Orifice         |                    |
| 1746.0 | 4.0   | 182.38 | 47.27         | 22.91          | 27.96     |  | 22.91 | Barrel Orifice         |                    |
| 1746.1 | 4.1   | 189.26 | 47.86         | 23.07          | 28.06     |  | 23.07 | Barrel Orifice         |                    |
| 1746.2 | 4.2   | 196.23 | 48.44         | 23.22          | 28.16     |  | 23.22 | Barrel Orifice         |                    |
| 1746.3 | 4.3   | 203.28 | 49.01         | 23.38          | 28.26     |  | 23.38 | Barrel Orifice         |                    |
| 1746.4 | 4.4   | 210.41 | 49.58         | 23.53          | 28.36     |  | 23.53 | Barrel Orifice         |                    |
| 1746.5 | 4.5   | 217.62 | 50.14         | 23.69          | 28.46     |  | 23.69 | Barrel Orifice         |                    |
| 1746.6 | 4.6   | 224.92 | 50.69         | 23.84          | 28.56     |  | 23.84 | Barrel Orifice         |                    |
| 1746.7 | 4.7   | 232.29 | 51.24         | 23.99          | 28.65     |  | 23.99 | Barrel Orifice         |                    |
| 1746.8 | 4.8   | 239.74 | 51.78         | 24.14          | 28.75     |  | 24.14 | Barrel Orifice         |                    |
| 1746.9 | 4.9   | 247.27 | 52.32         | 24.29          | 28.85     |  | 24.29 | Barrel Orifice         |                    |
| 1747.0 | 5.0   | 254.88 | 52.85         | 24.44          | 28.95     |  | 24.44 | Barrel Orifice         |                    |

Project Name: Beitelspacher Dam

laHoodInlet.xls Ver 1.10

Computed by: A. Roman

Date: 8/2/2010

Checked by: *A. Roman*

Date: 8/2/10

| Computed by: A. Roman                      |                      |              | Outflow, CFS |          |       |              | Structure<br>Outflow,<br>CFS | Controlling<br>Factor |                |
|--------------------------------------------|----------------------|--------------|--------------|----------|-------|--------------|------------------------------|-----------------------|----------------|
| Date: 8/2/2010                             | Checked by: A. Roman | Date: 8/2/10 | Elev         | HW<br>Ft | Weir  | Slug<br>Flow |                              |                       | Full Pipe      |
| Input Data                                 |                      |              | 1738.0       | 0.0      | 0.00  | 0.00         | 20.11                        | 0.00                  | Weir Flow      |
|                                            |                      |              | 1738.1       | 0.1      | 0.15  | 0.00         | 20.28                        | 0.15                  | Weir Flow      |
|                                            |                      |              | 1738.2       | 0.2      | 0.29  | 0.00         | 20.45                        | 0.29                  | Weir Flow      |
|                                            |                      |              | 1738.3       | 0.3      | 0.44  | 0.00         | 20.61                        | 0.44                  | Weir Flow      |
| Principal Spillway Crest Elev (ft)         |                      | 1738         | 1738.4       | 0.4      | 0.72  | 0.00         | 20.78                        | 0.72                  | Weir Flow      |
|                                            |                      |              | 1738.5       | 0.5      | 0.99  | 0.00         | 20.94                        | 0.99                  | Weir Flow      |
| Inside Wall - Type                         |                      | Smooth       | 1738.6       | 0.6      | 1.27  | 0.00         | 21.11                        | 1.27                  | Weir Flow      |
| Pipe Diameter (in)                         |                      | 18           | 1738.7       | 0.7      | 1.62  | 0.00         | 21.27                        | 1.62                  | Weir Flow      |
| Pipe Length (ft)                           |                      | 86           | 1738.8       | 0.8      | 2.00  | 0.00         | 21.43                        | 2.00                  | Weir Flow      |
| Entrance Coefficient 'Ke'                  |                      | 1            | 1738.9       | 0.9      | 2.42  | 0.00         | 21.59                        | 2.42                  | Weir Flow      |
| Mannings 'n-value'                         |                      | 0.01         | 1739.0       | 1.0      | 3.05  | 0.00         | 21.75                        | 3.05                  | Weir Flow      |
| Elbow Elev (if None, Leave 'BLANK')        |                      | 1732.2       | 1739.1       | 1.1      | 3.67  | 0.00         | 21.90                        | 3.67                  | Weir Flow      |
| Length of Outlet ('BLANK' if none)         |                      | 20           | 1739.2       | 1.2      | 4.30  | 0.00         | 22.06                        | 4.30                  | Weir Flow      |
| Outlet Type                                |                      | Cantilever   | 1739.3       | 1.3      | 4.89  | 0.00         | 22.22                        | 4.89                  | Weir Flow      |
| Outlet Elevation (ft)                      |                      | 1731.2       | 1739.4       | 1.4      | 5.47  | 0.00         | 22.37                        | 5.47                  | Weir Flow      |
| Tailwater Elev (if unknown, leave 'Blank') |                      |              | 1739.5       | 1.5      | 6.06  | 0.00         | 22.52                        | 6.06                  | Weir Flow      |
| Auxiliary Spillway Elev (ft)               |                      | 1743.8       | 1739.6       | 1.6      | 6.61  | 1.84         | 22.67                        | 6.61                  | Weir Flow      |
| Maximum Headwater Elev (ft)                |                      | 1747         | 1739.7       | 1.7      | 7.16  | 9.19         | 22.82                        | 9.19                  | Slug Flow      |
| Elev Increment After Full Pipe Flow        |                      | 0.5          | 1739.8       | 1.8      | 7.72  | 16.53        | 22.97                        | 16.53                 | Slug Flow      |
| Basic Output                               |                      |              | 1739.9       | 1.9      | 8.18  | 23.88        | 23.12                        | 23.12                 | Full Pipe Flow |
|                                            |                      |              | 1740.0       | 2.0      | 8.63  | 31.23        | 23.27                        | 23.27                 | 23.27          |
| Full Pipe Flow - Max. Outflow (cfs):       |                      | 31.96        | 1740.5       | 2.5      | 10.93 | 67.97        | 23.99                        | 23.99                 | Full Pipe Flow |
| Full Pipe Flow - Max. Velocity (fps):      |                      | 18.08        | 1741.0       | 3.0      |       |              | 24.70                        | 24.70                 | Full Pipe Flow |
|                                            |                      |              | 1741.5       | 3.5      |       |              | 25.38                        | 25.38                 | Full Pipe Flow |
|                                            |                      |              | 1742.0       | 4.0      |       |              | 26.05                        | 26.05                 | Full Pipe Flow |
| Barrel Area (Sq Ft):                       |                      | 1.77         | 1742.5       | 4.5      |       |              | 26.70                        | 26.70                 | Full Pipe Flow |
| Kp: 0.010784                               |                      |              | 1743.0       | 5.0      |       |              | 27.33                        | 27.33                 | Full Pipe Flow |
| Friction Slope (HW at the A.S. Crest):     |                      | 0.04310      | 1743.5       | 5.5      |       |              | 27.95                        | 27.95                 | Full Pipe Flow |
| Pipe Slope: 0.08822                        |                      |              | 1744.0       | 6.0      |       |              | 28.56                        | 28.56                 | Full Pipe Flow |
| Outlet Elbow Angle (deg):                  |                      | 2.0          | 1744.5       | 6.5      |       |              | 29.15                        | 29.15                 | Full Pipe Flow |
|                                            |                      |              | 1745.0       | 7.0      |       |              | 29.74                        | 29.74                 | Full Pipe Flow |
|                                            |                      |              | 1745.5       | 7.5      |       |              | 30.31                        | 30.31                 | Full Pipe Flow |
| Km: 0.00667                                |                      |              | 1746.0       | 8.0      |       |              | 30.87                        | 30.87                 | Full Pipe Flow |
| Tailwater Elev Used For Full Pipe Flow:    |                      | 1732.1       | 1746.5       | 8.5      |       |              | 31.42                        | 31.42                 | Full Pipe Flow |
|                                            |                      |              | 1747.0       | 9.0      |       |              | 31.96                        | 31.96                 | Full Pipe Flow |

## Notes &amp; Warnings

|                                   |                                |                 |                                 |     |                   |                                       |      |                      |
|-----------------------------------|--------------------------------|-----------------|---------------------------------|-----|-------------------|---------------------------------------|------|----------------------|
| Cooperator                        | Kenoy Beitel's packer Practice |                 | Pond                            | CD  | Walesworth County | Walesworth                            | Date | 4-28-08              |
| Driller/Logger<br>Eng./Technician | Kevin Paulsen / Jon Weidemann  |                 |                                 |     |                   |                                       |      |                      |
| Hole<br>Number                    | Surface<br>Elevation           | Soil            | Legal<br>Description            | Qtr | Sec               | T                                     | R    | Hole<br>Location     |
|                                   | 1800                           | Hh B. Highmoist |                                 | 4   | 32                | 12                                    | 11   | 77W                  |
|                                   |                                | Name            | Depth to Present<br>Water Table | N/A |                   | Depth of Seasonal<br>High Water Table |      | Landform<br>Position |
| Remarks on site:                  |                                |                 |                                 |     |                   |                                       |      |                      |

| Depth,<br>Feet   | Unified<br>Class            | USDA<br>Texture                                          | Munsell<br>Color                    | Moisture<br>Content         | Moist<br>Consistence                                    | %<br>Mortiles            | Field Estimate<br>of<br>Permeability                                    | Geologic<br>Material | Weathered/<br>Unweathered         | Effec-<br>vessence                 | Concen-<br>trations                                                        | Other<br>Features |
|------------------|-----------------------------|----------------------------------------------------------|-------------------------------------|-----------------------------|---------------------------------------------------------|--------------------------|-------------------------------------------------------------------------|----------------------|-----------------------------------|------------------------------------|----------------------------------------------------------------------------|-------------------|
| 0-6              | ML                          | Silt loam                                                |                                     |                             |                                                         |                          | 14-20                                                                   |                      |                                   |                                    |                                                                            |                   |
| 6-11             | CL                          | Silty clay<br>loam                                       | *                                   |                             |                                                         |                          | 16-20                                                                   |                      |                                   |                                    |                                                                            |                   |
| <del>11-16</del> |                             |                                                          |                                     |                             |                                                         |                          |                                                                         |                      |                                   |                                    |                                                                            |                   |
| 10-11            | CL                          | clay                                                     |                                     |                             |                                                         |                          | 10-20                                                                   |                      |                                   |                                    |                                                                            |                   |
|                  |                             |                                                          |                                     |                             |                                                         |                          |                                                                         |                      |                                   |                                    |                                                                            |                   |
|                  |                             |                                                          |                                     |                             |                                                         |                          |                                                                         |                      |                                   |                                    |                                                                            |                   |
| 0-11             | CH                          | clay                                                     |                                     |                             |                                                         |                          | 10-20                                                                   |                      |                                   |                                    |                                                                            |                   |
|                  |                             |                                                          |                                     |                             |                                                         |                          |                                                                         |                      |                                   |                                    |                                                                            |                   |
|                  |                             |                                                          |                                     |                             |                                                         |                          |                                                                         |                      |                                   |                                    |                                                                            |                   |
|                  |                             |                                                          |                                     |                             |                                                         |                          |                                                                         |                      |                                   |                                    |                                                                            |                   |
|                  | Chart<br>(see next<br>page) | C, SC,<br>CL, SiCL,<br>L, SiL, Si,<br>SL, LS, S,<br>etc. | Dominant<br>Matrix<br>Color<br>Name | Dry,<br>Moist,<br>Saturated | Loose,<br>V. friable,<br>Friable,<br>Firm,<br>Very firm | Chart<br>(see next page) | Loess,<br>Glacial till,<br>Silty drift,<br>Outwash,<br>Alluvium<br>etc. |                      | None<br>Weak<br>Strong<br>Violent | Lime<br>Fe & Mn<br>Gypsum,<br>etc. | Shale Chips,<br>Snail Shells,<br>Gravel,<br>Stones,<br>Cracks,<br>Organics |                   |

# Structural Design of Solid Wall, Plastic Pipe

Version 1.0 (1/30/06)

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

By: Angela Roman 7/17/10

*A. Roman 8/2/10*

## Proposed Pipe

|                      |                             |
|----------------------|-----------------------------|
| Description          | 18" PVC DR 25               |
| D <sub>o</sub>       | 18 in                       |
| SDR or SDR?          | SDR 25                      |
| wall thickness, t    | 0.78 in Table 52C-15        |
| E <sub>long</sub>    | 140,000 psi Page 52-12      |
| E <sub>short</sub>   | 400,000 psi Page 52B-25     |
| allow comp stress, σ | 2000 psi (from table 52C-1) |

## Loads

| SOIL                                 |         |       | WHEEL                                            |                 |                        |
|--------------------------------------|---------|-------|--------------------------------------------------|-----------------|------------------------|
| depth of soil cover, h               | 10.9    | ft    | Load class                                       | Field Equipment |                        |
| unit weight of soil, γ <sub>s</sub>  | 125     | psf   | Load, P <sub>L</sub>                             | 10,000          | lb                     |
| water ht. above pipe, h <sub>w</sub> | 0       | ft    | Do-t < 2.67h x 12 ?                              | N/A             | (b14>2, use Eq. 52-22) |
| P <sub>s</sub>                       | 1362.5  | psf   | Impact factor, I <sub>f</sub>                    | 1               |                        |
| W <sub>s</sub>                       | 2043.75 | lb/ft | W <sub>L</sub>                                   | 41              | lb/ft                  |
|                                      |         |       | P <sub>w</sub>                                   | 27              | psf                    |
| VACUUM                               |         |       | Total Load                                       | 1,390           | psf                    |
| P <sub>v</sub>                       | 0       | psf   | P <sub>s</sub> + P <sub>w</sub> + P <sub>v</sub> |                 |                        |
| U <sub>i</sub>                       | 16.44   | in    |                                                  |                 |                        |
| W <sub>v</sub>                       | 0.0     | lb/ft |                                                  |                 |                        |

## 1. Wall Crushing (solid wall pipe)

|                                      |       |                     |                                             |
|--------------------------------------|-------|---------------------|---------------------------------------------|
| Thrust in pipe wall, T <sub>pw</sub> | 1,042 | lb/ft               | <b>Proposed Pipe okay for wall crushing</b> |
| Required wall area, A <sub>pw</sub>  | 0.043 | in <sup>2</sup> /in |                                             |
| Thickness, t                         | 0.78  | in                  |                                             |

## 2. Deflection (solid wall pipe)

|                                       |     |                          |
|---------------------------------------|-----|--------------------------|
| Deflection Lag Factor, D <sub>L</sub> | 1.5 | (varies from 1.0 to 1.5) |
| Bedding Constant, K                   | 0.1 | (generally 0.1)          |
| Modulus of soil reaction, E'          | 200 | (see table 52-2)         |

Using Eq. 52-29 for SDR pipe

|                       |      |   |                                          |
|-----------------------|------|---|------------------------------------------|
| Deflection (% ΔX / D) | 4.57 | % | <b>Proposed Pipe okay for deflection</b> |
| Maximum deflection    | 5.0  | % |                                          |

## 3. Wall Buckling

|                                               |         |                      |
|-----------------------------------------------|---------|----------------------|
| Use E <sub>long</sub> or E <sub>short</sub> ? | E-long  |                      |
| E =                                           | 140,000 | psi                  |
| Factor of Safety, FS                          | 2.5     |                      |
| R <sub>w</sub>                                | 1.0     | ft                   |
| Coeff of elastic support, B'                  | 0.664   |                      |
| Moment of Inertia, I <sub>pw</sub>            | 0.040   | in <sup>4</sup> / in |
| Modulus of soil reaction, E'                  | 200     | psi                  |
| Allowable buckling, q <sub>a</sub>            | 25.40   | psi                  |
| Reduction factor, C                           | 0.66    |                      |
| Adj. allow. Buckling, q <sub>a</sub> C        | 16.89   | psi                  |
| q <sub>a</sub> C                              | 2,432   | psf                  |
| Total pressure, P                             | 1,390   | psf                  |
| <b>Proposed Pipe okay for wall buckling</b>   |         |                      |

## 4. Strain (solid wall pipe)

|                                         |        |                                      |
|-----------------------------------------|--------|--------------------------------------|
| Max strain, flexure, e <sub>f</sub>     | 0.0060 |                                      |
| Max strain, hoop strain, e <sub>h</sub> | 0.0003 |                                      |
| e <sub>h</sub> due to external load?    | Yes    |                                      |
| Max combined strain, e                  | 0.0058 | e = e <sub>f</sub> - e <sub>h</sub>  |
| Allowable strain, e <sub>all</sub>      | 0.05   | <b>Proposed Pipe okay for strain</b> |

## Annual Yield and Sediment Storage

Project: LeRoy Beitelspacher  
Calculations By: Angela Roman 7/16/10  
Checked By: *A. Roman 7/16/10*

### \*\*\*\*\*Annual Surface Yield\*\*\*\*\*

Input Data  
Isogram # = 2  
Curve Number = 81  
Contributing Acres = 1204  
% chance = 50  
runoff = 0.72 inches

$$\frac{\text{Contributing Acres} \times \text{Inches of Runoff}}{12} = \frac{1204 \times 0.72}{12} = 72.2 \text{ ACFT}$$

Storage at Principal Spillway = 79.7 ACFT

### \*\*\*\*\*Sediment Yield\*\*\*\*\*

Input Data  
Erodibility Area = K  
Gross Rate = 0.0086 25%-50% Cultivated  
Drainage Area = 1204  
Delivery Rate = 26 Median  
Design Life = 25

Gross Rate \* Drainage Area \* Delivery Rate \* Years = 67.3 ACFT

Available Sediment Storage = 29.6 years

REF:  
EFM 2-83 Method A

# DRAINAGE DIAPHRAGM LOCATOR

*A-Roman 7/16/10*

| Data Input                          |        |
|-------------------------------------|--------|
| Elev. Invert                        | 1738   |
| Pipe slope (ft/ft)                  | 0.084  |
| Top of Fill                         | 1745.7 |
| SS ratio                            | 3      |
| Dist from invert to ds edge top dam | 28     |
| pipe diam (ft)                      | 1.33   |
| dist from pipe CL to top diaphragm  | 4.7    |
| Diaphragm thickness (ft)            | 2      |

(This solver button doesn't work

X (max dist from invert to U/S diaph.) 36

(PLAY WITH THIS UNTIL b16 AND b17  
ARE EQUAL)

theta 18.43495

1/2 of top of fill to top Diaphragm 2.7215

1.033274

perp dist from to diaph to backslope 2.633861 Adjust X so that these are equal

Elevation of top of Diaphragm 1740.257

Water Permit Application No. 7210-3  
LeRoy Beitelspacher

Top of Dam Elev. - 1746.4  
2nd Spillway Elev. - 1743.8  
P. Spillway Elev. - 1742.0  
D/S Emb. Toe Elev. - 1730.0

Cat. 3. Low Hazard Dam

Ht. = 16.4 ft

Normal Storage Capacity - 79.7 A.-Ft  
Int. Storage Capacity - 121.2  
Max Storage Capacity - 209.2

Int. Capacity x Eff. Ht. =  $121 \times 13.8 = 1669 < 3000 \therefore 25$  year  
Minimum Spillway Design

From USGS WRI 98-4055 "Tech. for Est. Peak Flows ... in SO"  
Region B DA = 1204 Ac = 1.88 mi<sup>2</sup> P<sub>II</sub> = 0.65

$$Q_{95} = 148 CA^{.584} P_{II}^{.730}$$

$$= 148 (1.88)^{.584} (0.65)^{.730}$$

$$= 148 (1.4458) (0.7302)$$

$$= \underline{156 \text{ cfs}}$$

$$Q_{100} = 275 CA^{.625} P_{II}^{.742}$$

$$= 275 (1.88)^{.625} (0.65)^{.742}$$

$$= 275 (1.4837) (0.7264)$$

$$= \underline{296 \text{ cfs}}$$

NRCS Peak Flows =  $Q_{95} = 444 \text{ cfs}$  &  $Q_{100} = 664 \text{ cfs}$

Secondary Spillway Capacity

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

$$= (2.6)(100)(2.6)^{1.5} \quad L = 100$$

$$= \underline{1090 \text{ cfs}} \quad H = 2.6$$

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 - NRCS - OK
9. EPP - N/A Cat 3 - OK

NRCS Annual Field

DA = 1204 Ac. CN = 81 Iso = 2

80% chance = 0.28  
 $0.28 \times 1204^{1/2} = \underline{28 \text{ Ac-Ft}}$

50% chance = 0.70  
 $0.70 \times 1204^{1/2} = \underline{70 \text{ Ac-Ft}}$

10% chance = 2.8  
 $2.8 \times 1204^{1/2} = \underline{280 \text{ Ac-Ft}}$



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
denr.sd.gov

August 25, 2010

Leroy Beitelspacher  
31779 140<sup>th</sup> St.  
Bowdle, SD 57428

Dear Mr. Beitelspacher:

We have reviewed the plans and specifications for your dam project located in the NW ¼ SW ¼ of Sec. 32-T121N-R77W, in Walworth County. The plans and specifications for the project 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. 7210-3 is approved.

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

The Beitelspacher Dam will be classified as a small size Category 3, Low Hazard dam with a dam height of 16 feet and a normal storage capacity of 79.7 acre-feet and a maximum storage capacity of 209 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



**DEPARTMENT of ENVIRONMENT  
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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT  
APPLICATION NO. 7210-3, Leroy Beitelspacher**

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. 7210-3, Leroy Beitelspacher, 31779 140<sup>th</sup> Street, Bowdle SD 57428.

The Chief Engineer is recommending APPROVAL of Application No. 7210-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. Water Permit No. 7210-3 authorizes a dam with a storage capacity of 79.7 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  
August 25, 2010

REPORT ON  
WATER PERMIT APPLICATION NO. 7210-3  
Leroy Beitelspacher  
August 20, 2010

Water Permit Application No. 7210-3 has been filed by Leroy Beitelspacher to impound 79.7 acre-feet of water from runoff by constructing a dam located in the NW  $\frac{1}{4}$  SW  $\frac{1}{4}$  of Section 32-T121N-R77W, in Walworth County. The application also requests impoundment of sufficient water to maintain water to the outlet elevation. The water will be used for fish and wildlife production and livestock water purposes.

Discussion:

The dam will be classified as a small size, Category 3, Low Hazard dam. The dam has been designed by the Natural Resources Conservation Service (NRCS). The plans and specifications have been reviewed and will be approved; however, construction of the dam can not begin until Water Permit Application No. 7210-3 is approved.

The dam will be 16 feet high with a normal storage capacity of 79.7 acre-feet with a reservoir level at the primary spillway elevation, and a maximum storage capacity of 209 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 1204 acres or 1.88 square miles. The dam is designed to have a 30 inch diameter concrete riser with an 18 inch diameter PVC barrel with 4.4 feet of freeboard as the primary spillway, and a 100 foot wide earthcut secondary spillway with 2.6 feet of freeboard. The NRCS used a 25 year frequency event peak runoff of approximately 444 cfs and a 100 year frequency event peak runoff of approximately 644 cfs. The earthcut spillway will have a capacity of approximately 1090 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 28 acre-feet. The annual yield with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 70 acre-feet and the annual yield with a 10 percent chance, or 1 out of 10 years, is expected to be 280 acre-feet.

The Beitelspacher Dam will be located in the NW  $\frac{1}{4}$  SW  $\frac{1}{4}$  of Section 32-T121N-R77W, on a tributary to Swan Creek about 5 miles upstream of the confluence of the tributary and Swan Creek and Lake Oahe on the Missouri River. There are no existing Water Permits located on the unnamed tributary or Swan Creek between the proposed dam and Lake Oahe.

Conclusions:

1. Water Permit Application No. 7210-3 should be approved since unappropriated water is available and approval should not have any adverse effect on existing Water Permits/Rights.
2. If approved, the low flow bypass requirement for domestic use should be a qualification on Water Permit Application No. 7210-3.



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

# Affidavit of Publication

RECEIVED

SEP 21 2010

WATER RIGHTS  
PROGRAM

STATE OF SOUTH DAKOTA

COUNTY OF WALWORTH

I, Donnelle M. Cadotte, having first duly sworn under oath say: The Mobridge Tribune is a legal weekly newspaper of general circulation as required by South Dakota Code of Nineteen Hundred Thirty-Nine, and any acts amendatory thereto, printed and published by the Bridge City Publishing, Inc., in Mobridge, in said county and state, and has been such legal newspaper during the time hereinafter mentioned; that during all of said time as an employee or officer of said newspaper I have had personal knowledge of the facts stated in this affidavit; that the advertisement headed:

Notice of application filed to appropriate water

LeRoy Beitelspacher

a printed copy of which is hereto attached, was printed and published in said newspaper for two successive weeks upon the following dates, to-wit:

September 1<sup>st</sup> and 8<sup>th</sup>, 2010

that the full amount of the fees charged for publishing the same to-wit: the sum of \$46.93, inures solely to the benefit of the publishers of said newspaper; that no agreement or understanding for any division of this sum has been made with any other person; and that no part of said sum has been agreed to be paid to any person whomsoever.

*Donnelle M. Cadotte*

Subscribed and sworn to before me this 9<sup>th</sup> day of September, 2010

*Linda Meyer*

Linda Meyer, Notary Public  
State of South Dakota

My commission expires October 28<sup>th</sup>, 2015

(Seal)



## Application filed to appropriate water

NOTICE OF APPLICATION  
NO. 7210-3 to Appropriate Water  
Notice is given that Leroy Beitelspacher, 31779 140<sup>th</sup> St, Bowdle SD 57428 has filed an application for a water permit to impound 79.7 acre-feet of water from runoff by constructing a dam located in the NW 1/4 SW 1/4 Section 32 with water impounded in the SW 1/4 Section 32; all in T121N-R77W. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.  
Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 7210-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest.

In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol,

Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 20, 2010.

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.  
Published twice at the total approximate cost of \$46.93.

-090110-090810



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
denr.sd.gov

August 26, 2010

Mobridge Tribune  
PO Box 250  
Mobridge SD 57601

ATTENTION: Legal Public Notice

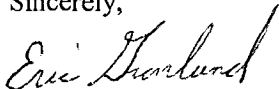
Enclosed is a Notice on Application No. 7210-3 to Appropriate Water to be published twice. Please publish the first notice on September 1, 2010 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

The applicant must verify to you that the notice is to be published, before you make the first publication. **Please BILL the APPLICANT for the cost of publication.** The APPLICANT is LeRoy Beitelspacher, 31779 140<sup>th</sup> St., Bowdle SD 57428 (Ph # 605-285-6171).

**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. 7210-3

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

Date \_\_\_\_\_

We are in receipt of your letter of August 26, 2010 enclosing Notice to Appropriate Water by Application No. 7210-3 which was first published in our issue of \_\_\_\_\_. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Newspaper



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

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

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

August 26, 2010

LeRoy Beitelspacher  
31779 140<sup>th</sup> St  
Bowdle SD 57428

Dear Mr. Beitelspacher:

Water Permit Application No. 7210-3 for fish, wildlife and livestock 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 Mobridge Tribune printed at Mobridge SD (Ph # 605-845-3646). 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 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  
[eric.gronlund@state.sd.us](mailto:eric.gronlund@state.sd.us)

enclosures

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

Instruction to Newspaper - Publish first Notice on September 1, 2010 with the second publication 7 days later. The applicant is responsible for payment. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352 or email: Karen.schlaak@state.sd.us.

---

NOTICE OF APPLICATION NO. 7210-3 to Appropriate Water

Notice is given that Leroy Beitelspacher, 31779 140<sup>th</sup> St, Bowdle SD 57428 has filed an application for a water permit to impound 79.7 acre-feet of water from runoff by constructing a dam located in the NW ¼ SW ¼ Section 32 with water impounded in the SW ¼ Section 32; all in T121N-R77W. This application requests impoundment of sufficient water to maintain water to the outlet elevation. The water is for fish and wildlife propagation and livestock water purposes.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 7210-3 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 20, 2010.

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.

Published twice at the total approximate cost of \_\_\_\_\_.



**DEPARTMENT of ENVIRONMENT  
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denr.sd.gov

**SEP 27 2010**

Leroy Beitelspacher  
31779 140<sup>th</sup> St  
Bowdle SD 57428

Dear Mr. Beitelspacher:

Enclosed is Water Permit No. 7210-3 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

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

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

Sincerely,

A handwritten signature in black ink, appearing to read "Garland Erbele".

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

enclosures

Permit No. 7210-3  
Missouri River - Water District

Contact Person & Address: Leroy Beitelspacher, 31779 140<sup>th</sup> St, Bowdle SD 57428 - 605-281-1450 cell

**Report Of Examination Of Works**

On, 9/25/15, I made a thorough examination of the water use system constructed by Leroy Bietelspacher holder of Permit No. 7210-3, bearing the priority of August 12, 2016 authorizing the storage of 79.7 acre-feet of the waters of surface water for fish and wildlife and livestock water purposes, in Walworth County.

The system is in the following condition good. The point of diversion is located from the SW corner of Sec 32 T121N-R77W; 395 ft E and 2350 ft N with latitude of 45.25308 and a longitude of -100.179908 as determined using GPS. The works are capable of storing 79.7 acre-feet of water which is to be used for fish and wildlife and livestock water. Water has been put to beneficial use to the maximum extent and the license should be issued for 79.7 acre-feet.

**Review of Permit Qualifications And Regulations:**

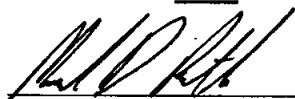
- 1) Special qualifications to permit being abided by yes
- 2) All structures, wells and lands on map yes
- 3) Exceptions to compliance are: none

**Report On the Specifics of the System**

**DAM INFORMATION:**

- |                                              |                                              |
|----------------------------------------------|----------------------------------------------|
| 1) Height to crest <u>16.5</u> feet          | 2) Height to primary spillway <u>12</u> feet |
| 3) Height to secondary spillway <u>13</u> ft | 4) Crest width <u>12</u> feet                |
| 5) Crest length <u>615</u> feet              | 6) Spillway length <u>100</u> feet           |
| 7) Spillway width <u>100</u> feet            | 8) Approx. storage <u>79.7</u> ac-ft         |
| 9) Approx. storage to crest <u>213</u> ac-ft | 10) Date constructed: <u>2011</u>            |
| 11) Outlet tubes:                            |                                              |
| a) diameter <u>18</u> inches                 | b) type <u>pvc</u>                           |
| c) valved <u>no</u>                          | d) valve type <u>na</u>                      |
| e) location on structure <u>center</u>       |                                              |
| 12) Category of Dam <u>3</u>                 | 13) Inspection Sheet Completed <u>no</u>     |

**Comments :** none



Mark D. Rath  
Natural Resources Engineer III  
DENR, Water Rights Program

9-30-15

Date



0 350 700 1,400 2,100 2,800 Feet

*MDR* 9.30.15  
Mark D Rath  
Natural Resources Engineer



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

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[denr.sd.gov](http://denr.sd.gov)

7210-3

OCT 19 2015

Leroy Beitelspacher  
31779 140<sup>th</sup> St  
Bowdle SD 57428

Dear Mr. Beitelspacher:

Enclosed is Water License No. 7210-3. This is the final water right document completing your process of obtaining a Water Right. Included with your license is a map prepared by the staff engineer who conducted the field investigation.

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

Sincerely,

Jeanne Goodman, Chief Engineer  
Water Rights Program  
(605) 773-3352

enclosures

**STATE OF SOUTH DAKOTA  
WATER LICENSE NO. 7210-3**

---

(1) Leroy Beitelspacher, 31779 140<sup>th</sup> St., Bowdle SD 57428 made Application No. 7210-3, August 12, 2010 for a water permit to impound 79.7 acre feet of runoff water in a storage dam located in Walworth County, South Dakota for fish & wildlife propagation and domestic livestock water purposes. Permit No. 7210-3, with a priority date of August 12, 2010 was approved September 20, 2010 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before September 20, 2015 and for the application to beneficial use of said water on or before September 20, 2019.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the storage dam and is entitled to impound 79.7 acre feet of water for beneficial use.

The storage dam (spillway) is located 395 feet east and 2,350 feet north of the SW corner of Section 32, T121N, R77W (NW ¼ SW ¼). The water is impounded in the SW ¼ Section 32, T121N, R77W.

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

(4) Pursuant to South Dakota Water Law 46-5-30.1: Leroy Beitelspacher, 31779 140<sup>th</sup> St., Bowdle SD 57428 the holder and/or owner of Water Right No. 7210-3 is issued a license to appropriate water, the right to impound 79.7 acre feet of water from runoff with a priority date of August 12, 2010 from the location specified in (2) of this license for fish & wildlife propagation and domestic livestock water purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 7210-3 and subject to the following qualifications:

- Water Permit No. 7210-3 authorizes a dam with a storage capacity of 79.7 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
- Low flows as needed for downstream domestic use, including livestock water and prior water rights must be bypassed.

  
\_\_\_\_\_  
Jeanne Goodman, Chief Engineer  
Water Rights Program  
Department of Environment and Natural Resources

OCT 19 2015  
date

